Review Article

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Speech Disorders in Children: A Short Review

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Abstract

Speech is a form of communication which is done verbally.A Speech-Language Pathologist is concerned with the assessment, diagnosis and management of the disorders pertaining to Speech and Language. Speech is a unique act performed by humans with the co-ordination and normal functioning of the respiratory system, phonatory system, articulatory system, resonatory system and nervous system.To understand the disorders of speech it is essential to know the components of Speech, which are fluency, articulation, voice and prosody. Each component plays an important role in normal speech. When there is a breakdown in one or more components it results in a speech disorder. Disorders of speech can be a result of structural and/or functional abnormalities. When a child is suspected to have disordered speech, an SLP will examine thoroughly. Informal and formal tests will also be administered as and when required. Suitable therapeutic strategies are then employed or suggested for intervention. A multidisciplinary team approach right from suspicion of a disorder, to management would give the best outcome for the child.

Keywords: Communication; Speech; Language; Speech Language Pathologist, Speech Disorders; Fluency; Articulation; Voice and Prosody.

Introduction

Communication is the exchange of information. Speech is a form of communication which is done verbally. Language is made up of socially shared rules. Speech disorders refer to several conditions in which a child has difficulty in forming or creating speech in order to communicate with others. Disorders of articulation, fluency and voice are the major and the most common forms of them. According to the Census Commission (2005), 0.16% of the Indian population presents with speech disorders [5] and is common in rural India [22]. As health care professionals, one would encounter many patients who have communication disorders as a co-existing condition, if not as the primary concern. Therefore it is very important to understand these disorders in order to give adequate patient guidance.

In this article we would be reviewing speech disorders in children. It will furnish the reader with information regarding the types of speech disorders and referring the child to the concerned specialist- the Speech language Pathologist. A Speech-Language Pathologist is concerned with the assessment, diagnosis and management of the disorders pertaining to Speech and Language. This paper will limit itself to describe speech disorders in children.

Systems of Speech

Anatomically there are five main sub-systems that contribute to the production of speech. They are the respiratory system, phonatory system, articulatory system, resonatory system and nervous system. The speech subsystems have speech production as an overlaid function over their primary functions [20].

The respiratory system with its primary function of respiration has a superimposed function of

supporting speech. It supplies air, the source of energy for speech production. The air supplied is used by the other subsystems to produce speech. Laryngeal framework forms the phonatory system. It is basically involved in the protection from particles other than air entering the lungs, stabilization of torso during physical exertion and modification of the upper airway to enable adequate gaseous exchange. The overlaid function above this primary function is the generation of sound. The vocal folds in the larynx uses the air trapped beneath it to set itself into stream of vibrations, producing voice.

The articulatory system is the combination of structures that are used to shape the sounds of speech. It includes the lips, tongue, hard and soft palates and the upper and lower jaws, and teeth. The primary functions of these structures are related to vegetative functions viz., chewing, biting, blowing &swallowing.

This is followed by the resonatory system. It encompasses vocal tract, pharynx, nasal and oral cavities. It adds resonance to the crude sound provided by the vocal cords.

The nervous system for speech includes motor and sensory control of the various structures involved in speech production. An integrated functioning of all these systems is essential for speech production.

Components of Speech

Speech can be divided into four primary components: Fluency, Voice, Articulation, and Prosody. Below is the description of each of these components and it'sdisorders.

Fluency

There are two kinds of fluency viz., Linguistic and Speech fluency; here we are concerned with speech fluency. Starkweather [16] defines speech fluency in terms of continuity, rate, duration, co-articulation and effort. In other words, fluency is the act of speaking effortlessly, smoothly and easily without hesitations, interjections, filler or blocks. Disorders that affect fluency are stuttering and cluttering. Stuttering is more of a disruption in the flow of speech, while cluttering is a fluency disorder considered to be due to a central language imbalance [21].

Stuttering is a disruption in the normal flow of speech or normal fluency. For e.g. "My name is a..a..asha" or "My name name is ashaa..sha" . It is of two types ie., developmental and acquired. Developmental stuttering is observed in children that continue into adulthood. Acquired stuttering is caused by brain damage. Speech disruptions can be repetitions (can be sound, syllable, word or part-word repetitions), prolongations, silent pauses, filled pauses (eg: mmmmm). Persons with stuttering show associated physical behaviors called secondaries while attempting to prevent stuttering or come out of them once they begin talking. These may include eye-blinks, breathing movements, facial tremors etc. These behaviors are more during stressful situations.

