Dysarthria (ECPG)

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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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Abbreviations

SMA: Smith Accent Voice therapy

APA: Auditory Perceptual Assessment

CPG: clinical Practice guidelines

AAC: augmentative and Alternative Communication mode

Executive Summary

The scope of the guidelines in the diagnosis and management of Dysarthria

1. Any subject with speech difficulty should undergo:

a). History taking (strong recommendation)

b). Auditory perceptual assessment (APA) (strong recommendation)

c). Examination that includes both neurological examination and ENT examination (strong recommendation)

2. By the end of this assessment battery, dysarthria by its type and severity should be diagnosed with exclusion of other speech disorders. (conditional recommendation)

3. Rehabilitation will start tailoring a therapeutic plan that may include all the aspects (in blue rectangles) or some of them according to the most prominent speech parameters affecting the speech intelligibility of the patient.(strong recommendation)

4. For every aspect, your therapeutic trials may succeed or fail, and accordingly measurement of the outcome is of value every three months. Work with the patient in more than one aspect at the same time and not one of them at a time.(conditional recommendation)

5. Resonance therapy through training ,however, if failed shift to obturator.(conditional recommendation)

6. Articulation, respiration, phonation and prosody have many techniques to correct them.(conditional recommendation)

7. Prognosis and therapy termination is determined when patient's satisfaction is reached and when the Auditory perceptual assessment showed correction and elimination of difficulties. (conditional recommendation)

8. Augmentative and alternative communication methods should be considered in case achieved progress is unsatisfactory, particularly in patients having severe difficulties. (strong recommendation)

Introduction, scope and audience

Introduction and definition

Dysarthria is a heterogeneous group of neurological speech disorders whose characteristics reflect abnormalities in the strength, speed, range, timing, or accuracy of speech movements as a result of pathophysiologic conditions such as weakness, spasticity, ataxia, rigidity and a variety of involuntary movements (e.g., dystonia and choreoasthetosis). Dysarthrias can affect the respirators, laryngeal, velopharyngeal, and oral articulatory subsystems, singly or in combination. The impact of dysarthria ranges from a barely appreciable speech disorder to a reduction in the intelligibility of speech to an inability to speak. This group of disorders varies along a number of dimensions, including age of onset (Congenital or acquired at any age), cause (vascular, traumatic, neoplastic, and so on), natural course (Developmental, recovering, stable, degenerative, and so on), site of lesion (Many sites in the central or peripheral nervous system or both), neurologic diagnosis Parkinson's disease, traumatic. In addition, dysarthria is a speech disorder due to disturbed muscular control of the speech mechanism resulting from impaired motor control involved in the execution of speech. It has a neurogenic origin.

Scope:

The scope of the guideline provides a brief overview of the context (eg: current policy and practice) as well as the key issues that will be considered in the guideline, why the guideline is needed or where it will add value

Target audience:

Phoniatricians and pediatricians.

Methods

Methods of development

Stakeholder Involvement: Individuals who were involved in the development process. Included the above-mentioned Phoniatrics Chief Manager, Phoniatrics 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, Medscape, ASHA, ANCDS Bulletin board, Google scholar

Keywords
Dysarthria, neurological speech disorders, motor speech disorders, prosody

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.

Time period searched: from January 2005 to December 2019.

Results
Two national Phoniatricians reviewed the guidelines available. Guidelines from Royal college of speech and language therapists and ASHA summary of the clinical practice guidelines and ANCDS evidence for effectiveness of treatment gained the highest scores as regards currency, contents and quality.
It was graded GRADE by7 experts and reviewed by three 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 from the Academy of neurologic Communication disorders and sciences (ANCDS) and Royal college of speech and language therapists
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	Reference
Assessment of VP Function	History Taking This phase of the assessment involves gathering pertinent information from the patient, the medical records and the referral source. Information should be gathered on areas such as the following: • The onset of symptoms and medical/dental history. • the nature, duration, and natural course of velopharyngeal (VP) impairment. • Reports of previous treatment. • The level of concern about the problem. • The patient's motivation relative to treatment.	High	Strong recommendation	**Systematic Review**	**5**
Assessment of VP Function	Search for etiological factors	Very low	Strong recommendation	Expert opinion	4
The perceptual assessment of speech	Determining the severity of the velopharyngeal impairment and the degree to which the velopharyngeal impairment disrupts speech production is critical to establishing the need for intervention and for accurate therapeutic intervention.	High	Strong recommendation	**Systematic Review**	**5**

