Electronic Supplementary Material

Interventions for oropharyngeal dysphagia in acute and critical care: a systematic review and meta-analysis.

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Appendix A: Electronic database and clinical trial search strategies

Database(s): **Ovid MEDLINE(R) ALL** 1946 to 31 March 2020
Search Strategy:

#	Searches
1	INPATIENTS/
2	"acute inpatient*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
3	"acute hospital*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
4	(tertiary adj5 (care* or setting* or inpatient* or hospital*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5	(acute adj5 (care* or setting* or hospital*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
6	(acute or hyper?acute or sub?acute).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
7	1 or 2 or 3 or 4 or 5 or 6
8	intensive care units/ or burn units/ or coronary care units/ or recovery room/ or respiratory care units/
9	critical care/ or early goal-directed therapy/
10	"intensive care*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11	"critical care*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol

	supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
12	ICU*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
13	Critical Illness/
14	"critical* ill*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15	("critical illness polyneuropath*" or CIP or CIPN or "critical illness polymyopath*").mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
16	((ICU* or "intensive care*") adj5 (musc* adj5 weak*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
17	8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
18	7 or 17
19	(swallow* adj5 (exercise* or therap* or rehab* or train*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
20	"swallow strengthening*".mp.
21	(swallow* adj5 man?euv*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
22	("thermal tactile stimulation*" or TTS).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
23	(diet* adj5 modif*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

24	((fluid* or bolus* or boli) adj5 (viscos* or thick* or rheology*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
25	(head?lift* or shaker* or CTAR* or "chin tuck against resistance*").mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
26	electric stimulation therapy/ or transcutaneous electric nerve stimulation/
27	Electric Stimulation/
28	"neuro?muscular electric* stimulation*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
29	vitalstim*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
30	"pharyn* electric* stimulation*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
31	((expiratory or respiratory) adj5 "muscle strength*").mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
32	EMST*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
33	(("oral pressure*" or tongue*) adj5 (strengthen* or exercis*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
34	("iowa oral performance instrument*" or IOPI*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

35	ELECTROMYOGRAPHY/
36	"surface electromyograph*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
37	biofeedback*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
38	"surface EMG*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
39	(intervention* or treatment* or therap* or rehab*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
40	19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39
41	Deglutition Disorders/
42	(swallow* adj5 (disorder* or dysfunction* or difficult*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
43	dysphagi*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
44	"oro?pharyngeal swallowing*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
45	"oral and pharyngeal swallowing*".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

46	(aspir* adj5 (pneumonia* or food* or feed* or fluid* or silent)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
47	Pneumonia, Aspiration/
48	41 or 42 or 43 or 44 or 45 or 46 or 47
49	Randomized Controlled Trials as Topic/
50	Randomized Controlled Trial/
51	Random Allocation/
52	Double-Blind Method/
53	Single-Blind Method/
54	Clinical Trial/
55	clinical trial, phase i.pt.
56	clinical trial, phase ii.pt.
57	clinical trial, phase iii.pt.
58	clinical trial, phase iv.pt.
59	controlled clinical trial.pt.
60	randomized controlled trial.pt.
61	multicenter study.pt.
62	exp Clinical Trials as Topic/
63	49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62
64	(clinical adj trial*).tw.
65	((singl* or doubl* or trebl* or tripl*) adj (blind* or mask*)).tw.
66	PLACEBOS/
67	placebo*.tw.
68	randomly allocated.tw.
69	(allocated adj2 random*).tw.
70	(quasi?experiment* or quasi?random* or quasi?control*).tw.
71	64 or 65 or 66 or 67 or 68 or 69 or 70
72	63 or 71
73	case report.tw.
74	LETTER/
75	Historical Article/
76	73 or 74 or 75

77	72 not 76
78	18 and 40 and 48 and 77
79	limit 78 to "all adult (19 plus years)"

Cochrane Library (CENTRAL)

#1 MeSH descriptor: [Inpatients] this term only 901

#2 (acute or hyper*acute or sub*acute or tertiary) NEAR/5 (inpatient* or hospital* or care* or setting*) 20948
#3 MeSH descriptor: [Critical Care] this term only 1680
#4 MeSH descriptor: [Intensive Care Units] this term only 2210
#5 "intensive care*" or ICU* 35185
#6 MeSH descriptor: [Critical Illness] this term only 1985
#7 "critical* ill*" or "critical care*" or CIP or SIPN 19974
#8 swallow* NEAR/5 (exercise* or therap* or rehab* or train* or strengthening* or man*euv*) 570
#9 "thermal tactile stimulation*" or TTS 693
#10 diet* NEAR/5 modif* 3171
#11 (fluid* or bolus* or boli) NEAR/5 (viscos* or thick* or rheology*) 317
#12 head*lift* or shaker* or CTAR* or "chin tuck against resistance*" 422
#13 MeSH descriptor: [Electric Stimulation Therapy] this term only 1811
#14 MeSH descriptor: [Transcutaneous Electric Nerve Stimulation] this term only 1057
#15 MeSH descriptor: [Electric Stimulation] this term only 1776
#16 "electric* stimulation*" 3935
#17 vitalstim* 23
#18 (expiratory or respiratory) NEAR/5 "muscle strength*" 872
#19 EMST* 60
#20 ("oral pressure*" or tongue*) NEAR/5 (strengthen* or exercis*) 81
#21 "iowa oral performance instrument*" or IOPI* 72
#22 MeSH descriptor: [Electromyography] this term only 3353
#23 "surface electromyograph*" 8
#24 biofeedback* 3318
#25 "surface EMG*" 364
#26 intervention* or treatment* or therap* or rehab* 1137038
#27 MeSH descriptor: [Deglutition Disorders] this term only 772
#28 swallow* NEAR/5 (dysfunction* or disorder* or difficult*) 1012
#29 dysphagi* 4305
#30 "oro*pharyngeal swallowing*" 2
#31 "oral and pharyngeal swallowing*" 1
#32 aspir* NEAR/5 (pneumonia* or food* or feed* or fluid* or silent) 1855
#33 MeSH descriptor: [Pneumonia, Aspiration] this term only 321
#34 #1 or #2 21725
#35 #3 or #4 or #5 or #6 or #7 48399
#36 #33 or #34 22024

#37 #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 1140882
#38 #27 or #28 or #29 or #30 or #31 or #32 or #33 6589
#39 #36 and #37 and #38 in Trials 350.

EMBASE

#	Searches
1	hospital patient/ or aged hospital patient/
2	"acute inpatient*".mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
3	"acute hospital*".mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
4	(tertiary adj5 (care* or setting* or inpatient* or hospital*)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
5	(acute adj5 (care* or setting* or hospital*)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
6	(acute or hyper?acute or sub?acute).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
7	1 or 2 or 3 or 4 or 5 or 6
8	intensive care unit/ or burn unit/ or coronary care unit/ or medical intensive care unit/ or neurological intensive care unit/ or psychiatric intensive care unit/ or stroke unit/ or surgical intensive care unit/
9	recovery room/
10	"respiratory care unit*".mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
11	intensive care/
12	"critical care*".mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
13	early goal-directed therapy/
14	ICU*.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

15	critical illness/
16	"critical* ill*".mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
17	("critical illness polyneuropath*" or CIP or CIPN or "critical illness polymyopath*").mp.
18	((ICU* or "intensive care*") adj5 (musc* adj5 weak*)).mp.
19	8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18
20	7 or 19
21	(swallow* adj5 (exercise* or therap* or rehab* or train*)).mp.
22	"swallow strengthening*".mp.
23	(swallow* adj5 man?euv*).mp.
24	("thermal tactile stimulation*" or TTS).mp.
25	(diet* adj5 modif*).mp.
26	((fluid* or bolus* or boli) adj5 (viscos* or thick* or rheology*)).mp.
27	(head?lift* or shaker* or CTAR* or "chin tuck against resistance*").mp.
28	electrotherapy/
29	"electric stimulation therap*".mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
30	transcutaneous electrical nerve stimulation/
31	neuromuscular electrical stimulation/
32	vitalstim*.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
33	"pharyn* electric* stimulation*".mp.
34	((expiratory or respiratory) adj5 "muscle strength*").mp.
35	emst*.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
36	(("oral pressure*" or tongue*) adj5 (strengthen* or exercis*)).mp.
37	("iowa oral performance instrument*" or IOPI*).mp.
38	electromyography/
39	"surface electromyograph*".mp.
40	biofeedback/
41	"surface EMG*".mp.
42	(intervention* or treatment* or therap* or rehab*).mp.
43	21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42

44	dysphagia/
45	((deglutition* or swallow*) adj5 (disorder* or dysfunction* or difficult*)).mp.
46	"oro?pharyngeal swallowing*".mp.
47	"oral and pharyngeal swallowing*".mp.
48	pulmonary aspiration/ or aspiration pneumonia/ or food aspiration/ or liquid aspiration/
49	(aspir* adj5 silent).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
50	44 or 45 or 46 or 47 or 48 or 49
51	Clinical Trial/
52	Randomized Controlled Trial/
53	controlled clinical trial/
54	multicenter study/
55	Phase 3 clinical trial/
56	Phase 4 clinical trial/
57	exp RANDOMIZATION/
58	Single Blind Procedure/
59	Double Blind Procedure/
60	Crossover Procedure/
61	placebo/
62	randomi?ed controlled trial$.tw.
63	rct.tw.
64	(random$ adj2 allocat$).tw.
65	single blind$.tw.
66	double blind$.tw.
67	((treble or triple) adj blind$).tw.
68	placebo$.tw.
69	Prospective Study/
70	quasi experimental study/
71	(quasi?experiment* or quasi?random* or quasi?control*).tw.
72	51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71
73	Case Study/
74	case report.tw.

75	abstract report/ or letter/
76	Conference proceeding.pt.
77	Conference abstract.pt.
78	Editorial.pt.
79	Letter.pt.
80	Note.pt.
81	73 or 74 or 75 or 76 or 77 or 78 or 79 or 80
82	72 not 81
83	20 and 43 and 50 and 82
84	limit 83 to (adult <18 to 64 years> or aged <65+ years>)

CINAHL

S71	S67 AND S68 AND S69 AND S70
S70	S65 OR S66
S69	S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64
S68	S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48
S67	S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40
S66	S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18
S65	S1 OR S2 OR S3 OR S4 OR S5 OR S6
S64	TX quasi#experiment* or quasi#random* or quasi#control*
S63	TX allocat* random*
S62	(MH "Quantitative Studies")
S61	(MH "Placebos")
S60	TX placebo*
S59	TX random* allocat*
S58	(MH "Random Assignment")

S57	TX randomi* control* trial*
S56	TX ((singl* n1 blind*) or (singl* n1 mask*))
S55	TX ((doubl* n1 blind*) or (doubl* n1 mask*))
S54	TX ((tripl* n1 blind*) or (tripl* n1 mask*))
S53	trebl* n1 mask*
S52	"trebl* N1 blind*"
S51	TX clinic* n1 trial*
S50	PT Clinical trial
S49	(MH "Clinical Trials+")
S48	(MH "Pneumonia, Aspiration")
S47	aspir* N5 (feed* or fluid* or silent)
S46	aspir* N5 (pneumonia* or food*)
S45	"oral and pharyngeal swallowing*"
S44	"oro#pharyngeal swallowing*"
S43	dysphagi*
S42	swallow* n5 (disorder* or dysfunction* or difficult*)
S41	(MH "Deglutition Disorders")
S40	intervention* or treatment* or therap* or rehab*
S39	"surface emg*"
S38	(MH "Biofeedback")
S37	"surface electromyograph*"
S36	(MH "Electromyography")
S35	""iowa oral performance instrument*" or IOPI*"
S34	("oral pressure*" or tongue*) N5 (strengthen* or exercis*)
S33	EMST*
S32	(expiratory or respiratory) N5 "muscle strength*"
S31	"pharyn* electric* stimulation*"
S30	"vitalstim*"

S29	"neuro#muscular electric* stimulation*"
S28	(MH "Electric Stimulation")
S27	"transcutaneous electric nerve stimulation*"
S26	"electric stimulation therap*"
S25	head#lift* or shaker* or CTAR* or "chin tuck against resistance*"
S24	bol* N5 (viscos* or thick* or rheology*)
S23	fluid* N5 (viscos* or thick* or rheology*)
S22	diet* N5 modif*
S21	"thermal tactile stimulation*" or TTS
S20	swallow* N5 (exercise* or therap* or rehab* or train* or strengthen* or man#euv*)
S19	(MH "Swallowing Therapy")
S18	"intensive care*" N5 "muscle weakness*"
S17	ICU* N5 "muscle weakness*"
S16	"critical illness polyneuropath*" or CIP or CIPN or "critical illness polymyopath*"
S15	(MH "Polyneuropathies")
S14	"critical* ill*"
S13	(MH "Critical Illness")
S12	ICU*
S11	"critical care*"
S10	"intensive care*"
S9	"early goal directed therapy"
S8	(MH "Critical Care")
S7	(MH "Stroke Units") OR (MH "Respiratory Care Units") OR (MH "Post Anesthesia Care Units") OR (MH "Coronary Care Units") OR (MH "Intensive Care Units") OR (MH "Burn Units")
S6	acute or hyper#acute or sub#acute
S5	acute N5 (care* or setting* or hospital*)
S4	tertiary N5 (care* or setting* or inpatient* or hospital*)

S3	(MH "Tertiary Health Care")
S2	"acute inpatient*" or "acute hospital*"
S1	(MH "Inpatients") OR (MH "Stroke Patients") OR (MH "Aged, Hospitalized") OR (MH "Burn Patients") OR (MH "Critically Ill Patients") OR (MH "Cancer Patients") OR (MH "Emergency Patients") OR (MH "Cardiac Patients").

Clinical Trials search strategy

First search (31 March 2020)

intensive care | Interventional Studies | swallowing | Adult

acute | Interventional Studies | swallowing | Adult

intensive care | interventional studies | dysphagia | adult

acute | interventional studies | dysphagia | adult

intensive care | interventional studies | deglutition | adult

acute | interventional studies | deglutition | adult

Second search (31 March 2020)

deglutition and critical care and rehabilitation and adult

deglutition and critical care and therapeutics and adult

deglutition and critical care and intubation and adult

WHO ICTRP search strategy

First search (31 March 2020)

intensive care | Interventional Studies | swallowing | Adult

acute | Interventional Studies | swallowing | Adult

intensive care | interventional studies | dysphagia | adult

acute | interventional studies | dysphagia | adult

intensive care | interventional studies | deglutition | adult

acute | interventional studies | deglutition | adult

Second search (31 March 2020)

deglutition and critical care and rehabilitation and adult

deglutition and critical care and therapeutics and adult

deglutition and critical care and intubation and adult

Web of Science – 31 March 2020

#7	1,321	#6 AND #5 AND #4 AND #3 *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years*
#6	1,476,991	#2 OR #1 *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years*
#5	4,766,279	**TOPIC:** (random* or RCT or RCTs) *OR* **TOPIC:** (controlled NEAR/5 (trial* or stud*)) *OR* **TOPIC:** (clinical* NEAR/5 trial*) *OR* **TOPIC:** ((control or treatment or experiment* or intervention) NEAR/5 (group* or subject* or patient*)) *OR* **TOPIC:** ((control or experiment* or conservative) NEAR/5 (treatment or therapy or procedure or manage*)) *OR* **TOPIC:** ((singl* or doubl* or tripl* or trebl*) NEAR/5 (blind* or mask*)) *OR* **TOPIC:** ((cross-over or cross over or crossover)) *OR* **TOPIC:** ((placebo* or sham)) *OR* **TOPIC:** (trial) *OR* **TOPIC:** (quasi$experiment* or quasi$random* or quasi$control*) *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years*
#4	37,806	**TOPIC:** ((deglutit* or swallow*) near/5 (disorder* or dysfunction* or difficult* or impair*)) *OR* **TOPIC:** (dysphagi*) *OR* **TOPIC:** ("oro$pharyngeal swallowing*") *OR* **TOPIC:** ("oral and pharyngeal swallowing*") *OR* **TOPIC:** (aspir* near/5 (pneumonia* or food* or feed* or fluid* or silent)) *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years*
#3	7,251,586	**TOPIC:** (swallow* near/5 (exercise* or therap* or rehab* or train* or strengthen* or man$euv*)) *OR* **TOPIC:** ("thermal tactile stimulation*" or TTS) *OR* **TOPIC:** (diet* near/5 modif*) *OR* **TOPIC:** ((fluid* or bolus* or boli) near/5 (viscos* or thick* or rheology*)) *OR* **TOPIC:** (head$lift* or shaker* or CTAR* or "chin tuck against resistance*") *OR* **TOPIC:** (electric* near/5 stimulat*) *OR* **TOPIC:** (vitalstim*) *OR* **TOPIC:** ((expiratory or respiratory) near/5 "muscle strength*") *OR* **TOPIC:** (EMST*) *OR* **TOPIC:** (("oral pressure*" or tongue*) near/5 (strengthen* or exercis*)) *OR* **TOPIC:** ("iowa oral performance instrument*" or IOPI*) *OR* **TOPIC:** (electromyograph* or "surface EMG*" or biofeedback*) *OR* **TOPIC:** (intervention* or treatment* or therap* or rehab*) *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years*
#2	236,767	**TOPIC:** ("intensive care*" or ICU*) *OR* **TOPIC:** ("burn unit*" or "coronary care unit*" or "recovery room*" or "respiratory care unit*") *OR* **TOPIC:** ("critical care*" or "critical* ill*") *OR* **TOPIC:** ("critical illness polyneuropath*" or CIP or CIPN or "critical illness polymyopath*") *OR* **TOPIC:** ((ICU* or "intensive care*") near/5 (musc* near/5 weak*)) *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years*
#1	1,296,127	**TOPIC:** (acute near/5 (care* or setting* or hospital* or inpatient*)) *OR* **TOPIC:** (tertiary near/5 (care* or setting* or inpatient* or hospital*)) *OR* **TOPIC:** (acute or hyper$acute or sub$acute) *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years*

Appendix B: Data Extraction Form

Interventions for oropharyngeal dysphagia in acute and critical care.

Study ID:	Lead author:	Reviewer initials:	Date of review:

GENERAL STUDY INFORMATION AND ELIGIBILITY

Title	Authors	Journal / Trial registry	Year / volume / page numbers
RCT Yes / No	Quasi RCT Yes / No	Cross-over RCT Yes / No	Single / Multi centre and length of study

Participants	**Setting**	**Interventions**	**Outcomes**
Adults, 18 years or older Yes □ No □	Acute hospital / acute care setting Yes □ No □	Electrical stimulation □ Respiratory strength training □ Tongue resistance training □ Non-invasive brain stimulation □ Swallow manoeuvre / exercise □ Behavioural interventions □ Texture and fluid modification □ Acupuncture □ Other □	Return to oral diet □ Incidence of aspiration □ Incidence of pneumonia □ Nutritional status □ Adverse incidents □ Health related quality of life □ Length of hospital stay □

Do not proceed if any of the above answers are 'No'. If study to be included in "Excluded Studies" section of the review, please record below the information to be inserted into "Table of excluded studies".

