I'm not a robot

Hearing test newborn

The aim of the Newborn Hearing Screening Programme in England (NHSP) is the identification of permanent childhood hearing impairment (PCHI) in newborn babies. NHSP defines this as a permanent hearing loss averaging >= 40dBnHL across 0.5 to 4kHz, in one of both ears. Even with a very sensitive newborn hearing screen, some children will develop a hearing loss later (Fortnum et al 2001) or will have missed screening or follow up. Therefore, a wider system is needed to identify these children. This document identifies which babies should be followed up and monitored, how and when this should be done, and by whom. It covers surveillance, referral and audiological monitoring following newborn hearing screening. It does not cover all the conditions requiring hearing assessment which may occur in older children. Training should be provided to primary care and other professionals to ensure early referral of children who have a high risk of late-onset or acquired hearing loss, and written care pathways should be developed at local service level to cover these. 2.1 Further testing post NHSP screen A general principle is that babies whose newborn hearing screen shows clear responses in both ears should not be subject to repeated screens, tests or follow-up unless they meet one or more of the criteria specified here. Parents are given appropriate checklists after their newborn’s screen to refer to in the first instance if there is concern. A child referred for audiological assessment should not be discharged until testing meets the discharge criteria outlined in the BSA document “Guidelines for the early audiological assessment and management of babies referred from the newborn hearing screening programme”. 2.2 Age at testing All ages in this document refer to corrected ages (from expected date of delivery) and are indicative; in practice ‘4 weeks’ may be 2 to 8 weeks, and ‘8 months’ may be 7 to 9 months (and in exceptional circumstances up to 12 months). While ABR testing is technically possible at any age, in practice it becomes increasingly difficult over 3 months (12 weeks) as the required sleep state becomes less predictable. Reliable behavioural assessment by Visual Reinforcement Audiometry (VRA) is increasingly possible from 6 months of age, but developmental delay will affect the ability to test behaviourally, as may some serious medical conditions. 2.3 Audiology teams and services Audiological services that are responsible for the assessment of referrals from the newborn hearing screen must participate in a peer-review process of ABR as detailed by the British Society of Audiology (BSA). See Current Guidance - Principles of Peer Review Commissioners are required to make sure that Audiology services participate in, and maintain accreditation to, defined quality standards operating under the umbrella of the United Kingdom Accreditation Schemes (UKAS) / Improving Quality in Physiological Services (IQIPS) and as set out by section 7a commissioning schedules 2 and 4, for the newborn hearing screening programme. Audiological testing should be carried out in accordance with national standards and guidance. Detailed clinical protocols are available from the BSA. For behavioural testing ear–specific testing should be routinely available. Audiology departments are responsible for the entry of audiological data onto the NHSP national IT system. Requirements for audiological data are given in NHSP Operational Guidance Chapter 9 . In summary this includes: Audiological information for all babies referred from the screen Audiological information for all babies referred for targeted follow up Audiological information for any child (irrespective of screening outcome) with a later identified PCHI of any degree in either ear identified by 5 years of age. A subset of such cases (who may be ‘false negatives’ for the screen) also need to be notified to the newborn hearing screening programme using the “Review of case of PCHI not identified by the newborn hearing screen” guidance template and form held on the Resources tile of the NHSP national IT system. The eligible population is all newborn babies born or resident in England and those babies under 3 months (12 weeks) of age or if born G (mitochondrial mutation) the baby should undergo newborn hearing screening and follow up if required as per standard screening protocol. It is now possible to test for this genetic change. If there is such a history, we urge medical teams caring for the child to test for this, be cautious and consider alternative antibiotics, otherwise there is a risk of significant hearing damage. The responsibility for monitoring of babies receiving ototoxic drugs and appropriate referral for audiological assessment lies with the medical team caring for the child. In deciding whether to make a referral for follow up beyond the screen, one factor will be whether the monitored aminoglycoside levels have exceeded the therapeutic range: see also national guidance on use of gentamicin for neonates (NPSA 2010). In general hearing loss attributable to ototoxicity is likely to be mild and in the higher frequencies and this is more accurately assessed by frequency-specific behavioural testing around 8 months. However, any baby that is suspected or known to have a change on the gene m.1555A>G and has received aminoglycosides (irrespective of whether blood levels are within the therapeutic range) should be referred for immediate follow-up and audiological monitoring irrespective of screen outcome. Babies with a change on the gene m.1555A>G may have a family history of sensorineural deafness from middle age in the affected individuals, changes in the gene m.1555A>G are usually inherited from a mother, however genetic changes can also occur for the first time in a pregnancy. Responsibility for making the referral and communication with family – medical team caring for the child Responsibility for making appointment - Audiology 5. Specific risk factor or concern occurring later This section includes a brief discussion about some of the issues that warrant immediate referral for audiological assessment irrespective of any earlier newborn hearing screening result. These are outside of the responsibility of local NHSP services, but this brief outline is included for completeness. 