# Newborn Hearing Screening Guidelines

## FLORIDA DEPARTMENT OF HEALTH

**Newborn Hearing Screening Program**
BUREAU OF EARLY STEPS AND NEWBORN SCREENING
DIVISION OF CHILDREN'S MEDICAL SERVICES

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# Introduction

According to 2022 data released by the Centers for Disease Control and Prevention (CDC) hearing loss affects approximately two per 1,000 infants born in the United States each year. Across the country, universal newborn hearing screening programs have become the gold standard of care for hospitals and birthing centers. The goal of a successful newborn hearing screening program is early detection of hearing loss. This document provides guidelines, based on evidence-based recommendations from the most recent 2019 Joint Committee on Infant Hearing (JCIH) Position Statement for the early detection, identification, and intervention of hearing loss to improve communication, education, and overall social development for children who are deaf or hard of hearing.

### Terminology

The terminology used in the Newborn Hearing Screening Guidelines are used to convey meaning to a range of health care professionals and technicians who perform hearing screenings and follow-up hearing testing. Terminology such as hearing loss, hearing impairment, and hearing level can carry varied meanings depending on context. However, health care professionals frequently use the term hearing loss to describe audiological conditions, including those that are progressive or develop later in life. Therefore, this document refers to the term hearing loss for clarity and consistency. For the purposes of these guidelines:

- Refer/fail – Indicates a non-pass result in hearing screening. These words will be intentionally paired to limit confusion about the meaning and implications of the words. Though the term “fail” has previously been discouraged, health care professionals often use it to describe the outcome of a screening.
- Prolonged NICU stay – An admission to the neonatal intensive care unit (NICU) for greater than five days.
- Medically fragile – An infant that has a medical condition requiring equipment or procedures to sustain life, e.g., ventilator dependent.
- Inpatient – Any test performed prior to discharge from the hospital.
- Outpatient – Any test performed after discharge from the hospital.

# Section 1: Florida Statute

Section 383.145, Florida Statute: Newborn and infant hearing screening

It is the intent of the Legislature to provide a statewide, comprehensive and coordinated interdisciplinary program of early hearing loss screening, identification, and follow-up care for newborns. The goal is to screen all newborns for hearing loss to alleviate the adverse effects of hearing loss on speech and language development, academic performance, and cognitive development. Hearing screens must be completed using Auditory Brainstem Response (ABR), Otoacoustic Emission (OAE), or appropriate technology as approved by the United States Food and Drug Administration (FDA).

### Hospital

Each hospital or other state-licensed birthing facility providing maternity and newborn care services shall ensure that all newborns are, before discharge, screened for the detection of hearing loss to prevent the consequences of unidentified auditory disorders. Each hospital shall formally designate a lead physician responsible for programmatic oversight for newborn hearing screening.

### Birth Center

Each licensed birth center that provides maternity and newborn care services shall ensure that all newborns are, before discharge, screened for the detection of hearing loss. Each birth center shall designate a licensed health care provider to provide such programmatic oversight and to ensure that the appropriate referrals are being completed.

### Home Birth

For home births, the health care provider in attendance is responsible for coordination and referral to an audiologist, a hospital, or another newborn hearing screening provider. The health care provider in attendance must make the referral for appointment within seven calendar days after the birth. In cases in which the home birth is not attended by a health care provider, the newborn's primary health care provider is responsible for coordinating the referral.

### Refusal

If the parent or legal guardian of the newborn objects to the screening, the screening must not be completed. In such case, the physician, midwife, or other person who is attending the newborn shall maintain a record that the screening has not been performed and attach a written objection signed by the parent or guardian to the child's medical record.

### Congenital Cytomegalovirus (cCMV) Screening

Florida began targeted screening for cCMV in January 2023 for all newborns who do not pass their hearing screen. Screening was expanded in July 2024 to include newborns who:

- Are born before 35 weeks gestational age.
- Have an anticipated NICU stay of 21 days or more.
- Are transferred to another facility for a higher level of care.

Information regarding implementation of cCMV screening is available on the Florida Newborn Screening website or click Cytomegalovirus Screening Guidelines.

### Reporting Results

The results of any test conducted, including but not limited to, newborn hearing screening, cCMV testing, and any related diagnostic testing, must be reported to the Florida Department of Health, Newborn Hearing Screening Program (NBHS) within seven calendar days after receipt of results.

