Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Bulow et al., 2008 PEDro score: 5	25 patients with chronic stroke and dysphagia	Neuromuscular electrical stimulation (NMES) (n=12) vs. Traditional swallowing therapy (n=13) **Treatment details**: 60-minutes/sessions, 5 days/week for 3 weeks. NMES: two electrodes were placed just at or above the level of the thyroid notch over the thyrohyoid muscle. Stimulation amplitude ranged from 4.5 – 25 mA.	**At 3 weeks (immediately post-treatment):** (-) Self-evaluation of dysphagia (Visual Analog Scale) (-) Actual Nutrition Scale (-) Oral Motor Function Test (-) Videofluoroscopic Swallowing Evaluation
Carnaby et al., 2006 PEDro score: 8	306 patients with acute stroke and dysphagia	Usual care (n=102) (Group A) vs. Standard low intensity treatment (n=102) (Group B) vs. Standard high intensity treatment (n=102) (Group C) NOTE: due to lack of notable differences in results between Group B and C the authors combined these two groups so that the results reported here reflect Group A vs. Group B+C. **Treatment details**: Group A: patient management by the attending physician. Group B: swallowing compensation strategies, environmental modification, safe swallowing advice, dietary modifications; 3 times/week for 1 month or for the duration of hospitalization. Group C: direct swallowing exercises, dietary modifications; 5 days/week for 1 month or for the duration of hospitalization.	**At 6 months (follow-up):** (-) Return to normal diet - time* (-) Return to normal diet – number of patients (+) Functional swallowing (i.e. return to pre-stroke diet without swallowing complications) (+) Chest infection (aspiration pneumonia) (+) Swallowing-related medical complications (dehydration, calorie-nitrogen deficit) (-) Barthel Index (-) Modified Ranking Scale (+) Death or institutionalization (-) Death or dependency * Between-group difference was found in favor of Group A vs. Group B+C

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Chipps et al., 2014 PEDro score: 5	51 patients with acute stroke and dysphagia	Timed oral care delivered by trained nurse (n=29) vs. Standard oral care as per hospital policy (n=22) **Treatment details**: 2 times/day for 10 days. Timed oral care consisted of providing patients with an "oral care box" containing necessary supplies. Performed care included timed tooth brushing with a battery powered toothbrush, tongue brushing, flossing, mouth rinse, and lip care.	**At 10 days (immediately post-treatment):** (-) Growth of S. aurcus (-) Functional Oral Intake Scale (-) Mann Assessment of Swallowing Ability (-) Revised-THROAT
DePippo et al., 1994 PEDro score: 6	115 patients with subacute stroke and dysphagia	Group A: Self-management of diet and swallowing techniques (n=38) vs. Group B: Diet chosen by dysphagia therapist; self-management of swallowing techniques (n=38) vs. Group C: Intensive diet management and swallowing techniques by dysphagia therapist (n=39) **Treatment details**: All patients were also given a thorough explanation of diagnostic results, recommendations for specific diets, and written swallowing techniques.	**Until end point during the inpatient stay (post-treatment) and at 1 year post-stroke (follow-up):** (-) Pneumonia – frequency (+) Pneumonia – onset (-) Dehydration (-) Calorie-nitrogen deficit* Note: Group B developed pneumonia sooner than group A *Calorie-nitrogen deficit was defined as serum albumin < 2.5 or sustained ketonuria without glycosuria over 2 weeks.
Ebihara et al., 2006 PEDro score: 5	105 patients with stroke (stage of stroke recovery not specified) and dysphagia	Black pepper oil olfactory stimulation (n=35) vs. Lavender oil olfactory stimulation (n=35) vs. Nasal inhalation of distilled water (n=35)	**After 30 days (immediately post-treatment):** (+) Latency of swallowing reflex (-) Cough-reflex sensitivity (+) Serum substance P (+) Number of swallowing movements

