

Figure 1 : PRISMA flow Diagram

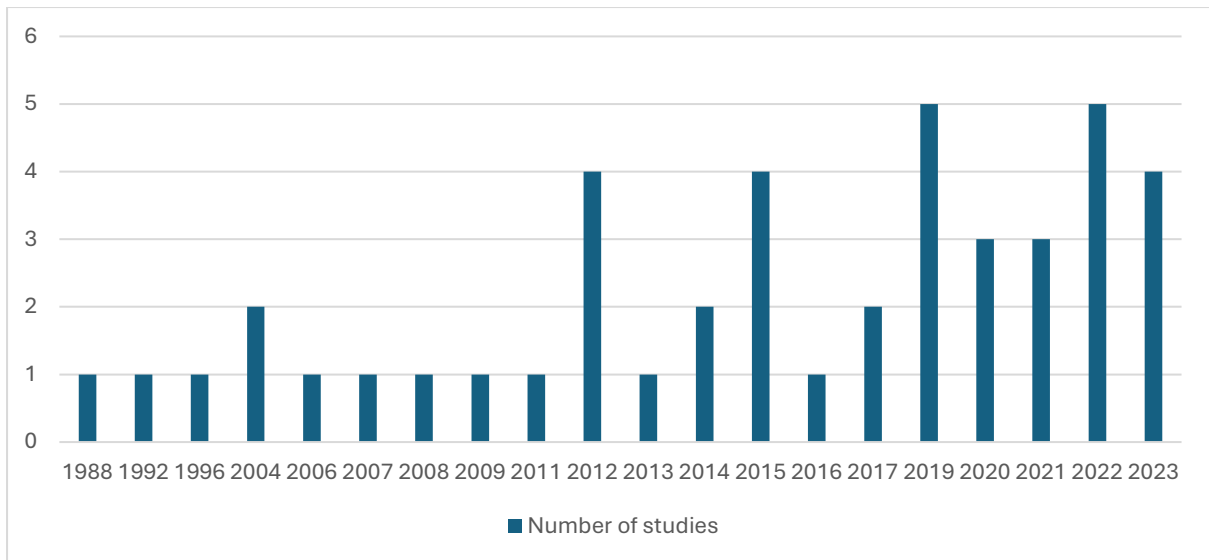


Figure 2: Number of cost analysis studies of SLT interventions published each year.



Key: 📍 Single study location studies, 📍 Multiple study location studies, 📍 Protocol only studies.

Figure 3 Geographical location of studies which assessed the cost of SLT interventions.

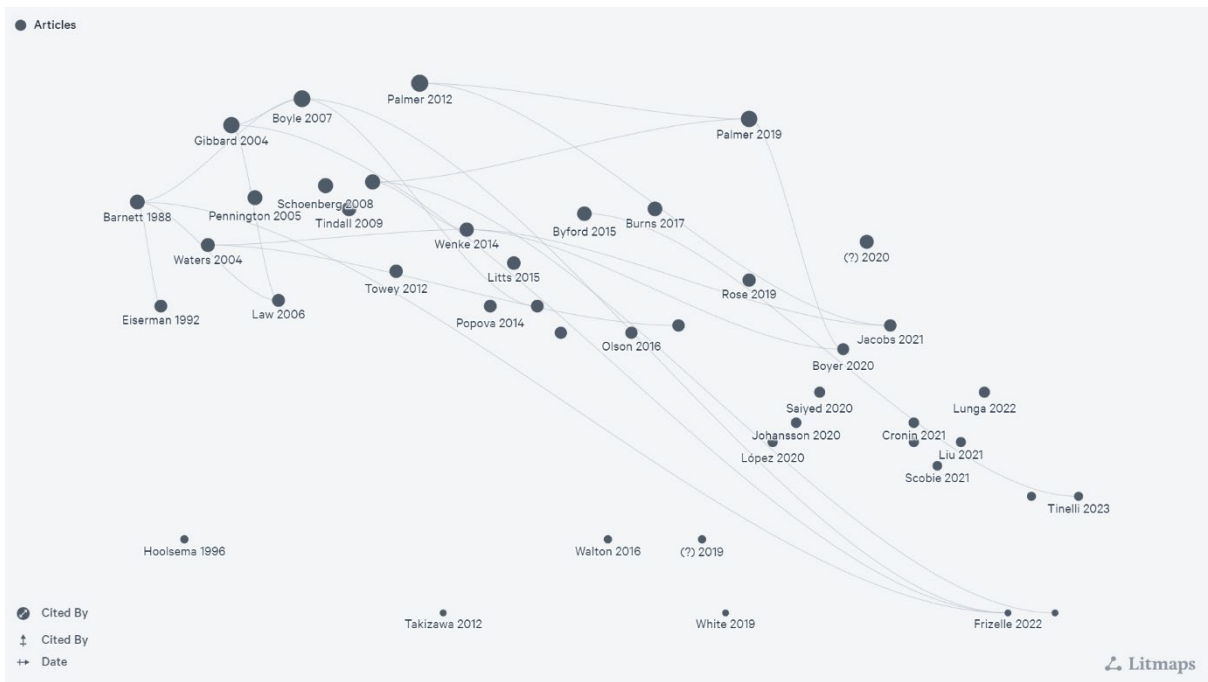


Figure 4: Citation map

Table.7; Study characteristics of studies which assessed cost or cost effectiveness of a SLT intervention for adult stroke patients or adult with aphasia or dysarthria;

