WV SPEECH, LANGUAGE AND HEARING ASSOCIATION TASK FORCE (1999)

GUIDELINES FOR HEARING AND ACOUSTIC IMMITTANCE SCREENING

I. PERSONNEL

Hearing and acoustic immittance (impedance) screening can only be performed by persons who are properly trained in the techniques which are suitable for the age groups being tested. Minimal training should include:

- Anatomy and physiology of the auditory system
- Hearing disorders and their causes
- Screening tools, methods, and procedures; and
- Consequences of hearing loss for communication and learning.


Audiologists are the only professionals who are qualified to perform these tests without further training. All screening programs for hearing loss and middle ear disorders should be under the supervision of a certified and/or licensed audiologist (Am J of Audiology; V.4, #2; p.36).

For pre-school and school aged children who are able to respond to conventional audiometry, speech-language pathologists (SLPs) may perform hearing and acoustic immittance (impedance) screening if they have had sufficient background instruction. The supervising audiologist will determine the extent of supervision required in the specific circumstance, taking into account the level of skill and experience which the SLP has with the screening procedures (Am J of Audiology; V.4, #2; p. 36).

For hearing and acoustic immittance (impedance) screening of children younger than 36 months, who are unable to respond to conventional audiometry, only properly trained individuals with direct supervision of a certified and/or licensed audiologist may be considered for testing.

Other professionals or non-professionals may perform hearing and acoustic immittance (impedance) screening on persons older than 36 months, who are able to respond to conventional audiometry, after they have been trained by a certified and/or licensed audiologist. On-site supervision should be provided in these cases either by a certified and/or licensed audiologist or by a SLP who has been approved by the supervising audiologist until the audiologist determines the degree of ongoing supervision required.

II. INSTRUMENTATION

A. Calibration

Instruments used for hearing and acoustic immittance (Impedance) screening must be calibrated to current ANSI standards. The audiometer should be calibrated in accordance with ANSI S3.6-1969 and the acoustic immittance (impedance) equipment should comply with ANSI S3.9-1987 or the most recent revision of these standards. All equipment must have undergone an exhaustive calibration within one year prior to the test date. A biological check of the equipment should be performed prior to testing each day.

A biological check of the audiometer involves listening to both earphones (or testing a known normal hearing subject) and making sure that the test tones can be heard at the recommended screening level. The examiner
should also be sure that there are no noises present and that when a tone is presented it can be heard only on the side to which it is directed. A biological check of the acoustic immittance (impedance) equipment should include the use of the manufacturer’s calibration cavities and a comparison of current tympanograms with previous tests performed on a subject with no known past or active middle ear pathology.

B. Pure Tone Screening Equipment

Instrumentation for pure tone screening of **pre-school and school aged children** must meet the following minimum criteria:

- Test frequencies: 1000 - 2000 - 4000 Hz
- Intensity level: 20 dB


For screening **adults** the following minimum criteria must be met:

- Test frequencies: 500 - 1000 - 2000- 4000 Hz
- Intensity levels: 25 & 40dB


C. Acoustic Immitance Screening Equipment

Instrumentation for acoustic immittance (impedance) screening must provide the following minimum information:

- Equivalent Ear Canal Volume
- Tympanometric Peak Pressure (TPP)
- Static Admittance (Compliance)
- Tympanometric Width (Gradient)

(Guidelines for Screening for Hearing Impairments and Middle Ear Disorders. 1990; 32 (Suppl 2); pp. 17-24).

**PROCEDURES FOR HEARING-SCREENING OF CHILDREN AGES 3 YEARS AND OLDER**

I. PERSONNEL

a. **Audiologists are the only professionals who are qualified to perform hearing screenings without further training.** All screening programs for hearing loss should be under the supervision of a certified and/or licensed audiologist.

b. **For preschool children who are able to respond to conventional audiometry, speech-language pathologists (SLP) may perform hearing and acoustic immittance screenings if they have sufficient background and instruction.** The supervising audiologist will determine the extent of supervision required in the specific circumstances taking into account the level of skill and experience which the SLP has with the screening procedures.

c. **Other professionals or non-professionals may perform hearing and acoustic immittance screening persons older than 36 months who are able to respond to conventional audiometry after they have been trained by a certified audiologist.** On site supervision should be provided in these cases either by a certified audiologist or by an SLP who has been approved by the supervising audiologist, until the audiologist determines the degree of ongoing supervision required.
II. CLINICAL INDICATIONS

A. Preschool and school age children are screened as needed, requested or mandated, or when they have conditions that place them at risk for hearing impairment. (See Clinical Indications IIB).

