

# American Speech-Language-Hearing Association

**Making effective communication, a human right, accessible and achievable for all.**

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## Hearing Screening

Hearing screening tests provide a quick and cost effective way to separate people into two groups: a pass group and a fail group. Those who pass hearing screening are presumed to have no hearing loss. Those who fail are in need of an in-depth evaluation by an audiologist and may also need follow-up care from other professionals.

Hearing screening occurs from birth throughout the adult years when requested, when conditions occur that increase risk for hearing loss, or when mandated by state and local laws or practices.

It is recommended that all hearing screening programs be conducted under the supervision of an audiologist holding the American Speech-Language-Hearing Association's (ASHA) Certificate of Clinical Competence (CCC).



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## Newborns and Infants

Hearing screening for newborns before they leave the hospital or maternity center is becoming a common practice. Without such programs, average age of detection of significant hearing loss is approximately 14 months. [Task Force on Newborn and Infant Hearing. (1999, February). Newborn and infant hearing loss: Detection and intervention. *Pediatrics*, 103(2): 527-530.].

When hearing loss is detected late, language development is already delayed. Children are more likely to perform below their grade level, and are more likely to be held back, drop out of school, and fail to earn a high school diploma. These consequences are in sharp contrast to those for children

who are identified early, receive early intervention, and then are found to function at the level of their peers by the time they enter school.

### Information on federal programs for infant hearing

## Screening Techniques

Screening procedures for newborns and infants can detect permanent or fluctuating, bilateral or unilateral, and sensory or conductive hearing loss, averaging 30 to 40 dB or more in the frequency region important for speech recognition (approximately 500-4000 Hz).

The screening of newborns and infants involves use of non-invasive, objective physiologic measures that include **otoacoustic emissions (OAEs)** and/or **auditory brainstem response (ABR)**. Both procedures can be done painlessly while the infant is resting quietly.

**Otoacoustic emissions** are inaudible sounds from the cochlea when audible sound stimulates the cochlea. The outer hair cells of the cochlea vibrate, and the vibration produces an inaudible sound that echoes back into the middle ear. This sound can be measured with a small probe inserted into the ear canal. Persons with normal hearing produce emissions. Those with hearing loss greater than 25-30 dB do not. OAEs can detect blockage in the outer ear canal, middle ear fluid, and damage to the outer hair cells in the cochlea.

**Auditory brainstem response** is an auditory evoked potential that originates from the auditory nerve. It is often used with babies. Electrodes are placed on the head, and brain wave activity in response to sound is recorded. ABR can detect damage to the cochlea, the auditory nerve and the auditory pathways in the stem of the brain.

ASHA-certified audiologists (and state licensed where applicable) should be designated as the manager of these screening programs.

### **What happens if an infant does not pass the screening?**

Infants who do not pass a screening are often given a second screening to confirm findings and then referred for ***follow-up audiological and medical evaluations that should occur no later than 3 months of age***. These evaluations confirm the presence of hearing loss; determine the type, nature, and (whenever possible) the cause of the hearing loss; and help identify options for treatment.

Even if the infant passes screening, certain conditions do not produce immediate hearing loss. Rather, the hearing loss occurs later in the child's development.

An infant with any of the following indicators for progressive or delayed-onset hearing loss should receive ***audiologic monitoring every six months until age 3 years***:

- Parental or caregiver concern regarding hearing, speech, language, and/or developmental delay
- Family history of permanent childhood hearing loss
- Characteristics or other findings associated with a syndrome known to include a sensorineural and/or conductive hearing loss
- Postnatal infections associated with sensorineural hearing loss including bacterial meningitis
- In utero infections such as cytomegalovirus, herpes, rubella, syphilis, and toxoplasmosis
- Neonatal indicators—specifically hyperbilirubinemia at a serum level requiring exchange transfusion, persistent pulmonary hypertension of the newborn associated with mechanical ventilation, and conditions requiring the use of extracorporeal membrane oxygenation (ECMO)

- Syndromes associated with progressive hearing loss such as neurofibromatosis, osteopetrosis, and Usher's syndrome
- Neurodegenerative disorders, such as Hunter's syndrome, or sensory motor neuropathies, such as Friedreich's ataxia and Charcot-Marie-Tooth syndrome
- Head trauma
- Recurrent or persistent otitis media with effusion for at least 3 months

## Legal Requirements

The Individuals with Disabilities Education Act (IDEA) in its regulations requires states to develop and implement a statewide system of early intervention services for infants and toddlers. It is required that infants and toddlers with disabilities be identified and evaluated using at risk criteria and appropriate audiologic screening techniques. After a hearing loss is confirmed, coordination of services should be facilitated by the infant's medical manager and the IDEA coordinating agencies.