Study names	Study design	Population of interest	Clinical setting	Intervention type	Comparator (if applicable)	Type of economic evaluation	Perspective	Horizon	Outcomes assessed
(Bowen et al., 2012) Link papers: (Boyle et al., 2009; Davies, 2011; Nct, 2005, 2009)	RCT	Adult, Stroke, Aphasia or Dysarthria	Hospital inpatient and outpatients	Enhanced early communication therapy by Speech and Language Therapists	Attention control (equivalent amount of contact time (attention) as those in the intervention arm (up to three times a week, for up to 3 months)	Cost-utility analysis	Healthcare sector and patients/families	6 months	Functional Communicative Ability: Measured at 6 months post-randomization using the Therapy Outcome Measure activity subscale. Perceptions of Communication : Assessed through the Communication Outcomes After Stroke scale for participants and part of the Carer COAST for carers. Carer Well-being:

									<p>Evaluated using the Carers of Older People in Europe Index and quality-of-life items from Carer COAST.</p> <p>Economic Evaluation: Included participants' utility measured by the European Quality of Life-5 Dimensions, service use, cost data, and a discrete choice experiment.</p>
<p>(Jacobs et al., 2023)</p> <p>Link paper: (Jacobs & Ellis, 2021)</p>	<p>Before and after study</p>	<p>Adult Stroke Aphasia</p>	<p>Community</p>	<p>Community-based telerehabilitation approach [Language-Oriented Treatment] [telehealth]</p>	<p>No control group. Study was focused on comparison by aphasia subtype, but also compared outcomes by severity and race.</p>	<p>Cost-effectiveness analysis</p>	<p>Healthcare payer</p>	<p>6 week</p>	<p>Aphasia Treatment Benefit: The therapeutic benefit was measured using the Western Aphasia Battery-Revised Aphasia Quotient before and after telerehabilitation treatment.</p>

									<p>Marginal Cost of Treatment: The marginal cost was calculated based on the change in Western Aphasia Battery-Revised Aphasia Quotient and the average cost per treatment session.</p> <p>Cost-Effectiveness by Aphasia Type: The study evaluated the cost-effectiveness of treatment by comparing the improvement in Western Aphasia Battery-Revised Aphasia Quotient scores relative to the type and severity of aphasia.</p>
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<p>(Kim et al., 2023)</p> <p>Link papers: (Godecke, Armstrong, Bernhardt, et al., 2014; Godecke et al., 2013; Godecke et al., 2015; Godecke et al., 2017; Godecke et al., 2016; Godecke, Armstrong, Middleton, et al., 2014; Godecke et al., 2018; Kim et al., 2021)</p>	<p>RCT</p>	<p>Adult Stroke Aphasia</p>	<p>Hospital inpatient and outpatients</p>	<p>Very Early Rehabilitation in Speech (VERSE) intervention</p> <p>Usual Care Plus: usual ward-based therapy and 20 additional sessions (45–60 minutes, provided daily)</p>	<p>Usual care</p>	<p>Cost-effectiveness</p>	<p>Societal perspective</p>	<p>26 weeks post-stroke</p>	<p>Costs: Estimation of costs for patients with aphasia after stroke based on the therapies provided.</p> <p>Healthcare Utilization: Analysis of healthcare resources used and productivity losses.</p> <p>Aphasia Severity: Measurement of clinically meaningful change in aphasia severity using the Western Aphasia Battery-Revised Aphasia Quotient</p> <p>Quality of Life: Comparison of the Stroke and Aphasia Quality</p>
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									of Life Scale-39 scores by study arm and baseline aphasia severity.
(Liu et al., 2021)	RCT	Adult Stroke Aphasia	Community	Acupuncture therapy combined with speech and language therapy	Speech and language therapy alone	Cost utility analysis	Societal perspective	12 weeks	<p>BDAE: Boston Diagnostic Aphasia Examination grades.</p> <p>CRRCAE: Chinese Rehabilitation Research Center Standard Aphasia Examination scores.</p> <p>QALYs: Quality-adjusted life-years.</p> <p>ICER: Incremental cost-effectiveness ratios for BDAE grade</p>

									improvement, CRRCAE score gain, and QALYs gained.
(Palmer et al., 2019) Link papers : (Latimer et al., 2021; Palmer et al., 2015; Palmer et al., 2020; Palmer et al., 2011)	RCT	Adult Stroke Aphasia	In the service user's home	(1) Self-managed computerised (StepByStep aphasia software) speech and language therapy [telehealth]	(2) Usual care(Assessment and review of language abilities and their impact, rehabilitation of different language domains, enabling communication using communication aids or compensatory strategies, or support for mood, confidence, work, family, form completion, and information provision.) (3) Usual care + attention control (Puzzle	Cost utility analysis	v Healthcare sector	Lifetime horizon	Word Finding Ability: The change in the ability to retrieve personally relevant words was measured using a picture naming test. Functional Communication : The change in functional communication ability was assessed by masked ratings of video-recorded conversations using the Therapy Outcome Measures. Self-Perception: The change in

					books (Sudoku, spot the difference, mazes, word searches, cross words, colouring)).				<p>patients' self-perception of communication, social participation, and quality of life was measured using the Communication Outcomes After Stroke questionnaire.</p> <p>Health-Related Quality of Life: This was measured using an accessible variant of the European Quality of Life Instrument (EQ-5D-5L) for patients, and standard EQ-5D-5L completed by carers on behalf of patients.</p> <p>Carers also completed the CarerQoL questionnaire to</p>
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									<p>assess their own quality of life.</p> <p>Adverse events compared.</p>
(Palmer et al., 2012)	RCT	Adult Stroke Aphasia	In the service user's home	Self-managed computerised speech and language therapy [telehealth]	<p>Usual care (participation in activities that provide general language stimulation as they had done previously: attendance at communication support groups and conversation, reading, and writing activities that are part of everyday life)</p>	Cost utility analysis	Health and social care system	Lifetime horizon	<p>Recruitment and Completion Rates: The study aimed to determine the feasibility of recruiting and retaining participants for a randomized controlled trial.</p> <p>Clinical Effectiveness: The effectiveness of the computer therapy was measured by the change in word retrieval ability at 5 and 8 months from baseline.</p> <p>Cost-effectiveness was investigated by estimating total</p>

