



Newborn Hearing Screening in Northern Ireland

Annual Report 2018 - 20

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Executive Summary

Introduction

This report covers the two year period 1st April 2018 – 31st March 2020.

Background

One or two babies in every 1,000 are born with a hearing loss in one or both ears¹. Research studies have demonstrated the importance of detecting a hearing loss as early as possible. The Newborn Hearing Screening Programme (NHSP) is offered to all babies, who are born or resident in Northern Ireland, up until the baby is aged 182 days. The aim of the screening programme is to identify babies who have a significant permanent childhood hearing impairment (PCHI)² to allow early referral, diagnosis and intervention. Early detection and effective interventions result in improved outcomes for children. This consolidated report of the Northern Ireland NHSP summarises the performance of the programme from 1st April 2018 to 31st March 2020.

Programme delivery

The NHSP is commissioned and quality assured by the Public Health Agency (PHA). It is provided, and managed, by five Health and Social Care Trusts (HSCTs) involving a wide range of professional staff.

Screening tests

The programme follows two separate screening protocols. The first is the Well Baby Protocol, which is the primary screening protocol and the second is the Neonatal Unit (NNU) Protocol. These are shown in appendices 1 and 2. In certain circumstances an Early Discharge Protocol is used instead of the Well

¹PHA Your baby's hearing screen NINHSP Information for parents/guardians accessed via: <https://www.publikealth.hscni.net/sites/default/files/ENGLISH%20-%20L1%20-%20Your%20Baby%27s%20Hearing%20Screen%20%28Well%20Baby%29.pdf>

² 'NHSP defines this as a bilateral permanent hearing loss averaging ≥ 40 dBnHL across 0.5 to 4kHz'. Sutton et al Guidelines for surveillance and audiological referral of infants & children following the newborn hearing screen, July 2012.

Baby Protocol e.g. when: an interpreter is on the ward at time of screening; there is a family history of PCHI and the mother wants screening completed as soon as possible; a baby is under care of social services or it is thought a mother is unlikely to return for completion of screening. In addition, the early discharge protocol may be used at outpatients so that screening is completed in one visit. The NNU Protocol is used if a baby has been in a neonatal/special care baby unit for more than 48 hours and screening has not been completed prior to admission.

There are also two types of hearing screening tests provided. The type of test that a baby requires and is offered will depend on (a) which screening protocol is applicable (see appendices 1 and 2) and (b) the results of their initial hearing screening test, if they have been following a Well Baby or Early Discharge protocol.

Key developments

In 2018 new national programme standards were issued by Public Health England (PHE) and adopted in Northern Ireland.

Amendments to contraindications to screening from PHE 2019 guidance were implemented in Northern Ireland.

An agreed process was established for babies transferring from the Well Baby to NNU Baby Protocol.

Quality improvement measures were introduced to ensure that NNU babies in a neonatal unit for more than 48 hours are screened using the NNU protocol.

Work continued on the procurement of a managed regional IT service to support programme management, data collection and quality assurance.

A full list of key developments during 2018-20 appears on page 10.

Headline results

The key statistics for the period 1st April 2018 – 31st March 2019 are:

- In 2018 – 19 there were 22,802 ‘current residents’ (i.e. babies) eligible for screening. Of these:
 - 99.8 % (22,755) were offered screening
 - 97.2 % (22,157) completed screening by the age of 4 weeks;
 - 99.0 % (22,585) completed screening by the age of 3 months
 - 2.1% (468) were referred to audiology services for diagnostic assessment by the age of 3 months.

In relation to ‘live births’ in hospitals in Northern Ireland during the same period:

- 75.3% (17,330/23,004) of babies had their hearing screening test completed before discharge from hospital.

The key statistics for the period 1st April 2019 – 31st March 2020 are:

- In 2019 – 20 there were 22,311 ‘current residents’ (i.e. babies) eligible for screening. Of these:
 - 99.8% (22,267) were offered screening
 - 95.8% (21,367) completed screening by the age of 4 weeks;
 - 98.3% (21,931) completed screening by the age of 3 months;
 - 2.3% (510) were referred to audiology services for diagnostic assessment by the age of 3 months.

In relation to ‘live births’ in hospitals in Northern Ireland during the same period:

- 77.8% (17,480/22,460) of babies had their hearing screening test completed before discharge from hospital.

Introduction

This report covers the operation of the Newborn Hearing Screening Programme over the two year period 1st April 2018 – 31st March 2020.

Background

Screening is defined as ‘the process of identifying healthy people who may have an increased chance of a disease or condition and offering them information, screening tests and, if required, further confirmatory (diagnostic) tests and treatment’³. The aim of screening is to reduce the problems and complications associated with the underlying disease or condition being screened for.

Following the recommendation from the UK National Screening Committee (UKNSC) that a national neonatal hearing screening programme should be established, the Northern Ireland Newborn Hearing Screening Programme (NHSP) was launched in October 2005.

Hearing screening is offered to all babies, who are born or resident in Northern Ireland, up to 6 months of age (i.e. from birth (day 0) until day 182 of life inclusive). This annual report of the Northern Ireland NHSP summarises the performance of the programme from 1st April 2018- 31st March 2020.

Aim of newborn hearing screening

The aim of the NHSP is to identify babies who have a significant permanent childhood hearing impairment (PCHI)⁴, i.e. a bilateral hearing loss of 40 dBnHL or more⁵, at the earliest stage and ideally within 4 weeks of birth.

³ PHE Screening explained <https://www.gov.uk/guidance/nhs-population-screening-explained>

⁴ ‘NHSP defines this as a bilateral permanent hearing loss averaging ≥ 40 dBnHL across 0.5 to 4kHz” Sutton et al *Guidelines for surveillance and audiological referral of infants & children following the newborn hearing screen*, July 2012.

⁵ Davis A, Bamford J, Wilson I, Ramkalawan T, Forshaw M - A critical review of the role of neonatal hearing screening in the detection of congenital hearing impairment. *Health Technol Assess* 1997;1(10)

This allows timely referral, diagnosis and intervention. One or two babies in every 1,000 are born with a hearing loss in one or both ears. Research studies have demonstrated the importance of detecting a hearing loss as early as possible. Early detection and effective interventions result in improved outcomes for children, in particular, improved speech and language development.

Programme delivery

In Northern Ireland the NHSP is commissioned and quality assured by the Public Health Agency (PHA). It is provided by five Health and Social Care Trusts (HSCTs) who manage and deliver the programme. It is a complex programme involving a wide range of professional staff including: local newborn hearing screening co-ordinators; screeners; Child Health System staff; midwives; paediatric staff; neonatal and special care baby unit staff; health visitors; community and hospital audiology and ear, nose and throat (ENT) specialist staff.

Screening pathway

Offer of screening

All resident babies (including those born in or who have moved in to Northern Ireland) are offered screening from over 34 weeks gestational age up until the age of 6 months⁶.