5.1 Parental or professional concern for any reason Parental concern about an infant’s hearing, or development of auditory or vocal behaviour should always be taken seriously. All professionals who may be in contact with a child should always feel able to refer to Audiology if there is parental concern, or if they themselves are concerned. 5.2 Confirmed or strongly suspected bacterial meningitis, or meningococcal septicaemia, confirmed congenital cytomegalovirus (cCMV), temporal bone fracture, severe unconjugated hyperbilirubinaemia These medical conditions can cause sensorineural hearing loss in a significant proportion of affected children (meningitis - Fortnum 1992, Fortnum & Davis 1993; temporal bone fracture - Zimmerman et al 1993, Lee et al 1998; hyperbilirubinaemia - Boo et al 1994, Shapiro 2003). If they occur at any point in infancy or childhood after the newborn hearing screen, then immediate referral should be made for audiological assessment on recovery and within 4 weeks of discharge from hospital. Audiology services should refer to the BAA/BSA Paediatric Audiology Minimum Discharge Criteria (Aged 6 Months +) when assessing these children. The guidance in this document was initially produced by the NHSP Clinical group. Many audiological and medical professionals shared their experience and expertise, and their contributions are acknowledged. 7. APPENDIX A: Historical changes Some aspects of these guidelines have undergone revisions since the document was first issued in 2003; the main changes are detailed below. Exclusions from the screen In 2003 bacterial meningitis was added as a reason to exclude the baby from the newborn screen on the grounds that babies who have bacterial meningitis have a very high risk of having a permanent hearing loss around 1/10 (Fortnum 1992) compared to about 1/100 for other NICU/SCBU babies, and 1/1000 for well babies so that both the screen performance and positive predictive value are totally different from that for the general population. There would be a high risk of missing resulting mild/moderate or high frequency loss in a screen. Performing a screen might also lead to a high false positive rate due to higher incidence of middle ear effusion following meningitis (Fortnum & Davis 1993). Hence, we concluded a screen is not appropriate for this population, and that full assessment by ABR is essential. The 2019 version added two further categories for exclusion from the screen. These are babies with programmable ventriculo-peritoneal (PVP) shunts in place and babies with confirmed congenital cytomegalovirus (cCMV). Programmable ventriculo-peritoneal (PVP) shunts are implantable devices that can be fitted to young babies as a treatment for hydrocephalus to drain excess cerebrospinal fluid (CSF) from the brain to another part of the body. PVP shunts have a magnetic valve, placed just under the skin behind the ear, for adjustment by an external control magnet. This implanted magnetic valve can unintentionally be reprogrammed by other magnetic devices if they are placed near the ear, which can then lead to a change in CSF pressure, thereby putting the baby at risk. Audiological equipment, including some screening devices, generate magnetic fields which can cause a potential risk. To reduce this risk from hearing screening devices all babies with PVP shunts should be referred directly to audiology for assessment instead of being offered the newborn hearing screen. Audiology services can use insert earphones which pose less risk as the magnetic field is further away from the PVP shunt. The British Society of Audiology has guidance for audiology services on assessment for patients with PVP shunts. Congenital cytomegalovirus is a common virus which can be associated with hearing loss if contracted in utero (congenital CMV or cCMV). It is the only cause of sensorineural hearing loss that can be treated, but the treatment is time dependent. Identification and treatment within 4 weeks of birth can help stop hearing loss deterioration. To speed the identification of hearing loss associated with cCMV it is now recommended that babies with confirmed cCMV before hearing screening has taken place should be referred immediately to audiology for hearing assessment instead of being offered the newborn hearing screen. Audiology services should seek advice from their infectious diseases team to ensure the babies are followed up appropriately, (Pesch MH, 2021) Targeted follow up In 2012 following a major review of the evidence (Wood et al 2011) the following categories were removed from the list for targeted follow up: Family history of permanent SNHL from childhood (in parents or siblings) Severe jaundice / hyperbilirubinaemia (exchange transfusion level) Mechanical ventilation over 5 days, or who have undergone ECMO Neuro-degenerative or neuro-developmental disorders Ototoxic drugs In versions 4 and 7, we amended our advice to the current position and clarified that it is the responsibility of the medical team caring for the child to decide whether further audiological assessment is required beyond the newborn screen, either immediately or around 8 months and to make any referral to Audiology. For babies with the m.1555A>G mitochondrial genetic change who are abnormally susceptible to aminoglycoside ototoxicity we advised immediate follow-up and audiological monitoring irrespective of screen outcome. 