



Keeping Connecticut Healthy

Commissioner J. Robert Galvin, MD, MPH, MBA

***EARLY HEARING DETECTION  
&  
INTERVENTION PROGRAM***

**Guidelines For Infant  
Hearing Screening**

Revised 2008

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Connecticut Department of Public Health  
Family Health Section  
Early Hearing Detection & Intervention

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## PREFACE

The Connecticut Department of Public Health Early Hearing Detection and Intervention Program developed the following guidelines in an effort to support a comprehensive and effective statewide mechanism to screen all newborns for hearing acuity, to provide prompt audiological follow-up testing for those infants who do not pass the newborn screen and to provide timely and appropriate early intervention services for those infants who are diagnosed with a hearing loss.

This document should serve as a guide for birth facilities and pediatric healthcare providers in the development and implementation of each respective Universal Newborn Hearing Screening Program. These guidelines are not intended to supersede individual hospital policy or the independent clinical assessment and judgment of physicians and medical providers in any individual case.

*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. Such delays may result in lower educational and employment levels in adulthood. 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 healthcare and education professionals with expertise in hearing loss and deafness in infants and young children. Regardless of previous hearing-screening outcomes, all infants with or without risk factors should receive ongoing surveillance of communicative development beginning at 2 months of age during well-child visits in the medical home. EHDI systems should guarantee seamless transitions for infants and their families through this process.*

*~Joint Committee on Infant Hearing 2007 Position Statement*

The Connecticut Department of Public Health hopes that you find this document useful. Questions or comments related to these guidelines should be directed to:

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## **BACKGROUND**

The Joint Committee on Infant Hearing was established in late 1969 and was composed of representatives from audiology, otolaryngology, pediatrics, and nursing. Throughout its over 30-year history, the Committee explored the complexities of hearing loss and its effect on a child's development, seeking to find newer and better methods to identify and serve the infants and their families. Today, the Joint Committee is comprised of representatives from the American Academy of Pediatrics, the American Academy of Otolaryngology and Head and Neck Surgery, the American Speech Language Hearing Association, the American Academy of Audiology, the Council on Education of the Deaf, and Directors of Speech and Hearing Programs in State Health and Welfare Agencies.

The Committee's primary activity has been publication of position statements summarizing the state of the science and art in infant hearing, and recommending the preferred practice in early identification and appropriate intervention of newborns and infants at risk for or with hearing loss.

In 1994, the JCIH endorsed universal detection of hearing loss in newborns and infants and stated that all infants with hearing loss be identified before 3 months of age and receive intervention by 6 months. With the support of the Health Resources Service Administration, Maternal and Child Health Bureau and Centers for Disease Control and Prevention, and other dedicated groups and individuals, universal screening gained momentum across the United States and all states now have newborn hearing screening programs in place.

The current JCIH Position Statement was released in 2007 after years of meetings, research, revision and hard work by many dedicated professionals and has been widely accepted as the "Gold Standard" of Universal Newborn Hearing Screening programs today.

The Connecticut Department of Public Health's Early Hearing Detection and Intervention (EHDI) Program and the Connecticut EHDI Advisory Board fully embrace early hearing detection and intervention for infants with hearing loss through integrated, interdisciplinary community, state, and federal systems of universal newborn hearing screening, evaluation, and family-centered intervention.

This document is designed to serve as a guide to assist birth facilities and other healthcare providers in the provision of services for newborns from screening, through diagnostic testing and enrollment into early intervention and is a revised version of the original *Connecticut Universal Hearing Screening Guidelines* that were distributed to Connecticut birth hospitals in 2000. The recommendations from the JCIH 2007 Position Statement were incorporated throughout this document.

## **OVERVIEW OF THE CT EARLY HEARING DETECTION AND INTERVENTION PROGRAM**

Connecticut General Statutes, Section 19a-59 requires each institution that provides childbirth services, as defined in section 19a-490, to include a universal newborn hearing screening program as part of its standard of care and to establish a mechanism for compliance review. The provisions of this subsection do not apply to any infant whose parent/responsible party objects to hearing screening as being in conflict with their religious tenets and practice (*see Appendix A, CT legislation*).

The Connecticut EHDI Program set benchmarks for birth facility newborn hearing screening programs, and monitors the programs and provides technical assistance when programs fall below the desired benchmarks. Birth facilities should strive to achieve the following:

- Screen 98% of all newborns prior to hospital discharge.
- Document the screening date, results and method on the nursery log and in the infant's medical record.
- The percentage of infants who do not pass the hearing screening at birth and are referred for audiological follow-up should not exceed 4%.

- Hospitals should offer an outpatient rescreen if an infant is missed in one or both ears, prior to discharge.
- Physicians should be notified of all screening results, including those of infants who were missed or whose parents refused the screening.
- Newborn hearing screening should be offered to infants born at home, or those born out-of-state and transferred to a CT birth facility.
- Physicians and hospitals are responsible for making the referral to a diagnostic audiologist following a referral from the screening at birth.
- It is important to obtain an appropriate diagnostic evaluation prior to 3 months of age in order to decrease the need for sedation of the infant, decrease parental anxiety, and identify the hearing loss within the recommended time frame.
- Following confirmation of hearing loss the audiologist should notify the Connecticut Early Hearing Detection and Intervention Program of the diagnostic results. The Connecticut Early Hearing Detection and Intervention Program will provide support and care coordination services to assure the family receives early intervention services as early as possible or by 6 months of age.