Contraindications to screening

There are a number of instances whereby newborn hearing screening is not appropriate and, instead, an immediate referral is made by the medical team caring for baby, to audiology. This is also referred to as 'screening contraindicated'.

For example, newborn hearing screening is not appropriate (contraindicated) in the following instances and whereby any of the following are present:

1. Microtia / external ear canal atresia

Microtia is a congenital (i.e. present from birth) deformity affecting the outer ear, whereby the ear does not fully develop during pregnancy. Atresia is the absence or closure of the external auditory ear canal;

2. Neonatal bacterial meningitis or meningococcal septicaemia

Bacterial meningitis occurs when bacteria infect the lining of the brain and the spinal cord. Meningococcal septicaemia – or blood poisoning – occurs when the bacteria in the blood multiply;

3. Programmable ventriculo-peritoneal shunts in place

A ventriculo-peritoneal (VP) shunt is a medical device that relieves pressure on the brain caused by fluid accumulation;

⁶ 6 months is defined as day 182 of life, with birth being day 0

4. **Confirmed congenital cytomegalovirus (cCMV)**

Congenital cytomegalovirus is a condition that can occur when an infant is infected with a virus called cytomegalovirus (CMV) before birth.

Screening protocols and tests

The programme follows one of two separate screening protocols. The first is the Well Baby Protocol, which is the primary screening protocol and which most babies follow. The second is the Neonatal Unit (NNU) Protocol. These are shown in Appendices 1 and 2.

In certain, limited, circumstances an 'Early Discharge Protocol' may be required to be used instead of the Well Baby Protocol. This will be determined by the newborn hearing screener / coordinator.

The NNU Protocol is used if a baby has been in a neonatal/special care baby unit for more than 48 hours and screening has not been completed prior to admission. These babies have an increased risk of hearing loss in one or both ears (around 1 in 100).

Two types of hearing screening tests are provided. The type of test that a baby requires, and is offered, will depend on (a) which screening protocol is applicable and (b) the results of their initial test if they have been following the Well Baby or Early Discharge Protocol.

A baby's newborn hearing screening test is often commenced and completed prior to discharge from hospital, but can also be commenced and/or completed following discharge at an outpatient clinic. The screening tests are described below.

An **Automated Otoacoustic Emission (AOAE)** test involves placing a small soft tipped earpiece in the outer part of a baby's ear to send clicking sounds to the inner ear. Using a computer, the screener carrying out the test can detect how

the baby's inner ear (cochlea) responds to sound. The test causes no discomfort to the baby and is often conducted while they are asleep. This test measures the mechanical function of the inner ear. In the cochlea, when a noise is heard, acoustic energy is generated which will cause vibration of special hair cells (these are known as otoacoustic emissions). The AOAE test screens for these otoacoustic emissions. All babies are offered this test.

An **Automated Auditory Brainstem Response (AABR)** is a different type of test. Rather than measure acoustic energy within the inner ear, it measures electrical brain activity. This screening test involves placing small sensors on a baby's head, shoulder and nape of the neck. Soft headphones are placed over baby's ears and a series of clicking sounds are played.

A computer measures how the baby's ears respond to these sounds. This test is only required for some babies in accordance with the screening protocols.

Referral

Depending on the results of these screening tests, a child may require referral for further specialist assessment by audiology services. This is to confirm a diagnosis and allow timely follow up and treatment if required.

Hearing loss

While the aim of the newborn hearing screening programme is to identify babies who have a significant permanent childhood hearing impairment, it is important to remember that no screening test is 100% accurate and also that hearing loss can occur at any stage of life. It is therefore important that parents/guardians remain vigilant for any changes or concerns regarding their child's hearing.

A developmental checklist (see Appendix 3) is shared with parents/guardians via the Personal Childhood Health Record (PCHR), to encourage monitoring of their baby's hearing throughout the early stages of life. Should a parent/guardian have any concern about hearing, this should be discussed with the health visitor or GP.

Hearing Risk Factors (updated 4 Feb 2020)

An infant with one or more of the following risk factors (identified at the time of newborn hearing screening) will be offered audiological assessment at 8 months, regardless of their hearing screening result:

Congenital Infection	Confirmed congenital infection due to toxoplasmosis or rubella, as determined by a TORCH screen ⁷
Craniofacial Anomalies	A (noticeable) cranio-facial anomaly such as cleft palate (excluding cleft lip only, minor pits or ear tags)
Syndrome	Confirmed syndrome related to hearing loss, e.g. Down's syndrome
NNU protocol results	NICU/SCBU ⁸ >48 hours with bilateral clear response at AABR and the infant does not have a clear response (C) in at least one ear at AOAE

⁷ a TORCH screen is a blood test used to screen for a number of infectious diseases that are known by the acronym TORCH – Toxoplasmosis, Other agents (including syphilis and HIV), Rubella, Cytomegalovirus and Herpes simplex

⁸ NICU = neonatal intensive care unit, SCBU = special care baby unit

Failsafe

A failsafe is a back-up mechanism which, in addition to usual care, ensures that if something does not go to plan in the screening pathway, the back-up process identifies what has happened and initiates appropriate action.

The NHSP includes a robust mechanism to capture babies who have not been offered, or taken part, in screening. This failsafe 'mop up' report identifies all babies from age 14 days until age 182 days (i.e. for the duration of the programme) with a nil or inconclusive result. The report is run each week by the NHSP Coordinator in each Trust, using the Child Health Information System. Once a baby has been identified on this list, their parent/guardian will be contacted to offer a screening hearing test.

Key developments 2018-20

During 2018-20 there were a number of developments within the NHSP. These included:

- In 2018 new national programme standards were issued by Public Health England (PHE) and adopted in Northern Ireland.
- Amendments to contraindications to screening from PHE guidance introduced in 2019 were implemented in Northern Ireland.
- An agreed process was established for babies transferring from the Well Baby to the NNU protocol.
- Quality improvement measures were introduced to ensure that NNU babies in a neonatal unit for more than 48 hours are screened using the NNU protocol.
- A Regional Quality Improvement Group for the NHSP, to oversee future development and quality improvement work at a regional level, advise on the strategic direction for the programme, approve key changes and provide ideas for programme modernisation, was reinstated.
- Ongoing input into the national (UK) Newborn Hearing Screening Programme Advisory Group
- Work continued on the procurement of a managed regional IT service, known as Smart4Hearing (S4H) to support programme management, data collection and quality assurance.

Procurement and implementation of S4H will reduce the need for manual entry of data as it will enable automated capture and retention of NHSP screening results. It will provide more timely access to programme data and allow monitoring of all national standards.

Further business processes, to procure the S4H service occurred during 2018-20, including engagement with regional stakeholders and service providers in order to shape the implementation of this complex system. This new service will be introduced in 2021.

Public information leaflets are available in multiple languages⁹. The programme keeps the need for additional translations under regular review using information provided by the Northern Ireland Health and Social Care Interpreting Service and additional translations can be added as required.