									<p>costs and total quality-adjusted life-years, incremental cost-effectiveness ratio.</p> <p>Intervention Feasibility: The study evaluated the ability of participants to carry out the self-managed intervention as prescribed.</p>
<p>(Rose et al., 2019)</p> <p>Link papers :(Rose et al., 2015; Rose et al., 2021; Rose et al., 2022)</p>	RCT	Adult Stroke Aphasia	Community	<p>1. Multi-Modal Aphasia Treatment [M-MAT] (3 hours mul-modality group therapy, 5 days a week for 2 weeks)</p> <p>2.Constraint-Induced Aphasia Therapy Plus [CIAT-Plus]: (3</p>	Usual care service-based aphasia therapy (Care as per usual in the community: estimated at <2h/week)	Cost-utility analysis	Healthcare system and patients	12 weeks	<p>Primary Outcome: The primary measure was the Western Aphasia Battery-Revised Aphasia Quotient, assessed immediately after the intervention.</p> <p>Secondary Outcomes: These included the Western</p>

				hours constraint-induced group therapy, 5 days a week for 2 weeks)					<p>Aphasia Battery-Revised Aphasia at 12-week follow-up, naming scores, discourse measures, the Communicative Effectiveness Index, the Scenario Test, and the Stroke and Aphasia Quality of Life Scale-39g both immediately and at 12 weeks post-intervention.</p> <p>Economic Evaluation: The study also looked at incremental cost-effectiveness ratios compared with usual care at 12 weeks.</p>
(Takizawa, Marty, & Roze, 2012)	Costing study	Adult Stroke Dysphagia	Acute and inpatient	Swallowing disorder rehabilitative session	Managed dysphagia vs unmanaged dysphagia	Costing study	Healthcare payer	Not clear	Cost: The cost of speech and language therapy (unit

									costs per patient)
(Wenke et al., 2014)	Non-randomised controlled trial	Adult Stroke Aphasia	Hospital inpatient and outpatients	<p>Intensive communication therapy by speech and language therapists (additional 1 – 1.5 hours of treatment employing either the use of</p> <p>1. Computer therapy (software programs including REACT-2, Aphasia Tutor, Language Links, and Synonyms)</p> <p>2. Group therapy (Four-to-six participants participated in each group therapy session</p>	<p>Speech pathology therapy assistant therapy (The tasks provided by the speech pathology therapy assistant were planned by the treating speech and language therapist and reflected similar tasks that participants received during their individual speech and language therapy)</p>	Consequence analysis*	Healthcare sector	Not clear	<p>Spoken Language Production: This included sub-tests for naming objects, naming actions, and word fluency.</p> <p>Disability Questionnaire: A standardized questionnaire measuring the impact of aphasia on daily life and emotional well-being.</p> <p>Organizational Outcomes: Data collected to determine the costs associated with each service delivery model.</p>

				which was facilitated by a speech and language therapist)					<p>Cost of service: pro-rata cost of providing treatment per hour per client.</p> <p>Client, Caregiver, and Clinician Satisfaction: Questionnaires evaluated the satisfaction levels of all parties involved with the intensive</p>
(Dowlatshahi et al., 2019)	Protocol: RCT	Adult Stroke	Acute and inpatient	Mobile tablet-based speech therapy [telehealth]	Usual care (speech and language therapist)	Cost-Utility Analysis	Not clear	Not clear	<p>Change in Western Aphasia Battery scores</p> <p>Cost-effectiveness incremental cost per one-unit improvement in AQ & incremental cost per one quality-adjusted life year.</p>

									<p>Stroke and Aphasia Quality of Life Scale</p> <p>Communicative Effectiveness Index</p> <p>Cognitive Linguistic Quick Test-Plus</p> <p>The 5-level EQ-5D version</p> <p>National Institutes of Health Stroke Scale</p> <p>Barthel index</p> <p>Modified Rankin Scale</p>
(Spielmann et al., 2016)	Protocol: RCT	Adult Stroke Aphasia	Acute and inpatient	Transcranial direct current stimulation	Sham treatment (activated for 30 seconds and then deactivated to mimic the sensation of active tDCS without providing actual stimulation)	Cost utility analysis	Societal (productivity costs included)	6 months	<p>Primary Outcome: The primary focus was on word-finding abilities, measured by the Boston Naming Test.</p>

									<p>Secondary Outcomes: These included measures of verbal communication, social participation, quality of life, and the cost-effectiveness of the intervention, Wong-Baker Faces pain rating scale.</p> <p>Verbal Communication : Aphasia Severity Rating Scale and the Amsterdam Nijmegen Everyday Language Test</p> <p>Quality of Life and Participation: Assessed using the European quality of life-5D, Stroke and Aphasia Quality of Life</p>
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									questionnaire, and the Community Integration Questionnaire.
(Stahl et al., 2019)	Protocol: RCT	Adult Stroke Aphasia	Acute and inpatient	Transcranial direct current stimulation	Sham treatment (mimicked the initial tingling sensation of actual transcranial direct current stimulation)	Cost-utility analysis	Healthcare system and patients	12 months	<p>Primary Outcome: The main focus was on communication ability, measured by changes in the Amsterdam-Nijmegen Everyday Language Test scores.</p> <p>Secondary Outcomes: These included assessments of linguistic-executive skills, attention, memory, emotional well-being, quality of life, health economic costs, and adverse events.</p>

Key: * **Defined by the authors as a cost-effectiveness study but did not actually combine cost and effectiveness outcomes**, Grey area indicates a protocol for a study, COAST – Carer Communication Outcome after Stroke carer communication, QALYs – Quality-Adjusted Life Years, ICER – Incremental Cost-Effectiveness Ratio, BDAE – Boston Diagnostic Aphasia Examination grades, CRRCAE – Chinese Rehabilitation Research Center Standard Aphasia Examination scores, CarerQoL – Carer Quality of Life, RCT – Random controlled trial.