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Examination	Physical Examination This involves an assessment of the structure and function of the oral mechanism, including the velopharynx at rest and during movement.	High	Strong recommendation	**Systematic Review**	**5**
Instrumental examination of the velopharyngeal mechanism	It is necessary to directly observe and measure velopharyngeal activity. Instrumentation may include videoflouroscopy, nasoendoscopy,aerodynamic (pressure-flow). assessments, and acoustic assessment. This instrumentation allows for the evaluation of • Intraoral air pressure and nasal airflow during production of pressure consonants. • Palatal movement. • Lateral pharyngeal wall movement. • Sphincteric activity during speech. • Nasal airflow and intraoral air pressure. • The timing of velopharygeal movements.	High	Conditional recommendation	**Systematic Review**	**5**

Instrumental examination of the velopharyngeal mechanism	It is necessary to directly observe and measure velopharyngeal activity. Instrumentation may include videoflouroscopy, nasoendoscopy ,aerodynamic (pressure-flow). assessments, and acoustic assessment. This instrumentation allows for the evaluation of • Intraoral air pressure and nasal airflow during production of pressure consonants. • Palatal movement. • Lateral pharyngeal wall movement. • Sphincteric activity during speech. • Nasal airflow and intraoral air pressure. • The timing of velopharygeal movements.	High	Conditional recommendation	**Systematic Review**	**5**
Documentation by audiorecording and nasofibroscopic examination	*Audio recording of speech sample to compare between before and after therapy. *Nasofibroscopic examination to	Very low	Conditional recommendation	**Expert opinion**	**2**
Resonance Intervention goal	Enhancement of speech and communication function is a fundamental target of intervention.	High	Strong recommendation	**Systematic Review**	**5**

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Prosthetic intervention	Palatal lift fitting has a long history associated with improved speech function in selected cases of dysarthria.	High	Strong recommendation	**Systematic Review**	**5**
Surgical intervention	It is not considered unless all other interventionshave failed.	High	Strong recommendation	**Systematic Review**	**5**
Measurement of Outcomes	It is increasingly important to document the outcomes of intervention. A variety of outcomemeasures may be obtained and can be categorized.	High	Strong recommendation	**Systematic Review**	**5**
Respiratory and phonatory disorders in dysarthria	Respiratory/phonatory impairment is a common manifestation of dysarthria and can have a major impact on the adequacy of speech production. Treatment of the respiratory and phonatory subsystems. It is often given priority because improvementsat this level generate improvements in other aspects of speech as well.	High	Strong recommendation	**Metanalysis**	**2**
Assessment of respiration and phonation	History of the problem 1. Onset and medical history. 2. Nature, duration and course ofdysfunction. 3. Report of previous treatment. 4. Level of patient's concern about the impairment and social limitations. 5. Patient's motivation relative to treatment. Specific attention should be paid tothe patient's presenting complaints asthey may provide the initial evidence ofrespiratory or phonatory involvement.	low	Strong recommendation	**Observational study**	**4**

Assessment of phonation and respiration	Speech characteristics can provide a window into the nature and existence of respiratory and/or phonatory subsystem involvement. perceptual evaluation of loudness and breath patterning. Inadequate loudness and improper control of loudness, as well as abnormal patterning of inhalation and exhalation during speech, may serve as indicators of impaired respiratory and function.	Moderate	Strong recommendation	**Metaanalysis**	**2**

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Assessment of respiration and phonation	**Loudness** • Overall loudness level. • Inconsistent loudness level. • Sudden, uncontrolled alterations in loudness. • The patient is unable to increase loudness. • The patient is unable to speak quietly. • The patient is unable to emphasize words in a sentence by increasing loudness. **Breath Patterning** • The patient does not demonstrate the normal pattern of quick inhalation followed by prolonged exhalation and • Does not inhale to appropriate lung volume levels (Chenery, 1998) • Speech is interrupted by sudden, forcedinspiratory/expiratory • The patient runs out of air before inhaling • The patient produces few words/syllableson one breath. • Breaths occur at syntactically inappropriate locations in the utterance.	high	Strong recommendation	**Metaanalysis**	**2**
Assessment of respiration and phonation	Determination of Overall grade of dysphonia (Breathy, rough, asthenic or strained) Determination of pitch and associated vocalfry.	Very low	Strong recommendation	**Expert opinion**	**5**

