NEWBORN HEARING SCREENING PROTOCOL

MAY 2019 REVISION

BC Early Hearing Program

A service of BC Children's Hospital
and the Provincial Health Services Authority

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OVERVIEW

BC EARLY HEARING PROGRAM (BCEHP) PURPOSE

Children born with permanent hearing loss or who acquire permanent hearing loss in the first few years of life are at risk for delays in speech and language development. The goal of the BCEHP is to identify infants and young children who are deaf or hard of hearing and provide their families with resources to support their child's early development. Newborn hearing screening within the BCEHP is the main gateway to detection of hearing loss for young children in British Columbia.

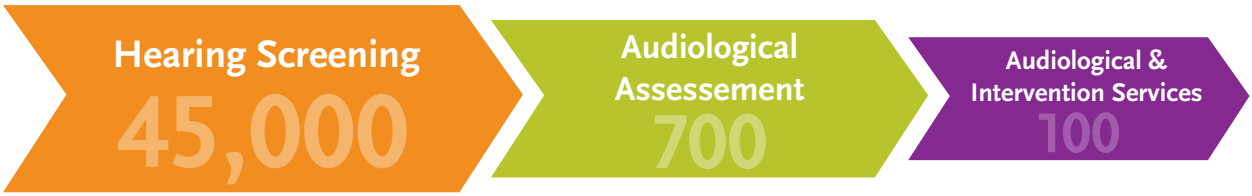
The 'critical period' for learning language is the first few years of life. In most developed countries before universal newborn hearing screening existed, the average age of permanent hearing loss identification was between 2 to 3 years of age. This meant children born with hearing loss often experienced early language deprivation during the critical period resulting in language delays.

Now, with a high-quality screening program, the average age of hearing loss confirmation is typically under six months and often under three months of age – before the critical period has passed. With early identification of hearing loss, prompt, appropriate and consistent hearing aid wear and good language learning supports, most infants and young children with permanent hearing loss can acquire highly effective spoken language skills.

The BCEHP identifies approximately 100 babies born annually with permanent hearing loss.

BCEHP – PROCESS OVERVIEW

The BCEHP uses the following steps to detect permanent hearing loss and provide supports to infants identified as deaf or hard of hearing.



Approximately 45,000 babies a year	Approximately 700 babies a year	Approximately 100 babies a year
• pass or fail results only	• provides detailed information about baby's hearing levels	• hearing equipment is provided when appropriate
• babies who do not pass screening are referred for a full audiological assessment	• babies identified with permanent hearing loss are referred for early support services	• early language services and parent support available for families

HEARING SCREENING ROLE

Hearing screeners have the important job of identifying the 1-2% of babies in the province who require a full audiological assessment. They do this by following the BCEHP screening protocol to ensure that hearing screening results for each baby are accurate and that appropriate referrals for follow-up assessment are made.

SCREENER RESPONSIBILITIES

Screeners are required to:

- understand the screening protocol
- follow the protocol as outlined to ensure high quality screening for each baby
- consult with their Regional Coordinator to determine best practice in situations where the protocol cannot be followed
- document protocol exceptions for each case where the protocol was not followed
- remain within their scope of practice at all times when communicating with families

SCREENER SUPPORT

Key sources of screener support include Regional Coordinators and the BCEHP Provincial Office.

1 BACKGROUND AND CONTEXT

This document defines the British Columbia Early Hearing Program (BCEHP) protocol for hearing screening of newborns and young infants. This revised protocol is effective June 1, 2019 and must be followed for all BCEHP-funded hearing screenings.

The protocol is based on:

- a careful review of scientific and clinical evidence
- outcome data
- BCEHP operational experiences, and
- information from other newborn hearing screening programs worldwide

SCREENING QUALITY:

This protocol was developed by the BCEHP to consistently achieve high quality hearing screening, which is important for every child and family in British Columbia.

Screening quality is determined by its:

- ***effectiveness*** – the accuracy with which babies who need more detailed hearing tests are identified and the proportion of infants who attend their follow-up testing in a timely manner
- ***equity*** – the extent to which effectiveness is consistent across all babies, service locations, individual service providers and over time
- ***efficiency*** – the achievement of acceptable levels of effectiveness and equity at a minimum overall cost

FAILURE TO FOLLOW PROTOCOL

Departure from this protocol can lead to failure to identify a child with genuine hearing loss, unnecessary follow-up tests resulting in family anxiety and disruption, need for corrective program actions such as having to recall babies for re-screening or full audiological assessment, as well as medico-legal risks.

1.1 HEARING AND HEARING LOSS OVERVIEW

Screeners are encouraged to review the BCEHP Typical Hearing and Hearing Loss animations for a basic understanding of the ear and hearing system.

Hearing loss may be present at birth or can occur at any age. It may be temporary or permanent and may be stable, may increase over time (*progressive*) or be variable over time (*fluctuating*). Hearing loss that never resolves is referred to as *Permanent Hearing Loss* or *PHL*.

TYPES OF HEARING LOSS

Sensorineural hearing loss – most PHL is caused by disorders of structure or function of the cochlea or its nerve connections to higher brain centres.

Conductive hearing loss – hearing loss due to disorders of sound conduction in the outer or middle part of the ear. Conductive hearing loss in children is often caused by fluid in the middle ear, which can be associated with ear infection, and is considered a temporary conductive hearing loss. In some cases conductive hearing loss can be permanent due to a structural malformation of the ear canal or middle ear ossicles (e.g., ear canal atresia).

Mixed hearing loss – conductive and sensorineural hearing loss that occur in the same ear at the same time.

1.2 EARLY HEARING DETECTION AND INTERVENTION (EHDI) PROGRAMS

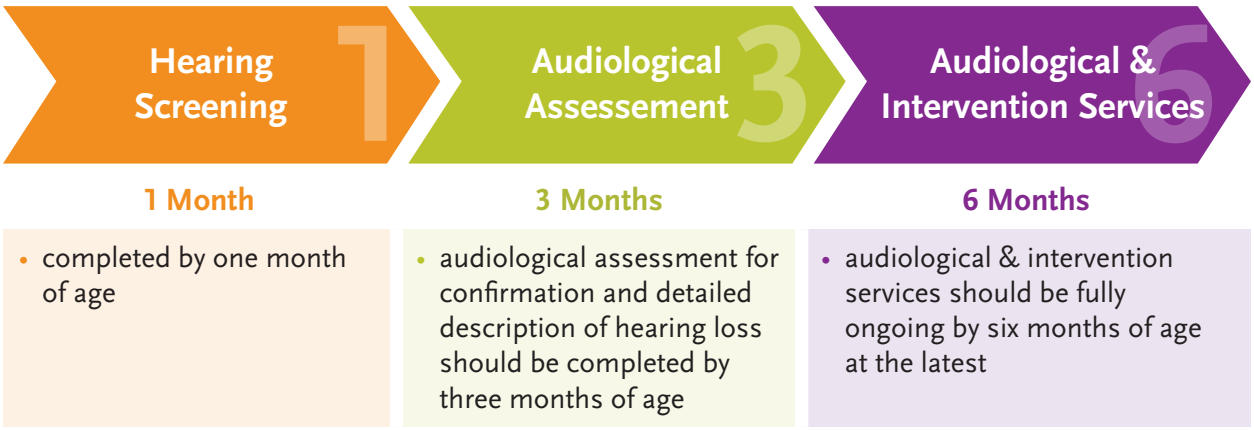
The BCEHP is an example of what are widely referred to as Early Hearing Detection and Intervention (EHDI – pronounced 'eddy') programs, which have become a standard of care in many regions and countries over the last 20 years. Effective EHDI programs include screening of the highest possible quality that must be strongly linked to appropriate follow-up services.

Universal newborn hearing screening is only justified if it leads to early identification of hearing loss and intervention for affected children and families. This includes complete audiological assessment to confirm the presence or absence of hearing loss, as well as determining the hearing loss type and severity.

For children identified with hearing loss, subsequent services may include a number of interventions to improve a child's hearing and communication abilities. Interventions may be:

- audiological (such as amplification equipment)
- early language therapy options, including speech and oral (spoken) language development training and sign language training
- medical (such as medications for persistent ear infections), and/or
- surgical (such as repair of structural disorders or insertion of a cochlear implant)

1.3 1-3-6 TIMELINES AND CORRECTED AGE



The BCEHP is only successful if young children with PHL are able to achieve *early* access to effective interventions for hearing and communication development. There are important timelines that must be achieved at each step of the EHDI process. The most widely accepted benchmarks are the '1-3-6' timelines, reflected in the US Joint Committee on Infant Hearing guidelines.

These benchmarks specify that, to the fullest extent possible, the overall process of hearing screening should be completed by one month of age, audiological assessment for confirmation and detailed description of hearing loss should be completed by three months of age and intervention procedures should be fully ongoing by six months of age. These criteria are challenging to fulfill, but their widespread achievement is an important measure of program effectiveness.

CORRECTED AGE

The age referred to in 1-3-6 is *corrected age*, which is the chronological age of the baby adjusted for a 40-week gestation period. For example, a baby born eight weeks ago (chronological age 8 weeks) after an estimated 34 weeks of gestation has a corrected age of: (34 – 40) + 8 = 2 weeks. Except where otherwise stated, any age specified in this document is a corrected age.

1.4 HEARING SCREENING TESTS

Hearing loss in newborns and young infants can only be detected and characterised accurately by objective measures of hearing. These include physiological measures of the ear and its connections to the brain. For practical screening of large numbers of babies, these physiological measurements are automated.

Two screening tests are available in the BCEHP: an Automated Otoacoustic Emissions (AOAE) test and an Automated Auditory Brainstem Response (AABR) test. As of 2019, both tests are implemented by the Otometrics Madsen AccuScreen device.

AUTOMATED OTOACOUSTIC EMISSIONS (AOAE) SCREENING TEST

When a healthy ear is stimulated by sound, the cochlea (inner ear) generates faint sounds called otoacoustic emissions (OAEs). Significant hearing loss eliminates OAEs making the presence or absence of OAEs a useful way to test for hearing loss.

The Automated Otoacoustic Emissions (AOAE) screening test:

- presents specific sounds to the ear
- measures responses from the cochlea with a miniature microphone in the ear canal
- analyses the recorded signal
- evaluates and reports adequacy of recording conditions
- applies a statistical decision algorithm to determine if an is OAE present
- gives an automated Pass or Fail result

If test conditions are good, the AOAE test will only take a few seconds per ear. Ideally the baby should sleep during the test because movement or crying interferes with the recording and automatic detection of the OAEs.

AUTOMATED AUDITORY BRAINSTEM RESPONSE (AABR) SCREENING TEST

Auditory Brainstem Response (ABR) is a tiny electrical signal from the auditory nerve generated in response to brief sounds. An ABR is typically less than one millionth of a volt in size and lasts only about one hundredth of a second. An ABR is much smaller than other electrical signals at the scalp that are caused by the brain, eyes, muscles, heart and external sources such as power leads and radio waves. Sophisticated equipment is needed to extract and analyze an ABR.

The Automated Auditory Brainstem Response (AABR) screening test:

- presents specific sounds to the ear
- records electrical responses on the surface of the head using sensitive signal amplifiers
- evaluates the measured electrical signal
- extracts the ABR waveform if present
- analyses the data with a statistical algorithm
- gives an automated Pass or Fail result

Again, ideally the baby should sleep during the AABR test, because electrical signals from muscles of the head and neck are very large during crying or movement and obscure the detection of an ABR signal. Typically, an AABR test takes about 2-5 minutes per ear, depending on how relaxed and still the baby is.

SUCCESSFUL SCREENING

Both AOAE and AABR screening tests are straightforward to run when test conditions are good. However, babies may be unsettled or active and test environments may be less than ideal, making successful AOAE probe placement and AABR sensor attachment challenging. In order to achieve consistently high rates of successful screening, Screeners require considerable skill and judgement in interacting with families, handling of the baby, controlling the test environment and operating the instrumentation.

1.5 LATE-ONSET PHL AND TARGETED MONITORING

Some children have normal hearing at birth but develop hearing loss in early childhood. These are cases of *late-onset* or *acquired* PHL. Evidence suggests that, for every 90-100 cases of PHL identified per year in BC through hearing screening, an additional 45-50 children will express late-onset or acquired PHL by school age. Prompt identification and intervention for late-onset and acquired hearing loss is a significant challenge for many EHDI programs including BCEHP.

