NEWBORN HEARING SCREENING ALGORITHM
MAINE MEDICAL CENTER

INFANT IS ADMITTED TO UNIT

Secretary enters data into shared drive (if not already present)

High Risk Factor(s) Reviewed

1st Screening of Newborn (infant must be at least 12 hours of age)

RESULT

RESULTS: PASS with Risk Factors
Appointment NOT required prior to infant discharge.
Screener and NUS/Designee to follow process outlined in the Newborn Screening Algorithm for the Referral Process guidelines

RESULTS: REFER Unilaterally or Bilaterally
2nd Screening of Newborn (needs to be done at least 6 Hours after 1st Screening)

RESULT

RESULTS: PASS without Risk Factors
No referral or follow-up appointment needed

Category A Facility
Appointment Required PRIOR to infant’s discharge. See Newborn Screening Algorithm for the Referral Process Guidelines

RESULTS: REFER Unilaterally or Bilaterally

RESULTS: PASS without Risk Factors
No referral or follow-up appointment needed

Effective: 11/2015
Revised: 2/2019
Newborn Hearing Screen Algorithm for the Referral & Appointment Process

**Newborn Hearing Screen Results**

- **REFER Unilaterally or Bilaterally**
- **PASS with Risk Factors**

### Newborn Hearing Screen Referral Form

**to be filled out by Screener (Appendix B):**
- Print an extra results label from the Natus Hearing Screen Machine and place on front of Referral Form
- Child’s Information Section (incl. Risk Factors & Level 1A, 1B or Level 2 follow up)
- Parent/Guardian Contact Info Section
- Alternate Contact (Friend/Relative) Section
- Follow-Up Information Section – Fill in the PCP Name, Phone and Fax #
- Have parents check off the Category A Audiology Facility they would prefer to have their follow-up appointment with
- Deliver Referral Form to NUS/Designee to call and make the follow-up appointment

### Follow-up Appointment Made by the NUS/Designee

- Call selected facility and make follow-up appointment. Newborn is required to have follow-up appointment by 30 days of life
- Fill out the ‘Follow-up Information’ Section on the Referral Form with the Location and Date/Time of Appointment
- Give Parents a scanned copy of the Referral Form
- Fax the Referral Form (Both Sides) to the following places:
  - Selected Audiology Facility (Category A)
  - Maine Newborn Hearing Program (MNHP)
  - Infant’s Primary Care Provider (PCP)
- Enter the Follow-up appointment information in EPIC (Discharge Navigator, Follow up appointment section)
- Provide a copy of the completed Referral Form to:
  - Parents of Infant
  - Infant’s Chart (ORIGINAL COPY)
- Communicate to the Screener and the Infant’s Nurse that the follow-up appointment has been made and a copy of the Referral Form has been given to parents.

### NUS/Designee to:

- Fax completed Referral Form to:
  - Maine Newborn Hearing Program (MNHP)
  - Infant’s Primary Care Provider (PCP)
- Provide a copy of the completed Referral Form to:
  - Parents of Infant
  - Infant’s Chart (ORIGINAL COPY)
- Communicate to the Screener and the Infant’s Nurse that the Referral Form has been faxed to all appropriate places and the parents have received a scanned copy of the Referral Form.

Effective: 11/2015
Revised: 2/2019
Appendix A

Risk Indicators for Hearing Loss

RISK INDICATORS ASSOCIATED WITH PERMANENT CONGENITAL, DELAYED-ONSET, OR PROGRESSIVE HEARING LOSS IN CHILDHOOD

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

- Caregiver concern regarding hearing, speech, language, or developmental delay*
- Family history* of permanent childhood hearing loss
- Neonatal intensive care of more than (>5) days; or, any of the following regardless of length of stay:
  - ECMO*, assisted ventilation greater than or equal to (≥) 5 days*, exposure to ototoxic medications (gentamycin and tobramycin), loop diuretics (furosemide/Lasix), or chemotherapy, and hyperbilirubinemia that requires exchange transfusion
  - In utero infections, such as CMV*, herpes, rubella, syphilis, and toxoplasmosis
  - Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies
  - Physical findings, such as white forelock, that are 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 syndrome, other frequently identified syndromes include Waardenburg, Alport, Pendred, and Jervell and Lange-Nielsen
  - Neurodegenerative disorders*, such as Hunter syndrome, or sensory motor neuropathies, such as Friedrich ataxia and Charcot-Marie-Tooth syndrome
  - Culture-positive postnatal infections associated with sensorineural hearing loss, including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis*
  - Head trauma, especially basal skull temporal bone fracture* that requires hospitalization
  - Chemotherapy
  - Severe birth asphyxia
  - Hyperbilirubinemia without transfusion (at risk for Auditory Neuropathy Spectrum Disorder)