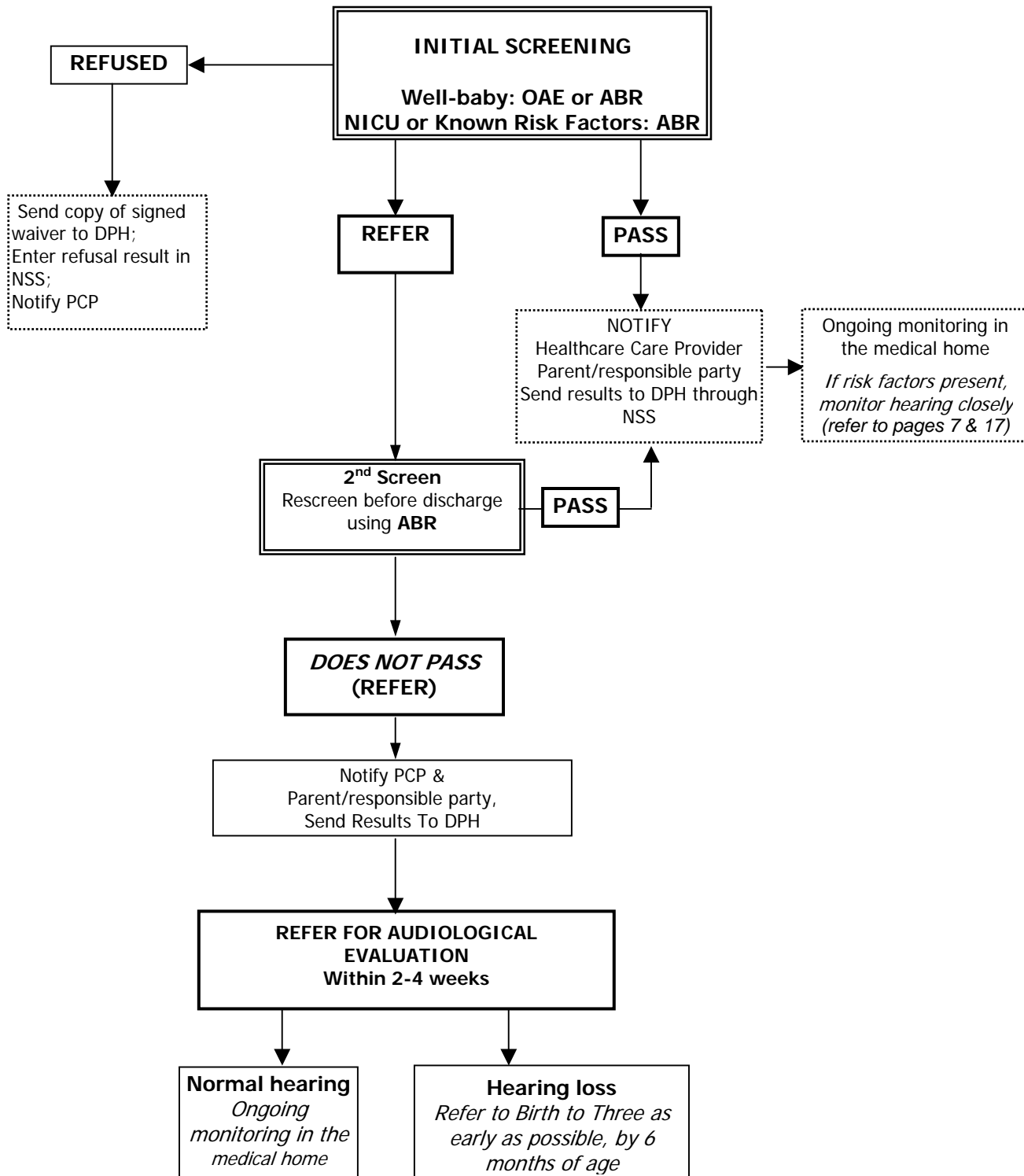
#### **PROGRAM DEVELOPMENT**

Since the Early Hearing Detection & Intervention program's inception in 2000, the CT Department of Public Health has assisted birth facilities in the development and implementation of Universal Hearing Screening Programs (UNHS) by drafting and disseminating program guidelines, through education and conferences and by providing technical assistance, consultation and support as needed.

Over the years, the DPH has assisted birth facilities to upgrade and/or standardize their screening equipment, identified diagnostic testing centers throughout the state, developed a web-based reporting system for the hospital's submission of screening data, conducted annual conferences and trainings for hospital staff and audiologists, developed a web-based training for pediatric healthcare providers titled, "*Newborn Screening in Connecticut*", standardized equipment in the diagnostic testing centers and developed a multitude of printed educational materials for families and healthcare providers.

Statewide hearing screening of all newborns began on July 1, 2000 and since it began, CT has consistently surpassed the national goals of screening by 1 month, diagnosis by 3 months, and enrollment in early intervention by 6 months of age.

### Early Hearing Detection & Intervention Program Service Delivery Flow Chart



## **ROLES AND RESPONSIBILITIES**

The success of the Connecticut EHDI program depends on families working in partnership with healthcare professionals as a well-coordinated team. Each team member should clearly understand his or her role and responsibilities. Essential team members are the birth hospitals, families, medical home pediatricians or pediatric healthcare providers, audiologists, otolaryngologists, geneticists, speech-language pathologists, educators of children who are deaf or hard of hearing, and early intervention professionals.

The birth hospital is a key member of the EHDI team! The hospital staff has the primary responsibility of assuring that all infants are screened prior to discharge. Additionally, in collaboration with the state EHDI coordinator, the hospital staff should ensure that parents and pediatric healthcare professionals receive and understand the hearing-screening results, that parents are provided with appropriate follow-up and resource information, and that each infant is linked to a medical home. The hospital ensures that hearing-screening information is transmitted promptly to the medical home and appropriate data are submitted to the state EHDI coordinator.

## **POLICIES AND PROCEDURES**

Each birth facility will develop written policies and procedures related to the newborn hearing screening program, including the necessary screener training, the screening process, data management, quality improvement and the testing of equipment. A copy of the policy and procedure manual shall be located in close proximity to the screening site, and be readily accessible to staff involved with newborn screening. The policies and procedures must be reviewed at least annually, or as per facility policy, and should include, but not be limited to the following:

- Identify the title of the staff person(s) responsible for the training of personnel responsible for conducting the hearing screens.
- Include the contact information of the facility staff person who provides administrative oversight of the newborn hearing screening program.
- Document all job descriptions, qualifications, and roles and responsibilities for each newborn hearing screening position (e.g. audiologist, nurse, patient care assistant, rehabilitation aide, patient care technician, etc.), as well as orientation, minimum length of training, level of supervision and continuing education plans. Specific guidelines for periodic supervised performance appraisals should be included.
- Identify the name, model or type of hearing screening equipment used by the facility including the manufacturer's name, address and telephone number. Care, use, trouble-shooting, replacement of parts, maintenance and servicing of the screening equipment should be included.
- Identify the optimal testing environment as well as the desired condition or state of the newborn during testing.
- Identify the number of weeks of gestation at which infants will be screened.
- Include a mechanism to conduct a visual assessment of the newborn's skin for conditions that might necessitate the need for an alternate testing device.
- Identify ototoxic and other medications, which may interfere with testing. Include a plan to conduct the hearing screening after completion of the course of such medications.
- Identify safety measures and infection control practices.



- Identify risk factors associated with hearing loss that may necessitate the need for ongoing, periodic audiological evaluation and establish a mechanism to inform the parent of the risk. **(see Appendix B, Risk Indicators).**
- The policies must include a mechanism to identify the name, address and telephone number of the newborn's pediatric healthcare care provider who will follow the infant after discharge.
- Describe the method used to document and track all births, including the method, date, time and ear-specific results of all hearing screens conducted.
- Describe the method of communication to notify the infant's family and pediatric healthcare provider of all hearing screening results.
- Describe the screening method for the first screening. Otoacoustic emissions (OAE) or auditory brainstem response (ABR) are acceptable methods for the first screening for infants who are not at risk.
- Describe the screening method for the second screen. ABR should be the screening method for any NICU infant, any infant at risk, and or for any infant who did not pass the first screen and requires a second screen.
- Describe the mechanism to document all infants referred for further diagnostic testing, including the name, address and telephone number of the audiologist to whom the infant was referred.
- Describe the process to document a refused screening, including signing of the refusal waiver and DPH notification.
- Identify the title of the staff person responsible for notifying the parent/responsible party of a "refer" screening result (e.g. the primary care provider, audiologist, technician or nurse) and identify the method of such notification. Results should be relayed to the parent/responsible party face-to-face, in a private location, in a language that they understand and in a culturally sensitive manner with an appropriate level of concern.
- Each birthing facility should ensure that appropriate backup testing equipment be readily available in the event of equipment malfunction and that the equipment be readily accessible to the screening staff at all times.

#### **PERSONNEL AND TRAINING**

Staff training should include the purpose and scope of the birthing facility's newborn hearing screening program, as well as a review of all policies related to the newborn hearing screening program. The training should:

- Identify the roles, responsibilities, assigned tasks, and scope of practice and limitations of the duties of the screener.
- Be conducted by trainers who have had experience in newborn hearing screening and should be hands-on and competency based.

- Include a review of nursery policies including, but not limited to, infection control, safety, and patient confidentiality.
- Not be limited to manufacturer representative's demonstrations. It should include supervised, return demonstrations of the screening process to evaluate the effectiveness of the training program and the competency of each individual screener. The length of training may be individualized.
- Include instruction on safe baby handling techniques.
- Include training on how to recognize typical versus atypical neonatal behaviors during the hearing screening process.
- Be readily accessible to all staff involved with newborn screening.
- Include education on the use, care, maintenance, routine function checks, and troubleshooting of the testing equipment used in performing the assigned tasks.
- Include the method of notifying the primary care provider and parent/responsible party of screening results.
- Include the mechanism for transmission of the necessary data elements to the DPH.
- Include the process for referring an infant to a pediatric audiologist, when indicated.

### **RECOMMENDED SCREENING TECHNOLOGIES**

Each birthing facility will be responsible for selecting and securing appropriate hearing screening equipment according to standards. Currently there are two physiologic measures used to objectively screen hearing acuity in newborns: Auditory Brainstem Response (ABR) and Otoacoustic Emissions (OAE).

Both OAE and ABR technologies provide noninvasive recordings of physiologic activity underlying normal auditory function, both are easily performed in neonates and infants, and both have been successfully used in universal screening of newborns. It is important to note that there are important differences between the 2 methods.

Although both ABR and OAE screening tests have a high sensitivity and specificity, both tests can miss some mild hearing losses or unusual configurations. It is important to remember that all infants with risk factors, including but not limited to genetic factors, asymptomatic cytomegalovirus (CMV), or a family history, are at risk for late onset hearing loss.

Both OAE and ABR screening technologies can be used to detect sensory (cochlear) hearing loss; however, both technologies may be affected by outer or middle-ear dysfunction. Consequently, transient conditions of the outer and middle ear may result in a hearing screening referral in the presence of normal cochlear and/or neural function.