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Physical Examination	Physical Examination A physical examination of the structure and function of the speech mechanism should be conducted, particularly if there are concerns of respiratory involvement. * The body position of the patient during evaluation (and treatment) should be con- sidered. Audible breathy inspiration, inhalatory stri- dor, or an audible grunt at the end of ex- piration. * Observation of these symptoms may pro- vide insight into the presence of respirato- ry/phonatory impairment, and whether the dysfunction stems from weakness, incoordi- nation, involuntary movements, and/or mal- adaptive strategies.	Very low	Strong recommendation	**Observational study**	**2, 4**
Clinical screening	Clinical Screening • A simple water glass manometer. • A hand-held respirometer is an economical device for gathering dataon vital capacity. • Contrasting the sharpness of the patient's cough with the glottal coup. • Sustained phonation time is also used as a very general estimate of respiratory/ phonatory capacity. • Sustained phonation with changes in loudness may also be implemented to estimate respiratory drive.	Very low	Conditional recommendation	**Observational study**	**2,1,3**

Instrumental Measures	A number of valuable respiratory/airflow measures (e.g., vital capacity, forced expiratory volume, functional residual capacity, inspiratory capacity, and expiratory/inspiratory reserve volumes) and subsequently compare them to predicted values based on the patient's age, height and sex. Additionally, kinematic assessment allows the SLP to infer the airflow volume.	Very low	Strong recommendation	**Observational study**	**1,2,3**
Instrumental Measures	*Maximum phonation time is often used as a global assessment of phonatory capacity. *laryngeal adduction can be inferred from the sharpness of a patient's cough and glottal coup.	Very low	Strong recommendation	**Observational study**	**1,2,3**
Phonatory assessment	Phonatory Function/ laryngeal assessment. A formal laryngeal assessment should be conducted when structural lesions or lesions of the vagus nerve are a possibility or prior to intensive voice therapy, such as the Lee Silverman Voice Treatment program.	Very low	Strong recommendation	**Observational study**	**1,2,3**

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Instrumental assessment of phonatory dysfunction	• Endoscopy. • Videostroboscoopy. • High-speech photography. • Optically precise rigid laryngoscopes. • Flexible fiberoptic laryngoscopy. • Aerodynamic measures have demonstrated utility in documenting perceptual voice characteristics and differentiating speakers with hypokinetic dysarthria. • Photoglottography. • Electroglottography. • Spectrographic/acoustic analyses. • Laryngeal aerodynamics. • Indirect mirror laryngoscopy.	high	Strong recommendation	**Systematic review**	**6**
Individual Intervention	Interventions vary as a type of dysarthria, severity of dysarthria, and co-existing factors. Therefore, individual intervention plans must be developed.	High	Strong recommendation	**Systematic review**	**6**
Individual Intervention	Staging of Intervention. Dysarthria often is not a stable condition. For example, children with developmental dysarthria may experience physiologic changes affecting speech production as they mature. Adults with acquired dysarthria may experience phases of recovery; as in dysarthria associated with traumatic brain injury; or phases of degeneration. (i.e., the timing of treatment) is critical for successful outcomes.	High	Strong recommendation	**Systematic review**	**6**

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Management of Reduced Function	The symptoms of respiratory/phonatory impairment may be categorized as reductions in: 1. Respiratory support. 2. Respiratory/phonatory coordinationand control. 3. Phonatory functioning.	High	Strong recommendation	**Systematic review**	
Improving the respiratory support	The following techniques have demonstrated clinical utility for improvingrespiratory support: • Controlled exhalation tasks. • Maximum inhalation and exhalation tasks. • Pushing and pulling techniques. • Breathing against resistance. • Using an air pressure transducer with feedback from an oscilloscope or computer screen. • Sustaining phonation with feedback from Visipitch or the VU meter on atape recorder.	High	Strong recommendation	**Systematic review**	**6**
Prosthetic Assistance	Expiratory boards or paddles provide a stationary object for the patient to lean into while speaking, thus increasing expiratory force.	high	Conditional recommendation	**Systematic review**	**6**
Speech Tasks	Manipulations of breathing patterns during speech production can provide a means of improving respiratory support	high	Conditional recommendation	**Systematic review**	6

