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Therapeutic and Training Techniques for Improving Speech in Children with Hearing Loss: A Theoretical Analytical Review

التقنيات العلاجية والتدريبية لتحسين النطق لدى الأطفال ذوي ضعف السمع:
مراجعة نظرية تحليلية

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Abstract:

This paper presents an analytical review of therapeutic and training techniques used to improve speech and spoken language in children with hearing loss. It also organizes current evidence into a practical framework for use in clinical and school settings. Drawing on recent professional documents and Arabic applied studies, it examines auditory training, auditory processing, audio-visual integration, SUVAG-based intervention, and individualized educational planning.

The review shows that speech improvement is rarely achieved through a single technique. Better outcomes depend on combining early detection, appropriate hearing technology, structured auditory-linguistic training, direct speech therapy, and active collaboration among family, school, and specialists. It also indicates that intervention is more effective when residual hearing is maximized, visual cues are integrated, and progress is monitored systematically. The paper proposes a 12-week intervention framework supported by pre-, post-, and follow-up evaluation indicators.

Keywords: hearing loss; speech intervention; auditory training; audio-visual integration; SUVAG.

المخلص:

تقدم هذه الورقة مراجعة تحليلية للتقنيات العلاجية والتدريبية المستخدمة في تحسين النطق واللغة الشفهية لدى الأطفال ذوي ضعف السمع، كما تنظم الأدلة المتاحة ضمن إطار عملي قابل للتطبيق في السياقات العيادية والمدرسية. واستنادًا إلى وثائق مهنية حديثة ودراسات عربية تطبيقية، تتناول الورقة التدريب السمعي، والمعالجة السمعية، والتكامل السمعي البصري، والتدخل القائم على نظام SUVAG، والتخطيط التربوي الفردي.

وتبين المراجعة أن تحسين النطق نادرًا ما يتحقق من خلال تقنية واحدة، بل يرتبط بنتائج أفضل عندما يجري الجمع بين الكشف المبكر، والتكنولوجيا السمعية الملائمة، والتدريب السمعي اللغوي المنظم، والعلاج الكلامي المباشر، والتعاون الفعال بين الأسرة والمدرسة والمختصين. كما تشير الورقة إلى أن التدخل يصبح أكثر فاعلية عندما تُستثمر البقايا السمعية، وتُدمج الإشارات البصرية، وتُتابع مؤشرات التقدم بصورة منتظمة، وتُتَرحَ إطارًا تدخلًا يمتد اثني عشر أسبوعًا مدعومًا بمؤشرات للتقويم القبلي والبعدي والتتبعي.

الكلمات المفتاحية: ضعف السمع؛ التدخل النطقي؛ التدريب السمعي؛ التكامل السمعي البصري؛ SUVAG.

1. INTRODUCTION

Hearing plays a central role in the acquisition of spoken language and in the regulation of speech production through auditory feedback. For this reason, any disruption in access to sound or in its interpretation during the early years of life affects vocabulary growth, sentence length, accuracy of sound production, intonation, and rhythm.

In its most recent publications, the World Health Organization confirms that more than 430 million people require rehabilitation services because of disabling hearing loss. It also reports that more than

95.1 million children and adolescents between the ages of 5 and 19 live with varying degrees of hearing loss. This global burden is expected to increase unless screening, rehabilitation, and prevention services are expanded¹.

The effects of hearing loss do not stop at the level of peripheral hearing. They extend to language, cognition, social development, and educational performance. Medical references indicate that undetected hearing loss, or delayed intervention, may lead to delays in speech, spoken language, and language comprehension. It may also result in later academic, social, and

psychological difficulties. Even mild or moderate hearing loss may be misleading in classroom settings with background noise, where a child's ability to perceive connected speech declines despite apparently acceptable performance at home².