Table.8; Study characteristics of studies which assessed cost or cost effectiveness of a SLT intervention for adult with aphasia or dysarthria;

Study names	Study design	Population of interest	Clinical setting	Intervention type	Comparator (if applicable)	Type of economic evaluation	Perspective	Horizon	Outcomes assessed
(Boyer, Jordan, & Cherney, 2022)	Retrospective observational study	Adults with Aphasia	Acute and inpatient	Intensive Comprehensive Aphasia Programme	None (although running the programme again after the initial intervention was compared)	Costing study	Healthcare payer	4 weeks	<p>Total Implementation Cost: The primary outcome measured was the total cost to the provider for implementing an Intensive Comprehensive Aphasia Program.</p> <p>Personnel Costs: A significant portion of the costs was attributed to personnel, especially the time of the Speech Language Pathologist.</p>

									<p>Break-even Charges: The study analyzed break-even charges per participant, which varied based on the number of participants.</p> <p>Cost Drivers: The main cost drivers identified were personnel costs and the number of participants in each cohort.</p>
(Burns et al., 2019)	Non-randomised controlled trial	Adults with Dysphagia	Outpatient	Telepractice service model for conducting clinical swallow examinations implemented [telehealth]	Standard care, which involved scheduled/on-demand clinician visits to remote services or patients travelling to face-to-face assessment	Consequence analysis*	Healthcare payer	One off assessment	<p>Waiting times: number of days</p> <p>Clinical session outcomes: no specific tool was described</p> <p>Service costs: total cost</p> <p>Consumer satisfaction: no</p>

									specific tool was described
(Hobson et al., 2013)	Non-randomised controlled trial	Adults with Aphasia	Hospital inpatient	(1) Computer therapy [telehealth] (2) group therapy.	(3) Use of speech pathology therapy assistant	Consequence analysis*	Healthcare sector	11 weeks	<p>Patient language function: no specific tool was described</p> <p>Attendance: no specific tool was described</p> <p>Cost of intervention: pro rata cost of intervention per hour</p>
(Thomas, Burris, & Colon, 2020)	Retrospective observational study	Adults with Dysphagia	Acute and inpatient	Modified Barium swallow	Fiberoptic endoscopic	Consequence analysis*	Healthcare payer	One year	<p>Discharge Disposition: The primary outcome measured is where patients were discharged to after their stay at the inpatient rehabilitation facility, particularly whether they were discharged</p>

									<p>home or to another type of facility.</p> <p>No specific description of the outcome for cost evaluation.</p>
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Key: * Defined by the authors as a cost-effectiveness study but did not actually combine cost and effectiveness outcomes

Table.9; Study characteristics of studies which assessed cost or cost effectiveness of a SLT interventions for adult head and neck cancer patients

Study names	Study design	Population of interest	Clinical setting	Intervention type	Comparator (if applicable)	Type of economic evaluation	Perspective	Horizon	Outcomes assessed
(Burns et al., 2017)	RCT	Adult Cancer, including head and neck cancer	Outpatient	Patient continuing to attend SLT appointments regionally but with specialist SLT support via telehealth with patient present)	Usual care: (attend appointments at their regional hospital with their local speech pathologist, while specialist support for the referred problem was provided by the Royal Brisbane and Women’s Hospital speech pathologist to the regional speech pathologist predominantly without the patient present, via email/telephone contact when convenient and clinically indicated))	Cost consequence analysis*	Healthcare payer	11 months	Health Service Costs: Calculated based on staff wages, equipment, patient travel reimbursement, and other service-related expenses. Patient & Carer Costs: Included travel expenses, wages lost due to treatment, and quality of life impacts measured by the Assessment of Quality-of-Life questionnaire 4D. Quality of Life: Utilized the Assessment of Quality-of-Life questionnaire 4D

									to measure changes in health-related quality of life for patients.
(Johansson et al., 2020)	RCT	Adult Cancer, including head and neck cancer	Outpatient	Voice rehabilitation	Usual care(general vocal hygiene advice according to clinical practice)	Cost utility analysis	Societal perspective	12 months	<p>Voice Rehabilitation Efficacy: The effectiveness of voice rehabilitation post-radiotherapy.</p> <p>Quality-Adjusted Life Years: QALYs</p> <p>Healthcare Costs: Direct healthcare costs and loss of production were analyzed to determine the cost-effectiveness of voice rehabilitation.</p> <p>Cost-Effectiveness Analysis: The incremental cost-effectiveness ratio was calculated to compare voice</p>

									rehabilitation with no rehabilitation intervention.
(Martino et al., 2017) Link paper: (Martino et al., 2015)	Feasibility study	Adult Cancer, including head and neck cancer	Outpatient	Mostly face to face, some follow ups completed via telephone	Standard care	Cost consequence analysis*	Patients and caregivers	3 months	<p>Delay to removal of an enteral feeding tube after completion of treatment</p> <p>M.D. Anderson Dysphagia Inventory</p> <p>The Functional Assessment of Cancer</p> <p>The Functional Assessment of Cancer Therapy–Enteral Feeding</p> <p>Swallow Quality of Care questionnaire</p> <p>European quality-of-life Research</p>