8. APPENDIX B: Guidelines for audiological follow up of babies diagnosed with bacterial meningitis and/or meningococcal septicaemia. Scope NICE guidelines have been produced to help clinicians develop local protocols for hearing assessment in babies up to the age of one year who have been diagnosed with bacterial meningitis and/or meningococcal septicaemia. Timing and details of assessments required can be found in the BSA document Guidelines for the Early Audiological Assessment and Management of Babies Referred from the Newborn Hearing Screening Programme. 9. References Berlow SJ, Caldarelli DD, Matz GJ, Meyer DH, Harsch GG. (1980). Bacterial meningitis and sensorineural hearing loss: a prospective investigation. Laryngoscope. 1980 Sep; 90(9):1445-52. 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Int J Audiol 52:394-399 Zimmerman WD, Ganzel TM, Windmill IM, Nazar GB, Phillips M (1993). Peripheral hearing loss following head trauma in children. Laryngoscope.103, 87-91. On this page:Most children hear and listen to sounds at and even before birth. They learn to talk by imitating the sounds they hear around them and the voices of their parents and caregivers. But that’s not true for all children. In fact, about two or three out of every 1,000 children in the United States are born with detectable hearing loss in one or both ears. More lose hearing later during childhood. Children who have hearing loss may not learn speech and language as well as children who can hear. For this reason, it’s important to detect hearing loss as early as possible.Because of the need for prompt identification of and intervention for childhood hearing loss, universal newborn hearing screening programs currently operate in all U.S. states and most U.S. territories. With help from the federal government, every state has established an Early Hearing Detection and Intervention Program. As a result, about 98% of babies have their hearing screened before 1 month of age.Why is it important to have my baby’s hearing screened early?The most important time for a child to learn language (spoken or signed) is in the first 3 years of life, when the brain is developing and maturing. In fact, children with typical hearing begin learning speech and language in the first 6 months of life. This is why it is so important to screen and start interventions for hearing loss as early as possible. Research shows that children with hearing loss who get help early develop better language skills than those who don’t.When will my baby’s hearing be screened?Your baby’s hearing should be screened before he or she leaves the hospital or birthing center. If not, make sure the baby is tested during the first month of life. If your baby’s hearing was not tested within 1 month of birth, or if you haven’t been told the results of the hearing screening, ask your child’s doctor today. Quick action will be important if the screening shows potential hearing loss.How will my baby’s hearing be screened?A newborn undergoes a hearing screening.Two different tests are used to screen for hearing loss in babies. Your baby can rest or sleep during both tests.Otoacoustic emissions (OAE) tests whether some parts of the ear respond to sound. During this test, a soft earphone is inserted into your baby’s ear canal. It plays sounds and measures an "echo" response that occurs in ears with normal hearing. If there is no echo, your baby might have hearing loss.The auditory brain stem response (ABR) tests how the auditory nerve and brain stem (which carry sound from the ear to the brain) respond to sound. During this test, your baby wears small earphones and has electrodes painlessly placed on his or her head. The electrodes adhere and come off like stickers and should not cause discomfort.What should I do if my baby’s hearing screening reveals potential hearing loss?If the results show that your baby may have hearing loss, make an appointment with a pediatric audiologist—a hearing expert who specializes in the assessment and management of children with hearing loss. This follow-up exam should be done as soon as possible, ideally by the time the baby is 2 to 3 months old. The audiologist will conduct tests to determine whether your baby has a hearing problem and, if so, the type and extent of that problem.If you need help finding a pediatric audiologist, ask your pediatrician or the hospital staff who conducted your baby’s screening. They may even be able to help you schedule an appointment. You can also try the directories provided by the American Academy of Audiology or the American Speech–Language–Hearing Association. If the follow-up examination confirms that your baby has hearing loss, he or she should begin receiving intervention services as soon as possible, ideally by the age of 3 to 6 months. See our Baby’s hearing screening and next steps: Timeline for parents (below) for a guide to follow.The pediatric audiologist may recommend that your baby visit a pediatric ear, nose, and throat (ENT) physician who specializes in conditions affecting the ear, known as a pediatric otologist. A pediatric otologist can determine possible causes of hearing loss and recommend intervention options. If your child has siblings, the audiologist or otologist may also recommend that their hearing be tested.The follow-up exam revealed that my baby’s hearing is fine. Does that mean we don’t need to check his or her hearing again?Not necessarily. Hearing loss can occur at any time of life. Some inherited forms of hearing loss don’t appear until a child is older. If your baby was exposed to certain infections before being born, they are more likely to have gradual hearing loss during childhood. Other factors, such as childhood illness, ear infection, head injury, certain medications, and loud noise are also linked to hearing loss in children. Use Your Baby’s Hearing and Communicative Development Checklist to monitor and track your child’s communication milestones through age 5. If you have concerns about your child’s hearing at any age, talk