## Section 2: Early Hearing Detection and Intervention (EHDI)

The Newborn Hearing Screening (NBHS) Program is responsible for improvement of the Florida EHDI system structure to promote language development for children up to age three who are deaf and hard-of-hearing (DHH), and to ensure newborns, infants, and children up to age three receive appropriate and timely services, including:

- Hearing screening
- Diagnosis
- Early intervention services
- Parent-to-parent support
- Deaf adult-to-parent services

The Florida NBHS Program engages in the following:

- Collecting hearing screening data from hospitals, primary care physicians (PCPs), audiologists, midwives and birth centers.
- Following up with parents and health care providers of newborns who do not pass the hearing screen.
- Monitoring diagnostic hearing evaluations and collecting outcome results.
- Referring babies, birth to three years old diagnosed with hearing loss, to early intervention programs.
- Providing parent-to-parent support and deaf adult-to-parent support for families with children who are DHH.
- Providing technical assistance and training to hospitals and birthing centers, midwives, audiologists, and PCPs on:
    - Best practices for performing hearing screens.
    - Audiology support and resources.
    - Timely and accurate result reporting to the NBHS Program.

### Hearing Health Care Partners in the EHDI System

All hearing care providers involved in the care of infants are essential partners with the Florida EHDI system. Together, the goal is to encourage early identification of hearing loss and provide every child the opportunity for early intervention based on the 1-3-6 benchmarks. These benchmarks include:

- Hearing screening by one month of age.
- Diagnosis by three months of age.
- Early intervention enrollment by six months of age.

NBHS Program staff follow all newborns and young children, birth-to-three years old, who do not pass the hearing screen to support rescreening and diagnostic testing. Children identified with hearing loss and those diagnosed with late onset hearing loss are referred to intervention and support services. All hearing screens and diagnostic test data are reported annually to the Centers for Disease Control and Prevention.

## Section 3: Newborn Hearing Screening Program Management and Monitoring

A minimum of one individual from each facility is required to serve as the contact person between the facility and the state NBHS Program. The NBHS Program should be notified within 10 business days of the transition when the contact person changes. The designated contact person should:

- Ensure individual program screening policies and procedures are followed.
- Verify staff are trained on how to perform a high-quality hearing screen.
    - Consider having staff complete the Newborn Hearing Screening Training Curriculum offered by the National Center for Hearing Assessment and Management (NCHAM) at Utah State University.
    - Routinely observe staff performing high-quality hearing screens.
- Take corrective action, when necessary, to improve and maintain the hearing screening program.
- Oversee hearing screen staff schedules to ensure 365 days of coverage in the hospital setting.
- Ensure screening equipment is functioning according to manufacturer specifications.
    - Perform daily equipment system and listening checks.
    - Schedule annual recommended calibrations.
- Monitor program statistics and quality assurance.

- Perform monthly reconciliation to ensure results are reported to the state.
- Guide follow-up procedures when outpatient hearing testing is needed.
- Ensure effective communication of hearing screening results and the need for further testing, if necessary, is provided to families according to the Americans with Disabilities Act. For more information visit ADA Requirements: Effective Communication.

## Section 4: Best practices for performing a hearing screen

### Preparing for the Hearing Screen

- Attempt to schedule the hearing screen shortly after feeding and close to hospital discharge, while allowing enough time (minimum 4 hours) for a repeat screen when one or both ears does not pass.
- Ensure the infant is resting comfortably, preferably asleep.
- Prepare the test environment.
    - Reduce environmental noise.
    - Request family members turn off electronic devices.
    - Minimize potential test interruptions by health care staff, family members, or guests.
- Perform a visual inspection (VI) of the infant's head and ears.
    - To the extent possible, identify any ear or facial abnormalities, including each ear canal to determine if there is an opening.
    - If abnormalities are observed and/or the person performing the hearing screening is unsure if the ear canal is open, consult with the supervising audiologist or the newborn's health care provider before performing the hearing screen.
    - Newborns with congenital aural atresia/microtia in one or both ears, or with visible ear canal deformity or malformation, should not be screened in either ear, unless otherwise directed by the supervising audiologist or the newborn's health care provider.

