ARTICULATION DISORDERS IN STUDENTS AND CLASSROOM INTERVENTIONS

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ABSTRACT

Speech is peculiar to man as a means of communication which involves the mouth or the speech organ. In some cases, the speech organ may become defective, thereby leading to speech disorders. A speech disorder can be described as any condition that affects a person's ability to produce sounds that create words.Speech disorders prevent people from forming correct speech sounds as expected by the society based on age, gender, and stature. This article discussed articulation disorders, which is a type of speech disorders, as the production of sounds, syllables or words incorrectly so that the listeners do not understand what is being said or pay more attention to the way the words sound than to what they mean. Types of articulation disorders discussed are omission, substitution, addition and distortion. Many therapeutic interventions were discussed before it was recommended that parents should avail their children at risk of speech disorder, especially articulation disorder, the opportunity of early intervention so as to mitigate the future debilitating effect of articulation disorder on academic performance and psychosocial wellbeing. It was equally recommended among others that the right professionals, like audiologists and speech language pathologists (SLPs) should be consulted and engaged for therapeutic and remediation services for optimum result.

Introduction

Speech is the process of producing specific sounds from the mouth that convey meaning to the listener. Speech is one of the main ways in which people communicate their thoughts, feelings, and ideas with others orally. The act of speaking requires the precise coordination of multiple body parts, including the head, neck, chest, and abdomen. A speech disorder is not the same as a language disorder. A speech disorder refers to any condition that affects a person's ability to produce sounds that create words. Speech disorders affect a person's ability to form the sounds that allow them to communicate with other people (Ugbo, 2017). They are not the same as language disorders. Speech disorders prevent people from forming correct speech sounds, while language disorders affect a person's ability to learn words or understand what others say. However, both speech and language disorders can make it more difficult for a person to express their thoughts and feelings to others.

According to Eske (2019) the broad term "speech sound disorder(s)" is used in this context to refer to functional speech sound disorders, including those related to the motor production of speech sounds (articulation) and those related to the linguistic aspects of speech production (phonological). It is often difficult to cleanly differentiate between articulation and phonological errors or to differentially diagnose these two separate disorders. Nevertheless, we often talk about articulation error types and phonological error types within the broad diagnostic category of speech sound disorder(s). A single child might show both error types, and those specific errors might need different treatment approaches.

It is normal for young children learning language skills to have some trouble saying words the right way. That's part of the learning process. Their speech skills develop over time. They master certain sounds and words at each age. By age 8, most children have learned how to master all word sounds. But some children have speech sound disorders. This means they have trouble saying certain sounds and words past the expected age. This can make it hard to understand what a child is trying to say. Speech sound problems include articulation disorder and phonological process disorder (American Speech-Language-Hearing Association, ASHA, 2019).

Articulation disorder (Dyslalia)

Articulation disorder, which is also called dyslalia, is the production of sounds, syllables or words incorrectly so that the listeners do not understand what is being said or pay more attention to the way the words sound than to what they mean. This condition which can be likened to 'baby talk' is characterized by abnormal production of speech sounds, which includes omissions, substitutions, additions and distortions (Hardman, Drew and Egan 2006, ASHA 2014, Ugbo, 2017).

Articulation disorder, although sounds like a structural defect in the articulators, or difficulty with the motor act of talking, can be functional as most

persons with this defect have nothing wrong with their articulators (lips, tongue, teeth, hard and soft palate). Rather they have a functional difficulty at the phonetic level that makes it difficult for them to say the sound they need or intended for speech (Bowen 2013). This situation has given rise to terms like functional articulation disorders and phonological disorders, as substitute for articulation disorders in order to de-emphasis structural physiological defect of the articulators and draw attention to environment or psychological causal factors.