For this reason, it is no longer scientifically acceptable to view hearing aids or cochlear implants as complete treatment in themselves. These devices improve access to the speech signal, but they are not sufficient on their own to build clear spoken language or functionally effective speech. They must be integrated into an organized rehabilitation and training program that takes into account the age at detection, the degree of hearing loss, consistency of device use, family readiness, and the characteristics of the classroom and linguistic environment.

From this standpoint, the present paper seeks to reformulate the previous article in a broader and more academically mature form. It refines the methodology, strengthens the documentation, expands the critical discussion, and reshapes the material into a theoretical analytical review suitable for submission to a scientific journal in audiology, speech and language therapy, or special education.

2. SIGNIFICANCE OF THE TOPIC AND ITS RESEARCH PROBLEM

The research problem of this topic arises from the fact that children with hearing loss do not constitute a homogeneous group. They differ in severity of hearing loss, age at diagnosis, type of hearing device, initial language level, and the presence of associated disorders. Therefore, the central question is not: What is the best technique in absolute terms? Rather, it is: Which technique is most appropriate for which child, at which stage, and under which conditions of implementation?

This question becomes even more important in the Arab context because of the relative gap between the availability of hearing devices on the one hand and the availability of integrated evidence-based programs on the other. Many practices stop

at diagnosis or device provision. However, clinical and educational reality shows that speech clarity and functional communication do not improve unless diagnosis is translated into a structured and measurable intervention plan.

3. METHODOLOGY OF THE ANALYTICAL REVIEW

This paper adopts an applied theoretical-analytical review approach. It is not presented as an original field study, nor as a full systematic review in the strict bibliometric sense. This approach was chosen because the aim is not limited to summarizing the literature. It also seeks to integrate theoretical, clinical, and educational evidence into a practical framework that can be used in therapeutic work.

The review draws on three types of sources: (1) recent official and professional documents issued by the World Health Organization and professional associations in audiology and speech-language pathology; (2) a clinical medical reference that explains patterns of symptoms, diagnosis, and treatment in children; and (3) recent Arabic applied studies on SUVAG-based individualized educational planning, auditory processing improvement programs, and audio-visual integration programs for children with hearing loss.

The sources were selected according to the following criteria: direct relevance to speech in children with hearing loss, recency as far as possible in professional documents, methodological clarity in applied studies, and the possibility of translating the findings into practical principles. General, promotional, or scientifically weak sources were excluded, especially those that did not offer direct value in explaining intervention mechanisms or evaluating them.

The analysis ultimately organized the evidence into a set of sequential themes: (a) the conceptual foundation of the relationship between hearing loss and speech, (b) the main therapeutic and training techniques, (c) the roles of the multidisciplinary team, (d) the individualized plan and assessment, and

(e) a proposed practical framework suitable for publication and professional use.

4. THEORETICAL FOUNDATION OF THE RELATIONSHIP BETWEEN HEARING LOSS AND SPEECH DISORDERS

4.1 Hearing Loss as an Entry Point to Speech and Language Disorder

Normal speech production is based on an interconnected process. It begins with reception of the acoustic signal. It then moves to auditory analysis, phonological encoding, and motor retrieval during production. When one part of this chain is disrupted by hearing loss, the child becomes less able to monitor speech and compare it with the correct model. As a result, errors of omission, substitution, and distortion may appear. Problems in intonation may also emerge, along with reduced overall speech intelligibility.

The Arabic study that examined the effectiveness of an individualized educational plan based on the Universal Auditory Verbal System (SUVAG) showed that speech disorders in children with hearing loss are not linked only to the isolated phoneme. They are also related to the phonetic context. The study further showed that improvement may appear at the level of the word, sentence, and syllable when structured individual intervention is provided³.

Clinical evidence also confirms that untreated hearing loss leads to clear weakness in speech and language comprehension. It may also result in school failure, social isolation, or psychological difficulties when diagnosis is delayed or when appropriate rehabilitative treatment is not activated⁴.

