Stuttering: An Overview

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Speech dysfluency (stuttering) is common in children. Although stuttering often resolves before adulthood, it can cause significant anxiety for children and their families. Stuttering speech patterns are often easily identifiable; when a child is learning to talk, repetition of sounds or words, prolonged pauses, or excessively long sounds in words usually occur. Secondary behaviors (e.g., eye blinking, jaw jerking, involuntary head or other movements) that accompany stuttering can further embarrass the child, leading to a fear of speaking. The etiology of stuttering is controversial, but contributing factors may include cognitive abilities, genetics, sex of the child, and environmental influences. Research has shown that more than 80 percent of stuttering cases are classified as developmental problems, although stuttering can also be classified as a neurologic or, less commonly, psychogenic problem. The initial assessment of patients who stutter addresses the severity of dysfluency; secondary behaviors; and the impact of stuttering, such as patient distress. Further testing is useful in assessing the need for therapy. Pharmacologic therapy has not been shown to improve stuttering. Encouraging patients to talk slowly and the use of fluency-shaping mechanisms such as delayed auditory feedback devices to slow the speech rate can help minimize or eliminate stuttering. For patients with persistent stuttering, controlled fluency or stuttering modification therapy may be effective. (*Am Fam Physician*. 2008;77(9):1271-1276, 1278. Copyright © 2008 American Academy of Family Physicians.)

▶ **Patient information:** A handout on stuttering, written by Uma Jayaraman, MD, *AFP* editing fellow, is provided on page 1278.

Speech dysfluency (stuttering) occurs in approximately 1.4 percent of children younger than 10 years.[1] Stuttering occurs in persons of all ages, but it is most common in young children who are developing and learning language and speech. Stuttering resolves by adulthood in nearly 80 percent of children with developmental stuttering. Less than 1 percent of adults stutter,[1] 80 percent of whom are men.[2] The prevalence of stuttering is similar across different social, economic, cultural, and ethnic groups.[1]

Definitions and Concepts

Stuttering is typically defined as involuntary dysfluency in verbal expression. Usually, stuttering manifests as repetitions of sounds, syllables, or words or as speech blocks or prolonged pauses between sounds and words.

Secondary behaviors associated with stuttering include eye blinking, jaw jerking, and head or other involuntary movements. These behaviors are learned approaches to minimize the increasing severity of stuttering and can add to the patient's embarrassment and fear of speaking. Older children and adults often develop additional secondary behaviors to hide stuttering. These linguistic escape and avoidance behaviors include word substitutions, use of interjections, and sentence revisions.

Classification

Stuttering is classified as developmental, neurogenic, or psychogenic. Developmental stuttering is the most common form. It is initially noted in children between three and eight years of age and accounts for more than 80 percent of stuttering cases in the general population.[3] Approximately 75 percent of preschoolers with developmental stuttering spontaneously recover within four years.[2] Patients with developmental stuttering initially present with mild symptoms that resolve or progress to more serious symptoms with secondary behaviors.

Neurogenic stuttering usually follows a neurologic event, such as traumatic brain injury, stroke, or other brain damage. Developmental stuttering can be differentiated from acquired stuttering because, with the developmental form, stuttering occurs at the beginning of words and the secondary behaviors are more obvious than with acquired stuttering.

Psychogenic stuttering is rare and involves rapid repetition of initial sounds. It usually occurs in adults with a history of psychiatric

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SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	*Evidence rating*	*References*
Families play an important role in the management of stuttering in children by providing an environment that encourages slow speech and by modeling slow, relaxed speech to help reduce stuttering events.	C	24, 25
The treatment of early, mild stuttering (generally in children younger than six years of age) focuses on the prevention or elimination of stuttering behaviors, usually by parental involvement and direct treatment.	C	25
The likelihood of eliminating stuttering behaviors decreases if they persist beyond eight years of age.	C	2

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 1205 or http://www.aafp.org/afpsort.xml.

problems following a psychological event or emotional trauma; there may be no other known etiology.[4]

Etiology

A variety of factors may influence stuttering events, although the etiology of the condition is unclear. Possible contributing factors include cognitive processing abilities, genetics, sex of the patient, and environmental influences. Research on the skills and behaviors of persons who stutter typically includes the assessment of confirmed adult stutterers.