References


Appendix A - Continued

RISK INDICATORS FOR LATER ONSET HEARING LOSS
Maine CDC Newborn Hearing Program
Assessment Key for Data Entry on Hearing Screening

All Risk Factors MUST be completed as “Y” or “N”

✓ Family History of Hearing Loss
  Answer yes (Y) if:
  • Baby has a blood relative with permanent childhood hearing impairment or hearing loss prior to age 20

✓ Perinatal Infection
  Answer yes (Y) if any of the following have been diagnosed during pregnancy:
  • Cytomegalovirus (CMV)
  • Herpes Simplex Virus (genital)
  • Toxoplasmosis, Rubella, or Syphilis

✓ Craniofacial Anomalies
  Answer yes (Y) if the following are present at birth:
  • Cleft lip or palate
  • Choanal atresia
  • Abnormalities of the pons (outer ear) or the ear canal, pre-auricular tags or pits

✓ Very Low Birth Weight
  Answer yes (Y) if the baby’s weight at birth is less than 1500 grams or 3.3 pounds

✓ Hyperbilirubinemia
  Answer yes (Y) if any of the following:
  • The newborn has blood exchange transfusion.
  • Term newborn (>37 weeks gest) with onset of jaundice in the first 24 hours of life.
  • Serum Bilirubin level greater than the following values:
    \[
    \begin{array}{ll}
    \text{BIRTH WEIGHT} & \text{BIL/LEVEL} \\
    \leq 1000 \text{ gms} & 15.0 \\
    1001 - 1250 \text{ gms} & 19.0 \\
    1251 - 1500 \text{ gms} & 13.0 \\
    1501 - 2000 \text{ gms} & 11.0 \\
    2001 - 2500 \text{ gms} & 17.0 \\
    \geq 2501 \text{ gms} & 11.0 \\
    \end{array}
    \]

✓ Bacterial Meningitis
  Answer yes (Y) if diagnosed in the newborn:
  • Bacterial meningitis, especially H. influenza

✓ Ototoxic Medications
  Answer yes (Y) if any of the following have been given:
  (Repeat the hearing screening if the medications have been administered after the initial screen)
  • Aminoglycosides given to the newborn for more than 3 days (Gentamycin, Tobiocyclin, Kanamycin, Strepptomycin, Vancomycin)
  • Diuretics given in combination with aminoglycosides to the newborn (Lasix, Bumex, Demedex, Edecrine, Mannitol)
  • Chemotherapeutic drugs given to the mother prenatally (Cisplatin, Bleomycin, Vincristine, Vinblastine)

✓ Syndrome Associated with Hearing Loss
  Answer yes (Y) if any of the following diagnosed:
  • Down Syndrome (Trisomy 21)
  • Pierre Robin Syndrome
  • CHARGE Syndrome
  • Usher’s syndrome
  • Waardenburg’s syndrome
  • Neurofibromatosis
  • Osteopetrosis (excessive calcification of the bones)
  • Stigma or other findings associated with sensorineural or conductive hearing loss or Eustachian tube dysfunction

✓ Prolonged Ventilation
  Answer yes (Y) if the newborn has any of the following:
  • Prolonged mechanical ventilation for duration equal to or greater than 5 days.
  • Persistent pulmonary hypertension of the newborn associated with mechanical ventilation.
  • Infant has required the use of extracorporeal membrane oxygenation (ECMO)

✓ Severe Asphyxia at Birth
  Answer yes (Y) if any of the following Apgar scores:
  • 0 to 4 at one minute
  • 0 to 6 at five minutes

✓ Admission to NICU
  Answer yes (Y) if baby in NICU for more than 5 days (current screeners cannot record this factor, but MNHP can please notify us)
Appendix A - Continued