4.2 Mechanisms of Influence: From Auditory Input to Phonological Representation

Weak speech performance in this group does not result only from a problem in the speech organs themselves. It also results from limited auditory input, which forms the raw material for building phonological representations. The lower the quality of the

sound heard, or the more distorted some of its frequencies are, the harder it becomes for the child to distinguish fine differences between similar sounds, retain them in auditory memory, or use them within syllables, words, and sentences.

For this reason, some children may show an initial ability to hear environmental sounds, yet still fail to interpret connected speech in the classroom or follow spoken instructions with multiple steps. This makes auditory training and auditory processing programs an essential part of speech rehabilitation, rather than a secondary component that can be overlooked.

Table 1. Common Speech Features in Children with Hearing Loss and Their Explanatory Mechanisms

Feature / Error	Clinical Description	Likely Mechanism	Most Appropriate Therapeutic Response
Omission	Omission of a sound or syllable from the word, especially in final syllables or complex syllabic structures.	Weak phonological representation or limited auditory feedback during production.	Training in syllabic awareness, auditory-visual modeling, and gradual progression from the syllable to the word level.
Substitution	Replacement of one sound with another that is close in auditory	Weakness in auditory discrimination or instability in establishing the	Fine auditory discrimination, articulatory training, and the use of a

	or articulatory features, such as confusion between similar or weakly contrasted sounds.	articulatory position of the target sound.	mirror, tactile cues, and visual cues.
Distortion	Production of a sound in an unfamiliar or inaccurate manner without changing it into another correct phoneme.	Impaired motor control with weak auditory monitoring of the sound feature.	Specific training on sound production, with repeated auditory and visual feedback.
Disorder of intonation and rhythm	Speech that is monotonous, excessively loud, or lacking temporal and prosodic coordination.	Reduced perception and control of suprasegmental features during speech production.	Melodic speech training, rhythmic training, and intonation and stress techniques.

Source: Prepared by the author.

5. MAIN THERAPEUTIC AND TRAINING TECHNIQUES

5.1 Early Detection and Hearing Screening Across Age Stages

The World Health Organization indicates that hearing screening programs

form part of the evidence-based response to preventing the effects of hearing loss and reducing its consequences. Screening should not be limited to newborns alone. It should also include school-age children and groups at risk⁵. WHO also notes that screening, early detection, and early rehabilitation are among the most cost-effective pathways for reducing the global burden of hearing loss.

At the clinical level, the MSD references indicate that hearing loss should be suspected when a child shows delayed onset of speech, lack of response to sounds, or weaker linguistic and social performance in the classroom than at home. Diagnosis includes tests such as otoacoustic emissions and auditory brainstem response testing for infants, in addition to behavioral and audiological methods appropriate for older children⁶.

5.2 Hearing Aids, Cochlear Implants, and Supportive Classroom Systems

Successful speech intervention cannot be built if the original auditory signal is not sufficiently available to the child. Hearing aids improve access to sound in cases of mild to moderate hearing loss and in some more severe cases. Cochlear implants are used when hearing aids do not provide satisfactory functional benefit. FM systems are also used in noisy classroom environments to improve the signal-to-noise ratio by transmitting the teacher's voice directly to the child's device⁷.

Although these tools are essential, their effectiveness is not measured simply by their physical availability. It also depends on regular use, appropriate programming, evaluation of actual benefit in the classroom and at home, and integration into a comprehensive auditory and speech training plan. WHO stresses that hearing devices and assistive technologies should be understood as part of comprehensive rehabilitation rather than as the endpoint of intervention⁸.

5.3 Auditory Training and Auditory Processing

Auditory training is based on improving the child's ability to attend to sound signals, detect them, discriminate

among them, remember them, and understand them in contexts that increase gradually in difficulty. Auditory processing, by contrast, focuses on what happens after sound reaches the auditory system. This includes discrimination, memory, auditory association, auditory inference, and speech understanding under changing communicative conditions.