Possible causes for late-onset PHL include:

- pre-existing or newly acquired infections
- head trauma
- ototoxic medications
- syndromes
- other genetic anomalies or predispositions

In BC, Screeners are responsible for identifying newborns with risk factors for PHL and ensuring that initial referrals for audiological follow-up assessment are made. Examples of important risk indicators include prenatal cytomegalovirus (CMV) infection and syndromes (such as Down, Pendred, Usher, etc.).

See Section 3 for complete information about BCEHP late-onset risk factors and referral requirements for audiological monitoring.

1.6 BC EARLY HEARING SURVEILLANCE TOOL (BEST)

Delivery of a chain of clinical and support services in an effective, equitable and efficient manner is only possible if supported by a high-quality information management system. The system must track every baby's progress along the EHDI care pathways, trigger required actions, and record outcomes of all key clinical and support processes.

The data system used within the BCEHP is called the BC Early Hearing Surveillance Tool (referred to as 'BEST'). All screeners within the BCEHP are required to use the BEST system

to record hearing screening results, family contact information, presence or absence of hearing loss risk factors, etc. It is through this data system that babies are referred for subsequent steps in the EHDI process and the BCEHP Provincial Office is able to track individual and group data. All Screeners will be provided with an overview of BEST by their BCEHP Regional Coordinator or a designate.

2 PROTOCOL FOR CONDUCTING HEARING SCREENING

2.1 CONTACT AND CONSENT

Prior to screening, Screeners must contact the baby's caregivers, verify contact information, introduce the BCEHP screening and seek consent to screen. Consent must be obtained from a parent, other legal guardian or the baby's nurse. Screeners must attempt to engage all family members present in the information exchange.

NON-CONSENT

If parents or guardians do not consent to having their baby's hearing screened, a decline waiver is signed, written communication milestones information is provided and the process is terminated.

2.2 ASSIGNMENT TO THE 'WELL-BABY NURSERY (WBN)' OR 'NEONATAL INTENSIVE CARE UNIT (NICU)' GROUP

Well-Babies and NICU babies differ in their average likelihood of permanent hearing loss (PHL). Many NICU babies are at risk for PHL while most WBN babies are not. Different screening tests are used with each group because of their different levels of PHL risk and the types of hearing loss anticipated.

NICU DEFINITION

For BCEHP purposes, a NICU baby includes any newborn attending a Special Care Unit for a cumulative total of 48 hours or more. This includes time spent in both Level 1 and Level 2 Special Care Units.

WBN DEFINITION

Babies who do not meet the NICU criteria (spend less than a cumulative total of 48 hours in a Special Care Unit) are designated as WBN babies.

2.3 IDENTIFY BCEHP RISK FACTORS FOR LATE-ONSET HEARING LOSS

Screeners are responsible for collecting accurate and complete risk factor information for every baby they screen.

Risk factors are attributes of the baby, family or medical care that are associated with increased likelihood of PHL. They can affect many aspects of the audiological and medical management of individual babies.

DETERMINING RISK FACTORS

Risk Factors are identified by chart review (Newborn Record Part 1 or electronic equivalent) and/or consultation with nursing or medical staff. The only risk factor that is not collected from the hospital chart is the family history of childhood hearing loss, which can only be confirmed following discussion with the family.

See Section 3 for BCEHP Risk Factors for Hearing Loss and Screener referral responsibilities.

SCREENING WELL-BABY NURSERY (WBN) BABIES

2.4 SCREENING TESTS USED

All BCEHP babies are screened using a two-stage screening protocol. Assignment to either the WBN or NICU group determines which screening tests are used for each stage of screening.

Stage 1 WBN – AOAE screen. Babies who fail the AOAE in one or both ears continue to Stage 2.

Stage 2 WBN – AABR screen.

See an overview of the Typical Process for In-Hospital Births.

SUBSTITUTING SCREENING TEST TYPE

It is appropriate to screen any baby with an AABR in place of an AOAE. In some cases, this will be recommended by your Regional Coordinator. It is never appropriate to screen with an AOAE in place of an AABR.

2.5 EXPLAIN THE SCREENING PROCEDURE

Screeners must review the screening process with family members present and answer any questions before starting the screening. It is important to emphasize that babies need to be sleeping or settled for the screening test.

2.6 TIMING OF IN-HOSPITAL AOAE SCREENING

Screen all babies as late as possible before hospital discharge.

	Criteria for readiness
Vaginal birth	13 hours after birth
Caesarean section	24 hours after birth

Babies who cannot be screened within the in-hospital timeline should be referred to outpatient screening in the community.

IN RARE CIRCUMSTANCES ONLY

Families living in remote communities or without easy access to outpatient screening services may be offered the option of early screening if the baby is within 1-2 hours of the readiness criteria and discharging from the hospital. See Early Screening scripting for appropriate messaging to families.

2.7 DEFINITIONS – SUCCESSFUL AND COMPLETE SCREENS

Successful screen – a screen giving a Pass or Fail result in any individual ear.

Complete screen – a successful screen in both ears. Screeners should make every reasonable effort to obtain a complete Stage 1 (AOAE) screen prior to hospital discharge for all babies who meet criteria for screening readiness.

2.8 REQUIRED BABY STATE FOR SUCCESSFUL AOAE SCREENING

Successful AOAE screening requires the baby to be asleep or resting quietly. A baby who is active or crying cannot be reliably screened and screening in this state should not be attempted.

Screeners must judge that a baby is quiet enough for a successful screen before the screening test is started. Using 'trial' screening runs as a 'test' of baby's state is not acceptable because overall, such action increases false Passes and undermines the credibility of a Fail result.

2.9 POSITIONING FOR AOAE SCREENING

IN-HOSPITAL

Prior to screening in-hospital, babies should be swaddled and positioned in the bassinet lying on one side. Place screening equipment at baby's feet with the probe cable running up in front of the baby and around to top of the head. Screeners should position themselves behind the baby for the best view of the ear and probe placement.

IN-COMMUNITY

Prior to screening in a community clinic, babies should be removed from the car seat/carrier and positioned lying on one side (typically with mom holding in a breastfeeding position). Place screening equipment at baby's feet with the probe cable running up in front of the baby and around to top of the head. If the baby is nursing, the probe cable can be placed around the back of Mom's neck so that it does not touch the baby's face. Screeners should position themselves behind the baby for the best view of the ear and probe placement.

2.10 EAR CANAL 'COLLAPSE'

A baby's external ear canal walls are soft and can sometimes close ('collapse') temporarily. This often happens when the baby has been lying on the ear or sleeping in a parent's arms. It is recommended that Screeners gently pull the pinna outward and massage the ear canal area with a circular motion prior to placing the AOAE probe.

2.11 EARTIP SELECTION AND PROBE INSERTION

To achieve a good seal and secure retention throughout the test, the eartip selected should be the largest that can be inserted at least halfway into the ear canal. While gently pulling out, back and slightly up on the pinna, gently but firmly insert the eartip and probe using a quick quarter turn screwing motion.

DEBRIS CHECK:

It is no longer required that the eartip be inserted and removed as a debris check before running the first AOAE attempt. BCEHP has determined that the potential benefits of routine debris checks are outweighed by the risk of arousing the baby and common lack of occluding debris.

Screener must always inspect the eartip and probe tip for debris following any initial AOAE attempt that results in a Fail result prior to running the second attempt.

2.12 EARTIP/PROBE INSPECTION AFTER A NON-START

On the start command (▶), the AccuScreen measures stimulus and noise levels in the ear canal and adjusts the stimulus level to a required target (auto-calibration). The noise level in the ear canal must be acceptably low. If test conditions are not satisfied, the device gives an error message and the screening test does not start.

Common reasons for error messages include:

- poorly fitting eartips – either too small or too large for the ear canal
- residual birth fluid or tissue debris blocking the eartip
- eartip sitting against the ear canal wall

Screeners must address any of these issues by removing the probe, inspecting the eartip for debris, replacing the eartip/probe tip as necessary and ensuring the eartip is inserted all the way on to the probe tip before re-inserting the probe into the baby's ear.

2.13 PROBE MOVEMENT AND ENVIRONMENTAL NOISE

Movement of the baby, the probe or its attachments can generate noise mechanically. Never hold the probe head during screening. If necessary, Screeners may hold the probe lead (cable) if the baby briefly becomes active. If the baby remains active or starts crying, the screening should be stopped and the baby settled before another screening is attempted.

In some cases, environmental noise can be sufficient to affect the screening test. Television noise or conversation in the room should not interfere with screening. As a guide, if you cannot hear someone talking to you in a soft voice from a meter away, the noise level in the room could be high enough to affect AOAE screening. The effect of environmental noise depends on the eartip fit; the better the fit, the less the likely it is to interfere with screening.

2.14 SECOND AOAE ATTEMPT AFTER A FAIL RESULT

Within Stage 1 screening for Well-Babies, a second AOAE screening is permitted and encouraged for any ear that fails the first AOAE screening.

Following an initial AOAE screening Fail result:

- remove the eartip/probe and inspect for debris
- replace with a new eartip and probe tip if necessary
- re-insert the probe into the ear canal for the second AOAE attempt
- run second AOAE attempt

NOTE:
Only one attempt is ever permitted with AABR.

SECOND AOAE ATTEMPT RESULTS

Pass: screening is complete; baby has an overall Pass result for that ear.

Fail: screening is complete; baby has an overall Fail result for that ear.

TIMING NOTE: Screeners must complete the second AOAE screening within the same shift on the same day. Otherwise, the Fail result of the first AOAE screening stands as the overall Stage 1 result and the baby is referred for Stage 2 screening by AABR.

2.15 INCOMPLETE TESTS

An incomplete test is an AOAE or AABR that is started* but does not run to a Pass or Fail result.

Where possible, Screeners must avoid multiple incomplete screening tests.

Common causes of incomplete tests are:

- probe errors
- calibration timeouts
- interruptions such as probe falling out of the ear
- baby unsettled or crying

***Screening start**

Both AOAE & AABR testing officially starts once the ▶ button is pressed on the AccuScreen unit.

LIMITS

For any single stage of screening, Screeners should limit the number of incomplete tests to four. In the cases where more than four incomplete screening tests occurred, a comment explaining the circumstances is required in BEST.

IMPACT OF INCOMPLETE TESTING ON FAMILY

Incomplete tests leave the family with the feeling that the equipment is not working or that the screener is not comfortable with the procedure. If a family loses confidence in the screening process, they are less likely to attend recommended follow-up or trust a future confirmation of hearing loss.

When a baby is not in an appropriate state for screening, Screeners have two options for the family. The Screener can check back later to see if baby settled or, if necessary, refer baby for screening as an outpatient in Community.

2.16 'TRIAL' STARTS AND ABORTED RUNS

Once a screening test starts (▶), it must left to run to completion. 'Let's try it and see if the conditions are good enough' is not an acceptable reason to start a screening test. In particular, it is important to allow screenings to run to a result when appears they will give a Fail result. A Fail result means there is a higher likelihood of hearing loss and early identification of hearing loss is the objective of the program.

EXCEPTION:

The screening test can be aborted if conditions unexpectedly change (e.g., probe falls out of the ear or baby starts crying).

2.17 EXPLAINING RESULTS TO PARENTS

Communicating effectively with parents is a key part of a hearing screener's role. Screeners are expected to follow the BCEHP Scripts when speaking with parents regarding screening results.

NOTE: A hearing screening never confirms the presence or absence of a hearing loss. A failed hearing screening increases the likelihood or chance of hearing loss in that individual baby.

2.18 STAGE 2 SCREENING – WHERE STAGE 1 SCREENING WAS COMPLETED IN-HOSPITAL

All WBN babies who fail Stage 1 AOAE screening must receive Stage 2 screening by AABR. Both ears must always be screened by AABR, even if one ear passed the AOAE screening.

STAGE 2 SCREENING IN-HOSPITAL

- Most Stage 2 screenings are completed the following day for babies still in-hospital (or within the first few weeks as an outpatient in Community).
- If a baby is 16 hours or older then back-to-back screening in-hospital is acceptable; this is recommended for all babies who do not have easy access to community services.
- If a baby is less than 16 hours old, Screeners must wait at least four hours between Stage 1 and Stage 2 screening.