⁹ <https://www.publichealth.hscni.net/publications/newborn-hearing-screening-english-and-translations>

Programme performance 2018-20

The NHSP routinely collects and collates anonymised data to measure and monitor programme performance. Northern Ireland is currently able to report on two of the five national programme standards: Standard 1- Coverage and Standard 3 – Referral rate to diagnostic audiological assessment. The procurement of S4H will improve the data reports that can be produced, including in relation to timeliness of diagnostic assessment and outcomes in line with national standards. The national programme standards have been summarised in Table 1 below.

Programme data

- Cohort: data is produced on the offer, uptake and outcome of newborn hearing screening of:
 - ‘Live births’ before discharge from hospital and
 - ‘Current residents’
- Key definitions:
 - ‘Live births’ – this includes all babies who were born alive in hospitals in Northern Ireland from 1st April 2018 to 31st March 2020.
 - ‘Current residents’ – this includes all babies who were:
 - born between 1st April 2018 and 31st March 2020 and
 - were resident in Northern Ireland, at some point, between 1st April 2018 and 31st March 2020.
 - The current resident cohort may include babies who were not born in hospital, or who were born outside Northern Ireland and moved into Northern Ireland within the first six months of life.

It may also vary from the total number of ‘live births’ as children may have been born in Northern Ireland hospitals but moved out of Northern Ireland.

- Source: Data on the performance of the programme is provided by the Child Health System (CHS). There are four CHS areas in Northern Ireland and these collectively cover the five health and social care trust geographies, i.e. Eastern (Belfast Health and Social Care Trust and South Eastern Health and Social Care Trust), Northern (Northern Health and Social Care Trust), Southern (Southern Health and Social Care Trust) and Western (Western Health and Social Care Trust).
- Health and Social Care Trust (HSCT) Definitions: When examining data at Trust level CHS data equates to Trust geographies in most cases ie NHSCT, WHSCT and SHSCT. However, BHSCT and SEHSCT data are provided by a single (Eastern) CHS. Therefore it is important to define the exact geographies included for each Trust. These differ for the ‘current resident’ and ‘live birth’ cohorts as outlined below.

HSCT	Geography included for ‘current resident’ cohort	Geography included for ‘live birth’ cohort
BHSCT	Current residents in North, South, West Belfast and Lisburn.	Live births in the Royal Jubilee Maternity Hospital, Mater Infirmorum Hospital and Lagan Valley Hospital
SEHSCT	Current residents in North Down, Ards, Down, East Belfast and Castlereagh	Live births in the Downpatrick and Ulster Hospitals

- Frequency of reporting: data are produced quarterly to cover the periods April to June, July to September, October to December and January to March. The reports that produce the data for a given quarter are produced and analysed four months after the end of that quarter.
- Methodology: the annual figures included in this report have been calculated by summing the figures in each quarter.

National standards

Table 1: UK Newborn Hearing Screening Programme Standards, 2018¹⁰

Standard		Description	Acceptable	Achievable
1	Coverage	The proportion of babies eligible for newborn hearing screening for whom the screening process is complete by 4 weeks corrected age (hospital programmes – well babies, neonatal intensive care unit (NICU) babies) or by 5 weeks corrected age (community programmes – well babies)	≥ 98.0%	≥ 99.5%
2	Test: well babies who do not show a clear response in both ears at automated optoacoustic emission 1 (AOAE1)	The proportion of well babies who do not show a clear response in both ears at AOAE1.	≤ 27.0% (hospital ¹¹ programme) ≤ 15.0% (community programme)	≤ 22.0% (hospital programme) ≤ 13.5% (community programme)
3	Test: referral rate to diagnostic audiological assessment	The proportion of eligible babies that receive a no clear response result in one or both ears or other result that requires an	≤ 3.0% (hospital programme) ≤ 1.6% (community	≤ 2.0% (hospital programme) ≤ 1.3% (community

¹⁰ PHE NHS Newborn Hearing Screening Programme Standards valid from 1st April 2018
<https://www.gov.uk/government/publications/newborn-hearing-screening-programme-quality-standards/newborn-hearing-screening-programme-standards-2018-to-2019>

¹¹ Northern Ireland provides the NHSP using 'hospital programme' only

Standard		Description	Acceptable	Achievable
		immediate onward referral for audiological assessment.	programme)	programme)
4	Referral: time from screening outcome to offered appointment for diagnostic audiological assessment	The proportion of babies with a no clear response result in one or both ears or other result who require an immediate onward referral for audiological assessment, are referred for diagnostic audiological assessment in a timely manner.	≥ 97.0%	≥ 99.0%
5	Diagnosis/intervention – time from screening outcome to attendance at an audiological assessment appointment	The proportion of babies with a no clear response result in one or both ears or other result that require an immediate onward referral for audiological assessment who receive audiological assessment within the required timescale.	≥ 90.0%	≥ 95.0%

Headline results

Data relating to the Northern Ireland Newborn Hearing Screening Programme highlight that from 1st April 2018 – 31st March 2019:

- There were 22,802 ‘current residents’ eligible for screening. Of these:
 - 99.8% (22,755) were offered screening.
 - 97.2% (22,157) completed screening by the age of 4 weeks (Standard 1 - acceptable threshold \geq 98.0%; achievable threshold \geq 99.5%).
 - 99.0% (22,585) completed screening by the age of 3 months.
 - 2.1% (468) of those who completed screening were referred to audiology services for diagnostic assessment by the age of 3 months (Standard 3 - acceptable threshold \leq 3.0%; achievable threshold \leq 2.0%).

Therefore, the Programme as a whole was just below the acceptable threshold for Standard 1 and met the acceptable threshold, but not the achievable threshold, for Standard 3.

In relation to ‘live births’ in hospitals in Northern Ireland during the same period:

- 75.3% (17,330/23,004) of babies had hearing screening completed before discharge from hospital.

For the period 1st April 2019 – 31st March 2020, regional data relating to the NI Newborn Hearing Screening Programme highlight that:

- There were 22,311 ‘current residents’ eligible for screening. Of these

- 99.8% (22,267) were offered screening.
- 95.8% (21,367) completed screening by the age of 4 weeks (Standard 1 - acceptable threshold \geq 98.0%; achievable threshold \geq 99.5%).
- 98.3% (21,931) completed screening by the age of 3 months.
- 2.3% (510) of those who completed screening were referred to audiology services for diagnostic assessment by the age of 3 months (Standard 3 - acceptable threshold \leq 3.0%; achievable threshold \leq 2.0%).

In relation to 'live births' in hospitals in Northern Ireland during the same period: 77.8% (17,480/22,460) of babies had their hearing screening test completed before discharge from hospital.