**Otoacoustic Emissions (OAE)** measures reflect the status of the peripheral auditory system extending to the cochlear outer hair cells. A soft click is presented through a small microphone placed in the baby's ear canal, and measures the echo that is returned from the baby's ear. Trained hospital personnel such as audiologists, nurses, or technicians can perform this procedure if automated OAE equipment is used.

There are two types of automated OAE technologies: Transient Evoked Otoacoustic Emissions (TEOAE) and Distortion Product Otoacoustic Emissions (a DPOAE).

Both TEOAE and DPOAE may miss a small percentage of hearing losses. The refer rates at discharge for newborns screened with OAE average 7-8%.

**Automated Auditory Brainstem Response (AABR)** measurements are obtained from electrodes placed on the infant's body that record neural activity generated in the cochlea, auditory nerve, and brainstem in response to acoustic stimuli delivered via an earpiece. AABR measurements reflect the status of the peripheral auditory system, the eighth nerve, and the brainstem auditory pathway.

AABR interpretation is fully automated and elicits a PASS/REFER response and therefore, does not require interpretation on the part of the screener. Consequently the AABR allows for a variety of trained hospital personnel to perform the screen such as nurses, technicians, support staff, or volunteers.

AABR may miss a small percentage of hearing losses, such as a high frequency loss greater than 4000Hz. The refer rates at discharge for newborns screened with ABR are typically less than 4 percent.

Each birthing facility should establish baseline Pass/Refer rates for all screening equipment used and should establish policies and procedures that include the care, use and maintenance of the equipment.

Calibration, service and maintenance of the testing equipment should be followed as directed by the manufacturer. Maintenance and service records should be documented and maintained as per facility policy.

### **RISK FACTORS FOR HEARING LOSS**

As many as 54% of infants who passed newborn hearing screening and were later identified with hearing loss, had one or more risk factors. Although an infant may "Pass" the initial hearing screen, the birth facility should assess the infant for other risk factors, which may precipitate the need for periodic audiological monitoring.

The JCIH Year 2007 *Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs* has outlined those conditions that put infants at greater risk for late onset/progressive or progressive hearing loss. These indicators include:

- **Caregiver concern**\* regarding hearing, speech, language or developmental delay
- **Family history**\* of Permanent Congenital Hearing Loss (PCHL)
- **Neonatal intensive care >5 days**, including any of the following:  
Extracorporeal membrane oxygenation (ECMO)\*, Assisted ventilation, Exposure to ototoxic medications (Gentamycin and Tobramycin) in combination with loop diuretics (Furosemide/Lasix)
- **Hyperbilirubinemia requiring exchange transfusion**
- **In-utero infections** such as cytomegalovirus\*, herpes, rubella, syphilis, and toxoplasmosis
- **Craniofacial anomalies** including those involving the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies
- **Physical findings** such as white forelock, associated with a syndrome known to include a sensorineural or permanent conductive hearing loss
- **Syndromes** associated with hearing loss or progressive or late onset hearing loss\* such as neurofibromatosis, osteopetrosis, and Usher's syndrome, Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson
- **Neurodegenerative disorders**\* such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich's ataxia and Charcot-Marie-Tooth syndrome
- **Culture positive** postnatal infections associated with sensorineural hearing loss\* Confirmed bacterial and viral (especially herpes viruses and varicella) meningitis
- **Head trauma**, especially basal skull/temporal bone fracture\* requiring hospitalization
- **Chemotherapy**\*

\* Risk indicators marked with an asterisk are of greater concern for delayed onset hearing loss.

Source: JCIH Year 2007 *Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs*

The CT EHDI Advisory Board has recommended that infants who Pass the hearing screening at birth, and have one or more risk factors as outlined by the JCIH, receive audiological monitoring every six months up until age three.

The Connecticut EHDI Program collects risk factor data from the birth facilities in the Newborn Screening System, on the Hearing panel. The birth facility has the responsibility of **assessing all newborns for risk factors**, and for reporting any recognized risk factors to the DPH through the Newborn Screening System.

The birth facility should notify the newborn's pediatric healthcare provider of any identified risk factors associated with the potential for late onset/progressive or progressive hearing loss that warrants the need for ongoing audiological evaluations.

Any recommendations for risk factor monitoring and audiological follow-up should be documented on the discharge summary and be explained to the parent/responsible party prior to discharge.

### **TIMING OF THE HEARING SCREEN**

Infants should be screened prior to discharge, leaving ample time to conduct a 2<sup>nd</sup> screening if the baby does not pass the 1st screen.

For premature infants, it is recommended that the infant be screened at **34 weeks corrected gestational age** or greater. If a newborn is receiving ototoxic and other medications that may interfere with testing, the hearing screen should be conducted after the completion of the course of the medications.

Birth facilities should take caution to **avoid over-screening** newborns! Although there may be factors that require the screen to be repeated, it is not recommended that babies be screened more than three times. The goal of the screening is NOT to get every baby to Pass, but rather to identify those that require further audiological evaluation. Over-screening increases the likelihood that you will get a false-negative result and that a child with a hearing loss may not be identified.

### **TESTING ENVIRONMENT**

The facility should provide an area conducive to hearing testing that is free from excessive light ambient noise and/or other distractions that may impair the testing. It is recommended that signage be posted to indicate that a hearing screen is in progress. Newborns who have been discharged and return to the birthing facility for the initial or a repeat hearing screen, shall be screened in an area that is separate from the newborn nursery, in accordance with hospital infection control policies.

### **SCREENING PROTOCOLS IN THE WELL-BABY NURSERY**

The parent/responsible party should be given the hearing screening brochure titled, "*Listen Up!*" prior to the screening and staff should be available to answer any questions that they may have about the procedure. The parent should be permitted to observe the screening, if they so request.

The equipment used for the initial screen in the well-baby nursery varies from hospital to hospital. Some facilities utilize OAE equipment and others only use ABR. Use of either technology in the well-baby nursery will detect peripheral (conductive and sensory) hearing loss of 40 dB or greater. When automated ABR is used as the single screening technology, neural auditory disorders can also be detected.

Any infant that does not pass the first hearing screen, regardless of the method, must have a repeat screen conducted before discharge using ABR equipment.

**Under no circumstances should an infant who does not pass the ABR screen, be rescreened by OAE testing and "Passed." Until further audiological testing is conducted such infants are presumed to be at risk of having a subsequent diagnosis of auditory neuropathy/dyssynchrony.**

### **SCREENING PROTOCOLS IN THE NICU**

A neonatal intensive care unit (NICU) is defined as a unit in a facility in which a neonatologist provides primary care for the infant. Newborn units are divided into 3 categories:

- Level I: basic care, well-baby nurseries
- Level II: specialty care by a neonatologist for infants at moderate risk of serious complications
- Level III: a unit that provides both specialty and subspecialty care including the provision of life support (mechanical ventilation)

The DPH recommends ABR technology as the only appropriate screening technique for use in the NICU. For infants who do not pass automated ABR testing in the NICU, referral should be made directly to an audiologist for diagnostic testing and, when indicated, a comprehensive evaluation, including diagnostic ABR testing, rather than a rescreen.

### **SCREENING PROTOCOLS FOR READMISSION**

The JCIH Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs recommends that readmissions in the first month of life when there are conditions associated with potential hearing loss (eg, hyperbilirubinemia that requires exchange transfusion or culture-positive sepsis), an ABR screening should be performed before discharge. The results should be submitted to the DPH on the “back-up” paper reporting form.

### **INTERPRETING THE RESULTS**

#### **When The Screen Result Is A “Pass”**

Infants who “Pass” the first hearing screen, or any subsequent screenings can be assumed to have adequate hearing function for speech/language development, at that point in time. It is important to note that a “Pass” result on the newborn screen does not guarantee normal hearing for the rest of the child’s life. Infants and children can “Pass” the hearing screen at birth and develop a delayed onset or progressive hearing loss at a later time.

Therefore, primary care providers have the responsibility for surveillance of all infants to monitor for delayed onset or progressive hearing loss and certainly, parental concern at any age, should prompt a referral for an audiological evaluation.

