Hearing Screening and Anticipatory Guidance

RATIONALE

The Child Health and Disability Prevention (CHDP) Program supports the early identification of all children with a hearing loss, in concert with the national initiative *Healthy People 2020* (United States Department of Health and Human Services, Public Health Service, 2010). One to three infants of every one-thousand live births are born deaf or hard of hearing.[1] These children must be identified as early as possible to ensure normal language, cognition, and psychosocial development. It is also imperative to maintain an ongoing program to monitor children for fluctuating hearing loss due to otitis media, progressive or late-onset hearing loss, or a permanent loss from childhood disease and/or loud noise.

The Joint Committee on Infant Hearing (JCIH) endorses early detection of and intervention for infants with hearing loss. The goal of early hearing detection and intervention (EHDI) is to maximize linguistic competence and literacy development for children who are deaf or hard of hearing. Without appropriate opportunities to learn language, these children will fall behind their hearing peers in communication, cognition, reading, and social-emotional development. To maximize the outcome for infants who are deaf or hard of hearing, the hearing of all infants should be screened at no later than 1 month of age. Those who do not pass screening should have a comprehensive audiological evaluation at no later than 3 months of age. Infants with confirmed hearing loss should receive appropriate intervention at no later than 6 months of age from health care and education professionals with expertise in hearing loss and deafness in infants and young children[2].

The state of California Child Health and Disability Prevention (CHDP) program is implementing CHDP periodicity schedules to conform with the American Academy of Pediatrics Bright Futures Recommendations for Periodic Preventive Health Care and will provide updated CHDP hearing screening guidelines as information becomes available.

SCREENING REQUIREMENTS

- Review family and medical history for indicators associated with hearing loss. See Table 1: Risk Indicators Associated With Permanent Congenital, Delayed-Onset, Or Progressive Hearing Loss In Childhood.
- Examine ears, head, **and** neck for structural defects or abnormalities.
- At each assessment visit, monitor for auditory skills, middle ear status, and developmental milestones (from JCIH 2007 position statement)
- Assess auditory responsiveness and speech development of young children.

- See Table 2: Behaviors Indicating Possible Hearing Loss or Speech and Language Delay.
- Administer a validated global screening tool at 9, 18, and 24-30 months (from JCIH 2007 position statement)
- Screen for hearing of children age three to 21 years at each health assessment[3] visit using a pure tone air conduction audiometer with intensity levels not exceeding 25 decibels (dB) at frequency levels of 1000, 2000, and (3000 Hz is optional) 4000 Hz.
  See "Guidelines for Audiometric Testing."

Bright Futures*
Bright Futures, 3rd Edition Guidelines and Pocket Guide.

OTOACOUSTIC EMISSIONS (OAE) TECHNOLOGY **
CHDP providers have questioned whether they can use OAE for screening hearing during a CHDP health assessment. OAE technology is sensitive to outer hair cell function in the inner ear. The technology can be used to assess inner ear hearing loss. OAE evaluations do not measure neural (i.e., eighth nerve or auditory brainstem pathway) function and the results of the OAE evaluation can be misinterpreted if outer or middle ear pathology is present. The procedure also requires a co-operative child in a quiet state with a properly fitted probe to ensure reliability of the stimulus presentation. See Table 2. Behaviors Indicating Possible Hearing Loss Or Speech And Language Delay for age ranges.

Although use of OAE technology has application in the hearing screening of newborns and in the diagnosis of hearing loss, the CHDP Program does not recognize this procedure as standard of practice for screening of a child's hearing as part of a CHDP health assessment. Therefore, CHDP Program will not reimburse for its use.

**See CHDP Provider Information Notice 03-23 and CHDP Provider Information Notice 03-25 November 14, 2003. Program Letter:

Qualifications of Personnel Performing an Audiometric Screening

- All persons administering a pure tone audiometric screening for the CHDP health assessment on children age three to six years using the Audiometric Screening and Play Audiometry method and on children age seven to twenty years using the traditional (hand raising) method must have completed a training course in Audiometric Screening and Play Audiometry and receive a certificate from their local CHDP program. Only those persons who complete the training and earn a certificate are qualified to conduct audiometric screening.