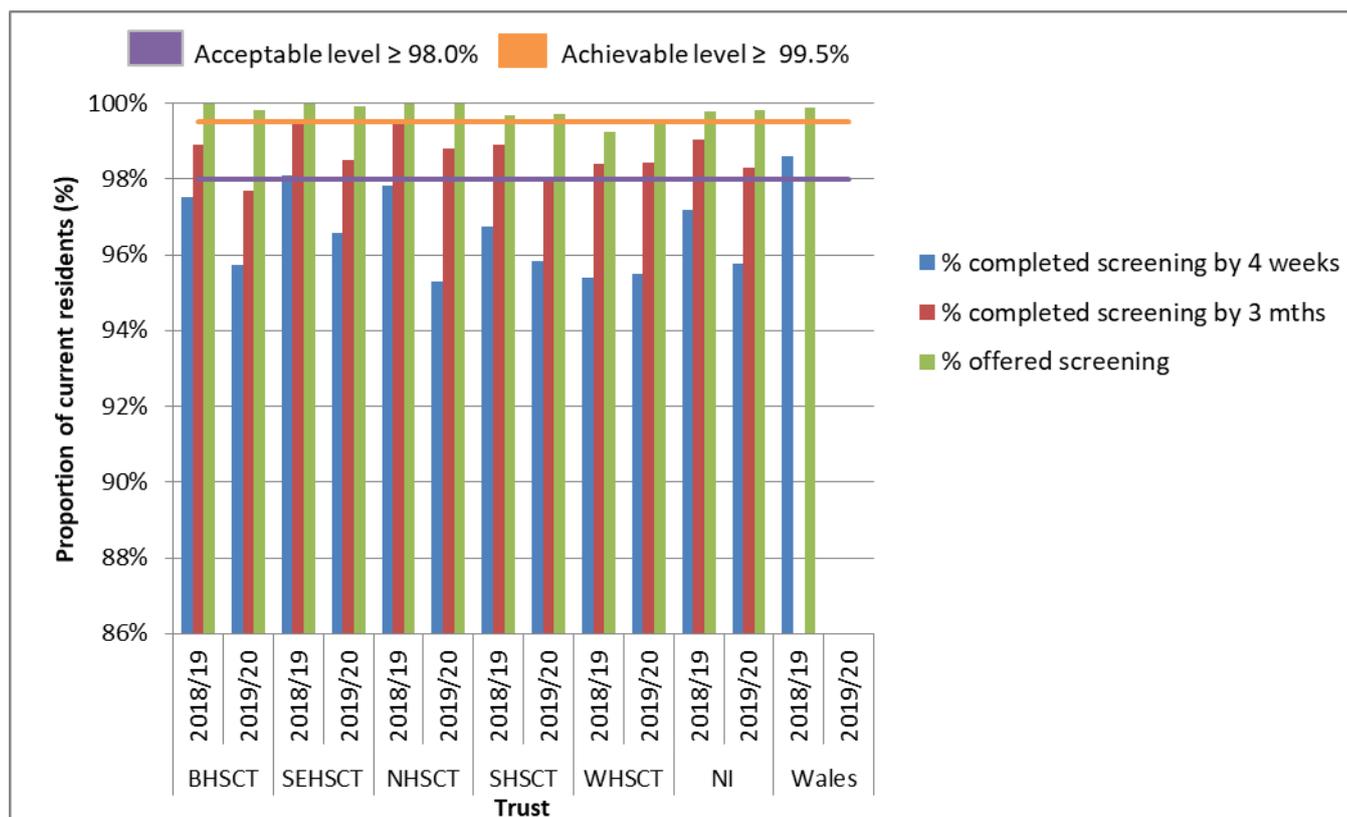
Therefore, the Programme as a whole was below the acceptable threshold for Standard 1 and met the acceptable threshold, but not the achievable threshold, for Standard 3.

Trends in data

Figure 1 and Tables 2a and 1b show that in 2018-19 and 2019-20, as in 2017-18, over 99% of current residents in Northern Ireland were offered hearing screening and over 97.0% had completed screening by 3 months of age. As outlined above screening may be declined or, in some instances, may not be appropriate.

Figure 1 also shows each Trust's performance regarding offer of screening and completion rates, with comparative figures for Wales for 2018-19. (At time of publication, comparative published figures were not available for England and Scotland). During the years 2018-19 and 2019-20, each Trust offered screening to over 99% of their current residents, with the NHSCT achieving 100% in both years. Over 95% of all current residents in both years completed screening within 4 weeks in all Trusts. However, the only Trust that met the acceptable threshold of $\geq 98.0\%$ was the South Eastern Trust in 2018-19. Over 98% of all current residents completed screening by 3 months of age in all Trust areas except BHSCT (97.7%).

Figure 1: Proportion of ‘current residents’ in each Health and Social Care Trust (HSCT) offered newborn hearing screening and completion rates by 4 weeks and 3 months of age in 2018-20. The threshold levels relate to Standard 1 - % completed screening by 4 weeks.



Notes

Wales data

Data source = Newborn Hearing Screening Wales Annual Statistical Report 2018 – 19 produced by Screening Division of Public Health Wales <https://phw.nhs.wales/services-and-teams/screening/newborn-hearing-screening-wales/publications/annual-reports/newborn-hearing-screening-wales-annual-statistical-report-2018-19/>
2019/20 figures were not available at the time of publication of this report

Table 2a: Proportion of ‘current residents’ in each HSCT offered newborn hearing screening and completion rates by 4 weeks and 3 months of age 2018-19

Trust	Number of current residents	No. offered screen	% offered	No. completed by		% completed by	
				4 wks	3 mths	4 wks	3 mths
BHSCT	4386	4385	99.98%	4278	4338	97.54%	98.91%
SEHSCT	3965	3964	99.97%	3890	3944	98.11%	99.47%
NHSCT	5366	5366	100.00%	5250	5336	97.84%	99.44%
SHSCT	5293	5277	99.70%	5121	5235	96.75%	98.90%
WHSCT	3792	3763	99.24%	3618	3732	95.41%	98.42%
NI Total	22802	22755	99.79%	22157	22585	97.17%	99.05%

Table 2b: Proportion of ‘current residents’ in each HSCT offered newborn hearing screening and completion rates by 4 weeks and 3 months of age 2019-20

Trust	Number of current residents	No. offered screen	% offered	No. completed by		% completed by	
				4 wks	3 mths	4 wks	3 mths
BHSCT	4232	4225	99.83%	4052	4134	95.75%	97.68%
SEHSCT	3891	3888	99.92%	3758	3833	96.58%	98.51%
NHSCT	5319	5319	100.00%	5069	5256	95.30%	98.82%
SHSCT	5219	5205	99.73%	5002	5115	95.84%	98.01%
WHsCT	3650	3630	99.45%	3486	3593	95.51%	98.44%
NI Total	22311	22267	99.80%	21367	21931	95.77%	98.30%

Figure 2 and Tables 3a and 3b show that in relation to Standard 3 (referral rate) 2.1% (in 2018-19) and 2.3% (in 2019-20) of current residents who had completed screening in Northern Ireland by 3 months of age required referral to audiology services for further testing following the result of their screening test. The acceptable threshold for this standard is $\leq 3.0\%$ and the achievable threshold is $\leq 2.0\%$. As shown in Figure 3, the referral rate varied by HSCT and was highest in NHSCT in both 2018-19 and 2019-20 with 4.0% and 4.8% respectively of all current residents referred to audiology by the age of 3 months. While the NHSCT did not meet the acceptable standard the other Trusts met the achievable standard.