to your pediatrician right away.How can I help my child with hearing loss develop language skills?When interventions begin early, children with hearing loss can develop language skills that help them communicate freely and learn actively. The Individuals with Disabilities Education Act ensures that all children with disabilities have access to the services they need to get a good education. Your community may also offer additional services to help support your child.Your baby’s health care team will help you find services and methods to overcome communication barriers. You may also be referred to a speech-language pathologist or a teacher who is experienced in working with children with hearing loss. Talk to and communicate with your child often and stay up-to-date with all health care appointments.What devices could help my child hear and communicate better?Depending on your baby’s hearing loss and communication needs, some of these devices and tools may help to maximize his or her communication skills.Hearing aids. Worn behind the ear, hearing aids help make sounds louder and clearer. Hearing aids can be used for different degrees of hearing loss in babies as young as 1 month. A pediatric audiologist who is experienced in treating infants and children can help you choose the best hearing aid and make sure that it fits securely and is properly adjusted. Read the NIDCD fact sheet Hearing Aids for more information.Cochlear implants. If your child cannot benefit from a hearing aid, your doctor or audiologist may suggest a cochlear implant. This electronic device can provide a sense of sound to people who are profoundly deaf or hard-of-hearing. The device converts sounds into electrical signals and carries them past the nonworking part of the inner ear to the brain. Since 2020, cochlear implants have been FDA approved for surgical placement in children as young as 9 months.With training, children with cochlear implants can learn to recognize sounds and understand speech. Studies have also shown that eligible children (as young as 9 months of age) who receive a cochlear implant early may develop spoken language skills at a rate comparable to children with normal hearing, and many succeed in mainstream classrooms. Some doctors now recommend the use of two cochlear implants, one for each ear. An audiologist or otolaryngologist who specializes in cochlear implants can help you decide if a cochlear implant is appropriate for your child. Read the NIDCD fact sheet Cochlear Implants for more information.Assistive devices. As your child grows, other devices may be useful. Some devices help children hear better in a classroom. Others amplify one-on-one conversations or make talking on the phone or watching TV and videos easier. Read the NIDCD fact sheet Assistive Devices for People with Hearing, Voice, Speech, or Language Disorders for more information.What language and communication approaches might be available for my child?Children who are deaf or hard-of-hearing can learn to communicate in several ways. Find out as much as you can about the communication choices and ask your health care team to refer you to experts if you want to know more. Because language development begins early, regardless of the communication mode you choose, you should engage with your child and begin intervention as soon as possible.Common approaches used to help children with hearing loss communicate and interact with others include:Listening and spoken language (also known as auditory-verbal): works to strengthen listening, talking, and reading skills through the use of natural hearing and hearing devices such as hearing aids and cochlear implants, without the use of manual communication.Auditory-oral: emphasizes residual natural hearing in combination with amplification devices and technology to help children develop speech and spoken-language skills. It includes the use of speech reading and natural gestures in the communication process. Cued speech: is a system of specific hand shapes and placements that represent groups of consonants and vowels and that are used in combination with natural lip movements. American Sign Language: is a visual-manual, natural language that is used in the American Deaf community.Combined approaches: use aspects of various communication approaches, some of which are listed above, to expose children who are deaf or hard-of-hearing to many ways to communicate with others.Will my child be successful in school?Like all children, children who are deaf or hard-of-hearing can develop strong academic, social, and emotional skills and succeed in school. Find out how your school system helps children with hearing loss. With your input, your child’s school will develop an Individualized Education Program (IEP) or Individualized Family Service Plan (IFSP) for your child, and you should ask if an educational audiologist is available to be part of the academic team. Explore programs outside of school that may help you and your child and talk with other parents who have already dealt with these issues. The Individuals with Disabilities Education Act ensures that children with hearing loss receive free, appropriate, early-intervention services from birth through the school years. Contact the U.S. Department of Education, along with resources listed in our directory of organizations.An educator teaching a young boy.Baby’s hearing screening and next steps: Timeline for parentsUse this timeline to get started.Where can I find more information about hearing screening and communication approaches?NIDCD maintains a directory of organizations providing information on the normal and disordered processes of hearing, balance, taste, smell, voice, speech, and language. For more information, contact us at:NIDCD Information Clearinghouse1 Communication AvenueBethesda, MD 20892-3456Toll-free voice: (800) 241-1044Toll-free TTY: (800) 241-1055Email: nidcdinfo@nidcd.nih.gov