Exclusion reason:

	Intervention Group	**Comparison Group 1**	**Comparison Group 2**
Participants (adults, >18 years)	N =	N =	N =
Age	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:
Gender	Male: N = Female: N =	Male: N = Female: N =	Male: N = Female: N =
Inclusion criteria: (SPECIFIC TO TRIAL)			
Severity of illness scoring used: (e.g. NIHSS, APACHE 2, SOFA,)	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:
Frailty assessment completed:	Yes □ No □	Yes □ No □	Yes □ No □
Frailty score:	Tool used = Mean: SD: Median: IQR:	Tool used = Mean: SD: Median: IQR:	Tool used = Mean: SD: Median: IQR:
Dysphagia severity score: (e.g. DSS, MASA, FOIS)	Tool used = Mean: SD: Median: IQR:	Tool used = Mean: SD: Median: IQR:	Tool used = Mean: SD: Median: IQR:

PARTICIPANTS

NIHSS National Institute of Health Stroke Scale, *APACHE* Acute Physiology and Chronic Health Evaluation II, *SOFA* Sequential Organ Failure Assessment, *DSS* Dysphagia Severity Scale, *MASA* Mann Assessment of Swallowing Ability, *FOIS* Functional Oral Intake Scale, *SD* Standard Deviation, *IQR* interquartile range.

SETTING DETAILS

Country	Type of acute setting	Type of hospital
	Intensive care unit □ High dependency unit □ Acute stroke unit □ Acute hospital ward □ Acute rehabilitation unit □ Other, please specify □	University affiliated □ General hospital □

INTERVENTION DETAILS

(as per TIDieR checklist)

	Intervention Group	**Comparison Group 1**	**Comparison Group 2**
Name and description of intervention			
Intervention materials and procedures.	Intervention materials described Y □ N □ Materials accessible Y □ N □ Intervention procedure & activities described Y □ N □	Intervention materials described Y □ N □ Materials accessible Y □ N □ Intervention procedure & activities described Y □ N □	Intervention materials described Y □ N □ Materials accessible Y □ N □ Intervention procedure & activities described Y □ N □
Mode of delivery	Face to face Y □ N □ Individual Y □ N □ Group Y □ N □	Face to face Y □ N □ Individual Y □ N □ Group Y □ N □	Face to face Y □ N □ Individual Y □ N □ Group Y □ N □
Personnel delivering the intervention; their expertise, background and any specific training given.	SLT □ Nurse □ Healthcare assistant □ Rehab assistant □ Family member □ Other □	SLT □ Nurse □ Healthcare assistant □ Rehab assistant □ Family member □ Other □	SLT □ Nurse □ Healthcare assistant □ Rehab assistant □ Family member □ Other □
Intervention protocol.	Number of sessions included Y □ N □	Number of sessions included Y □ N □	Number of sessions included Y □ N □

Describe the number of times the intervention was delivered and over what time period including their duration.	Session duration included Y □ N □ Intervention time period included Y □ N	Session duration included Y □ N □ Intervention time period included Y □ N □	Session duration included Y □ N □ Intervention time period included Y □ N □
Intervention adaptation.	Adapted / Tailored Y □ N □	Adapted / Tailored Y □ N □	Adapted / Tailored Y □ N □
Intervention modification	Modified Y □ N □	Modified Y □ N □	Modified Y □ N □
Intervention adherence / fidelity.	Adherance assessed Y □ N □	Adherance assessed Y □ N □	Adherance assessed Y □ N □

SAMPLE SIZE

	Intervention Group	**Comparison Group 1**	**Comparison Group 2**
Sample size	Number recruited = Number randomised = Number analysed =	Number recruited = Number randomised = Number analysed =	Number recruited = Number randomised = Number analysed =

OUTCOMES

Table of numeric content.

	Intervention Group	**Comparison Group 1**	**Comparison Group 2**
Primary outcomes Time taken in days from onset of treatment for participants to return to a functional diet (as measured by relevant tool such as FOIS).	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:
Incidence of aspiration as rated by VFS or FEES using PAS	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:
Secondary outcomes Nutritional status as measured by a validated nutrition screening tool (e.g. MUST) or similar as described by authors.	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:
Change in secretion severity as rated by FEES using a validated scale such as NZSS or SRS.	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:
Change in residue severity as rated by VFS or FEES using a validated scale such as YRS.	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:

Adverse events associated with intervention such as patient discomfort, deterioration in swallow function or physiological parameter as per instrumental assessment.	**n / N =**	**n / N =**	**n / N =**
Incidence of pneumonia as measured by the presence of a new or worsening chest X-ray or computed tomography (CT) change consistent with pneumonia in the context of at least two of the following: temperature < 35 °C or > 38 °C; a white cell count of < 4×10^9 / L or > 11×10^9 / L; or purulent tracheal secretions.	**n / N=**	**n / N=**	**n / N=**
Length of hospital stay	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:
Quality of life as measured by a validated dysphagia quality of life scale (e.g. SWALQOL, DHI).	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:	Mean: SD: Median: IQR:

VFS Videofluoroscopy, *FEES* Fibreoptic endoscopic evaluation of swallowing, *PAS* Penetration Aspiration Scale, *NZSS* New Zealand Secretion Scale, *SRS* Secretion rating scale, *YRS* Yale Residue Scale, *MUST* Malnutrition Universal Screening Tool, *SWALQOL* Swallowing Quality of Life Scale, *DHI* Dysphagia Handicap Index.

OUTCOMES

Table of descriptive content

(Four components in each outcome addressed as per SPIRIT 2013 Checklist).

	Intervention group	**Control group 1**	**Control group 2**
Primary outcome Time taken in days from onset of treatment for participants to return to a functional diet (as measured by relevant tool such as FOIS).	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)* Measurement time-point
Incidence of aspiration as rated by VFS or FEES using PAS	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units

	(analysis metric and method of aggregration) Measurement time-point	*(analysis metric and method of aggregration)* Measurement time-point	*(analysis metric and method of aggregration)* Measurement time-point
Secondary outcomes Nutritional status as measured by a validated nutrition screening tool (e.g. MUST) or similar as described by authors.	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point
Change in secretion severity as rated by FEES using a validated scale such as NZSS or SRS.	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point

Change in residue severity as rated by VFS or FEES using a validated scale such as YRS.	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point
Adverse events associated with intervention such as patient discomfort, deterioration in swallow function or physiological parameter as per instrumental assessment.	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregration)* Measurement time-point
Incidence of pneumonia as measured by the presence of a new or worsening chest X-ray or computed tomography (CT) change consistent with pneumonia in the context of at	Reported / Not reported Definition provided Y/N *(specific measurement variable)*	Reported / Not reported Definition provided Y/N *(specific measurement variable)*	Reported / Not reported Definition provided Y/N *(specific measurement variable)*

least two of the following: temperature < 35 °C or > 38 °C; a white cell count of < 4 × 10^9 / L or > 11×10^9 / L; or purulent tracheal secretions.	Measurement units *(analysis metric and method of aggregation)* Measurement time-point	Measurement units *(analysis metric and method of aggregation)* Measurement time-point	Measurement units *(analysis metric and method of aggregation)* Measurement time-point
Length of hospital stay	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)* Measurement time-point	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)* Measurement time-point
Quality of life as measured by a validated dysphagia quality of life scale (e.g. SWALQOL, DHI).	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)*	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)*	Reported / Not reported Definition provided Y/N *(specific measurement variable)* Measurement units *(analysis metric and method of aggregation)*

	Measurement time-point	Measurement time-point	Measurement time-point

METHODOLOGICAL QUALITY

Please refer to Cochrane Risk of Bias Table for additional details.

Domain	Description	Reviewer's judgment
Sequence generation	Method used for sequence generation:	Was the allocation sequence adequately generated to avoid selection bias? Yes / No / Unclear
Allocation concealment	Methods used to conceal allocation to group:	Was allocation adequately concealed to prevent selection bias? Yes / No / Unclear
Blinding of participants & personnel	Description of measures used to prevent study participants and personnel from knowledge of the intervention group assigned and effectiveness of these measures, if known:	Was knowledge of the allocated intervention adequately prevented during the study? Yes / No / Unclear
Blinding of outcome assessors	Description of any measures used to prevent knowledge of the assigned intervention by the outcome assessors and effectiveness, if known:	Was knowledge of the allocated intervention by outcome assessors adequately prevented? Yes / No / Unclear

Incomplete outcome data	Description of the completeness of outcome data and reporting of attrition and exclusions:	Were incomplete outcome data adequately addressed? Yes / No / Unclear
Selective outcome reporting	Consider time lag to publication; language; duplicate publication; citation reporting; outcome reporting.	Are reports of the study free of suggestion of selective outcome reporting? Yes / No / Unclear
Other sources of bias	Description:	Is the study free from other sources of bias? Yes / No / Unclear

Appendix C: Intervention descriptions of included studies using TIDieR[19]

Bath et al 2016 [27]

TIDieR item number	Item descriptor	Item
1	Brief name	Pharyngeal electrical stimulation, Phagenyx, Phagenesis Ltd., Manchester, UK.
2	Why	Using this approach in patients with subacute stroke in a randomized dose-comparison trial, PES reduced radiological aspiration. An individual patient data meta-analysis of these 3 trials found that PES significantly reduced aspiration and dysphagia and was safe and well tolerated
3	What materials & procedures	Sterile single-patient use treatment catheters which contain an inner lumen for feeding, were inserted via the nose by trained staff. The catheter was inserted to an aboral depth related to the patient's height so that the pair of ring treatment electrodes located on the outer surface of the catheter were adjacent to the pharynx. Treatment was started once dysphagia was confirmed by videofluoroscopy. At each session, the catheter was connected to the controlling base station, and electric current at 5 Hz was increased incrementally from 1 mA to detect threshold
4	Expertise / training of intervention providers	Staff were trained to pass catheter trans nasally but details of this training was not provided. No details given on expertise, professional background or training received by personnel delivering PES treatment.
5	Mode of delivery	Face to face and individual
6	Where	Acute stroke unit in UK hospitals.
7	When and how much	10 minutes daily over 3 consecutive days
8	Tailoring of the intervention	At each session, the catheter was connected to the controlling base station, and electric current at 5 Hz was increased incrementally from 1 mA to detect threshold (patient first aware of stimulation) and then tolerated (patient does not want current increased further) intensity levels in all patients.

9	Modifications of intervention during study	No intervention modification described in study or stated explicitly that this was assessed.
10	Planned adherence assessment	An assessment of adherance was not planned for in this study.
11	Actual adherence	9/87 did not receive allocated intervention.

Carnaby et al 2006 [28]

TIDieR item number	Item descriptor	Item
1	Brief name	Behavioural intervention included indirect behavioural strategies (eg, modification of food consistency) and direct behavioural strategies (eg, stimulation of oral and pharyngeal structures).
2	Why	The primary aim of this study was to ascertain whether a standard behavioural intervention for swallowing dysfunction after stroke, given by a speech pathologist for up to a month after stroke, could improve swallowing function, as measured by the proportion of patients returning to a normal (pre stroke) diet by 6 months after stroke, compared with usual care in hospital.
3	What materials and procedures	Standard low-intensity swallowing therapy was composed of swallowing compensation strategies, mainly environmental modifications (eg, upright positioning for feeding); safe swallowing advice (eg,reduced rate of eating); and appropriate dietary modification. The choice of specific swallowing compensation strategies was directed by the findings of the clinical swallowing examination and videofluoroscopy (at baseline and atfollow up, if necessary). Standard high-intensity swallowing therapy consisted of direct swallowing exercises (eg, effortful swallowing, supraglottic swallow technique) and appropriate dietary modification, under the direction of the study speech pathologist,
4	Expertise / training of intervention providers	Study SLTs delivered either low or high intensity swallowing treatment. Details of their expertise and training were not given.
5	Mode of delivery	Face to face and on individual basis

6	Where	Acute stroke unit in acute hospital setting.
7	When and how much	Standard low-intensity treatment was given three times per week for a month, or for the duration of the hospital stay (if less than a month). Both high and low intensity sessions lasted 24 minutes each. The average time period for delivery of high-intensity treatment was 11 days. The average time period for delivery of low-intensity treatment was 16.7 days. The average number of sessions of high intensity delivered was 11.6. The average number of sessions of low-intensity delivered was 7.8.
8	Tailoring of the intervention	Yes. The choice of swallow compensatory strategies and choice of swallow exercises in low and high intensity groups respectively was directed by clinical and videofluoroscopy findings of each individual patient.
9	Modifications of intervention during study	This was not stated in the study
10	Planned adherence assessment	Planned assessment of adherance not stated in this study
11	Actual adherence	188/204 completed the intervention.

Chen et al 2016 [29]

TIDieR item number	Item descriptor	Item
1	Brief name	Acupuncture
2	Why	Some studies showed positive but limited effectiveness of acupuncture as an adjunct treatment to conventional swallowing rehabilitation.
3	What materials & procedures	All patients received conventional stroke rehabilitation including normal limb posture, passive exercises on hemiplegic side, Bobath technique, neuromuscular electrical stimulation and swallow training for dysphagia. Acupuncture points in scalp involved two to three needles penetrating top midline, the motor region and sensory region of the lesioned side. Acupuncture points for dysphagia were added: GB20 (Fenchi), EX-HN14

		(Yiming), BL10 (Tianzhu), GV16 (Fengfu), Gongzue (1 cm below GB20) and CV23 (Lianquan).
4	Expertise / training of intervention providers	The acupuncture was performed by three acupuncture doctors who have a master degree with more than five years of clinical experience, and had been trained previously to perform the same protocols
5	Mode of delivery	Face to face assumed but not clearly stated in study.
6	Where	Acute hospital setting
7	When and how much	The rehabilitation program (including physiotherapy and occupational therapy for two hours per day, six days per week) for each participant was developed by the rehabilitation team according to the investigator's brochure. The acupuncture group also received additional thirty minutes of acupuncture therapy as bedside treatment, six days per week for three weeks (eighteen total sessions).
8	Tailoring of the intervention	This was not stated in study.
9	Modifications of intervention during study	The study did not state that the intervention was modified.
10	Planned adherence assessment	No formal assessment of intervention adherance was stated in this study.
11	Actual adherence	120/125 completed this intervention

Du et al 2016 [30]

TIDieR item number	Item descriptor	Item
1	Brief name	Repetitive transcranial magnetic stimulation (rTMS) is a safe, painless, and non-invasive method of stimulation for modulating cortical excitability
2	Why	Studies have found that rTMS over the swallowing motor cortex induced the excitability of direct corticobulbar projections to the swallowing muscles, thereby enhancing swallowing functions. However, few studies have compared the effects of high-frequency versus low-frequency stimulation on dysphagia patients after stroke.
3	What materials and procedures	Patients seated and electromyography recordings (Danteckeypiont, Skovlunde, Denmark) from mylohyoid

		muscles were detected using two pairs of surface electrodes placed submentally. All magnetic stimulations were carried out using a MagPro X100 Stimulator (MagVenture company, Farum, Denmark) with a figure of 8 coil. Single pulse TMS was applied to both hemispheres separately in order to measure cortical excitability and motor evoked potential for each patient.
4	Expertise / training of intervention providers	Stimulation was performed by one investigator but not details provided of their professional background, expertise or specific training.
5	Mode of delivery	Individual and face to face.
6	Where	Acute hospital ward
7	When and how much	Each patient received rTMS daily for 5 consecutive days. Patients in the high-frequency stimulation group received 3-Hz rTMS for 10 s, with an inter-train interval of 10 s, and 40 trains with a total of 1200 pulses at 90% rMT on the affected hemisphere. For low-frequency stimulation, patients received 1-Hz rTMS for 30 s, with an inter-train interval of 2 s, and 40 trains with a total of 1200 pulses at 100% rMT on the unaffected hemisphere. The coil was oriented at an angle of approximately 45°over the ‘‘hot spot” of the hemisphere in the 3-Hz and 1-Hz rTMS groups.
8	Tailoring of the intervention	Single-pulse TMS was applied to both hemispheres separately in order to measure cortical excitability (resting motor threshold (rMT) and the motor evoked potential (MEP)) for each patient. The coil was first located at the vertex of cranium, then positioned2–4 cm anteriorly and 4–6 cm laterally, and moved around in this region to obtain the highest MEP recording to locate the mylohyoid cortical area of hemisphere (Hamdy et al., 1996). The location yielding the highest MEP recording was termed ‘‘hot spot,” and we delivered magnetic stimulation to that point. Then, single-pulse TMS was delivered to the ‘‘hot spot,” decreasing in steps of2% of the stimulator output.
9	Modifications of intervention during study	There was no modification to the intervention described in the study
10	Planned adherence assessment	No assessment of intervention adherance was detailed in study

11	Actual adherence	All completed intervention but 2/ 28 were lost to follow up analysis post intervention.

Dziewas et al 2018 [31]

TIDieR item number	Item descriptor	Item
1	Brief name	Pharyngeal electrical stimulation (PES).
2	Why	PES is a novel technique shown to enhance reorganisation of the swallow-related motor cortex, to facilitate activation of corticobulbar pathways, and to increase salivary levels of substance P (a neurotransmitter involved in the control of swallowing).
3	What materials and procedures	For the study intervention (PES), we used a commercial device (Phagenyx, Phagenesis Ltd, Manchester, UK), which comprises a nasogastric feeding catheter that houses stimulation ring-electrodes and a computerised base station that delivers stimulation in the range 1–50 mA at 5 Hz. In all patients, the stimulation catheter was placed before randomisation. The catheter was inserted via the nose to an aboral depth related to the patient's height so that the pair of treatment ring electrodes located on the outer surface of the catheter were adjacent to the pharynx. A coloured zone on the outer catheter surface and visible at the nares also aided correct placement and easy confirmation of correct electrode depth.
4	Expertise / training of intervention providers	This information was not provided in this study
5	Mode of delivery	Face to face on an individual level.
6	Where	Neurological intensive care unit, Germany.
7	When and how much	In all patients, PES or sham stimulation was given on three consecutive days for 10 min each day
8	Tailoring of the intervention	The current intensity (mA) at which PES treatment was delivered was individually adjusted and optimised at every session by the health-care worker interacting with the touchscreen on the base station in response to patient responses. This treatment optimisation procedure involved increasing the current intensity incrementally from 1 mA to

		detect the perceptual threshold (i.e. patient first aware of stimulation) and then to the maximum tolerated threshold (i.e. patient no longer wants the current to be increased further) intensity levels three-times each. Thereafter, the optimal treatment intensity was automatically calculated by the base station with the use of average values of the three trials according to the formula PT+0·75×(MTT–PT
9	Modifications of intervention during study	The intervention was not modified and this was not clearly stated in study
10	Planned adherence assessment	It was not clearly stated in study that adherance assessment was planned or strategies used to maintain fidelity.
11	Actual adherence	100% adherance to PES as evidenced by full number of patients analysed for primary outcome.