COGNITIVE ABILITY

Recent studies have shown that some adults who stutter have different cognitive processing abilities than those who do not stutter.[5,6] One small study reported that adults who stutter have longer reaction times than fluent speakers when presented with increasingly complex cognitive tasks.[5] In persons who stuttered, these cognitive processes involved more use of the right hemisphere of the brain than was used in fluent speakers.

Another study that compared functional magnetic resonance imaging scans of persons who stutter with those who do not stutter found that neural systems activate differently during the generation and production of speech.[6] Persons who stuttered required greater ongoing attention to processing and reduced the amount of "conceptual work" to limit their stuttering. Because there are no studies of brain scans in children who stutter, the link between cognitive function and childhood stuttering has not been determined.

GENETICS

Growing evidence supports a link between genetics and stuttering.[7,8] In a study of twins, nearly 70 percent of the variance in stuttering was attributable to genetics, with the remainder attributable to environmental influences.[9]

The sex of the patient clearly influences stuttering. There is a higher incidence of stuttering in males than in females, even in young children.[10] Resolution of stuttering by adulthood appears to occur more often in girls than in boys.[2] The male-to-female ratio of stuttering is nearly 2:1 in children and is as much as 5:1 in adults.[7] New research techniques are expanding classic genetic and twin studies and are confirming the preponderance of stuttering cases in males. However, the exact genetic etiology is still unclear.[11,12]

ENVIRONMENT

Environmental influences, such as stressful social situations, talking on the telephone, and negative experiences associated with speaking, may also contribute to the persistence of stuttering. Anxiety levels of persons who stutter are specific to the communication situation.[13] Preschool children who stutter have been shown to have greater emotional reactions and more problems with flexibly controlling attention and emotion than preschoolers who do not stutter.[14]

Burdens of Stuttering

Persons with advanced forms of stuttering may fear speaking, which can lead to physical effects (e.g., tense muscles) and emotional effects (e.g., embarrassment, frustration). Persons who stutter may also be socially

Table 1. Physician's Checklist for Referral

	*The child with normal dysfluencies**	*The child with mild stuttering**	*The child with severe stuttering**
Speech behavior you may see or hear:	❑ Occasional (not more than once in every 10 sentences); brief (typically one half second or shorter) repetitions of sounds, syllables, or short words (e.g., li-li-like this)	❑ Frequent (3 percent or more of speech); long (one half to one second) repetitions of sounds, syllables, or short words (e.g., li-li-li-like this); occasional prolongations of sounds	❑ Very frequent (10 percent or more of speech); often very long (one second or longer) repetitions of sounds, syllables, or short words; frequent sound prolongations and blockages
Other behaviors you may see or hear:	❑ Occasional pauses, hesitations in speech, or fillers such as "uh," "er," or "um;" changing of words or thoughts	❑ Repetitions and prolongations begin to be associated with eyelid closing and blinking, looking to the side, and some physical tension in and around the lips	❑ Similar to mild stutterers only more frequent and noticeable; some rise in pitch of voice during stuttering; extra sounds or words used as "starters"
When problems are most noticeable:	❑ Tends to come and go when the child is tired, excited, talking about complex/new topics, asking or answering questions, or talking to unresponsive listeners	❑ Tends to come and go in similar situations, but it is more often present than absent	❑ Tends to be present in most speaking situations; far more consistent and nonfluctuating
Child reaction:	❑ None apparent	❑ Some show little concern, some are frustrated and embarrassed	❑ Most are embarrassed and some are also fearful of speaking
Referral decision:	❑ Refer only if parents are moderately to overly concerned	❑ Refer if stuttering continues for six to eight weeks, or if parental concern justifies it	❑ Refer as soon as possible

**—Age of onset: one and one half to seven years of age.*

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stigmatized and perceived as less capable than those who do not stutter.

A study of more than 200 adults who stutter reported that more than 70 percent of participants believed that stuttering adversely impacted their chance of being hired or promoted, more than 33 percent thought that stuttering interfered with job performance, and 20 percent had declined a job or promotion because of stuttering.[15] Thus, stuttering can evoke strong emotions in persons with the condition, affecting their self-esteem, self-image, and academic and occupational relationships.