Contact your local school district or your state or local health department to find out how to obtain screenings/evaluations and intervention services through your state's Early Intervention program.

## Older Infants and Toddlers

Infants and toddlers (7 months through 2 years) should be screened for hearing loss as needed, requested, mandated, or when conditions place them at risk for hearing disability.

Infants not tested as newborns should be screened before three months of age. Other infants should be screened who received neonatal intensive care or special care, or who display other indicators that place them at risk for hearing loss.

Older infants and toddlers who have a greater chance of hearing loss because of certain risk factors should also be screened. This screening should be done even if an initial hearing screening is passed because some causes of hearing loss do not take effect until later in the child's development. These children's hearing should be ***monitored at least every 6 months until 3 years of age, and at regular intervals thereafter dependent upon the risk factor.***

## Risk Factors

- Parental, caregiver and/or health care provider concerns regarding hearing, speech, language, and/or developmental delay based on observation and/or standardized developmental screening
- Family history of permanent childhood hearing loss
- Characteristics or other findings associated with a syndrome known to include a sensorineural and/or conductive hearing loss
- Infections associated with sensorineural hearing loss including bacterial meningitis, mumps
- In utero infections such as cytomegalovirus, herpes, rubella, syphilis, and toxoplasmosis
- Neonatal indicators—specifically hyperbilirubinemia at a serum level requiring exchange transfusion, persistent pulmonary hypertension of the newborn associated with mechanical ventilation, and conditions requiring the use of extracorporeal membrane oxygenation (ECMO)
- Syndromes associated with progressive hearing loss such as neurofibromatosis, osteopetrosis, and Usher's syndrome
- Neurodegenerative disorders, such as Hunter's syndrome, or sensory motor neuropathies, such as Friedreich's ataxia and Charcot-Marie-Tooth syndrome

- Head trauma
- Recurrent or persistent otitis media with effusion for at least 3 months
- Anatomic disorders that affect eustachian tube function
- Neurofibromatosis type II or neurodegenerative disorders

## Screening Techniques

Screening procedures to detect hearing impairment that exceeds 20-30 dB HL are applicable to this age group. Two screening methods are suggested as the most appropriate tools for children who are functioning at a development age of 7 months to 3 years, **visual reinforcement audiometry (VRA)** and **conditioned play audiometry (CPA)**. Both of these methods are behavioral techniques that require involvement and cooperation of the child.

**Visual reinforcement audiometry (VRA)** is the method of choice for children between 6 months and 2 years of age. The child is trained to look toward (localize) a sound source. When the child gives a correct response, e.g., looking to a source of sound when it is presented, the child is "rewarded" through a visual reinforcement such as a toy that moves or a flashing light.

**Conditioned play audiometry (CPA)** can be used as the child matures. It is widely used between 2 and 3 years of age. The child is trained to perform an activity each time a sound is heard. The activity may be putting a block in a box, placing pegs in a hole, putting a ring on a cone, etc. The child is taught to wait, listen, and respond.

With both of these methods, sounds of different frequencies are presented at a sound level that children with normal hearing can hear.

It is ideal if the child will allow earphones to be placed on his or her head so that independent information can be obtained for each ear. If the child refuses earphone placement or earphone placement is otherwise not possible, sounds are presented through speakers inside a sound booth. Since sound field screening does not give ear specific information, a unilateral hearing loss (hearing loss in only one ear) may be missed.

Alternative procedures, such as **otoacoustic emissions (OAEs)** or **auditory brainstem response (ABR)** may be used if the child is unable to be conditioned.

ASHA certified audiologists are the professionals who have the knowledge, skill, and expertise to screen for hearing impairment in this age group. You can use ASHA's ['Find a Professional'](#) referral service to locate an audiologist near you.

### What happens if a toddler does not pass the screening?

A toddler who does not pass the screening should be rescreened or referred for audiologic evaluation. *Confirmation of hearing status should be obtained within 1 month, but no later than 3 months, after the initial screening.*

Legislative requirements are the same as for younger children.

## Preschoolers

The goal of screening for hearing loss in preschoolers (ages 3-5 years) is to identify children most likely to have hearing loss that may interfere with communication, development, health, or future school performance. In addition, because hearing loss in this age range is so often associated with

middle ear disease, it is also recommended that children in this age group be screened for outer and middle ear disorders (acoustic immittance screening).