Types of articulation disorders

Articulation disorders as highlighted by Ugbo (2017) are as follows:

Omissions: this is the dropping of some speech sounds, especially consonants, in speech production. For example;

The word 'hat' pronounced as 'at'
The word 'show' pronounced as 'ow'
The word 'lost' pronounced as 'los'

Substitution: this is the unconscious replacement of speech sound or syllable with another speech sound or syllable. For example;

The word 'rabbit' pronounced as 'wabbit'
The word 'sun' pronounced as 'thun'
The word 'right' pronounced as 'wight'

Addition: this is the unconscious production of extra speech sounds or syllables not present in the intended or conventional word. For example;

The word 'yes' pronounced as 'yest'
The word 'number' pronounced as 'numbern'

Distortion: this is the unconscious pronunciation of speech sounds inaccurately, but sounds something like the intended speech sound. For example;

The word 'zebra' pronounced as 'thebra'
The word 'those' pronounce as 'vose'
The word 'super' pronounced as 'thooper'

Articulation disorders are not the same with articulation mistakes which happens once in a while. Hence, in articulation disorder the frequency and consistency of errors must be strong enough to affect intelligibility, communication and psychosocial wellbeing.

According to American Speech-Language-Hearing Association (ASHA, 2019) the child's symptoms depend on what type of speech sound disorder the child has. He or she may have trouble forming some word sounds correctly past a certain age. This is called articulation disorder. The child may drop, add, distort, or swap word sounds. However, it is instructive to note that some sound changes may be part of an accent and not speech errors. Signs of this problem can include:

Leaving off sounds from words (example: saying 'coo' instead of 'school')

Adding sounds to words (example: saying 'puhlay' instead of 'play')

Distorting sounds in words (example: saying 'thith' instead of 'this')

Swapping sounds in words (example: saying 'wadio' instead of 'radio')

If the child often makes certain word speech mistakes, he or she may have phonological process disorder. The mistakes may be common in young children learning speech skills. But when they last past a certain age, it may be a disorder. According to Eske (2019) other signs of this condition are:

Saying only 1 syllable in a word (example: 'bay' instead of 'baby')

Simplifying a word by repeating 2 syllables (example: 'baba' instead of 'bottle')

Leaving out a consonant sound (example: 'at' or 'ba' instead of 'bat')

Changing certain consonant sounds (example: 'tat' instead of 'cat')

Diagnoses of Articulation Disorders

First, an audiologist will assess the child's hearing. This is to make sure that the child is not simply hearing words and sounds incorrectly. If the child's audiologist rules out hearing loss, you may want to talk with a speech-language pathologist. This is a speech expert who evaluates and treats children who are having problems with speech-language and communication. A speech-language pathologist (SLP) is a healthcare professional who specializes in speech and language disorders. An SLP will evaluate a person for groups of symptoms that indicate one type of speech disorder. To make an accurate diagnosis, SLPs need to rule out other speech and language disorders and medical conditions. An SLP will review a person's medical and family history. They will also examine how a person moves their lips, jaw, and tongue and may inspect the muscles of the mouth and throat (Gelisano Children Hospital, 2019)

By watching and listening to the child speak, a speech-language pathologist can determine whether the child has a speech sound disorder. The pathologist will evaluate the child's speech and language skills. He or she will keep in mind accents and dialect. He or she can also find out if a physical problem in the mouth is affecting the child's ability to speak. Finding the problem and getting help early are important to treat speech sound disorders (American Speech-Language-Hearing Association ASHA, 2019). The speech sound disorder affects the child's ability or willingness to communicate in the classroom (e.g., when responding to teachers' questions; during classroom discussions or oral presentations) and in social settings with peers (e.g., interactions during lunch, recess, physical education, and extracurricular activities). Hence, dismissal from speech-language pathology services occurs once eligibility

criteria are no longer met- that is, when the child's communication problem no longer adversely affects academic achievement and functional performance.

Other methods of evaluating articulation disorders according to Gelisano Children Hospital (2019) include:

- Denver articulation screening examination. T test evaluates the clarity of a person's pronunciation.
- Prosody-voice screening profile. SLPs use the test to examine multiple aspects of a person's speech, including pitch, phrasing, speech patterns, and speaking volume.
- Dynamic Evaluation of Motor Speech Skills (DEMSS) manual. The DEMSS is a comprehensive guide for helping SLPs diagnose speech disorders.

Causes of Articulation Disorder

The causes of articulation disorders can be divided into structural and functional causes. This is because, some are structurally caused by physical malformations of the teeth (malocclusion), tongue (frenum, microglosia, macroglosia), jaw (cleft), lips (cleft), palate (cleft), nerve injury or brain damage (cerebral palsy) or even hearing loss (Heardman, Drew and Egan, 2006, Ugbo, 2017).