									Foundation, Rotterdam, Netherlands Functional Oral Intake Scale Body Mass Index Patient Self- Administered Financial Expenditure
(Waters et al., 2004)	RCT	Adult Cancer, including head and neck cancer	Outpatient	Swallowing rehabilitation intervention strategy (swallowing exercises 16 x 1 hour sessions)	Waiting-list control	Cost consequence analysis*	Patient and health care trust	8 months	Oral Transit Time Pharyngeal Transit Time Duration of Tongue Base Retraction Duration of Tongue Base to Pharyngeal Wall Contact at the Level of Inferior C2. Duration of Tongue Base to Pharyngeal Wall

									Contact at the Level of Superior C3
									Pharyngeal Delay Time
									Pharyngeal Response Time
									Duration of Hyoid Movement
									Duration of Laryngeal Elevation
									Oral Transit Time
									Pharyngeal Transit Time
									Duration of Tongue Base Retraction.
									Duration of Tongue Base to Pharyngeal Wall Contact at the Level of Inferior C2

(International Standard Randomised Controlled Trial Number, 2023)	Protocol: Feasibility study	Adult Cancer, including head and neck cancer	Outpatient	60-minute outpatient Speech and Language Therapy appointment once a week for 6 weeks	Usual care	Cost-utility analysis	Healthcare payer and patient	18 months follow-up	<p>Pressure Measurements: Using High-Resolution Manometry at baseline and 3 months.</p> <p>Repeat Swallows: Number of repeat swallows measured with the 100 ml water swallow test</p> <p>Swallow Score: Patient report of swallow score using the MD Anderson Dysphagia Inventory</p> <p>Pharyngeal Constriction: Ratio measurement using video fluoroscopy swallow evaluation</p> <p>Diet Level Score: Clinician report using the</p>
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									<p>Functional Oral Intake Scale</p> <p>Neck Range of Motion: Score measured with a goniometer</p> <p>Cost-effectiveness: Assessed using the EuroQol EQ-5D-5L health-related quality of life measure</p>
(International Standard Randomised Controlled Trial Number, 2018)	Protocol: RCT	Adult Ca ncer, including head and neck cancer	Outpatient	<p>Patients referred to group 1 or 2 will practice at home following an instruction session.</p> <p>Group 2 will receive an additional app to support in this delivery.</p>	Receives speech therapist supervised therapy	Cost-utility analysis	Not explicitly stated	4 months	<p>Swallowing Function: Assessed using the Mann Assessment of Swallowing Ability – Cancer, Eating Assessment Tool (EAT-10), a visual analogue scale for self-perception of swallowing ability, and the Functional Oral Intake Scale 50.</p>

									<p>Compliance: The degree of adherence to the exercise program is measured weekly through patient and therapist logbooks, the IOPI device for tongue strengthening exercises, and app usage data for Group.</p> <p>Muscle Strength: Tongue strength is measured using the Iowa Oral Performance Instrument, and maximum muscle strength during Chin Tuck Against Resistance is assessed with a dynamometer1.</p> <p>Quality of Life: Evaluated using the Swallowing Quality of Life Questionnaire and</p>
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									the Dysphagia Handicap Index
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Key: * **Defined by the authors as a cost-effectiveness study but did not actually combine cost and effectiveness outcomes**, Grey area indicates a protocol for a study, QALYs - Quality-Adjusted Life Years, RCT - Randomised controlled trial.

Table 1. Study characteristics of studies which assessed cost or cost effectiveness of a SLT intervention for adults with a range of conditions;

Study names	Study design	Population of interest	Clinical setting	Intervention type	Comparator (if applicable)	Type of economic evaluation	Perspective	Horizon	Outcomes assessed
(Hoolsema, 1996)	Before and after study	Adults with non-specific condition or problem	Acute and inpatient	Speech therapy	None	Cost-Effectiveness Analysis	Healthcare payer	9 months	Functional communication measure: designed by American Speech-Language-Hearing Association taskforce on treatment outcome. Cost: Total cost of speech and language therapy intervention.
(Litts et al., 2015)	Retrospective observational study	Adults with a Voice - related issues	Outpatient	Voice therapy	Study compared patients evaluated by a laryngologist and SLT against control group assessed by laryngologist only	Cost consequence analysis *	Healthcare sector	3 months	Therapy Attendance: The study measured the number of therapy sessions attended and the number of cancellations or no-shows. Voice Therapy Outcomes: Changes in Voice Handicap Index-10 scores

									<p>Discharge Reasons: The reasons for patients being discharged from therapy, whether they met therapeutic goals or not</p> <p>Cost: The study examined the financial repercussions of co-assessment, including potential revenue lost due to missed appointments and the effect on SLP billing revenue.</p>
(Lunga, Thibeault, & Francis, 2022)	Retrospective observational study	Respiratory care in adults	Unclear	Speech therapy	Costs for patients who initiated versus did not initiate speech therapy and who had successful versus unsuccessful therapy were compared	Cost consequence analysis *	Societal	12 months	<p>Time to Diagnosis: The duration from the onset of dyspnoea symptoms to the diagnosis of Paradoxical Vocal Fold Movement.</p> <p>Healthcare Costs: Direct and indirect costs incurred before and after the diagnosis, including office visits, procedures, and prescribed pharmaceuticals.</p> <p>Lost Wages: Indirect costs associated with</p>