Figure 2: Proportion of ‘current residents’ in each HSCT with a bilateral clear response screening outcome by 4 weeks and 3 months of age in 2018-2020

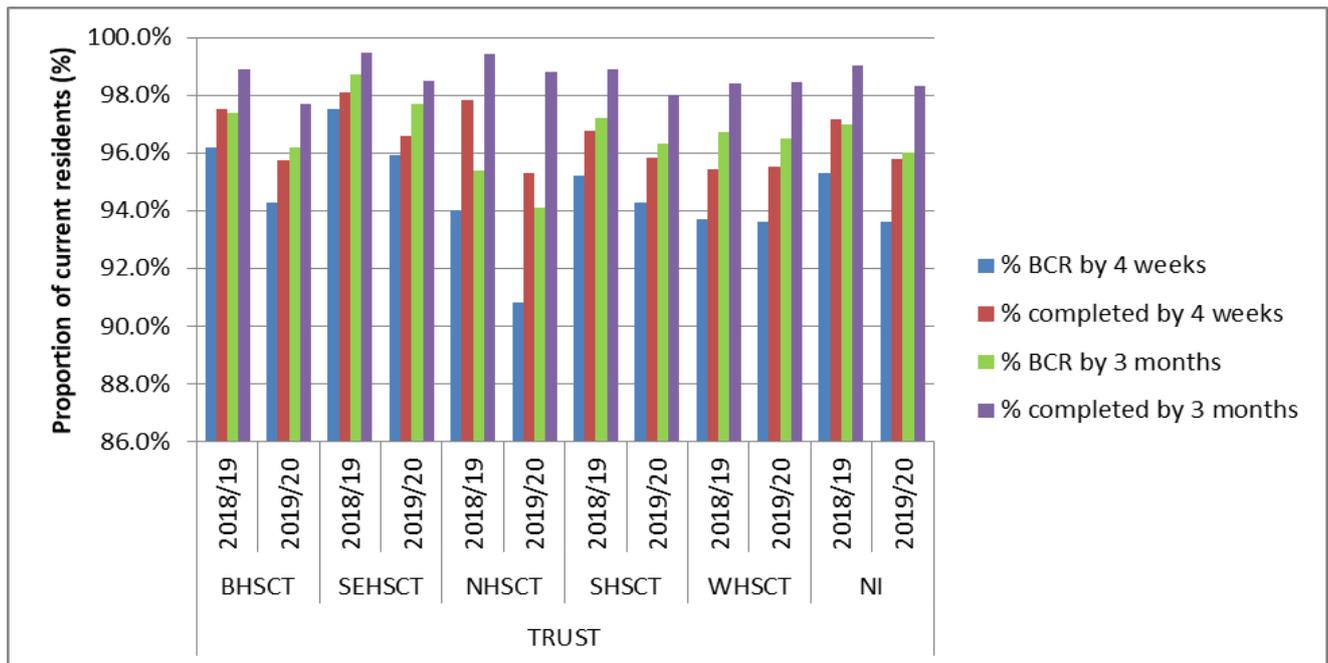
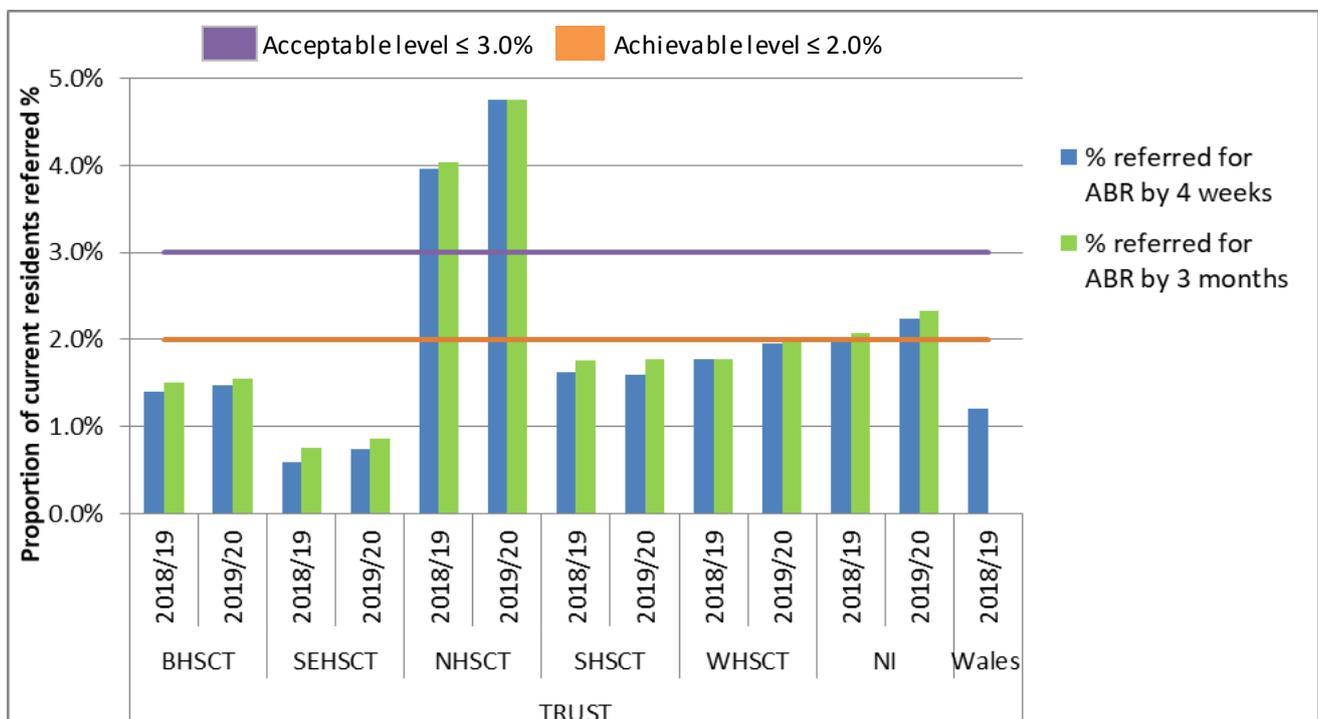


Figure 3: Proportion of ‘current residents’ who have completed screening in each HSCT referred for ABR by 4 weeks and 3 months of age in 2018 – 20