Often, a speech sound disorder has no known cause. But some speech sound errors may be caused by: injury to the brain; thinking or development disability; problems with hearing or hearing loss, such as past ear infections; physical problems that affect speech, such as cleft palate or cleft lip; disorders affecting the nerves involved in speech. However, most articulation problems occur in the absence of any obvious physical defect. Hence, functional articulation disorders are seen to be caused by faulty learning of speech sound or the act of speaking.

Children at Risk of Articulation Disorders

The cause often is not known, but children at risk for a speech sound disorder include those with: developmental disorders such as autism; genetic disorders such as Down syndrome; hearing loss; nervous system disorders such as cerebral palsy; illnesses such as frequent ear infections; physical problems such as a cleft lip or palate; too much thumb-sucking or pacifier use; low education level of the parent; lack of support for learning in the home.

Therapeutic Intervention

Historically, treatments that focus on motor production of speech sounds are called articulation approaches; treatments that focus on the linguistic aspects of speech production are called phonological/language-based approaches. Articulation

approaches target each sound deviation and are often selected by the clinician when the child's errors are assumed to be motor based; the aim is correct production of the target sound(s). Phonological/language-based approaches target a group of sounds with similar error patterns, although the actual treatment of these error patterns may target individual sounds (Eske, 2019). Phonological approaches are often selected in an effort to help the child internalize phonological rules and generalize these rules to other sounds within the pattern (e.g., final consonant deletion, cluster reduction).

Articulation and phonological/language-based approaches might both be used in therapy with the same individual at different times or for different reasons. According to Eske, (2019) both approaches for the treatment of speech sound disorders typically involve the following sequence of steps:

- Establishment- eliciting target sounds and stabilizing production on a voluntary level.
- Generalization- facilitating carry-over of sound productions at increasingly challenging levels (e.g., syllables, words, phrases/sentences, conversational speaking).
- Maintenance- stabilizing target sound production and making it more automatic; encouraging self-monitoring of speech and self-correction of errors.

Treatment Strategies

In addition to selecting appropriate targets for therapy, SLPs select treatment strategies based on the number of intervention goals to be addressed in each session and the manner in which these goals are implemented. A particular strategy may not be appropriate for all children, and strategies may change throughout the course of intervention as the child's needs change. According to Gelisano Children Hospital (2019) the "Target attack" strategies include the following:

- Vertical- intense practice on one or two targets until the child reaches a specific criterion level (usually conversational level) before proceeding to the next target or targets.
- Horizontal- less intense practice on a few targets; multiple targets are addressed individually or interactively in the same session, thus providing exposure to more aspects of the sounds system.
- Cyclical- incorporating elements of both horizontal and vertical structures; the child is provided with practice on a given target or targets for some predetermined period of time before moving on to another target or targets for a predetermined period of time. Practice then cycles through all targets again.

Treatment Options

The following are brief descriptions of both general and specific treatments for children with speech sound disorders. These approaches can be used to treat speech sound problems in a variety of populations. Treatment selection will depend on a number of factors, including the child's age, the type of speech sound errors, the severity of the disorder, and the degree to which the disorder affects overall intelligibility (Williams, McLeod, & McCauley, 2010).

Contextual utilization approaches

Contextual utilization approaches recognize that speech sounds are produced in syllable-based contexts in connected speech and that some (phonemic/phonetic) contexts can facilitate correct production of a particular sound. Contextual utilization approaches may be helpful for children who use a sound inconsistently and need a method to facilitate consistent production of that sound in other contexts. Instruction for a particular sound is initiated in the syllable context(s) where the sound can be produced correctly.

The syllable is used as the building block for practice at more complex levels. For example, production of a "t" may be facilitated in the context of a high front vowel, as in "tea". Facilitative contexts or "likely best bets" for production can be identified for voiced, velar, alveolar, and nasal consonants. For example, a "best bet" for nasal consonants is before a low vowel, as in "mad"(Bernthal, Bankson, and Flipsen, 2017).