									<p>lost wages due to healthcare visits.</p> <p>Treatment Outcomes: The dichotomy of therapy outcomes into successful (significant symptom improvement) and unsuccessful (persistent or worsened symptoms)</p>
(Mills et al., 2019)	Before and after study	Adults with a Tracheostomy	Critical care	Assessed by SLT and patients only eating and drinking with the cuff inflated if found to be safe	Patients prior to implementation of change	Cost consequence analysis *	Healthcare payer	10 months	<p>Length of stay: intensive care unit length of stay & Ward length of stay</p> <p>Cost: Cost savings</p> <p>Total mortality for hospital stay</p> <p>Number of chest X-rays on intensive care unit.</p>
(Sanz Lopez, Perez Marrero, & Rivera	RCT	Adults with a Voice - related issues	Outpatient	Standard SLT (traditional supervised speech	Tube phonation (performed exercises involving phonating into	Cost-Effectiveness	Healthcare payer	1 year	GRBAS Scale: The subjective evaluation of

Rodriguez, 2020)				therapy sessions)	water through a tube)				patients' voices using the GRBAS scale Cost-Effectiveness: Analysis of the healthcare costs associated with Tube phonation and Standard SLT treatments
(Schoenberg et al., 2008)	Non-randomised controlled trial	Adults with a Brain injury	Outpatient	Computer-based cognitive teletherapy rehabilitation [telehealth]	Face-to-face speech–language rehabilitation (rehabilitation was a programmatic outpatient speech and cognitive therapy program delivered in a face-to-face manner by certified and licensed speech–language therapists who had a minimum of 10 years' experience)	Cost consequence analysis *	Healthcare sector	6 months	Independent Living: Determining if participants required in-home care. Independent Driving: Assessing if participants could pass a driving course or the state's driving examination. Return to Work/School: Evaluating if participants engaged in paid or volunteer work, or attended school classes for more than 31 hours per week.

									<p>Hours of Therapy: The total number of hours participants engaged in either teletherapy or face-to-face therapy.</p> <p>Cost: total cost of the treatment and a measure of service costs per hour.</p>
(Towey, 2012)	Retrospective observational study	Mixed (adults and children) with vocal cord dysfunction	Community	1:1 Telehealth and some face to face [telehealth]	N/A	Cost consequence analysis *	Healthcare sector	1 month	Cost: cost savings
(Payten et al., 2022)	Protocol: Prospective observational cohort study	Adults with non-specific condition or problem	Outpatient	Speech–language pathology primary contact telehealth [telehealth]	N/A	Cost utility analysis	Limited societal	18 months	<p>Case history information: case history questionnaire</p> <p>Voice aerodynamic measures of maximum phonation time in seconds and S/Z ratio</p> <p>Perceptual voice quality measures using the Consensus Auditory–Perceptual Evaluation of Voice</p>

									<p>Acoustic voice quality measures</p> <p>Voice- related quality of life: Voice Handicap Index- 10</p> <p>Self- reported symptoms of laryngopharyngeal reflux: Reflux Symptom Index</p> <p>Self- reported symptoms of laryngeal hypersensitivity: Newcastle Laryngeal Hypersensitivity Questionnaire</p> <p>Health-related quality of life scores measured using the validated Assessment of Quality of Life- 6D</p> <p>Diagnostic classification impression after speech–language pathology primary contact telehealth and laryngoscopy</p>
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Key: * **Defined by the authors as a cost-effectiveness study but did not actually combine cost and effectiveness outcomes**, Grey area indicates a protocol for a study, RCT - Randomised controlled trial, GRBAS - grade, roughness, breathiness, asthenia, strain.

Table 2. Study characteristics of studies which assessed cost or cost effectiveness of a SLT intervention for children with a range of conditions;

Study names	Study design	Population of interest	Clinical setting	Intervention type	Individual being supported if applicable	Comparator (if applicable)	Type of economic evaluation	Perspective	Horizon	Outcomes assessed
(Prathane, 2011)	Before and after study	Cleft lip and palate (Speech), Early years and school, 3 to 13 years (majority 7-13 years)	Outpatient	Speech therapy provided by five speech and language pathologists, including individual and group therapy, for a total of 18 hours during the four-day speech camp and six hours in the one-day follow-up session.	Children and caregivers	Funding support for the 4-day speech camp and 1-day follow-up were investigated for a comparison of the expenses by individuals with Cleft lip and palate for services from the nearest and only	Cost consequence analysis*	Limited societal	6 months	Reduction of Articulation Errors: during the main speech camp and the one-day follow-up session Knowledge: Basic knowledge related to cleft lip and/or palate Cost: Funding support (health service) and expenses (patient) for Speech Camps

						speech center (Speech Clinic, Srinagarind Hospital, Khon Kaen Province) in northeast of Thailand.				
(de Sonnevill e-Koedoot et al., 2015)	RCT	Stammering Early years and school, 3.0 to 6.3 years	Outpatient	The Lidcombe Program intervention consists of two stages: Stage 1 with a median of 11 to 15 clinic visits and Stage 2 with at least 7 to 12 treatment sessions. The RESTART-DCM treatment involves weekly clinic visits with a mean of 12 treatment sessions, as per the pilot study.	N/A	Speech and language therapy based on the Demands and Capacities Model (12 sessions)	Cost-utility analysis	Societal perspective	8 months	<p>“Number needed to treat for one patient not to stutter at 18 months</p> <p>Decreased health related quality of life:</p> <p>EuroQoL EQ-VAS</p> <p>Health Utility Index-3</p>