Guillan-Sola et al 2017 [32] (Respiratory Muscle Strength Training)

TIDieR item number	Item descriptor	Item
1	Brief name	This intervention, aimed at strengthening respiratory muscles, might improve cough effectiveness and reduce aspiration risk.
2	Why	Respiratory muscle training is another therapeu-tic strategy to be considered in patients with dys-phagia. As impaired cough function in stroke is related to respiratory muscle weakness,8 an inter-vention aimed to strengthen respiratory muscles might improve cough effectiveness and reduce aspiration risk. Two randomized clinical trials dem-onstrated significant improvement in inspiratory muscle strength and other physiologic parameters after inspiratory muscle training.9,10 Some studies have suggested that expiratory muscle strength training can improve respiratory function in patients with Parkinson disease, and also improve swallow-ing function and avoid chest infections. a randomized controlled trial was designed to assess the thera-peutic effectiveness of neuromuscular electrical stimulation and of inspiratory and expiratory mus-cle training in dysphagic subacute stroke patients, compared to standard swallow therapy. A second objective was to

		evaluate their potential influence on the occurrence of respiratory complications at 3-month follow-up
3	What materials and procedures	All three groups received standard swal-low therapy, which consisted of an educational intervention aimed to improve self-management of dysphagia and protect the airway, oral exer-cises to improve lingual praxis, and compensatory techniques based on videofluoroscopic findings. These swallowing manoeuvres, oral exercises, and compensatory techniques were individualized according to intrinsic patient characteristics.Additionally, Group II received respiratory training sessions
4	Expertise / training of intervention providers	Speech and Language Therapist. No details of expertise or specific training were given in study.
5	Mode of delivery	Face to face and on an individual basis
6	Where	Acute stroke unit in acute hospital
7	When and how much	5 sets of 10 respirations followed by 1 minute of unloaded recovery breathing off the device (Orygen Dual Valve®, Forumed SL, Barcelona, Catalonia, Spain),18 twice a day, 5 days per week for 3 weeks, with the assistance of a therapist. Patients in this group also received 1 hour a day of standard swallowing therapy as detailed in procedures section, five days a week for 3 weeks.
8	Tailoring of the intervention	Training loads were set at a pressure equivalent to 30% of maxi-mal inspiratory and expiratory pressures and increased weekly at intervals of 10 cmH2O
9	Modifications of intervention during study	Intervention was not modified
10	Planned adherence assessment	No planned assessment of adherance was described in study
11	Actual adherence	16 of the 20 patients randomised to this group completed full intervention protocol

Guillan-Sola 2017 [32] (Neuromuscular electrical stimulation)

TIDieR item number	Item descriptor	Item
1	Brief name	Neuromuscular electrical stimulation using the Intelect VitalStim device (VitalStim®, Chattanooga Group, Hixson, TN, USA).
2	Why	Neuromuscular electrical stimulation aims to improve the strength of muscle groups that were disabled by stroke but preserved motor innervation. The available studies observed contradictory results, with some authors reporting that sensory and motor stimulation of peripheral nerves can accelerate swallowing recovery
3	What materials and procedures	All three groups received standard swallow therapy, which consisted of an educational intervention aimed to improve self-management of dysphagia and protect the airway, oral exercises to improve lingual praxis, and compensatory techniques based on videofluoroscopic findings. These swallowing manoeuvres, oral exercises, and compensatory techniques were individualized according to intrinsic patient characteristics. In addition to standard swallow therapy, Group III received sham respiratory muscle training, with the workloads fixed at 10 cmH2O throughout the 3-week-intervention period, and neuromuscular electrical stimulation using the Intelect VitalStim device
4	Expertise / training of intervention providers	Speech and Language Therapist. No details of expertise or specific training were given in study.
5	Mode of delivery	Face to face and on an individual basis
6	Where	Acute stroke unit, acute hospital ward.
7	When and how much	Under supervision by a speech-lan-guage therapist, two electrodes were placed on suprahyoid muscles in 40-minute daily sessions (5 days per week for 3 weeks) and 80 Hz of transcuta-neous electrical stimulus was applied, according to VitalStim® instructions; patients were instructed to swallow when they felt muscle contraction. Patients in this group also received 1 hour a day of standard swallowing therapy as detailed in procedures section, five days a week for 3 weeks.
8	Tailoring of the intervention	No intervention adaptation or description of same in this study

9	Modifications of intervention during study	Intervention was not modified
10	Planned adherence assessment	No planned assessment of adherance was described in study
11	Actual adherence	19/21 patients randomised to this experimental group completed full intervention protocol

Huang et al 2014 [33]

TIDieR item number	Item descriptor	Item
1	Brief name	Neuromuscular electrical stimulation using the Intelect VitalStim device (VitalStim®, Chattanooga Group, Hixson, TN, USA).
2	Why	This therapy bypasses the injured central swallowing circuitries such as stroke and delivers an electrical current via electrodes that are placed on the neck muscles to create a contraction of the swallowing muscles.
3	What materials and procedures	Each patient's anterior neck skin was cleaned using an alcohol swab to remove sub-stances that might interfere with the electrode contact, and the 2 sets of electrodes were placed on the patients' anterior neck. The placement of the dual-channel electrodes was located in 1 vertical line with channel 1 above the thyroid notch and channel 2 below the thyroid notch. The VitalStim therapeutic device, which consists of a dual channel with 2 bipolar electrodes for each channel. The parameters of electrical stimulator are a pulse width of 700ms, frequency of 80 Hz, and wave amplitude of 0-25 mA.
4	Expertise / training of intervention providers	A licensed physiatrist with 10 years of clinical experience and certified training in using the VitalStim electrical stimulator administered the NMES.
5	Mode of delivery	Face to face and on an individual basis is assumed as no group therapy is stated.
6	Where	Acute hospital ward

7	When and how much	Patients were treated 3 times per week (60 minutes per session), and 10 sessions of NMES were performed per patient.
8	Tailoring of the intervention	The wave amplitude of the treatment was set according tothe patient's tolerance level, and it gradually increased ina stepwise increment of .5 mA from 0 mA until the patientfelt a tingling sensation on the neck and a muscle contrac-tion. The tolerance wave amplitude was different amongindividuals. The current intensity of the electrical stimu-lation was determined and fixed during the treatmentsession.
9	Modifications of intervention during study	No modification stated in this study
10	Planned adherence assessment	This study did not state a planned assessment of adherance was in place
11	Actual adherence	100% adherance assumed as all partipants completed intervention and were included in final analysis

Hwang et al 2007 [34]

TIDieR item number	Item descriptor	Item
1	Brief name	Pre-emptive swallowing stimulation consisted of thermal tactile stimulation, oral stimulation, oral massage, digital manipulation and a cervical range of motion exercise
2	Why	Regular pre-emptive swallowing stimulation could potentially prevent or decrease loss of proprioception, muscle atrophy and changes of mechanoreceptors or chemoreceptors in the oropharynx, thus assisting in the recovery of swallowing function following extubation.
3	What materials and procedures	Thermal tactile stimulation 1) Chill laryngoscope2) Open patient's mouth wide and stroke the right side of the anterior palatal arch five times with thelaryngoscope3) Similarly, stroke the left side of the anterior palatal arch five times with the laryngoscope. Oral stimulation

		1) Stimulate the tongue gently with a gauze or brush 2) Stroke the middle and both sides of the tongue 3) Stroke the roof of the oral cavity gently4) Repeat for 1 minute. Oral massage 1) After donning gloves, place the second finger into the oral cavity, with the thumb outside 2) Massage both lips with traction 3) Massage both cheeks similarly 4) Repeat for 1minute. Digital manipulation 1) Place the thumb and second finger around the thyroid 2) Stroke the upper portion of hyoid bone to below the thyroid cartilage up and down forcefully 3) Repeat five times 4) Stroke the muscles around neck downward 10 times. Cervical range of motion exercise 1) Flex the neck of the patient toward the chest and then extend the neck2) Bend the neck of the patient to the right side until the patient's ear is in contact with the shoulder3) Repeat on the left side4) Rotate the neck of the patient to fully to the right and then to the left 5) Open the patient's mouth as wide as possible and massage the tympanomandibular joints 6) Repeat this five times.
4	Expertise / training of intervention providers	Only one occupational therapist performed the pre-emptive swallowing stimulation.
5	Mode of delivery	Face to face at patient's bedside
6	Where	In general medical / surgical intensive care unit
7	When and how much	Patients in the experimental group received this pre-emptive swallowing stimulation for 15 minutes twice daily, six days per week, in a semi-suppine position with the back rest at 30-45 degrees from the third day after intubation until video-fluoroscopy.
8	Tailoring of the intervention	Not stated in the study
9	Modifications of intervention during study	Not stated in the study
10	Planned adherence assessment	Not stated in the study
11	Actual adherence	All participants completed intervention.

Jayaskeran et al 2010 [35]

TIDieR item number	Item descriptor	Item
1	Brief name	Pharyngeal electrical stimulation
2	Why	It has been shown that pharyngeal electrical stimulation (PES) using swallowed intraluminal electrodes can enhance the excitability and organization of human pharyngeal motor cortex
3	What materials and procedures	Sub-jects swallowed a 3.2-mm–diameter intraluminal catheter (Gaeltec, Ltd, Dunvegan, Isle of Skye, UK), either trans-nasally or transorally, depending on their preference. The catheter housed a pair of bipolar platinum ring electrodes, approximately 1 cm apart in a rostrocaudal orientation, that were positioned in the pharynx. The pharyngeal catheter also was used to deliver electrical stimulation. Electrical stimulation of the pharynx was performed using the pharyngeal electromyography catheter described previously, which was connected to an electrical stimulator (model DS7; Digitimer,Ltd, Welwyn–Garden City, Herts, UK) via a trigger generator (Digitimer model DL2). Pharyngeal electrical stimuli (0.2-ms pulses, 280 V) was delivered at a set frequency (5 Hz), intensity (75% of maximal tolerated), and duration (10 minutes) as reported by Fraser
4	Expertise / training of intervention providers	This was not included in this stud
5	Mode of delivery	Face to face and on individual basis assumed as this intervention has been delivered at patient's bedside in other PES studies but not clearly stated in study.
6	Where	Acute stroke unit, acute hospital setting.
7	When and how much	Within 24 hours after videofluoroscopy, subjects in the active group received bedside PES once daily for 3 consecutive days
8	Tailoring of the intervention	The maximum tolerated PES intensity was predetermined from each participant’s first perceived sensation and pain threshold (the point when the pharyngeal sensation became uncomfortable), which were calculated from an average of 3 trials.

9	Modifications of intervention during study	No modification of intervention stated in study.
10	Planned adherence assessment	Planned adherance assessment not completed in this study
11	Actual adherence	16/17 randomised participants completed intervention and post intervention analysis.

Kumar et al 2011[36]

TIDieR item number	Item descriptor	Item
1	Brief name	Transcranial direct current stimulation (TDCS).
2	Why	TDCS is a non invasive brain stimulation technique that utilizes weak direct current to produce shifts in neuronal excitability and can be combined with swallowing exercises. It has been shown to improve motor functions in chronic stroke patients. More recently, investigators have shown that application of anodal tDCS to the pharyngeal motor cortex in healthy human subjects increases pharyngeal excitability in an intensity-dependent manner.
3	What materials and procedures	Using the international 10- to 20-EEG electrode system for guidance, a saline-soaked anodal electrode was placed over the undamaged hemisphere, mid-distance betweenC3 and T3 on the left or C4 and T4 on the right, with a reference electrode over the contralateral supraorbital region. This montage was expected to generate maximal current density over the inferior sensorimotor cortex and the neighbouring premotor brain regions critical for reorganization of the swallowing motor cortex. We confirmed the location of the stimulating electrode and its proximity to the targeted regions by co-registering it with high-resolution T1-weighted MRI scans. A DOSS score was obtained immediately before stimulation sessions (DOSS-pre) and after the fifth session (DOSS-post).The tDCS/sham was applied in conjunction with standardized swallowing maneuvers to provide adequate sensory and motor activation of the swallowing cortex. All participants sucked on a lemon-flavored lollipop during these sessions. Patients reporting dryness of mouth were provided with 1 to 2 small

		ice chips intermittently. Patients were instructed to "swallow hard" every 30 seconds, thereby generating approximately 60 effortful swallows during each session. We used gesticulations to encourage aphasic patients to swallow at regular intervals. Occurrence of a swallow response was assessed by observing the movement of the thyroid cartilage or by palpating its excursion in patients with thicker necks
4	Expertise / training of intervention providers	Not clearly stated in study
5	Mode of delivery	Face to face on an individual basis
6	Where	Acute hospital setting.
7	When and how much	tDCS (2 mA for 30 minutes) was applied daily to the non lesional hemisphere for 5 consecutive days. The tDCS was delivered through a battery-driven constant current stimulator (Phoresor; Iomed, Salt Lake City, UT), with the following electrode dimensions: 35 cm for the anode and 56 cm for the reference electrode.
8	Tailoring of the intervention	Intervention was not adapted
9	Modifications of intervention during study	Intervention was not modified
10	Planned adherence assessment	Adherance was assessed and was 100%
11	Actual adherence	100% adherance with the intervention was recorded

Li et al 2018 [37]

TIDieR item number	Item descriptor	Item
1	Brief name	Vital stim, (Neuromuscular electrical stimulation), Chattanooga Group, Hixson, Tennessee, USA.
2	Why	Electrical stimulation has been reported as a treatment for pharyngeal dysphagia. It uses surface electrodes to contract local muscles by delivering electrical stimulation to depolarise nerve fibres.
3	What materials and procedures	The skin of the anterior neck was cleaned with 70% isopropyl alcohol cotton. Two sets of

		electrodes were used. The top set was placed in the submental region between the anterior belly of the digastric muscle and the hyoid bone, and the hyoid bone and thyroid cartilage. The bottom set was placed on the skin between the thyroid cartilage and cricoid cartilage and below the cricoid cartilage. We stimlated the muscles responsible for swallowing, such as the digastric muscle, mylohyoid and thyrohyoid. NMES carries possible risks, including laryngospasm, arrhythmia, hypotension, glottic closure and burns. We explained the possible adverse effects to the patients before treatment and we closely observed and recorded every treatment session. The vital stim device cycles automatically from 'on' to 'off' to 'on' again for 1 second every minute. Because the change in stimulation is ramped, this cycling process takes up to 4 seconds, the therapy sessions they were not swallowing. The traditional swallowing therapy included basic training and direct food intake training. The basic training referred to indirect training of organs related to food intake and swallowing. Direct food intake training involved several aspects including food intake environment, body posture for swallowing and remove of pharyngeal food residue. Direct food intake training was used primarily for mild dysphagia.
4	Expertise / training of intervention providers	Vital stim therapy was delivered by an occupational therapist. The expertise or details of specific training were not provided in this study.
5	Mode of delivery	Face to face and on an individual basis.
6	Where	Patient's bedside in acute hospital ward
7	When and how much	Therapy sessions were 1 hour long, delivered daily x 5 per week x 4 weeks
8	Tailoring of the intervention	A sensory threshold for each participant had to be identified. Amplitude of the electrical current level was approx 7 mili Amps

9	Modifications of intervention during study	No modification of the intervention detailed in this study
10	Planned adherence assessment	Study did not state that an assessment of intervention adherance was planned.
11	Actual adherence	38/45 completed intervention and completed post treatment assessments.

Moon et al 2017 [38]

TIDieR item number	Item descriptor	Item
1	Brief name	Expiratory muscle strength training (EMST)
2	Why	Although EMST is a potential remedial approach for swallowing disorder, it has only been investigated in the elderly and in patients with Parkinson's disease and Huntington's disease. Therefore, in this study, acute stroke patients with dysphagia were monitored and examined to determine the effects of EMST.
3	What materials and procedures	The experimental group was trained using the EMST 150 (Aspire Products LLC., USA). First, patients were provided with a mouthpiece to blow into, after which the nasal cavity was closed using forceps. The personal maximal expiratory pressure (MEP) was then measured using a manometer. A threshold value of 70%, it based on the personal MEP. The training consisted of taking a deep breath and biting a mouthpiece, during which time the patient was told to blow faster and stronger. Each patient received seven trainings per session, five times a week for four weeks. Breaks of 30 seconds were provided after one session
4	Expertise / training of intervention providers	All swallowing treatments were carried out by the responsible therapists (Occupational therapists). No further information on expertise, background or specific training.
5	Mode of delivery	Face to face and on an individual basis
6	Where	Acute hospital setting
7	When and how much	All participants performed traditional swallowing rehabilitation therapy in 30 minute sessions five times a week for four weeks. Expiratory muscle strength training was only provided to the experimental group in 30 minute

		sessions. Traditional swallowing treatment was composed of orofacial exercises, thermal-tactile stimulation, the Mendelson maneuver, effortful swallow, and supraglottic maneuver. All swallowing treatments were carried out by the responsible therapists.
8	Tailoring of the intervention	The personal maximal expiratory pressure (MEP) was then measured using a manometer. Wheeler et al. were trained with a threshold value of 70%, it based on the personal MEP11).
9	Modifications of intervention during study	The intervention was not modified during this study
10	Planned adherence assessment	Adherance was not formally assessed or this assessment documented in study.
11	Actual adherence	100% of all patients in both groups completed treatments as per information in results section.

Moon et al 2018 [39]

TIDieR item number	Item descriptor	Item
1	Brief name	Tongue palate resistance training using an Iowa Oral Performance Instrument.
2	Why	Tongue strength training has been shown to be more effective when it is accompanied by accuracy training compared with tongue strength training alone. Tongue pressure strength and accuracy training (TPSAT) improves not only tongue strength but also bolus control within the mouth. The tongue and its pressure generate intraoral cavity pressure that transports the bolus from the oral cavity to the pharynx, affecting the oral transit time during the swallowing process. According to previous research, an increase in the tongue–palate pressure during swallowing enhances the generation of pharyngeal pressures. Considering these aspects, the generation of tongue–palate pressure may play an important role in the establishment of the overall swallowing strength
3	What materials and procedures	The traditional dysphagia therapy consisted of thermal tactile stimulation, the Mendelsohn maneuver, effortful

		swallow, and diet modification. PSAT consisted of an anterior and posterior isometric tongue strength exercise and an isometric tongue accuracy exercise. For the anterior isometric tongue strength exercise, participants were instructed to use the tongue tip to press on the air-filled bulb of the posterior portion of the alveolar arch of the tongue; for the posterior isometric tongue strength exercise, participants were instructed to use the middle portion of the tongue to press on the air-filled bulb of the middle portion of the hard palate.
4	Expertise / training of intervention providers	Dysphagia therapy was performed by an occupational therapist with 6 years of experience with dysphagia management
5	Mode of delivery	Face to face and on an individual basis
6	Where	Acute hospital setting
7	When and how much	The TPSAT group underwent TPSAT for 30 min in the morning and traditional dysphagia therapy for 30 min in the afternoon five times per week for 8 weeks. The protocol involved five sets of tongue-to-palate presses, with six repetitions per set for each session.
8	Tailoring of the intervention	As for the isometric tongue accuracy exercise, amplitudes were set at 50, 75, and 100% of the maximum pressure measured during the first isometric strength exercise in the session for each bulb location by the occupational therapist.
9	Modifications of intervention during study	No modification to the intervention was stated in the study.
10	Planned adherence assessment	Study did not state adherance was formally assessed.
11	Actual adherence	80% adherance. 2 drop outs accounted for in results following randomisation.