Another type of disruption in fluency is called "disfluency". Normal non-fluency is typically seen in children between two and seven years of age. They show very little disfluency without any awareness, no associated tension or struggle. The disfluencies in them are mostly interjections, whole-word repetitions and revisions [7]. Unless evaluated by a Speech Language Pathologist, it is very difficult to identify whether the child is "disfluent" or "dysfluent". It is therefore essential to refer a child once a disruption in the normal flow of speech is observed.

Cluttering or tachyphemia is a fluency problem in which a person's speech is too fast and irregular. Their speech is understood by the listeners with great difficulty. They are unaware of their difficulties, unlike the stuttering group. Hence many of them are not diagnosed until they enter their adulthood. It can also co-occur with stuttering [2].

Voice

It is the audible sound that is produced by the vocal cords. The parameters of voice are pitch, loudness & quality. These are the psychophysical correlate of frequency, intensity & timbre respectively. Voice is considered abnormal when one of these or all is affected. Both structural and functional abnormalities can lead to voice disorders. Voice disorders in pediatric population are often neglected by health professionals. However, it has to be remembered that voice changes can be permanent. Further it would lead to a negative effect on the social life of these children [4].

Voice disorders in childhood could be congenital as well as acquired. Based on the etiology voice disorders can be viewed as organic and psychogenic.

A speech pathologist will assess the parameters of voice using perceptual (rating scales), acoustic (quantification of fundamental frequency, intensity etc), aerodynamic measures (airflow, laryngeal airway resistance) and endoscopic measurements [13]. The speech pathologist would compare the findings with that of the observations of the pediatric

Table 1: Classification of voice disorders [27]

Organic	Psychogenic/ Functional
Congenital malformations/ anomalies: Atresia, cri du chat, laryngomalacia, Subglottic stenosis, laryngeal web, laryngeal cleft, papilloma, laryngocele, mongolism, laryngeal saccule, lymphangioma, Subglottic hemangioma, and ectopic thyroid gland.	*Emotional stress- Musculoskeletal tension:* Vocal abuse and misuse, voclfaigue, contact ulcers, and vocal nodules.
Inflammatory conditions of the vocal folds such as laryngitis, vocal fold nodules etc.	*Psychoneurosis:* Mutism, falsetto (high pitched) voice, and puberphonia (seen in adolescent males).
Benign and malignant neoplasms	
Metabolic conditions	
Trauma-contact ulcers, vocal nodules etc.	
Sulcus vocalis	
Neurologic conditions: Cerebral palsies, childhood strokes etc.	

otolayngologist and thereafter advice and employ suitable therapeutic principles as and when applicable. Children with voice disorder may present with symptoms like hoarseness, excessively loud voice without reason, effortful voice, voice breaks during singing, vocal tiring or deep voice as compared to the peer group.

Here, it is essential to indicate that stridor (noisy inhalation) has to be differentiated from other (above specified) pediatric voice disorders. Such voice symptoms indicating airway interference or swallowing difficulty must be immediately brought into medical intervention [12]. It is important to use child-friendly language to assess older children for pediatric voice disorders. Dysphonia that is intermittent (worse in the morning than at night) can be indicative of gastro-oesophageal reflux disease. For example, terms like "sour-burps, mini-throw-ups" can be used to assess reflux related symptoms that may help to obtain useful details for differential evaluation [15].

Articulation

It is the motoric execution of the articulators to produce correct pronunciations. Persons with articulation disorder are presumed to experience difficulty in producing speech. For e.g. a child with an articulation disorder might not be able to shape his or her articulators in such a way as to pronounce /st/ in the word "stop". Sounds can be substituted, left off, added or changed. These errors may make it hard for people to understand the child's speech.

Articulation disorders are mainly caused by organic etiology and to an extent functional as well. Amongst the organic causes for misarticulation is cleft lip and/or palate, ankyloglossia (tongue tie), congenitally deformed tongue or soft palate such as a short palate etc., neurogenic disorder which cause damage to the nerves supplying the articulators or childhood apraxia of speech (poor motor planning and sequencing), as might be the case in children with cerebral palsy, syndromes such as Down's syndrome, developmental disorders and children with hearing loss as well.

The functional causes of misarticulation have to do more with phonology than articulation. During the first few years of life when the child begins to learn sounds he or she may make errors in pronouncing a word correctly, which are usually termed as phonological processes and if prolongs into later childhood becomes a phonological disorder- this is linked to language processes and not speech. The terminology "phonological disorder" should not be confused with "articulation disorder". Articulation disorder is at the level of motor act of producing vowels and consonants. Phonological disorder is a language disorder and it happens at the cognitive level; difficulty arises in the organization of speech sounds [3]. It is wise to remember here that both articulation and phonological disorder can occur in the same child. However, the terms should not be interchangeably used.