B. Indicators associated with delayed onset, progressive or acquired sensori-neural or conductive hearing impairment include (JCIH. 1994):
   1. Parent/care provider and for health care provider concerns regarding hearing, speech, language and for developmental delay based on observation and for standardized developmental screening (e.g., Denver Development Screening Test - Revised (Denver II), Frankenburg, Dodds, Archer, Bresnick, & Shapiro, 1990).
   2. Family history of hereditary childhood hearing loss.
   3. In utero infection, such as cytomegalovirus, rubella, syphilis, herpes, and toxoplasmosis.
   4. Craniofacial anomalies, including those with morphological abnormalities of the pinna and ear canal.
   5. Otoxic medications, including but not limited to the chemotherapeutic agents or aminoglycosides, used in multiple courses or in combination with loop diuretics
   7. Stigmas or other findings associated with syndrome known to include sensorineural and/or conductive hearing loss
   8. Head trauma associated with loss of consciousness or skull fracture.
   9. Neurofibromatosis Type II or neurodegenerative disorders.
   10. Recurrent or persistent otitis media with effusion for at least 3 months.

III. CLINICAL PROCESS:

A. Prior to screening, obtain documented informed permission for screening from child's legal guardian.

B. Conduct screening in a manner congruent with appropriate infection control and universal precautions (Ballachandra, Roeser, & Kemp, 1996; U.S. Department of Labor, Occupational Safety and Health Administration, 1991). (See Section on Infection Control in Hearing Screening Programs).

C. Question accompanying adult or student concerning recent episodes of otalgia (ear pain), otorrhea (ear discharge), or medical intervention

D. Visually inspect the structure of the ear, head, and neck to identify risk factors for hearing loss and/or disease. Otoscopy, when utilized should include ear canal and eardrum inspection for obvious obstructions, structural defects or tympanostomy tubes

E. Accomplish conditioning of the desired motor response prior to initiation of screening. Administer a minimum of two conditioning trials at a presumed supra threshold level to assure that the child understands the task. For those children who can reliably participate in conditioned play audiometry (CPA) or conventional audiometry screening should consist of the presentation of pure tone stimuli to each ear individual, at a hearing level of 20dB (ANSI 3.6-1969) at 1000Hz, 2000Hz, and 4000Hz. If pure tone screening is not performed in conjunction with acoustic immittance (impedance) screening, 500Hz should also be included. When 500Hz is utilized, the screening level shall be at 25dB.

F. Minimum acoustic immittance screening shall consist of static admittance, equivalent ear canal volume, Tympanometric width, and Tympanometric peak pressure. Acoustic reflex testing is optional.

IV. PASS/FAIL CRITERIA:

A. History:
   Pass: No recent occurrences of otalgia (ear pain) or Otorrhea (ear discharge).
   No Pass: Recent occurrences of otalgia (ear pain) or otorrhea (ear discharge) should result in an immediate medical referral

B. Visual inspection:
   Pass: No visual evidence of structural defects; ear canal abnormalities or eardrum abnormalities
   No Pass: Visual evidence of structural defects of the ear, head or neck along with acoustic immittance or pure tone failure should result in immediate referral.
Visual evidence of ear canal abnormalities including excessive cerumen, blood, foreign bodies or tumors should result in a medical referral.
Visual evidence of obvious eardrum abnormalities including perforation, inflammation or severe retraction of the tympanic membrane should result in a medical referral

C. Pure Tone Screening:
   Pass: Student responded at 20dBLH at 1000 Hz, 2000Hz, and 4000Hz for two out of three presentations to each ear individually.
   No Pass: Student failed to respond to one or more frequencies at the recommended intensity (loudness) level in either ear during both an initial screening and a pure tone recheck. Student should then be referred to an audiologist for a complete audiometric evaluation.