  - Play Audiometry method is the preferred method to administer an individualized pure tone air conduction audiometric screening test to children age three to six years immediately upon audiometric screening training certification.

- If a screener has not administered a hearing screening test within a year of their training course, the screener must repeat the training.
- Certification for Audiometric Screening and Play Audiometry is valid for four years. Recertification is required any time prior to the fourth year.

Guidelines for Audiometric Testing:

- For children 3 years and older use a pure tone audiometer to conduct hearing screening tests. The pure tone audiometer must meet or exceed specifications for type 4 audiometers as defined by the American National Standards Institute (ANSI) S3.6-1996 (revision of S2.6-1989). Each audiometer must be calibrated annually, be powered by alternation current (AC) as required for their accuracy and long life. The pure tone audiometer must have the minimum ability to:

  - Produce intensities between 0 to 80 dB.
  - Produce frequencies at 1000, 2000, and 4000 Hz with 3000 Hz being optional.
  - Have a headset with right and left earphones.
  - Be operated manually.

- When testing by air conduction, cover both ears with an earphone and cushion ANSI S3.6 2010.
- Do not use speech materials for the testing procedure because these materials fail to identify individuals with hearing in the frequency range above 500 Hz.
- It is also recommended, but not required, that the audiometer include the capacity to produce a pulse tone. If the audiometer does not have a pulsed tone option, create a pulse manually by pushing the tone control button multiple times.
- CHDP providers are responsible to secure non-colored blocks and non-noise producing basket as instructed at the Audiometric Screening and Play Audiometric Training.
- Test the audiometer each day prior to use to determine if it is working properly. A person with normal hearing should do this. Listen to the sounds from each earphone. If unwanted sounds or interruptions occur (e.g. crackling, static, buzzing, etc.) do not use the audiometer. Instead, arrange for the audiometer to be serviced.
- Assess the testing room for noise level prior to the start of testing. To ensure the testing room is quiet enough to perform the hearing screening, a person with

normal hearing should put the earphones on and be able to hear each frequency (1000-4000 Hz) at 15 decibels.

- Perform an electroacoustic calibration check of an audiometer at least every 12 months or more frequently, if indicated. If the audiometer fails to meet any of the ANSI S3.6 2010, provide for electroacoustic adjustments so that all standards are met before using the audiometer for screening.
- Keep a calibration chart or sticker with the audiometer showing proof of performance.
- Clean earphones with non-alcoholic wipes in between screening each child.
- Earphones are not interchangeable with other audiometers. Earphones are calibrated with the specific audiometer.

CONSIDERATIONS FOR REFERRAL TREATMENT AND/OR FOLLOW-UP

- Repeat an audiometric screening when the pathology causing an initial failure of the screening has resolved.

- Refer children (3 years and older) who fail to respond to any frequency on two screenings separated by an interval of at least six weeks after the initial screening to an audiologist or California Children Services (CCS) See section for "California Children Services."

- Refer to an audiologist when children with special health care needs cannot be screened using standard testing procedures.

Table 1. RISK INDICATORS ASSOCIATED WITH PERMANENT CONGENITAL, DELAYED-ONSET, OR PROGRESSIVE HEARING LOSS IN CHILDHOOD [4]

Age	Risk Indicators
For use with neonates (birth through age 28 days) when universal screening is not available.	Risk indicators that are marked with a "§" are of greater concern for delayed-onset hearing loss. 1. Caregiver concern§ regarding hearing, speech, language, or developmental delay. 2. Family history§ of permanent childhood hearing loss. 3. Neonatal intensive care of more than 5 days or any of the following regardless of length of stay: ECMO,§ assisted ventilation, exposure to ototoxic medications (gentamycin and tobramycin) or loop diuretics