Some children may pass an initial hearing screening, but still be at risk for hearing loss that fluctuates, is progressive (gets worse over time), or is acquired later in development.

### **Risk Factors**

- Parental, caregiver and/or health care provider concerns regarding hearing, speech, language, and/or developmental delay based on observation and/or standardized developmental screening
- Family history of permanent childhood hearing loss
- Characteristics or other findings associated with a syndrome known to include a sensorineural and/or conductive hearing loss
- Infections associated with sensorineural hearing loss including bacterial meningitis, mumps
- In utero infections such as cytomegalovirus, herpes, rubella, syphilis, and toxoplasmosis
- Neonatal indicators—specifically hyperbilirubinemia at a serum level requiring exchange transfusion, persistent pulmonary hypertension of the newborn associated with mechanical ventilation, and conditions requiring the use of extracorporeal membrane oxygenation (ECMO)
- Syndromes associated with progressive hearing loss such as neurofibromatosis, osteopetrosis, and Usher's syndrome
- Neurodegenerative disorders, such as Hunter's syndrome, or sensory motor neuropathies, such as Friedreich's ataxia and Charcot-Marie-Tooth syndrome
- Head trauma
- Recurrent or persistent otitis media with effusion for at least 3 months
- Ototoxic medications, including but not limited to chemotherapeutic agents or aminoglycosides used in multiple courses or in combination with loop diuretics
- Apgar scores of 0-4 at 1 minute or 0-6 at 5 minutes
- Neurofibromatosis type II or neurodegenerative disorders
- Anatomic disorders that affect eustachian tube function

Screening procedures to detect unilateral or bilateral sensorineural and/or conductive hearing loss greater than 20 dB HL in the frequency region from 1000 through 4000 Hz are applicable to this age group.

Conditioned play audiometry (CPA) is the most commonly employed procedure.

Acoustic Immittance screening may include tympanometry, acoustic reflex, and static acoustic impedance.

Tympanometry introduces air pressure into the ear canal making the eardrum move back and forth. A special machine then measures the mobility of the eardrum. Tympanograms, or graphs, are produced which show stiffness, floppiness, or normal eardrum movement.

Acoustic reflex measures the response of a tiny ear muscle that contracts when a loud sound occurs. The loudness level at which the acoustic reflex occurs and/or the absence of the acoustic reflex give important diagnostic information.

Static acoustic measures estimate the physical volume of air in the ear canal. This test is useful in identifying a perforated eardrum or whether ear ventilation tubes are still open.

Screening should be limited to audiologists holding a Certificate of Clinical Competence (CCC-A) from the American Speech-Language Hearing Association and state licensure where applicable; speech-language pathologists holding a Certificate of Clinical Competence (CCC-SLP) from the American Speech-Language Hearing Association and state licensure where applicable; and other personnel under the supervision of an ASHA-certified audiologist.

Find a professional near you.

### **What happens if a preschooler does not pass the screening?**

If the child cannot be conditioned to the play audiometry, the child will be screened using infant-toddler procedures or will be recommended for a more in-depth audiologic assessment.

If the child did condition and did not pass the screening, then referral for audiological assessment by an ASHA-certified audiologist will be made.

***Hearing status of children referred after screening should be confirmed within 1 month, but no later than 3 months, after the initial screening.***

### **Legislative Requirements**

The Individuals with Disabilities Education Act (IDEA) in its regulations for student ages 3 - 21 requires states to identify children with disabilities, including hearing loss, residing in the state. Contact your local school district or your state's education department to find out how to obtain screenings/evaluations for children with suspected disabilities.

## **School age (5-18 years)**

School-age children should be screened for hearing loss as needed, requested, mandated, or when conditions place them at risk for hearing disability. Screening for hearing loss identifies the school-age children most likely to have hearing impairment that may interfere with development, communication, health, and education. School age children with even minimal hearing loss are at risk for academic and communication difficulties.

Periodic screenings are recommended because of the increased potential for hearing loss due to overexposure to high levels of noise and the importance of identifying children at risk for hearing impairment that may affect their future educational, vocational, or social opportunities.

School age children should be *screened at the following times*:

1. ***on first entry into school***
2. ***every year from kindergarten through 3<sup>rd</sup> grade***
3. ***in 7<sup>th</sup> grade***
4. ***in 11<sup>th</sup> grade***
5. ***upon entrance into special education***
6. ***upon grade repetition***
7. ***upon entering a new school system*** without evidence of having passed a previous hearing screening

School age children who already receive regular audiologic management need not participate in a

screening program.