STAGE 2 SCREENING IN THE COMMUNITY

In cases where Stage 2 AABR screening is not completed in-hospital, it should be provided in the community before 1 month of age. Screeners are responsible for referring babies in BEST to community screening clinics for Stage 2 screening.

2.19 STAGE 2 SCREENING – WHERE STAGE 1 SCREENING WAS NOT COMPLETED IN-HOSPITAL

Babies who receive Stage 1 screening in Community (hospital misses or home births) and go on to require a Stage 2 screening, must receive the AABR screening within the same community visit.

It is not appropriate to schedule a second community screening appointment unless requested by the family. In these cases, the Screener must make a note of the circumstances in BEST.

2.20 STAGE 2 SCREENING EAR TEST ORDER

Stage 2 (AABR) screening must begin in an ear that failed Stage 1 (AOAE) screening. If both ears failed Stage 1 screening, then Stage 2 screening can begin in either ear.

2.21 REQUIRED TEST CONDITIONS FOR SUCCESSFUL AABR

Successful AABR screening requires the baby to be asleep or resting quietly. Sleeping is preferred to resting quietly because electrical 'noise' from head and neck muscles (myogenic noise) can be large for any baby who is awake, even if the baby is lying still and appears relaxed. Myogenic noise distorts and obscures the much smaller ABR response. The effects of myogenic noise are minimized by screening with low and symmetrical electrode impedances – see Section 2.23 for more on impedance value requirements.

A baby who is active or crying cannot be screened reliably and screening in this state should not be attempted. Screeners must judge that a baby is quiet enough for a successful screen before a screening test is started. Using 'trial' screening runs as a 'test' of baby's state is not acceptable. 'Trial' screening runs increase potential for false Passes and undermine the credibility of a Fail result.

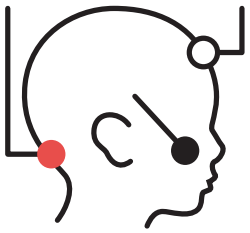
Any of the following can help baby settle into a better state for screening:

- feeding
- changing diaper
- parents taking baby for a walk
- waiting

2.22 SKIN PREPARATION AND ELECTRODE POSITION FOR AABR

SKIN PREPARATION:

- always start with the forehead
- use Nu-Prep on a gauze pad
- wipe the skin using five firm strokes in the same direction at each electrode site (red, black and white dots)
- use a new gauze pad to dry the skin at the three electrode sites before placing the electrode tabs



CORRECT ELECTRODE PLACEMENT ENSURES ACCURATE SCREENING:

- Snap electrode leads on to the electrode tabs before removing the plastic backing
- Electrode tabs (with leads attached) are placed horizontally at:
  - White – forehead, high and centered, as close to the hairline as possible
  - Red – nape of the neck, high and centered, as close to the hairline as possible
  - Black – cheek

2.23 AABR ELECTRODE ATTACHMENT AND IMPEDANCE VALUES

All three electrode tabs must be securely attached to the skin. Replace any tab that is not sticking well. Electrode attachment and impedance affect the quality of the ABR recording, measured noise levels, overall test time and screening results.

IMPEDANCE VALUES

Electrode contact impedances should all be less than or equal to 5 kΩ.

Any skin site with impedance values higher than 5 kΩ must be re-prepped, dried and a new electrode tab applied. In most cases re-prepping the forehead will improve conditions well enough for screening.

If after two re-prepping efforts the impedance criteria cannot be satisfied, the AABR screening should be run. In these cases, the Screener must make a note of the circumstances and attempts to improve impedance in BEST.

2.24 AABR LISTENING CHECK

Always listen to ensure that sound is coming out of the ear coupler before placing it over baby's ear for testing. Listening checks reduce ear mix-ups, other errors in test set-up and allow confirmation that the earphone cable is working correctly at the time of testing.

2.25 AABR SCREENING

STARTING SCREENING

Screeners should only start (▶) the AABR screening once they have determined:

- impedance values are appropriate (all 5 kΩ or lower)
- sound is coming out of the ear coupler, and
- baby is sleeping or resting quietly

SCREENING MUST RUN THROUGH TO COMPLETION

'Let's try it and see if conditions are good enough' is not acceptable. It is important to allow screenings to run through particularly when it looks like they will give a Fail result. A Fail result means a higher likelihood of hearing loss, and early identification of hearing loss is the objective of our program.

AABR screening can be paused if the baby becomes active.

AABR screening may be aborted if the screening conditions unexpectedly change (e.g., baby starts crying).

LIMIT OF FOUR INCOMPLETE TESTS PER STAGE

For any single stage of screening, limit the number of incomplete tests to four. In the cases where more than four incomplete screening tests have occurred, a comment explaining the circumstances is required in BEST.

AABR SCREENING RUN ONLY ONCE PER EAR

Within Stage 2 screening, AABR is only run once per ear. The only appropriate action following a failed AABR (Stage 2) screening is a referral for ABR Assessment.

AABR FAIL RESULT

A Stage 2 AABR Fail in either ear requires a referral for detailed ABR Assessment with an audiologist.

If the first ear fails AABR screening, the other ear must still be tested even if that ear had previously passed AOAE screening. However, if conditions change for the baby and testing the

second ear is not possible, it is inappropriate to schedule a repeat AABR visit for that purpose alone. Instead, refer baby for ABR Assessment and note the circumstances in BEST.

In contrast, if both ears Failed Stage 1 (AOAE) screening and the first ear tested by AABR Passes, the second ear must be screened by AABR in order for screening to be complete.

SCREENING NICU BABIES

2.26 NICU SCREENINGS – AABR IS THE ONLY TEST USED

All NICU babies must be screened by AABR only. NICU babies are never screened using AOAE.

NICU DEFINITION

For BCEHP purposes, a NICU baby includes any newborn attending a Special Care Unit for a cumulative total of 48 hours or more. This includes time spent in both Level 1 and Level 2 Special Care Units.

2.27 AABR SCREENING PROCEDURE FOR NICU BABIES

The general principles of AABR screening for NICU babies are identical to those outlined previously for Stage 2 AABR for WBN babies (2.21 – 2.25).

It is emphasized that successful AABR screening requires babies to be asleep or resting quietly, and that all electrode impedance values must all be less than or equal to 5 kΩ.

AABR screening is only run one time for each stage of screening.

2.28 TIMING OF AABR SCREENING FOR NICU BABIES

Screening for NICU babies must only be done when the baby is medically stable and at least 34 weeks gestation.

The rules for the required minimum number of hours from birth to the AOAE screening do not apply to AABR screening, but where practical, as close as possible to hospital discharge is preferred.

2.29 STAGE 2 SCREENING FOR NICU BABIES

Any NICU baby who Fails Stage 1 AABR screening must receive Stage 2 AABR screening (repeat screening). Stage 1 and Stage 2 screenings must never occur on the same day. Screeners must always rescreen both ears for Stage 2, even if one ear Passed Stage 1 screening.

STAGE 2 SCREENING IN-HOSPITAL

Ideally, Stage 1 and Stage 2 screenings both occur in-hospital prior to discharge. Screenings must be completed on different days.

STAGE 2 SCREENING IN-COMMUNITY

If Stage 2 screening is not completed in-hospital, it should be provided in Community within one month of hospital discharge. Screeners are responsible for referring babies in BEST to community screening clinics for Stage 2 screening.

REFERRALS TO ABR ASSESSMENT

2.30 ABR ASSESSMENT AND TIMING

All Babies who Fail Stage 2 AABR screening must be referred for ABR Assessment. Referrals for ABR Assessment must be sent immediately after Stage 2 screening is completed.

ABR Assessment is an in-depth evaluation of a baby's hearing levels by a BCEHP Audiologist with specialized training. The Audiologist will figure out exactly what sounds the baby can and cannot hear. If there is hearing loss, the Audiologist will be able to tell the family how much hearing loss there is for each ear, for what types of sounds, whether it is likely to be temporary or permanent, and what can be done to help.

ABR Assessment appointments should occur between 4 and 8 weeks corrected age. ABR Assessment includes detailed, manual testing of the baby's hearing levels for each ear while the baby is sleeping; it is more difficult to achieve complete results on babies older than eight weeks. In addition, keeping the interval short between screening and ABR assessment limits anxiety for the family and allows them to move rapidly towards intervention if PHL is confirmed.

2.31 MESSAGING TO FAMILIES ABOUT THE IMPORTANCE OF ABR ASSESSMENT

Communicating effectively with parents is a key part of a hearing screener's role. Screeners are expected to follow the BCEHP Scripts when speaking with parents regarding screening results.

If the family does not attend the ABR Assessment, the baby is at-risk of having an unidentified hearing loss during the critical early years of language development.

The Screener's top priority is to ensure the family understands:

- their baby did not pass hearing screening
- a full hearing test (ABR Assessment) is recommended and will give them specific information about their baby's hearing in each ear
- it is important to attend the appointment

Families are most likely to attend the ABR Assessment when they feel the recommendation is valid, reasonable and important.

RE-SCREENING NICU ADMISSIONS WITH AABR

2.32 RE-SCREENING NICU ADMISSIONS AFTER A WELL-BABY (AOAE) PASS AND DISCHARGE HOME

Babies re-admitted to the NICU who previously passed Well-Baby AOAE screening and were discharged home, must be only be re-screened if a BCEHP Risk Factor is present. Re-screening must always be done using AABR. In these cases, level of care is changed in BEST to 'NICU' and risk factors are updated with comments as required.

Babies are sometimes re-admitted as neonates to a Special Care Unit (e.g., NICU, PICU, Pediatric ward). Typical reasons include jaundice, feeding or respiratory issues. For most re-admitted babies there will be no increased risk of PHL associated with their re-admission to the hospital. This group of babies is very different from those admitted to a Special Care Unit immediately after delivery.

A few re-admitted babies will be at increased risk for PHL. If a baby requires urgent medical attention (e.g., for serious head injury, infection, cardiac or respiratory crisis), it is the responsibility of the managing physician to determine the need for follow-up audiological assessment and make the appropriate referral.

NICU admissions after a Well-Baby miss and discharge home

If the baby missed Stage 1 (AOAE) screening before initial WBN hospital discharge and the NICU re-admission is 48 hours or more, the baby becomes a BCEHP 'NICU baby' and must receive Stage 1 screening by AABR. If re-admission to the NICU is less than 48 hours and screening is not completed in-hospital, the baby is booked for WBN Stage 1 AOAE screening as an outpatient.

2.33 RE-SCREENING NICU ADMISSIONS AFTER A WELL-BABY (AOAE) PASS FOR BABIES NOT YET DISCHARGED HOME

Babies can sometimes be transferred to a Special Care Unit (e.g., NICU) after having Passed Well-Baby AOAE screening but before discharge to home. For these babies admitted to the NICU for 48 hours or more, re-screening with AABR in the NICU is required. Level of care is updated in BEST to 'NICU' and risk factors are updated with comments as required. Babies admitted to the NICU for less than 48 hours are not re-screened with AABR.

SCREENING BABIES IN COMMUNITY

2.34 COMMUNITY APPOINTMENT LIMITS

Make every reasonable effort to limit the required number of community screening visits to one.

In rare cases, this may not be possible if the parent is not able to stay for the Stage 2 screening. In these cases, the Screener can offer the family one additional community appointment to complete screening and must make a note of the circumstances in BEST.

If screening is not completed after two visits to the community clinic, the Screener consults their Regional Coordinator regarding whether to proceed with scheduling additional screening appointments or referring the infant for ABR assessment.

2.35 STAGE 1 SCREENING BY AOAE IN COMMUNITY

WBN babies

For Well-Babies who Fail Stage 1 screening by AOAE in Community, Stage 2 AABR should happen within the same appointment.

2.36 STAGE 1 SCREENING BY AABR IN COMMUNITY

In cases where a baby receives Stage 1 screening by AABR in Community and Fails, Stage 2 screening is Bypassed and the baby must be referred directly for ABR Assessment. AABR screening is not repeated back-to-back on the same day for anyone.

2.37 AGE LIMITS FOR SCREENING

Hearing screening should only be done for infants less than 6 months corrected age. Infants older than 6 months should be referred for audiological assessment at their local public health audiology clinic.