A recent Arabic study conducted with children with hearing loss showed that a training program consisting of 55 sessions was effective in improving auditory processing skills, and that this effect was maintained at follow-up assessment. This finding indicates that auditory processing training is not a marginal intervention. Rather, it is an influential component in building auditory perception, on which later speech accuracy depends⁹.

This result is important for reordering therapeutic priorities. A child who fails to discriminate between sounds or retain the auditory sequence of a word may not respond well to direct articulatory therapy alone unless skills of attention, discrimination, and auditory memory are established before it or alongside it.

5.4 Audio-Visual Integration and Speechreading

Recent literature confirms that speech is, by nature, an audio-visual event. The speaker does not only hear the sound, but also reads the movement of the lips, tongue, jaw, and facial expressions. For this reason, audio-visual integration is especially important for children with hearing loss, as it compensates for part of the weakness in auditory input by supporting perception through a set of synchronized visual cues.

A recent Arabic study showed that a program based on audio-visual integration contributed to the development of receptive and expressive language skills in children with hearing loss. The program relied on the use of residual hearing, speechreading, pictures and visual stimuli, and techniques such as reinforcement, imitation, homework, and role play¹⁰.

However, the real value of this approach appears when it is integrated into authentic communicative situations, not when it is reduced to mechanical lip-reading. It is therefore preferable to present it through live face-to-face interaction, short videos, illustrated storytelling, or description and matching tasks, so that the child learns to connect sound, movement, and meaning at the same time.

5.5 Melodic Speech and the Universal Auditory Verbal System (SUVAG)

Melodic speech, or the Universal Auditory Verbal System (SUVAG), is one of the most prominent approaches in Arabic work on speech rehabilitation for children with hearing loss. This method is based on making use of residual hearing and linking it to rhythm, movement, and intonation. It also employs filters or frequencies adapted to the child's hearing profile in a way that supports the development and regulation of spoken speech.

The Algerian study published in 2023 showed that an individualized educational plan based on SUVAG led to improvement in the pronunciation of single words, sentences, and target speech sounds. It also reduced distortion and substitution errors and supported the transition from general expression to more accurate and clearer production¹¹.

The importance of this method is especially clear in children who respond well to a rhythmic-motor approach. Hand and body movements, stress patterns, and gradual changes in speed can help stabilize articulation and improve the motor timing of speech. These features make the method particularly useful when traditional training on isolated sounds is not sufficient on its own.

5.6 Direct Speech Therapy Targeting Sounds, Syllables, Words, and Sentences

Direct speech therapy remains the cornerstone of correcting speech errors and improving speech intelligibility. Its effectiveness, however, increases when it is based on a qualitative assessment of the child's error pattern. Is the problem related

to place of articulation? Auditory discrimination? Motor sequencing? Or syllabic structure?

In practical terms, intervention should not begin with long sentences if the child is still unable to produce the sound in isolation or within a syllable. The most logical professional progression begins with identifying the articulatory placement and manner of production, then producing the sound in isolation, then within an open syllable, then a closed syllable, then within a word, then in a short sentence, and finally in spontaneous speech. Throughout this process, the clinician may use a mirror, visual cues, immediate feedback, purposeful repetition, positive reinforcement, and home-based generalization.

Table 2. Analytical Comparison of the Main Therapeutic and Training Techniques

Technique	Main Strengths	Limitations or Conditions	Most Suitable Cases
Hearing aids / cochlear implants	Improve access to the speech signal and increase opportunities for auditory-verbal learning.	Require periodic adjustment and consistent use. They are not sufficient on their own without training.	Children with hearing loss who achieve functional benefit from auditory amplification.
Auditory training and auditory processing	Enhance attention, discrimination, comprehension, and auditory memory.	Require patience, gradual progression, and continuous documentation of the auditory-linguistic	Children who show auditory confusion or weak auditory comprehension.

