Articulation Disorders (Speech Sound Disorders): Adapted Egyptian Clinical Practice Guidelines

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The present Egyptian CPG (ECPG) represents an adapted CPG with clear outlined methodology and the related references to each guideline were cited. The contributors of these adapted ECPGs have made considerable efforts to ensure that the information upon which they are based is accurate and up to date. The publishers will be pleased to make good any omissions or rectify any mistakes brought to their attention at the earliest opportunity.

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Specialties related to this guideline: Audiology and paediatrics

Sincere thanks extend to the secretaries: Samar Hussein and Eman Ragab, as well as the editor: Mohamed Salah

Abbreviations

SSD **speech sound disorders**

GRADE **Grading of Recommendations Assessment, Development and Evaluation**

Executive Summary

1. **How to identify speech sound disorders from organic causes of impaired speech production:**
    a. History taking: to exclude delayed developmental milestones, sensori-neural hearing loss, cleft palate, and dysarthria. (strong recommendation)
    b. Thorough general and otolaryngological examination. (strong recommendation)
2. **Speech sound assessment: formal language and articulation tests to assess language and phonology, followed by:**
    a. Phonetic transcription for the phonological errors and any special context where they occur. (strong recommendation)
    b. Identify error pattern: omission, substitution, or distortion. (strong recommendation)
    c. Stimulability. (strong recommendation)
    d. Intelligibility. (strong recommendation)
3. **Treatment options:**
    a. Contextual therapy: this approach utilizes that speech sounds are produced in syllable- based contexts in connected speech and some phonemic/phonetic contexts can facilitate correct production of a particular sound. (conditional recommendation)
    b. Contrast therapy: minimal opposition, maximal opposition, or multiple opposition therapy. (strong recommendation)
    c. Cycle approach: the child is provided with a practice on a given target for a predetermined period, before moving to another target for a predetermined period, and then cycles again. (strong recommendation)
    d. Metaphone therapy: bringing about phonological change through increasing the metalinguistic awareness. (conditional recommendation)
    e. Naturalistic intelligibility intervention: naturalistic intervention refers to the notion that phonological disorders should be corrected in communication situations that resemble everyday life. (strong recommendation)

Introduction, scope and audience

Introduction

Speech sound disorders is the preferred term for describing difficulties that young children have with speech production.

Speech sound disorders include sound substitutions, omissions, distortions and additions [1].

Scope:

The scope of this guideline is to deduce speech sound disorders from other articulation disorders through a stepwise assessment plan and highlight the appropriate rehabilitation programs.

Target audience:

Phoniatricians, audiologists, pediatricians and family physicians.

Methods

Methods of development

Stakeholder Involvement: Individuals who were involved in the development process. Included the above-mentioned Phoniatric Chief Manager, Phoniatric Executive Manager, Assembly Board, Grading Board and Reviewing Board.

Information about target population experiences were **not applicable** for this topic.

Search method

Electronic database searched:
Pubmed, Medline, Egyptian Knowledge Bank, Medscape, WebMD, Google Scholar

Keywords:
Speech sound disorders, Guidelines, Children

The adaptation cycle passed over: set-up phase, adaptation phase (Search and screen, assessment: currency, content, quality & /decision/selection) and finalization phase that included revision and external reviewing.

Results

Three national Phoniatricians reviewed the available guidelines; Evidence based management of phonological Impairment 2004 [2], University of N. Carolina 2006 [3], Child Speech Disorder Research Network (CSDRN)2017 [4], and Clinical guideline speech therapy 2019 [5]

The guidelines of University of North Carolina and Clinical guidance speech therapy gained the highest scores as regards currency, contents and quality and were thus adopted then adapted.

It was graded GRADE[6] by eleven experts and reviewed by five expert reviewers to improve quality, gather feedback on draft recommendations.
The external review was done through a rating scale as well as open-ended questions.

Setting: Primary, secondary and tertiary care centers & hospitals, and related specialties.