Assessment

Family physicians play an important role in the assessment of patients who stutter because they are often the first to address the condition with parents or patients. Although many cases resolve spontaneously, referral for therapeutic intervention usually is necessary if stuttering is severe or persists for more than six to 12 months, if the patient has a family history of dysfluency, or if the family or patient is overly concerned about stuttering behaviors. *Table 1* is a checklist to determine the need for referral.[16] Early treatment for stuttering is most effective.

SEVERITY

The initial assessment should establish the severity of speech dysfluency. The Stuttering Foundation of America recognizes three levels of dysfluency: normal dysfluency, mild stuttering, and severe stuttering. Normal dysfluency, which occurs between 18 months and three years of age, is characterized by repetitions in sounds, syllables, and words that usually occur at the beginning of a sentence. Children with normal dysfluency have little or no frustration or awareness of their stuttering. Resources to help parents differentiate normal dysfluency from the initial stages of stuttering are available on the Stuttering Foundation Web site at http://www.stutteringhelp.org/Default.aspx?tabid=6.

Mild stuttering usually occurs between three and five years of age. Children with mild stuttering often present with similar repetitions in speech as those with normal dysfluency; however, the repetitions are more

frequent and may be accompanied by secondary behaviors. Although patients and their families may not be concerned by mild stuttering, early detection and referral to a speech-language pathologist is highly recommended to decrease the frequency of stuttering.

Severe stuttering usually occurs between one and seven years of age. Although the level of severity within the first six months of onset does not reflect the likelihood of spontaneous recovery, a pattern of recovery should demonstrate reduction in symptoms after six months.[17] In most patients with severe cases, stuttering occurs with less than 20 percent of words; however, stuttering occurs with almost every phrase or sentence, is usually accompanied by secondary and avoidance behaviors, and often leads to embarrassment and fear of speaking.

IMPACT ON THE PATIENT AND FAMILY

Regardless of the level of severity, the physician should assess whether stuttering is causing the patient or family anxiety or discomfort. Even with normal dysfluency or mild stuttering, patients and families may benefit from referral to a fluency subspecialist or speech-language pathologist for additional support and acknowledgment of individual concerns.

Distinguishing between normal, mild, and severe stuttering can help determine the next step of the physician assessment and what type and degree of counseling should be provided. Also, a clear differentiation between neurogenic and developmental stuttering is important.

FURTHER TESTING

Speech-language pathologists can formally assess speech using subjective and objective testing. The speech history includes a parental interview *(Table 2[18])*, during which attention is paid to parent-child interactions. Parents who frequently interrupt or speak quickly can increase their child's dysfluency.

Formal tests include the Stuttering Severity Instrument for Children and Adults and the Stuttering Prediction Instrument for Young Children; both are available at http://www.proedinc.com. These instruments are used to calculate the frequency, type, and duration of stuttering; evaluate the overall rate of speech; assess whether secondary behaviors are present; and determine the need for therapy. Formal testing also includes an assessment of the parents' and child's emotional status and overall attitudes toward speech and the impact of stuttering on their quality of daily living.

Although hearing loss has not been linked to stuttering, a referral to an audiologist for a formal hearing assessment may help determine if other conditions, such as a loss or discrimination disorder, exist.

Table 2. Questions for Parents to Differentiate Normal Speech Dysfluency from Stuttering

1. Does the child repeat parts of words rather than whole words or entire phrases? (For example, "a-a-a-apple")
2. Does the child repeat sounds more than once every eight to 10 sentences?
3. Does the child have more than two repetitions? ("a-a-a-a-apple" instead of "a-a-apple")
4. Does the child seem frustrated or embarrassed when he or she has trouble with a word?
5. Has the child been stuttering more than six months?
6. Does the child raise the pitch of the voice, blink the eyes, look to the side, or show physical tension in the face when stuttering?
7. Does the child use extra words or sounds like "uh" or "um" or "well" to get a word started?
8. Does the child sometimes get stuck so badly that no sound at all comes out for several seconds when trying to talk?
9. Does the child sometimes use extra body movements, like tapping the finger, to get sounds out?
10. Does the child avoid talking or use substitute words or quit talking in the middle of a sentence because he or she might stutter?