Improving Coordination/Control	Nonspeech Tasks Rehearsing a speech-like breathing pattern (i.e., quick inspirations and slow,controlled expirations) • Implementing "inspiratory checking" without accompanying speech (if it is problematic for the patient to speak on controlled exhalations). • Facilitating inspiratory coordination and speed through sniffing, or exhalatory coordination through blowing. • Practicing switching between inspiration and expiration; the speed of the task can eventually beincreased.	high	Strong recommendation	**Systematic review**	**6**

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
	Speech Tasks Initiate speech at variable points in the respiratory cycle and need more consistent inspiratory control. • Initiate speech at inappropriate lung volume levels and need to vary the depth of consecutive inhalations. • Terminate speech late in the expiratory cycle with resultant diminished loud- ness. • Exhibit abnormal or maladaptive respiratory patterns, such as speaking on inhalation and forced expiration, often seen in patients with hyperkinetic dysarthria or patients with a concomitant cognitive impairment. • Adopt a fatiguing pattern of breathing, such as excessive shoulder elevation. The speaker can then practice reading paragraphs in which the respiratory patterns or breath group boundaries have been marked. • Cued conversational scripts. Conversational scripts for two speakers are prepared. The patient can practice modifying inhalations according to the marked respiratory patterns while speaking with another person. • Un cued reading/conversation. The patient reads aloud or speaks conversationally without the aid of respiratory pattern markings.	High	Strong recommendation	Systematic review	6

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Improving Phonatory Function	**Physical Strategies to Enhance Adduction: Clasping hands together and squeezing palms together as hard as possible** • Interlacing hands and pulling outward. • Pushing down on the speaker's raised arms in a rapid, uninterrupted motion. • Sitting in a chair, grasping the bottom with both hands, and pulling upward. • Sitting in a chair and pushing down on the seat bottom with both hands. • Pushing against a lap board, the arms of a wheelchair, or against any other firm surface. • Pushing the head forward against resistance provided by the examiner's hands placed on the forehead of the speaker. • Grunting and controlled coughing (To elicit phonatory behavior). **Trigger Better Speech with Increased Loudness** • High phonatory and physical effort • Intensive treatment: Daily practiceopportunities are requisite; treatmentis administered four times a week for 16 sessions in one month. • Sensory calibration/perception: Speaker learns to identify the appropriate amount of effort. • Quantification: Quantified	high	Strong recommendation	**Systematic review**	**6**

	feedback by the clinician is key to motivating speakers.				
Measurement of Outcomes	Perceptual measures. Measure of activity. Measures of impairment.	high	Strong recommendation	**Systematic review**	**6**

Alternative and augmentative communication tools	If a speaker remains unable to communicate satisfactorily following intervention, AAC modes should be pursued.	high	Strong recommendation	**Systematic review**	**6**
Candidacy	The most common explanation for selectinga particular intervention for a speaker with dysarthria was based on physiologic features. Because the respiratory subsystem provides the energy source and the phonatory system provides the sound source, both are critical to speech production.	high	Strong recommendation	**Systematic review**	**6**
Articulation therapy	Working with articulatory deficits as an isolated error of articulation.	Low	Conditional recommendation	Cross sectional study	7

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
	Prognostic indicators were provided for intervention. * In speakers with flaccid dysarthria, improved phonation with pushing exercises was used as a rationale for a complete program to enhance respiratory drive. * In persons with Parkinson disease, improved phonation with instructions to speak loudly was cited as a positive indicatorof candidacy for treatment.	high	Strong recommendation	**Systematic review**	6