Park et al 2013 [40]

TIDieR item number	Item descriptor	Item
1	Brief name	Repetitive transmagnetic stimulation (RTMS)

2	Why	Studies have found that rTMS over the swallowing motor cortex induced the excitability of direct corticobulbar projections to the swallowing muscles, thereby enhancing swallowing functions.
3	What materials and procedures	Patients seated in chair and 3mm pharyngeal catheter inserted nasally and pair of surface electrodes placed on intact side of thenar muscle and connected with electromyography device and EMG signal obtained. Cranial vertex identified and marked on scalp. The pharyngeal and adjacent thenar motor hot spots were determined by discharging magnetic stimulator at supra threshold intensities over intact cortices to identify site evoking the greatest pharyngeal response and subsequent co localised thenar response.
4	Expertise / training of intervention providers	Not stated in study
5	Mode of delivery	Face to face with individual patients.
6	Where	Acute hospital setting
7	When and how much	rTMS was given for 10 minutes every weekday for 2 weeks. A session consisted of ten trains of 10 trains of 5Hz stimulation each lasting 10s and then repeated every minute given through a 70mm figure of eight coil positioned over pharyngeal hot spot of the intact hemisphere. Intensity of stimulation set at 90% of the thenar motor threshold for the same hemisphere.
8	Tailoring of the intervention	Not stated in study
9	Modifications of intervention during study	Not stated in study
10	Planned adherence assessment	Not stated in study
11	Actual adherence	100% adherence to treatment

Park et al 2018 [41]

TIDieR item number	**Item descriptor**	**Item**

1	Brief name	Chin Tuck against Resistance (CTAR) (ISO-CTAR Device, Alternative Speech and Swallowing Solutions) A method of training the suprahyoid muscles by placing an elastic rubber ball with resistance on the chin and sternum, and then tucking the chin against the resistance has been proposed.
2	Why	The results of performing CTAR in normal adults demonstrate increased activation of the suprahyoid muscles involved in swallowing.
3	What materials and procedures	The experimental group performed CTAR using a CTAR device in a sitting position on a chair. Isometric and isotonic exercises were performed separately. In isometric CTAR, the patients are asked to chin tuck against device 3 times for 60 s with no repetition. In isotonic CTAR, the patient performs 30 consecutive repetitions by strongly pressing against the resistance of the device and releasing it again. To perform the CTAR correctly, the therapist explained and demonstrated the exercise methods to all patients before the intervention. We especially emphasized on the correct chin tuck posture, so that the patients do not flex their heads against the devices. We also instructed them to press as strongly as possible for greater activation of the suprahyoid muscles. Both groups received the same conventional dysphagia treatment such as orofacial muscle exercises, thermal tactile stimulation, and therapeutic or compensatory manoeuvres.
4	Expertise / training of intervention providers	All interventions were performed by an occupational therapist with 7 years of clinical experience in treating dysphagia.
5	Mode of delivery	Face to face and on an individual basis
6	Where	Acute hospital setting
7	When and how much	An experienced occupational therapist performed the CTAR in all participants for 30 min/day, five days a week, for 4 weeks. Isometric and isotonic exercises using CTAR were performed separately. In isometric CTAR, the patients are asked to chin tuck against device 3 times for 60 s with no repetition. In isotonic CTAR, the patient performs 30 consecutive repetitions by strongly pressing against the resistance of the device and releasing it again.

8	Tailoring of the intervention	The study did not clearly state that the intervention was adapted.
9	Modifications of intervention during study	The study did not clearly state that the intervention was modified
10	Planned adherence assessment	The study did not state it planned to assess adherance. Flowchart with study numbers were included.
11	Actual adherence	11/13 participants completed intervention and data used in final analysis

Park 2019 [42]

TIDieR item number	Item descriptor	Item
1	Brief name	Effortful swallowing training (EST)
2	Why	Studies report EST improves tongue strength and induces activation of suprahyoid muscles, the main muscles in pharyngeal phase of swallowing.
3	What materials and procedures	During effortful swallowing training patients were asked to push the tongue firmly onto the palate, while squeezing the neck muscles and swallow as forcefully as possible. Effortful swallowing was confirmed by therapist through visual observation and palpation during this exercise.
4	Expertise / training of intervention providers	Occupational Therapist delivering the intervention had seven years experience delivering dysphagia treatments. Specific training was not stipulated.
5	Mode of delivery	Face to face and individual.
6	Where	Acute stroke unit in South Korea.
7	When and how much	Effortful swallowing training was performed 10 times per session, 3 sessions per day, 5 days per week for 4 weeks. It was combined with traditional swallowing exercises as per control group in the study.
8	Tailoring of the intervention	This was not reported in the study
9	Modifications of intervention during study	The intervention was not modified
10	Planned adherence assessment	Adherance to the intervention was reported as complete. No detail of who assessed or if any strategies were used to maintain or improve fidelity were given.

11	Actual adherence	12/15 patients in each experimental arm finished the study.

Suntrup et al 2015 [43]

TIDieR item number	Item descriptor	Item
1	Brief name	Pharyngeal electrical stimulation. This intervention is a novel neuro stimulation treatment for dysphagia that triggers neuro plastic reorganisation of swallowing control.
2	Why	Electrical pharyngeal stimulation (EPS) has been shown to improve swallowing function and in particular decrease airway aspiration in acute stroke patients
3	What materials and procedures	Stimulation was delivered via the Phagenyx catheter system and base station (Phagenesis Ltd, UK). The system consists of a nasogastric feeding tube housing a pair of bipolar titanium ring electrodes with a distance of 10 mm in between. The electrodes were positioned in the middle pharynx. Correct positioning of the electrodes was visually confirmed by fiberoptic endoscopic evaluation of swallowing. The catheter was connected to the base station to deliver stimuli of 0.2 ms pulse duration at a frequency of 5 Hz with 280 V, which had previously been found to be the most effective stimulation parameters
4	Expertise / training of intervention providers	Not clearly stated in study
5	Mode of delivery	Face to face and individual
6	Where	Neurological intensive care unit, Germany.
7	When and how much	In the treatment condition stimulation was afterwards delivered for a total of 10 min at this intensity, The intervention was repeated daily for three consecutive days. The stimulation catheter remained in place over this period of time and was used as a regular feeding tube between treatment sessions
8	Tailoring of the intervention	Yes intervention was tailored to patients. The current intensity (mA) was individually adjusted in every session. Therefore prior to the actual intervention the perceptual threshold (PT) and the maximum tolerated threshold (MTT) were determined repeatedly by slowly increasing the current. The average values of three trials were taken into

		account for the calculation of the optimal stimulation intensity. Thresholds as well as calculated optimal stimulation intensities were documented at each session.
9	Modifications of intervention during study	The intervention was not modified
10	Planned adherence assessment	Adherance to the intervention was reported as complete. No detail of who assessed or if any strategies were used to maintain or improve fidelity were given.
11	Actual adherence	All recruited patients finished the study. All participants in experimental arm were analysed post treatment. 100% adherence

Suntrup-Kreugar 2018 [44]

TIDieR item number	Item descriptor	Item
1	Brief name	Transcranial direct current stimulation (Tdcs) was delivered by a battery-driven constant current stimulator (Neuro Conn, Ilmenau, Germany)
2	Why	TDCS promotes brain plasticity by tonic stimulation with weak direct currents, with evidence now available that anodal tDCS is able to excite the pharyngeal motor cortex
3	What materials and procedures	If the patient's condition allowed, swallowing exercises (dry swallows, effortful swallows, administration of fluids or pudding, depending on the patient's swallowing abilities) were performed during stimulation. Patients not able to perform any swallowing exercises were asked to stay relaxed with their eyes open. Whether swallowing training was performed during tDCS was documented. Stimulation was delivered by a battery-driven constant current stimulator through a pair of conductive-rubber electrodes in saline-soaked sponges. As previously described, we positioned the center of the anode approximately 3.5cm lateral and 1cm anterior to the vertex with its long axis parallel to the central sulcus to cover the center of the motor cortical swallowing network. The reference electrode had a larger size to diminish its functional effect and was placed over the contralateral orbit

4	Expertise / training of intervention providers	No details on personnel delivering the intervention, their training or expertise given.
5	Mode of delivery	Face to face and on an individual level assumed as no group therapy described, so individual sessions assumed.
6	Where	Acute hospital ward
7	When and how much	Anodal tDCS was performed at 1mA for 20 minutes, once daily on 4 consecutive days. If the patient's condition allowed, swallowing exercises (dry swallows, effortful swallows, administration of fluids or pudding, depending on the patient's swallowing abilities) were performed during stimulation. Patients not able to perform any swallowing exercises were asked to stay relaxed with their eyes open. Whether swallowing training was performed during tDCS was documented.
8	Tailoring of the intervention	Not stated in this study
9	Modifications of intervention during study	Not stated in this study
10	Planned adherence assessment	No formal adherance assessment was described in the study.
11	Actual adherence	1 drop out from randomised population.

Vasant et al 2016 [45]

TIDieR item number	Item descriptor	Item
1	Brief name	Pharyngeal electrical stimulation as described in detail in materials and procedures section.
2	Why	Intraluminal pharyngeal electrical stimulation (PES) is one such neuro stimulation technique that has been shown to promote this type of plasticity in healthy individuals and achieve measurable improvements in swallowing function in dysphagic stroke patients.
3	What materials and procedures	Based on previous pharyngeal electrode placement experience in clinically dysphagic patients, the intraluminal pharyngeal "stimulation" catheter (Gaeltec, Dunvegan, Isle of Skye, UK) was inserted either orally or nasally (depending on patient preference) such that its bipolar

		electrodes were secured at the mid pharyngeal level (17 cm from the nasal flare or 15 cm aboral). The catheter was connected to a stimulator (Model DS7; Digitimer, Welwyn-Garden City, Herts, UK) via a trigger generator (Neurolog System, Digitimer), and stimuli were delivered (0.2 ms pulses, maximum 280 V) at the previously defined optimal parameters (5 Hz frequency and an intensity [current] 75% of the maximum.
4	Expertise / training of intervention providers	Interventions were delivered by a trained researcher independent of the clinical team.
5	Mode of delivery	Face to face and individual basis as at patient's bedside in hospital for treatment.
6	Where	Acute stroke unit in acute hospital setting
7	When and how much	Group 1 received 3 sessions of PES for 10 minutes on 3 consecutive day. Both groups continued to receive standard swallowing treatments as decided by Speech and Language of the respective hospital
8	Tailoring of the intervention	The maximum tolerated intensity was determined from each patient's perception and pain thresholds; these values were calculated from an average of 3 consecutive measurements on each of the 3 days
9	Modifications of intervention during study	No modification to intervention stated in this study.
10	Planned adherence assessment	No planned adherance assessment was described in the study
11	Actual adherence	Of the 14 patients who actually received active PES, only 1 patient received suboptimal stimulation (2 doses), whereas the rest received all 3 doses. 14/18 randomised received PES, 4 drop outs: 2 normal swallows, 2 withdrew consent.

Wu et al 2011 [46]

TIDieR item number	Item descriptor	Item
1	Brief name	Acupuncture
2	Why	Some studies showed positive but limited effectiveness of acupuncture as an adjunct treatment to conventional swallowing rehabilitation.

3	What materials and procedures	Patient seated in supine position. A 35mm and 40 mm acupuncture needle penetrates the acupuncture point of Lianquan towards the pharynx. Twist quickly for one minute (frequency 120 per minute) and pull out needle. Needling depth is about 0.8inches. Re-acupuncture to point of Fengchi towards the laryngeal prominence. Needling depth is about 1.2 inches. Yifeng toward to the prominentia laryngea. Needling depth is about 1.2 inches. Renying: penetrate the skin directly with needling depth of 1.0 inches. After twisting needles for one minute, using SDZ-II therapeutic apparatus to stimulate the acupuncture points, choosing discontinuous wave, the frequency is 15-20Hz and the stimulus intensity is 5mA.
4	Expertise / training of intervention providers	Training and expertise of personnel delivering intervention was not stated in study.
5	Mode of delivery	Presumed on an individual basis though not explicitly stated in study
6	Where	Acute hospital setting
7	When and how much	All needles in position for 30 minutes except the Lanquan point. Treatment given once a day, 5 treatments a week for four weeks.
8	Tailoring of the intervention	Not stated in study
9	Modifications of intervention during study	Not stated in study
10	Planned adherence assessment	Not stated in study
11	Actual adherence	6 drop outs from totally of 229 patients in study.

Xia et al 2011 [47]

TIDieR item number	Item descriptor	Item
1	Brief name	Neuromuscular electrical stimulation using the Intelect VitalStim device (VitalStim®, Chattanooga Group, Hixson, TN, USA).
2	Why	This therapy bypasses the injured central swallowing circuitries such as stroke and delivers an electrical current

		via electrodes that are placed on the neck muscles to create a contraction of the swallowing muscles.
3	What materials and procedures	Vital stim system contains two direction square waves with wave width being 700 us, frequency 80Hz and wave amplitude 0-25mili amps. Electrode position and treatment mode selected according to videofluoroscopy scores, patient's tolerance and condition.
4	Expertise / training of intervention providers	All therapy performed by experienced Speech and Language Therapists blinded to the experimental design.
5	Mode of delivery	Face to face and individual
6	Where	Acute hospital setting
7	When and how much	Treatment administered twice a day, lasting 30 minutes each time, 5 days a week for 4 successive weeks.
8	Tailoring of the intervention	Yes as depended on results of videofluoroscopy assessment as to which electrode placement and treatment mode was selected.
9	Modifications of intervention during study	Not stated in the study
10	Planned adherence assessment	Not stated in the study
11	Actual adherence	100% adherance assumed as all participants included in final analysis.

Yang et al 2012 [48]

TIDieR item number	Item descriptor	Item
1	Brief name	Transcranial direct current stimulation (TDCS), a form of non-invasive brain stimulation, is reported to improve motor function after stroke. It modulates cortical excitabillity in a polarity dependent manner, it increases cortical excitability by depolarising resting membrane potential. It can be combined with various types of rehabilitation training.
2	Why	In this study we tested the hypothesis that anodal tDCS over the affected hemisphere, combined with swallow training in patients with post-stroke dysphagia, might elicit greater improvements in swallowing function than sham stimulation.

3	What materials and procedures	Anodal tDCS, the direct current was increased to 1 mA incrementally over several seconds and maintained for 20 mins in anodal tDCS. A saline soaked electrode was placed over the patient's scalp of the affected hemisphere in the region, which was reported to induce maximal pharyngeal response (anterior 4.6cm and lateral 6.15cm from vertex in right hemisphere stimulation; anterior 4cm and lateral 7.1m in left hemisphere with a reference electrode over the contralateral supraorbital region. The electrodes were secured using adjustable straps placed around the head.
4	Expertise / training of intervention providers	Two trained therapists administered swallow training. tDCS and sham was administered by investigators who did not participate in outcome assessments. The professional background, expertise or relevant training of these personnel was not stated in the study.
5	Mode of delivery	Face to face and on an individual level.
6	Where	Acute hospital setting.
7	When and how much	All subjects received 10 intervention sessions (five per week for 2 weeks) of tDCS during conventional swallow training. tDCS was administered at the beginning of 20 mins with swallow training and then swallow training alone continued for the remaining 10 mins. Swallow training included compensatory strategies such as diet modification, positioning, behavioural manouevres including Menelsohn manouevre, supraglottic and effortful swallowing. Indirect therapies included physical manouevre such as oral motor exercise and thermal tactile stimulation. The anodal tDCS was delivered to affected hemisphere.
8	Tailoring of the intervention	No tailoring of the intervention appeared necessary or was described in this study.
9	Modifications of intervention during study	The intervention was not modified or stated to have been modified.
10	Planned adherence assessment	Planned assessment of adherance to the intervention was not stated in this study
11	Actual adherence	100% adherance to the experimental intervention by all 9 participants in this group.

Appendix D: Outcome reporting as per SPIRIT [23]

Time to return to oral intake	Definition provided	Measurement units	Time-point
Hwang et al [34]	No	Days	Post treatment

Secondary outcomes

Aspiration incidence post treatment	Definition provided	Measurement units (analysis metric and method of aggregation)	Time-point
Guillan-Sola et al [32]	Oral food, fluids or saliva entering below level of vocal cords into trachea and not be expelled out of larynx	Penetration aspiration score >5 on 1-8 scale	3 months
Park et al [40]	Graded patients who aspirated as grade 3.	Penetration aspiration score on 1-8 scale used	2 weeks
Huang et al [33]	As above	Penetration aspiration score > 5 on 1-8 scale	Not defined
Yang et al [48]	As above	Penetration aspiration score > 5 on 1-8 scale	3 months

Pneumonia incidence	Definition provided	Measurement units (analysis metric and method of aggregration)	Time-point
Bath et al [27]	Chest infection or pneumonia diagnosed in local participating units	Number of events	Post randomisation
Dziewas et al [31]	Pneumonia but no definition given for this diagnosis in study.	Number of events	Day 30
Jayasekeran et al [35]	Lower respiratory tract infection defined as clinically diagnosed chest infection requiring either oral or intravenous antibiotics.	Number of events	During hospital admission
Vasant et al [45]	Chest infection but no definition given for this diagnosis.	Number of events	2 months after randomisation
Suntrup-Kreugar et al [44]	Pneumonia diagnosed by treating physician	Number of events	During hospital admission
Guillen-Sola et al [32]	Respiratory complications defined as presence of lung infections shown on chest x-ray or by fever or abnormal respiratory signs according to information obtained from medical report and telephone interview at follow up	Number of events	3 months

Carnaby et al [28]	Chest infection defined at least 3 of: fever > 38C; productive cough; abnormal respiratory exam; arterial hypoxaemia; culture of relevant pathogen; positive chest radiograph	Number of events	6 months
Hwang et al [34]	Aspiration pneumonia but no definition for this diagnosis provided in study	Number of events	Not defined

Quality of life	Definition provided	Measurement units (analysis metric and method of aggregration)	Time-point
Moon et al [39]	Eating duration & desire, symptom frequency, food selection, communicaton, fear, mental health, social, fatique and sleep	Swallowing-related quality of life scale score	Post intervention, time-point not defined.
Wu et al [46]	As above	Swallowing related quality of life scale score	Post intervention, time-point not defined
Xia et al [47]	As above	Swallowing-related quality of life scale score	Post intervention, time-point not defined.