		level.	
Audio-visual integration	Supports speech perception and compensates for weak auditory input in natural settings.	Requires effective face-to-face interaction and systematic use of visual stimuli.	Users of hearing aids or cochlear implants, and children who benefit from speechreading.
SUVA G / melodic speech	Helps improve intonation, rhythm, and stabilization of articulation through melody and movement.	Requires specialized training and a clear individualized plan.	Children with evident speech errors and a need for rhythmic-motor support.
Direct speech therapy	Targets phonological and articulatory errors with precision.	May be less effective if it is not preceded or accompanied by appropriate auditory intervention.	All children, with adaptation of level and goals.

Source: Prepared by the author.

6. THE MULTIDISCIPLINARY TEAM AND THE INDIVIDUALIZED PLAN

Professional documents issued by ASHA and AAA indicate that care for children with communication and hearing disorders is based on genuine interprofessional practice. Collaboration is not a secondary or decorative element. It is one of the conditions for service quality. The audiologist is responsible for assessment,

diagnosis, device fitting and adjustment, and monitoring auditory benefit. The speech-language pathologist is responsible for evaluating speech and language, setting treatment goals, and conducting therapy sessions. The special education teacher and school staff prepare the classroom environment and adapt instructions, noise conditions, and daily practices. The family, in turn, plays a central role in generalization and home follow-up¹².

ASHA also explains that professional collaboration includes involving the individual and the family in decision-making and in the development of individualized plans and educational services, including IFSPs and IEPs when these are applied within different educational systems¹³.

This means that a speech improvement program should not remain isolated within the therapy room. It should be connected to what happens in the classroom, at home, and in play, reading, and everyday life.

Table 3. Distribution of Roles Within the Rehabilitation Team in Speech Improvement Programs for Children with Hearing Loss

Team Member	Core Tasks	Examples of Practical Responsibilities	Indicator of Good Coordination
Audiologist	Audiological assessment, device fitting and adjustment, and measurement of auditory benefit.	Hearing tests, programming the hearing aid, checking FM system performance, and interpreting classroom difficulties.	Availability of an updated audiologic report with practical recommendations for the team.
Speech	Assessment	Identifying	Measurable

h- Langu age Pathol ogist	nt of speech and language, treatment planning, and interventi on delivery.	ng target sounds, structurin g sessions, and monitori ng generaliz ation.	e short- term treatment goals and document ed progress.
Specia l Educat ion Teach er / School Staff	Preparing the education al environme nt and applying recommen dations on a daily basis.	Reducing noise, supportin g spoken compreh ension, and monitori ng classroom performa nce.	Transfer of improvement from the clinic to the classroom .
Family	Home practice, generaliza tion, and daily observatio n.	Carrying out home assignme nts, documen ting performa nce, and ensuring regular use of the device.	Stability of performan ce outside the therapy session and improved opportunit ies for generaliza tion.

Source: Prepared by the author.

7. A PROPOSED PRACTICAL FRAMEWORK FOR BUILDING AN IMPLEMENTABLE THERAPEUTIC-TRAINING PLAN

In light of the evidence analyzed in this review, a practical framework may be proposed to connect auditory and language assessment with session planning and outcome documentation. This framework is based on six principles: (1) individualization, meaning that goals are matched to the child's profile rather than to the category in general; (2) progression,

from perception to production and from simple to complex tasks; (3) integration, among auditory, visual, and motor stimuli; (4) partnership, among the family, the school, and the multidisciplinary team; (5) purposeful repetition, rather than mechanical repetition; and (6) documentation, through pre-, post-, and follow-up measurement.

Application of this framework begins with collecting a clear baseline. This includes the type and degree of hearing loss, the type of hearing aid or cochlear implant and the consistency of its use, the level of receptive and expressive language, the list of the most persistent speech errors, the efficiency of auditory discrimination, the ability to follow spoken instructions, and the level of family participation. On this basis, short-term goals are formulated, usually for a period of 2 to 4 weeks, as well as medium-term goals that usually extend from 8 to 12 weeks.