Screening older infants is invalid because there is not enough published data to know its reliability. Screening has been validated adequately only for newborns and young infants.

3 RISK FACTORS FOR HEARING LOSS AND REFERRALS FOR AUDIOLOGICAL MONITORING

3.1 HEARING LOSS IN EARLY CHILDHOOD

The broad purpose of the BCEHP is to minimise the disadvantage to young children caused by undetected permanent hearing loss (PHL). Undetected PHL typically causes delays in speech and language development. The most critical time period to identify and provide early intervention for children with hearing loss is between birth and 3 years of age.

HEARING LOSS ONSET

Permanent hearing loss can occur at any time in early childhood. Permanent hearing loss present at birth is *congenital PHL*. Alternately, PHL not present at birth is *non-congenital PHL*. If the event or condition thought to cause a non-congenital PHL occurred before or during birth (e.g., baby had a CMV infection in utero), then the non-congenital PHL is *late-onset*. If the cause of hearing loss occurs after birth (e.g., baby contracts meningitis at 2 months old), the non-congenital PHL is *acquired*.

Congenital PHL	PHL present at birth
Non-Congenital PHL	PHL not present at birth
Late-onset PHL	Cause of PHL occurs before or during birth
Acquired PHL	Cause of PHL occurs after birth

HEARING LOSS PREVALENCE

The prevalence of congenital PHL is about 1-3/1000 newborns. As birth cohorts (groups with the same birth year) of children get older, the prevalence of PHL increases. This is due to both late-onset and acquired PHL developing.

In addition to the 90-100 cases of congenital PHL per year in BC identified through newborn hearing screening, it is estimated that approximately 45-50 more children will express late-onset or acquired PHL by age 5 years, with 25-30 of them identifiable by age 2. These numbers justify further efforts at hearing loss detection over the first few years of life.

The process of identifying PHL that is not detected by newborn hearing screening is called *Monitoring*.

3.2 BCEHP TARGETED MONITORING USING RISK FACTORS

Any child may develop non-congenital PHL at any age. To find everyone with PHL, screening programs would need to retest hearing for all babies throughout childhood; however, the costs and logistics of this would be unsustainable for a public health system.

Instead, BCEHP uses an approach called *Targeted Monitoring* to improve the benefit-to-cost ratio and to achieve realistic overall costs. Targeted Monitoring is a process of proactively recalling young children for audiological assessment who have not been identified with PHL through newborn hearing screening but have one or more risk factors for hearing loss.

Risk factors are attributes of the baby, family or medical care that are associated with increased likelihood of PHL.

SCREENER RESPONSIBILITIES

Collect Risk Factors: It is important that Screeners accurately collect complete risk factor information for every baby screened so that babies with risk factors can be referred for appropriate Monitoring.

Make Initial Referral: Screeners are responsible for making initial referrals for audiological follow-up for babies with risk factors who pass hearing screening. See the Screener Risk Factors Cheat Sheet for type and location of initial referrals for each risk factor.

Communicate with Families: In cases where Monitoring is recommended, Screeners play a key role in communicating to families that it is important to attend the recommended follow-up even if they believe their child is hearing well.

3.3 BCEHP RISK FACTORS AND MONITORING SCHEDULES

The Monitoring Schedule depends on the risk factor present. Children with more than one risk factor should be referred based on the most conservative follow-up.

Two categories of Monitoring:

Basic Monitoring: Children are seen for audiological assessment at their local public health audiology clinic at 9 months and 3 years of age.

Specialized Monitoring: Children receive more frequent audiological assessment and some appointments are coordinated with specialized interdisciplinary teams (e.g., Cleft Palate Program, Neonatal Follow-Up Program).

See the Screener Risk Factors Cheat Sheet for a quick reference guide to initial referral type and locations only.

Craniofacial Differences

A. Cleft Palate (including sub-mucous cleft palate)

Specialized Monitoring. Children will be enrolled in a Cleft Palate Program.
See Cleft Palate Carepath for details.

Screeners are required to make TWO referrals for all babies with cleft palate:

1. **Refer for ABR Assessment at local ABR Assessment Centre following Stage 1 screening regardless of Stage 1 screening result.**
2. **Refer to Cleft Palate Craniofacial Program at BCCH Audiology.**
   NOTE: Families from Vancouver Island and Kelowna connecting with the local Cleft Palate Program will not require a referral to BCCH.

A. Unilateral Atresia

Specialized Monitoring.

Screeners Bypass to ABR Assessment at local ABR Assessment Centre following Stage 1 screening regardless of Stage 1 screening result.

A. Bilateral Atresia

Specialized Monitoring.

Screeners Bypass to ABR Assessment at local ABR Assessment Centre without screening.

A. Other

- microtia
- craniosynostosis
- microcephaly
- macrocephaly

Basic Monitoring: audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

B. Family History of Permanent Childhood Hearing Loss

Permanent hearing loss present in a biological parent or sibling of the baby (including half-siblings) that has been present since childhood.

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

C. Syndrome or Condition associated with Progressive or Late-Onset Hearing Loss

See the BCEHP list of Syndromes and Conditions Commonly Associated with Hearing Loss.

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

Audiologists may recommend additional, specialized monitoring depending on the syndrome present. See Carepath for details.

D. Birth Weight less than 1200 Grams

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

Respiratory Problems

E. Five-minute APGAR score less than or equal to 3

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

E. Hypoxic-Ischemic Encephalopathy (HIE) moderate/severe (Sarnat II or III)

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

E. Congenital Diaphragmatic Hernia (CDH)

Specialized Monitoring. Children will be enrolled in the BCCH Neonatal Follow-Up Program. See ECMO/CDH Carepath for details.

Screeners refer for ABR Assessment at BCCH Audiology.

Respiratory Problems

E. Extra-Corporeal Membrane Oxygenation (ECMO)

Specialized Monitoring. Children will be enrolled in the BCCH Neonatal Follow-Up Program. See ECMO/CDH Carepath for details.

Screeners refer for ABR Assessment at BCCH Audiology.

E. inhaled Nitrous Oxide (iNO) or High-Frequency Oscillatory (HFO) or Jet (HFJ) ventilation

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

Brain Abnormalities

F. Intra-ventricular Haemorrhage (IVH), Grade III

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

F. Intra-ventricular Haemorrhage (IVH), Grade IV

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

Neonatal Follow-Up Program at BC Children's Hospital will enrol some children with grade IV IVH when eligibility criteria are met.

F. Peri-ventricular Leukomalacia (PVL)

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

Neonatal Follow-Up Program at BC Children's Hospital will enrol some children with PVL when eligibility criteria are met.

F. Hydrocephalus

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

G. Hyperbilirubinemia

≥400 µM or meeting any standard criteria for exchange.

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

Infection

H. TORCHES infection (not including CMV): toxoplasmosis, rubella, herpes, syphilis

Lab-proven infection in the baby.

Basic Monitoring: Audiological assessment at local public health audiology clinic at 9 months and 3 years of age.

Screeners refer for 9 month follow-up.

H. TORCHES infection: Cytomegalovirus (CMV) only

Lab-proven infection in the baby.

Specialized Monitoring. See CMV Carepath for details.

Screeners refer for ABR Assessment at local ABR Assessment Centre regardless of screening result.

H. Meningitis, irrespective of pathogen

Lab-proven infection in the baby.

Specialized Monitoring. See Meningitis Carepath for details.

Screeners refer for ABR Assessment at local ABR Assessment Centre regardless of screening result.

- If baby has not yet been screened, Bypass to ABR Assessment without screening.
- If baby has already been screened, Refer for ABR Assessment regardless of screening result.

APPENDICES

PROVINCIAL OFFICE AND REGIONAL CONTACTS

BCEHP Provincial Office Location
Provincial Health Services Authority
BC Children's and Women's Hospital
Room B208, Shaughnessy Building
4480 Oak Street
Vancouver, BC V6H 3V4
bcehp@phsa.ca

BCEHP Provincial Office Telephone and Fax
Phone: 604-875-234 ext. 4848
Toll Free: 1-866-612-2347
Fax: 604-875-2996

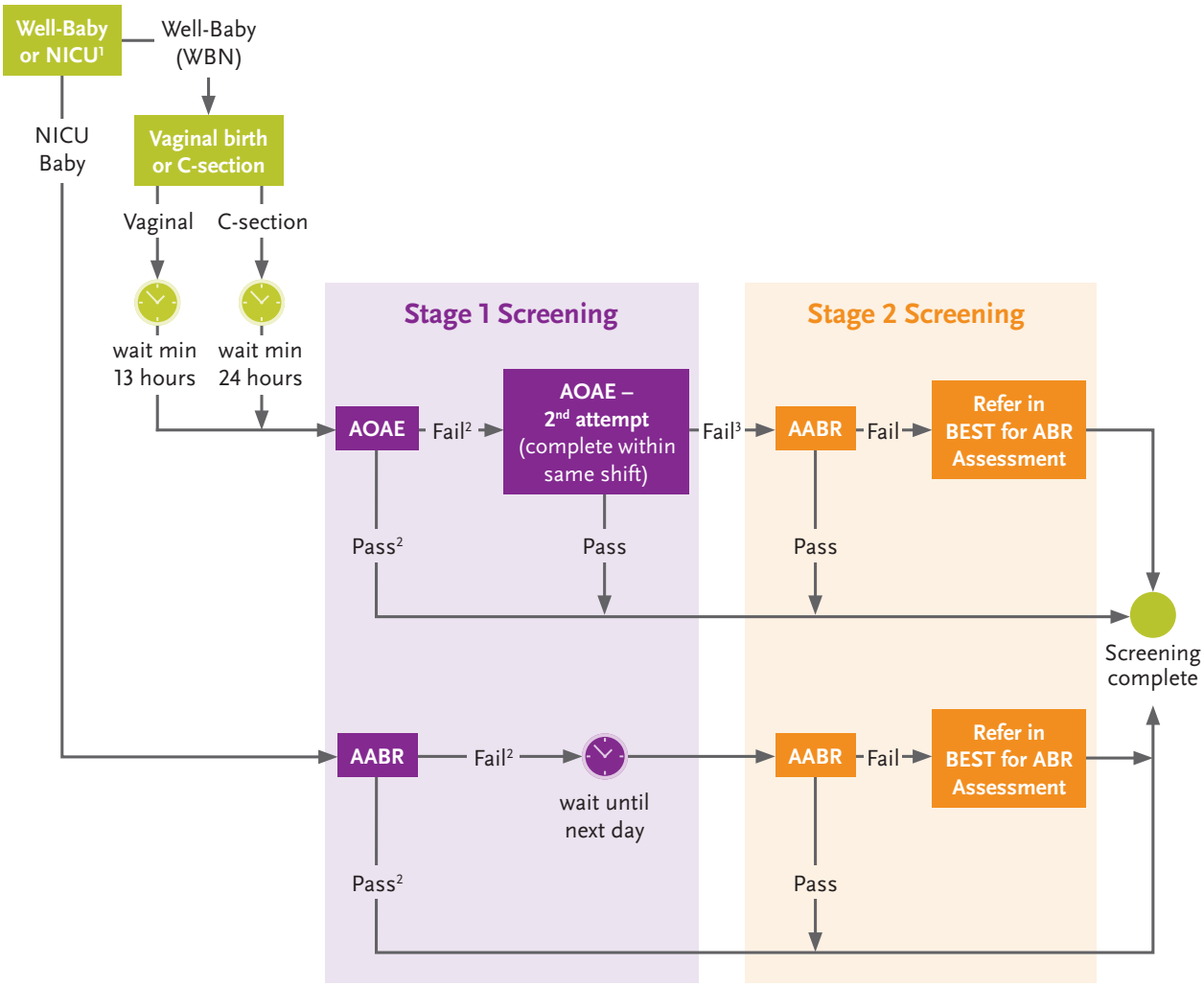
BCEHP Provincial Office Staff
Screening & Audiology Services, Provincial Lead: Alison Beers
Intervention Services, Provincial Lead: Lori Bell
Director: Diane Bremner
Financial Administrator: Irene Canton
Administrative Coordinator: Kim Fujisawa
Research and Clinical Audiologist: Jenny Hatton
Database Coordinator: Karson Wong

BCEHP Regional Coordinators
Fraser Health Authority: Samantha Trowell-Martin
Interior Health Authority: Barry Hunks
Northern Health Authority: Krista Dunlop
Vancouver Coastal Health: Dreena Davies
Vancouver Island Health Authority: Laura Prout (Central and North Island)
Niki Timar (South Island)

BCEHP Online Resources

BCEHP external website:	www.phsa.ca/earlyhearing
BC Early Hearing Resource Tool (BERT):	http://pod/bcehp
BC Early Hearing Surveillance Tool (BEST):	https://ehp.phsa.ca

NEWBORN HEARING SCREENING – TYPICAL PROCESS FOR IN-HOSPITAL BIRTHS



Hospital Discharges

Hospital discharge can happen at any time during the process. Screeners must refer all babies with incomplete screening results to the baby's local BCEHP screening clinic to complete screening in Community.