Length of hospital stay	Definition provided	Measurement units (analysis metric and method of aggregation)	Time-point
Bath et al [27]	Time of admission to discharge period	Days	At discharge from hospital
Suntrup et al [43]	Time of treatment to discharge	Days	At discharge from hospital
Suntrup-Kreugar et al [44]	Time in hospital	Days	Not defined
Carnaby et al [28]	Not defined	Days	No defined
Vasant [45]	Randomisation to hospital discharge	Days	At discharge from hospital

Pharyngeal residue severity	Definition provided	Measurement units (analysis metric and method of aggregration)	Time-point
Moon et al [38]	Pharyngeal residue defined by 4 grades: Grade 0=no residue Grade 1= 25% or less Grade 2 = 25-50% Grade 3 = > 50% residue	Residue severity graded during videofluoroscopy using Eisenhuber et al rating [59]	Post 4 week intervention period. Exact time-point post intervention not defined.
Park et al [41]	No definition provided	Functional Dysphagia Scale [58] Sub-score in this assessment for rating pharyngeal residue severity during videofluoroscopy.	Post 4 week intervention period. Exact time-point post intervention not defined.
Park et al [40]	Residue graded using 4 levels of severity in VDS during videofluoroscopy	Videofluoroscopic Dysphagia Scale (VDS) [60]	Week 2 and week 4 post treatment

		No residue = 0 <10% residue = 2 10-50% = 4 >50% = 6	
Park et al [42]	No definition provided in publication	Videofluoroscopic Dysphagia Scale (VDS) [60]	Baseline and at 4 weeks (immediately post treatment)

Intervention-related adverse events	Definition provided	Measurement units (analysis metric and method of aggregration)	Time-point
Du et al [30]	Defined as transient headaches or tingling sensation in the head	Number of events per participant	Following first treatment session
Dziewas et al [31]	Medical device complication	Number of events per participant	Time-point not defined

Nutritional status	Definition provided	Measurement units	Time-point
Bath et al [27]	Blood albumin level	Measured grams / per litre	2, 6 and 12 weeks post treatment

Appendix E: Summary of characteristics of included studies

Author and publication year	Methods	Participants	Summary of intervention tested	Summary of usual care	Key outcomes
Bath 2016 [27] Multi-centre trial UK	• RCT • Computerised randomisation • Blinded outcome assessors	N= 162 Mean age 74 years Inclusion: Videofluoroscopy confirmed dysphagia Exclusion: Dysphagia history, advanced dementia, implanted cardiac device or pacemaker, distorted oropharyngeal anatomy, pregnant.	Pharyngeal electrical stimulation Treatment protocol: 10 minutes pharyngeal electrical stimulation over 3 consecutive days and standard stroke rehabilitation (no specific description provided)	Sham stimulation (3 sessions x 10 minutes) and standard swallowing therapy	Primary: Change in penetration-aspiration scores at 2 weeks post treatment. Secondary: Safety outcomes, clinical dysphagia, dependency, activities of daily living, quality of life, nutritional measures). Follow-up: 12 weeks
Carnaby [28] US & Australia	• RCT • 3 arm study • Computerised randomisation • Blinded outcome assessors • Intention to treat analysis	(N=306) Mean age: 71 years Baseline characteristics similar Inclusion: Clinical & videofluoroscopy evidence of dysphagia, enrol within 2 weeks of stroke onset Exclusion: Previous dysphagia therapy, head and neck surgery, inability to consent	Standard swallowing therapy involving exercises such as supraglottic, effortful and Mendelssohn (data combined in this review as similar interventions)	Mealtime supervision, safe feeding guidance, referral to speech / language therapy service if deemed appropriate by medical practitioner.	Time to return to normal diet (6 month time point) Aspiration pneumonia Dysphagia (PHADscore < 85). Follow-up timepoint: 6 months
Chen 2016 [29] Multi-centre trial China	• RCT • Random number generation • Blinded outcome assessors	(N= 250 participants) Mean age: 63 years Baseline characteristics similar Inclusion:	Acupuncture and conventional stroke rehabilitation 3 week duration	Conventional stroke rehabilitation including 'swallow training for dysphagia' (part of 2 hour physio and occupational	Primary: National Institute of Stroke Severity Scale Index Secondary: motor function, rate of recovery

		Acute stroke within 2-7 days, clinical & videofluoroscopy evidence of dysphagia. Exclusion: Inability to complete cognitive / swallow assessments, posterior circulation infarct, receiving thrombolytics, involved in other clinical trial in previous 3 months		therapy rehabilitation x 6 days per week x 3 weeks)	based on bedside swallow assessment, videofluoroscopy, Mini-mental state exam, Montreal Cogntive Assessment
Du 2016 [30] Single centre study China	• RCT • 3 arm study • Sealed envelopes • Blinded outcome assessors	(N=40) Mean age 58.5years Baseline characteristics similar between groups Inclusion: Within 2 months of stroke onset confirmed by imaging, clinical evidence of dysphagia Exclusion: other neurological disease, severe aphasia or cognitive impairment, contraindications for transcranial magnetic stimulation	Repetitive transmagnetic stimulation, 2 experimental groups, (1 Hz & 3 Hz intensity). Treatment duration: 5 consecutive days. Length of treatment session not stipulated in study. (Data combined in this review as similar interventions)	Sham stimulation	Swallow function score using Standardised Swallowing Assessment, Modified Rankin score, measures of mylohyoid motor evoked potentials Follow up time-point: 3 months
Dziewas 2018 [31] Multinational study Germany The Netherlands Austria Italy UK	• RCT followed by open label study • Computerised randomisation • Blinded outcome assessors • Full reporting of outcomes	(N=69) Mean age 64 years No baseline differences between groups Inclusion: Participants had severe dysphagia following acute stroke precluding tracheostomy decannulation Exclusion:	Pharyngeal electrical stimulation Treatment: 10 minutes stimulation x 3 consecutive days	Sham stimulation Treatment: 10 minutes sham-stimulation x 3 consecutive days	Primary: time to decannulation post intervention Secondary: swallow function, severity of stroke, length of stay and adverse events.

		Infratentorial stroke, pre-existing dysphagia, presence of cardiac pacemaker or implanted device, previous oesophageal surgery, less than 3 months life expectancy			
Guillen-Sola 2017 [32] Single centre study Spain (Data set 1)	• RCT • 3 arm study • Randomisation software • Blinded outcome assessors	N=31 Mean age 69 years No significant group differences at baseline. <u>Inclusion:</u> Subacute ischaemic stroke, dysphagia confirmed by penetration aspiration score > 3 on videofluoroscopy. <u>Exclusion:</u> Participants with cognitive impairment, previous neurological disease.	Neuromuscular electrical stimulation, sham respiratory muscle strength training & standard swallowing therapy Protocol: 40 minutes treatment, 5 days per week for 3 weeks	Standard swallowing therapy (i.e. education, oral exercises & compensatory techniques). 1 hour per day x 5 days a week x 3 weeks. (Control group number split in half for meta-analysis in this review)	Respiratory muscle function, severity of dysphagia (using PAS, VVST, DOSS), occurrence of respiratory complications (chest x-ray, fever) Follow-up timepoints: 3 weeks, 3 months.
Guillen-Sola 27 [32] Single centre study Spain (Data set 2)	• RCT • 3 arm study • Randomisation software • Blinded outcome assessors	N=31 Mean age 69 years No significant group differences at baseline <u>Inclusion:</u> Subacute ischaemic stroke, dysphagia confirmed by penetration aspiration score > 3 on videofluoroscopy. <u>Exclusion:</u> Participants with cognitive impairment, previous neurological disease.	Inspiratory and expiratory muscle training & standard swallowing therapy Protocol: 5x5 breaths x 5 days per week x 4 weeks. In addition, 1 hour of standard swallowing therapy.	Standard swallowing therapy (i.e. education, oral exercises & compensatory techniques). 1 hour per day x 5 days per week x 3 weeks. (Control group number split in half for meta-analysis in this review)	Respiratory muscle function, severity of dysphagia (using PAS, VVST, DOSS), occurrence of respiratory complications (chest x-ray, fever) Follow-up timepoints: 3 weeks, 3 months.

Huang 2014 [33] Taiwan	• RCT • 3 arm study • Randomisation method not clearly stated • Blinded outcome assessors • All pre-specified outcomes were reported	N= 29 Mean age 67 years No significant group differences at baseline Inclusion: Acute stroke and dysphagia Exclusion: Aphasia or cognitive impairment, other neurological disease associated with dysphagia, head and neck surgery or radiotherapy, cardiac pacemaker, pneumonia or acute medical condition at time of enrolment.	Experimental group 1: Neuromuscular electrical stimulation (alone). Experimental group 2: combined NMES & standard therapy Treatment protocol: 1 hour a day x 3 days per week x 10 sessions. (Data combined for meta-analysis as similar interventions)	Traditional swallowing therapy (i.e. chin tuck, head tilt / rotation, thermal tactile stimulation, supraglottic / Mendelssohn and effortful swallows. Protocol: 3x60 minute sessions per week x 10 sessions.	Swallow function using penetration-aspiration score, functional oral intake scale and functional dysphagia scale.
Hwang 2007 [34] Single centre study Korea	• RCT • Computerised randomisation • Blinded outcome assessors • All pre-specified outcomes reported	(N=33) Inclusion: Medical intensive care patients who were >48 hours intubated. Exclusion: History of intubation or dysphagia, traumatic brain injury, cranial nerve injury or neuromuscular disease	Pre-emptive swallowing stimulation and oral hygiene Protocol: 15 minutes x 2 daily, 6 days per week from 3rd day after intubation until videofluoroscopy post extubation	No therapy, general oral hygiene only	Swallowing parameters: oral transit time, oropharyngeal transit time, oropharyngeal swallowing efficiency, length of ICU stay, aspiration pneumonia, days to oral intake, time to discharge.
Jayaskeran 2010 [35] 2 UK centres	• RCT • Computerised randomisation • Blinded outcome assessors • All pre-specified outcomes reported	N=28 Mean age 75year Baseline characteristics similar across groups Inclusion: Anterior circulation infarct or haemorrhage < 3 weeks Exclusion:	Pharyngeal electrical stimulation Protocol: 10 minutes per day x 3 days	Sham stimulation Protocol: 10 minutes per day x 3 days	Aspiration post intervention Follow-up timepoint: 2 weeks

		Implanted cardiac devices; severe receptive aphasia; distorted oropharyngeal anatomy; dysphagia resulting from conditions other than hemispheric stroke			
Kumar 2011 [36] Single centre study USA	• Double blinded RCT • Randomisation method not clearly described • Intention to treat analysis • Blinded outcome assessors	N= 14 Mean age 75years Unclear if baseline characteristics were similar <u>Inclusion:</u> Acute unilateral hemispheric infarct (24-168 hours) <u>Exclusion:</u> Cognitive impairment; pre-existing dysphagia; contraindications for tDCS.	Transcranial direct current stimulation Protocol: Treatment for 30 minutes x 5 consecutive days	Sham stimulation and traditional swallowing exercises (i.e. approximately 60 effortful swallows and oral stimulation with lemon flavoured swabs). Protocol: 30 minutes x 5 consecutive days	Swallowing impairment using dysphagia outcome and severity scale
Li 2018 [37] China	• RCT • 3 arm study • Randomisation software used • Blinded outcome assessors	N=118 Mean age 66 years No significant baseline group differences <u>Inclusion:</u> Acute stroke > 3 months with dysphagia, able to elicit a pharyngeal swallow on videofluoroscopy <u>Exclusion:</u> Progressive and other neurological conditions; head and neck	Neuromuscular electrical stimulation (NMES). Treatment group 1: NMES & traditional swallowing therapy Treatment group 2: NMES only. (Data combined in both groups as similar interventions used) Treatment protocol: 1 hour x 5 days per week x 4 weeks.	Traditional swallowing therapy (i.e oral trials with swallowing exercises). Protocol: 1 hour x 5 days per week x 4 weeks	Swallowing function (measured using Standardised Swallowing Assessment, sEMG values, oral transit and pharyngeal transit times).

		radiotherapy or surgery; not able to elicit a pharyngeal swallow			
Moon 2017 [38] Single centre Korea	• RCT • Randomisation method not outlined • Blinded outcome assessment not clearly stated • All pre-specified outcomes were reported	N= 18 Mean age 63 years No baseline group differences Inclusion: Acute stroke within 1 month Exclusion: Facial paralysis; tracheostomy; pericutaneous gastrostomy.	Expiratory muscle strength training (EMST) and traditional swallowing therapy Protocol: 30 minutes daily x 5 days per week for 4 weeks. 7 breaths into EMST daily x 5 times per day x 4 weeks	Traditional swallowing therapy (i.e. orofacial exercises, Thermal-tactile stimulation, Mendelssohn, effortful and Massako manoeuvres). Protocol: 30 minutes x 5 days per week x 4 weeks.	Swallow function using Functional dysphagia scale; Penetration Aspiration score; vallecular residue and pyriform sinus residue
Moon 2018 [39] Single centre study Korea	• RCT • Randomisation software used • Blinded outcome assessors • All pre-specified outcomes were reported	N=16 Mean age 63 years No significant baseline group differences Inclusion: Acute stroke Exclusion: Non-stroke patients with dysphagia; any cuts or pain in tongue during movement	5 tongue presses x 6 repetitions x 30 minutes daily x 5 days per week x 8 weeks 30 minutes standard therapy x 5 days per week x 8 weeks.	Standard swallowing therapy 30 minutes per day x 5 days per week x 8 weeks	Maximum isometric tongue pressures of anterior and posterior tongue; Swallowing function using Mann assessment of swallowing ability; Quality of life.
Park 2013 [40] Single centre study Korea	• RCT • Computerised randomisation • Blinded outcome assessors • All pre-specified outcomes reported	N= 18 Mean age 71 years No significant baseline group differences Similar baseline characteristics Inclusion: More than 1 month post stroke, videofluoroscopy confirmed dysphagia Exclusion: History of seizures, metal implants / pacemakers.	High frequency repetitive Transcranial magnetic stimulation (5Hz) at the contralesional intact cortex. Treatment protocol: 10 minutes per day x 2 weeks	Sham repetitive transcranial magnetic stimulation Protocol: 10 minutes per day x 2 weeks	Videofluoroscopy dysphagia score, penetration-aspiration score.

Park 2018 [41] Single centre study Korea	• RCT • Not clearly stated blinded outcome assessors were used	N=22 Mean age 60 years No significant baseline group differences Inclusion: Stroke < 12 months Exclusion: Secondary stroke, severe communication disorder, neck pain, unstable medical condition, head and neck cancer	Chin tuck against resistance and standard swallowing therapy. Protocol: 30 minutes x 5 days per week x 4 weeks combined with standard care (20 sessions).	Standard swallowing therapy (i.e. orofacial exercises, thermal tactile stimulation, compensatory manoeuvres). Protocol: 30 minutes x 5 days per week x 4 weeks combined with standard care (20 sessions).	Swallow function using Functional Dysphagia Scale, Penetration-aspiration scale.
Park 2019 [42] Single centre study Korea	• RCT • Blinded outcome assessors were used • Computer generated randomisation	N = 24 Mean age No significant baseline group differences Inclusion: Stroke confirmed by imaging; dysphagia confirmed by VFSS. Exclusion: Secondary stroke, severe communication disorder; neck pain or surgery	Effortful Swallowing Training (EST) and traditional swallowing therapy. Protocol: 10 reps of EST in treatment session, 3 sessions per day, 5 days per week for 4 weeks. (90 sessions in total). Combined with Traditional swallowing therapy	Traditional swallowing therapy. 30 minutes per day, 5 days per week for 4 weeks. Compensatory and therapeutic techniques such as orofacial exercises, thermal tactile stimulation, chin tuck and head tilt.	Tongue strength using Iowa Oral Performance Instrument. Swallow function using Videofluoroscopic Dysphagia Scale.
Suntrup 2015 [43] Single centre study Germany	• RCT • Computer generated randomisation • Not clearly stated in study that blinded outcome assessor used	N=30 Mean age 65 years No significant baseline group differences Inclusion: Acute stroke patients with tracheostomy and severe dysphagia Exclusion: Pre-existing dysphagia, implanted device	Pharyngeal electrical stimulation Protocol: 10 minutes stimulation x 3 consecutive days	Sham stimulation Protocol: 10 minutes x 3 consecutive days	Ability to decannulate, feeding status at discharge, length of intensive care stay, time from stimulation to discharge, modified Rankin scale.

	• Pre-specified outcomes reported				
Suntrup-Kreugar 2018 [44] Single centre study Germany	• RCT • Computerised randomisation • Blinded outcome assessors • Pre-specified outcomes all included	N= 60 Mean age 68 years No significant baseline group differences <u>Inclusion:</u> Acute stroke > 24 hours post onset <u>Exclusion:</u> Pre-existing dysphagia; seizure history; previous or need for skull surgery; metallic implants; tracheal cannula; unstable medical condition; unable to give informed consent.	Transcranial direct current stimulation and traditional swallowing therapy. Protocol: 20 minutes per day x 4 days of stimulation, combined with standard care.	Sham stimulation and traditional swallowing therapy Protocol: 30 seconds stimulation & electrodes then left in position for remainder of session. Swallowing exercises (i.e. dry / effortful swallows with oral trials) for 20 minutes a day x 4 consecutive days.	Swallow function using Dysphagia Severity Rating Score; diet at discharge.
Vasant 2016 [45] 3 centres in UK	• RCT • Computer generated randomisation • Analysis by Intention to treat • Blinded outcome assessors	N=36 Mean age 71 years Baseline characteristics are similar <u>Inclusion:</u> new onset dysphagia within 6 weeks of stroke; medically stable. <u>Exclusion:</u> Advanced dementia, history of dysphagia, pacemaker or implanted cardiac device, structural abnormalities,	Pharyngeal electrical stimulation & standard swallowing therapy Protocol: 10 minutes x 3 consecutive days	Sham stimulation & standard swallowing therapy. Protocol: 10 minutes x 3 consecutive days	Death, swallow function, dysphagia. Follow-up timepoint: 3 months
Wu 2011 [46] China	• RCT • 3 arm study • Random number table	N=229 Mean age 68 years No significant baseline group differences	Treatment group 1: Acupuncture	Standard rehabilitation training (i.e. tailored treatment to include tongue exercises, thermal-	Swallowing function, quality of life.

	• Blinded assessors not clearly state	Inclusion: Acute stroke < 2 weeks post onset Exclusion: Respiratory failure, previous dysphagia, cannot adhere to treatment, adverse events during treatment	Treatment group 2: Acupuncture & rehabilitation training. Protocol: 30 minutes treatment x 5 days per week x 4 weeks. (Data from both treatment groups were combined for meta-analysis in this review)	tactile stimulation and breathing exercises).	
Xia 2011 [47] China	• RCT • 3 arm study • Randomisation not clearly stated • Blinded outcome assessors used • Pre-specified outcomes were reported	N=120 Mean age 66 years No significant baseline group differences Inclusion: Acute stroke confirmed by imaging; dysphagia present; being able to consent Exclusion: Pulmonary disease; unable to cooperate, <40 years	Treatment group 1: Neuromuscular electrical stimulation (NMES) Treatment group 2: NMES & standard swallowing therapy Treatment protocol: 30 minutes x 2 daily, 5 days per week x 4 weeks.	Standard swallowing therapy (i.e. swallow exercises and oral trials).	Swallow function using Videofluoroscopy swallowing scale, Standardised swallowing assessment; swallowing quality of life; muscle function using sEMG.
Yang 2012 [48] Single centre study Korea	• RCT • Method of randomisation not clearly stated • Blinded outcome assessors used	N=16 Mean age 70 years No significant baseline group differences Inclusion: Videofluoroscopy confirmed dysphagia post stroke. Exclusion: Bilateral brain lesion, implanted cardiac device, history of seizure, severe language disturbance, cognitive impairment, history of alcohol abuse	Anodal transcranial direct current stimulation combined with standard care Treatment protocol: 20 minutes x 5 days per week x 2 weeks.	Sham stimulation and standard swallowing therapy (i.e. Mendelsohn, supraglottic, effortful, thermal tactile stimulation and oromotor exercises). Protocol: 30 minute session x 5 days per week x 2 weeks.	Swallow function as measured by Functional Dysphagia Scale

Appendix F: Table of excluded studies.