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Treatment details: Nasal inhalation of 100 mL of black pepper oil or lavender oil or distilled water was administrated to the nostrils with a paper stick. Caregivers assisted with nasal inhalation of the nominated odorants by participants for 1 minute immediately before each meal for a period of 30 days.	Significant differences in favour of black pepper oil vs. lavender oil and distilled water.
El-Tamawy et al., 2015 PEDro score: 5	30 patients with stroke (stage of stroke recovery not specified) and dysphagia	Physical therapy + neuromuscular electrical stimulation (NMES) (n=15) vs. Standard medical care (n=15) **Treatment details**: PT program comprised a 45-minute session of strengthening and stimulation of the elevator muscle of the larynx above and below the hyoid bone. NMES was applied for 30 minutes/session using two channels placed at the submental region (80Hz frequency, 0 -150 V amplitude, 0 – 25mA intensity). PT+NMES was provided 3 times/week over 6 weeks.	**At 6 weeks (immediately post-treatment):** (+) Videofluoroscopic Swallowing Study (VFSS) - Oral transit time (+) VFSS - Hyoid elevation (+) VFSS - Laryngeal elevation (-) VFSS - Oesophageal sphincter opening (+) VFSS - Aspiration/penetration
Huang et al., (2014) PEDro score: 6	29 patients with acute stroke and dysphagia	Neuromuscular electrical stimulation (NMES) + traditional swallowing therapy (Group A) (n=10) vs. NMES alone (Group B) (n=8) vs. Traditional swallowing therapy alone (control) (n=11) **Treatment details**: All groups received their respective treatment over 10 60-minute sessions, 3 times per week for 3 weeks.	**At 3 weeks (immediately post-treatment):** (-) Functional Oral Intake Scale (+) Functional Dysphagia Scale (FDS)– Solids* (+) FDS - Thick liquids* (-) FDS - Soft diet (-) FDS - Thick liquids (-) Penetration-Aspiration Scale *In favor of Group A vs. Group B and vs. control group.

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		NMES was provided using VitalStim® device consisting of dual channel with 2 bipolar electrodes placed at the anterior neck (80Hz frequency, 0-25mA amplitude, 700 µs pulse width).	
Jayasekeran et al., 2010 PEDro score : 8	28 patients with acute stroke and dysphagia	Active pharyngeal electrical stimulation (n=16) vs. Sham pharyngeal electrical stimulation (n=12) **Treatment details**: Stimulation delivered via electromyography catheter (0.2ms pulses, 280V, 5Hz frequency, 75% of maximum tolerated intensity, 10 minutes duration). 10-minute session, 1 time/day for 3 consecutive days.	**At 2 weeks following the start of the treatment**: (+) Penetration-Aspiration Scale (-) Temporal swallowing measures (+) Dysphagia Severity Rating Scale At discharge from the hospital: (-) Barthel Index (+) Length of hospitalization
Joo Yang et al., 2012 PEDro score: 7	16 patients with acute stroke and dysphagia	Anodal transcranial direct current stimulation (tDCS) (n=9) vs. Sham tDCS (n=7) **Treatment details**: 30-minutes/session, 5 days/week for 2 weeks. Stimulation was applied to the pharyngeal motor cortex of the affected hemisphere during conventional swallowing training.	**At 2 weeks (immediately post-treatment):** (-) Functional Dysphagia Scale (-) Videofluoroscopic Swallowing Study (VFSS) - Oral transit time (-) VFSS - Pharyngeal transit time (-) VFSS- Total transit time **At 3 months (follow-up):** (+) Functional Dysphagia Scale (-) VFSS - Oral transit time (-) VFSS - Pharyngeal transit time (-) VFSS - Total transit time
Khedr & Abo-Elfetoh, 2010 PEDro score: 6	22 patients with acute and subacute stroke and dysphagia	Active repetitive transcranial magnetic stimulation (rTMS) (n=11) vs.	**At 5 days (immediately post-treatment):** (+) Dysphagia Grade (-) National Institutes of Health Stroke Scale