For families living in remote areas, make every reasonable effort to complete screening prior to hospital discharge. Babies 16 hours or older can have Stage 1 and 2 screenings back-to-back.

NOTES

1. NICU Babies
For BCEHP purposes, any newborn attending a Special Care Unit for a cumulative total of 48 hours or more is designated as a 'NICU' baby.

2. Screening Results (AOAE & AABR)
PASS = both ears passed screening
FAIL = one or both ears failed screening

3. Stage 2 Screening for Well-Baby Nursery (WBN)
Most Stage 2 screenings are completed the following day if baby is still in-hospital or later as an outpatient in Community.

DAILY HOSPITAL WORKFLOW

Pre-Screening

Administrative

- ☐ Import records into BEST
- ☐ Check BEST mailbox for transfers, access requests, etc.
- ☐ Check Communication book
- ☐ Print BEST screening worksheets for eligible babies
- ☐ Prioritize eligible babies for screening
  - ☐ Well-Baby: Older babies, babies discharging today
  - ☐ NICU: >48 hrs in NICU + >34 weeks GA + close to leaving + nurse approval

Equipment

- ☐ Complete quality check on AOAE probe and AABR electrode and ear coupler cables
- ☐ Ensure your cart has adequate supplies for day:
  - ☐ Clear probe tips, disposable eartips, electrode tabs, ear couplers, NuPrep, gauze pads
  - ☐ Brochures: Pass, Pass with Risk Factor, Repeat Screening and Needs Hearing Assessment
  - ☐ Screening worksheets + pen
  - ☐ Disinfecting wipes, hand sanitizer, container for used probe tips, garbage can/bag, and door sign

Screening

- ☐ Check Newborn Record Part 1 or electronic equivalent for present risk factors
- ☐ Introduce yourself to parents and explain screening as per BCEHP scripts
- ☐ Confirm 2 patient identifiers (mother name, baby name, address, phone number, phn, etc.)
- ☐ Ask Family History risk factor question as per BCEHP scripts
- ☐ Follow appropriate infection control standards (clean hands to baby, to clean equipment, to new supplies)
- ☐ Enter BCEHP# and baby DOB into AccuScreen
- ☐ Screen BOTH ears of baby
- ☐ Discard single use supplies
- ☐ Communicate results to parents as per BCEHP scripts
- ☐ Fill-out and give appropriate brochure to family
- ☐ Fill-out results on screening worksheet including time of screening + risk factors
- ☐ Document results on Newborn Record Part 2 or electronic equivalent

Post-Screening

- ☐ Clean and disinfect hard clear probe tips, rinse and leave them to dry overnight
- ☐ Enter screening results into BEST, and any other site-specific required program (e.g., PARIS)
  - ☐ Refer any babies for Stage 2 screening, ABR assessment or other in BEST, as required
  - ☐ Create Bring Forward in BEST or site-specific program (e.g., PARIS), as required
- ☐ Document any issues (including equipment problems) as per local procedures

INFECTION CONTROL

These are the **minimum** infection control standards required by BCEHP. Please consult your health authority supervisor and/or regional coordinator to ensure that you are meeting all local requirements.

BCEHP SCREENER DRESS CODE REQUIREMENTS

The following statements apply to BCEHP screeners when in direct contact with patients and/or their environment:

- Nails should be kept clean and short at all times. The nail should not show past the end of the finger
- Artificial nails, nail art or enhancements, and nail jewelry should not be worn
- Nail polish, including gel polish, should not be worn
- Rings should not be worn
- Hand/wrist jewellery, including watches, should be removed
- Long hair should be tied back
- Only scent-free products should be used
- Closed footwear should be worn at all times
- Lanyards are not to be worn during direct patient contact; ID must be worn on a retractable clip

PERSONAL ILLNESS

To screen babies in the hospital or community, the screener must be:

- Vaccinated against influenza or wearing a mask during flu season, as per Health Authority policy
- Free of transmissible infectious diseases such as conjunctivitis (pink-eye), active cold/cough, gastrointestinal symptoms and dermatitis. If you are sick, please stay at home. Consult Workplace Health/Occupational Health for further guidelines on when and how long to stay home if you think you have an infection
- Free from active herpes labialis (cold sores). The lesions must be dry, scabbed over and covered before returning to work; employees with lesions that cannot be covered with protective dressing must not have any direct contact with infants

RESPIRATORY ETIQUETTE

Follow posted respiratory etiquette instructions, including covering your cough or sneeze and cleaning your hands immediately after coughing or sneezing.

GLOVES

The use of gloves does not replace the need for hand hygiene. Hand contamination can occur during the donning/doffing of gloves and due to unexpected punctures and tears. Hands should be cleaned before donning gloves and after glove removal. Gloves should be removed and discarded immediately after the activity for which they were used and before exiting the environment of a patient.

- Wear gloves for as short a time as possible
- Clean and dry hands before donning gloves and after glove removal
- Wear gloves that are clean and dry inside

HAND HYGIENE

- Hand hygiene is the act of cleaning hands for the purpose of removing soil, dirt, and microorganisms.
- The 4 moments of hand hygiene in health care are:
  - Before touching a patient
  - Before aseptic procedure
  - After body fluid exposure risk
  - After contact with patient or patient environment
- Hand hygiene can be performed using soap and water or by using a 70-90% alcohol-based hand rub (ABHR). In most situations ABHR is the preferred method of hand hygiene. Hand washing with soap and water is the preferred method when hands are visibly soiled. Follow instructions posted in your screening sites for proper hand hygiene.
- Hand hygiene must always be completed before:
  - Before cleaning or touching clean equipment
  - Before touching baby
  - Before touching clean supplies (i.e., and again if you change the eartip size after you have touched the baby)
  - After the procedure is completed
  - Any time hands are visibly soiled

CLEANING AND DISINFECTING EQUIPMENT AND WORK SURFACES

The following equipment and surfaces should be routinely disinfected:

- AccuScreen body
- All cables and probes
- Screening cart: top work surface and handle
- Outside of eartip container
- Pen and clipboard, etc.

NOTE: Follow local health authority procedures for cleaning and disinfecting clear plastic probe tips.

Cleaning and Disinfecting defined

- **Cleaning:** Removing foreign material (dirt, germs, and impurities) from objects or surfaces.
- **Disinfecting:** Using chemicals to kill germs on objects or surfaces.

All items must be cleaned first before disinfectant is applied. This is because the disinfecting action of the solution can be hampered by the presence of dirt, organic matter, etc.

Disinfection of screening equipment and surfaces requires two steps:

Step 1: Use a hospital grade disinfectant wipe to clean, removing any debris or organic matter residue.

Step 2: Wipe again using a new hospital grade disinfectant wipe to kill germs. Leave the solution to dry for the amount of time recommended by the manufacturer on the product label.

Two-step Cleaning + Disinfection is required at each of the following times:

- Any time equipment is visibly soiled
- Upon NICU entry before moving to the bedside
- Before exiting a room on isolation precautions

Disinfection between patients:

- Unless visibly soiled, equipment and surfaces can be wiped using a single hospital grade disinfectant wipe at the start of the shift, between patients, and the end of the shift.

SCREENING BABIES ON ISOLATION PRECAUTIONS (IN-HOSPITAL)

Babies on isolation precautions will be indicated by signage at bedside or outside the room. Screeners must all follow the posted instructions for required personal protective equipment (e.g., face shield, mask, respirator, gown and gloves) and details.

Precautions are determined based on the microorganisms involved and their mode of transmission. Precaution levels include:

- Contact
- Droplet and Contact
- Airborne and Contact
- Contact Plus

When screening any baby on isolation precautions, only essential screening equipment should enter the room (i.e., cart is left outside; only the AccuScreen device and a couple of eartips should be brought into the room) to prevent unnecessary contamination of other equipment, brochures and supplies on the cart. Any unused eartips that were brought into the room should be discarded before exiting.

The AccuScreen and any equipment that is taken into the isolation room must be cleaned and disinfected prior to taking it out of the room.

SAMPLE HOSPITAL WORKFLOW WITH REQUIRED HAND HYGIENE AND EQUIPMENT DISINFECTION

- Hand hygiene
- Enter hospital room to check if baby is in appropriate state for screening
- Hand hygiene
- Enter baby's information into AccuScreen
- Enter room
- Hand hygiene
- Put tip on probe, bring equipment to bedside, screen baby
- Hand hygiene
- Communicate results, complete brochure, leave room
- Hand hygiene
- Disinfect equipment and all surfaces as per above protocol

NEWBORN RECORD PART 2 COMPLETION GUIDE

The British Columbia Perinatal Health Program has developed the BC Newborn Record Parts 1 and 2 as tools to document the summary of care during the newborn period. It is intended to facilitate communication and continuity of care between facilities and care providers.

The BC Early Hearing Program is responsible for completing Section 9 "Hearing Screening" in the Newborn Record Part 2. This must be done accurately, consistently and legibly.

PROCEDURE FOR IN-HOSPITAL SCREENING

Stage 1 screening

- Screener completes the Newborn Record Part 2 (section 9) following each completed screening or incomplete screening attempt (i.e., including "could not test" results). See examples below.
- The "Pass" or "Passed with Risk Factors" is checked only when a pass result has been obtained for both ears.
- The *Needs Follow-up* section is completed if the baby will be seen again through BCEHP for any of the following reasons:
  - Baby failed Stage 1 screening in one or both ears
  - Stage 1 screening was incomplete (i.e., "could not test" result)
  - Baby is being referred for ABR Assessment
  - Baby has a risk factor for hearing loss and will be referred for late-onset monitoring

Stage 2 screening

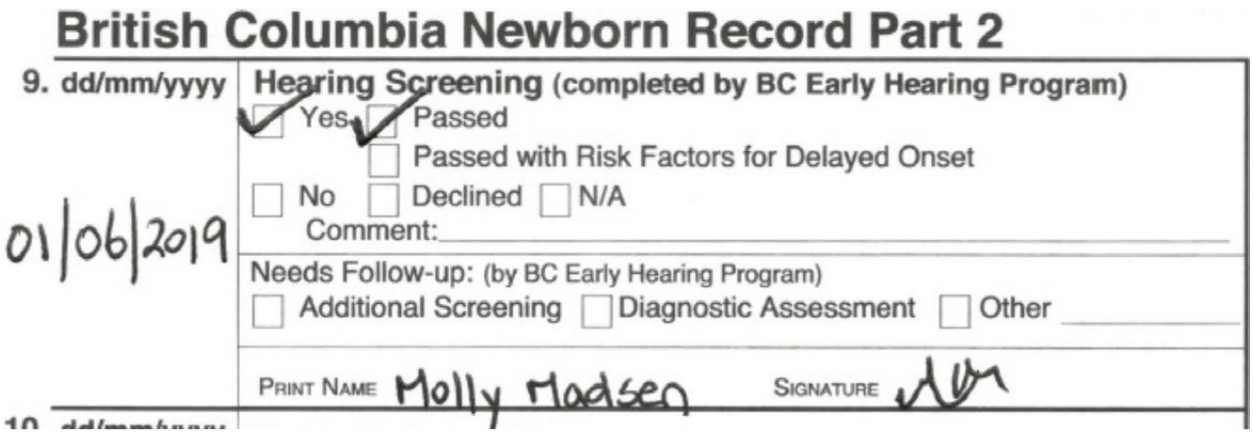
- Any time Stage 2 screening is completed in-hospital, the Newborn Record must be amended to reflect the final screening results and follow-up recommendation. See examples below.
- Screener must initial and date beside the changes and sign the section again.