- If the infant passes the hearing screen at birth and has one or more risk factors present, the child should be referred for follow-up audiological monitoring. The CT EHDI Advisory Board recommends that infants with one or more risk factors have an audiological evaluation **every six months**, up until age three.
- The infant’s parent/responsible party will be notified of the hearing screen result and of the recommendation for follow-up audiological monitoring, both verbally and in writing, according to facility policy.
- The newborn’s pediatric healthcare provider will be notified of the screening results and any identified risk factors associated with the potential for hearing impairment, which may warrant the need for audiological follow-up.
- Any recommendations for audiological follow-up should be documented on the discharge summary and be explained to the parent/responsible party, prior to discharge.

- The facility will document that the infant has been screened and will record the results on the nursery log, and in the infant's medical record as well as report the results electronically to DPH through the Newborn Screening System (**see Appendix X, Electronic Reporting Guidelines**).
- If the infant passed the hearing screen at birth and has NO risk factors, the child should receive ongoing surveillance of communicative development beginning at 2 months of age, during well-child visits in the medical home.

### **When The Baby “Does Not Pass” The Screen**

Any infant who does not pass the first hearing screening in one or both ears, must have, at a minimum, a second hearing screening performed prior to discharge. The second, or repeat screening, should be conducted using ABR equipment.

- If the baby does not pass the 2<sup>nd</sup> ABR screen, the child should be referred to one of CT's Diagnostic Testing Centers for a rescreening, and, when indicated, comprehensive evaluation, including diagnostic ABR testing. For rescreening, a complete screening on both ears is recommended, even if only one ear failed the initial screening.
- The birth hospital should ensure that parents and primary healthcare professionals receive and understand the hearing screening results, that parents are provided with appropriate follow-up and resource information, and that each infant is linked to a medical home.
- The birth facility should ensure that hearing screening information is transmitted promptly to the medical home and appropriate data are submitted to the state EHDI coordinator.

Note: Infants in the well-baby nursery who do not pass an automated ABR screen should NOT be rescreened by OAE testing and “passed”, because they are presumed to be at risk of having a subsequent diagnosis of auditory neuropathy/dyssynchrony.

### **CONVEYING SCREENING RESULTS**

Screening results should be conveyed immediately to families so that they understand the outcome and the importance of follow-up when indicated and are allowed ample time to ask any questions. Communication with parents should be face-to-face, confidential and presented in a caring and sensitive manner. The person conveying the results should consider the following:

- The parent of an infant who does not pass the hearing screen should be given the brochure titled, “*A Parent's Guide to Diagnostic Hearing Testing of Infants*”. The brochure is distributed to birth facilities by the DPH and is available in both English and Spanish.
- Information conveyed to families should be accurate, at an appropriate reading level and in a language they are able to understand.
- Parents should be told in a culturally sensitive and understandable manner that their infant did not pass the hearing screen and informed of the importance of prompt audiological follow-up testing.
- An appointment should be made for follow-up testing before discharge, if possible (**see Appendix C, Diagnostic Testing Locations**).

- It is recommended that the birthing facility NOT use the word “Fail,” when an infant did not pass the hearing screen. It is suggested that the term “Refer” be used.
- The birthing facility will notify the child’s primary healthcare provider of the hearing screening results (pass, did not pass, refused, or missed), as documented in the hospital medical chart.
- The screening result should be entered into the electronic Newborn Screening System (NSS) reporting system, and the data saved and committed. Refer to the *Electronic Reporting Guidelines*, which can be found in the first section of this manual.
- The need for audiological follow-up should be documented on the discharge summary. If the facility attaches the hearing screen sticker on the discharge summary, they should supplement it with language that explains that a “Refer” result indicates the need for follow-up audiological testing.
- All birthing facilities should be prepared to link the parent/responsible party of those infants who do not pass the screen to providers for community-based support and education, as needed.

#### **DOCUMENTATION OF THE RESULTS**

In addition to submitting the newborn’s hearing screen results to the DPH, the facility should document the screening results in the infant’s medical record, according to facility policy. It is recommended that the documentation include:

- Screener’s name
- Screening date(s)
- Type of equipment used
- Ear specific results
- Contact information of the Diagnostic Audiology Center that the infant was referred to
- Audiology appointment date/time if known.

Referral information should also be documented in the discharge planning instructions. It is strongly suggested that the infant’s Accession Number and hearing screening results be documented in the nursery log book, along with other pertinent birth information, so that it is readily accessible and can provide a quick view of infants who may be in need of a hearing screen before discharge.

#### **DATA SUBMISSION TO DPH**

An electronic record should be created in the *Newborn Screening System* for each live birth. The biographical data should be completed as soon as possible after birth, and prior to submission of the NBS Lab filter paper form to the DPH. The hearing screening panel should be completed and committed prior to infant discharge. Refer to the *Electronic Reporting Guidelines*, which can be found in the first section of this manual.

#### **MISSED SCREEN**

Connecticut birth facilities are required by State law to conduct a hearing screen on all newborns, as a “standard of care” (**see Appendix A, Hearing Screening Legislation**). Staff should understand that when a newborn is discharged without a hearing screen there is an estimated 1 in 1000 risk that the baby will have an undetected bilateral hearing loss.

- The birth facility should determine who will assume the initial responsibility for recall and screening a child who was discharged without the hearing screen.

- It is the responsibility of the primary care physician to know the hospital policies and procedures for recalling and rescreening infants who miss a screen.
- Screening should be performed by 1 month of age, as later ages require more time due to the infant's increased alertness and may even require sedation.
- The birth facility should notify the infant's pediatric healthcare provider that the baby was discharged without a hearing screen and inform the provider of any arrangements to recall the baby.
- The contact with the parent/responsible party and primary care provider should be documented in the infant's medical record.
- If the infant is recalled to the birth facility for the initial hearing screen, the screening should be conducted in an area that is separate from the newborn nursery, in accordance with hospital infection control policies.
- The hearing screening results should be submitted to the DPH through the NSS when conducted.
- If the infant does not return to the birth hospital for the hearing screening, the facility should report the result as "Not Tested" in the Newborn Screening System and submit the results to the DPH.

## **RIGHT OF REFUSAL**

It is the responsibility of the birth facility to assure that the hearing screening is conducted. Parents should understand that if a newborn is discharged without a hearing screen there is an estimated 1 in 1000 risk of the baby having an undetected bilateral hearing loss. Parents who refuse the hearing screening for their child should be counseled on the importance of early identification and encouraged to allow the hearing screen to be performed.

In accordance with the Connecticut General Statutes, Section 19a-59, a newborn's parent/responsible party has the right to oppose having the hearing screening conducted if it is in conflict with their religious tenets and practice. If a parent/responsible party refuses to allow the hearing screening to be conducted prior to discharge, they must sign the DPH Hearing Screening Refusal Waiver (**see Appendix D, Refusal Waiver**). The Hearing Screening Refusal Waiver can also be accessed electronically in the *Newborn Screening System* under *Forms* in the top toolbar.

- Open the child's electronic record.
- Go to the "Hearing" panel.
- Select the "Parent Refused Screening" check box located at the top of the page.
- Enter the refusal date.
- On the top tool bar, click on "Forms".
- Select "Hearing Waiver" and print out the document.

Refer to the *Electronic Reporting Guidelines*, in the first section of this manual for more information on refusals.

The birth facility staff should complete the refusal waiver and have the infant's parent/responsible party sign and date it. The infant's accession number should be included on the refusal waiver. This may be conducted by affixing the pre-printed bar code label used for laboratory screening directly on the waiver, or the number can be hand written on the form.

The original, signed waiver must be maintained as a permanent part of the infant's medical record. A copy of the signed waiver must be faxed to the state EHDI Program at **860 509-8132**.



The facility must notify the infant's pediatric healthcare provider of the refusal. The refusal and any parental counseling by staff should be documented in the infant's medical record.

### **ADOPTION OR FOSTER CARE**

Newborns that will be placed for adoption will have the hearing screening and any repeat screenings conducted prior to discharge. If a referral for diagnostic follow-up is indicated, the follow-up information will be given to the representative of the adoption agency at the time the newborn is discharged, as well as to the birthing facility social worker and/or discharge planner, as per facility policy.