Hearing screening should be done in other years when:

- Parent/care provider, health care provider, teacher, or other school personnel have concerns regarding hearing, speech, language, or learning abilities
- There is family history of late or delayed onset hereditary hearing loss
- Otitis media with effusion (fluid in the middle ear) recurs or persists for at least 3 months
- There are skull or facial abnormalities, especially those that can cause changes to the structure of the pinna and ear canal
- Characteristics or other findings occur that are associated with a syndrome known to include hearing loss
- Head trauma occurs with loss of consciousness
- There is reported exposure to potentially damaging noise levels or to drugs that frequently cause hearing loss

### **Screening techniques used for school-age students**

Screening procedures to detect unilateral or bilateral sensorineural and/or conductive hearing loss greater than 20 dB HL in the frequency region from 1000 through 4000 Hz are applicable to this age group.

Conventional audiometry where students are instructed to raise their hand (or point to the appropriate ear) when they hear a tone is the commonly used procedure. Conditioned play audiometry (CPA) is also used.

### **Who should carry out the screening?**

Screening practitioners should be limited to:

- Audiologists holding a Certificate of Clinical Competence (CCC-A) from the American Speech-Language Hearing Association and state licensure where applicable
- Speech-Language Pathologists holding a Certificate of Clinical Competence (CCC-SLP) from the American Speech-Language Hearing Association and state licensure where applicable
- Support personnel under supervision of a certified audiologist

### **What happens if a school-age student does not pass the screening?**

- The student should be reinstructed, earphones repositioned, and rescreened in the same session
- If the student does not pass the rescreening, he or she should be referred for audiologic assessment
- ***Hearing status of referred students should be confirmed within one month, and no later than 3 months, after initial screening***

### **Legislative mandates.**

The Individuals with Disabilities Education Act (IDEA) in its regulations for students aged 3-21 years requires states to identify children with disabilities residing in the state. "The identification of children with hearing loss" is included in the definition of audiology.

Contact your local school district or your state's education department to find out how to obtain screenings/evaluations for children with suspected disabilities.

## Adults

Hearing loss is a prevalent chronic condition among adults of all ages. It is recognized that hearing loss increases as a function of age, especially for frequencies at 2000 Hz and above. However, adults tend to ignore its effects, delay their decision to seek audiologic services, and tend to put off recommended treatments.

While more than 30% of people over 65 have some type of hearing loss, 14% of those between 45 and 64 have hearing loss. Close to 8 million people between the ages of 18 and 44 have hearing loss.

Adult hearing screening programs are considered voluntary. ***It is recommended however, that adults be screened at least every decade through age 50 and at 3-year intervals thereafter.***

### Screening techniques used for adults

Screening procedures to detect unilateral or bilateral sensorineural and/or conductive hearing loss greater than 25 dB HL in the frequency region from 1000 through 4000 Hz are applicable to this age group.

Techniques for hearing screening include case history [regarding history of hearing loss, unilateral hearing loss, sudden or rapid progression of hearing loss, unilateral tinnitus, acute or chronic dizziness, recent drainage from the ear(s), and/or pain of discomfort in the ear(s)], visual inspection of the ear, pure-tone screening, and screening by self-assessed judgment of hearing difficulty.

Conventional audiometry where individuals are instructed to raise their hand (or point to the appropriate ear) when they hear a tone is the commonly used procedure for the pure-tone screening.

### Telephone Screening for Hearing Loss Questioned

#### Who should carry out the screening?

Screening practitioners should be limited to:

- Audiologists holding a Certificate of Clinical Competence (CCC-A) from the American Speech-Language Hearing Association and state licensure where applicable
- Speech-Language Pathologists holding a Certificate of Clinical Competence (CCC-SLP) from the American Speech-Language Hearing Association and state licensure where applicable
- Support personnel under supervision of a certified audiologist

#### What happens if an individual does not pass the screen?

The individual is counseled regarding hearing loss. Counseling may result in a recommendation for audiologic evaluation. However, the individual may decline audiologic evaluation or further medical follow-up.

- The individual should be referred for audiologic assessment if case history discussion indicates a condition indicating a risk for hearing loss.
- The individual should be referred for audiologic assessment and/or cerumen (wax) management if visual inspection indicates any physical abnormality of the outer ear, or if there is otoscopic identification of ear canal abnormality, or impacted cerumen.

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