Here's How to Treat Childhood Apraxia of Speech

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APPENDIX 13–B
Understanding Childhood Apraxia of Speech

Childhood apraxia of speech (CAS) is a sensorimotor speech disorder that affects children. Speaking is a complex process that involves coordinating not only the muscles of the jaw, lips, and the tongue (articulation), but also the muscles that support breathing (respiration), turn on and off the voice (phonation), and move the soft palate up and down to direct the flow of air out the mouth or the nose (resonance). The muscle movements for speech are highly refined and require accurate timing of all these muscle groups to work in a coordination for clear and consistent speech production to occur. For a child with CAS, planning and coordinating these movements is challenging and affects the intelligibility of their speech.

Consider the child who is trying to say a fairly simple word such as, *"come."* What is required for the child to produce this word? Let's break it down.

Steps Involved in Saying the Word "Come"

1. The child has an *intention* to communicate an idea. This is a cognitive/thinking skill.
2. The child finds the word, "come," in his vocabulary "bank" to represent the idea he wants to express. This is a language skill.
3. The child plans out what his speech systems (respiration, phonation, resonance, articulation) and the muscles that make up these systems are going to do. This is the sensorimotor planning phase and the phase where speech breaks down in children with CAS.
   a. Inhale quickly to get ready to speak on the exhalation (respiration).
   b. Lift up the soft palate/velum (the soft tissue just at the back of the roof of your mouth) to close off the passageway between the pharynx and the nasal cavity, so the sound comes out the mouth and not the nose when making the /k/ sound (represented by the letter "c") (resonance).
   c. Raise up the back of the tongue to contact the soft palate to say the /k/ sound.
   d. Open the vocal cords (vocal folds) so the voice is not turned on when saying /k/ (otherwise it would sound like /g/).
   e. Get ready for the "uh" vowel sound, represented by the letter "o" in the word "come," by opening the jaw slightly and dropping the tongue to the mid-front position of the oral cavity and get ready to turn on your voice.
   f. Vibrate the vocal folds (phonation) while the tongue is in position for the "uh" vowel (articulation).
   g. Get ready to lower the soft palate to prepare for the /m/ sound.
   h. Keep your vocal folds vibrating (phonation) while the air flows into the nasal cavity (resonance) and close your lips to say the /m/ sound (articulation).
4. The child completes production of the word "come." This is the motor execution phase.

Children with CAS do not have significant weakness or paralysis of the muscles for speech. They have adequate strength to make speech sounds but have difficulty planning and coordinating the muscle movements for speech. These challenges with planning interfere with speech production and manifest themselves in different ways, depending on the child. Some children with CAS have tremendous difficulty imitating sounds and words, whereas others are speaking, but their speech is highly unintelligible.

Characteristics of Childhood Apraxia of Speech

Following are some of the characteristics associated with CAS. Keep in mind that no child will demonstrate each characteristic listed:

- inconsistent speech errors
  - producing the same word in different ways on different occasions (e.g., banana produced as "bana," "babana," and "nana")
  - producing specific speech sounds in different ways on different occasions (e.g., the child produces "s" correctly sometimes, but substitutes "b," "t," or "h" for "s" at other times)
- difficulty combining sounds and syllables (e.g., child can say "ma" and "me" but cannot say "mommy")
- pauses or breaks between sounds, syllables, or words (e.g., "Ha..ppy…birth..day")
- omitting sounds or syllables in words (e.g., 4-year-old says, "nana" for *banana* or "da-ee" for *daddy*)
- producing words in simpler ways beyond the age when these simplified versions would be expected (e.g., a 3-year-old who persists in saying "wawa" for *water*)
- greater difficulty saying longer words or phrases than shorter ones
- limited variety of consonant and vowel sounds
- possible history of limited babbling during infancy
- groping or struggling to speak (child appears to be searching for how to start the word by moving the mouth into different positions)
- monotonous or robotic-sounding speech
- placing stress on the incorrect syllable of a word (e.g., "bana**na**" for *ba**na**na*) or placing equal stress on each syllable of a word (e.g., "**di-no-saur**" for ***di**nosaur*)
- possible difficulty imitating and sequencing nonspeech movements of the lips and tongue (e.g., popping or rounding the lips, protruding, or lifting the tongue, moving the tongue from side to side)
- possible difficulty eating that is unrelated to muscular strength
- slow development of speech
- better ability to understand language than to use language expressively
- general clumsiness or poor fine and/or gross motor coordination
- possible difficulty in school learning literacy skills like reading, spelling, and writing

Assessing a Child With Suspected Childhood Apraxia of Speech

A speech-language pathologist (SLP) who has experience working with children with speech sound disorders, specifically sensorimotor speech disorders including CAS, is the appropriate person to evaluate and diagnose CAS. A hearing screening or evaluation should always be conducted to rule out any possible hearing loss impacting speech development. An audiologist is the professional who conducts the hearing evaluation. A thorough motor speech evaluation will need to be conducted to properly differentiate CAS from other speech disorders. During a motor speech evaluation, the SLP will evaluate the following areas:

- *Oral structure and function.* The muscle tone of the oral-facial area will be evaluated to rule out (or in) speech problems that are caused by significant muscle weakness or reduced muscle tone. Imitation of nonspeech movements (e.g., puckering the lips, smiling, moving the tongue from side to side, licking the lips) and sequencing these movements will be evaluated. Children who can imitate sounds will be asked to repeat syllables to assess the speed and rhythm of syllable production (e.g., saying "puh puh puh," "tuh tuh tuh," and "puh tuh kuh" repeatedly). The child's coordination during drinking, chewing, and swallowing may also be evaluated.
- *Speech sounds.* The SLP will make note of each consonant and vowel sound the child is able to produce. The types of speech sound errors the child makes also will be noted, including substitutions of one sound for another; omissions of sounds at the beginning, middle, and/or end of words; or distortions of sounds. In addition, the child's overall speech intelligibility will be described.
- *Syllable shapes.* The types of syllable shapes the child uses in terms of the sequences of consonant (C) and vowel (V) sounds will be described. Examples include CV (no, she), VC (up, ouch), CVC (hop, night), CV.CV (mama, daddy, bunny), CCVC (snap, black), CVC.CVC (cupcake, napkin). Syllable structures can be quite complex in the case of multisyllabic words like *refrigerator* or *encyclopedia*.
- *Prosody.* The melody of speech will be evaluated to determine if the child is using stress on the correct syllables of words (**bu**nny, to**ma**to) and on individual words within sentences ("Give THAT one to me." versus "Give that one to ME."), as well as appropriate and varied intonation, rhythm, and tone of voice.

In addition to a motor speech evaluation, the SLP may evaluate the following other areas, depending on the age and skill level of the child:

- *Voice and fluency.* If the SLP recognizes difficulties with voice quality (e.g., hoarseness, harshness, breathiness) or the fluency of the child's speech (stuttering more than would be expected for the child's age), these areas will be more thoroughly evaluated.
- *Language.* The SLP will evaluate the child's ability to understand spoken language (receptive language) and use language (expressive language). Areas of language assessment may include vocabulary, grammar, syntax, comprehension of questions and instructions, and the ability to use connected language to tell a story. In addition, the child's social language skills may be assessed to determine if the child is using language, gestures, and facial expressions appropriately, and using language for a wide range of social purposes (e.g., requesting an item or an activity,

greeting, protesting, asking and answering questions, asking for assistance, sharing information).

- *Literacy.* The SLP may evaluate the child's phonological awareness skills. Phonological awareness refers to the ability to think about and manipulate the sounds of words as separate from the meaning of those words. Some phonological awareness skills include recognizing words that rhyme, blending syllables or sounds together to create a word (e.g., ba + na + na = banana; sh + i + p = ship), separating words into individual sounds (e.g., hats = h + a + t + s), associating sounds with the letters used to spell those sounds, and grouping words together with the same beginning or ending sounds. If the SLP suspects that the child's reading, spelling, writing, and/or phonological awareness skills are delayed, the SLP will consult with the child's teacher and other members of the educational team to request a more thorough evaluation of the child's learning.

Treatment for Childhood Apraxia of Speech

Children with CAS benefit from frequent and intensive treatment. Repetitive practice of speech movement sequences is essential for children to develop the ability to learn new speech movements and to make these movements more automatic. Therefore, individual therapy sessions are recommended, particularly earlier in the treatment process, when children are beginning to develop control of their sensorimotor speech skills. As children make progress, the amount of treatment may be reduced. Inclusion in small groups also may be beneficial so children can practice using their speech skills with peers.

Although therapists use somewhat different methods to support speech development in children with CAS, the common, underlying element of treatment should be to help children plan and program speech movement sequences. The most appropriate treatment programs are those that

- help the child learn to say **sequences of sounds**, not just individual sounds
- use **multisensory cueing techniques** (visual, auditory, tactile/touch cues) to increase speech accuracy
- encourage **repetitive practice** of words, phrases, and sentences so children develop greater ability to say words and sentences accurately and automatically, particularly when children are beginning to learn new words and sentences
- help the child develop normal **stress**, **rhythm**, and **intonation** patterns
- work on other areas of communication (e.g., receptive and expressive language, phonological awareness, social communication, etc.) to support the child's overall competence in communication

Some children with CAS may benefit from the use of augmentative forms of communication, including sign language, picture boards, or electronic communication devices. Sign language or picture boards may be used in conjunction with speech for younger children in the early stages of speech and language development or older children whose speech is difficult to understand. For some children, these augmentative modes of communication may be faded over time as speech intelligibility improves. For other children whose apraxia is quite severe, augmentative communication systems may become the primary mode of communication.

Parents play a critical role in the treatment process for children with CAS. Finding opportunities at home to practice the skills that are being worked on in speech therapy will help to reinforce the newly learned skills and provide increased practice opportunities to help your child achieve optimal progress. Children with CAS frequently require treatment for extended periods of time. This sustained effort can be challenging for both the child and the family. Care should be taken to be supportive of the gains the child is making in communication, even if these successes are gradual and slow in coming.