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
	Patients were differentiated according to location of lesion: lateral medullary infarction (n=11) or other brainstem infarction (n=11)	Sham rTMS (n=11) **Treatment details**: 10-minutes/session for 5 days. rTMS was applied to the provisional oesophageal cortical area of both hemispheres (3cm anterior and 6 cm lateral to the vertex), 3Hz stimulation lasting for 10 seconds and repeated every minute for 10 minutes.	(-) Hemispheric Stroke Scale – grip strength (+) Barthel Index* **At 1-month and 2-month follow-up:** (+) Dysphagia Grade (-) National Institutes of Health Stroke Scale (-) Hemispheric Stroke Scale – grip strength (+) Barthel Index* * in patients with lateral medullary infarction only
Kumar et al., 2011 PEDro score: 6	14 patients with acute stroke and dysphagia	Anodal Transcranial direct current stimulation (tDCS) (n=7) vs. Sham tDCS (n=7) **Treatment details**: 30-minutes/session for 5 days. tDCS was applied to the sensorimotor cortical representation of swallowing in the unaffected hemisphere; both groups received their respective intervention with standardised swallowing maneuvers; anodal tDCS was of 2mA amplitude.	**At 5 days (immediately post-treatment):** (+) Dysphagia Outcome and Severity Scale
Lim et al., 2009 PEDro score: 6	36 patients with subacute or chronic stroke and dysphagia	Neuromuscular electrical stimulation (NMES) + tactile-thermal stimulation (TTS) (n=18) vs. TTS alone (n=18) **Treatment details**: NMES was provided using VitalStim® device with electrodes placed to stimulation the digastric, myohyoid	**At 4 weeks (immediately post-treatment):** (+) Swallow Function Scoring system (+) Penetration-Aspiration Scale (semi-solids and liquids) (+) Videofluorosocpic Swallowing Study - pharyngeal transit time (semi-solids and liquids)

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		and thryrohyoid muscle (at 7mA amplitude, for 1 hour with on and off periods). TTS involved using a cold mirror to stimulate the oral cavity and an ice stick to stimulate the side of the face. 5 trials of each treatment/week for 4 weeks.	NB: changes refer to changes in pre- to post-treatment scores.
Michou et al., 2014 PEDro score : 6	18 patients with subacute or chronic stroke and subsequent dysphagia	Pharyngeal electrical stimulation (PES) (n=6) vs. Paired associative stimulation (PAS) (n=6) vs. Repetitive transcranial electrical stimulation (rTMS) (n=6) vs. Sham application of each respective treatment (n=18) **Treatment details**: Each treatment and their respective sham treatment were provided once, in random order, on different days. PES: 5Hz for 10 minutes. PAS: pairing a pharyngeal electrical stimulus (0.2ms pulse) with single TMS pulse over the pharyngeal motor cortex, delivered repeatedly every 20 seconds, inter-stimulus interval of 100ms for 10 minutes. rTMS: delivered to the pharyngeal motor cortex, 5Hz frequency, 90$ of resting thenar Motor Threshold intensity in train of 250 pulses, in 5 blocks of 50 with 10 seconds between-block pauses.	**At 30 minutes post-intervention:** (+) Cortical excitability of the unaffected hemisphere *# (+) Penetration-Aspiration Scale # *in favor of PES vs. PES sham, and PAS vs. PAS sham in the unaffected hemisphere. #when responses for all 3 modalities were combined.
Momosaki et al., 2013 PEDro score: 8	20 patients with chronic stroke and dysphagia	Real functional magnetic stimulation over the suprahyoid muscle group (n=10) vs.	**At 1 session of 10 minutes (immediately post-treatment):** (-) Timed Water-Swallow Test (TMT) – Interswallow interval