Notes

Wales data

Data source = Newborn Hearing Screening Wales Annual Statistical Report 2018– 19 produced by Screening Division of Public Health Wales

<https://phw.nhs.wales/services-and-teams/screening/newborn-hearing-screening-wales/publications/annual-reports/newborn-hearing-screening-wales-annual-statistical-report-2018-19/>

2019/20 figures were not available at the time of publication of this report

% referred = % screened babies referred for assessment

Table 3a: Proportion of ‘current residents’ in each HSCT who completed screening with screening outcome (bilateral clear response (BCR) or referral for ABR) by 4 weeks and 3 months of age 2018-19

Trust	by 4 weeks					by 3 months				
	No. of current residents who completed screening	% BCR of those completed		% referred of those completed		No. of current residents who completed screening	% BCR of those completed		% referred of those completed	
BHSCT	4278	98.60%	4218	1.40%	60	4338	98.50%	4273	1.50%	65
SEHSCT	3890	99.41%	3867	0.59%	23	3944	99.24%	3914	0.76%	30
NHSCT	5250	96.04%	5042	3.96%	208	5336	95.97%	5121	4.03%	215
SHSCT	5121	98.38%	5038	1.62%	83	5235	98.24%	5143	1.76%	92
WHSCT	3618	98.23%	3554	1.77%	64	3732	98.23%	3666	1.77%	66
NI Total	22157	98.02%	21719	1.98%	438	22585	97.93%	22117	2.07%	468

Table 3b: Proportion of ‘current residents’ in each HSCT who completed screening with screening outcome (bilateral clear response (BCR) or referral for ABR) by 4 weeks and 3 months of age 2019-2020

Trust	by 4 weeks					by 3 months				
	No. of current residents who completed screening	% BCR of those completed		% referred of those completed		No. of current residents who completed screening	% BCR of those completed		% referred of those completed	
BHSCT	4052	98.52%	3992	1.48%	60	4134	98.45%	4070	1.55%	64
SEHSCT	3758	99.25%	3730	0.75%	28	3833	99.14%	3800	0.86%	33
NHSCT	5069	95.25%	4828	4.75%	241	5256	95.24%	5006	4.76%	250
SHSCT	5002	98.40%	4922	1.60%	80	5115	98.22%	5024	1.78%	91
WHSCT	3486	98.05%	3418	1.95%	68	3593	98.00%	3521	2.00%	72
NI Total	21367	97.77%	20890	2.23%	477	21931	97.67%	21421	2.33%	510

In 2018-19 and 2019-20 as highlighted in Figure 4, 75.3% and 77.8%, respectively of all babies born alive in hospitals in Northern Ireland, completed hearing screening before discharge from hospital. The proportion of live births completing hearing screening prior to discharge from hospital varied by Trust (Figure 4 and Tables 4a and 4b) with 92.1% (in 2018-19) and 89.6 % (in 2019-20) completing screening prior to discharge from hospitals in the NHSCT and 67.6 % and 69.9% completing hearing screening prior to discharge from hospitals in the BHSCT.

Figure 4: Proportion of ‘live births’ in each HSCT completing hearing screening before discharge from hospital in 2018-20