Table 4. Proposed 12-Week Therapeutic-Training Protocol

Phase / Weeks	Therapeutic Goal	Core Activities	Indicators of Success
1-2	Auditory preparation and attention building	Checking the hearing device, training the child to orient to sound, recognizing environmental sounds, guiding the family, and recording baseline performance.	Consistent response to sound and regular use of the hearing device.
3-4	Improving auditory	Discriminating	Reduced confusion

	discrimination and phonological awareness	between similar sounds, sound-picture matching, short auditory memory tasks, and distinguishing the beginning and end of words.	between sounds and increased accuracy of discrimination.
5-6	Stabilizing articulation	Modeling in front of a mirror, visual and tactile cues, sound-syllable training, and the use of rhythm or melodic speech when needed.	Accurate production of the target sound in isolation and within syllables at an acceptable level.
7-8	Generalizing the sound in words	Picture cards, audio-visual training, naming and guided repetition, and short role-play activities.	Improved intelligibility in common functional words.
9-10	Use in sentences and interaction	Picture description, sentence completion, guided dialogue,	Improved sentence intelligibility and reduced omission and

		and multi-step spoken commands	substitution errors.
11–12	Generalization and follow-up	Coordination with the teacher, home assignments, audio recordings, final review, and follow-up indicators.	Stable performance at school and at home, with increased communicative initiative.

Source: Prepared by the author.

8. EVALUATION AND MEASUREMENT OF THERAPEUTIC OUTCOMES

One of the main weaknesses of poorly structured intervention programs is the absence of clear measures of progress. For this reason, any program intended for publication or professional use should include pre-, post-, and follow-up indicators. It should also distinguish between improvement within the therapy session and functional improvement in everyday life. Not every child who can repeat a sound at the therapy table is able to use it spontaneously in the classroom or at home.

Recent Arabic literature highlights the importance of combining structured clinical observation, word and sentence lists, available language or auditory measures, and family and teacher questionnaires. It also stresses the need to document the accuracy of target sound production across more than one context, the degree of spoken instruction comprehension, the level of communicative initiative, and the extent of reliance on visual cues or prompting.

Table 5. Pre-, Post-, and Follow-Up Evaluation Indicators in Speech Improvement Programs for Children with Hearing Loss

Measure Dimension	Examples of Indicators	Appropriate Tool or Procedure	Time of Measurement
Auditory benefit	Response to sound, orientation toward the source, comprehension in noise, and consistency of device use.	Audiological report, clinical observation, and family and school follow-up.	Pre-intervention, ongoing, post-intervention, follow-up.
Speech	Accuracy of sound production in different positions, and number of omission, substitution, and distortion errors.	Word and sentence lists, audio recordings, and speech sample analysis.	Pre-intervention, weekly, post-intervention.
Language	Comprehension of instructions, vocabulary size, sentence length, and ability to describe and narrate.	Language measure or structured observation protocol.	Pre-intervention, post-intervention, follow-up.
Communicative functioning	Communicative initiative, classroom	Family/teacher questionnaire	Pre-intervention, post-

	m participat ion, response at home, and independ ence in speech use.	and naturalis tic observati on.	intervent ion, follow- up.
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Source: Prepared by the author.

9. ANALYTICAL DISCUSSION

The evidence analyzed in this review points to a central conclusion: improving speech in children with hearing loss is not the result of a single factor. Rather, it is the outcome of an organized interaction among the quality of auditory input, the adequacy of auditory and language processing, the precision of motor control in speech, and the effectiveness of the supporting environment. Without sufficient auditory input, the development of phonological representation is hindered. Without auditory training, discrimination and comprehension remain weak. Without direct speech therapy, articulatory and phonological errors remain uncorrected. Without the support of the family and the school, generalization is limited and progress remains confined to the therapy session.