	(furosemide/Lasix), and hyperbilirubinemia that requires exchange transfusion 4. In utero infections, such as CMV,§ herpes, rubella, syphilis, and toxoplasmosis. 5. Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies. 6. Physical findings, such as white forelock, that are associated with a syndrome known to include a sensorineural or permanent conductive hearing loss 7. Syndromes associated with hearing loss or progressive or late-onset hearing loss, § such as neurofibromatosis, osteopetrosis, and Usher syndrome other frequently identified syndromes include Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson. 8. Neurodegenerative disorders,§ such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich ataxia and Charcot-Marie-Tooth syndrome 9. Culture-positive postnatal infections associated with sensorineural hearing loss, § including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis. 10. Head trauma, especially basal skull/temporal bone fracture§ that requires hospitalization. 11. Chemotherapy§
For use with infants (age 29 days through 2 years) when certain health conditions develop that require rescreening.	Parent/caregiver concern regarding hearing, speech, language, and/or developmental delay. 2. Bacterial meningitis and other infections associated with sensorineural hearing loss. 3. Head trauma associated with loss of consciousness or skull fracture. 4. Stigmata or other findings associated with a syndrome known to include a sensorineural and/or conductive hearing loss. 5. Ototoxic medications, including but not limited to chemotherapeutic agents or aminoglycosides, used in multiple courses or in

	combination with loop diuretics. 6. Recurrent or persistent otitis media with effusion for at least three months.
For use with infants (age 29 days through three years) who require periodic monitoring of hearing. Some newborns and infants may pass initial hearing screening but require periodic monitoring of hearing to detect delayed-onset sensorineural and/or conductive hearing loss. Infants with these indicators require hearing evaluation at least every six months until age three years and at appropriate intervals thereafter.	**. Indicators associated with delayed-onset <u>sensorineural</u> hearing loss include:** • Family history of hereditary childhood hearing loss. • In utero infection, such as cytomegalovirus, rubella, syphilis, herpes, or toxoplasmosis. • Neurofibromatosis Type II and neurodegenerative disorders. **2. Indicators associated with <u>conductive</u> hearing loss include:** • Recurrent or persistent otitis media with effusion. • Anatomic deformities and other disorders that affect eustachian tube function. • Neurodegenerative disorders.

Source: JOINT COMMITTEE ON INFANT HEARING *Position Statement 2007*

Infant Diagnostic Hearing Evaluation

The diagnostic audiologic evaluation of an infant should include both developmentally appropriate behavioral measures, objective physiologic threshold measures using frequency specific (tonal/toneburst) stimuli and a measure of middle ear function.

Source: California Department of Health Care Services, Children's Medical Services Branch, California Children's Services Program.

Guidelines for Audiometric Testing for Children Over Six Years of Age:

- Use a pure tone audiometer to conduct hearing screening tests. The pure tone audiometer must meet or exceed specifications for type 4 audiometers as defined by the American National Standards Institute (ANSI) S3.6-1996 (revision of S2.6-1989). Each audiometer must be calibrated annually, be powered by alternation current (AC) as required for their accuracy and long life. The pure tone audiometer must have the minimum ability to:

    - Produce intensities between 0 to 80 dB.

- Produce frequencies at 1000, 2000, and 4000 Hz with 3000 Hz being optional.
- Have a headset with right and left earphones.
- Be operated manually.

Screening Method:

- Patient will respond to the “beep” by raising their hand***.

***Refer to page 3, “Guidelines for Audiometric Testing” for further instructions.

Table 2. BEHAVIORS INDICATING POSSIBLE HEARING LOSS OR SPEECH AND LANGUAGE DELAY [4]

Age	Hearing, Speech, and Language	Auditory Test
Birth-3 months	No startle to loud sounds. Does not awaken to sounds. Does not blink or widens eyes in response (reflex) to noises.	OAE's Automated ABR
3-4 months	Does not quiet to mother's voice. Does not stop playing to listen to new sounds. Does not look for source of new sounds not in sight.	COR or VRA
6-9 months	Does not enjoy musical toys. Does not coo and gurgle with inflection. Does not say "mama"	COR or VRA
12-15 months	Does not respond to his or her name and "no" Does not follow simple requests. Does not use expressive vocabulary of 3 to 5 words. Does not imitate some sounds.	COR or VRA
18 to 24 months	Does not know body parts Does not use expressive vocabulary2-word phrases (minimum of 20 to 50 words 50% of speech intelligible to strangers.	COR or VRA
3 years	Does not use expressive vocabulary 4-5 word sentences (approximately 500 words) Speech is not 80% intelligible to strangers Does not understand some verbs	COR or VRA Play Audiometry
	Cannot carry on a simple conversation.	COR or VRA Play Audiometry