Clinical questions	Action recommendation	Evidence Quality	Strength of Recommendation	Study type	Reference
Improving phonatory Function	**Smith accent voice therapy** technique will improve function of respiration and phonation in the form of: • Increase loudness. • Better respiratory support. • Slowing the rate of speech. • Adjust onset of phonation and respiration.	Very low	Strong recommendation	**Cross sectional study**	**6,7**
Articulation therapy	**Treatment of articulatory errors** using:Consonant exaggeration. Syllable by syllable attack. Slowing the rate of speech. **Oral muscular exercises** are not mandatory for weak musculature as muscle tone needed for speech is different from muscle tone needed for the swallowing process. Restrict oral muscle exercises in drooling.	Very low	Conditional recommendation	**Cross sectional study**	**6,7**
Prosodic correction	Therapeutic intervention for: Pitch inflections, stress and tone units.	Very low	Strong recommendation	**Cross sectional study**	**6,7**
AAC	Augmentative and alternative communication incase of: *Failed traditional therapy. *Anarthria.	Very low	Strong recommendation	**Cross sectional study**	**6,7**

Prognosis	Good prognosis with:Young age. Early intervention. Intensive therapeutic strategies.	Very low	Conditional recommendation	**Cross sectional study**	**6,7**

Research needs

There is a need to conduct randomized controlled trials (RCTs) to determine the efficacy of therapy in persistent prosodic affection
The factors influencing the outcome of rehabilitation using smith accent voice therapy

Monitoring and evaluating the impact of the guideline

Monitoring/ Auditing Criteria: to assess guideline implementation or adherence to recommendations.
Acquire the a full history from the patient or parents

- Exclude other causes of speech difficulty
- Prescribe the proper assessment
- Consider managing the defective speech mechanism according to the patient's needs
- Give advice on how to monitor improvement

All clinicians should be aware and informed to consider the following:

- Red Flags that need urgent referral for Assessment/ Management must be taken into consideration.
- For Assessment it is crucial to perform a detailed history/ clinical examination as a minimum patient assessment
- Management should be targeted towards treating the defective speech mechanism and to improve intelligibility of speech.

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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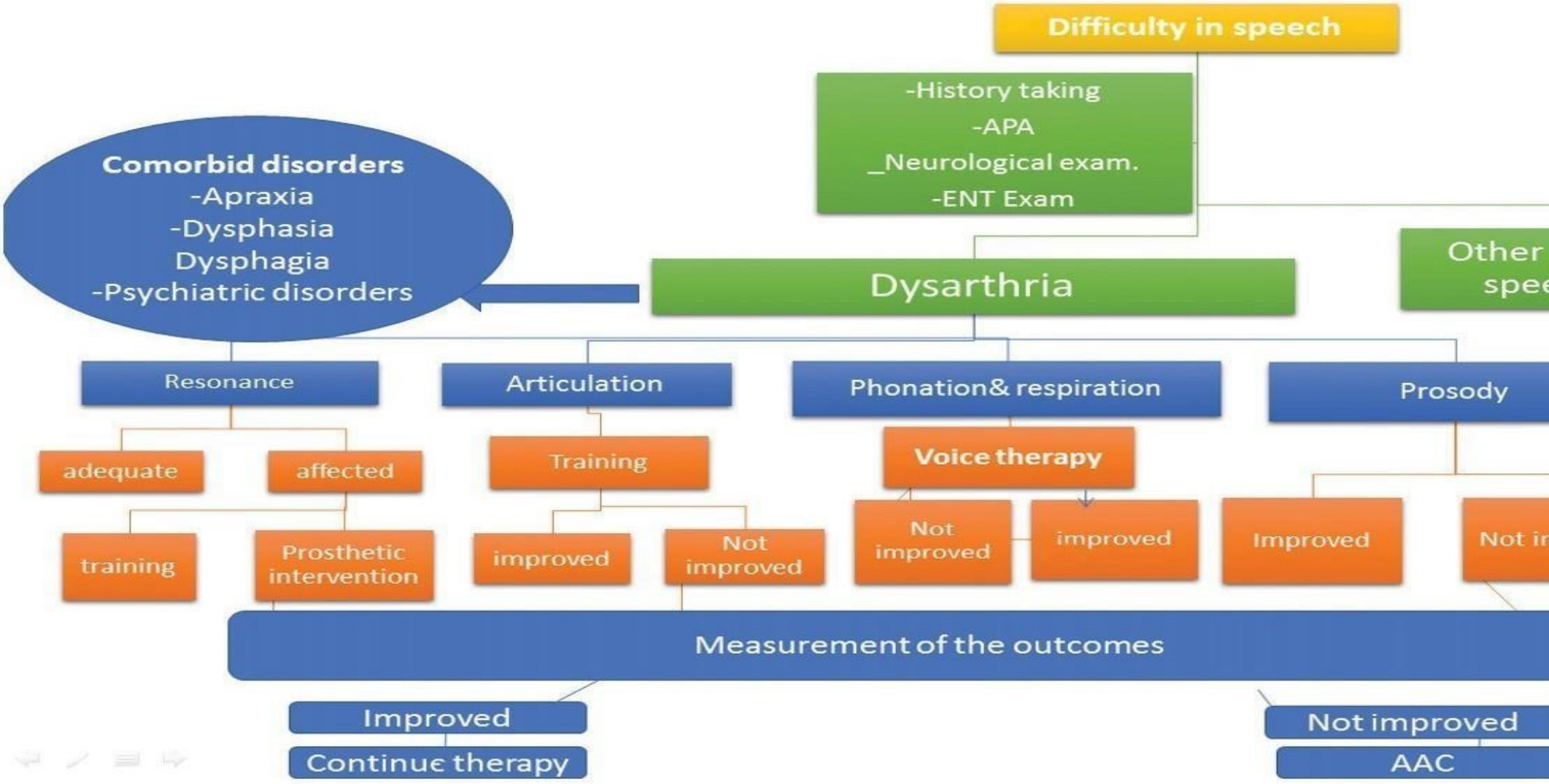
Annexes