Interpretation of strong and conditional recommendations for an intervention

Audience	Strong recommendation	Conditional recommendation
Patients	Most individuals in this situation would want the recommended course of action; only a small proportion would not. Formal decision aides are not likely to be needed to help individuals make decisions consistent with their values and preferences.	Most individuals in this situation would want the suggested course of action, but many would not
Clinicians	Most individuals should receive the intervention. Adherence to the recommendation could be used as a quality criterion or performance indicator.	Different choices will be appropriate for individual patients, who will require assistance in arriving at a management decision consistent with his or her values and preferences. Decision aides may be useful in helping individuals make decisions consistent with their values and preferences.
Policymakers	The recommendation can be adopted as policy in most situations.	Policy-making will require substantial debate and involvement of various stakeholders.

WHO handbook for guideline development – 2nd ed.
Chapter 10, page 129

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach to Decision frameworks (GRADE Working Group 2013)

Grade	Definition
High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very Low	We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect

Recommendations,

The following statements and flowchart were adapted from the Guidelines of University of North Carolina and Clinical guidance speech therapy which received the highest scores as regards the currency, contents, and quality.

Recommendations statements

Accepted statements	
Modified statements	
Added statements	

Clinical questions	Action recommendation	Evidence quality	Strength of recommendation	Study type	References
Definition	Speech sound disorders (SSD) include sound substitutions, omissions, distortions and additions. In addition, there can be errors that affect the word level and/or the rhythm and intonation characteristics of running speech.	Low	Strong recommendation	Cross sectional study	1
	Speech sound disorders result from difficulties with speech, motor production and coordination of speech movements, as well as the lack of phonological knowledge or misapplication of the phonological rules associated with the child's native language. All languages are governed by phonological rules which determine the appropriate speech sounds (or phonemes) and phoneme sequences that characterize a particular language.	High	Strong recommendation	Systematic review	7
Presentation	The cause of speech sound disorders in most children is unknown. The cause of some speech sound problems is known and can be the result of motor speech disorders (e.g., Apraxia and Dysarthria), structural differences (e.g., cleft-palate), syndromes (e.g., Down Syndrome) or sensory deficiencies (e.g., hearing loss).	High	Conditional recommendation	Systematic review	7
Presentation	Apart from short term memory disorders,the exact cause of speech sound disorders inmost children is unknown. The cause of other articulation disorders is known and can be the result of motor speech disorders (e.g., Apraxia and Dysarthria), structural differences (e.g., cleft-palate), syndromes (e.g., Down Syndrome) or sensory deficiencies (e.g., hearing loss). SSD have to be clearly differentiated from other organic articulation disorders as early as possible during preliminary diagnosis in order to direct the patient to the suitable diagnostic procedure	High	Strong recommendation	Systematic review	7

Clinical questions	Action recommendation	Evidence quality	Strength of recommendation	Study type	References
Risk factors.	• Gender-males being higher risk. • Ear, nose and throat problems. • Family history of speech and language problems. • Limited parental education/ learning support at home. • Omissions/deletions: Specific sounds are omitted or deleted (e.g., boo for book and geen for green).	High	Strong recommendation	Systematic review	7
Symptomatology	• Substitutions: One or more sounds are substituted (e.g., wed for red and dut for duck, widuh forrider). • Additions: One or more extra sounds are added into a word (e.g., bulack for black). • Distortions: Sounds are modified or altered (e.g., a slushy /s/). • Whole-word/syllable-level errors: Weak syllables are deleted (e.g., boon for balloon); a syllable is repeated or deleted (e.g., nana for candy). • Prosody errors: Errors that occur in stress, rhythm and intonation.	High	Strong recommendation	Systematic review	7
Assessment	Case history • Family history of speech/language difficulties. • Recurrent middle ear infections. • Child's primary language used in the home. • Family and teacher concerns. • Age developmental milestoneswere met. • Medical history.	Low	Strong recommendation	Cohort study	8

Clinical questions	Action recommendation	Evidence quality	Strength of recommendation	Study type	References
Assessment	Oral mechanism examination includes: • Assessment of dentition and alignment of teeth • Muscle movement as well as development of the jaw, lips and tongue and the integrity of the oral structures (hardand soft palate, jaw, maxilla, lips and tongue) • Oral motor reflexes as well as purposeful movement through imitation of non-speech actions • Diadokokinetic rate: muscle movement for coordination and sequencing • Assessment of tongue and mouth resting posture to determine existence oftongue thrust	low High	Strong recommendation strong recommendation	Cohort study Systematic review	8 9