Follow local procedures if there is no Newborn Record on baby's chart (e.g., NICU babies transferred to a new facility)

Review the following examples of how to record on the Newborn Record Part 2:

- Pass (both ears) Stage 1 – no risk factors
- Pass (both ears) Stage 1 – present risk factor for late-onset monitoring
- Fail or "Could not Test" Stage 1
- Pass (both ears) Stage 2 – no risk factors
- Pass (both ears) Stage 2 – present risk factor for late-onset monitoring
- Fail Stage 2

Pass (both ears) Stage 1 – no risk factors



British Columbia Newborn Record Part 2

9. dd/mm/yyyy: 01/06/2019

Hearing Screening (completed by BC Early Hearing Program)

☑ Yes ☑ Passed

☐ Passed with Risk Factors for Delayed Onset

☐ No ☐ Declined ☐ N/A

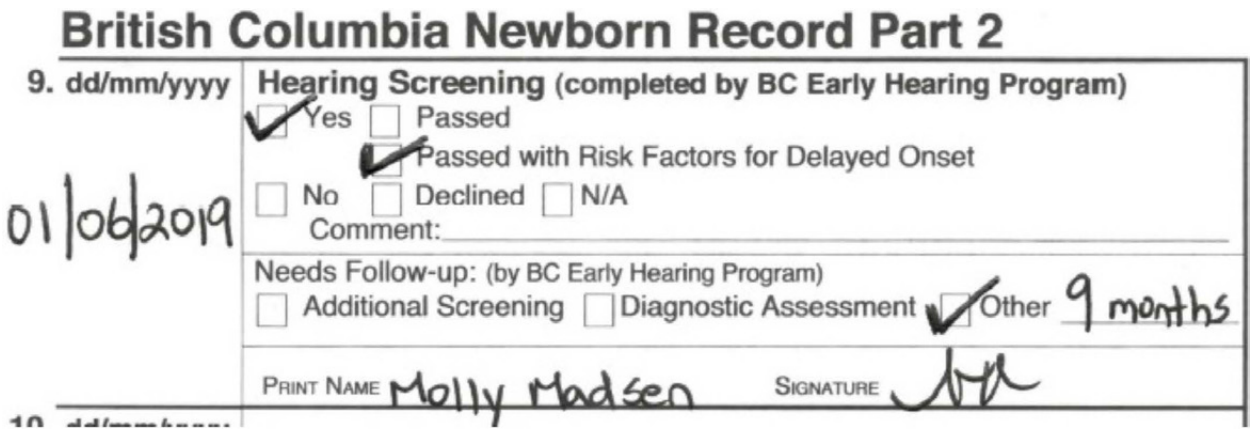
Comment:

Needs Follow-up: (by BC Early Hearing Program)

☐ Additional Screening ☐ Diagnostic Assessment ☐ Other

PRINT NAME Molly Madsen SIGNATURE

Pass (both ears) Stage 1 – present risk factor for late-onset monitoring



British Columbia Newborn Record Part 2

9. dd/mm/yyyy: 01/06/2019

Hearing Screening (completed by BC Early Hearing Program)

☑ Yes ☐ Passed

☑ Passed with Risk Factors for Delayed Onset

☐ No ☐ Declined ☐ N/A

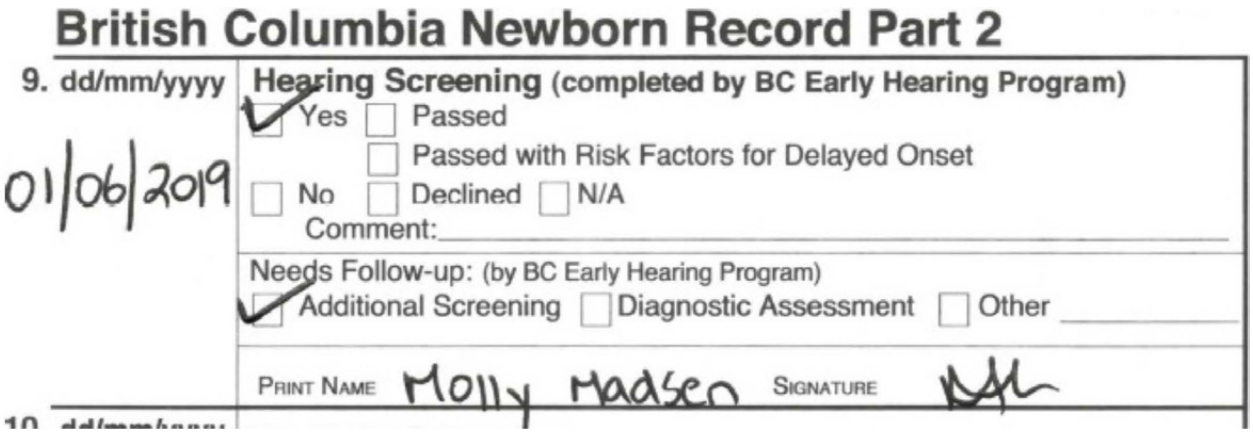
Comment:

Needs Follow-up: (by BC Early Hearing Program)

☐ Additional Screening ☐ Diagnostic Assessment ☑ Other 9 months

PRINT NAME Molly Madsen SIGNATURE

Fail or "Could not Test" Stage 1



British Columbia Newborn Record Part 2

9. dd/mm/yyyy: 01/06/2019

Hearing Screening (completed by BC Early Hearing Program)

☑ Yes ☐ Passed

☐ Passed with Risk Factors for Delayed Onset

☐ No ☐ Declined ☐ N/A

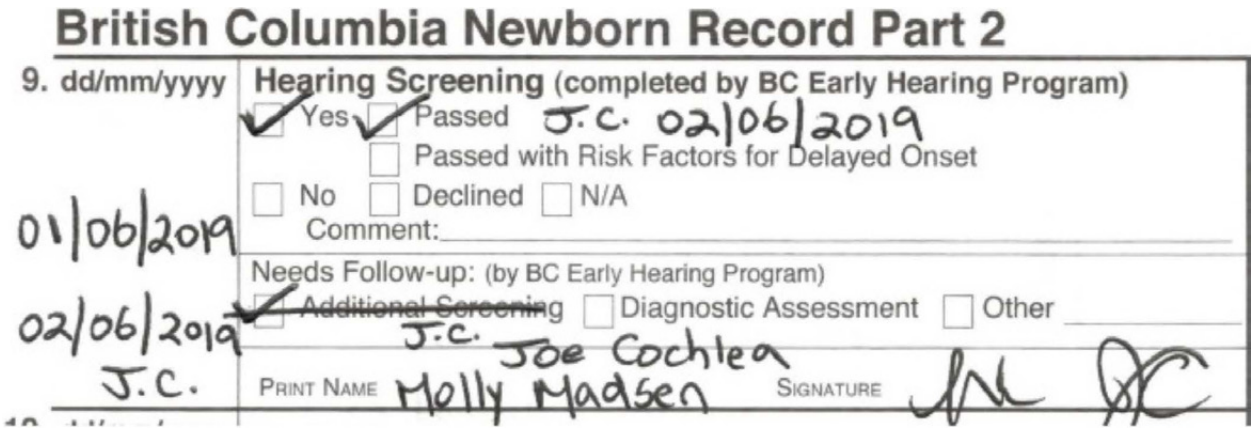
Comment:

Needs Follow-up: (by BC Early Hearing Program)

☑ Additional Screening ☐ Diagnostic Assessment ☐ Other

PRINT NAME Molly Madsen SIGNATURE

Pass (both ears) Stage 2 – no risk factors


British Columbia Newborn Record Part 2

9. dd/mm/yyyy

Hearing Screening (completed by BC Early Hearing Program)

☑ Yes ☑ Passed J.C. 02/06/2019

☐ Passed with Risk Factors for Delayed Onset

☐ No ☐ Declined ☐ N/A

Comment:

01/06/2019

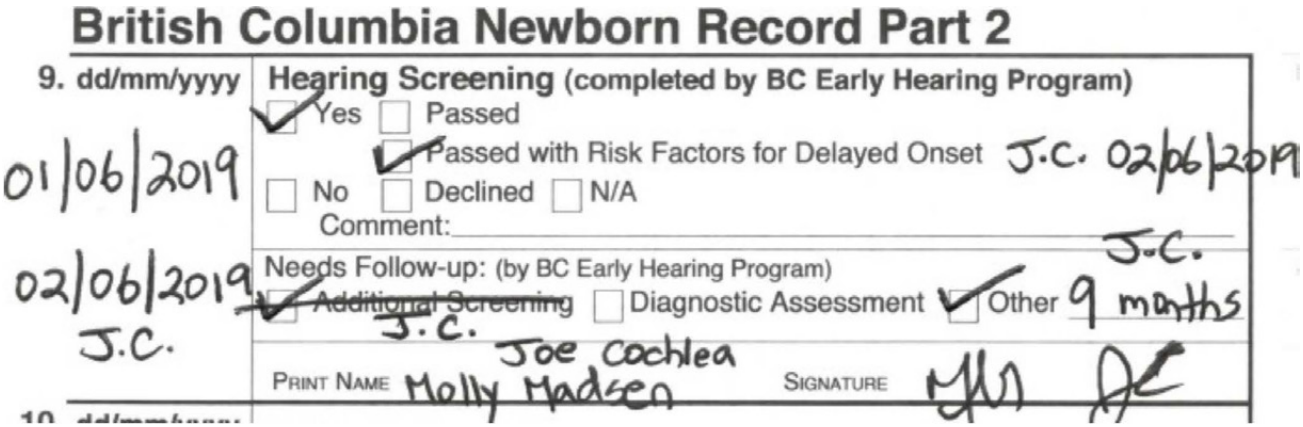
Needs Follow-up: (by BC Early Hearing Program)

02/06/2019 ☑ ~~Additional Screening~~ J.C. ☐ Diagnostic Assessment ☐ Other

J.C.

Print Name Molly Madsen Joe Cochlea Signature

Pass (both ears) Stage 2 – present risk factor for late-onset monitoring


British Columbia Newborn Record Part 2

9. dd/mm/yyyy

Hearing Screening (completed by BC Early Hearing Program)

☑ Yes ☐ Passed

☑ Passed with Risk Factors for Delayed Onset J.C. 02/06/2019

☐ No ☐ Declined ☐ N/A

Comment: J.C.

01/06/2019

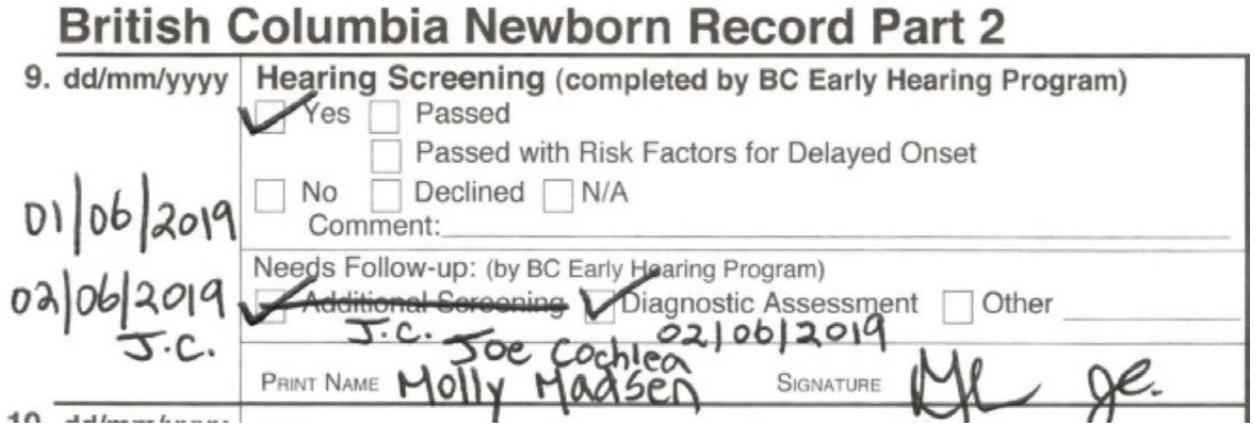
Needs Follow-up: (by BC Early Hearing Program)

02/06/2019 ☑ ~~Additional Screening~~ J.C. ☐ Diagnostic Assessment ☑ Other 9 months

J.C.