The review also shows that speaking about the “best technique” in absolute terms is methodologically misleading. A more accurate approach is to speak of the “best combination of interventions” according to the characteristics of each case. A child with moderate hearing loss and weak auditory processing is not the same as a child with a cochlear implant who has limited vocabulary but shows basic auditory discrimination. Likewise, a child whose main difficulty lies in intonation and rhythm may benefit more from the inclusion of melodic speech, whereas direct articulatory focus may be more appropriate in other cases.

At the same time, applied Arabic literature, despite its importance, still requires more experimental studies with

larger samples, more standardized assessment tools, and longer follow-up periods. A considerable part of the available research is based on small samples or local programs whose findings should be generalized with caution. Even so, its practical value remains significant because it offers models that are close to the Arab context and can be refined and developed, rather than relying on the direct transfer of foreign models without adaptation.

10. LIMITATIONS OF THE PAPER AND ITS RECOMMENDATIONS

The main limitation of this paper lies in the fact that it is an application-oriented analytical review rather than a full systematic review. In addition, part of the Arabic evidence used remains limited in terms of sample size and diversity of settings. Some of the applied findings reported in Arabic literature are also linked to local institutional conditions that may not fully correspond to other contexts.

Accordingly, the paper offers the following recommendations. First, peer-reviewed Arabic research should be expanded to examine the relationship between the type of hearing loss and the most effective pattern of speech intervention. Second, standardized Arabic protocols should be developed for the assessment of speech, auditory processing, and functional generalization. Third, the role of the family and the school within intervention plans should be documented as a major variable rather than a secondary factor. Fourth, practitioners should be trained to design individualized plans that connect auditory, language, and speech assessment. Fifth, Arabic review articles should be developed in closer alignment with the structure of contemporary scientific reviews, including a clear description of selection strategy, analysis procedures, and study limitations.

CONCLUSION

This paper concludes that therapeutic and training techniques for improving speech in children with hearing loss are most effective when they are based on

integration rather than fragmentation. Such integration includes early detection, functional audiological assessment, hearing aids or cochlear implants, auditory training, audio-visual integration, melodic speech when needed, and targeted speech therapy, all within a collaborative individualized plan led by a multidisciplinary team.

No single technique is suitable for all cases. Clinical and educational success depends on how well the intervention matches the child's auditory and linguistic profile. It also depends on the ability of the team and the family to translate therapeutic goals into daily practice that can be measured and generalized. In its revised form, this article therefore provides a stronger theoretical and practical foundation and is more closely aligned with the requirements of academic publication in specialized Arabic journals.

RECOMMENDATIONS

- Expand early hearing screening and early intervention services. Screening programs should include newborns, school-age children, and at-risk groups in order to reduce delayed diagnosis and improve speech and language outcomes.

- Adopt integrated intervention models rather than isolated techniques. More effective results are achieved when hearing technology, auditory training, audio-visual integration, direct speech therapy, and individualized planning are combined within one coordinated framework.

- Develop individualized therapeutic plans for each child. Intervention should be based on the child's auditory profile, language level, age at diagnosis, and specific speech difficulties rather than on a one-size-fits-all approach.

- Strengthen multidisciplinary and family-school collaboration. Successful speech improvement depends on close coordination among the audiologist, speech-language pathologist, teachers, and family, with shared goals and consistent follow-up.

- Establish systematic evaluation procedures.

Intervention programs should include pre-, post-, and follow-up assessment measures covering auditory benefit, speech production, language development, and communicative functioning.

- Promote stronger Arabic research and standardized tools in this field. More studies are needed with larger samples, longer follow-up periods, and better standardized Arabic assessment and intervention protocols for children with hearing loss.

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¹¹ Shafii, A., and M. Jefal, Ibid.

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¹³ American Speech-Language-Hearing Association. “Scope of Practice in Speech-Language Pathology.” 2016