Monitoring Infants with Risk Factors for Hearing Loss

<table>
<thead>
<tr>
<th>Level 1A Risk Factors</th>
<th>Level 1B Risk Factors</th>
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</thead>
<tbody>
<tr>
<td>• Family history of permanent childhood hearing loss</td>
<td>• Syndromes associated with progressive hearing loss (Neurofibromatosis, Osteopetrosis, Usher syndrome, Waardenburg Syndrome, Pendred Syndrome, Alport Syndrome, Lange-Neelson Syndrome)</td>
</tr>
<tr>
<td>• In-utero infections (CMV, herpes, rubella, toxoplasmosis, syphilis)</td>
<td>• Neurodegenerative disorders or sensory motor neuropathies (Hunter Syndrome, Friedreich ataxia, Charcot-Marie-Tooth Syndrome)</td>
</tr>
<tr>
<td>• Culture positive postnatal infection (bacterial meningitis, sepsis)</td>
<td>• Head Trauma, especially of the basal skull and temporal bone fractures</td>
</tr>
<tr>
<td>• Craniofacial or temporal bone anomalies (clot lip/pate, areas, ear tags pits)</td>
<td>• Very low Birth Weight (&lt;1500 g)</td>
</tr>
<tr>
<td>• Severe birth asphyxia</td>
<td>• Respiratory Distress</td>
</tr>
<tr>
<td>• Mechanical ventilation</td>
<td>• Bronchiopulmonary dysplasia</td>
</tr>
<tr>
<td>• Hyperbilirubinemia with transfusion</td>
<td></td>
</tr>
<tr>
<td>• Multiple risk factors from any level</td>
<td></td>
</tr>
<tr>
<td>• ECMO</td>
<td></td>
</tr>
<tr>
<td>• Chemotherapy</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 2 Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ototoxic medication exposure (any amount) with no other risk factors</td>
</tr>
<tr>
<td>• Low birth weight (1500-2500 g) with no other risk factors</td>
</tr>
<tr>
<td>• Prematurity (&lt;37 weeks) with no other risk factors</td>
</tr>
<tr>
<td>• NICU stay greater than 5 days</td>
</tr>
<tr>
<td>• Hyperbilirubinemia without transfusion (at risk for Auditory Neuropathy Spectrum Disorder)</td>
</tr>
</tbody>
</table>

*Caregiver concern for hearing, speech, language, or developmental delay should indicate necessity for a diagnostic audiological evaluation at the time of concern.

Level 1A Risk Factors: If the infant falls within this category, and has passed the newborn screening, it is recommended the baby is referred for a full diagnostic evaluation by 3 months. Frequent follow up is recommended.

Level 1B Risk Factors: If the infant falls within this category, and has passed the newborn screening, it is recommended the baby is referred for a full diagnostic evaluation by 6 months. Frequent follow up is recommended.

Level 2 Risk Factors: If the infant falls within this category, and has passed the newborn screening, it is recommended the child be referred for a full diagnostic evaluation by 12 months, and no later than 20-24 months.

*Routine follow-up thereafter is at the discretion of the audiologist/PCP

References:

Maine Newborn Hearing Program 207-287-8427
Updated August 2015

Effective: 11/2015
Revised: 2/2019
Appendix B

SHARED ELECTRONIC HEALTH RECORD
NEWBORN HEARING SCREEN REFERRAL
Page 1 of 2

Child's Information
Mother's Name: ___________________________ Phone#: ___________________________
Alternate Phone#: _______________________
Address: ____________________________________________
Alternate Contact: ___________________________ Phone#: ___________________________
Alternate Phone#: ___________________________
Birth Facility: ______________________________ Screen Facility (if different): _________

PCP Name: ___________________________ Phone#: ___________________________
Fax#: ___________________________

Risk Factor(s)
Level 1A (follow up before 3 months of age)
- Family history of permanent childhood hearing loss
- In-utero infection
- Culture + postnatal infection
- Craniofacial/temporal bone anomalies
- Severe birth asphyxia
- Mechanical ventilation ≥ 5 days
- Hyperbilirubinemia with transfusion
- Multiple Risk Factors (>1)
- ECMO
- Chemotherapy

Level 1B (follow up before 6 months of age)
- Syndromes associated with progressive hearing loss
- Neurodegenerative disorders or sensory motor neuropathies
- Head trauma
- Weight <1500g
- Respiratory distress

Level 2 (follow up before 12 months of age)
- Ototoxic medication (any amount)
- 1500-2500g
- <37 weeks
- NICU > 5 days
- Hyperbilirubinemia without transfusion
*Please select MULTIPLE RISK FACTORS if an infant has > 1 risk factor