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Sham functional magnetic stimulation over the suprahyoid muscle group (n=10) **Treatment details**: 1 x 10-minute session. Stimulation was provided using the MagVenture MagProR30® parabolic coil (280 µs of active pulse width, 30Hz frequency, 2 seconds duration followed by 28 seconds of rest, repeated over 10 minutes; 1200 pulses in total).	(+) TMT – Speed (+) TMT – Capacity
McCullough & Kim, 2013 PEDro score: 5 (crossover study)	18 patients with subacute or chronic stroke and dysphagia	Mendelsohn maneuver (n=9) vs. No treatment (control) (=9) **Treatment details**: 45-60 minutes/sessions, 2 times/day for 2 weeks, using an AABB / BBAA study design.	**At 2 weeks (immediately post-treatment) and at 3 months (follow-up):** (-) Videofluoroscopic Swallowing Study (VFSS) - Hyoid maximum elevation (-) VFSS - Hyoid maximum anterior excursion (-) VFSS - Extent of the upper esophageal sphincter opening (-) Penetration-Aspiration Scale (-) Dysphagia Outcome and Severity Scale
McCullough et al., 2012 PEDro score: 5 (cross-over study)	18 patients with subacute or chronic stroke and dysphagia	Mendelsohn maneuver (n=9) vs. No treatment (control) (n=9) **Treatment details**: 45-60minutes/sessions, 2 times/week for 2 weeks.	**At 2 weeks (immediately post-treatment):** (-) Videofluoroscopic Swallowing Study (VFSS) - Duration of hyoid maximum anterior excursion (-) VFSS - Duration of hyoid maximum elevation (-) VFSS- Pharyngeal response duration (-) VFSS - Duration of upper esophageal sphincter opening (-) Penetration-Aspiration Scale (-) Dysphagia Outcome and Severity Scale

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Park et al.,. 2016 PEDro score: 6	61 patients with chronic stroke and dysphagia	Neuromuscular motor electrical stimulation combined with effortful swallow (n=31) vs. Neuromuscular sensory electrical stimulation (n=30) **Treatment details**: 30 x 30-minutes sessions over 6 weeks; both groups received conventional dysphagia therapy. NMES provided using the VItalStim® with electrodes placed at the infrahyoid area targeting sternohyoid muscle (80Hz pulse rate, 700µs duration, 9-14mA intensity).	**At 6 weeks (immediately post-treatment):** (+) Videofluoroscopic Dysphagia Scale (VDS) – Total (-) VDS – Oral phase (+) VDS – Pharyngeal phase (+) Horizontal displacement of the hyoid bone (+) Vertical displacement of the hyoid bone (+) Penetration-Aspiration Scale
Park et al., 2013 PEDro score: 8	18 patients with subacute or chronic stroke and dysphagia	Repetitive transcranial magnetic stimulation (rTMS) (n=9) vs. Sham rTMS (n=9) **Treatment details**: 10-minutes sessions/weekday for 2 weeks, applied over the pharyngeal hotspot of the intact hemisphere, 10 trains of 5Hz stimulations, lasting 10sec, repeated every minute.	**At 2 weeks (immediately post-treatment):** (+) Videofluoroscopic Dysphagia Scale (-) Penetration-Aspiration Scale **At 4 weeks (follow-up):** (+) Videofluoroscopic Dysphagia Scale (-) Penetration-Aspiration Scale Note: Results indicate within-group differences for the rTMS group only; no between group analyses were performed.
Park et al., 2012 PEDro score: 5	20 patients with stroke (phase of stroke recovery not specified) and dysphagia	Effortful swallow with infrahyoid motor electrical stimulation (n=10) vs. Effortful swallow with infrahyoid sensory electrical stimulation (control) (n=10) **Treatment details**: 20-minutes sessions, 3 times/week for 4 weeks using VitalStim® consisting of 2 sets of electrodes placed at the	**At 4 weeks (immediately post-treatment):** (+) Videofluoroscopic Swallowing Study (VFSS) – maximal vertical displacement of the larynx (-) VFSS – maximal vertical and anterior displacement of the hyoid bone (-) VFSS – maximal anterior displacement of the larynx (-) VFSS – maximal width of the upper