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.

Flow chart of Dysarthria



Annex2 :

Tables of appraisal of selected guidelines: Currency (table 1), Content (table 2) and Quality (table 3) of the selected guidelines.

Table 1 : Currency

Number	Responsible organization	Date of publication	Expected review date
Guideline 1	Academy of Neurologic Communication disorders and Sciences (ANCDS)	2001	NR
Guideline 2	Royal College of Speech and language Therapists	2005	NR
Guideline 3	ANCDS Bulletin Board	2008	NR
Guideline 4	American Speech-Language – Hearing Association	2017	NR

Table 2: Content

Dysarthria	Guideline 1 Academy of Neurologic Communication disorders and Sciences (ANCDS)	Guideline2 Royal College of Speech and language Therapists	Guideline3 ANCDS Bulletin Board	Guideline4 American Speech-Language – Hearing Association	Gu Cli gu sp the Evi he
Credibility	9	9	8	6	4

Observability	9	7	8	5	5
Relevance	7	8	7	6	5
Relative advantage	9	8	8	8	6
Easy to install and understand	8	9	7	6	7
Compatibility	5	8	8	6	6
Testability	8	7	7	5	5
Total score	55	56	53	42	32

Table 3: Quality

Domain	Guideline 1	Guideline2	Guideline 3	Guideline 4
Transparency	A	B	A	C
Conflict of Interest	A	NR	NR	NR
Development Group	A	B	A	B
Systematic Review	A	A	A	B
Grading of evidence	B	A	B	C
Recommendations	A	A	A	B
External review	A	A	A	C
Updating	B	B	A	B

Annex 3:

The risks and benefit from added or modified statements

Statement	Risk	benefit
Smith accent voice therapy technique will improve function of respiration and phonation in the form of: • Increase loudness. • Better respiratory support. • Slowing the rate of speech. Adjust onset of phonation and respiration.	May not applied by all physicians. It is usually known and applied by middle east physicians	Mandatory in cases of dysarthria as it corrects the prosodic affection as well as loudness and respiratory incoordination and hence improve intelligibility
Treatment of articulatory errors using:Consonant exaggeration. Syllable by syllable attack. Slowing the rate of speech. **Oral muscular exercises** are not mandatory for weak musculature as muscle tone needed for speech is different from muscle tone needed for the swallowing process.	Speech Intelligibility won't improve	Essential to improve speech intelligibility
Therapeutic intervention for: Pitch inflections, stress and tone units	The tone of speech as well as other prosody elements still affected with abnormal speech performance	Prosodic correction
Augmentative and alternative communication incase of: *Failed traditional therapy. *Anarthria.	May stop trying to train verbal communication	There is need to train patients using AAC to overcome loss of communication in cases of anarthria
Good prognosis with:Young age. Early intervention. Intensive therapeutic strategies.	Unrealistic expectations might stop commitment to therapy intervention	Adding prognostic apects may motivate patients and caregivers to continue therapy even if slow improvement is seen