Results
1st SCREENING: Date: _____/____/____ Right Ear: Pass Refer N/A Left Ear: Pass Refer N/A
2nd SCREENING (if applicable): Date: _____/____/____ Right Ear: Pass Refer N/A Left Ear: Pass Refer N/A

Follow-up:
- PASS with risk factors (PCP please schedule with Level A Audiology Office before 3 months (level 1A) 6 months (level 1B) or 12 months of age (level 2)
- Refer unilaterally or bilaterally on two screenings (Secretary to Schedule 1 month appointment)
- Date & Time: ___________________________

- Refusal for follow-up screening/audiological assessment (Complete refusal form & fax both refusal & refusal forms to MNHP & PCP)

1st Screening (Natus Hearing Screen result label)

2nd Screening (Natus Hearing Screen result label)

***Hearing Screen Criteria: off caffeine and antibiotics, >34 weeks, and in a crib***

- MNHP (207) 287-4243
- PCP Office
- Auditory Office
- Copy to Parents

Faxed by: ___________ Date: ___________

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Revised: 2/2019
Appendix C

Maine CDC Newborn Hearing Program
Division of Disease Prevention, Department of Health & Human Services

**CATEGORY A**
These facilities have indicated they provide full audiological diagnostic evaluation (this includes ABR with frequency specific results) recommended by the MNHP for infants: birth to 6 months who are referred from hearing screening programs. These facilities also provide testing on children over 6 months of age.

(9) = facility has indicated medical center affiliation for sedated testing, if needed.

<table>
<thead>
<tr>
<th>Location</th>
<th>Facility Name</th>
<th>Address</th>
<th>City, State, Zip Code</th>
<th>Phone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>BANGOR</td>
<td>EMMC Hearing (9)</td>
<td>Eastern Maine Healthcare Mall 905 Union Street, Suite 10 Bangor ME 04401</td>
<td>Bangor</td>
<td>(207) 973-8800</td>
<td>(207) 973-8330</td>
</tr>
<tr>
<td>BANGOR</td>
<td>Warren Center PCHC</td>
<td>992 Union Street, Suite 3 Bangor ME 04401</td>
<td>(207) 404-8080</td>
<td>(207) 941-2582</td>
<td></td>
</tr>
<tr>
<td>LEWISTON</td>
<td>L'Â Hearing Center</td>
<td>72 Strawberry Avenue Lewiston, ME 04240</td>
<td>Lewiston</td>
<td>(207) 786-3365</td>
<td>(207) 517-6163</td>
</tr>
<tr>
<td>PORTLAND</td>
<td>Maine Medical Partners ENT (9)</td>
<td>1250 Forest Avenue Portland, ME 04103</td>
<td>Portland</td>
<td>(207) 797-6763</td>
<td>(207) 797-9571</td>
</tr>
<tr>
<td>WATerville</td>
<td>Northeast Hearing and Speech</td>
<td>75 West Commercial Street, Suite 205 Portland, ME 04101</td>
<td>Portland</td>
<td>(207) 877-1065</td>
<td>(207) 877-1068</td>
</tr>
<tr>
<td>WATerville</td>
<td>Maine General Medical Center (9)</td>
<td>140 North Street Waterville, ME 04901</td>
<td>Waterville</td>
<td>(207) 872-4400</td>
<td>(207) 872-4021</td>
</tr>
</tbody>
</table>

*Unsedated ABR from birth to 3 months.

Facility information is accurate as of November 2018. Information may change due to changes in staffing and diagnostic capacity. Please notify the Maine Newborn Hearing Program with any corrections and updates. (207) 287-5357

Effective: 11/2015
Revised: 2/2019
Appendix D

Maine CDC Newborn Hearing Program
Division of Disease Prevention, Department of Health and Human Services

**CATEGORY E**
These facilities have indicated they provide pediatric audiological testing procedures for children over 6 months of age with services including, but not limited to, soundfield testing, screening prior to electrophysiological testing, otoacoustic emission testing, and support services for hearing aid fitting. (*) = facility able to provide high frequency tympanometry testing.