Print Name Molly Madsen Joe Cochlea Signature

Fail Stage 2


British Columbia Newborn Record Part 2

9. dd/mm/yyyy

Hearing Screening (completed by BC Early Hearing Program)

☑ Yes ☐ Passed

☐ Passed with Risk Factors for Delayed Onset

☐ No ☐ Declined ☐ N/A

Comment:

01/06/2019

Needs Follow-up: (by BC Early Hearing Program)

02/06/2019 ☑ ~~Additional Screening~~ J.C. ☑ Diagnostic Assessment 02/06/2019 ☐ Other

J.C. Joe Cochlea

Print Name Molly Madsen Signature

SYNDROMES AND CONDITIONS COMMONLY ASSOCIATED WITH HEARING LOSS IN CHILDREN

It is estimated that at least 50% of congenital hearing loss is due to hereditary factors. Hereditary factors can include syndromic and non-syndromic hearing loss.

The patterns of inheritance of hereditary hearing loss can be autosomal recessive, autosomal dominant, x-linked, and mitochondrial. The number of genes known to cause hearing loss is constantly changing as researchers identify them.

Approximately 30% of hereditary hearing loss is syndromic. Syndromes are often not identified at birth.

CRANIOFACIAL DIFFERENCES:

A craniofacial difference – defined as an abnormality of the face or head, and may be a sign of an underlying syndrome.

Common craniofacial differences include:

- cleft palate
- ear canal atresia
- microtia
- craniosynostosis
- microcephaly
- macrocephaly

SYNDROMES AND CONDITIONS ASSOCIATED WITH HEARING LOSS IN CHILDREN:

Below is a list of some of the more common syndromes and conditions that are known to be associated with hearing loss.

Alport syndrome: collagen synthesis disease characterized by renal disease

Alström syndrome: pigmentary retinopathy, diabetes mellitus, and obesity

Apert syndrome: craniosynostosis, syndactyly of hands and feet, intellectual disability

Branchio-Oto-Renal syndrome: kidney, ears, and neck abnormalities

Charcot-Marie-Tooth: motor and sensory neuropathy, nephritis

CHARGE syndrome: acronym for the set of congenital features: Coloboma of the eye, Heart defects, Atresia of the nasal choanae, Retardation of growth and/or development, Genital and/or urinary abnormalities, and Ear abnormalities and deafness

Chondrodysplasias, e.g. achondroplasia

Cornelia de Lange syndrome: developmental disorder, signs and symptoms vary widely in affected individuals, slow growth, intellectual disability, skeletal abnormalities; can be associated with cleft palate

Crouzon syndrome: craniosynostosis, maxillary hypoplasia, shallow orbits

Down syndrome aka Trisomy 21: associated with physical growth delays, mild to moderate intellectual disability and characteristic facial features

DiGeorge syndrome/22q11 Deletion syndrome/Velocardiofacial syndrome: heart defects, hypocalcaemia, craniofacial anomalies (low set ears), cleft palate, developmental delays, speech differences, behaviour problems

Ehlers-Danlos syndrome: synthesis of collagen defects, characterized by hypotonia, ocular abnormalities, joint hypermobility

Freeman Sheldon syndrome: characterized by joint deformities and abnormalities of the head and face including hypertelorism and micrognathia (small jaw). Often associated with problems eating and speaking, hearing loss, and developmental delay

Friedreich ataxia: spinocerebellar, resulting in progressive gait ataxia

Gastroschisis: congenital defect of the abdominal wall resulting in extrusion of the intestines from the body. Infants often require ventilator support and have a higher risk of hearing loss

Goldenhar syndrome: incomplete development of the ear, nose, soft palate, lip, and mandible (part of the oculo-auriculo-vertebral spectrum)

Hemifacial microsomia: abnormal development of the lower half of the face, most commonly the ears, the mouth and the mandible (part of the oculo-auriculo-vertebral spectrum)

Hurler syndrome aka Mucopolysaccharidosis Type 1 (MPS 1): most severe of the MPS sub-types, a progressive lysosomal storage disease characterized by coarse facial features, skeletal malformations, hydrocephalus, hearing loss, recurrent otitis media, hepatosplenomegaly, macroglossia, developmental delay and shortened life span. No cure – bone marrow transplant and enzyme replacement therapy may help manage symptoms

Hunter syndrome aka Mucopolysaccharidosis Type 2 (MPS 2): progressive lysosomal storage disease occurring almost exclusively in males. It is characterized by coarse facial features, skeletal malformations, hydrocephalus, hearing loss, recurrent otitis media, hepatosplenomegaly, macroglossia, developmental delay and shortened life span

Jervell and Lange-Nielsen syndrome: variant of long QT syndrome (see below)

Klinefelter syndrome (XXY): hypogonadism, infertility

Klippel-Feil sequence: fused cervical vertebrae, webbed neck, can have cleft palate

Kabuki syndrome: postnatal growth deficiency, onset <1styear, craniofacial anomalies, some have cleft palate, some cardiac deficiencies

Large Vestibular Aqueduct syndrome: enlargement of vestibular aqueduct in the inner ear

Long QT syndrome: prolongation of QT on ECG, syncope, and sudden death

Neurofibromatosis II (NF2): tumours of the central and peripheral nervous system, including non-malignant vestibuloschwannomas

Noonan syndrome: short stature, characteristic facial features, hypotonia, cardiac abnormalities

Norrie syndrome: retinal detachment, possible intellectual disability

Ohdo syndrome: mental retardation, congenital heart disease, blepharophimosis/ptosis, hypoplastic teeth

Osteogenesis imperfecta: disorder of type I collagen metabolism characterized by bone fragility

Osteopetrosis: increased osseous density due to defects in osteoclastic resorption

Pendred syndrome: goitre and hypothyroidism

Pfeiffer syndrome: craniosynostosis

Pierre Robin sequence: characterized by a small lower jaw (micrognathia), a tongue placed further back than normal (glossoptosis) and airway obstruction. May occur with the presence of a cleft palate

Refsum syndrome: phytanic acid storage disease characterized by microcephaly, severe developmental delay, hypotonia, hepatomegaly, retinitis pigmentosa and dysmorphic facial features

Saethre-Chotzen syndrome: craniofacial anomalies including variable craniosynostosis

Severe Combined Immunodeficiency aka SCID: a group of rare disorders caused by mutations in the genes that regulate the development and function of infection-fighting immune cells. Affected individuals are highly susceptible to severe infections and are often treated with gene, enzyme and stem cell therapies

Stickler syndrome: flat midface, cleft palate, myopia with retinal detachment and cataracts, musculo-skeletal findings

Tetralogy of Fallot: a combination of four congenital defects involving the heart and its vessels. Impairs the normal blood flow through the heart

Townes-Brock syndrome: characterized by imperforate anus, abnormally shaped ears, thumb malformations, kidney abnormalities and hearing loss

Treacher Collins syndrome: craniofacial differences

Turner syndrome: XO genotype characterized by short stature, infertility, renal abnormalities, chronic otitis media

Usher syndrome: retinits pigmentosa and vitiligo

Waardenburg syndrome: white forelock, heterochromia of irises

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Primary Reference:

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Other References:

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3. The Journal of Pediatrics Vol. 144, Issue 2, Feb. 2004, Pg. 278-280. Bilateral Sensorineural Deafness in Adenosine Deaminase-deficient Severe Combined Immunodeficiency. Wendy Albuquerque, Mbchb, Mrcp, Msc, and Hubert B. Gaspar, Mbbs, Mrcp(uk), Phd.
4. In Draft October 20, 2017. Risk of Hearing Loss with 106 Case Survivors of Gastroschisis, a Ten Year Experience. Dr. Joseph Y. Ting MBBS, DROCG, MRCPCH, FRCPC, MPH; Laurie Usher M.Sc. Clinical Audiologist; Eddie Kwan PhD NICU Pharmacist.
5. Iran J Otorhinolaryngol. 2016 Mar; 28(85): 105–111. Frequency of Congenital Heart Diseases in Prelingual Sensory-Neural Deaf Children. Masoud Motasaddi Zarandy,1 Mohammad Jafar Mahmoudi, Iran Malekzadeh, and Sevil Nasirmohtaram.

BCEHP HEARING LOSS RISK FACTORS AND INITIAL SCREENER REFERRALS

Risk Factor	Screening Result	Initial Referral	Location
Regardless of risk factor presence/absence	Fail	ABR Assessment	Local ABR Assessment Centre

WELL-BABY AND NICU BABY RISK FACTORS

Risk Factor	Screening Result	Initial Referral	Location
A. Craniofacial Differences			
Cleft Palate (including sub-mucous cleft)	ABR Assessment after Stage 1 screening regardless of result	ABR Assessment ***and***	Local ABR Assessment Centre
		Cleft Palate Craniofacial Program*	BCCH Audiology
Unilateral Atresia	Bypass to ABR Assessment after Stage 1 screening regardless of result	ABR Assessment	Local ABR Assessment Centre
Bilateral Atresia	Bypass to ABR Assessment without screening	ABR Assessment	Local ABR Assessment Centre
Other microtia craniosynostosis microcephaly macrocephaly	Pass	9 Month Follow Up	Local Audiology Clinic
B. Family History of childhood hearing loss *(parent or sibling only, onset ≤18 years old)*	Pass	9 Month Follow Up	Local Audiology Clinic
C. Syndrome or Condition associated with late-onset hearing loss	Pass	9 Month Follow Up	Local Audiology Clinic

*Families from Vancouver Island and Kelowna connecting with local Cleft Palate Program will not require a referral to BCCH.

NICU BABY RISK FACTORS

Risk Factor	Screening Result	Initial Referral	Location
D. Birth weight less than 1200 grams (less than 2 lbs, 10 oz)	Pass	9 Month Follow Up	Local Audiology Clinic
E. 5 minute APGAR score ≤3	Pass	9 Month Follow Up	Local Audiology Clinic
E. Hypoxic-Ischemic Encephalopathy (HIE) Moderate or Severe (Sarnat II, III)	Pass	9 Month Follow Up	Local Audiology Clinic
E. Congenital Diaphragmatic Hernia (CDH)	ABR Assessment regardless of screening result	ABR Assessment	BCCH Audiology
E. Extracorporeal Membrane Oxygenation (ECMO)	ABR Assessment regardless of screening result	ABR Assessment	BCCH Audiology
E. iNO or HFO or HFJ	Pass	9 Month Follow Up	Local Audiology Clinic
F. Intra-ventricular Hemorrhage (IVH) Grade III or Grade IV	Pass	9 Month Follow Up	Local Audiology Clinic
F. Peri-ventricular Leukomalacia (PVL)	Pass	9 Month Follow Up	Local Audiology Clinic
F. Hydrocephalus	Pass	9 Month Follow Up	Local Audiology Clinic
G. Hyperbilirubinemia (≥400 µM or meeting exchange criteria)	Pass	9 Month Follow Up	Local Audiology Clinic
H. TORCHES – Lab-proven infection in baby *(toxoplasmosis, rubella, herpes, syphilis)*	Pass	9 Month Follow Up	Local Audiology Clinic
H. TORCHES – Cytomegalovirus (CMV) only	ABR Assessment regardless of screening result	ABR Assessment	Local ABR Assessment Centre
H. Meningitis (pre-screening)	Bypass to ABR Assessment without screening	ABR Assessment	Local ABR Assessment Centre
H. Meningitis (post-screening)	ABR Assessment regardless of screening result	ABR Assessment	Local ABR Assessment Centre

NOTE: If more than 1 risk factor present, make referral based on most conservative follow-up schedule.

SCRIPTS AND RESPONDING TO QUESTIONS FROM PARENTS

Always keep language simple and clear, and limit conversation to what is necessary to complete an effective screening. The more you say, the more likely your main messages will get buried amongst less important information.

INTRODUCTIONS

Introduce yourself: *I'm (name) from hearing screening. Is this a good time to check baby's ears?*

Confirm demographic information (address and phone number), as well as names of both mom and baby.

RISK FACTORS

Ascertaining family history of hearing loss

Ask initial, general questions about family history of hearing loss:

Is there any hearing loss for mom or dad (of the baby)?

Is this your first baby?

Is there any hearing loss for baby's siblings?