D. Acoustic Impittance (impedance):
   Pass: Type A tympanogram: tympanogram peak pressure less than +1000mmH20/daPa and greater than -200mmH20/daPa with normal static admittance, normal equivalent ear canal volume and normal tympanometric width.
   No Pass: Type B tympanogram: no discernable tympanogram pressure peak, low static admittance, large or normal equivalent ear canal volume and wide tympanometric width.
   Type C tympanogram: tympanogram peak beyond -200mmH20/daPa with normal static admittance, normal equivalent ear canal volume, and normal tympanometric width.
   Questionable: Consult audiologist concerning any tympanogram that does not fit in the above categories.

V. FOLLOW-UP PROCEDURES:
   A. If referral is attributable to failure to condition, screen using Procedures for Screening Infants and Toddlers or recommend an audiologic evaluation.
   B. If referral is unattributable to failure to condition, recommend Audiologic evaluation
   C. If referral is attributable to failure of acoustic immittance screening, history of recent otalgia or otorrhea, recommend screening recheck or medical evaluation.

VI. SETTING/EQUIPMENT SPECIFICATIONS:

   A. SCREENING FACILITIES
      1. The test environment chosen to perform the screenings should be well lighted, adequate in size to accommodate the tester and equipment, well ventilated, equipped with appropriate type and number of electrical outlets and have low (background) ambient noise levels.
      2. A simple biological check of acceptable noise levels can be performed by screening one or two persons with proven normal hearing sensitivity. If both of these individuals fail to hear the tones at 20dBLH, the environment most likely is not satisfactory, and modifications to the test site should be made or a new test site chosen. **It is inappropriate to increase the loudness level of the test stimuli. Do not proceed with the screening if all of the test tones cannot be heard.**

   B. SCREENING INSTRUMENTS
      1. Pure tone audiometers and/or acoustic immittance (impedance) equipment are to be utilized. The audiometer should be calibrated in accordance with ANSI S3.6-1969 and the acoustic immittance equipment should comply with ANSI S3.39-1987 or the most recent revision of these standards, annually. All equipment should meet regulatory agency, specification for electrical safety for all electroacoustic equipment.

VII. DOCUMENTATION:
   A. Record identifying Information, screening results, and recommended follow-up procedures.
   B. Request results from referral and follow-up.
INFECTION CONTROL IN HEARING SCREENING PROGRAMS

In hearing screening programs the importance of infection control is underscored by the sheer numbers of persons contacted, the emphasis on performing procedures quickly, the age of persons seen, and the fact that it is done in divergent locations necessitating portability of all equipment. Probability of contact with bodily fluids is increased by these factors, and varies with the specifics of the particular group dealt with at a given site.

I. GUIDELINES:

A. Contact housekeeping or custodial services to clean after bodily fluid has been spilled.
B. Thoroughly wash all areas exposed to saliva immediately following contact.
C. Observe auricle and surrounding area for signs of disease or lacerations, abrasions, or any break in the skin. If these exist, clean earphones and cushions with disinfecting agent before and after testing.
D. Thoroughly wash immediately following any contact with cerumen.
E. Thoroughly clean probe cuffs of acoustic immittance equipment between uses.
F. Use protective vinyl or latex gloves, especially if you have any open cuts or breaks in the skin.
G. Glean any toys used in play audiometry between uses.
H. Consider hepatitis B vaccine. This disease is spread via blood or mucus in cuts or contact via eye or mouth, or bites.
I. Report any bodily fluid exposure.
J. Have a squeeze bottle for eye flushes available at all times.
K. Disinfect all surface areas possibly coming in contact with body fluids including saliva, cerumen, or blood. Disinfection is a two-step process involving cleaning to remove gross contamination followed by disinfecting.
L. Use clean tissue to remove probe cuff from probe assembly.

II. TO BE CONSIDERED:

A. No-rinse antibacterial hand disinfectant such as CalStat@
B. Disposable earphone covers
C. Ultrasonic cleaning of acoustic immittance cuffs using commercial disinfectant such as Audiologists' Choice@
D. Hepatitis B and flu immunization.

BIBLIOGRAPHY AVAILABLE ON REQUEST