Phonological contrast approaches

Phonological contrast approaches are frequently used to address phonological error patterns. They focus on improving phonemic contrasts in the child's speech by emphasizing sound contrasts necessary to differentiate one word from another. Contrast approaches use contrasting word pairs as targets instead of individual sounds. There are four different contrastive approaches- minimal oppositions, maximal oppositions, treatment of the empty set, and multiple oppositions.

- Minimal Oppositions (also known as "minimal pairs" therapy)- uses pairs of words that differ by only one phoneme or single feature signaling a change in meaning. Minimal pairs are used to help establish contrasts not present in the child's phonological system (e.g., "door" vs. "sore," "pot" vs. "spot," "key" vs. "tea").

- Maximal Oppositions- uses pairs of words containing a contrastive sound that is maximally distinct and varies on multiple dimensions (e.g., voice, place, and manner) to teach an unknown sound. For example, "mall" and "call" are maximal pairs because /m/ and /k/ vary on more than one dimension—/m/ is a bilabial voiced nasal, whereas /k/ is a velar voiceless stop (Roth & Worthington, 2018).

- Treatment of the Empty Set- similar to the maximal oppositions approach but uses pairs of words containing two maximally opposing sounds (e.g., /r/ and /d/) that are unknown to the child (e.g., "row" vs. "doe" or "ray" vs. "day").

- Multiple Oppositions- a variation of the minimal oppositions approach but uses pairs of words contrasting a child's error sound with three or four strategically selected sounds that reflect both maximal classification and maximal distinction (e.g., "door," "four," "chore," and "store," to reduce backing of /d/ to /g/).

Complexity approach

The complexity approach is a speech production approach based on data supporting the view that the use of more complex linguistic stimuli helps promote generalization to untreated but related targets. The complexity approach grew primarily from the maximal oppositions approach. However, it differs from the maximal oppositions approach in a number of ways. Rather than selecting targets on the basis of features such as voice, place, and manner, the complexity of targets is determined in other ways. These include hierarchies of complexity (e.g., clusters, fricatives, and affricates are more complex than other sound classes) and stimulability (i.e., sounds with the lowest levels of stimulability are most complex). In addition, although the maximal oppositions approach trains targets in contrasting word pairs, the complexity approach does not (Peña-Brooks and Hegde, 2015).

Core vocabulary approach

A core vocabulary approach focuses on whole-word production and is used for children with inconsistent speech sound production who may be resistant to more traditional therapy approaches. Words selected for practice are those used frequently in the child's functional communication. A list of frequently used words is developed (e.g., based on observation, parent report, and/or teacher report), and a number of words from this list are selected each week for treatment. The child is taught his or her "best" word production, and the words are practiced until consistently produced (Dodd, Holm, Crosbie, & McIntosh, 2006).

Cycles approach

The cycles approach targets phonological pattern errors and is designed for children with highly unintelligible speech who have extensive omissions, some substitutions, and a restricted use of consonants. Treatment is scheduled in cycles ranging from 5 to 16 weeks. During each cycle, one or more phonological patterns are targeted. After each cycle has been completed, another cycle begins, targeting one or more different phonological patterns. Recycling of phonological patterns continues until the targeted patterns are present in the child's spontaneous speech (Hodson, 2010; Prezas&Hodson, 2010).

The goal is to approximate the gradual typical phonological development process. There is no predetermined level of mastery of phonemes or phoneme patterns within each cycle; cycles are used to stimulate the emergence of a specific sound or pattern-not to produce mastery of it.

Distinctive feature therapy

Distinctive feature therapy focuses on elements of phonemes that are lacking in a child's repertoire (e.g., frication, nasality, voicing, and place of articulation) and is typically used for children who primarily substitute one sound for another. (Roth & Worthington, 2018). Distinctive feature therapy uses targets (e.g., minimal pairs) that compare the phonetic elements/features of the target sound with those of its substitution or some other sound contrast. Patterns of features can be identified and targeted; producing one target sound often generalizes to other sounds that share the targeted feature (American Speech-Language-Hearing Association, ASHA, 2019).