										Quality adjusted life years (V-QALYs & U-QALY)	Cost-effectiveness ratio (one additional child who did not stutter at 18 months and Total cost"
(King et al., 2019)	Before and after study	Oropharyngeal dysphagia Age unspecified	Outpatient	Videofluoroscopic Swallow Study training and mentoring program utilising a remote specialist speech and language therapist attending the Videofluoroscopic Swallow clinic via real-time synchronous	Parents	None	Costing study	Not stated	Not stated		Percentage of families who would prefer their treatment to be delivered either via telehealth or at the clinic

				telehealth. [telehealth]						
(Raatz et al., 2023)	Cost minimisation	Eating/drinking/feeding disorder Early years and school, < 10 years old, majority under 2 years	Outpatient	Tele-practice (using videoconferencing) paediatric appointments [telehealth]	Parents	Face-to-face paediatric appointments	Cost cost consequence analysis*	Societal perspective	12 months	Cost Savings: Per appointment for families. Service Costs: The health service costs were equivalent for both models, as the clinician's time remained the same for both tele-practice and in-person appointments.
(Finestack et al., 2022)	Feasibility study	Proactive service for children with galactosemia Early years, Starting at <6 months	Community	Babble Boot Camp (BBC) (Individualised sessions for parents to provide strategies to support their child's communication development) [telehealth]	Parents	None	Costing study	Healthcare system and families	Period of sessions (based on individuals, with minimum of 67 sessions)	Parent Satisfaction Survey: 5-point Likert rating scales Intervention Session Logs: The study tracked session attendance and

										<p>modality (Zoom or email).</p> <p>Fidelity Checks: Videos were reviewed for adherence to key intervention components (review, teach, model, plan).</p>
<p>(Boyle et al., 2007)</p> <p>Link paper: (Dickson et al., 2009)</p>	RCT	<p>Language disorder</p> <p>School Primary (6 to 11 years)</p>	Outpatient	<p>(1) Direct individual therapy [speech and language therapist (SLT) working individually with a child],</p> <p>(2) indirect individual therapy [speech and language therapy assistant (SLTA) working individually with a child]</p>	N/A	<p>(3) Direct group therapy (SLT working with a small group of children)</p>	Cost-Effectiveness Analysis	Teaching setting	3.5 months	<p>Language Outcome: Standardised scores on tests of expressive and receptive language (CELF-3)</p> <p>Vocabulary: standardised scores on the BPVS II</p> <p>Parental and teacher observational rating scales linked to the CELF-3</p>

										<p>Binary outcome measure: showed progress postintervention/ did not show progress postintervention</p> <p>Enderby's Therapy Outcome Measures (TOM),151 selected to provide standardised information about change of case status</p> <p>Qualitative data: questionnaire, focus group data from parents, teachers, project SLTs and speech and language therapy assistants.</p>
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(Olson et al., 2016)	Before and after study	Language, speech sound or other developmental difficulty affecting speech and language Early years, 11-26 months	Community	Training / education: Text messages to deliver developmental education to families [telehealth]	Parents	Not applicable	Costing study	Healthcare payer	3 months	Program completion rate Response rate to intraportal text messages Parental survey responses to questions (Likert Scale)
(Byford et al., 2015)	RCT	Neurodevelopmental conditions, including autism and ADHD (Social communication) Early years, 2 to 5 months	Outpatient	The intervention was the PACT (Pre-school Autism Communication Trial) therapy, which was a parent-mediated, communication-focused intervention delivered by specially trained speech and language therapists. It consisted of fortnightly one-to-one clinic sessions for six months, followed by	Parent	Usual care	Cost-Effectiveness Analysis	Limited societal	13 months	Autism Symptom Severity: The severity of autism symptoms was measured using the ADOS-G social communication algorithm score Parent-Child Interaction: Video-rated parent-child interaction during naturalistic play was assessed Child Language and Social Communication:

				monthly booster sessions for an additional six months, aiming to target social interactive and communication impairments in children with autism.						<p>The study evaluated child language and social communication using the researcher-assessed Preschool Language Scales</p> <p>Adaptive Functioning in School: The Vineland Adaptive Behaviour Scales, Teacher Rating Form, rated by face-to-face interview with teachers, assessed adaptive functioning in school</p>
(Tinelli et al., 2023)	RCT	Neurodevelopmental conditions, including autism and ADHD (Social communication)	Outpatient	Direct treatment sessions/ home training programme	Parents	Usual care	Cost-consequence analysis	Limited societal	6months	Severity of Autism Symptoms: Assessed using the total score of social communication algorithm items from the Autism

		Early years, 2 years to 4 years and 11 months								Diagnostic Observation Schedule- Generic. Child Language Parent-Child Dyadic Communication Social Difficulties Comorbid Psychopathology
(Gibbard, Coglan, & MacDonald, 2004)	Non-randomised controlled trial	Expressive language delay Early years, 22 to 36 months	Outpatient	Parent-based intervention (PBI) consisting of 11 fortnightly group sessions with set language objectives for parents to work on at home with their child	Parents	Usual care	Cost-Effectiveness Analysis	Healthcare system and families	8 months	Estimate of Phrase Length Word list Reynell Developmental Language Scales Pre-School Language Scale-3 UK (comprehension and expression) Mean length of utterance

