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Research Article

Role of Vocal Cord Articulation and Oro-Motor Exercises in the Management of Motor Speech Disorders: Childhood Apraxia of Speech, Dysarthria, and Associated Drooling

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Abstract

Background: Motor speech disorders in childhood may affect speech motor planning/programming, neuromuscular execution, phonation, articulation, prosody, intelligibility, and oral sensorimotor control. Childhood apraxia of speech (CAS) and dysarthria require different but sometimes overlapping treatment principles. Drooling may coexist when oral-motor control, posture, swallowing frequency, or salivary management is impaired.

Objective: To examine whether speech-focused vocal/phonatory-articulatory coordination and oro-motor exercises (OME) have a defensible role in management of CAS, dysarthria, and associated drooling, with particular attention to textbook guidance and recent evidence.

Methods. A narrative evidence review was developed using current professional guidance, systematic reviews, randomized or controlled treatment studies, and standard textbooks. Priority was given to sources addressing motor-speech treatment, CAS, dysarthria, pediatric oral-motor intervention, phonatory/respiratory management, and pediatric sialorrhea. Sources were cross-checked through September 2026, including the 2026 fifth edition of Duffy's Motor Speech Disorders and two 2026 pediatric drooling evidence syntheses.

Results: The literature supports task-specific, speech-based motor treatment for CAS, including approaches such as Dynamic Temporal and Tactile Cueing (DTTC) and Rapid Syllable Transition Treatment (ReST). Studies indicate gains in treated speech targets and, in some trials, generalization or maintenance. For dysarthria, treatment may target the impaired speech subsystems—respiration, phonation, resonance, articulation, and prosody—rather than using a uniform exercise package. Systematic evidence for respiratory/phonatory management supports continued investigation of behavioural treatments, although much of the higher-level evidence is drawn from neurodegenerative populations rather than children. In contrast, older systematic reviews found insufficient evidence that nonspeech oral-motor exercises alone improve speech. More recent pediatric drooling reviews indicate that behavioral/rehabilitative interventions, including oral-motor approaches, can improve drooling and oral-motor outcomes in some children, but effects vary substantially and are not consistently durable or generalizable.

Conclusion: Oro-motor activities may have a management role when they directly address an identified oral sensorimotor or swallowing-related impairment, particularly in drooling or feeding contexts. For speech sound improvement in CAS and dysarthria, however, exercises should be linked to functional speech tasks and motor-learning principles. The strongest evidence supports repeated, individualized, task-specific practice; oral-motor exercises should not replace speech practice when the treatment goal is speech intelligibility.

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INTRODUCTION

Motor speech performance depends on coordinated control of respiration, phonation, resonance, articulation, and prosody. In children with motor speech disorders, breakdown may occur at the level of planning/programming, neuromuscular execution, or multiple interacting systems. Duffy's fifth edition of *Motor Speech Disorders* (2026) places apraxia and dysarthrias within a broader framework of neurologic substrates, differential diagnosis, and disorder-specific management. Caruso and Strand's pediatric text similarly emphasizes assessment, motor learning, speech motor control, treatment planning, and functional outcomes in children with motor speech disorders.

CAS is primarily a disorder of speech motor planning/programming in which children may show inconsistent consonant and vowel errors, disrupted transitions, altered prosody, and difficulty achieving accurate sequences. Current treatment research favors approaches that repeatedly practice speech movements and syllable transitions rather than relying on nonspeech strengthening. A systematic review of CAS treatment studies identified motor speech approaches among the most frequently investigated strategies and found supportive evidence for several speech-motor treatments, including Integral Stimulation/DTTC, ReST, and Integrated Phonological Awareness.

Dysarthria differs because the primary problem is impaired execution of speech movements due to weakness, abnormal tone, incoordination, involuntary movement, or other neuromuscular factors. Treatment therefore depends on the dysarthria type and the dominant subsystem impairment. Articulation exercises, phonatory control, respiratory support, rate modification, loudness work, and compensatory strategies may all be appropriate, but only when matched to the clinical profile.