- The name of the infant's primary care provider who will care for the infant after discharge should be obtained and recorded in the Newborn Screening System, if known.
- If the name of the physician that will follow the infant after discharge is unknown, the name, address and telephone number of the Adoption Agency will be recorded in place of the physician's information.

### **NON RESIDENT BIRTHS**

State legislation mandates that all birth hospitals implement a Newborn Hearing Screening Program as a "standard of care". This requires any infant born in a Connecticut birthing facility to have the hearing screen conducted, regardless of the state of residence and the child's screening information should be reported to DPH through the Newborn Screening System.

### **OUT OF STATE BIRTHS**

Infants that are born out of state, who are transferred to a Connecticut hospital should have a hearing screening conducted before discharge. The results can be sent to the DPH on the back-up, paper reporting form and DPH will notify the Hearing Screening Coordinator in the infant's state of birth that the hearing screen was conducted (*see Appendix E, Hearing Screening Reporting Form*).

### **TRANSFERS OUT OF STATE**

When a Connecticut-born infant is transferred to an out-of-state hospital, more than likely the hearing screen will not have been conducted prior to transfer due to the infant's medical condition. Since all states bordering CT have hearing screening programs, the hospital of transfer *should* conduct the hearing screening on the infant prior to discharge.

- The newborn's electronic record cannot be transferred to an out of state hospital.
- The birth facility should document any screenings that need to be conducted on the Inter-Agency transfer report that is sent to the hospital of transfer.
- The birth facility should inform the DPH EHDI Program that the infant was transferred out of state by completing the Hearing Screen Reporting Form (**Appendix E**) and faxing it to the DPH at 860 509-8132.
- DPH will contact the out-of-state hospital and will obtain the hearing screen results when completed.
- Alternatively, if the appropriate authorization from the child's parent/responsible party has been obtained, the facility of birth can contact the out-of-state hospital of transfer and confirm that the newborn hearing screening was conducted, then enter the screening results into the NSS.

***Remember, the NSS electronic record cannot be transferred to an out-of-state hospital and must remain at the facility of birth. Document all information related to the CT Newborn Screenings that need to be performed on the Inter-Agency Transfer Report and on the infant's Discharge Summary.***

## **IN-STATE TRANSFERS**

If a newborn is transferred to a Connecticut hospital and was not screened prior to discharge because of an acute medical condition or other factor, it is the responsibility of the hospital of birth to assure that the hearing screen is conducted.

The facility of birth should transfer the infant's NSS record electronically to the hospital of transfer and document any screenings that are needed on the discharge summary and *Inter-Agency Transfer Report*. (Refer to the *Connecticut Newborn Screening Program, Electronic Reporting Guidelines*).

## **REFERRAL TO THE AUDIOLOGIST**

The key to a positive outcome of any newborn hearing screening program is to connect the family and infant to the appropriate services. Any infant who does not pass the final hearing screen before discharge, should be referred to one of Connecticut's Diagnostic Testing Centers for audiological testing (**see Appendix C, Diagnostic Testing Locations**). Infants who are in need of diagnostic testing should be referred to audiology centers that have the personnel, equipment, training and skills to complete the procedures recommended by the CT EHDI Advisory Board (**see Appendix F, CT EHDI Advisory Board Best Practice Recommendations**). The timing and number of hearing re-evaluations for children with risk factors should be individual and customized depending on the relative likelihood of a subsequent delayed onset hearing loss.

- The birth facility should explain to the parent/responsible party the importance of taking the child for follow-up audiological testing.
- The birthing facility staff should provide the parent/responsible party with the referral information necessary for diagnostic evaluation.
- The DPH strongly recommends that the parent/responsible party be given the appointment for follow-up with a pediatric audiologist, prior to discharge.
- The follow-up appointment information should be explained to the parent/responsible party prior to discharge, documented in the infant's medical record and be included on the discharge instructions (see Conveying Results section).
- The infant's pediatric healthcare provider who will follow the infant after discharge must be notified of all screening results including pass, refer or missed screens. If the primary care provider will be referring the family to the pediatric audiologist directly, the birthing facility should attempt to secure the name of the audiologist and appointment information, prior to discharge. This information should be explained to the parent/responsible party, documented in the infant's medical record, included in the discharge instructions and entered into the DPH data system for tracking.
- Referrals to a pediatric audiologist may be scheduled and conducted prior to discharge. If an audiologist evaluates an infant prior to discharge, there shall be a written consultation for the services and such consultation will be properly entered into the infant's medical record. The audiologist will be responsible for submitting the diagnostic results to the DPH on the appropriate form (**see Appendix G, Diagnostic Testing Reporting Form**)

## DIAGNOSTIC EVALUATION

Any audiologist accepting infants for initial audiological evaluations should have the equipment, training and skills to complete the procedures recommended by the CT EHDI Advisory Board (**see Appendix F, CT EHDI Advisory Board Best Practice Recommendations**). **It is important to note that both ears should be tested during the diagnostic evaluation, regardless of whether one ear passed in the initial screen.** The following recommendations outline the process for the diagnostic testing of infants, according to age.

### Audiological Evaluation from Birth to 6 Months of Age

For infants from birth to a developmental age of approximately 6 months, the test battery and audiological assessment should include:

- A child and family history.
- An evaluation of risk factors for congenital hearing loss.
- An evaluation of parental report of the infant's responses to sound.
- A frequency-specific assessment of the ABR using **air and bone**-conducted tone bursts, when indicated.
- When permanent hearing loss is detected, **frequency-specific ABR** testing is needed to determine the degree and configuration of hearing loss in each ear for fitting of amplification devices.
- Click-evoked ABR testing using both condensation and rarefaction single-polarity stimulus, if there are risk indicators for neural hearing loss (auditory neuropathy/auditory dyssynchrony) such as hyperbilirubinemia or anoxia, to determine if a cochlear microphonic is present.
- Because some infants with neural hearing loss have no risk indicators, any infant who demonstrates "no response" on ABR elicited by tone-burst stimuli must be evaluated by a click-evoked ABR.
- Distortion product or transient evoked OAEs.
- Tympanometry using a probe tone greater than 1000-Hz.
- Clinician observation of the infant's auditory behavior as a crosscheck in conjunction with electrophysiologic measures.
- **Behavioral observation alone is not adequate** for determining whether hearing loss is present in this age group, and it is not adequate for the fitting of amplification devices.
- All NICU infants, or other infants at risk, should have a diagnostic evaluation conducted, not a rescreen.
- The initial diagnostic hearing evaluation with the pediatric audiologist should be scheduled within 2-4 weeks of parent/responsible party notification.
- The audiologist should have the ability to access ear mold impressions, fit, provide, dispense and repair hearing aids for the infants in a timely manner.
- Loaner hearing aids should be available, within a practical amount of time.
- If sedation is required, it should be administered in a medical facility where the child can be monitored safely.
- The audiologist will initiate the referral to the Connecticut Birth to Three System at the time of diagnosis by calling the Child Development Infoline at 1-800-505-7000.

- The diagnosing pediatric audiologist should work with the Birth to Three early intervention coordinator to provide the parent/responsible party with the information they need to make informed decisions regarding early intervention options. This transition period should include ongoing audiologic assessment as the families select intervention options.
- The audiologist should notify the infant's pediatric healthcare provider and the DPH EHDI Program of all testing results, including inconclusive results, failure to show for scheduled appointments and any subsequent referrals.
- The audiologist is responsible for faxing the initial diagnostic and any subsequent audiological evaluation results to the CT Early Hearing Detection & Intervention Program **within 2 days** following the appointment. Results should be faxed to the EHDI Program (860 509-8132) for **any child born after July 1, 2000 (see Appendix G, Diagnostic Testing Reporting Form).**

### **Audiological Evaluation from 6 to 36 Months of Age**

For subsequent testing of infants and toddlers at developmental ages of 6 to 36 months, the confirmatory audiological test battery includes:

- Child and family history.
- Parental report of auditory and visual behaviors and communication milestones.
- Behavioral audiometry (either visual reinforcement or conditioned-play audiometry, depending on the child's developmental level), including pure-tone audiometry across the frequency range for each ear and speech-detection and -recognition measures.
- OAE testing.
- Acoustic immittance measures (tympanometry and acoustic reflex thresholds).
- ABR testing if responses to behavioral audiometry are not reliable or if ABR testing has not been performed in the past.