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		infrahyoid area targeting the sternohyoid muscle (80Hz pulse rate, 700μs duration).	esophageal sphincter opening (-) Penetration-Aspiration Scale Note: Results indicate significant within-group differences for motor electrical stimulation only; there were no significant changes from baseline to post-treatment following sensory electrical stimulation.
Power et al., 2006 PEDro score: 7	16 patients with acute stroke and dysphagia	Oral electrical stimulation (n=8) vs. Sham electrical stimulation (n=8) **Treatment details**: 1 x 60 minutes session. Stimulation of the anterior faucial pillar for 10 minutes (0.2-Hz frequency stimulation or sham stimulation).	**At 1 session of 60 minutes (immediately post-treatment):** (-) Oral transit time (-) Pharyngeal transit time (-) Swallow response time (-) Laryngeal closure duration (-) Cricopharyngeal opening duration (-) Penetration-Aspiration scale
Shigematsu et al., 2013 PEDro score: 8	20 patients with subacute or chronic stroke and dysphagia	Anodal transcranial direct stimulation (tDCS) (n=10) vs. Sham tDCS (n=10) **Treatment details**: 20-minutes session/weekday for 2 weeks tDCS: 1-mA anodal tDCS to the ipsilesional pharyngeal motor cortex; sham stimulation applied to the ipsilesional pharyngeal motor cortex; Intensive swallowing therapy: blowing, ice massage, pushing exercises, supraglottic swallowing, Shaker exercise, effortful swallow, K-point stimulation.	**At 2 weeks (immediately post-treatment):** (+) Dysphagia Outcome and Severity Scale At 1-month follow-up: (+) Dysphagia Outcome and Severity Scale

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Terre & Mearin, 2015 PEDro score : 8	20 patients with subacute acquired brain injury (n=14 with stroke) and dysphagia	Neuromuscular electrical stimulation (NMES) + conventional swallowing therapy (n=7/10 patients with stroke) Shame NMES + conventional swallowing therapy (n=7/10 patients with stroke) **Treatment details**: NMES: provided using VitalStim® device with 2 sets of electrodes placed over mylohyoid muscle above the hyoid, and the thyroid cartilage over the thyrohyoid muscle (80Hz frequency, 300 µs duration, 2.5-25.0mA apmplitude). 60-minute sessions, 5 times/week for 4 weeks. Conventional swallowing therapy: changes in diet and active maneuvering, motor control exercises.	**At 4 weeks (immediately post-treatment):** (+) Functional Oral Intake Scale (FOIS) (+) Satisfaction with treatment (7-Point Likert Scale) (+) Bolus viscosity at which aspiration appeared (-) Pharyngo-esophageal manometry – basal pressure, relaxation, pharyngeal contraction * **At 3 months (follow-up):** (-) Functional Oral Intake Scale (FOIS) (-) Satisfaction with treatment (7-Point Likert Scale) (-) Bolus viscosity at which aspiration appeared (-) Pharyngo-esophageal manometry – basal pressure, relaxation, pharyngeal contraction * *significant improvements from pre- to post-treatment scores within NMES + conventional swallowing therapy group were noted.
Woo Lee et al., 2014 PEDro score: 5	67 patients with acute stroke and dysphagia	Neuromuscular electrical stimulation (NMES) combined with traditional swallowing therapy (n=35) vs. Traditional swallowing therapy (control) (n=32) **Treatment details**: NMES: 30-minutes/weekday for 3 weeks. NMES was provided using electrodes placed at the infrahyoid area, targeting sternohyoid muscle (80Hz pulse rate, 700 µs duration, starting at 3mA and gradually increased by 1mA of amplitude).	**At 3 weeks (immediately post-treatment):** (+) Functional Oral Intake Scale At 6-week and 12-week (follow-up): (+) Functional Oral Intake Scale