NOTE: *These questions are listed in order of the seriousness of the problem. If a parent answers "yes" to any question other than number one, it suggests the possibility of stuttering rather than normal dysfluency.*

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Management

Stuttering can be challenging to treat because there is a lack of evidence-based consensus about therapy. Although several pharmacologic interventions to control or alleviate stuttering events have been studied, all have proved ineffective or have had adverse effects.[17,19] In addition, no large-scale

Table 3. Types of Stuttering Therapies

Therapy	*How it works*	*Effectiveness*
Contemporary devices	Alters the frequency of the speaker's voice to mimic the "choral effect" (a phenomenon that decreases or ceases the instances of stuttering when the person is speaking with others) or slows the rate of speech through delayed auditory feedback	Long-term outcome studies have not been published
Controlled fluency (fluency-shaping technique)	Uses a speaking style that requires careful and prominent self-monitoring	Fluency-shaping techniques can improve stuttering, although the effectiveness decreases if stuttering persists after eight years of age
Fluency-shaping mechanisms	The speaker must slow the rate of speech to prevent distortions in the speech that is heard through the device	Effectiveness varies with stuttering severity
Parental involvement (Lidcombe approach)	Parents or other family members provide an environment that encourages the child to speak slowly; child receives praise for fluent speech and occasional correction of stuttering	Effective in preschoolers with early stuttering
Stuttering modification (traditional stuttering therapy)	Reduces the severity of stuttering so that speaking is performed without struggle by controlling primary symptoms, eliminating secondary behaviors, and reducing the fear of overt stuttering	Generally does not eliminate stuttering events, but it helps minimize the impact and occurrence of stuttering

trials on pharmacologic therapy have been published, and there are no trials including children.[20-22] A comprehensive review of pharmacologic interventions for stuttering showed that no agent leads to valid improvement in stuttering (i.e., decrease to less than one half of its prior frequency or with less than 5 percent of words) or in secondary social and emotional consequences.[22]

Recently, treatment of stuttering has focused on nonpharmacologic approaches, such as self-monitoring of speech to manage stuttering events[23] and symptom reduction instead of elimination.[24] The focus of treatment in children is to prevent the progression of confirmed stuttering (i.e., decrease to normal dysfluency). *Table 3* summarizes the types of stuttering therapies.

Families play an important role in the management of stuttering in children. Providing an environment that encourages slow speech, affording the child time to talk, and modeling slowed and relaxed speech can help reduce stuttering events.[24,25] Gentle, nonjudgmental acknowledgment of stuttering does not worsen the problem and may comfort a frustrated child. Some of the most effective preschool intervention programs call for direct acknowledgment of stuttering in the form of contingencies such as "That was bumpy" or "That was smooth."[25]

Fluency-shaping mechanisms, such as delayed auditory feedback devices, may improve fluency. Using the device, the speaker must slow the rate of speech to prevent distortions in the speech that they hear through the device. Contemporary stuttering devices alter the frequency of a speaker's voice to mimic the "choral effect" (i.e., a phenomenon that significantly decreases or ceases stuttering when the person is speaking with a group of others) or slow the rate of speech through delayed auditory feedback. Long-term outcome studies on these devices have not been published.[26,27]

The treatment of early, mild stuttering (generally in children younger than six years) focuses on the prevention or elimination of stuttering behaviors. Therapy is usually characterized by parental involvement and direct treatment. The Lidcombe approach, which has become prominent in recent years, involves parental praise for fluent speech in the child's daily speaking and occasional correction of stuttering.[28]

The likelihood of eliminating stuttering behaviors decreases if they persist beyond eight years of age.[2] For those who have more advanced forms of stuttering and secondary behaviors, therapy is generally a variation or combination of two approaches. The first approach is a fluency-shaping technique that replaces stuttering with controlled fluency (a speaking style requiring careful self-monitoring). The second approach focuses on reducing the severity of stuttering so that speaking is performed without struggle by controlling primary symptoms, eliminating secondary behaviors, and reducing the fear of overt stuttering; this approach is typically referred to as stuttering modification or traditional stuttering therapy.

Although there is no cure for stuttering, successful elimination of mild stuttering is likely when treatment is initiated before four years of age. For all persons who stutter, an optimal outcome depends on the appropriate combination of education, training, and individualized interventions. More information and resources for physicians and parents are available on the Stuttering Foundation Web site at http://www.stutteringhelp.org.

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