(Law et al., 2006)	Non-randomised controlled trial	Primary language difficulties Early years	Early years setting, e.g. nurseries	Structured language curriculum with individualized planning, and daily intervention	Children	Usual care (Children receiving 'typical' provision in health service settings)	Cost consequence analysis*	Healthcare sector and families	6months	Language and Behaviour Improvements
(Frizelle et al., 2022)	Non-randomised controlled trial	Universal intervention for children from disadvantaged areas Early years	Preschools	Community-based language intervention with group training and individual coaching ["Happy Talk"]	Children and caregivers	Usual care	Cost-utility analysis	Healthcare sector	8 months	Receptive Language Improvement: Pre-school Language Scale 5 th edition comprehension score Total Language Improvement: Pre-school Language Scale 5 th edition total score Health-Related Quality of Life : Child Health Utility instrument
(Cronin & Addo, 2021)	Longitudinal data-retrospective cohort study	Speech, language and communication needs	Other	Speech and language therapy	Not specified	N/A	Costing study	Justice system	Not specified	Youth Antisocial Behaviour: The study measured various antisocial behaviours in

		Early years and school, for the 4 to 17 years								<p>young people, including physical fights, skipping school, stealing, graffiti, carrying weapons, and more. (questionnaire)</p> <p>Youth Justice (YJ) Contacts: The study also examined contact with the system, including attending YJ conferences, being charged with offenses, appearing in court, and being convicted.</p>
(Barnett & et al., 1988)	RCT	<p>Language handicaps (Language/communication difficulty (various definitions))</p> <p>Early years, 35-59months</p>	Outpatient	(1) Home based (parent-delivered) intervention, (2) center-based intervention, (3) both center- and	Parent	(4) No treatment (no intervention services from the clinic during the	Cost consequence analysis*	Healthcare sector and patients/families	13 months	<p>Auditory comprehension and verbal ability: Measured using the Preschool</p>

				home-based intervention		13-week period)				Language Scale – Revised Articulation proficiency: Assessed using the Arizona Articulation Proficiency Scale
(Wake et al., 2015) link paper: (Wake et al., 2012)	RCT	Language delay Early years, 4 to 6 years	Community	Home based therapy sessions X 18 one hour (language (narrative skills, vocabulary and grammar) and preliteracy skills (phonological awareness and letter knowledge) were targeted)	Children and caregivers	Usual care	Cost consequence analysis*	Healthcare system Families	24 months	Expressive and Receptive Language: The trial evaluated both expressive and receptive language skills (CELF-P2) Literacy Skills: The study looked at literacy-related skills, including word reading and spelling (Wide Range Achievement Test) Narrative Skills: Researchers assessed

										<p>narrative abilities, such as storytelling and understanding story structure (The Renfrew Language Scales: Bus Story Test)</p> <p>Phonological Skills: Phonological awareness, which includes recognizing and manipulating sounds in words, was another outcome (Comprehensive Test of Phonological Processing)</p> <p>Pragmatic Skills (Social Language Use): The trial examined pragmatic language skills, which involve using language appropriately in</p>
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										<p>social contexts (Children's Communication Checklist)</p> <p>Phonological short-term memory (Children's Test of Non-Word Repetition)</p> <p>Health-Related Quality of Life: Parent-reported measures assessed children's overall well- being and quality of life (Health Utilities Index and Paediatric Quality of Life Inventory)</p> <p>Behaviour: The study considered behavioural aspects related to language delay and intervention effects (Strengths and</p>
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										Difficulties Questionnaire)
(Popova et al., 2014)	Costing study	Other congenital disorders, including foetal alcohol syndrome and cerebral palsy Early years and school, 2 to 19 years	Other	1:1 speech-language interventions (20-30 hours of intervention depending on the severity)	Children	N/A	Costing study	Healthcare sector	12 months	Prevalence of Speech and Language Disorders (SLD) among Children with Foetal Alcohol Spectrum Disorder Severity Levels of Speech and Language Disorders: The study categorized Speech and Language Disorders severity into three levels: normal, mildly impaired, and moderately-to-severely impaired.

<p>(Eiserman, Weber, & McCoun, 1992)</p> <p>Link paper: (Eiserman, Weber, & McCoun, 1995)</p>	<p>RCT</p>	<p>Moderate speech sound disorder</p> <p>Early years 3 to 4 years old</p>	<p>Community</p>	<p>Educational training mothers in therapeutic techniques (mom and child home training at least four times a week with 40-minute visits twice a month by a speech and language pathologist)</p>	<p>Parent</p>	<p>Standard Weekly speech and language therapy (occasional homework)</p>	<p>Cost cost consequence analysis*</p>	<p>Healthcare system and families</p>	<p>7 months</p>	<p>Battelle Developmental Inventory</p> <p>Goldman-Fristoe Test of Articulation</p> <p>Patterned Syntax Elicitation Test</p> <p>Preschool Language Scale</p> <p>Test for Auditory Comprehension of Language</p> <p>Parenting Stress Index</p> <p>Family Adaptability and Cohesion Scales</p> <p>Structured Photographic Expressive Language</p> <p>Family Resource Scale</p>
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										Family Support Scale Family Inventory of Life Events
(Actrn, 2020)	Protocol: RCT	Other	Community	Online education online for parents with children (12 months - 36 months) with communication difficulties [telehealth]	Parent	Face-to-face group workshop	Cost-consequence analysis	Healthcare payer	N/R	Parent report of identification of actions in relation to parenting a child with communication difficulty, as assessed by 10 point Likert scale Attendance
(Drks, 2022)	Protocol: RCT	Language disorder	Outpatient	Online interval small group of 2-3 children therapy (30 therapeutic sessions of 45 min each) [telehealth]	N/R	Standard face-to-face therapy (active intervention: 30 therapeutic sessions of 45 min each)	Cost-effectiveness	Healthcare payer	N/R	Language development status Speech-language therapists' time consumption

Key: * Defined by the authors as a cost-effectiveness study but did not actually combine cost and effectiveness outcomes, Grey area indicates a protocol for a study, RCT - Randomised controlled trial, QALYs: Quality-Adjusted Life Years