### **MEDICAL EVALUATION**

Every infant with confirmed hearing loss and/or middle ear dysfunction should be referred for otologic and other medical evaluation. The purpose of these evaluations is to determine the etiology of hearing loss, to identify related physical conditions, and to provide recommendations for medical/surgical treatment as well as referral for other services. Essential components of the medical evaluation include:

- Clinical history,
- Family history of childhood-onset permanent hearing loss,
- Identification of syndromes associated with early or late-onset permanent hearing loss.
- A physical examination.
- Indicated radiologic and laboratory studies (including genetic testing).

Portions of the medical evaluation, such as urine culture for CMV, a leading cause of hearing loss, might even begin in the birth hospital, particularly for infants who spend time in the NICU.

### **PRIMARY HEALTH CARE PROFESSIONAL**

The infant's pediatrician or other primary health care professional (PCP) is responsible for monitoring the general health, development, and well-being of the infant. The PCP should verify that the newborn's hearing screen was conducted during the child's first office visit. If the hearing screen was not done prior to discharge, the PCP should refer the family back to the birth facility, or to a diagnostic center where the hearing screen can be conducted. The following outlines additional responsibilities of the infant/child's PCP:

- Must assume responsibility to ensure that the diagnostic testing/audiological assessment is conducted in a timely fashion on all infants who do not pass the hearing screening.
- Initiate referrals for any medical specialty evaluations necessary to determine the etiology of the hearing loss.
- Monitor the child's middle-ear status because the presence of middle-ear effusion can further compromise hearing.
- Partner with other specialists, including the otolaryngologist, and audiologist to facilitate coordinated care for the infant and family.
- Because 30% to 40% of children with confirmed hearing loss will demonstrate developmental delays or other disabilities, the primary care physician should closely monitor developmental milestones and initiate referrals related to suspected disabilities.
- Review every infant's medical and family history for the presence of risk indicators that require monitoring for delayed-onset or progressive hearing loss and ensure that an audiological evaluation is completed for children at risk of hearing loss, at least once by 24 to 30 months of age according to the Joint Committee on Infant Hearing, regardless of their newborn screening results. The CT EHDI Advisory Board recommends that infants with one or more risk factors have an audiological evaluation every six months, up until age three. This includes infants who passed the hearing screening at birth.
- Infants with specific risk factors, marked with an asterisk on page 7 – such as CMV infection or a family history, are at increased risk of delayed-onset or progressive hearing loss and should be monitored closely.
- Conduct ongoing surveillance of parent concerns about language and hearing, auditory skills, and developmental milestones of all infants and children regardless of risk status, as outlined in the pediatric periodicity schedule published by the AAP.
- Children with cochlear implants may be at increased risk of acquiring bacterial meningitis compared with children in the general US population. The PCP must assure that all children with, and all potential recipients of, cochlear implants receive the CDC recommended pneumococcal immunization that apply to cochlear implant users and that they receive age-appropriate *Haemophilus Influenzae* Type B vaccines.

## OTOLARYNGOLOGIST

Otolaryngologists are medical doctors who diagnose, treat, and manage a wide range of diseases of the head and neck and specialize in treating hearing and vestibular disorders. They perform a full medical diagnostic evaluation of the head and neck, ears, and related structures, including a comprehensive history and physical examination, leading to a medical diagnosis and appropriate medical and surgical management. Often, a hearing or balance disorder is an indicator of, or related to, a medically treatable condition or an underlying systemic disease. The otolaryngologists work closely with other healthcare professionals, including other physicians, audiologists, speech-language pathologists, educators, and others, in caring for patients with hearing, balance, voice, speech, developmental, and related disorders. It is important for a family to select an otolaryngologist that specializes in working with infants and children.

- The otolaryngologist's evaluation includes a comprehensive history to identify the presence of risk factors for early-onset childhood permanent hearing loss, such as family history of hearing loss, having been admitted to the NICU for more than 5 days, and having received ECMO.
- A complete head and neck examination for craniofacial anomalies should document defects of the auricles, patency of the external ear canals, and status of the eardrum and middle-ear structures. Atypical findings on eye examination, including irises of 2 different colors or abnormal positioning of the eyes, may signal a syndrome that includes hearing loss. Congenital permanent conductive hearing loss may be associated with craniofacial anomalies that are seen in disorders such as Crouzon disease, Klippel-Feil syndrome, and Goldenhar syndrome. The assessment of infants with these congenital anomalies should be coordinated with a clinical geneticist.
- In large population studies, at least 50% of congenital hearing loss has been designated as hereditary, and nearly 600 syndromes and 125 genes associated with hearing loss have already been identified. The evaluation, therefore, should include a review of family history of specific genetic disorders or syndromes, including genetic testing for gene mutations such as *GJB2* (connexin-26), and syndromes commonly associated with early-onset childhood sensorineural hearing loss. As the widespread use of newly developed conjugate vaccines decreases the prevalence of infectious etiologies such as measles, mumps, rubella, *Haemophilus Influenzae* Type B, and childhood meningitis, the percentage of each successive cohort of early-onset hearing loss attributable to genetic etiologies can be expected to increase, prompting recommendations for early genetic evaluations.
- Approximately 30% to 40% of children with hearing loss have associated disabilities, which can be of importance in patient management. The decision to obtain genetic testing depends on informed family choice, in conjunction with standard confidentiality guidelines.
- In the absence of a genetic or established medical cause, a computed tomography scan of the temporal bones may be performed to identify cochlear abnormalities, such as Mondini deformity with an enlarged vestibular aqueduct, which have been associated with progressive hearing loss.
- Temporal bone imaging studies may also be used to assess potential candidacy for surgical intervention, including reconstruction, bone-anchored hearing aid, and cochlear implantation. According to the JCIH, recent data have shown that some children with electrophysiologic evidence suggesting auditory neuropathy/dyssynchrony may have an absent or abnormal cochlear nerve that may be detected with MRI.

Historically, an extensive battery of laboratory and radiographic studies was routinely recommended for newborn infants and children with newly diagnosed sensorineural hearing loss. However, emerging technologies for the diagnosis of genetic and infectious disorders have simplified the search for a definitive diagnosis, which obviates the need for costly diagnostic evaluations in some instances. If, after an initial evaluation, the etiology remains uncertain, an expanded multidisciplinary evaluation protocol including electrocardiography, urinalysis, testing for CMV, and further radiographic studies is indicated. The etiology of neonatal hearing loss may remain uncertain in as many as 30% to 40% of children.

- Once hearing loss is confirmed, medical clearance for hearing aids and enrollment into Birth to Three should be initiated as soon as possible. Amplification and early intervention should not be delayed pending the outcome of the diagnostic process.
- The otolaryngologist should conduct careful longitudinal monitoring to detect and promptly treat any coexisting middle-ear effusions.

### **MEDICAL GENETICIST**

A referral to the Medical Geneticist can provide families with information on the etiology of the hearing loss, prognosis for progression, associated disorders (e.g., renal, vision, cardiac), and the likelihood of recurrence in future offspring. This information may influence the parents' decision-making regarding intervention options for their child. All families of children with confirmed hearing loss should be offered a genetics evaluation and counseling. The medical geneticist is responsible for the following:

- Interpreting family history data.
- Clinically evaluating and diagnosing inherited disorders, if present.
- Performing and assessing genetic tests.
- Providing genetic counseling to the family.

### **OTHER MEDICAL SPECIALISTS**

Every infant with a confirmed hearing loss should have an evaluation by an ophthalmologist to document visual acuity and rule out concomitant or late-onset vision disorders such as Usher syndrome. Indicated referrals to other medical subspecialists, including developmental pediatricians, neurologists, cardiologists, and nephrologists, should be facilitated and coordinated by the primary health care professional.

### **EARLY INTERVENTION**

Before newborn hearing screening was instituted universally, children with severe-to-profound hearing loss, on average, completed the 12th grade with a 3rd- to 4th-grade reading level and language levels of a 9- to 10-year-old hearing child. In contrast, infants and children with mild-to-profound hearing loss who are identified in the first 6 months of life and provided with immediate and appropriate early intervention services have significantly better outcomes than later-identified infants and children in vocabulary development, receptive and expressive language, syntax, speech production, and social-emotional development.