Metaphon therapy

Metaphon therapy is designed to teach metaphonological awareness —that is, the awareness of the phonological structure of language. This approach assumes that children with phonological disorders have failed to acquire the rules of the phonological system. The focus is on sound properties that need to be contrasted. For example, for problems with voicing, the concept of "noisy" (voiced) versus "quiet" (voiceless) is taught. Targets typically include processes that affect intelligibility, can be imitated, or are not seen in typically developing children of the same age (American Speech-Language-Hearing Association, ASHA, 2019).

Naturalistic speech intelligibility intervention

Naturalist speech intelligibility intervention addresses the targeted sound in naturalistic activities that provide the child with frequent opportunities for the sound to occur. For example, using a McDonald's menu, signs at the grocery store, or favorite books, the child can be asked questions about words that contain the targeted sound(s). The child's error productions are recast without the use of imitative prompts or direct motor training. This approach is used with children who are able to use the recasts effectively (Camarata, 2010).

Nonspeech oral-motor therapy

Nonspeech oral-motor therapy involves the use of oral-motor training prior to teaching sounds or as a supplement to speech sound instruction. The rationale behind this approach is that (a) immature or deficient oral-motor control or strength may be causing poor articulation and (b) it is necessary to teach control of the articulators before working on correct production of sounds.

Speech sound perception training

Speech sound perception training is used to help a child acquire a stable perceptual representation for the target phoneme or phonological structure. The goal is to ensure that the child is attending to the appropriate acoustic cues and weighting them according to a language-specific strategy (i.e., one that ensures reliable perception of the target in a variety of listening contexts).

Treatment techniques and technologies

Techniques used in therapy to increase awareness of the target sound and/or provide feedback about placement and movement of the articulators include the following:

- Using a mirror for visual feedback of place and movement of articulators
- Using gestural cueing for place or manner of production (e.g., using a long, sweeping hand gesture for fricatives vs. a short, "chopping" gesture for stops)
- Using ultrasound imaging (placement of an ultrasound transducer under the chin) as a biofeedback technique to visualize tongue position and configuration (Adler-Bock, Bernhardt, Gick, &Bacsfalvi, 2007; Lee, Wrench, &Sancibrian, 2015; Preston, Brick, &Landi, 2013; Preston et al., 2014)
- Using palatography (various coloring agents or a palatal device with electrodes) to record and visualize contact of the tongue on the palate while the child makes different speech sounds (McAllister Byun, Swartz, & Lazarus, 2017)
- Amplifying target sounds to improve attention, reduce distractibility, and increase sound awareness and discrimination—for example, auditory bombardment with low-level amplification is used with the cycles approach at the beginning and end of each session to help children perceive differences between errors and target sounds (Hodson, 2010)
- Providing spectral biofeedback through a visual representation of the acoustic signal of speech (McAllister Byun & Hitchcock, 2012)

Recommendation

- Parents should avail their children at risk of speech disorder, especially articulation disorder, the opportunity of early intervention so as to mitigate the future debilitating effect of articulation disorder on academic performance and psychosocial wellbeing.

- The right professionals, like audiologists and speech language pathologists (SLPs) should be consulted and engaged for therapeutic and remediation services for optimum result.

- Parents, siblings and significant others to children at risk of articulation disorder or children with articulation disorder, should be good language models and make the environment stimulating and conducive for language learning.

- Counseling services should be made available to persons with articulation disorder for them to be able to deal with all the negative self-complexes that may get in the way of self-development, academic achievement and psychosocial wellbeing.

Conclusion

Speech disorders affect a person's ability to produce sounds that create words. They are not the same as language disorders, which make it more difficult for people to learn words or understand what others are saying to them. Types of speech disorder include stuttering, apraxia, dysarthria and articulation disorder. Articulation disorder is characterized by abnormal production of speech sounds, which includes omissions, substitutions, additions and distortions. The causes of articulation disorders can be divided into structural and functional causes. This is because, some are structurally caused by physical malformations of the articulators, nerve injury or brain damage, however, it can still happen without a structural defect of the articulators.

Speech disorders can affect a person's self-esteem and their overall quality of life. However, the treatment options and all the therapeutic interventions highlighted in this work will go a long way in the treatment and management of articulation disorders.

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