Drooling (sialorrhea) is also a motor-control problem in many neurologically affected children. It is often less a problem of excessive saliva production than ineffective saliva containment and clearance. Management can include positioning, cueing, behavioral strategies, oral sensorimotor treatment, medical treatment, and, for severe refractory cases, procedural or surgical approaches. The 2026 pediatric sialorrhea systematic review proposes a stepwise approach and reports modest short-term benefit from behavioral/oral-motor therapy with low-to-moderate certainty.

The central question, therefore, is not whether "oral-motor exercises work" in general. The clinically meaningful question is: which exercise, for which impairment, connected to which functional outcome, and measured by which outcome variable? This distinction prevents nonspecific movements from being presented as established speech treatment while still allowing oral sensorimotor activities to be used when an identified impairment makes them clinically relevant.

• REVIEW METHOD AND EVIDENCE SYNTHESIS

Design. This paper is a narrative evidence review rather than a registered systematic review or meta-analysis. The purpose is to synthesize clinically relevant findings quickly while preserving important limitations in the evidence.

Information sources. Literature was drawn from PubMed-indexed studies, professional practice resources from the American Speech-Language-Hearing Association (ASHA), publisher/library records for major motor-speech and pediatric feeding texts, and recent 2026 systematic reviews of pediatric sialorrhea and behavioral/oral-motor interventions.

Selection logic. Sources were prioritized when they: (1) examined treatment rather than description alone; (2) included children when pediatric evidence was available; (3) reported speech accuracy, intelligibility, phonatory function, drooling frequency/severity, or oral-motor outcomes; and (4) used controlled, systematic-review, or clinically established treatment frameworks. Adult neurodegenerative dysarthria evidence was used only to illuminate subsystem-based respiratory/phonatory management and is explicitly identified as indirect evidence for pediatric practice.

Evidence interpretation. Three broad patterns emerged. First, task-specific speech-motor treatment has the clearest support for CAS. ReST randomized trials have demonstrated treatment effects and generalization; DTTC studies also support gains in treated and untreated words in young children. Second, nonspeech oral-motor exercise has a weaker evidence base for speech itself: a systematic review concluded that available studies were methodologically weak and insufficient to support or refute speech effects. Third, oral-motor/behavioral approaches appear more defensible for some drooling and oral-motor outcomes than for speech sound acquisition. A 2026 randomized-trial meta-analysis found significant benefits in drooling and oral-motor domains, while noting substantial heterogeneity and context dependence.

Terminology and treatment taxonomy. For this review, "speech-specific articulatory practice" means practicing real speech sounds, syllables, words, phrases, and prosodic patterns. "Phonatory/respiratory coordination" means treatment of breath support, voice onset, loudness or vocal stability when those are impaired. "Oro-motor exercises" refers to nonspeech movements such as lip, tongue, jaw, or oral sensory-motor activities. These categories must not be treated as interchangeable.

Quality-control principle. A treatment should be justified by a stated impairment and linked to a measurable functional outcome. For speech, outcome measures should include accuracy, consistency, intelligibility, prosody, or communicative participation. For drooling, severity/frequency and functional burden can be tracked. Where the evidence is low or mixed, the technique should be considered adjunctive and re-evaluated against measurable change.

Domain	Better-supported target	Role of oro-motor exercise	Key caution
CAS	Speech motor planning/programming	Adjunct only when a specific oral sensorimotor impairment is documented	Do not replace speech-movement practice
Dysarthria	Impaired speech subsystems	May support specific physiologic goals; evidence depends on disorder	Match exercise to impairment and diagnosis
Drooling	Saliva containment/clearance and functional oral control	Potential role; newer evidence suggests domain-specific benefit	Effects vary; assess severity and safety

• **CHILDHOOD APRAXIA OF SPEECH: IMPLICATIONS FOR ARTICULATION AND ORO-MOTOR PRACTICE**

CAS requires treatment of the speech motor system. The foundational distinction is between nonspeech oral movement and speech movement: speech requires rapid, highly coordinated sequences with precise timing, while chewing, blowing, or isolated tongue movements impose different motor demands. ASHA’s CAS guidance has therefore cautioned that nonspeech oro-motor therapy is neither necessary nor sufficient as a stand-alone route to improved speech production.