According to federal guidelines and CT State law (C.G.S. 19a-59), once any degree of hearing loss is confirmed in a child, a referral should be initiated to the CT Birth to Three System, Connecticut's early intervention program, within 2 days of confirmation of hearing loss. Referrals are made to Birth to Three by calling the Child Development Infoline at 1-800-505-7000. More information about the CT Birth to Three System can be obtained by visiting their website at: <http://www.birth23.org>

- The family should be referred to Birth to Three by the diagnosing audiologist at the time of diagnosis and EI services should be initiated as soon as possible, and no later than 6 months of age.
- CT has three EI centers that specialize in infants and children who are deaf or hard of hearing: American School for the Deaf, CREC/Soundbridge and New England Center for Hearing Rehabilitation (NECHEAR). **See Appendix H, Birth to Three Centers.** Upon referral to Early Intervention the family will receive information about each of the three programs. Although the audiologist and PCP should be available to answer any questions that the family may have about the three programs, the choice as to which program is selected, should be made by the family.
- Children with other medical conditions in which hearing loss is not the primary disability, should have access to intervention with a provider who is knowledgeable about hearing loss.

## APPENDICES INDEX

- A. Connecticut Newborn Hearing Screening Regulation
- B. Risk Indicators
- C. Diagnostic Testing Center Locations
- D. Refusal Waiver
- E. Hearing Screen Reporting Form
- F. CT EHDI Advisory Board Best Practice Recommendations
- G. Diagnostic Testing Reporting Form
- H. Comprehensive Birth to Three Hearing Specialty Centers



**Appendix A**  
**Connecticut Hearing Screening Regulations**

**Connecticut General Statutes, Section 19a-59: Program to identify newborn infants at high risk for hearing impairments.**

- a) Each institution, as defined in section 19a-490, that provides childbirth service shall, no later than July 1, 2000, include a universal newborn hearing screening program as part of its standard of care and shall establish a mechanism for compliance review. The provisions of this subsection shall not apply to any infant whose responsible party objects to hearing screening as being in conflict with their religious tenets and practice.
- b) The Department of Public Health shall establish a plan to implement and operate a program of early identification of infant hearing impairment. The purpose of such plan shall be to: (1) Identify infants at high risk of having hearing impairments; (2) notify responsible party of such infants of the risk; (3) inform responsible party of resources available to them for further testing and treatment, including rehabilitation services for such infants, and (4) inform responsible party of financial assistance available through the Department of Public Health, including, but not limited to, parental eligibility criteria, which may result in reduced cost or no cost to responsible party for testing, evaluation or treatment, including rehabilitation of such infants. The department shall develop such plan in consultation with persons including, but not limited to, pediatricians, otolaryngologists, audiologists, educators and responsible party of deaf and hearing impaired children.
- c) The Commissioner of Public Health shall adopt regulations, in accordance with Chapter 54, to implement the provisions of subsection (a) of this section.

## **Appendix B Risk Factors for Hearing Loss**

Caregiver concern\* regarding hearing, speech, language or developmental delay

Family history\* of Permanent Congenital Hearing Loss (PCHL)

Neonatal intensive care >5 days - - including any of the following:

- Extracorporeal membrane oxygenation (ECMO)\*
- Assisted ventilation
- Exposure to ototoxic medications (gentamycin and tobramycin) or loop diuretics (furosemide/lasix)

Hyperbilirubinemia requiring exchange transfusion

In-utero infections such as cytomegalovirus\*, herpes, rubella, syphilis, and toxoplasmosis

Craniofacial anomalies, including those involving the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies

Physical findings such as white forelock, associated with a syndrome known to include a sensorineural or permanent conductive hearing loss

Syndromes associated with hearing loss or progressive or late onset hearing loss\* such as neurofibromatosis, osteopetrosis, and Usher's syndrome, Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson

Neurodegenerative disorders\*, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich's ataxia and Charcot-Marie-Tooth syndrome

Culture positive postnatal infections associated with sensorineural hearing loss\*  
- Confirmed bacterial and viral (especially herpes viruses and varicella) meningitis

Head trauma, especially basal skull/temporal bone fracture\* requiring hospitalization

Chemotherapy\*

* Are of greater concern for delayed onset hearing loss
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**CONNECTICUT EARLY HEARING DETECTION AND INTERVENTION  
INFANT DIAGNOSTIC TESTING LOCATIONS**

The following audiologists have indicated that they conduct the test battery recommended by the CT Early Hearing Detection and Intervention Advisory Board, for the diagnostic hearing testing of infants who do not pass the hearing screening conducted at birth.

**BRIDGEPORT**

**Ahlin Centers**  
226 Mill Hill Avenue  
Bridgeport, CT 06610  
(203) 366-7551  
Medical facility affiliation for sedation: Bridgeport Hospital

**FARMINGTON**

**UConn Health Center**  
263 Farmington Avenue  
Dowling South  
Mail Code 6228  
Farmington, CT 06030-6228  
(860) 679-2804  
\*\*

**GLASTONBURY**

**Connecticut Children's Medical Center, Glastonbury Satellite Office**  
310 Western Blvd.  
Glastonbury, CT 06033-1236  
(860) 545-9642  
Medical facility affiliation for sedation: CCMC - Hartford

**HARTFORD**

**Connecticut Children's Medical Center**  
282 Washington Street  
Hartford, CT 06106  
(860) 545-9642  
Medical facility affiliation for sedation: CCMC

**St. Francis Hospital & Medical Center**  
Rehabilitation Medicine  
114 Woodland Street  
MS #20904  
Hartford, CT 06105  
(860) 714-6591  
\*\*

**HAMDEN**

**Hearing, Balance & Speech Center**  
2661 Dixwell Avenue  
Hamden, CT 06518  
(203) 287-9915  
\*\*

**NEW HAVEN**

**ENT Medical & Surgical Group**  
46 Prince Street  
New Haven, CT 06519  
(203) 752-1726  
\*\*

**Yale New Haven Hospital, Yale Hearing & Balance Center**  
800 Howard Ave, 4th Floor  
New Haven, CT 06519  
(203) 785-2467  
Medical facility affiliation for sedation: Yale New Haven Hospital

**NEW LONDON**

**Lawrence & Memorial Speech and Audiology Services**  
365 Montauk Avenue  
New London, CT 06320  
(860) 442-0711 ext. 2522  
Medical facility affiliation for sedation: Lawrence & Memorial Hospital

**OLD SAYBROOK**

**Lawrence & Memorial Medical Office Building**  
Speech & Audiology Services  
633 Middlesex Turnpike  
(Rt. 154)  
Old Saybrook, CT 06475  
(860) 388-5881 ext. 7350  
\*\*

**STORRS**

**University of Connecticut Speech & Hearing Clinic**  
850 Bolton Road  
Unit 1085  
Storrs, CT 06269-1085  
(860) 486-2629  
\*\*

**WALLINGFORD**

**Gaylord Hospital Hearing Center**  
Gaylord Farm Road  
PO Box 400  
Wallingford, CT 06492  
(203) 284-2880  
\*\*

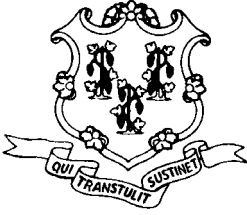
**WATERBURY**

**Easter Seals of Waterbury**  
22 Tompkins Street  
Waterbury, CT 06708  
(203) 754-5141  
\*\*

\*\* = Does not perform sedation

**For more information, contact the Connecticut Department of Public Health  
Early Hearing Detection and Intervention Program at 860 509-8057  
or visit our web site: <http://www.ct.gov/dph>  
Click on "Programs and Services" at the top of the page, then select "H" and click on "Hearing Screening."**

Appendix D  
Hearing Screen Refusal Waiver



**Connecticut Department of Public Health  
Family Health Section**

*Newborn Hearing Screening  
Refusal Waiver*

As defined in Section 19a-59 of the Connecticut General Statutes, I the parent or guardian of \_\_\_\_\_ (newborn name), a baby born on \_\_\_\_\_ (date of birth), in \_\_\_\_\_ (birthing facility/hospital name), refuse permission for the Newborn Hearing Screening Test to be performed on my baby, because such a test is in conflict with my religious tenets and practice. The risks and benefits of the Newborn Hearing Screening have been fully explained to me and I understand and accept responsibility for choosing not to have the screening performed.

