

- **Otoacoustic emissions** measure sound waves produced in the inner ear. A tiny probe is placed just inside the infant's ear canal. It measures the response (echo) when clicks or tones are played into the infant's ears.

Both of these tests are quick (5 to 10 minutes), painless, and may be performed while the infant is sleeping or lying still. The tests are sensitive but not as specific as more definitive tests. Infants who do not pass these tests are referred for more comprehensive testing. Many of these infants have normal hearing on definitive testing. Infants who do not have normal hearing should be immediately evaluated or referred for etiologic diagnosis and early intervention.

For children not screened at birth (such as children of immigrant parents) or children with suspected acquired hearing loss, later testing may allow early appropriate intervention. Hearing can be screened by means of an office audiogram, but other techniques are needed (ABR, behavior audiometry) for young, neurologically immature or impaired, and behaviorally difficult children. The typical audiologic assessment includes pure-tone audiometry over a variety of sound frequencies (pitches), especially over the range of frequencies in which most speech occurs. **Pneumatic otoscopic** examination and **tympanometry** are used to assess middle ear function and the tympanic membrane compliance for pathology in the middle ear, such as fluid, ossicular dysfunction, and eustachian tube dysfunction (see Chapter 9).

The treatment of conductive hearing loss (largely due to otitis media and middle ear effusions) is discussed in Chapter 105. Treatment of sensorineural hearing impairment may be medical or surgical. If amplification is indicated, hearing aids can be tuned preferentially to amplify the frequency ranges in which the patient has decreased acuity. Educational intervention typically includes speech-language therapy and teaching American Sign Language. Even with amplification, many hearing-impaired children show deficits in processing auditory information, requiring special educational services for helping to read and for other academic skills. **Cochlear implants** are surgically implantable devices that provide hearing sensation to individuals with severe to profound hearing loss. The implants are designed to substitute for the function of the middle ear, cochlear mechanical motion, and sensory cells, transforming sound energy into electrical energy that initiates impulses in the auditory nerve. Cochlear implants are indicated for children older than 12 months with profound bilateral sensorineural hearing loss who have limited benefit from hearing aids, have failed to progress in auditory skill development, and have no radiologic or medical contraindications. Implantation in children as young as possible gives them the most advantageous auditory environment for speech-language learning.

Speech-Language Impairment

Parents often bring the concern of speech delay to the physician's attention when they compare their young child with others of the same age (Table 10-9). The most common causes of the speech delay are MR, hearing impairment, social deprivation, autism, and oral-motor abnormalities. If a problem is suspected based on screening with tests such as Ages and Stages Questionnaires or the Parents' Evaluation of Developmental Status test (see Chapter 8) or other standard screening test (Early Language Milestone Scale), a referral to a specialized hearing and speech center is indicated. While awaiting

Table 10-9 Clues to When a Child with a Communication Disorder Needs Help

0–11 MONTHS	
Before 6 months, the child does not startle, blink, or change immediate activity in response to sudden, loud sounds.	
Before 6 months, the child does not attend to the human voice and is not soothed by his or her mother's voice.	
By 6 months, the child does not babble strings of consonant and vowel syllables or imitate gurgling or cooing sounds.	
By 10 months, the child does not respond to his or her name.	
At 10 months, the child's sound-making is limited to shrieks, grunts, or sustained vowel production.	
12–23 MONTHS	
At 12 months, the child's babbling or speech is limited to vowel sounds.	
By 15 months, the child does not respond to "no," "bye-bye," or "bottle."	
By 15 months, the child does not imitate sounds or words.	
By 18 months, the child is not consistently using at least six words with appropriate meaning.	
By 21 months, the child does not respond correctly to "Give me . . .," "Sit down," or "Come here" when spoken without gestural cues.	
By 23 months, two-word phrases that are spoken as single units (e.g., "whatszit," "thankyou," "allgone") have not emerged.	
24–36 MONTHS	
By 24 months, at least 50% of the child's speech is not understood by familiar listeners.	
By 24 months, the child does not point to body parts without gestural cues.	
By 24 months, the child is not combining words into phrases (e.g., "go bye-bye," "go car," "want cookie").	
By 30 months, the child does not show understanding of spatial concepts: on, in, under, front, and back.	
By 30 months, the child is not using short sentences (e.g., "Daddy went bye-bye").	
By 30 months, the child has not begun to ask questions (using <i>where</i> , <i>what</i> , <i>why</i>).	
By 36 months, the child's speech is not understood by unfamiliar listeners.	
ALL AGES	
At any age, the child is consistently dysfluent with repetitions, hesitations; blocks or struggles to say words. Struggle may be accompanied by grimaces, eye blinks, or hand gestures.	

Adapted and updated from Weiss CE, Lillywhite HE: Communication Disorders: a handbook for prevention and early detection, St Louis, 1976, Mosby.

the results of testing or initiation of speech-language therapy, parents should be advised to speak slowly and clearly to the child (and avoid *baby talk*). Parents and older siblings should read frequently to the speech-delayed child.

Speech disorders include **articulation**, **fluency**, and **resonance disorders**. Articulation disorders include difficulties producing sounds in syllables or saying words incorrectly to the point that other people cannot understand what is being said. Fluency disorders include problems such as **stuttering**, the condition in which the flow of speech is interrupted by abnormal stoppages, repetitions (*st-st-stuttering*), or prolonging