Neurogenic Disorders of Speech in Children and Adults
Complexity of Speech

• Speech is one of the most complex activities regulated by the nervous system
• It involves the coordinated contraction of a large number of muscles for its production
• Contraction of the muscles is controlled by nerve impulses that originate in cerebral cortex of brain and then pass to the muscles by way of the motor pathways
Nerves Used for Speech

• Neurons connect the central nervous system (brain and spinal cord) to the muscle fibers

• These neurons form the route by which nerve impulses travel from the CNS to cause muscle contraction.

• These speech muscles are the face, lips, jaw, tongue, larynx, respiratory system.

• Damage to the nervous system causes disruption to the motor system involved in speech.
Nerves Used For Speech, continued

• The type of neurogenic speech disorder depends on where in the neuromuscular system the damage is located.

• The two most common motor speech disorders are **apraxia of speech** and **dysarthria**.
Dysarthria

• A collective name for a group of related speech disorders that are due to disturbances in muscular control of the speech mechanism resulting from impairment of any of the basic motor processes involved in the execution of speech.
Developmental Dysarthria in Children

• Caused by damage to specific areas of the brain, either during fetal development, or during or shortly after birth.

• Mostly associated with cerebral palsy
Cerebral Palsy

- Characterized by an inability to fully control motor function, particularly motor control and coordination.
Three Types of Cerebral Palsy

• Spastic Cerebral Palsy (stiff and difficult movement)- 70-80% of occurrences. Muscles are stiff and permanently contracted.

• Athetoid-Uncontrolled, slow movements, which usually affects hands, feet, arms, legs, muscles of face, and articulators. Often results in distorted facial patterning and drooling.

• Ataxic-(disturbed sense of balance and depth perception)-least common. Involves disturbances to balance and depth perception. Includes poor coordination, unsteady gait, tremors.
Developmental Dysarthria

• Is characterized by a disruption in the development of the ability to generate motor speech function due to the dysfunction of the speech subsystems
• Involved subsystems include respiration, phonation, and articulation
Acquired Apraxia of Speech

A disorder in which the patient has trouble speaking because of a cerebral lesion that prevents his executing voluntarily and on command the complex motor activities involved in speaking, despite the fact that muscle strength is undiminished.

It is characterized primarily by errors in articulation and secondarily by compensatory alterations of prosody (pauses, slow rate of speech, equalization of stress). They appear to visibly and audibly grope to achieve the correct articulation.
Apraxia, continue

• The number of articulatory errors is greater during repetition than during conversational speech.
Developmental Apraxia of Speech

• Difficulty in planning volitional movements
• Deviant speech development
• Vowel errors
• Inconsistent patterns of speech sound errors
• Possible groping of articulators
• Reduced prosody
• Increases error with increased performance load
Differentiation of Apraxia from Dysarthria

• Both motor speech disorders, but each represents a breakdown at a different level of speech production

• Individuals with apraxia show no significant evidence of weakness, paralysis that can account for the speech disturbance

• Individuals with dysarthria have either hyper or hypo-tonus of the muscles, and a restricted range of movement.
Differentiation of Apraxia of Speech from Dysarthria, continued

• In dysarthria, errors of articulation are characteristically errors of simplification (distortions or omissions), where as in apraxia of speech, the errors take the form of complications of speech (substitution of one phoneme for another, addition of phonemes, repetition of phonemes)
Treatment of Acquired Neurogenic Speech Disorders

• The goal is to improve intelligibility by enhancing physiological support for speech and by teaching compensatory speech behaviors.
Five Principles of Treatment for Motor Speech Disorders

• Compensatory Strategies - assisting patient to utilize his remaining strengths and potential
• Purposeful Activity - learn strategies to increase intelligibility of speech, which should become purposeful and not automatic
• Early Treatment
• Monitoring - Self-monitoring of behaviors
• Motivation
Augmentative Communication (AAC)

- Alternate forms of communication
- Picture Exchange Communication System (PECS)
- Communication Board
- AAC chosen depends on physical abilities, cognitive level, receptive language abilities.
Specific Treatment Methods for Developmental Dysarthria

• Treatment of Respiratory dysfunction largely focuses on postural control in terms of appropriate positioning that will attempt to counteract abnormal muscle tone interfering with respiration and phonation.

• Children are taught to produce longer vocalizations such as imitating prolonged vowels and chains of syllables.

• Children are taught to strengthen and maximize use of their articulators.
Treatment of Developmental Apraxia of Speech

• Requires multimodal approach

• Incorporates a variety of techniques, such as reduced rate of speech, phonetic placement, PROMPT (utilizes tactile and kinesthetic stimuli), cueing.