4 years	**< 1000 words. Says less than four word complex sentences. < 90 percent understandable.**	
5 years	**Has delayed speech and language.**	**COR or VRA Play Audiometry**

CALIBRATION SERVICES

It is recommended that audiometers be purchased through agencies that provide readily available repair and calibration services. The following is a partial list of resources specializing in audiometric equipment that are located throughout California.

PURETONE ADIOMETERS, SALES, REPAIRS, AND CALIBRATION SERVICES

RESOURCES	PHONE NUMBERS	WEBSITE	CONTACTS
STATEWIDE			
AMBCO ELECTRONIC, INC. 15052 Redhill Avenue, Suite D Tustin, CA 92780	800-345-1079 Tel: 714-259-7930 Fax: 714-259-1688	http://www.ambco.com/	Aida Xiong
NORTHERN CALIFORNIA			
AUDIOLOGY SYSTEMS INC. (ASI) 4615 Glass Court, Suite D Modesto, CA 95356	800-227-1130 Tel: 209-549-9308 Fax: 209-549-9775	www.audiologysystems.com	John Brewer
MEDI 4814 East Second Street Benecia, CA 94510	800-736-6334 Tel:707-746-6334 Fax:707-746-6374	http://www.medi.cc/	Phil Korbas Donna Ward
HEALTH CARE INSTRUMENT (HCI) AUDIOMETRICS 2122 College Ave Modesto, CA 95350-3044	800-653-3277 Tel: 209-491-0420 Fax: 209-491-0413	http://www.manta.com/c/mmlk67t/health-care-instruments-inc	Dan Hatch
SOUTHERN CALIFORNIA			
HEALTH CARE INSTRUMENT (HCI) AUDIOMETRICS 909 S. Tremont Street Oceanside, CA 92054	800-873-1222 Tel: 760-435-1034 Fax:760-435-1334	http://www.audiometrics.net/	Jeff Pommier
ELECTRO-MEDICAL INSTRUMENTATION 8475 Arcadia Blvd, Suite 104 Buena Park, CA 90621	800-273-3340 Tel:714-690-2970 Fax:714-690-2921	No website	Jack Beard Robert Stewart
SAN-VAL ELECTRONIC LAB (Calibration Service Only) 215 Jeffries Avenue Monrovia, CA 91016	Tel: 626-574-5572 Fax: 626-574-5572	No website	Phillip A. Feola
HEAR & C Hearing Equipment, Audiometer Repairs &Calibration 14528 Jalisco Road La Mirada, CA 90638	Tel: 714-739-8121 Fax:714-752-6428 Cell:562-743-3997	daniel@hearandc.com	Daniel Gomez
AUDIOLOGY SYSTEMS INC. (ASI) 16037 Valley View Ave, Santa Fe Springs, CA 90670	800-982-7762 Tel: 562-921-1427		Tammy Dinan

Resources:

- American Academy of Pediatrics. (2014). Bright Futures American Academy of Pediatrics.
- Moeller M. Early intervention and language development in children who are deaf and hard of hearing. Pediatrics. 2000 Sep: 106(3):e43.
- Infant Audiology Assessment Guidelines, Department of Health Care Services, July 2010.

References:

[1] Healthy People 2020: Hearing and Other Sensory or Communication Disorders.
[2] Joint Committee on Infant Hearing. AMERICAN ACADEMY OF PEDIATRICS: Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs.
[3] Bright Futures/AAP Periodicity Schedule.
[4] American Academy of Pediatrics: Hearing Assessment in Infants and Children: Recommendations Beyond Neonatal Screening, Table 2 and Table 3.

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