Accession Number: \_\_\_\_\_

Birth Mother's Name (Please print): \_\_\_\_\_

Street Address: \_\_\_\_\_

Town/Zip Code: \_\_\_\_\_

Infant's Primary Care Physician: \_\_\_\_\_

Physician's Address: \_\_\_\_\_

Physician's Telephone: \_\_\_\_\_

Parent/Guardian Signature: \_\_\_\_\_

Relationship (if other than parent): \_\_\_\_\_

Witness: \_\_\_\_\_

Date: \_\_\_\_\_

A copy of this signed waiver is to be forwarded to:  
Connecticut Department of Public Health  
Early Hearing Detection & Intervention Program  
410 Capitol Avenue, MS #11 MAT  
Hartford, Connecticut 06134-0308  
**FAX: 860 509-8132**

**CONNECTICUT  
DEPARTMENT OF PUBLIC HEALTH**

**NEWBORN HEARING SCREENING REPORTING FORM**

<b>Birth Place</b>	<input type="text"/>	<b>Mother's Last Name</b>	<input type="text"/>	<b>First</b>	<input type="text"/>		
<b>Accession #</b>	<input type="text" value="/ / / / / / / /"/>	<b>Baby's Medical Record Number</b>	<input type="text"/>				
<b>Baby's Last Name</b>	<input type="text"/>	<b>First</b>	<input type="text"/>	<b>Address</b>	<input type="text"/>	<b>Telephone</b>	<input type="text" value="( ) -"/>
				<input type="text"/>			
<b>Date of Birth</b>	<input type="text" value="/ /"/>	<b>Weight (grams)</b>	<input type="text"/>	<b>EGA (weeks)</b>	<input type="text"/>		
<b>Birth Sequence</b>	<input type="text"/>	<b>Sex:</b>	<input type="checkbox"/> Male	<input type="checkbox"/> Female	<b>Race</b>	<input type="text"/>	
<b>Hospital Transferred to</b>	<input type="text"/>						

<b>HEARING SCREENING</b>								
<b>Date</b>	<input type="text" value="/ /"/>	<b>Method</b>	<input type="text"/>	<b>Right</b>	<input type="text"/>	<b>Left</b>	<input type="text"/>	
					<i>(indicate pass or refer)</i>			
<b>Date</b>	<input type="text" value="/ /"/>	<b>Method</b>	<input type="text"/>	<b>Right</b>	<input type="text"/>	<b>Left</b>	<input type="text"/>	
					<i>(indicate pass or refer)</i>			
<b>Primary Care Provider Name</b>	<input type="text"/>						<b>Telephone</b>	<input type="text" value="( ) -"/>
<b>PCP Address</b>	<input type="text"/>							
	<input type="text"/>							

**Please return this form to:** Connecticut Department of Public Health  
Early Hearing Detection and Intervention Program  
410 Capitol Avenue, MS# 11 MAT, P.O. Box 340308  
Hartford, CT 06134-0308

or Fax to: (860) 509-8132

Contact the CT EHDI Program at (860) 509-8057 with any questions.

**INFANT DIAGNOSTIC HEARING TESTING**  
**CONNECTICUT EARLY HEARING DETECTION AND INTERVENTION ADVISORY BOARD**  
**BEST PRACTICE RECOMMENDATIONS**

Early infant hearing detection and intervention are keys to the development of speech and language. Universal newborn hearing screening has been mandated in Connecticut since July 2000. Approximately 1-2% of all infants screened will be referred for diagnostic hearing testing. The initial diagnostic hearing evaluation should be scheduled promptly upon discharge and be conducted by the time the child is two months of age.

The pediatric audiologist to whom the child is referred must decide on the **battery of tests** that is appropriate for each child based on: screening results, the medical history of the child, risk factors if present, and the type, number, and timing of screenings carried out prior to the referral.

The Connecticut Early Hearing Detection and Intervention Advisory Board strongly recommends that any audiologist accepting infants for initial diagnostic audiological evaluations have the ability to complete the following procedures (\*):

**Auditory Brainstem Response [ABR (a.k.a BAERS, BAER)]:**

- Threshold measurement with frequency specific tone bursts
- Threshold measurement with bone conduction ABR
- Sedation in a medical facility where the child can be appropriately monitored

**Immittance Testing:**

- Tympanometry with high frequency probe tone **greater than 1000 Hz**
- Acoustic reflex testing

**Otoacoustic Emissions (OAE):**

- Transient evoked or distortion product

**Behavioral Audiometry:**

- May be useful in addition to the above

(\*) An otological evaluation must be included as part of the diagnostic process, although it may occur at a different facility and time.

The audiologist must report the results of the initial diagnostic audiological evaluation to the referring physician and to the Connecticut Department of Public Health, in the requested format. For reporting instructions, please call (860) 509-8057.

The audiologist must refer any child with a hearing loss to the CT Birth to Three System at the time of diagnosis. The Birth to Three System provides a range of services including ongoing audiological testing, acquisition of assistive technology, family training and communication intervention. For referrals, more information, or to receive the *Service Guidelines for Children Who are Hard of Hearing or Deaf*, contact CT Birth to Three at 1-800-505-7000 or visit their website: <http://www.birth23.org/>.

Appendix G

Connecticut Department of Public Health
Early Hearing Detection and Intervention
DIAGNOSTIC AUDIOLOGY REPORTING FORM

Child's Last Name First Name DOB Birth Hospital Accession Number
Parent / Responsible Party Name Parent/ Responsible Party Address Parent/ Responsible Party Telephone
Pediatrician Name Address Telephone

Date of Evaluation: \_\_\_\_\_

Did not Keep Appointment: \_\_\_\_\_

Purpose of Appointment: INITIAL SCREEN RESCREEN DIAGNOSTIC TESTING Screening Method: OAE / ABR Results RIGHT: PASS / REFER Results LEFT: PASS / REFER FOLLOW UP TESTING RISK FACTOR MONITORING

DIAGNOSTIC ABR RESULTS:

Right Ear Left Ear
Hearing within Normal Limits
TYPE OF HEARING LOSS: Sensorineural Hearing Loss, Conductive Hearing Loss, Mixed Hearing Loss, Undetermined Type Hearing Loss
DEGREE OF HEARING LOSS: (Degree of AC Thresholds at 500, 1000, 2000 Hz) Mild Hearing Loss, Moderate Hearing Loss, Severe Hearing Loss, Profound Hearing Loss

Other Tests Conducted (Please Specify): \_\_\_\_\_

Was this a Progressive or Late Onset Hearing Loss? Yes No Unknown

Hearing Aid Candidate? Yes No Not Determined Date of Amplification:

Cochlear Implant Candidate? Yes No Not Determined Date of Implant if Known (mm/yy):

Referred for Genetic Testing? Yes No Unknown

Referred to Birth to Three? Yes Date:

(Referral Line: 800-505-7000) No Reason:

RISK FACTORS: (Check all that Apply)

- None Known, NICU > 5 Days, Craniofacial Anomalies, Family History, In Utero Infection, Ototoxic Meds, Bacterial Meningitis, Low Apgar score, Low Birth Weight (less than 3.3 lbs), Mechanical Ventilation, Stigmata or Syndrome, Other:

AUDIOLOGIST'S RECOMMENDATIONS:

ENT REFERRAL? Yes No Referred to: Telephone:

TESTING CONDUCTED BY: NAME OF CENTER: TELEPHONE:

**Appendix H**  
**Comprehensive Birth to Three Hearing Specialty Centers**

**Capitol Region Education Council (CREC)/Soundbridge**

123 Progress Drive  
Wethersfield, CT 06109  
Telephone: (860) 529-4260  
<http://www.crec.org/>

**New England Center for Hearing and Rehabilitation (NECHEAR)**

354 Hartford Turnpike  
Hampton, CT 06247-1320  
Telephone: (860) 455-1404  
<http://www.nechear.com>

**American School for the Deaf**

139 North Main Street  
West Hartford, CT 06107  
Telephone: (860) 570-2300 (Voice)  
(860) 570-2222 (TTY)  
<http://www.asd-1817.org/>