Study	Reason for exclusion
1. Byeon H, Koh HW. Comparison of treatment effect of neuromuscular electrical stimulation and thermal-tactile stimulation on patients with sub-acute dysphagia caused by stroke. Journal Physical Therapy Science 2016; 28: 1809-1812.	Author contacted and confirmed study was completed in a step-down rehabilitation unit, not acute hospital setting.
2. Byeon, H. Combined Effects of NMES and Mendelsohn Maneuver on the Swallowing Function and Swallowing–Quality of Life of Patients with Stroke-Induced Sub-Acute Swallowing Disorders. *Biomedicines* **2020**, *8*, 12.	The study was designed using a non-equivalent control group pretest–posttest design, therefore not an RCT.
3. Carnaby G, LaGorio L, Silliman S, Crary M. Exercise-based swallowing intervention (McNeill Dysphagia Therapy) with adjunctive NMES to treat dysphagia post-stroke: A double-blind placebo-controlled trial. Journal of Oral Rehabilitation 2020; 47: 501-510. NCT01279824.	This study was conducted with sub-acute stroke patients in rehabilitation hospital setting.
4. Clave P. Sensory Neuromodulation Protocol for the Treatment of post-stroke oropharyngeal dysphagia (FIS 2014). NCT 04052178	Author response confirmed this trial was conducted in an outpatient setting.
5. Chiang CF, Lin MT, Hsiao MY, Yeh YC, Liang YC, Wang TG. Comparative Efficacy of Noninvasive Neurostimulation Therapies for Acute and Subacute Poststroke Dysphagia: A Systematic Review and Network Meta-analysis. Arch Phys Med Rehabil. 2019;100(4):739-750.e4. doi:10.1016/j.apmr.2018.09.117, 10.1016/j.apmr.2018.09.117	Systematic review not RCT. All included studies in review have been reviewed by this review's authors for possible inclusion.
6. Chang L, He P-L, Zhou Z-Z, Li Y-H. Efficacy observation of dysphagia after acute stroke treated with acupuncture and functional electrical stimulation. Chinese Acupuncture and Moxibustion 2014;34(8):737-740.	Chinese publication translated by native Chinese Researcher (QUB). Study excluded as outcomes specified by this review were not reported
7. Chen Q, Guo J-H, Feng X, Zhou Y, Zhang Y, Hu X-Y. The effectiveness of a multi-disciplinary intervention for deglutition disorders in elderly inpatients. The Journal of Nursing 2018;65(4):73-83. [DOI: doi.org/10.6224/JN.201808_65(4).10]	Chinese publication translated by native Chinese researcher (QUB). Intervention delivered on both inpatient and outpatient basis and outcome data for inpatients not analysed separately in study results.
8. De Pippo KL, Holas MA, Reding MJ, Mandel FS, Lesser ML. Dysphagia therapy following stroke. Neurology 1994; 44: 1655-1660.	No control group and participants treated in rehabilitation hospital.
9. Denk D-M, Kaider A. Videoendoscopic biofeedback: a simple method to improve the efficacy of swallowing rehabilitation of patients after head and neck surgery. ORL 1997; 59: 100-105.	No control group and intervention delivered in both inpatient and outpatient settings.

10. Diniz PB, Vanin G, Xavier R, Parente MA. Reduced incidence of aspiration with spoon-thick consistency in stroke patients. Nutrition in Clinical Practice 2009; 24(3): 414-418.	Irrelevant intervention used (i.e. two different fluid consistencies being compared in study)
11. Erfmann. Effects of expiratory muscle strength training (EMST) on oropharyngeal dysphagia in subacute stroke patients: a randomised controlled trial. Journal of Clinical Practice in Speech-Language Pathology 2017; 19(2): 111-111.	Review article of Park et al 2016 (which is included in studies awaiting classification in this review)
12. Ershov VI, Zdvizhkova SV, Gonchar-Zaikin AP, et al. [The treatment efficacy of disturbed swallowing function in patients with ischemic stroke and neurogenous dysfagia in the intensive care unit]. [in Russian] Zh Nevrol Psikhiatr Im S S Korsakova. 2019;119(7):35-40. doi:10.17116/jnevro201911907135, 10.17116/jnevro201911907135	Irrelevant intervention used (i.e. diet modification / fluid thickening)
13. Feng X-G, Hao W-J, Ding Z , Sui Q, Guo H, Fu J.. Clinical study of Tongyan Spray for post stroke dysphagia patients: a randomised controlled trial. Chinese Journal of Integrated Traditional and Western Medicine 2012; 18(5): 345-349. [DOI: DOI: 10.1007/s11655-012-1140-9]	Irrelevant intervention used (i.e. herbal spray/ pharmaceutical intervention)
14. Gallas S, Marie JP, Leroi AM, Verin E. Sensory transcutaneous electrical stimulation improves post-stroke dysphagic patients. Dysphagia 2010; 25: 291-297. [DOI: DOI 10.1007/s00455-009-9259.	No control group and no randomisation
15. Goulding R, Bakheit AMO. Evaluation of the benefits of monitoring fluid thickness in the dietary managment of dysphagic stroke patients. Clinical Rehabilitation 2000; 14: 119-124.	Irrelevant intervention used (i.e. two different diet modifications being compared in study)
16. Hamdy S, Jilani S, Price V, Parker C, Hall N, Power M. Modulation of human swallowing behaviour by thermal and chemical stimulation in health and after brain injury. Neurogastroenterology Motility 2003; 15: 69-77.	Irrelevant design (within study design) and assessing swallow function in a series of assessments rather than testing an intervention
17. Hägglund P, Hägg M, Wester P, Jäghagen EL. Effects of oral neuromuscular training on swallowing dysfunction among older people in intermediate care—a cluster randomised, controlled trial, *Age and Ageing*, Volume 48, Issue 4, July 2019, Pages 533–540, https://doi-org.queens.ezp1.qub.ac.uk/10.1093/ageing/afz042	Irrelevant study setting: conducted in intermediate-care units not acute hospital setting.
18. Hernandez et al. Swallowing and nutritional treatment on oropharyngeal patients. NCT04132271	Irrelevant intervention: Ongoing trial testing diet modification in elderly dysphagia population

19. Hong Z, Yulin W, Qin Y. Influence of diet nursing care on the prognosis of patients with poststroke dysphagia. Chinese Nursing Research 2011;25(1):211-213. [DOI: doi:10.3969/ j.issn.1009-6493.2011.03.012].	Chinese publication translated by native Chinese researcher (QUB). Irrelevant intervention used (i.e. diet / fluid modification).
20. Huina C, Zhihui G. Application of double Yellow Decoction in oral nursing of patients with dysphagia after stroke. Chinese Nursing Research 2016;30(2):194-195. [DOI: 10.3969/j.issn.1009-6493.2016.02.024.	Irrelevant intervention for this review (i.e. herbal remedy used).
21. Jakobsen D, Poulsen I, Schultheiss C, et al The effect of intensified nonverbal facilitation of swallowing on dysphagia after severe acquired brain injury: A randomised controlled pilot study. NeuroRehabilitation. 2019; 45(4): 525-536. https://doi.org/10.3233/NRE-192901	Irrelevant study setting: study conducted in neurorehabilitation hospital setting.
22. Jang KW, Lee SJ, Kim SB, Lee KW, Lee JH & Park JG. Effects of mechanical inspiration and expiration exercise on velopharyngeal incompetence in subacute stroke patients. Journal of rehabilitation medicine 2019; 51: 97-102. https://doi.org/10.2340/16501977-2506	Irrelevant study setting: study conducted in rehabilitation centre in South Korea.
23. Kasprisin AT, Clumeck H, Nino-Murcia M. The efficacy of rehabilitative management of dysphagia. Dysphagia 1989; 4: 48-52. [DOI: https://doi.org/10.1007/BF02407403].	Irrelevant study design as retrospective and not randomised trial.
24. Khedr EM, Ahmed MA, Fathy N, Rothwell JC. Therapeutic trial of repetitive transcranial magnetic stimulation after acute ischemic stroke. Neurology 2005; 65: 466-468.	Irrelevant intervention for this review
25. Khedr EM, Abo-Elfetoh N, Rothwell JC. Treatment of post-stroke dysphagia with repetitive transcranial magnetic stimulation. Acta Neurol Scand 2009; 119: 155-161.	Irrelevant outcomes not related to those specified in this review
26. Khedr EM, Abo-Elfetoh N. Therapeutic role of rTMS on recovery of dysphagia in patients with lateral medullary syndrome and brainstem infarction. Journal Neurology Neurosurgery and Psychiatry 2010; 81(495-499).	Irrelevant outcomes not related to those specified in this review

27. Kiger M, Brown CS, Watkins L. Dysphagia managment: an analysis of patient outcomes using Vitalstim Therapy compared to traditional swallow therapy. Dysphagia 2006; 21(4): 243-253.	Irrelevant study setting (i.e. rehabilitation and outpatient settings)
28. Kim H-H, Park J-S. Efficacy of modified chin tuck against resistance exercise using hand-free device for dysphagia in stroke survivors: A randomised controlled trial. *J Oral Rehabil*. 2019;46:1042–1046. https://doi. org/10.1111/joor.12837	Irrelevant study setting: rehabilitation setting with stroke patients > 6 months post onset.
29. Koestenberger M, Neuwersch S, Hoefner E. *et al.* A Pilot Study of Pharyngeal Electrical Stimulation for Orally Intubated ICU Patients with Dysphagia. *Neurocrit Care* 2020; 32: 532–538. https://doi 10.1007/s12028-019-00780-x	ICU study. Irrelevant study design as historical control group used, not RCT design.
30. Kotz T, Federman AD, Kao J, Milman L, Packer S, Lopez-Prieto C, Forsythe K, Genden EM. Prophylactic swallowing exercises in patients with head and neck cancer undergoing chemoradiation. Arch Otolaryngol Head Neck Surg 2012; 138(4): 376-382.	Irrelevant study setting. Author contacted and confirmed intervention was tested in outpatient setting only
31. Kraaijenga SAC, van der Molen L, Jacobi I, Hamming-Vrieze O, Hilgers FJM, van den Brekel MWM. Prospective clinical study on long-term swallowing function and voice quality in advanced head and neck cancer patients treated with concurrent chemoradiotherapy and preventive swallowing exercises. Eur Arch Otorhinolaryngol 2015; 272: 3521-3531.	Addresses long term follow up data relating to Kotz et al 2012 study (which is included in this table and was excluded due to irrelevant setting
32. de Lama Lazarra G, Lazarus C, Logemann J. Impact of thermal stimulation on the triggering on the swallow reflex.. Dysphagia 1986; 1: 73-77.	Irrelevant study design – no control group.
33. Lee K, Kim S, Lee J, Lee S, Park J, Jang K. Effects of Neuromuscular Electrical Stimulation for Masseter Muscle on Oral Dysfunction After Stroke. Ann Rehabil Med. 2019; 43(1):11-18. **DOI: https://doi.org/10.5535/arm.2019.43.1.11**	Irrelevant study setting: Cardiovascular centre in South Korea.
34. Leelamanit V, Limsakul C, Geater A. Synchronised electrical stimulation in treating pharyngeal dysphagia. Laryngoscope 2002; 112: 2204-2210.	Irrelevant study design – prospective study with no control group

35. Li Li L, Li Y, Huang R, Yin J, Shen Y, Shi J. The value of adding transcutaneous neuromuscular electrical stimulation (VitalStim R) to traditional therapy for post-stroke dysphagia: a randomised controlled trial. European Journal of Physical and Rehabilitation Medicine 2015; 51(1): 71-78.	Duplicate of more recent study Li et al 2018 which is included in review
36. Liaw MY, Hsu CH, Leong CP, Liao CY, Wang LY, Lu CH, Lin MC. Respiratory muscle training in stroke patients with respiratory muscle weakness, dysphagia, and dysarthria - a prospective randomized trial. Medicine 2020; 99:10 (e19337) http://doi:10.1097/MD.0000000000019337	Author response received to confirm that study was conducted in rehabilitation setting of tertiary hospital and not acute hospital setting.
37. Logemann JA, Gensler G, Robbins JA, Lindblad AS, Brandt D, Hind JA, Kosek S, Dikeman K, Kazandjian M, Gramigna GD, Lundy D, McGarvey-Toler S, Miller Gardner PJ. A randomised study of three interventions for aspiration of thin liquids in patients with dementia or Parkinson's disease. Journal Speech Language Hearing Research 2008;51(1):173-183.	Irrelevant intervention (i.e. different fluid modifications) and irrelevant setting (i.e. inpatients and participants from residential home setting and inpatient data was not analysed separately in study)
38. Logemann J, Rademaker A, Pauloski B, Kelly A, Stangl-McBreen C, Antinoja J, Grande B, Farquharson J, Kern M, Easterling C, Shaker R. A randomised study comparing the Shaker exercise with traditional therapy: a preliminary study. Dysphagia 2009; 24: 403-411. [DOI: DOI 10.1007/s00455-009-9217-0]	Irrelevant study setting – all participants were outpatients
39. Malik SN, Khan MSG, Ehssan F, Quarra-Tul-Ain. Effectiveness of swallow maneuvers, thermal stimulation and combination both in treatment of patients with dysphagia using functional outcome swallowing scale. Biomedical Research India 2017; 28(4): 1479-1482.	Irrelevant study setting – all participants were outpatients
40. Martin A, Ortega O, Roca M, Arus M, Clave P. Effect of a minimal-massive intervention in hospitalised older patients with oropharyngeal dysphagia: a proof of concept study. Journal Nutrition Health Aging 2018; 22(6): 739-747.	Irrelevant study design. Historical controls, not randomised trial design.
41. Ortega O, Rofes L, Martin A, Arreola V, Lopez I, Clave P. A comparative study between two sensory stimulation strategies after two weeks treatment on older patients with oropharyngeal dysphagia. Dysphagia 2016; 31: 706-716.	Irrelevant study setting. Author contacted and confirmed that all participants were treated on an outpatient basis.

42. Park J-W, Kim Y, Oh J-C, Lee H-J. Effortful swallowing training combined with electrical stimulation in post-stroke dysphagia: a randomised controlled study. Dysphagia 2012; 27: 521-527.	Irrelevant study outcomes not related to those specified in this review
43. Park J-S, Oh D-H, Hwang N-K, Lee J-H (a). Effects of neuromuscular electrical stimulation combined with effortful swallowing on post-stroke oropharyngeal dysphagia: a randomised controlled trial. Journal of Oral Rehabilitation 2016; 43:426-434.	Irrelevant study setting as participants treated in rehabilitation centre.
44. Park JS, Lee G, Jung YJ. Effects of Game-Based Chin Tuck against Resistance Exercise Vs Head-Lift Exercise in Patients with Dysphagia After Stroke: An Assessor-Blind, Randomized Controlled Trial. *Journal of Rehabilitation Medicine 2019;* 51(10): 749–754. http://doi: 10.2340/16501977-2603.	Irrelevant study setting: study conducted in rehabilitation centre in South Korea.
45. Restivo DA, Casabona A, Centonze D, Marchese-Ragona R, Maimone D, Pavone A. Pharyngeal electrical stimulation for dysphagia associated with multiple sclerosis: a pilot study. Brain stimulation 2013; 6: 418-423.	Irrelevant study setting. Author contacted and confirmed all participants treated on an outpatient basis
46. Reyes A, Cruickshank T, Nosaka K, Ziman M. Respiratory muscle training on pulmonary and swallowing function in patients with Huntington's disease: a pilot randomised controlled trial. Clinical Rehabilitation 2015;29(10):961-973. [DOI:10.1177/0269215514564087]	Irrelevant study setting. Participants completed outpatient, home-based programme
47. Rofes L, Arreola V, Martin A, Clave P. Effect of oral piperine on the swallow response of patients with oropharyngeal dysphagia. Journal Gastroenterology 2014; 49: 1517-1523.	Irrelevant study setting. Author contacted and confirmed all participants in study treated on outpatient basis.
48. Shigematsu T, Fujishima I, Ohno K. Transcranial direct current stimulation improves swallowing function in stroke patients. Neurorehabilitation and Neural Repair 2013; 27(4): 363-369. [DOI: 10.1177/1545968312474116].	Irrelevant study setting. Trial completed in rehabilitation facility.
49. Steele CM, Bayley MT, Peladeau-Pigeon M, Nagy A, Namasivayam AM, Stokely SL, Wolkin T. A randomised trial comparing two tongue-pressure resistance training protocols for post-stroke dysphagia. Dysphagia 2016; 31:452-461.	Irrelevant study setting. Author contacted and confirmed all participants treated in rehabilitation facility and not acute hospital.

50. Terre R, Mearin F. Effectiveness of chin down posture to prevent tracheal aspiration in dysphagia secondary to acquired brain injury. A videofluoroscopy study. Neurogastroenterol Motility 2012; 24: 414-e206. [DOI: doi: 10.1111/j.1365-2982.2011.01869.x]	Irrelevant study setting. Participants treated in rehabilitation facility.
51. Verin E, Leroi AM. Poststroke dysphagia rehabilitation by repetitive transcranial magnetic stimulation: a noncontrolled pilot study. Dysphagia 2009; 24: 204-210.	Irrelevant study design (i.e. noncontrolled pilot study and not RCT)
52. Wall LR, Kularatna S, Ward EC. *et al.* Economic Analysis of a Three-Arm RCT Exploring the Delivery of Intensive, Prophylactic Swallowing Therapy to Patients with Head and Neck Cancer During (Chemo) Radiotherapy. *Dysphagia* **34,** 627–639 (2019). https://doi-org.queens.ezp1.qub.ac.uk/10.1007/s00455-018-9960-1	Irrelevant study setting: study conducted with outpatients at tertiary oncology unit
53. Weidong L, Wayne PM, Davis RB, Buring JE, Li H, Macklin EA, Lorch JH, Burke E, Haddad TC, Goguen LA, Rosenthal DS, Tishler RB, Posner MR, Haddad RI. Acupuncture for chemoradiation therapy-related dysphagia in head and neck cancer: a pilot randomised sham-controlled trial. The Oncologist 2016; 21: 1522-1529.	Irrelevant study setting. Author contacted and confirmed all participants were treated on an outpatient basis only.
54. Whelan K. Inadequate fluid intakes in dysphagic acute stroke. Clinical Nutrition 2001; 20(5): 423-428	Irrelevant intervention (i.e. two different fluid modifications compared)
55. Wong ISY, Ng KF, Tsang HWH. Acupuncture for dysphagia following stroke: A systematic review. European Journal of Integrative medicine 2012; 4: e141-e150.	Systematic review so irrelevant study design. One study in this review was conducted in an acute setting and included in this review (i.e. Wu et al 2011).
56. Wu, C., Xu, Y., Wang, T. *et al.* Effects of a swallowing and oral care intervention for patients following endotracheal extubation: a pre- and post-intervention study. *Crit Care* 2019; 23**:** 350, 1-8 https://doi-org.queens.ezp1.qub.ac.uk/10.1186/s13054-019-2623-2	Irrelevant study design: pre- and post-intervention study with historical controls conducted at a tertiary medical centre in Taiwan.
57. Xia W, Zheng C, Zhu S, Tang Z. Does the addition of specific acupuncture to standard swallowing training improve outcomes in patients with dysphagia after stroke: a randomised controlled trial. Clinical Rehabilitation 2016; 3: 237-246. [DOI: 10.1177/0269215515578698]	Irrelevant study setting. Both inpatients and outpatients included in this study but data was not analysed separately.