Clinical questions	Action recommendation	Evidence quality	Strength of recommendation	Study type	References
Assessment **Audiological assessment**	Will be provided to children during the initial Speech and Language Evaluation unless results of a comprehensive audiological assessment has already been completed. Follow up audiological assessment is indicated when progress in speech development has not been achieved or is minimal and evidence suggests risk for hearing impairment.	High	Strong recommendation	Systematic review	10
Speech Sound Assessment	The evaluation process may include the selection of administration of standardized tests, language/speech samples, or a descriptive analysis of informal findings. Assess articulation at the word, phrase and conversational levels. Establish a phonetic inventory for the child (i.e., what sounds can the child produce?). Identify the error patterns the child uses and look for phonological process use in children whoare less intelligible. Identify speech sound production inconsistencies. The child does not always misarticulate the error sound the same way in all words. Evaluate stimulability of error sounds. Evaluate intelligibility.	low	Strong recommendation	Cohort study	8
Assessment Stimulability	Child's ability to produce target sounds with cues • Used to select treatment targets based on the child's ability to utilize these cues • Assists in determining prognosis.	low	Strong recommendation	Cohort study	8

Clinical questions	Action recommendation	Evidence quality	Strength of recommendation	Study type	References
Intelligibility	Intelligibility refers to the listener's ability to understand the child's speech. A guideline for expected conversational intelligibility levels of typically developing children talking to unfamiliar listeners is summarized below • 1 year- 25% intelligible • 2 year- 50% intelligible • 3 year- 75% intelligible • 4 year- 100% intelligible Intelligibility can be impacted by several factors including: • Length of utterance • Familiarity with child's speech. • Child's speech rate, intonation, loudness level, vocal quality and fluency • Contextual cues • Presence of ambient noise during conversation.	Low	Strong recommendation	Comparative study	11
Onset of intervention	If SSD is not attributed to any other communication disorder, intervention should be started at the age of 5-6 years. Therapy should be postponed to give chance for completing the phonemic inventory and disappearance of all phonological processes including devoicing	low	Conditional recommendation	Cohort study	12
Intervention **Contextual utilization** **Contrast therapy**	Treatment starts with practicing syllable based contexts in which the sound is produced correctly. That syllable is used to train more difficult productions. For example, a /s/ may be more easily produced in the syllablewith a high front vowel. Targets focus on a specific phoneme feature using contrasting word pairs. Minimal pairs are different by one feature or phoneme that changes the word meaning (tip vs. ship). Maximal pairs use a sound target differing by several distinctive features which affect phoneme placement and manner to introduce sounds that the child cannot produce (beat vs. cheat)	Low High	Conditional recommendation Strong recommendation	Cohort study Systematic review	13 14

Clinical questions	Action recommendation	Evidence quality	Strength of recommendation	Study type	References
Core vocabulary approach	Used with children who are highly unintelligible due to inconsistent misarticulations and may not respond well to traditional therapy. This is a word-based approach as opposed to a phoneme-based technique. Words the child commonly uses are selected for practice and feedback is provided to reinforce the most accurate production of each word.	low	Conditional recommandation	Case study	15
Cycles approach	Focuses on improving phonological patterns with a strategy similar to normal sound acquisition. It is used withchildren who have poor intelligibility, characterized by numerous omissions and limited phonemic inventories. Each cycle targets all phonological patterns in error until they emerge in spontaneous speech.	High	Conditional recommandation	Systematic review	16
Distinctive features approach	Focuses on sound features the child cannot produce (nasals, fricative, voicing, placement) and is usually used with children who substitute. sounds. Error patterns are targeted using tasks such as minimal pair contrasts; usually once a contrast pattern emerges, it can be generalized. to other sounds that share the same feature.	High	Strong recommendation	Systematic review	14