### Performing a High-Quality Hearing Screen

Accepted hearing screening methods include OAE or AABR. Automated equipment means the test results provide pass or refer/fail only, without the need for interpretation. Use of either method is acceptable for screening well-nursery infants. However, AABR is recommended for infants receiving care in the NICU greater than five days.

- Screen both the left and right ear during the same session.
- Avoid over-screening or completing multiple screens during the same session.
- Allow each screen to continue, without interruption until a pass or refer/fail result is obtained.
    - During testing, if an infant wakes, begins moving, or the test environment becomes too noisy, pause the screen.
    - Once baby is asleep or test conditions return to an accepted level, continue the screen.

### Special Considerations for Prolonged NICU Stay and Extended Inpatient Stay

Hospitals should establish medical criteria for performing a hearing screen on infants admitted to the NICU. This includes infants who have been moved to other locations within the hospital needing specialized medical care. Established medical criteria should be available to all hearing screeners and health care staff.

Once criteria are met, a hearing screen should be performed prior to discharge. At a minimum, the use of automated auditory brainstem response (AABR) is recommended. Facilities equipped with AABR and OAE capability are encouraged to perform two-technology hearing screenings.

Whenever possible, an inpatient consultation with a pediatric audiologist is recommended when any of the following scenarios occur:

- The final hearing screen result is a refer/fail in one or both ears.
- An infant is diagnosed with a syndrome or medical condition associated with late onset or progressive hearing loss, including cCMV.
- For medically fragile infants who cannot receive a hearing screen.

## Section 5: Hearing screen results

### Pass Result (must include both ears)

- Notify the parent or legal guardian of the passing hearing screen results along with education regarding developmental milestones.
    - NBHS provides downloadable and hard copies of the Can My Baby Pass the Newborn Hearing Screening and Still Have Hearing Loss? brochure.
- Document passing results in the medical record and discharge summary, including the date and screening method used.
- Report the results to the state NBHS Program within seven calendar days (see Section 10: Reporting Hearing Screen Results).

### Non-pass or Refer/Fail Result (one or both ears)

When one or both ears does not pass the initial screen, a single repeat screen should be completed before discharge. The repeat hearing screen should not occur immediately after the first screen.

- Whenever possible, wait until the next day to complete a repeat screen.
- When same-day discharge is pending, wait a minimum of four hours in between screens.
- Avoid over-screening (more than two attempts per ear, per screen or more than two complete screens) to achieve a passing result.
- Communicate the results of each hearing screening with the parent or legal guardian.
- Document results in the medical record and discharge summary, including the date and method used.
- Report the final inpatient screening results to the state NBHS Program within seven calendar days.
- Provide education regarding the need for follow-up hearing testing and if possible, schedule an outpatient appointment with a pediatric audiologist before discharge.

### Communicating Results to Families

Communicate accurate results of the hearing screen to the parent or caregiver. When the result of the final hearing screen is a refer/fail, provide the family with education regarding the need for further outpatient hearing testing (see Section Six: Follow-up Hearing Test Needed).Parent education is available at no charge and can be found on the Newborn Screening website. To learn more, visit Florida Newborn Screening or click Request Educational Materials Toolkit - Florida Newborn Screening to order.

Communication to families should be provided verbally (with the use of a foreign language or American Sign Language (ASL) interpreter, as needed) and in writing. Hospital programs should have available communication scripts for health care staff and hearing screeners on how to relay hearing screen results to

families. Examples of communication scripts developed by NCHAM are available online in English and Spanish and are available for download by visiting www.infanthearing.org.

Parents have the right to decline the hearing screen. However, with proper communication regarding the importance of providing a newborn hearing screen, many parents will decide to have the hearing screen completed before leaving the hospital or birthing center. When a parent or guardian declines the hearing screen, signed documentation of the hearing screen refusal must be included in the newborn's medical record. All parent refusals are reported to the NBHS Program (See Section 10: Reporting Hearing Screen Results).