58. Yoon JS, Sung YJ. Effects of lower jaw muscle strength training on the swallowing function in swallowing disorder of patients. Journal of Rehabilitation Research 2013; 17: 393-407	Irrelevant study setting: study conducted in rehabilitation setting.
59. Zhang C, Zheng X, Lu R, Yun W, Yun H, Zhou X. Repetitive transcranial magnetic stimulation in combination with neuromuscular electrical stimulation for treatment of post-stroke dysphagia. Journal of International Medical Research 2019; 47(2): 662–672. https://doi.org/10.1177/0300060518807340	Irrelevant study setting: study conducted in a neurorehabilitation outpatient setting.
60. Zheng L, Li Y, Liu Y. The individualised rehabilitation interventions for dysphagia: a multidisciplinary case control study of acute stroke patients. International Journal of Clinical and Experimental Medicine 2014; 7(10): 3789-3794.	Irrelevant outcomes not related to those specified in this review

Appendix G: Table of unclassified and ongoing studies

1. Bulow et al 2008 [57]	Await author response to confirm setting of study as unclear if acute hospital or rehabilitation setting
2. Carnaby-Mann et al NCT01279824 [58]	Author contacted requesting trial data / findings as unable to find related publication and no results submitted on clinicaltrials.gov
3. De Fraga et al 2017 [59]	Await author response to confirm setting of study as unclear if acute hospital or rehabilitation setting
4. El-Tamawy et al 2015 [60]	Await author response to confirm study setting as intervention described as home programme which suggests an outpatient setting
5. Eom et al 2017 [61]]	Unpublished data on incidence of aspiration post intervention (i.e. PAS > 5 score) was requested – response awaited.
6. Gao et al 2017 [62]	Unpublished data on incidence of aspiration post intervention (i.e. PAS >5 score) was requested – response awaited.
7. Kim et al 2017 [63]	Unpublished date on incidence of aspiration post intervention (i.e. PAS > 5 score) was requested – response awaited.
8. Lim et al 2009 [64]	Await author response to confirm with acute hospital or rehabilitation setting as not clearly stated in study.
9. Park et al 2016 (b) [65]	Unpublished data on incidence of aspiration post intervention (i.e. PAS > 5 score) was requested – response awaited.
10. Simonelli et al 2019 [66]	Await author response to confirm study setting as study describes recruiting subacute stroke patients from IRCCS Santa Lucia Foundation, Rome, Italy.
11. Menna et al RBR-9829jK [50]	Ongoing study – no results posted on clinicaltrials.gov and no response from author when contacted regarding trial results.
12. Brodsky et al PRESIDE trial NCT02442102 [51]	Ongoing intensive care study testing early dysphagia intervention during intubation with acute respiratory distress syndrome population
13. Jakob et al PHINEST trial NCT03840395 [52]	Ongoing trial testing pharyngeal electrical stimulation during intubation in ICU.
14. Dziewas et al. Pharyngeal Electrical Stimulation for the treatment of Post-Extubation Dysphagia in acute stroke NCT02470078 [53]	Ongoing clinical trial. No publication of results available yet. Authors contacted for trial results – response awaited.
15. Hamdy et al The utility of cerebellar transcranial magnetic stimulation in the neurorehabilitation of dysphagia after stroke. NCT03274947 [54]	Ongoing trial testing TMS as dysphagia treatment for stroke patients.
16. Brief and intensive therapy for dysphagia in patients with head and neck cancer. NCT03755921 [55]	Ongoing trial dysphagia treatment in head and neck cancer patients.
17. Restivo et al. tDCS for dysphagia associated to brainstem stroke NCT04308733 [56]	Ongoing trial testing transcranial direct current stimulation in stroke patients

Appendix H: Members of Expert Advisory Panel meeting June 2019

Professor Martin Brodsky, Johns Hopkins University, US.

Professor Louise Rose, Kings College, London.

Dr. Anna Miles, Auckland University, New Zealand.

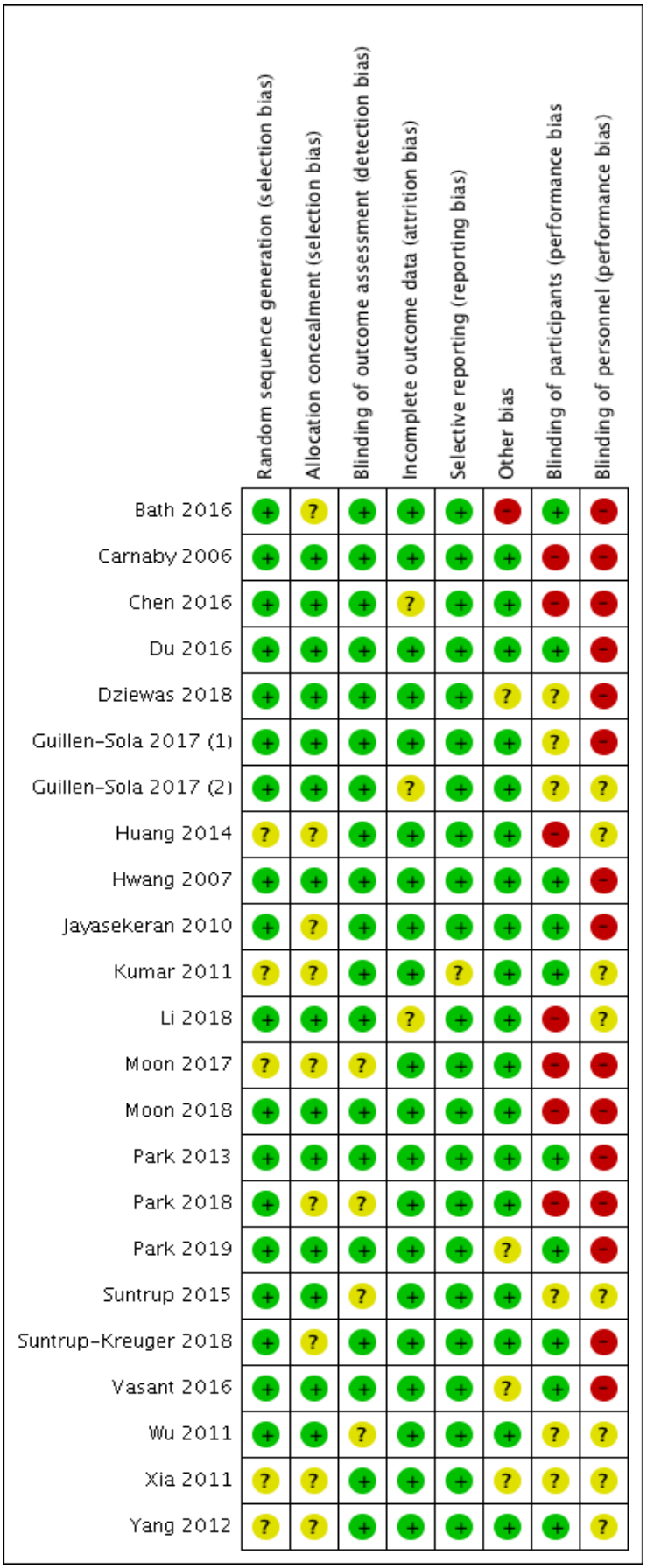
Dr. Jacqui McRae, Consultant Speech / Language Therapist, St. George's NHS Trust, London.

Dr. Alastair Proudfoot, Consultant Cardiac Intensivist, St. Bart's Trust, London.

Dr. Anna-Liisa Sutt, Clinical Research Speech/Language Therapist, St. Bart's Trust, London.

Dr. Bronwen Connolly, Consultant Clinical Research Physiotherapist & NIHR Clinical Trials Fellow, Guy's and St. Thomas' Trust, London.

Appendix I: Risk of bias within studies and judgement tables



Bath 2016 [27]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Low risk	Investigators entered baseline and follow-up data into a commercial database (Rave, Medidata Solutions, Inc) linked to a randomization list (Quantics Consulting, Ltd). The data were checked to confirm the patient's eligibility, and the system then assigned a participant to treatment with active PES or sham PES with allocation 1:1. Allocation was by randomly permuted blocks.
Allocation Concealment	Unclear	This is not clearly stated in study.
Blinding Outcome Assessors	Low	A member of the central research team (S.H.), who was masked to treatment assignment, validated and categorized investigator-reported serious adverse events, including cause-specific deaths.
Incomplete reporting outcome data	Low	Flow of patients through the trial: consented, 195; screened with VFS, 181; randomized, 162; treatment attempted, 152; treated, 141; treated with VFS at 2 weeks, 126; all 3 treatments received with VFS at 2 weeks, 123; treated with VFS at 12 weeks. All patients accounted for in trial.
Selective reporting outcome data	Low	All pre-specified outcomes are reported
Other biases	High	P.M. Bath received honoraria for work as the Chief Investigator and for consultancy. S. Hamdy is the inventor of PES and has stock in Phagenesis. J. Love was an employee of Phagenesis. Institutions using P. M. Bath, D. Cohen, H.K. Iversen, R. Dziewas, V. Woisard, and P. Clavé received per-patient fees for recruitment. P.M. Bath, P. Scutt, D. Cohen, H.K. Iversen, R. Dziewas, and V. Woisard received travel expenses for attending meetings.
Blinding of participants during treatment	Low	Patients, but not the treating researcher, were masked to treatment assignment. This is stated in the study.
Blinding of personnel delivering treatment	High	It is stated in study treating researcher was not masked to treatment assignment.

Carnaby 2006 [28]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Low	Randomisation was undertaken by use of a block randomisation technique. The treatment allocation was based on a computer-generated random numbers list generated with the SPSS statistical package

Allocation Concealment	Low	The randomisation schedule was held in the trial office, remote from the study environment. After clinical assessment by the study speech pathologist (JP), eligible patients were informed about the trial and, after providing informed consent, were randomly assigned to one of three treatment options by means of a telephone call to the trial office by the study speech pathologist.
Blinding Outcome Assessors	Low	Outcome was assessed by an independent speech pathologist (GC), who was unaware of the treatment allocation, every month for 6 months after randomisation.
Incomplete reporting outcome data	Low	60 participants died by 6 month follow up period. Only 3 drop outs were reported across 3 intervention groups by 6 month analysis period.
Selective reporting outcome data	Low	All prespecified outcomes were reported
Other biases	Low	None identified in this study
Blinding of participants during treatment	High	Patients were aware of their treatment allocation, this is clearly stated in the text.
Blinding of personnel delivering treatment	High	All people involved in the study were unaware of the treatment allocation, apart from the patients and the study speech pathologist who treated the patients assigned to the high-intensity and low-intensity groups.

Chen 2016 [29]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Consecutive patients were randomly assigned to standard rehabilitation care with or without acupuncture (1:1 allocation ratio). Randomization was computer-generated by independent research staff using software, and the generated list of random numbers was placed into sequentially numbered, opaque, sealed envelopes
Allocation Concealment	Low	Random numbers placed into sequentially numbered, opaque, sealed envelopes
Blinding Outcome Assessors	Low	All of the allopathic medical staff, rehabilitation therapists, outcome assessors, and data analysts were blinded to group assignments.
Incomplete reporting outcome data	Unclear	5 participants lost to follow up. Not all participants were given VFSS examination.
Selective reporting outcome data	Low	All pre-specified outcomes were recorded in this study.
Other biases	Low	None identified
Blinding of participants during treatment	High	Participants were informed if they would receive acupuncture or not in this study - so blinding not possible.
Blinding of personnel delivering treatment	High	specialized acupuncturists were informed to do acupuncture for assigned patients.

Du 2016 [30]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Low	Treatment allocations were kept in sequentially numbered sealed opaque envelopes
Allocation Concealment	Low	Sealed envelopes only opened at time of enrolment.
Blinding Outcome Assessors	Low	These measures were evaluated by a trained neurologist who was blinded to the subjects' group allocation throughout.
Incomplete reporting outcome data	Low	2 participants lost to follow-up
Selective reporting outcome data	Low	All outcomes measures reported at all time points: post intervention, 1 month, 2 months and 3 months post intervention.
Other biases	Low	None identified in study
Blinding of participants during treatment	Low	All patients were blinded to the type of treatment they received.
Blinding of personnel delivering treatment	High	Magnetic stimulation was performed by one investigator who was not involved in clinical assessment, follow-up of patients, or data analysis but was aware of intervention.

Dziewas 2018 [31]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Low	Patients were randomly assigned to receive PES or sham treatment (1:1) via a computerised interactive wireless randomisation system (IWRS) that applied randomisation stratified by study site in blocks of four patients per site.
Allocation Concealment	Low	Each trial site, the randomisation procedure was obtained from the IWRS by a group of investigators responsible only for treatment application
Blinding Outcome Assessors	Low	All other investigators and health-care workers not involved in treatment were masked.
Incomplete reporting outcome data	Low	Full flow chart adhering to CONSORT guidelines was included in this study. All drop out / attrition rates included and data for both randomised and open label section of study included.
Selective reporting outcome data	Low	All primary and secondary outcomes were reported in full in both randomised and open label parts of this study.
Other biases	Unclear	Role of the funding source <b>The study was sponsored by Phagenesis Ltd. The sponsor was involved in the design of the study, and contributed to data interpretation and the writing of the manuscript. It also financially compensated sites for data collection, a clinical research organisation (FAKKEL, Belgium; for

		further details see appendix) for study management and source data verification, and University Medical Centre Utrecht (Utrecht, Netherlands) and Cytel Inc (Cambridge, MA, USA) for data analysis. Interim analyses were reviewed by the IDSMB without involvement of the sponsor or the steering committee. All authors had full access to all data. The corresponding author had final responsibility for the decision to submit for publication
Blinding of participants during treatment	Unclear	As with many device studies, masking of patients could not be guaranteed because, in principle, patients could feel whether PES was applied. In all other aspects, PES and the sham condition were kept as similar as possible. PES or sham stimulation had to be commenced within 24 h of randomisation
Blinding of personnel delivering treatment	High	This was not possible as the personnel delivering treatment had to be aware of whether to deliver PES or sham stimulation to patient groups. This was not possible as the personnel delivering treatment had to be aware of whether to deliver PES or sham stimulation to patient groups.

Guillan-Sola 2017 (1) [32]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Used a computer-generated randomization list
Allocation Concealment	Low	Randomisation was performed independently by a collaborator blinded to patient identity
Blinding Outcome Assessors	Low	rehabilitation specialist, who also was blinded to study group assignments, carried out all outcome assessments.
Incomplete reporting outcome data	Low	Twenty-one patients were not able to perform the respiratory and/or swallowing assessment after the 3-week intervention. Eleven of these patients were lost to 3-month follow-up and no clinical information was available from their medical records for analysis.
Selective reporting outcome data	Low	All prespecified outcomes were reported in this study
Other biases	Low	None identified
Blinding of participants during treatment	Unclear	This is not clearly stated in the study
Blinding of personnel delivering treatment	High	Personnel undertaking treatment would have been aware of allocation

Guillan-Sola 2017 (2) [32]

Bias	**Authors' judgement**	**Support for judgement**

Random Sequence Generation	Low	Randomisation using a computer-generated randomization list
Allocation Concealment	Low	Randomisation was performed independently by a collaborator blinded to patient identity
Blinding Outcome Assessors	Low	rehabilitation specialist, who also was blinded to study group assignments, carried out all outcome assessments.
Incomplete reporting outcome data	Unclear	Twenty-one patients were not able to perform the respiratory and/or swallowing assessment after the 3-week intervention. Eleven of these patients were lost to 3-month follow-up and no clinical information was available from their medical records for analysis
Selective reporting outcome data	Low	All prespecified outcomes were reported in this study
Other biases	Low	None identified
Blinding of participants during treatment	Unclear	This is not clearly stated in study
Blinding of personnel delivering treatment	Unclear	Not clearly stated in study

Huang 2014 [33]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Unclear	We randomly divided the patients into 3 groups. The method of randomisation used in this study is not clearly stated.
Allocation Concealment	Unclear	This is not clearly stated in this study.
Blinding Outcome Assessors	Low	Both the 8-point PAS and FDS were interpreted and scored before and after each therapy by another well-experienced speech–language therapist who was also blinded to all 3 interventions.
Incomplete reporting outcome data	Low	All randomised participants were accounted for in analysis of outcomes post interventions.
Selective reporting outcome data	Low	All pre-specified outcomes in methods section were included in analysis / results section.
Other biases	Low	There were no other obvious sources of bias when reviewing this study. It was supported by grants from the National Science Council, Taiwan.
Blinding of participants during treatment	High	It does not clearly state that participants were blinded to treatment in this study as interventions were different blinding was not possible.

Blinding of personnel delivering treatment	Unclear	Blinding of personnel is not clearly stated in this study. As interventions were different (Electrical vs traditional exercises). It does seem different therapists delivered therapy to the different treatment groups but not clear if they knew which was experimental vs control groups.

Hwang 2007 [34]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Randomization and allocation was done using a random assignments generator (Medusa, solution@randombots.com, Long Beach, CA, USA)
Allocation Concealment	Low	None of the patients could see the pre-emptive swallowing stimulation done to other patients because of temporal screening
Blinding Outcome Assessors	Low	video-fluoroscopic swallow study examiner and assessor did not know whether a patient was assigned into the experimental or the control group. This was tool used during outcome assessment in this study.
Incomplete reporting outcome data	Low	Results tables do report outcomes for all participants in control and experimental groups. No Consort flow chart available in publication.
Selective reporting outcome data	Low	No evidence of selected outcomes being reported. All swallowing and health related parameters identified in methods section were reported in results of this study.
Other biases	Low	None identified in study
Blinding of participants during treatment	Low	The text clearly states that patients did not know whether a patient was assigned into the experimental or control group. Both experimental and control groups received standard care: oral hygiene and tooth brushing.
Blinding of personnel delivering treatment	High	Only the one occupational therapist who performed pre-emptive swallowing stimulation knew the group assignments

Jayaskeran 2010 [35]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Randomization was undertaken by local software (Minim programme, Department of Bioengineering, Salford Royal Hospital NHS Trust, Salford, UK) using a process of minimization.