Evidence for speech-specific motor approaches is more favorable. Murray, McCabe, and Ballard’s systematic review of CAS treatment outcomes found that motor-speech approaches were among the central treatment categories and identified sufficient evidence for several approaches to justify further clinical use. A randomized trial comparing ReST with NDP3 in 26 children aged 4–12 years found large treatment effects for both programs, with maintenance and generalization effects; the authors concluded that both had support for clinical use when delivered intensively. A later randomized pilot study likewise found that ReST and ultrasound biofeedback each improved treated speech targets, with gains in untreated words and sentences for speech sound accuracy.

DTTC is another speech-motor approach particularly suited to children with more severe CAS. It uses dynamic cueing, repeated practice, and gradual fading of support as the child gains control. A 2024 multiple single-case study of seven children aged 2.5–5 years reported measurable improvement in word accuracy across intervention and maintenance probes, supporting further use of DTTC while acknowledging that treatment research in very young children remains limited.

Where oro-motor exercises may fit. If a child with CAS also has an independently established oral sensorimotor problem—for example, difficulty with lip closure, jaw stability, feeding, chewing, or saliva containment—specific oro-motor activities may be clinically indicated for those goals. The intervention should then be measured against oral function or drooling outcomes, not assumed to improve speech simply because speech structures are being moved.

A practical CAS sequence is: (1) select functional speech targets; (2) establish accurate movement with an appropriate cueing hierarchy; (3) provide many correct practice trials; (4) vary phonetic and prosodic contexts to support generalization; (5) fade cues; and (6) measure retention and carry-over. Articulation should therefore be understood as task-specific speech motor practice rather than isolated “mouth strengthening.”

Clinical implication. The evidence supports a strong role for articulatory and phonatory coordination when these terms refer to speech movements. It does not support claiming that generic tongue, lip, or jaw exercises alone are an established treatment for CAS speech errors.

• **DYSARTHRIA: VOCAL-FOLD, RESPIRATORY, AND ARTICULATORY COORDINATION**

Dysarthria is heterogeneous, so treatment is best organized around the impaired speech subsystems. A child with spastic or dyskinetic dysarthria may require a different treatment emphasis from a child whose primary limitation is weakness, incoordination, or reduced respiratory support. Duffy’s 2026 text devotes separate management chapters to dysarthrias and emphasizes disorder-specific rather than one-size-fits-all treatment.

Phonation. When the clinical profile includes weak, breathy, strained, unstable, or otherwise inefficient voice, treatment may include tasks that improve respiratory-phonatory coordination, sustained but functional voicing, appropriate loudness, and efficient voice onset. These activities are not “vocal cord articulation” in the strict anatomical sense; rather, they train coordination of the respiratory and laryngeal systems so the articulators receive a stable phonatory signal.

A recent systematic review of behavioral management for respiratory/phonatory dysfunction in dysarthria associated with neurodegenerative disease identified 88 eligible studies from more than 1,500 records and described a growing evidence base that includes respiratory muscle strength training, singing, and technology-supported programs. Because this literature is largely adult and neurodegenerative, it should not be transferred directly to children; however, it supports the general principle that respiratory and phonatory components can be legitimate treatment targets when dysfunction is present.

Articulation. In dysarthria, articulatory precision can be limited by weakness, speed, range, tone, or coordination. Speech-specific practice may include over-articulation or clear-speech strategies, slowed rate, increased articulatory contacts, and repeated functional phrases. These approaches are more directly connected to intelligibility than nonspeech repetitions. Where oral exercises are used, the rationale should specify the physiologic target—such as lip closure or jaw stability—and the clinician should test whether a change in those variable transfers to speech.