## Section 6: Follow-up hearing test needed

At the time of discharge for infants who did not pass (refer/fail) the final hearing screen in one or both ears, it is recommended the birth facility ensure:

- The parent or legal guardian is provided a written copy of the hearing screen results and educated on the need for outpatient follow-up hearing testing.
- Hearing screen results are documented in the discharge summary and provided to the infant's PCP.
- If possible, schedule outpatient diagnostic hearing testing with a pediatric audiologist prior to discharge.
    - To locate a pediatric audiologist, it is recommended the family:
        - Speak with the infant's PCP.
        - Contact their insurance carrier.
        - Visit EHDI-PALS to find a participating audiology provider.

## Section 7: Missed hearing screen

Every effort shall be made to complete a hearing screen prior to hospital discharge. When a hearing screen is not completed and the newborn is discharged before an initial hearing screen, a process will be in place for the hospital or birthing facility to contact the family and arrange for an outpatient hearing screen within 21 days after the birth.

Missed screens are reported to the state NBHS Program (see Section 10: Reporting Hearing Screen Results). To avoid missed hearing screens, hospitals will establish a contingency plan to ensure hearing screens are provided during unexpected events when:

- Screening or diagnostic equipment needs to be repaired, calibrated, or replaced.
    - NBHS Program maintains OAE and ABR equipment available for short and long-term loan. For more information contact 866-289-2037 or email eReports@flhealth.gov.
- Inclement or severe weather, such as a tropical storm or hurricane, is forecast to impact the region in which the facility is located.
- The facility experiences an extended power outage.
- Facility construction or maintenance causing hearing screening service interruption.
- A widespread health crisis negatively impacting a birthing facility's ability to perform a high-quality hearing screen prior to discharge.

## Section 8: Infants Readmitted to the Hospital

Infants with conditions present that are associated with potential hearing loss (i.e., hyperbilirubinemia requiring exchange transfusion, culture results of sepsis or meningitis, and/or exposure to ototoxic medications) that

require hospital readmission within the first month of life should receive a repeat hearing screen prior to discharge. When an infant has been readmitted and the hearing screener is unsure if an infant needs a repeat hearing screen, consult with the audiology supervisor or with the infant's health care provider.

## Section 9: Outpatient Hearing Screens

### Primary Care Provider (PCP) Office

The first newborn hearing screen should be completed at the birthing hospital, but it is acceptable to complete an initial screen at the PCP office for a missed inpatient screen, parent refusal, and homebirth. However, infants with a medical history of NICU care, microtia/atresia, or diagnosis of cCMV should not be screened and should be referred directly to a pediatric audiologist for diagnostic evaluation.

- Initial hearing screens should occur during the infant's first check-up, or well-baby appointment.
  - Follow best practices for performing a high-quality hearing screen (see Section 4: Best Practices for Performing a Hearing Screen).
  - When the result is a refer/fail in one or both ears, repeat the hearing screen in sufficient time to allow for a cCMV test before 21 days of age, but not during the same appointment.
  - Report results to the state (see Section 10: Reporting Hearing Screen Results) within seven calendar days.
- Well-nursery infants who fail the final inpatient screen, a single, repeat screen is acceptable.
  - Follow best practices for performing a high-quality hearing screen (see Section 4: Best Practices for Performing a Hearing Screen).
  - Screen both ears, even when only one ear failed the inpatient screen.
  - When the result is a refer/fail, refer baby to a pediatric audiologist for diagnostic evaluation (see Section 5: Hearing Screen Results).
  - Report results to NBHS (see Section 10: Reporting Hearing Screen Results) within seven calendar days.

### Non-PCP Health Care Providers

Complete a single repeat high-quality hearing screen on both ears during the same session using AABR, if available, even when only one ear failed a previous screen. Follow best practices for performing a high-quality hearing screen (see Section 4: Best Practices for Performing a Hearing Screen).

When the result is a refer/fail in one or both ears, notify the infant's PCP and refer the baby to a pediatric audiologist for diagnostic evaluation (see Section 5: Hearing Screen Results). Report results to the state (see Section 10: Reporting Hearing Screen Results) within seven calendar days.

## Section 10: Reporting Hearing Screen Results

### Reporting Methods

There are three options to report hearing results to the NBHS Program.

1. Enter results directly on the newborn screening specimen card. For instructions on how to complete the hearing section of the card, visit Florida Newborn Screening.
2. Submit results electronically through the eReports™ System.
   a. eReports™ is a secure online portal that accepts both hearing screen and diagnostic hearing results.

b. For new user accounts, please complete the eReports™ registration form available on the Florida Newborn Screening website.
c. Training videos are available at no charge for all new and existing eReports™ users. For more information, visit Florida Newborn Screening.