When one finds a child with the chief complaint of unclear speech or mispronunciations, it is advisable to refer him/her to a speech-language pathologist who will evaluate the child's speech and diagnose the condition and give further guidance on the lines of management.

Prosody

It is a term that refers to suprasegmental aspects of speech including variations in pitch/ fundamental frequency, loudness/ intensity, duration, pause/ silence, intonation, rate, stress and rhythm of speech. Dysprosody or impaired prosody occurring in isolation is hardly seen. However, it occurs in unison with impairments of the other components of speech.

Children with autism [10], apraxia [1], hearing loss [9], right hemisphere damage [20] or Down Syndrome [18] may exhibit features of impaired prosody. Prosodic deficits in children often affect others' social perception about them as well as pose hurdles in mainstream integration [6].

The unnatural speech models that are often used in therapy for achieving the speech targets are gradually modified and reduced to natural speech as the naturalness in speech is the ultimate aim in intervention. Targeting prosody is the ultimate in speech intervention practices.

Assessment of Speech

A Speech language pathologist assesses the speech before arriving at a diagnosis of the pathology involved. Assessing the pediatric population is a challenging task. In most cases children who have a speech disorder will have to be screened for a potential language deficit.

The following protocol is recommended by the ASHA (American Speech-language and Hearing Association) 2004:

- Case history, including medical status, education, socioeconomic, cultural, and linguistic backgrounds and information from teachers and other related service providers
- Patient/client/student and family interview
- Review of auditory, visual, motor, and cognitive status
- Standardized and/or non-standardized measures of specific aspects of speech, spoken and non-spoken language, cognitive-communication, and breathing and swallowing function, including observations and analysis of work samples (*whichever indicated)*
- Identification of potential for effective intervention strategies and compensations
- Selection of standardized measures for speech, language, cognitive-communication, and/or swallowing and breathing assessment with consideration for documented ecological validity and cultural sensitivity
- Follow-up services to monitor communication and swallowing status and ensure appropriate intervention and support for individuals with identified speech, language, cognitive-communication, and/or swallowing disorders

Following these guidelines there are proformas, questionnaires, and standardized test for the Indian population which will be utilized to get a comprehensive repertoire of the child's speech. Objective measurements using instrumentation may also be used to assess different components of speech.

Intervention

Management of speech disorders is the most crucial aspect as it decides the prognosis. There are general therapy techniques as well as specific and goal oriented techniques.

The first step to a good management program is keen observation. After which a broad lesson plan is prepared, which includes short and long term goals. The therapist then decides appropriate activities that will cater to the interest of these goals. Each disorder of speech will follow a different course in management.

Therapy can be intensive and short term or laid-out and long term, depending on the availability of therapists and the nature of the disorder. In certain conditions, surgical management (eg: ankyloglossia, vocal fold cysts, cleft lip and palate) precedes speech intervention in pediatric population.

There are some controversies with respect to the speech intervention practices. For instance, recently the use of oral-motor exercises for improving speech in children has been extensively questioned. It is doubted that non-speech techniques are of use in improving children's speaking skills [8].

Early intervention is generally more effective than waiting for these children to overcome the disorders. For instance, many times, misarticulations can be the result of habitually used incorrect sound pattern. With early intervention, these errors are often quickly eliminated, especially for school-age children.

Conditions like childhood apraxia require long term therapy with intensive drilling and intervention practices. Progress is often slow with some developing normal speech patterns and others with residual errors affecting their academics as well. Such children may require continued intervention and support for easy transition into young adulthood.

At times, SLPs act realistically by discharging a child from therapy when he or she has learnt all the speech targets but still sounds imperfect. For instance, a child with apraxia of speech may have mastered the articulatory targets and sound intelligible, however their prosody may be imperfect. In such cases, they are dismissed from speech intervention programs knowing that they have reached their full potential.

Team Approach

Speech-Language Pathologists collaborate with

other health care professionals, often working as part of a multidisciplinary team, providing referrals and information to health care professionals (including physicians, dentists, nurse practitioners, nurses, occupational therapists, dietitians), educators, behavior consultants (applied behavior analysis) and parents as dictated by the individual client's needs. For e.g. the treatment of patients with cleft lip and palate demands interdisciplinary approach with speech language pathologist plastic-surgeons, dieticians, social workers etc.

Conclusion

Health care professionals ought to understand the need to give due importance to these conditions at a young age and guide the parents to a qualified Speech Language Pathologist. Earlier the referrals better the prognosis.

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