<table>
<thead>
<tr>
<th>Location</th>
<th>Facility Name</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUGUSTA</td>
<td>Maine General Medical Center</td>
<td>35 Medical Center Parkway, Augusta, ME 04330</td>
<td>(207) 622-8600</td>
<td>(207) 622-8681</td>
</tr>
<tr>
<td>BANGOR</td>
<td>EMMC Hearing</td>
<td>Eastern Maine Healthcare Mall (*)</td>
<td>905 Union Street, Suite 10, Bangor, ME 04401</td>
<td>(207) 973-8130</td>
</tr>
<tr>
<td>RANGOR</td>
<td>Warren Center/Fennoecho Health Center (*)</td>
<td>902 Union Street, Suite 3, Bangor, ME 04401</td>
<td>(207) 973-8130</td>
<td>(207) 973-8130</td>
</tr>
<tr>
<td>BATH</td>
<td>Pine Tree Society (*)</td>
<td>140 Front Street, Bath, ME 04530</td>
<td>(207) 386-6920</td>
<td>(207) 441-1195</td>
</tr>
<tr>
<td>BELFAST</td>
<td>Hearing Solution</td>
<td>147 Northport Avenue, Belfast, ME 04915</td>
<td>(207) 385-0270</td>
<td>(207) 388-0270</td>
</tr>
<tr>
<td>BELFAST</td>
<td>Waldo County General Hospital Audiology Dept. (*)</td>
<td>116 Northport Avenue, Suite 116, Belfast, ME 04915</td>
<td>(207) 926-2269</td>
<td>(207) 926-2269</td>
</tr>
<tr>
<td>BIDDEFORD</td>
<td>Maine Medical Partners ENT (*)</td>
<td>30 West Cold Street, Biddeford, ME 04005</td>
<td>(207) 284-2042</td>
<td>(207) 284-2042</td>
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<tr>
<td>BRENTWOOD</td>
<td>Maine Medical Partners ENT (*)</td>
<td>413 Alfred Street, Suite 201, Biddeford, ME 04005</td>
<td>(207) 284-2042</td>
<td>(207) 284-2042</td>
</tr>
<tr>
<td>BRIDGTON</td>
<td>Maine Medical Partners ENT (*)</td>
<td>55 Main Street, Bridgton, ME 04009</td>
<td>(207) 284-2042</td>
<td>(207) 284-2042</td>
</tr>
<tr>
<td>BRITISH</td>
<td>Family Ear, Nose and Throat (*)</td>
<td>33 Walker Street, Suite 200, Kittery, ME 03904</td>
<td>(207) 882-3232</td>
<td>(207) 882-3232</td>
</tr>
<tr>
<td>LEWISTON</td>
<td>L/A Hearing Center (*)</td>
<td>72 Strawberry Avenue, Lewiston, ME 04240</td>
<td>(207) 786-3205</td>
<td>(207) 786-3205</td>
</tr>
<tr>
<td>NOTRE</td>
<td>Maine Medical Partners ENT (*)</td>
<td>193 Main Street, Narragansett, ME 04126</td>
<td>(207) 746-2835</td>
<td>(207) 746-2835</td>
</tr>
<tr>
<td>PORTLAND</td>
<td>InterMed (*)</td>
<td>84 Marginal Way, Portland, ME 04103</td>
<td>(207) 347-2910</td>
<td>(207) 347-2910</td>
</tr>
<tr>
<td>PORTLAND</td>
<td>Maine Medical Partners ENT (*)</td>
<td>1100 Forest Avenue, Portland, ME 04103</td>
<td>(207) 797-5253</td>
<td>(207) 797-5253</td>
</tr>
<tr>
<td>PORTLAND</td>
<td>Mark Hammond Assoc., Inc (*)</td>
<td>220 Anawoma Street, Portland, ME 04103</td>
<td>(207) 797-5253</td>
<td>(207) 797-5253</td>
</tr>
<tr>
<td>PORTLAND</td>
<td>Northeast Hearing and Speech (*)</td>
<td>75 West Commercial Street, Suite 205, Portland, ME 04101</td>
<td>(207) 784-2165</td>
<td>(207) 784-2165</td>
</tr>
<tr>
<td>PRESQUE ISLE</td>
<td>TAMC ENT (*)</td>
<td>68 Martin Street, Presque Isle, ME 04769</td>
<td>(207) 766-8401</td>
<td>(207) 766-8401</td>
</tr>
<tr>
<td>WATERVILLE</td>
<td>Maine General Medical Center (*)</td>
<td>140 North Street, Waterville, ME 04901</td>
<td>(207) 872-4100</td>
<td>(207) 872-4100</td>
</tr>
</tbody>
</table>

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