3. Enter results through the Newborn Screening Web Order Application. For more information, contact the Newborn Screening Laboratory at 904-791-1645.

### Prolonged NICU and Extended Inpatient Stays

Infants with NICU or extended inpatient stays who do not yet meet the criteria for a hearing screen should be reported as having a "prolonged NICU stay" on the blood specimen card or through eReports under the "reason not screened" section. However, once medical criteria are met, complete the hearing screen prior to discharge, allowing time for a repeat screen if needed. When the result of the final screen is a refer/fail, consultation with a pediatric audiologist is recommended prior to discharge.

### Medically Fragile

Infants considered medically fragile cannot be screened due to medical reasons and may be discharged without a hearing screen. Upon discharge, report as "medically fragile" on the blood specimen card or through eReports under the "reason not screened" section.

### Ear-related Abnormality

Infants with an ear-related abnormality are reported as visual inspection (VI) for the method. Select refer/fail for the result for the affected ear(s).

### Missed

Infants discharged without a hearing screen. Report as "missed" on the blood specimen card or through eReports under the "reason not screened" section.

### Infants Born Out-of-State

Infants born out of state will not be found in the eReports system. Contact the NBHS Program at 866-289-2037 or email eReports@flhealth.gov to request assistance.

## Section 11: NBHS Program Quality Indicators

### Established Benchmarks:

- Percentage of infants without a screening record out of the total number of births: ≤ .25%
- Average number of days from screen date to report date for all screens: ≤ 7.49
- Percentage of infants reported with the not screened reason of "missed' out of the total number of births: ≤ .25%
- Percentage of refer/fail screens on the most recent screen prior to discharge out of the total number of infants screened: ≤ 4%
- Percent of infants with the initial screen completed by one month of age out of the total number of births: ≥ 95%

## Section 12: Risk Factor Classification

Hearing screening programs are encouraged to report risk factors associated with hearing loss in the medical record. Current risk factors available in eReports™ include:

- Family history of childhood hearing loss
- Extracorporeal membrane oxygenation (ECMO)
- Exchange Transfusion (Hyperbilirubinemia)
- Persistent Pulmonary Hypertension of the Newborn (PPHN)
- Low Birth Weight (<1500 grams)
- NICU (> 5 days)
- Aminoglycoside antibiotics > 5 days
- Asphyxia/Hypoxic Ischemic Encephalopathy
- Herpes/Rubella/Syphilis/Toxoplasmosis
- Congenital Cytomegalovirus (cCMV)
- Ear microtia/atresia/oral facial cleft
- Head trauma/skull/temporal bone fracture

An infant who has a passing result on a newborn hearing screen may develop or show evidence of childhood hearing loss. In 2019, the JCIH released a revised list of risk factors which includes recommendations for follow up and evaluation for infants who pass the newborn hearing screen. The updated list includes 12 separate risk factors divided into subgroups of perinatal (risk factors 1 – 9) and postnatal (risk factors 10 – 12).

Risk Factors for Early Childhood Hearing Loss: Guidelines for Infants who Pass the Newborn Hearing Screen

| | Risk Factor Classification | Recommended Diagnostic Follow-up | Monitoring Frequency |
|---|---|---|---|
| Perinatal | | | |
| 1 | Family history* of early, progressive, or delayed onset permanent childhood hearing loss | by 9 months | Based on etiology of family hearing loss and caregiver concern |
| 2 | Neonatal intensive care of more than 5 days | by 9 months | As per concerns of ongoing surveillance of hearing skills and speech milestones |
| 3 | Hyperbilirubinemia with exchange transfusion regardless of length of stay | by 9 months | |
| 4 | Aminoglycoside administration for more than 5 days** | by 9 months | |
| 5 | Asphyxia or Hypoxic Ischemic Encephalopathy | by 9 months | |
| 6 | Extracorporeal membrane oxygenation (ECMO)* | No later than 3 months after occurrence | Every 12 months to school age or at shorter intervals based on concerns of parent or provider |
| 7 | In utero infections, such as herpes, rubella, syphilis, and toxoplasmosis | by 9 months | As per concerns of ongoing surveillance |
| | In utero infection with cytomegalovirus* | No later than 3 months after occurrence | Every 12 months to age 3 or at shorter intervals based on parent/provider concerns |
| | Mother + Zika and infant with no laboratory evidence and no clinical findings | Standard | Periodicity schedule |
| | Mother + Zika and infant with laboratory evidence of Zika + clinical findings | AABR by 1 month | ABR by 4-6 months or VRA by 9 months |