Allocation Concealment	Unclear	Process of allocation concealment is not described in the study.
Blinding Outcome Assessors	Low	Aspiration scores were recorded by 2 speech and language therapists, blinded to the intervention. This was the main outcome assessment tool used after treatment.
Incomplete reporting outcome data	Low	3 drop outs from original number of 31 participants randomised to intervention vs control groups.
Selective reporting outcome data	Low	All pre-specified outcomes were reported in this trial.
Other biases	Low	None identified in this study
Blinding of participants during treatment	Low	Participants blinded to the intervention.
Blinding of personnel delivering treatment	High	Personnel delivering PES aware of treatment groups

Kumar 2011[36]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Unclear	Patients were randomized to receive either anodal tDCS or sham stimulation to the unaffected hemisphere using simple randomization. No further details given on randomisation method, whether computer generated software was used etc.
Allocation Concealment	Unclear	Not clearly stated in study
Blinding Outcome Assessors	Low	They were all evaluated by speech and language pathologists specializing in dysphagia (C.W. and C.F.) who were blinded to study allocation and rated swallowing impairments using a validated dysphagia scale, Dysphagia Outcome and Severity scale (DOSS). 20 DOSS
Incomplete reporting outcome data	Low	No exclusions. All patients randomised to treatment groups were analysed post intervention.
Selective reporting outcome data	Unclear	All pre-planned outcomes were reported in results section of study. However videofluoroscopy ratings that were taken for 7 patients (to achieve DOSS score) were not reported on in detail in results section, though all DOSS scores were included in results table.
Other biases	Low	None identified
Blinding of participants during treatment	Low	Clearly stated in methods section 'patients were blinded to their stimulation allocations'
Blinding of personnel delivering treatment	Unclear	This is not clearly stated in study

Li 2018 [37]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Low	Participants were randomly divided into groups after stratification using minimising software.
Allocation Concealment	Low	After signing consent, each participant received a sealed envelope indicating her group assignment.
Blinding Outcome Assessors	Low	It is clearly stated in study that assessors were blinded to participants' treatment assignments.
Incomplete reporting outcome data	Unclear	17 participants dropped out of a total of 135 randomised. The drop outs were during treatment and before final outcome assessments were completed. (12% attrition rate)
Selective reporting outcome data	Low	All pre-specified outcomes were reported in this study.
Other biases	Low	None identified
Blinding of participants during treatment	High	Participants were made aware of which experimental group they were assigned to before treatment commenced. As interventions were different in each group, blinding was not possible.
Blinding of personnel delivering treatment	Unclear	It is not clearly stated in study.

Moon 2017 [38]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Unclear	All participants were randomly assigned to either an experimental group (n=9) or a control group (n=9). The authors don't specify how randomisation was completed, what method was used.
Allocation Concealment	Unclear	Allocation concealment is not clearly specified in the study
Blinding Outcome Assessors	Unclear	Blinding of outcome assessors is not clearly stated in this study.
Incomplete reporting outcome data	Low	All participants analysed were accounted for in outcome data. No drop out rates in this study.
Selective reporting outcome data	Low	All pre-specified outcomes were analysed and reported as planned.
Other biases	Low	There are no conflicts of interest declared with this study and no other sources of bias detected.
Blinding of participants during treatment	High	As the treatments in each group were different and no placebo used then blinding would not be possible.
Blinding of personnel delivering treatment	High	It is not possible to blind personnel in this intervention as both treatment groups received different treatments.

Moon 2018 [39]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Low	Of the 118 individuals, 19 were included and allocated randomly to either the TPSAT group or the control group using random allocation software (http://randomization.com/). After the preassessment, random allocation was per- formed by an independent staff member.
Allocation Concealment	Low	For allocation concealment, sealed envelopes sequentially numbered and opaque were used. The envelopes were kept in a location distinct from the assessment place and were not available to the assessor or the data analyst.
Blinding Outcome Assessors	Low	A sealed envelope was signed, dated, and opened by the allocation examiner immediately before the intervention, and only in the absence of the assessor and the data analyst. This comment illustrates that assessors were not aware of group allocation when doing baseline or post treatment assessments.
Incomplete reporting outcome data	Low	A study flow chart is provided accounting for all participants recruited, randomised and analysed and any drop outs in the study and reasons for exclusions pre randomisation and reasons given why participants dropped out.
Selective reporting outcome data	Low	All outcomes that were pre-specified were reported in the analysis section of this study, within and between groups. Non-significant results were also discussed in results section along side any more positive findings.
Other biases	Low	None identified
Blinding of participants during treatment	High	As the treatments were different, participants would have known if they were receiving the experimental intervention. It is not clearly stated in this study that participants were blinded.
Blinding of personnel delivering treatment	High	It was not possible to blind personnel in this study as one occupational therapist delivered the intervention to participants in both groups.

Park 2013 [40]

Bias	Authors' judgement	Support for judgement
Random Sequence Generation	Low	Computer generated randomisation sequence used.

Allocation Concealment	Low	Automated assignment system used.
Blinding Outcome Assessors	Low	Clearly stated that blinded outcome assessors are used.
Incomplete reporting outcome data	Low	None lost to follow up.
Selective reporting outcome data	Low	All pre-specified outcomes reported.
Other biases	Low	None identified
Blinding of participants during treatment	Low	Clearly states in study that participants are blinded.
Blinding of personnel delivering treatment	High	Personnel delivering the intervention were not blinded to treatment groups.

Park 2018 [41]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Not clear how block randomisation was done
Allocation Concealment	Unclear	This is not clearly stated in the study.
Blinding Outcome Assessors	Unclear	It is not clearly stated in this study that outcome assessors were blinded or that assessors were different personnel to those delivering the intervention.
Incomplete reporting outcome data	Low	In total, 22 participants completed this study. Three participants dropped out prior to the follow- up because of discharge. All numbers recruited, randomised and analysed have been accounted for. All outcomes to be reported were reported in analysis section of this study.
Selective reporting outcome data	Low	All pre-specified outcomes to be measured in this study, as detailed in methods section, were accounted for in results section.
Other biases	Low	None identified
Blinding of participants during treatment	High	As interventions were different, it is not possible to blind participants to group allocation in this study.
Blinding of personnel delivering treatment	High	All interventions were completed by one therapist so blinding to intervention type was not conducted.

Park 2019 [42]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Computer randomisation software used

Allocation Concealment	Low	Study states allocation was performed under blinded conditions.
Blinding Outcome Assessors	Low	Study states outcome assessment using VDS scale was interpreted by experienced physician and occupational therapist blinded to group allocation.
Incomplete reporting outcome data	Low	All incomplete outcome data were presented in Consort Diagram in paper. Low drop out of 3/15 patients across both experimental groups and accounted for.
Selective reporting outcome data	Low	All pre-specified outcomes were reported in results of paper.
Other biases	Unclear	Within an acute rehab unit in a single centre study, it is possible that participants from both experimental groups would find out what group they were assigned to given patient proximity to each other in such units.
Blinding of participants during treatment	Low	This is described as double-blinded study. Participants were unaware what experimental group they were allocated to.
Blinding of personnel delivering treatment	High	As this study involved testing a swallowing therapy that involved interaction with the participant, it was not possible to blind personnel delivering the intervention.

Suntrup 2015 [43]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	randomly assigned 2:1 to receive either EPS or sham stimulation using computer-assisted randomization
Allocation Concealment	Low	The randomization schedule was kept remotely from the study environment. The study coordinator provided assignment to the treating physician by phone.
Blinding Outcome Assessors	Unclear	Not clearly stated in this study.
Incomplete reporting outcome data	Low	All recruited patients finished the study. One patient was transferred to rehab during unblinded EPS but could be followed up. All outcome data accounted for and study flow chart as per CONSORT guidelines was included in this study accounting for all participants randomised and analysed.
Selective reporting outcome data	Low	All outcomes of interest to the research team attached to this study were reported in results section. Intervention adherance and adverse events also reported.
Other biases	Low	None identified in this study.
Blinding of participants during treatment	Unclear	Blinding not explicitly stated in this study

Blinding of personnel delivering treatment	Unclear	It is unclear from text how the personnel delivering the intervention could be blinded from giving active versus sham stimulation. It is not clearly stated if different personnel were involved in delivery of sham stimulation and active stimulation

Suntrup-Kreuger 2018 [44]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Dysphagic patients fulfilling the inclusion criteria were randomly assigned 1:1 to receive either tDCS or sham stimulation using computer-assisted randomization.
Allocation Concealment	Unclear	Not clearly stated in the study.
Blinding Outcome Assessors	Low	Investigators performing swallowing assessment, medical technical staff involved in MEG data acquisition, and the researchers performing nonautomated steps in anatomical and functional imaging data preprocessing and analysis were also blinded to the intervention type.
Incomplete reporting outcome data	Low	Sixty patients were randomized. One dropped out because of recurrent stroke not related to the study intervention. All other patients (n 5 59) were treated as intended, completed the study, and were included in data analysis.
Selective reporting outcome data	Low	All prespecified primary and secondary outcomes were reported in results section.
Other biases	Low	None identified
Blinding of participants during treatment	Low	Subjects were unaware of the type of treatment they received.
Blinding of personnel delivering treatment	High	This was not possible as interventions delivered were different and not clearly stated that different personnel delivered intervention to the different treatment groups.

Vasant 2016 [45]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Following consent and baseline assessment, patients were randomized through a concealed program created by our information technology department.
Allocation Concealment	Low	Concealment completed via a computerised programme

Blinding Outcome Assessors	Low	SLTs who independently assessed the outcomes (DSR/ instrumental swallowing examinations) were blinded to group allocation.
Incomplete reporting outcome data	Low	1 participant lost to follow up; 2 died before 3 month follow-up assessments completed (N=36)
Selective reporting outcome data	Low	All outcomes reported in this study
Other biases	Unclear	SH provides scientific advice via a secondment agreement with the University of Manchester to a medical device company focusing on dysphagia (Phagenesis Ltd), which manufactures the Phagenyx device. He also sits on the Phagenesis Ltd board of directors as a founder and owns shares in the company.
Blinding of participants during treatment	Low	Participants were blinded to group allocation - clearly stated in procedures section of study.
Blinding of personnel delivering treatment	High	The researcher who delivered the interventions was not blinded to the group allocation.

Wu 2011 [46]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Low	Random number table method used in this study.
Allocation Concealment	Low	Doctors and patients do not know the allocation.
Blinding Outcome Assessors	Unclear	Not stated in the study
Incomplete reporting outcome data	Low	207/229 completed all treatment, with 6 drop outs in total across study participants.
Selective reporting outcome data	Low	All pre-specified outcomes in study were reported
Other biases	Low	None identified
Blinding of participants during treatment	Unclear	Not stated in study
Blinding of personnel delivering treatment	Unclear	Not stated in study

Xia 2011 [47]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Unclear	Randomisation is not clearly stated in study

Allocation Concealment	Unclear	Not stated in study
Blinding Outcome Assessors	Low	Outcomes were assessed blinded.
Incomplete reporting outcome data	Low	All participants randomised were included in analysis of all outcomes
Selective reporting outcome data	Low	All prespecified outcomes were reported
Other biases	Unclear	Unclear from study if any additional biases
Blinding of participants during treatment	Unclear	Not stated in study
Blinding of personnel delivering treatment	Unclear	Not stated in study

Yang 2012 [47]

Bias	**Authors' judgement**	**Support for judgement**
Random Sequence Generation	Unclear	Study states patients were randomly assigned to active or sham stimulation groups but it does not state method of randomisation used in this study.
Allocation Concealment	Unclear	No method used to conceal allocation described in this study.
Blinding Outcome Assessors	Low	The study clearly states that blinding was performed during pre treatment, post treatment and 3 month follow up assessments.
Incomplete reporting outcome data	Low	Two participants were lost during follow-up period: one from sham and one from active tDCS groups. 14 patients were assessed at post treatment periods.
Selective reporting outcome data	Low	All prespecified outcomes were reported in this study
Other biases	Low	None identified. Study funded by local hospital research fund.
Blinding of participants during treatment	Low	As the treatments were identical in this study and all devices were the same, with only difference being active or sham stimulation, it is assumed blinding was possible.
Blinding of personnel delivering treatment	Unclear	However it does not clearly state in study that investigators delivering stimulation were blinded to group allocation.

Appendix J: Meta analyses of secondary outcomes

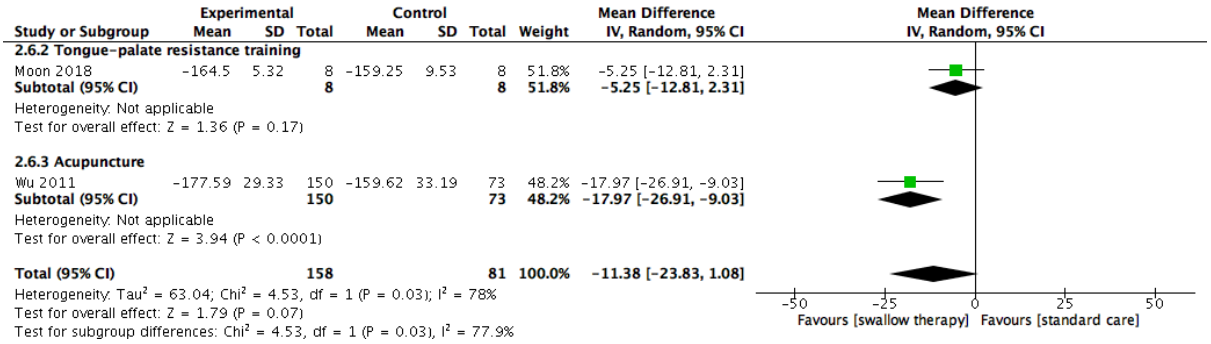


Fig. 1: Swallowing therapy versus standard care: quality of life.

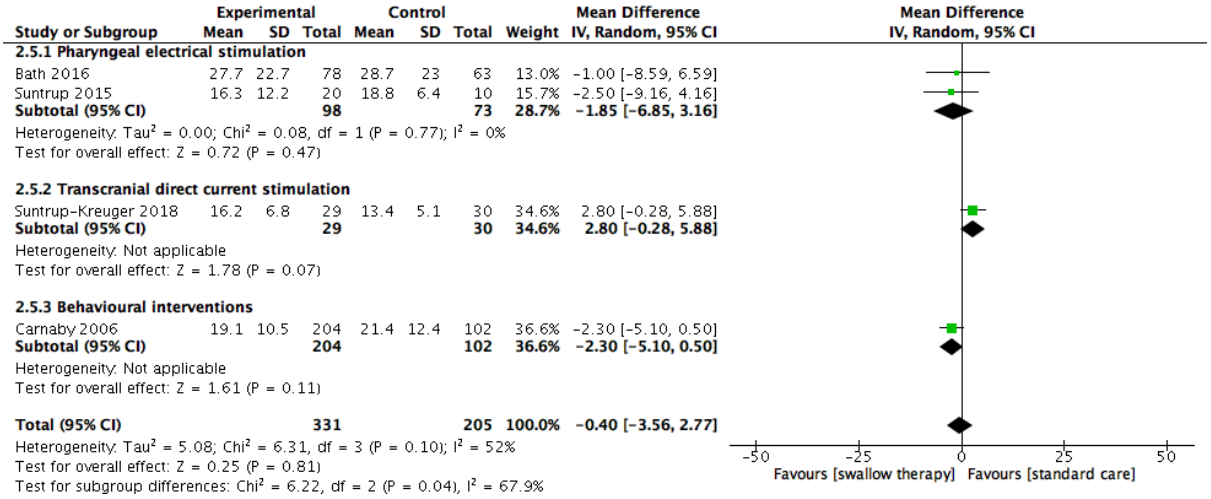


Fig. 2: Swallowing therapy versus standard care: length of stay.

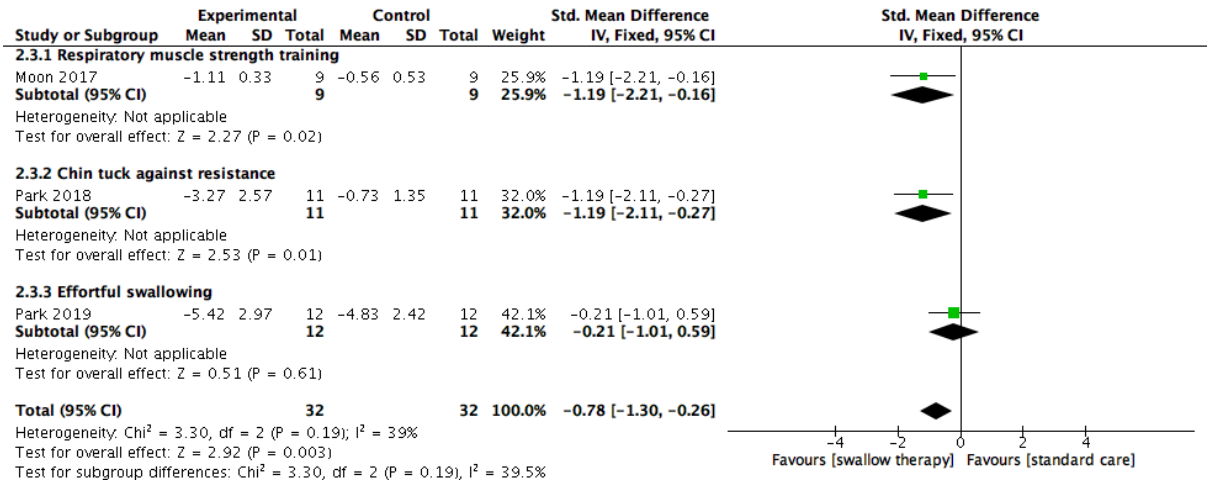


Fig. 3: Swallowing therapy versus standard care: change in pharyngeal residue severity

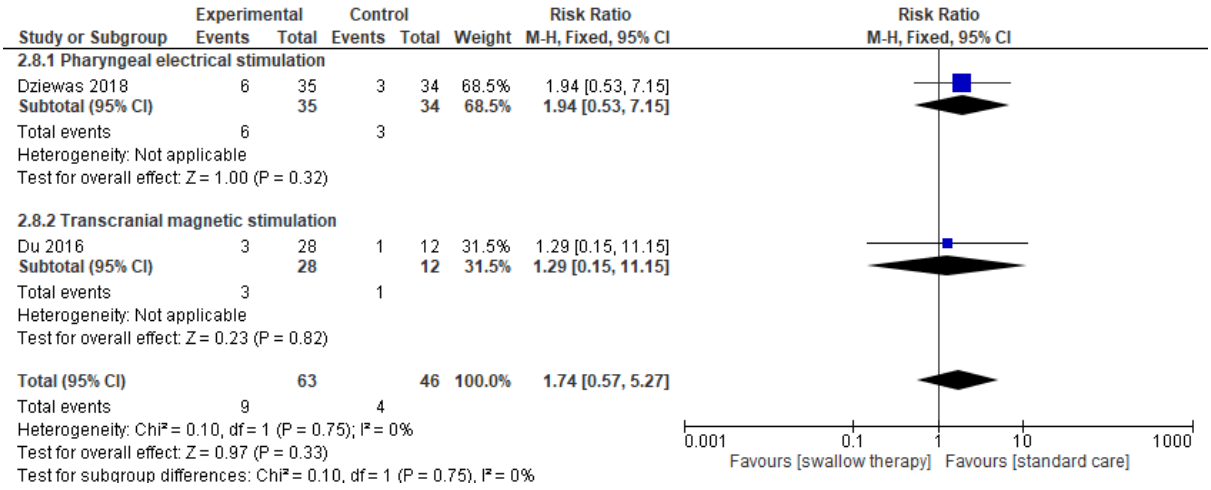


Fig. 4: Swallowing therapy versus standard care: Intervention-related adverse events