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Traditional swallowing therapy included thermal-tactile stimulation with any combination of lingual-strengthening exercise, laryngeal adduction-elevation exercises, effortful swallow maneuver, Mendelsohn maneuver, Masako maneuver, and Shaker exercises, provided for 60 minutes/day, every day for 15 days.	
Xia et al., 2011 PEDro score: 5	120 patients with acute stroke and dysphagia	Neuromuscular electrical stimulation (NMES) with traditional swallowing therapy (intervention 1) (n=40) vs. NMES (intervention 2) (n=40) vs. Traditional swallowing therapy (control) (n=40) **Treatment details**: NMES: VitalStim® surface electrical stimulation system was used (700 µs wave width, 80 Hz frequency, and 0-25 mA amplitude), 2 channels each equipped with 2 electrodes placed on the surface of swallowing muscles. 30-minute sessions 2 times/weekday for 4 weeks.	**At 4 weeks (immediately post-treatment):** (+) Standardized Swallowing Assessment* (+) Surface Electromyography* (+) Videofluoroscopic Swallowing Study* (+) Swallowing-related Quality of Life Questionnaire* *in favor of intervention 1 vs. intervention 2 and vs. control
Xia et al., 2016 PEDro score : 6	124 patients with acute stroke and dysphagia	Acupuncture combined with standard swallowing training (n=62) vs. Standard swallowing training (n=62) **Treatment details**: 30-minute sessions, 6 times/week for 4 weeks.	**At 4 weeks (immediately post-treatment):** (+) Standardized Swallowing Assessment (+) Dysphagia Outcome Severity Scale (+) Modified Barthel Index (+) Swallowing-Related Quality of Life Scale
Zhang et al., 2016 PEDro score: 5	90 patients with acute stroke and dysphagia	Neuromuscular electrical stimulation (sensory approach) + traditional swallowing therapy (Group A) (n=30) vs.	**At 4 weeks (immediately post-treatment):** (+) Water Swallow Test * (+) Standardized Swallowing Assessment *

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Neuromuscular electrical stimulation (motor approach) + traditional swallowing therapy (Group B) (n=30) vs. Traditional swallowing therapy (control) (n=30) **Treatment details**: Motor approach: 2 electrodes placed in parallel on the skin of the anterior belly of the digastric muscle in the submental region above the hyoid bone. NMES provided using a multifunctional nerve rehabilitation and treatment system (100µs pulse width, 120Hz frequency) Sensory approach: cathode placed on the submental region, anode placed on the occipital skin. NMES provided using vocaSTIM-Master® (0.25Hz frequency, 0-15mA intensity with gradual increase to stimulate swallowing) Both therapies provided for 20-minutes sessions, 2 times/day, 5 days/week for 4 weeks.	(+) Functional Oral Intake Scale * (+) Swallowing-Related Quality of Life Scale * *In favor of the Group A vs. Group B and vs. control therapy. *In favor of the Group B vs. control therapy.
Zhao et al., 2015 PEDro score : 4	120 patients with acute stroke and dysphagia	Combined acupuncture and neuromuscular electrical stimulation (n=62) vs. Acupuncture alone (n=58) **Treatment details**: NMES + Acupuncture: NMES provided using stimulation therapy device (50-100Hz frequency, over nerves and muscles of the throat and neck); Acupuncture provided using reinforcing-reducing manipulation of 8 acupoints. 30-minute sessions, 2 times/day for 2 weeks.	**At 2 weeks (immediately post-treatment):** (+) Kubota's water test* * This refers to a change score from pre- to post-treatment.

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Acupuncture alone: Provided using uniform reinforcing-reducing manipulation of 6 acupoints. 30-minute sessions, 1 time/day for 2 weeks.	