| | | | |
|---|---|---|---|
| | Mother + Zika and infant with laboratory evidence of Zika - clinical findings | AABR by 1 month | ABR by 4-6 months<br><br>Monitory Periodicity schedule (Adebanjo et al., 2017) |
| 8 | Certain birth conditions or findings:<br>• Craniofacial malformations including microtia/atresia, ear dysplasia, oral facial clefting, white forelock, and microphthalmia<br>• Congenital microcephaly, congenital or acquired hydrocephalus<br>• Temporal bone abnormalities | by 9 months | As per concerns of ongoing surveillance of hearing skills and speech milestones |
| 9 | Over 400 syndromes have been identified with atypical hearing thresholds***. For more information, visit the Hereditary Hearing Loss website (Van Camp & Smith, 2016) | by 9 months | According to natural history of syndrome or concerns |
| Perinatal or Postnatal | | | |
| 10 | Culture-positive infections associated with sensorineural hearing loss***, including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis or encephalitis | No later than 3 months after occurrence | Every 12 months to school age or at shorter intervals based on concerns of parent or provider |
| 11 | Events associated with hearing loss:<br>• Significant head trauma especially basal skull/temporal bone fractures<br>• Chemotherapy | No later than 3 months after occurrence | According to findings and or continued concerns |
| 12 | Caregiver concern**** regarding hearing, speech, language, developmental delay and or developmental regression | Immediate referral | According to findings and or continued concerns |

Note: ABR = auditory brainstem response; AABR = automated auditory brainstem response

*Infants at increased risk of delayed onset or progressive hearing loss

**Infants with toxic levels or with a known genetic susceptibility remain at risk

***Syndromes (Van Camp and Smith, 2016)

****Parental/caregiver concern should always prompt further evaluation

Reference: The Joint Committee on Infant Hearing. Year 2019 Position Statement: Principles and Guidelines for Early Detection and Intervention Programs. *The Journal of Early Hearing Detection and Intervention, 2019*; *4*(2): 1-44

## Appendix 1

Hospital-based newborn hearing screening start-up checklist:

Identify program oversight designee and notify NBHS Program to provide contact information. The oversight designee shall:

- Develop training criteria and competencies for newborn hearing screeners and document completion that:
    - Ensure staff receive pre-service training.
        - The National Center for Hearing Assessment and Management (NCHAM), Utah State University provides an online training course for new hearing screeners.
    - Ensure training curriculums include a post evaluation and certificate of completion.
    - Provide annual competency evaluations for staff who perform hearing screens.
- Develop and implement protocols, policies, and procedures and ensure documentation is available for the Florida Department of Health, NBHS Program review, including:
    - Pre-service training record and annual competency evaluation documentation.
    - Screening equipment manufacturer specifications, functionality testing, repair, and maintenance records.
    - Equipment supplies inventory and ordering process.
    - Procedures for referral after a failed final inpatient hearing screen.
    - Procedures for missed hearing screens (i.e., discharged without a hearing screen).
    - Parent education regarding follow-up testing.
        - Information is available, free of charge, through Newborn Screening's website Florida Newborn Screening. To order these free materials visit Florida Newborn Screening/Toolkit.
    - Documentation of hearing screening results in the infant's medical record.
- Ensure all **final** hearing screen results are reported to the NBHS Program.
    - Report final hearing screen results, including risk factors for late onset hearing loss, to the NBHS Program via the blood specimen card, eReports system, or web portal (for participating hospitals) no later than 7 calendar days from receipt of test results.
    - Provide parents with hearing screen results in writing.
    - Document parent refusals, prolonged NICU stays, or medically fragile infant as the reason not screened.
    - Reconcile monthly reports sent by the EHDI Program with 10 business days.
    - Designate a back-up contact person to serve as the liaison to the state NBHS Program when the program oversight designee is not available.