If either parent answers "yes" regarding family history, then additional clarifying questions are required. For example:

- *Have you had the hearing loss since childhood or did it start when you were an adult?*
- *Is the hearing loss still there today or has it resolved?*
- *Do you know the reason for the hearing loss?*
- *Did the doctors ever try or recommend surgery to fix it?*
- *Did you ever wear a hearing aid as a child?*

If family history is present, this is documented in the Risk Factors section in BEST along with a comment summarizing details provided by the family.

If the family is uncertain then the risk factor is documented as absent.

Confirming other risk factors for babies in-hospital

For babies in-hospital, confirm all other risk factors using baby's hospital chart (Newborn Record Part 1 or electronic equivalent) and/or baby's nurse prior to your interaction with the family.

Confirming other risk factors for Community screenings (i.e., when you don't have access to a hospital chart, Newborn Record or hospital nursing staff)

Well-Babies:

- *Is baby doing well today?*
- *Are there any medical concerns for baby?*

NICU Babies:

- *Is baby doing well today?*
- *Are there any ongoing medical concerns for baby that I should be aware of? Is baby being followed medically for anything now?*
- *Because your baby spent some time in the NICU, we need to go through our list of risk factors and see whether any apply.*
  - *Was your baby born quite early or small?*
  - *Did your baby have any respiratory/breathing problems in the NICU?*
  - *Were there any concerns about his brain?*
  - *Did he get any treatment for jaundice?*
  - *Did your baby ever have a viral or bacterial infection?*

  *If parents respond yes to any of these general questions, then show or verbally list the specific NICU risk factors and be sure to document any that parents confirm are present along with details provided by the family.

Risk factors under investigation

If baby is under investigation for a risk factor, but it has not yet been confirmed, then the risk factor is considered to be absent at the time of screening.

- Record in the Risk Factor section as "do not know" and add a comment with details provided by the family.
- Advise the family to call and inform their local hearing clinic if the risk factor becomes confirmed, as this will trigger follow-up testing for their child.
- It is not appropriate for you to follow-up with family.
- Do not refer in BEST for follow-up testing.

SCREENING

Explaining the procedure

Briefly explain the screening procedure you are about to use.

AOAE:

- *I am going to put a soft tip in your baby's ears that will play soft sounds.*
- *Baby may squirm a little but it doesn't hurt.*
- *The more still and quiet baby stays, the faster my test will run.*
- *Do you have any questions before I start?*

AABR:

- *I am going to clean your baby's skin in three places, on the forehead, cheek and back of the neck.*
- *I am going to put three sensors on the spots that I clean and little headphones over the ears.*
- *The headphones will play soft sounds and the sensors will pick up your baby's response.*
- *The more still and quiet baby stays, the faster my test will run.*
- *Do you have any questions before I start?*

Early Screening (i.e., younger than 13 hours old):

Early screening should only be offered to families in rare circumstances when babies are discharging at 11-12 hours old and families do not have easy access to Community screening services.

Messaging to the family:

- *Our protocol requires babies to be at least 13 hours old for hearing screening. It sounds like you will be going home before your baby is old enough and I see that you are from (name of remote community).*
- *We have two options. We can try the screening a little earlier than recommended. There is no harm to your baby, it is just that babies are more likely to fail the screening when they are screened too early.*
- *If baby does not pass, we do not know whether this was due to early screening or not, so it will be really important for you to bring your baby into the clinic to try it again in a couple of weeks.*
- *If baby passes then we are done with screening and will have saved you a trip into the clinic.*
- *Would you rather wait a couple of weeks or try it now?*

COMMUNICATING SCREENING RESULTS

Provide the family with written information as you are explaining the test results and next steps.

- Use the brochure as a guide to ensure that all families are receiving consistent information.
- Use translated materials and interpreting services as appropriate.

Pass Screening – No Risk Factors

- *Your baby has passed hearing screening and is hearing well today.*
- *We are not recommending any follow-up testing at this time.*
- *Hearing can change at any age.*
- *Here are some speech and language milestones to watch for over the first few months (point them out on the brochure).*
- *If you ever have concerns for your baby's hearing or feel that he is not meeting his milestones, then it is important to have baby's hearing re-checked through your local public health clinic.*
- *Clinic locations and more information about hearing are available on our website. Contact us if you would like more information or if you would like to find out more about hearing testing for your child. (show parents the website on the brochure)*
- *Do you have any questions? (Please be mindful of your scope of practice)*

Pass Screening with risk factor for Basic Monitoring – needs 9 month follow-up

(e.g., family history, low birth weight, hyperbilirubinemia, HIE, etc.)

- *Your baby has passed hearing screening and is hearing well today.*
- *Because of (name the risk factor present) we are recommending follow-up testing for your baby at around 9 months old.*
- *I will be sending the follow-up referral to (local clinic name) and they will contact you in a few months to book this appointment.*
- *Hearing can change at any age.*
- *Here is a list of speech and language milestones to watch for over the next few months (point them out on the pass brochure)*
- *If you have concerns for your baby's hearing before the 9 month check, then give the clinic a call to see if you should come in sooner. Clinic contact information is available on our website.*
- *Do you have any questions? (Be mindful of your scope of practice)*

Pass Screening with risk factor for Specialized Monitoring, – needs ABR Assessment

(e.g., cleft palate, atresia, CMV, CDH, ECMO)

- *Your baby has passed hearing screening and is hearing well today.*
- *Because of (name the risk factor present) we are recommending that your baby get a full hearing assessment at 4-8 weeks old. This is the best age to get the most accurate results.*

- *I will be sending the follow-up referral to (ABR Assessment centre name) and they will contact you shortly to book this appointment.*
- *Do you have any questions? (Be mindful of your scope of practice)*

Fail Stage 1 Screening (in-hospital) – Baby needs Repeat (Stage 2) Screening

- *Your baby did not pass hearing screening today.*
- *This means that we need to do a repeat screening test.*
- *If you will still be in-hospital tomorrow, we will try to get this done for you before you go home. If you go home today, we will contact you to come back as an outpatient to (screening clinic name) in a couple of weeks.*
- *I am leaving you this brochure which has important information.*
- *It is really important that your baby gets this repeat screening, ideally before he is 1 month old.*
- *Do you have any questions? (Be mindful of your scope of practice)*

Fail Screening – Stage 1 (in Community for Well-babies only, using AOAE screening)

- *Your baby did not pass hearing screening today.*
- *This means that we need to do a repeat screening test, which I am going to do for you right now (explain AABR set-up).*
- *Do you have any questions before I start?*

NOTE: NICU babies who fail Stage 1 screening in Community will be Bypassed on Stage 2 screening and referred directly for ABR Assessment. AABR screening is never run twice in a row on the same day for anyone.

Fail Stage 2 Screening – Baby needs full hearing assessment (ABR Assessment)

- *Your baby did not pass the repeat hearing screening today.*
- *Because your baby has not passed two hearing screenings, this alerts us to the possibility of hearing loss.*
- *I will be referring your baby for a full hearing test with an audiologist at (ABR Assessment centre name), which will be scheduled when your baby is 4-8 weeks old. This is the best age to get most accurate results.*
- *At this appointment, the audiologist will be able to determine the details of how your baby is hearing, and in most cases you will get the results at the end of the test.*
- *There is no cost to you for this testing.*
- *I am leaving you this brochure which has important information about the testing.*
- *It is really important that you bring your baby to this appointment so that you can find out exactly how he is hearing.*
- *Do you have any questions? (Be mindful of your scope of practice)*

RESPONDING TO COMMON QUESTIONS FROM PARENTS

Why are you screening my baby's hearing?

- *It is the standard of care for babies born in BC. We identify about 100 babies per year in the province with permanent hearing loss; most of them have no risk factors for hearing loss including no family history of hearing loss.*
- *There is so much we can do to help these babies develop good speech and language when we find them early.*

Why did my baby fail the hearing screening?

- *The screening test is just pass or fail based on the responses collected by the equipment. My equipment does not give me any detailed information about why he did not pass.*

There is no hearing loss in our family, is there really a chance that my baby has hearing loss?

- *Yes. Most of the babies that we identify with hearing loss are healthy and have no risk factors for hearing loss including no family history of hearing loss.*

Is it as important to go to the ABR Assessment if my baby only fails in one ear?

- *Yes, it is very important to attend the appointment.*
- *We try to focus on the overall pass or fail result for your baby, and overall he did not pass hearing screening*
- *We know that babies who fail screening in only one ear can end up having either hearing loss in one or both ears.*
- *Babies who turn out to have hearing loss in one or both ears develop better speech and language when we know about it early.*

Don't most babies fail the hearing screening anyways?

- *No, in fact more than 90% of newborns pass the initial (Stage 1) hearing screening and do not need any additional screening.*
- *Approximately 85% of infants who receive repeat (Stage 2) screening will pass and not require any follow-up audiological testing.*

What are the chances my baby has hearing loss if he fails the hearing screening?

- *The chance of hearing loss in a healthy newborn is about 2/1000.*
- *If your baby fails the initial (Stage 1) hearing screening, the likelihood of permanent hearing loss is approximately 1/40.*
- *If your baby fails the repeat (Stage 2) hearing screening, the likelihood of permanent hearing loss is approximately 1/7.*

I can tell that my baby is hearing my voice. Why do I need to get a hearing test?

- *It is great that you are observing your baby is responding to your voice.*
- *We do not know for sure that your baby is hearing all of the sounds they need to develop language*
- *The only way to figure this out is to get a full hearing assessment with an audiologist.*

NEWBORN DECLINE HEARING SCREENING WAIVER

Screening Site: _____

Health Authority: _____

Physician: _____

Infant's Name: _____

Infant's DOB: _____

I _____ (parent or guardian) request that the newborn hearing screening NOT be done on my baby by the BC Early Hearing Program (BCEHP).

- I release the screening site, health authority and the physician named above, and BCEHP of any liability related to not screening my baby.
- I have been advised that the newborn hearing screening procedure is safe, painless, and may provide information that is important to the development of my child.
- I am aware that children whose hearing loss is discovered early and who receive special services before six months of age are more likely to develop normal communication skills than children who are identified later.
- I have been provided the opportunity to ask questions about the risks and benefits of the screening procedure.
- I understand that I can contact a local hearing clinic at any time in the future and request a hearing screening for my baby.
- Nevertheless, I accept all responsibility and liability for choosing not to have this screening performed.

Name: _____

Relationship to Newborn: _____

Signature (parent/guardian): _____

Date: _____

Name of witness: _____

Position: _____

Signature of witness: _____

Date: _____

Taking Care of Your Baby's Hearing.

Congratulations on the arrival of your new baby! Good hearing is essential for your baby's speech and language development. About one out of every three hundred babies is born with hearing loss.

You have chosen not to screen your baby's hearing at this time. If you change your mind at any time, you can contact your closest hearing clinic to arrange screening (www.phsa.ca/earlyhearing). Babies can have difficulties with their ears and hearing as they grow. Some children will have frequent ear infections or serious illnesses that can result in later hearing loss.

Screening is quick simple and safe.

Soft sounds are played in your baby's ear, and a computer measures the response from your baby. Screening takes only a few minutes with a quiet baby. On babies over six months, your baby's reactions to soft sounds are measured.

A child is never too young to have a hearing check.

You know your child best. Act quickly if you suspect a problem or a change in your child's hearing or your child's speech and language seem delayed.

As your baby grows, check speech, language and listening:

By Two Months, your baby...

- Startles to loud sound
- Quiets to familiar voices
- Makes vowel sounds like "ohh" and "ahh"

By Four Months, your baby...

- Looks for sounds with eyes
- Starts babbling
- Uses a variety of pitches, in squeals, whimpers, chuckles

By Six Months, your baby...

- Turns head towards sound
- Tries to imitate changes in voice pitch
- Babbles ("baba", "mama" and "gaga")

By Nine Months, your baby...

- Imitates speech sounds of others
- Understands "no-no" or "bye-bye"
- Will locate a sound's source at eye level or below

By 12 Months, your baby...

- Correctly uses "ma-ma" or "da-da"
- Gives a toy when asked
- Responds to singing or music

Local Hearing Clinic Contact Number: _____

Provincial Health Services Authority
Province-wide solutions. Better health.

www.phsa.ca/earlyhearing