Clinical question	Action recommendation	Evidence quality	Strength of recommendation	Study type	References
Metaphone therapy	Used with children who appear to have not mastered phonological system rules. Examples are descriptive and provide information about how a sound is produced, e.g., voiced (noisy) vs. voiceless (quiet). Sounds most impacting intelligibility are selected first.	Low	Conditional recommendation	Cohort study	17
Naturalistic Speech Intelligibility Intervention	Uses everyday activities to elicitthe target sound frequently during the session. For example, the child is asked about a toy that involves responses using the targeted sound. (i.e., "What color is the car?" "Red.") Appropriate productions are recast (i.e., casually modeled by the clinician or parent).	Low	Strong recommendation	Cohort study	18
Speech sound Perception Training	Speech perception tasks are used to help the child gain a consistent perception of the target sound. Tasks may include auditory bombardment and sound identification tasks. Usually used prior to or at the same time as speech production intervention.	High	Strong recommendation	Systematic review	14

Implementation considerations

Implementation:
The adapted guideline will be freely **disseminated** through both print and electronic versions as a portable document format (PDF) and through workshops and national conferences of ENT, Audio-Vestibular Medicine, Phoniatrics and related specialties.
Identification of potential barriers and facilitating factors through checklists with printed and electronic versions.
A guideline summary is provided together with a flowchart.

Research needs

There is a need to conduct comparative studies to highlight the most effective therapy program.

Monitoring and evaluating the impact of the guideline

Monitoring/ Auditing Criteria
The clinicians should be able to:
- Differentiate between all disorders of articulation
- Exclude organic defects or sensory disabilities
- Seek appropriate help from other specialities when needed

Updating of the guideline

Updating Procedure:
Any recommendation of this guideline will be updated when new evidence that could potentially impact the current evidence base for this recommendation is identified. If no new reports or information are identified for a particular recommendation, the recommendation will be revalidated. The focus will be on recommendations supported by very-low- or low certainty evidence and where new recommendations or a change in the published recommendations may be needed.

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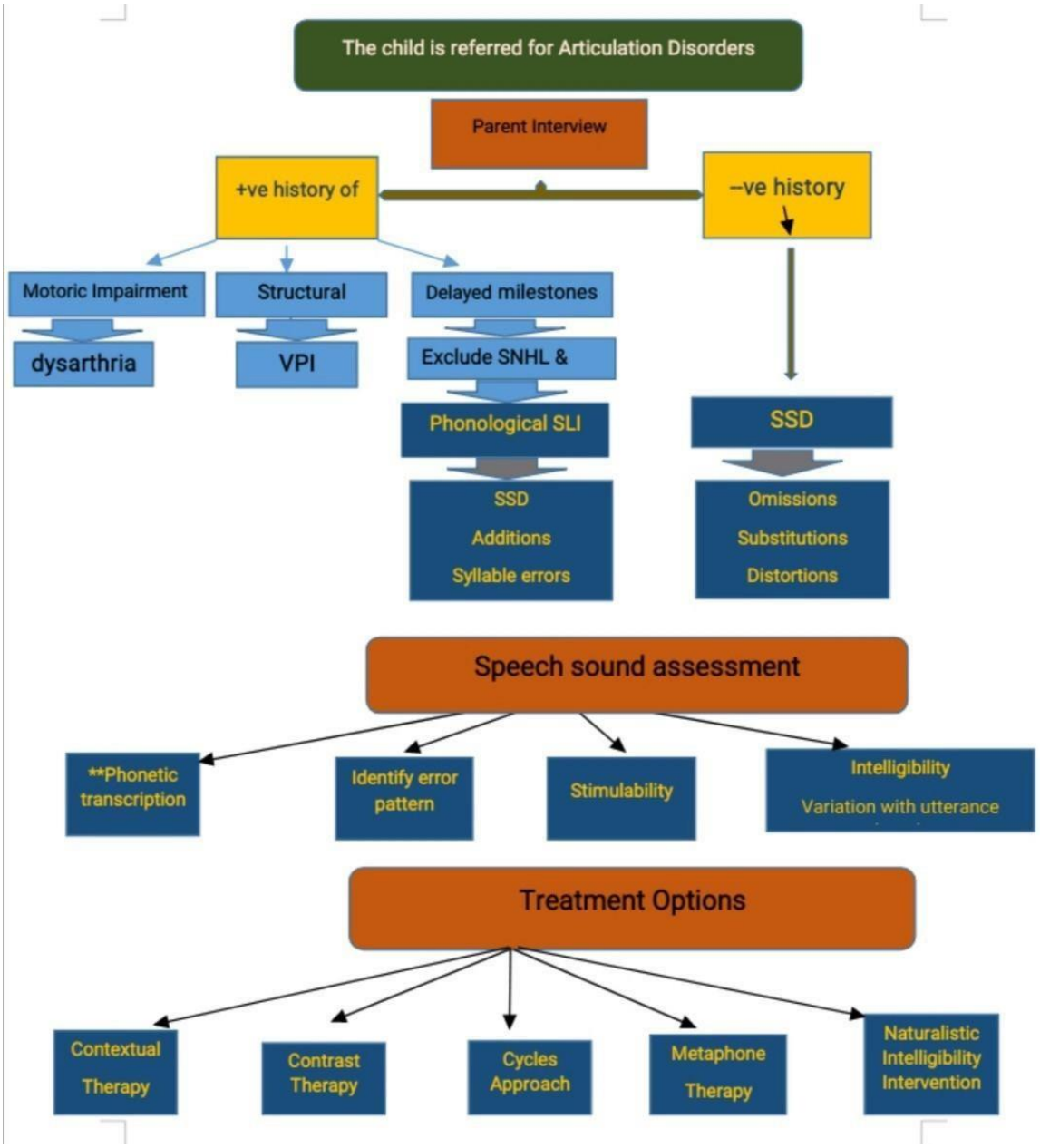
Annexes