Prosody and rate. Speech intelligibility is often influenced by rate, stress, phrasing, and respiratory grouping. Children may benefit from pacing, phrase segmentation, controlled speaking rate, and prosodic contrast. These are communication

behaviours, so they can be practised in words, sentences, reading, conversation, and functional school/home routines. Clinical implication. A useful treatment chain is respiration -> phonation -> articulation -> prosody -> functional communication, with loops back to any subsystem that limits performance. The sequence is not a mandatory order; it is a way to identify the bottleneck. Exercises that improve a physiologic measure but do not change speech or participation should not be assumed to be clinically meaningful.

• **ASSOCIATED DROOLING (SIALORRHEA): ROLE OF ORAL SENSORIMOTOR MANAGEMENT**

Drooling in children with neurologic or motor impairment commonly reflects reduced oral containment, impaired swallowing frequency, posture, reduced lip/jaw control, and/or reduced awareness rather than simply excessive saliva production. Because the functional problem is saliva management, treatment can reasonably include behavioral and oral sensorimotor strategies when the child's evaluation identifies a relevant impairment.

The evidence has changed in an important way. Arvedson and colleagues' 2010 evidence-based systematic review concluded that there was insufficient evidence to determine the effects of oral-motor exercises on pediatric swallowing problems and drooling, reflecting heterogeneous and methodologically variable studies. A 2018 systematic review of behavioral drooling interventions found low-level evidence of benefit but high risk of bias across the available studies.

More recent evidence is cautiously encouraging. A 2026 systematic review of pediatric sialorrhea included 22 studies and 1,028 children; behavioral therapies, particularly oral-motor therapy, produced modest short-term improvements in drooling severity and frequency, with low-to-moderate certainty. A separate 2026 systematic review and meta-analysis restricted to randomized controlled trials found a significant

moderate post-intervention effect for drooling (Hedges' g about 0.63) and significant effects for oral-motor skills and mastication, while emphasizing substantial heterogeneity and context dependence. These findings support a role for selected behavioral/oral-motor interventions but do not establish one universal exercise program.

Practical components may include: upright postural alignment; lip closure and saliva containment; structured swallow reminders; cueing for dry mouth/closed mouth; functional chewing when mastication is impaired; and caregiver-supported practice. Sensory modifications and task-specific practice can be useful when feeding or swallowing are also affected. The 2019/2020 pediatric feeding and swallowing text by Arvedson, Brodsky, and Lefton-Greif provides a multidisciplinary framework for assessment and management.

Important safety principle. Drooling management should not be reduced to exercises. Children should be assessed for swallowing safety, aspiration risk, medication effects, nasal/airway factors, dental issues, posture, and the impact of drooling on skin, clothing, hydration, social participation, and caregiver burden. Severe or refractory sialorrhea may require medical or procedural management, including pharmacologic therapy, botulinum toxin, or surgery, as described in recent reviews.

Clinical implication. Oro-motor therapy is more defensible as a targeted drooling/oral-function intervention than as a generic speech exercise. Improvement should be measured using drooling frequency/severity and functional participation, not merely the child's ability to perform an oral movement.

• **INTEGRATED EVIDENCE-INFORMED CLINICAL FRAMEWORK**

The following framework integrates the evidence without treating all three disorders as the same condition. It can be adapted by a qualified speech-language pathologist after individual assessment.

Stage	CAS	Dysarthria	Drooling	Outcome measure
1. Baseline	Speech consistency, transitions, prosody	Subsystem profile, intelligibility, rate	Severity/frequency, posture, saliva containment	Baseline probes
2. Primary target	Speech movement sequences	Impaired respiratory/phonatory/articulatory subsystem	Containment + swallow/clearance	Goal-linked measure
3. Core practice	DTTC/ReST-type speech practice, repeated functional targets	Speech-specific practice + selected subsystem work	Functional oral-motor/behavioral routines	Within-session + probe
4. Cueing	Visual, auditory, tactile as indicated	Rate, loudness, posture, pacing, articulatory cues	Prompting, reminders, caregiver cues	Accuracy/independence
5. Generalization	Untreated words, phrases, conversation	Novel contexts and communication partners	Meals, school, home, community	Carry-over
6. Re-evaluate	Maintenance + intelligibility	Subsystem change + participation	Drooling + burden/safety	Pre/post comparison

• **DISCUSSION, LIMITATIONS, AND RECOMMENDED RESEARCH**

The reviewed literature supports a nuanced position. Speech-specific motor treatment should remain central for CAS. For dysarthria, management should be individualized to the

affected speech subsystems and may legitimately include phonatory/respiratory work, articulatory practice, rate and prosody strategies, and selected physiologic exercises. For drooling, behavioral and oral-motor interventions have a growing but still heterogeneous evidence base.

A major limitation is the tendency to use the label “oral-motor exercise” for very different interventions. Tongue or lip movements, sensory stimulation, resistance exercises, chewing activities, swallowing drills, and speech-sound practice are not equivalent. When studies mix these elements, it becomes difficult to identify which component produced an observed effect. Future studies should report treatment dose, exact exercise procedures, therapist training, diagnostic subtype, baseline impairment, and treatment fidelity.

A second limitation is population transfer. Some of the strongest dysarthria evidence comes from adults with neurodegenerative disease. Those findings can inform principles of respiratory/phonatory management, but pediatric dysarthria may have different developmental, neurologic, and learning characteristics. Similarly, CAS studies often use small samples and single-case experimental designs. These designs can be clinically informative, yet replication and larger controlled studies remain important.

A third limitation concerns outcome measurement. A treatment can improve a laboratory or impairment-level measure without improving everyday communication. Therefore, future studies should combine speech accuracy with intelligibility, communicative participation, caregiver-reported burden, and maintenance/generalization measures. The 2026 pediatric drooling meta-analysis illustrates this issue: effect sizes differed by domain and by the type of outcome measure, and broad clinical heterogeneity limited generalizability.

Recommended research directions include: direct comparisons of speech-specific practice with and without adjunctive oral sensorimotor work; studies of children with co-occurring CAS/dysarthria and drooling; standardized drooling and speech outcomes; dose-response trials; and longer-term follow-up. Research should also distinguish treatment mechanisms—motor planning, strength, range, timing, sensory awareness, saliva management, or compensatory control—rather than assuming that all “oral-motor” approaches share one mechanism.

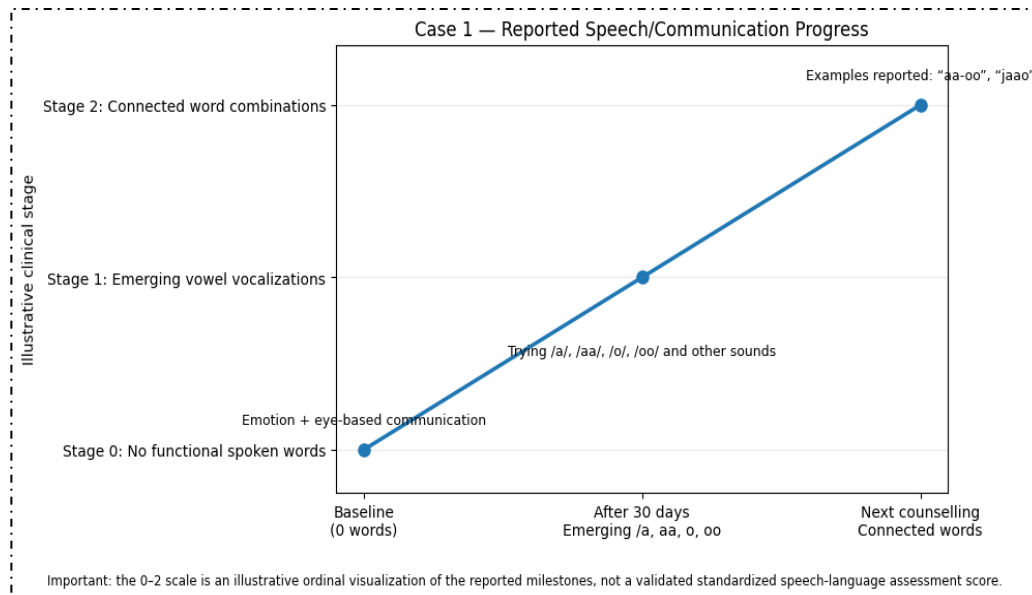
Conclusion. The literature supports the use of articulatory and phonatory coordination exercises when they are specific to an identified speech impairment and connected to functional

speech practice. Oro-motor exercises have a more limited role for speech production itself but can be clinically relevant for documented oral sensorimotor, swallowing, mastication, or drooling problems. The most defensible management model is impairment-specific, task-specific, measurable, and integrated with family-centered and multidisciplinary care.

Practice statement: These techniques should be presented as components of individualized speech-language therapy—not as a universal exercise package or a substitute for diagnosis and evidence-based treatment selection.

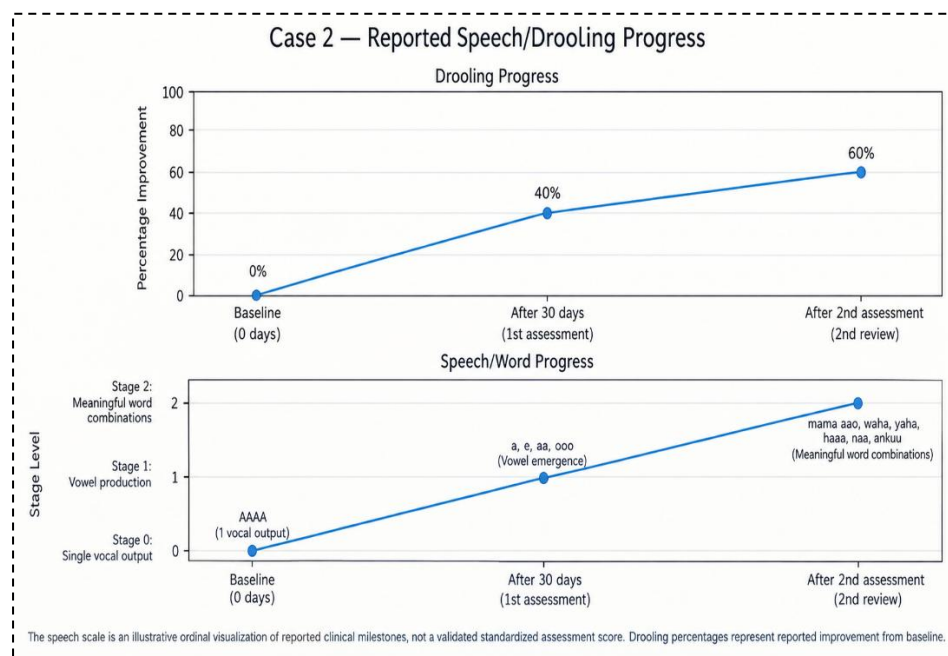
• CLINICAL CASES: -

1. A 5-year-old male child, **Tanush Singh**, presented to our clinic with a chief complaint of severe speech delay. Initial assessment revealed an absence of functional speech output, with the child demonstrating essentially zero-word power and relying primarily on emotional expressions, gestures, and eye-contact-based communication to convey his needs. A multidisciplinary intervention program comprising occupational therapy, oro-motor stimulation, vocal cord articulation training, speech-language stimulation activities, and regular parental counseling was initiated. After 30 days of therapy, the child showed significant improvement, beginning to vocalize isolated vowel sounds such as /a/, /aa/, /o/, and /oo/, indicating emerging phonatory control and vocal awareness. Continued intervention focused on speech production and sound sequencing. During subsequent follow-up sessions, further progress was observed as the child successfully combined sounds to produce simple vocal sequences such as "AAOO" and "JAOO." The incorporation of speech-language kits, structured vocal articulation exercises, and oro-motor techniques including sucking and blowing activities appeared to enhance oral motor coordination and speech initiation. The child demonstrated increasing attempts at verbal communication, suggesting positive therapeutic outcomes. Ongoing speech therapy was recommended to further develop meaningful word formation, expressive language skills, and functional communication abilities.



2. A 12 - year-old male child, **Ankush Kumar**, was brought to the Speech Therapy Unit with chief complaints of speech delay and excessive drooling during communication. During the initial counselling session, his parents revealed that he had been suffering from tongue-tie (ankyloglossia) since birth and had undergone surgical management at SKMCH, Muzaffarpur, but the outcome was not satisfactory. At the commencement of speech therapy, the child had a very limited speech repertoire, producing only a single vocalization, “aaaa.” Considering his oral motor deficits, therapy was initiated with oro-motor exercises, including tongue mobility and strengthening activities, blowing and sucking exercises,

and other oral musculature stimulation techniques. After 30 days of regular intervention, drooling was reduced by approximately 40%, and the child began producing vowel sounds such as /a/, /e/, /aa/, and /ooo/. During the second assessment, drooling showed nearly 60% improvement, and several significant speech milestones were observed. The child was able to combine vowel sounds to produce meaningful verbalizations, including “mama,” “aao,” “waha,” “yaha,” “haaa,” “naa,” and “ankuu.” The therapy is continuing, and the progress achieved demonstrates the effectiveness of structured oro-motor exercises in improving oral motor control, reducing drooling, and facilitating speech development in children with speech delay.



REFERENCES

1. Duffy JR. Motor speech disorders: substrates, differential diagnosis, and management. 5th ed. St. Louis (MO): Elsevier/Mosby; 2026.
2. Caruso AJ, Strand EA, editors. Clinical management of motor speech disorders in children. New York: Thieme; 1999.
3. Arvedson JC, Brodsky L, Lefton-Greif MA. Pediatric swallowing and feeding: assessment and management. 3rd ed. San Diego (CA): Plural Publishing; 2019/2020.
4. Williams P, Stephens H, editors. The therapy manual of the Nuffield Centre Dyspraxia Programme. 3rd ed. NCDP Ltd; 2004.
5. McCauley RJ, Strand EA, Lof GL, Schooling T, Frymark T. Evidence-based systematic review: effects of nonspeech oral motor exercises on speech. *Am J Speech Lang Pathol*. 2009;18(4):343-360. doi:10.1044/1058-0360(2009/09-0006).
6. Arvedson J, Clark H, Lazarus C, Schooling T, Frymark T. The effects of oral-motor exercises on swallowing in children: an evidence-based systematic review. *Dev Med Child Neurol*. 2010;52(11):1000-1013. doi:10.1111/j.1469-8749.2010.03707. x.
7. Murray E, McCabe P, Ballard KJ. A systematic review of treatment outcomes for children with childhood apraxia of speech. *Am J Speech Lang Pathol*. 2014;23(3):486-504. doi:10.1044/2014_AJSLP-13-0035.
8. Murray E, McCabe P, Ballard KJ. A randomized controlled trial for children with childhood apraxia of speech comparing Rapid Syllable Transition Treatment and the Nuffield Dyspraxia Programme-Third Edition. *J Speech Lang Hear Res*. 2015;58(3):669-686. doi:10.1044/2015_JSLHR-S-13-0179.
9. Thomas DC, McCabe P, Ballard KJ. Rapid Syllable Transitions (ReST) treatment for childhood apraxia of speech: the effect of lower dose-frequency. *J Commun Disord*. 2014; 51:29-42. doi: 10.1016/j.jcomdis.2014.06.004.
10. Grigos MI, Case J, Lu Y, Lyu Z. Dynamic temporal and tactile cueing in young children with childhood apraxia of speech: a multiple single-case design. *J Speech Lang Hear Res*. 2024;67(4):1042-1071. doi:10.1044/2024_JSLHR-23-00415.

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