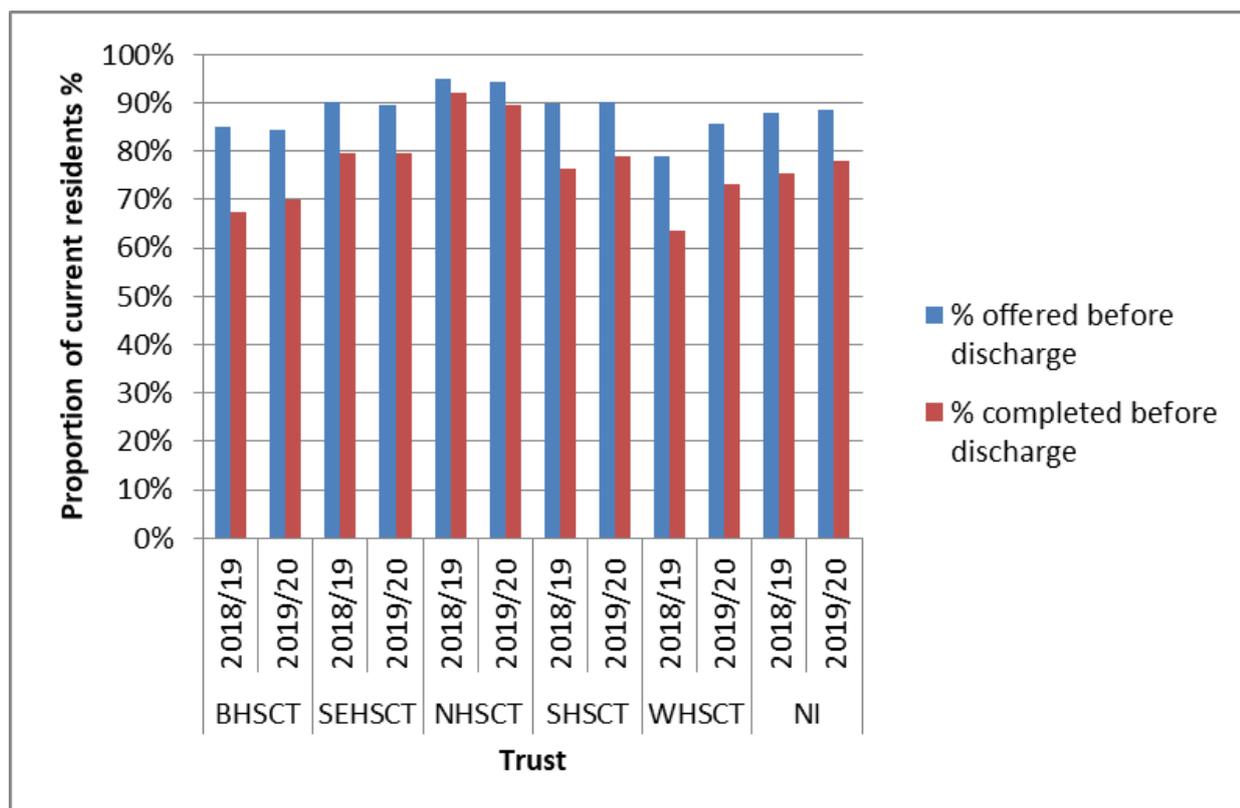


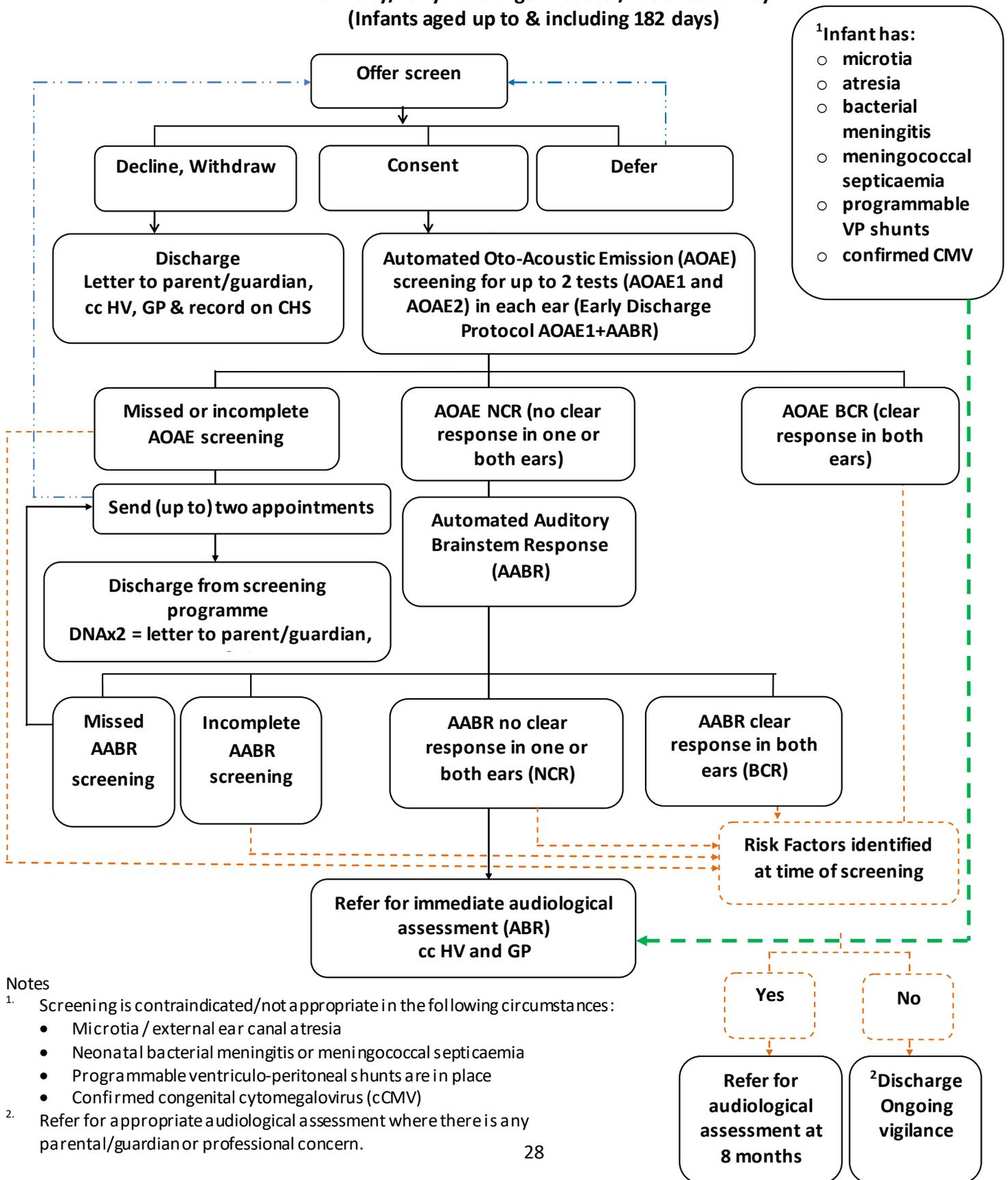
Table 4a: Proportion of ‘live births’ in each HSCT offered and completing hearing screening before discharge from hospital in 2018-19

Trust	Total number of live births	% offered before discharge		% completed before discharge		% referred before discharge	
		%	Number	%	Number	%	Number
BHSCT	5459	85.09%	4645	67.56%	3688	0.81%	44
SEHSCT	4240	90.21%	3825	79.69%	3379	0.47%	20
NHSCT	3790	94.91%	3597	92.14%	3492	4.64%	176
SHSCT	5671	89.95%	5101	76.27%	4325	1.22%	69
WHSCT	3844	78.90%	3033	63.63%	2446	1.17%	45
NI Total	23004	87.82%	20201	75.33%	17330	1.54%	354

Table 4b: Proportion of 'live births' in each HSCT offered and completing hearing screening before discharge from hospital in 2019-20

Trust	Total number of live births	% offered before discharge		% completed before discharge		% referred before discharge	
BHSCT	5245	84.35%	4424	69.93%	3668	0.78%	41
SEHSCT	4118	89.41%	3682	79.58%	3277	0.27%	11
NHSCT	3848	94.33%	3630	89.55%	3446	5.82%	224
SHSCT	5552	90.27%	5012	78.91%	4381	1.19%	66
WHsCT	3697	85.80%	3172	73.25%	2708	1.62%	60
NI Total	22460	88.69%	19920	77.83%	17480	1.79%	402

**Well Baby/Early Discharge Protocol/Patient Journey
(Infants aged up to & including 182 days)**



- ¹Infant has:
- microtia
 - atresia
 - bacterial meningitis
 - meningococcal septicaemia
 - programmable VP shunts
 - confirmed CMV

Notes

1. Screening is contraindicated/not appropriate in the following circumstances:

- Microtia / external ear canal atresia
- Neonatal bacterial meningitis or meningococcal septicaemia
- Programmable ventriculo-peritoneal shunts are in place
- Confirmed congenital cytomegalovirus (cCMV)