Editorial Independence:

- This guideline was developed without any external funding.
- All the guideline development group members have declared that they do not have any competing interests.

Annex 1: Articulation disorders Flowchart



Annex 2: <u>Tables of appraisal of selected guidelines:</u> Currency (table 1), Content (table 2) and Quality (table 3) of the selected guidelines.

1- Currency (table 1)

Number	Responsible Organization	Date of Publication	Review Date	Original Details Date
CPG1	Child lang. Teach. & Therapy	2004	NR	2001
CPG2	University of N Carolina	2006	NR	2011
CPG3	CSDRN	2017	NR	2013-2017
CPG4	Evicore	2019	Annually	2015-2018

2- Content (table 2)

	Guideline 1	Guideline 2	Guideline 3	Guideline 4
Criteria	Evidence-based management of ph. impairment 2004	University of N. Carolina 2006	Child Speech Disorder Research Network 2017	Clinical guideline Speech therapy 2019
Credibility	9	8	5	8
Observability	4	3	5	3
Relevance	5	9	7	9
Relative advantage	6	7	5	7
Easy to install and understand	8	9	8	9
Compatibility	6	9	7	8
Testability	5	8	9	9
Total	43	53	46	53

Quality (table 3)

Domain	CPG1	CPG2	CPG3	CPG4
Transparency	A	A	A	A
Conflict of Interest	NR	NR	NR	NR
Development Group	C	C	C	C
Systematic Review	A	A	B	B
Grade of Evidence	B	B	B	C
Recommendations	C	A	B	B
External Review	NR	NR	NR	A
Update	C	B	B	A
CPG2: 3A, 2B, 1C, 2NR CPG4: 3A, 2B, 2C, 1NR				

Annex 3: The risks and benefits of added and/or modified statements

Statement	Risk	Benefit
Apart from short term memory disorders, the exact cause of speech sound disorders in most children is unknown. The cause of other articulation disorders is known and can be the result of motor speech disorders (e.g., Apraxia and Dysarthria), structural differences (e.g., cleft-palate), syndromes (e.g., Down Syndrome) or sensory deficiencies (e.g., hearing loss). SSD have to be clearly differentiated from other organic articulation disorders as early as possible during preliminary diagnosis in order to direct the patient to the suitable diagnostic procedure	Late diagnosis and subsequently interference leads to development of disarticulation strategies that will postpone response to therapy program later on.	Early identification of the cause of articulation disorders (other than SSD) helps to manage the underlying cause in the developmental period.
If SSD is not attributed to any other communication disorder, intervention should be started at the age of 5-6 years. Therapy should be postponed to give chance for completing the phonemic inventory and disappearance of all phonological processes including devoicing	Interference before completion of phonemic inventory is not effective in most cases	Waiting for phonemic inventory completion is important to facilitate targeting the correct place and manner of articulation of the affected phoneme