2. Refer for appropriate audiological assessment where there is any parental/guardian or professional concern.

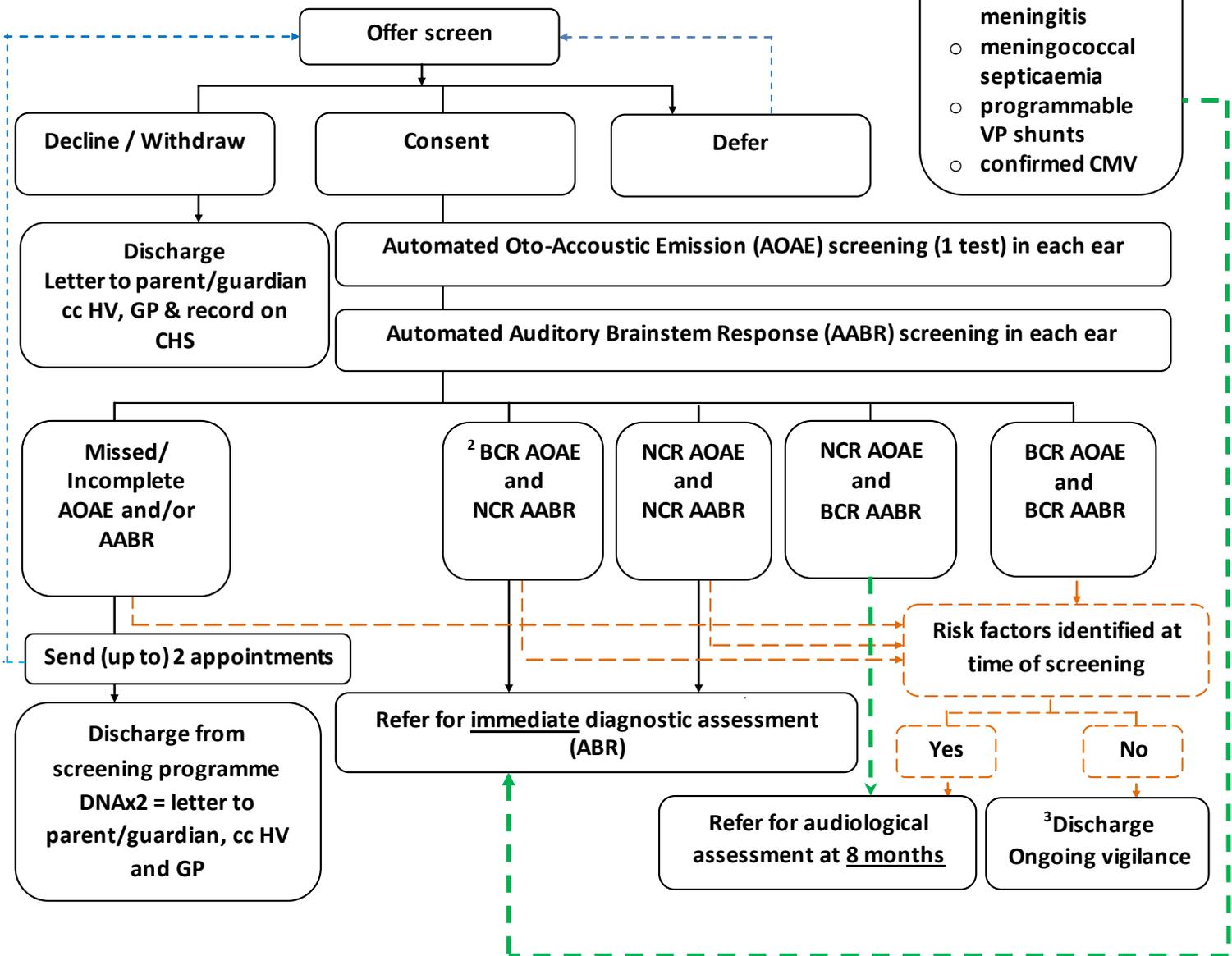
Appendix 2



NUU/SCBU (> 48hrs) Protocol/Patient Journey (Infants aged up to & including 182 days)

¹Infant has:

- microtia
- atresia
- bacterial meningitis
- meningococcal septicaemia
- programmable VP shunts
- confirmed CMV



Notes

^{3.} Screening is contraindicated/not appropriate in the following circumstances:

- Microtia / external ear canal atresia
- Neonatal bacterial meningitis or meningococcal septicaemia
- Programmable ventriculo-peritoneal shunts are in place
- Confirmed congenital cytomegalovirus (cCMV)

^{4.} Screening Outcomes: BCR – clear response achieved in both ears
 NCR – no clear response in one or both ears

^{5.} Refer for appropriate audiological assessment where there is any parental/guardian or professional concern.

Appendix 3

Developmental checklist (PCHR) (Hearing, speech and language)

Extracted from the Northern Ireland Personal Child Health Record (PCHR – ‘red book’) for translation of newborn hearing screening programme information. The full version of ‘Your Baby’s Development’ is available within the PCHR.

Birth to 8 weeks

- Is startled by sudden loud noises, e.g. a hand clap or a door slamming.
- Blinks or opens eyes widely, stops sucking or starts to cry at loud noises.
- Pauses, appears to listen and may turn towards sudden ongoing sounds when they begin, e.g. a vacuum cleaner.

9-16 weeks

- Quietens or smiles to familiar voices even when unable to see speaker. Turns eyes or head towards voice. Shows excitement at sounds, e.g. voices, footsteps.
- Makes soft sounds when awake. Gurgles and coos.

5-9 months

- Makes laughter-like and sing-song sounds. e.g. ‘a-a’, ‘muh’, ‘goo’, ‘der’, ‘aroo’, ‘adagh’.
- Turns immediately to familiar voices across the room or to very quiet noises on each side (if not too occupied with other things).
- Listens closely to familiar everyday sounds and looks for very quiet sounds made out of sight. Makes sounds to show friendliness or annoyance.
- Babbles, e.g. ‘da da da’, ‘ma ma ma’, ‘ba ba ba’. Shows pleasure in babbling loudly and tunefully in response to others. Starts to copy other sounds like coughing or smacking lips.

9-12 months

- Shows some response to own name.
- Babbles loudly, often making sounds with rhythm that sound like a simple conversation.

- Responds to words like 'no' and 'bye bye' even when the speaker's gestures cannot be seen.
- Waves 'bye bye' and claps hands.
- Around 12 months, may use 1 or 2 words.

1-2 years

- Around 15 months, makes lots of speech-like sounds. Uses 2-6 words correctly that you understand, e.g. 'teddy' when seeing or wanting a teddy bear.
- Around 18 months, when playing, makes speech-like sounds with rhythm that sound like a simple conversation. Uses 6-20 words that you understand. Follows simple instructions, e.g. 'show me your shoes'.
- Finds and points to pictures in books by using words 'look' and 'see'. Turns pages one at a time.
- Around 24 months, uses 50 or more words correctly that you understand. Puts 2 or more words together to make simple sentences, e.g. 'more milk'. Joins in nursery rhymes and songs. Talks to self during play – speech may be unclear to others.

2-3 years

- Around 30 months, uses 200 or more words that you understand. Uses pronouns, e.g. 'I', 'me' and 'you'. Uses sentences but many will lack adult structure. Talks to self during play. Asks questions. Says a few nursery rhymes.
- Around 36 months, uses a large number of words – speech is clear to familiar listeners.

3-5 years

- Speech is clear to unfamiliar listeners. Around 4-5 years, talks in sentences, where words and grammar are mostly in the correct order.

References: B. McCormick, Children's Hearing Assessment Centre, Nottingham, UK – 'Can Your Baby Hear You?' (1982)
Mary D. Sheridan – 'Birth to Five Years' (1997)

Other translations of this leaflet are available to view/download at:

<https://www.publichealth.hscni.net/publications/newborn-hearing-screening-english-and-translations>

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Data for this report was produced and collated by:

Daniel Bradley (Information Services, WHSCT)
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Linda Smith (CHS – SHSCT)
Tracy Thompson (CHS – SHSCT)

Data analysed and report written by:

Dr Adrian Mairs, Nicola Cunningham and Leanne McMullan (Public Health Agency)



Public Health Agency

12-22 Linenhall Street, Belfast BT2 8BS.
Tel: 0300 555 0114 (local rate).
www.publichealth.hscni.net

Find us on:

