Trust Guideline for the Newborn and Infant Physical Examination (NIPE)

A Clinical Guideline recommended

For use in:	Blakeney Ward, Delivery Suite, Neonatal Intensive Care Unit (NICU), Midwifery Led Birthing Unit (MLBU), Community
By:	Neonatal Nurses and Midwives who have successfully completed The Newborn and Infant Physical Examination Course, Advanced Neonatal Nurse Practitioners (ANNPs) and paediatric medical staff
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If Yes - does the strategy/policy deviate from the recommendations of NICE? If so why?	No

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Objective of Guideline

To ensure early identification of any abnormalities and to facilitate appropriate and timely referral where necessary.

Rationale

All newborn infants require a medical examination before discharge. Abnormalities may have already been detected by antenatal investigations, and these infants will be identified by the *'Neonatal Alert'* system. Other abnormalities will either be identified by the parents, midwife or later by the newborn examiner. This guideline will give guidance to the newborn examiner with regard to follow-up or referral if necessary based on the evidence available.

Broad recommendations

NIPE newborn examination should take place within 72 hours of age.
It is considered safer to undertake the NIPE newborn examination early with the potential for more false positives, rather than risk missing screening altogether.

In the case of early transfer home, babies should still be offered a NIPE newborn examination and the need for this should be communicated to the appropriate clinician at handover. Ideally, the examination should take place in hospital before transfer home. If this does not happen before transfer, there must be a robust local follow-up pathway to ensure it takes place within 72 hours of age. This could be by return to a designated NIPE clinic or arrangements being made for the examination to take place in the community/primary care setting.

It is the responsibility of the maternity service providing care to ensure the NIPE newborn examination is provided for babies born at home.

When documenting the examination care should be taken to identify the correct infant by cross referencing their name, date of birth, NHS number and maternal details therefore ensuring the correct record is being accessed.

To comply with this guideline:

Neonatal nurses, Midwives and ANNPs must have successfully completed the Newborn and Infant Physical Examination Course or hold an equivalent qualification, and will maintain a portfolio to provide evidence of ongoing continuing professional development.

Junior paediatric medical staff must have successfully completed a competency assessment in examination of the newborn. (See Appendix 1)

Midwives are expected to complete the competency assessment. (See appendix 2)

In addition midwives and ANNP's will be required to complete the following on line learning package on ESR http://intranet/ESR/

ESR 234 Radiation Protection and IR(ME)R Training for Non-Medical Referrers (45 mins)

Midwives must complete on line learning annually via https://www.e-lfh.org.uk/programmes/nhs-screening-programmes/ as part of their Learning beyond Registration (LBR)

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Introduction

What is a NIPE?

The NHS Newborn and Infant Physical Examination Screening Programme (NIPE) sets standards to ensure all parents are offered the opportunity of a head to toe physical examination for their baby. This examination is to check for problems or abnormalities within 72 hours of birth and again between six and eight weeks this examination take place in a community setting (usually by the GP) between 6 and 8 weeks of age, (however this document only covers the initial check). It includes a general all over physical examination, as well as specific screening elements which involve examination of the baby's eyes, heart, hips and testes. Documentation of the NIPE should take place on the NIPE Smart system, a national computerised database.

Prevalence of conditions
• Heart – around 1 in 200 babies may have a heart problem
• Hips – about 1 or 2 in 1,000 babies have hip problems that require treatment
• Eyes – about 2 or 3 in 10,000 babies have problems with their eyes that require treatment
• Testes – about 1 in 100 baby boys have problems with their testes that require treatment

A comprehensive and skilled systemic examination of the newborn infant is an important part of routine care. Knowledge of normal and abnormal is essential so that conditions requiring more detailed assessment or treatment can be identified.

The examination should include a review of parental concerns and the infant's medical history should be evaluated to include an assessment of family, maternal, antenatal and perinatal history and an assessment of fetal and neonatal well-being. Knowledge of gestational age and appropriate growth patterns assist in identifying potential risks to the neonate.

The routine examination will be carried out in a safe, warm, well lit environment.
Privacy should be provided particularly when discussing family health issues of a sensitive nature.

The examiner should allow sufficient time for an unhurried examination which includes discussing findings with the parents, referral if necessary and completing the relevant documentation. The NIPE smart system will automatically generate a completed newborn examination proforma that should be given to parents to file in their child health record ('red book').

Screen positive

The outcomes that should be recorded for screen positive babies are:

- Hip screen positive (clinical examination) – undergo hip ultrasound by 2 weeks of age.
- Presence of hip risk factors – undergo hip ultrasound by 6 weeks of age.
- Eye screen positive – seen at ophthalmology appointment by 2 weeks of age.
- Bilateral undescended testes – senior paediatrician review within 24 hours of the newborn examination.
- Heart screen positive – senior paediatrician review (urgency depends on suspected condition) but review is recommended before discharge home. Bleep number #1377 (9-5pm) after 5pm and overnight bleep #1060.

Babies in neonatal units

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Babies in neonatal units should be assessed and if well enough the NIPE screen should take place within 72 hours of age.

Some babies in neonatal units may be too ill at the time the examination is due and the NIPE screen is not appropriate. If possible all screening elements should be undertaken but, if not, each element of the NIPE screen should be completed as soon as practicable.

Some elements of the NIPE screen may need to be repeated in very preterm babies (for example, eyes) but referrals should still be made as per national standards regarding screen positive cases.

Referral timescales should not be age adjusted for preterm babies.

Babies less than 32 weeks gestational age (up to 31 weeks and 6 days) or less than 1500g birthweight should be screened for retinopathy of prematurity (ROP).

Who should examine which baby?

Neonatal team		NIPE Trained midwife
< 36 weeks gestation: Nasogastric tube feeds. Significant antenatal congenital anomalies. Babies on a **treatment** course of antibiotics. Babies with a birthweight <2.2kg.		All others including: 'Well babies' to include those: - Mothers have GBS risk factors. - Mothers are diabetic. - Having routine blood sugar monitoring. - On 48 hours **prophylactic** iv antibiotics for maternal risk factors - Born through meconium - Born where the ruptured membrane interval exceeds 18hrs - With a sibling or parent with a cardiac anomaly (if current anomaly scan/ fetal echocardiogram normal) Maternal 'safeguarding' record – where these are for information only If any concerns, midwives should discuss with neonatal team.

Referral pathways and documentation

- Any concerns that the practitioner has after examining the neonate should be referred to an appropriate neonatal senior middle grade colleague or consultant.
- Pathways for onward referral to other departments are identified under each relevant section of this guideline.

A 'Higher Needs' form should be completed (available on Blakeney and Delivery Suite) and a set of hospital notes (buff folder) made up for any infant where findings deviate from normal in any respect. For specific issues highlighted on the NIPE for the four areas of national screening, documents will be automatically generated when the NIPE findings sheet is printed.
The findings of the examination should be documented within the neonatal notes (on higher needs form) and on the NIPE SMART system with copies printed and placed in the Child Health Record (red book) and neonatal notes.

Communication with Parents

Prior to performing the examination, the purpose and procedure followed should be fully explained to the parents, verbal consent obtained, and a written information leaflet provided.

After completion of the examination:

- The findings of the examination should be discussed with the parents and any questions/queries answered (even for a normal examination)
- If any deviation from the normal is detected and referral to another specialty is indicated, the parents should be given a full explanation of the abnormality, the reason for and time scale of the referral. If any abnormality is found in any of the four specific screening elements of the NIPE (eyes, heart, hips and testes) an automatic referral letter will be generated by the system.

NIPE Examinations by System

1. **Skin Assessment:**

Note the colour, perfusion, texture, tone and turgor and the presence of birthmarks. Presence of birthmarks to be documented on NIPE SMART.

Common normal variations (no treatment required):

Superficial peeling: often seen, particularly post term.

Acrocyanosis (bluish discoloration of hands and feet): benign, exacerbated by low temperature.

Circumoral cyanosis (bluish discoloration around the mouth): as above.

Erythema toxicum neonatorum (small white/yellow papules or vesicles with erythematous base): benign, can be found anywhere on the body. Can be present for up to 2 weeks after delivery.

Epstein's pearls and milia (epidermal cysts caused by blocked sebaceous gland secretions): Epstein's pearls can be found in mouth and penis, milia on nose. Resolve spontaneously.

Lanugo: fine hair.

Vernix caseosa: a waxy or cheese-like white substance found coating the skin

Mild jaundice: normally physiological between day 3-5. For more significant jaundice see separate guideline.

Bruising: usually due to birth trauma. If extensive or purpuric seek further advice.

Hyperpigmented lesions: due to abnormal development of melanin cells. Hyperpigmented macule (Mongolian blue spot) is the commonest lesion seen in 90% of Asian, Hispanic and African origin infants and up to 10% Caucasian infants).
Sucking blisters: often seen on lips and fingers.

Neonatal pustular melanosis: a cutaneous condition that presents at birth with 1 to 3mm flaccid, superficial fragile pustules, some of which may have already resolved in-utero, leaving pigmented macules.

Abnormalities:

Jaundice: if <24 hours of age manage as pathological jaundice (see NICE guideline).

Cyanosis: if central consider cardiac anomalies.

Pallor: may indicate shocked baby or anaemia. Investigate as appropriate.

Plethora (purplish hue): may need further investigation for possible polycythaemia, including haemoglobin (Hb) and haematocrit.

Cutis aplasia: an uncommon congenital abnormality in which layers of the skin are absent. Can occur anywhere but most common on scalp. Seek senior advice.

Pustular skin rashes: seek senior advice.

Vesicular and blistering lesions: seek senior advice.

Birth Marks:

Naevus simplex (stork marks): superficial capillary naevi seen on eyelids, forehead or nape of neck. Reassure the parents.
Superficial cavernous haemangioma (strawberry naevus): usually bright red raised and sharply defined. Appears within the first week, increases in size until 6 months of age, after which time it regresses.

Capillary haemangioma (port wine stain): larger and darker than naevus simplex. Can be anywhere on body, frequently on face. May be associated with intracranial vascular anomalies (Sturge-Weber syndrome). Seek senior advice.

Café au lait spots: often seen in axillae and viscera. If they are larger than 3cm in size or greater than 6 in number, consider cutaneous neurofibromatosis. Seek senior advice.

Head Assessment:

Fontanelles are areas where at least 3 bony plates of the skull meet. The posterior fontanelle should be less than 5mm and closes shortly after birth. The anterior measures 10-50mm and may not close until 18 months. The anterior fontanelle should neither bulge nor be sunken. It can bulge when the baby cries. A tense or bulging anterior fontanelle can indicate raised intracranial pressure.

Sutures are gaps between 2 bony plates of the skull. These may be easily palpable at birth. Premature fusion of the sutures **(craniosynostosis)** may be palpable as a prominent edge, but this may also be overriding sutures. Overriding sutures tends to present as a step up feel.

Craniosynostosis needs a middle grade review then onward referral to the craniofacial unit at Great Ormond Street Hospital.

Overriding sutures resolve with time and parental reassurance is needed.

Head shape - the scalp is relatively easily traumatised and swelling, bruising and moulding is common.

Brachycephaly is shortness in the anteroposterior diameter of the skull and can be linked to syndromes such as Trisomy 21

Plagiocephaly: flattening of one side of the head. No action required.

Oxycephaly (turricephaly) is when the head forms a pointed shape.

Caput succedaneum - scalp oedema caused by pressure over the presenting part. This oedema may cross suture lines and is often accompanied by bruising and petechia. This is a benign finding that will resolve fairly quickly.

Bruises and swelling are common responses to trauma and will resolve with time. Be aware that the bruises may contribute to jaundice.

Birth injuries are bruises, lacerations or lesions from amniotic hook, fetal scalp electrode, ventouse cap or forceps. Suturing may sometimes be required. Observe for signs of infection.

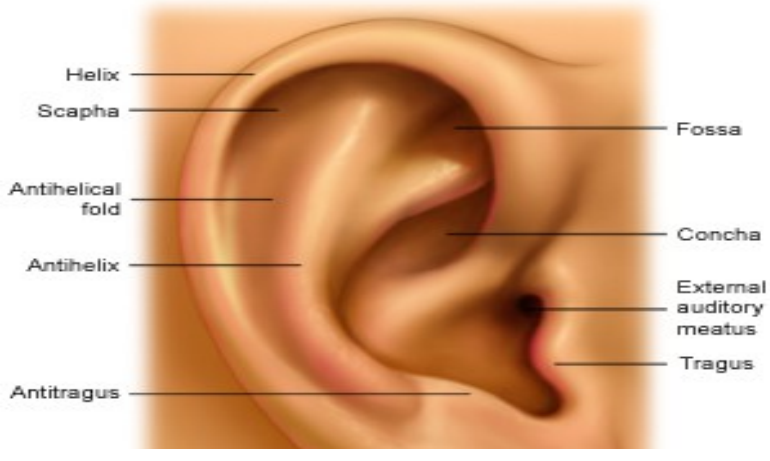
Cephalhaematoma - accumulation of blood below the periosteum which is contained within suture lines and may be unilateral of bilateral. More commonly found with forceps or vacuum assisted delivery. It will resolve spontaneously, though may lead to jaundice.

Subaponeurotic haematoma is a rapidly developing swelling that crosses the suture lines and often presents with signs of hypovolaemic shock. Babies should be transferred to NICU for immediate assessment.

Head Size: Note the occipito-frontal circumference (OFC). The normal range for a term baby is 32-37cm.

Macrocephaly: >90th percentile on growth chart. This may be familial or moulding. Also linked to subaponeurotic haematoma and hydrocephalus. A large head with widely separated sutures may need an immediate ultrasound.

Microcephaly: <10th percentile on growth chart. Cause may be chromosomal, metabolic, congenital infection or an isolated microcephaly.
Seek senior neonatal advice for any abnormalities.



Ear Assessment:

Look at the general **shape, size and position** of the ears and feel the cartilage.

Low set ears, in normally placed ears the top of the helix lies on a line drawn at right angles to the facial profile from the outer canthus of the eye.

Abnormal formation or placement can be associated with chromosomal anomalies or syndromes.

Pre-auricular tags are epithelial mounds or pedunculated skin tags that arise near the front of the ear around the tragus. They have no bony, cartilaginous, or cystic components and do not communicate to the ear canal or middle ear. They can be familial and are of cosmetic importance only. Referral to plastic surgeons should be offered to parents.

Pre-auricular sinuses should be referred to the ear, nose and throat surgeons (ENT) as surgery may be required and multiple infections are likely.

Facial Assessment:

An unusual facial appearance is often the first clue to an underlying disorder. Therefore this should prompt a particularly diligent search for other dysmorphic manifestations.

Asymmetry of the face may be the result of the baby lying awkwardly in-utero, but it can occur with other syndromes. It may also be a sign of hemihypertrophy (enlargement of one side of the body), which can be associated with nephroblastoma and therefore should be seen by a senior colleague who may consider a renal ultrasound.

Asymmetry can also be caused by facial nerve paralysis, with inability to close the eye, and inability to move lips on the affected side. Newborns with facial nerve palsy have

difficulty achieving a seal around the nipple and consequently exhibit drooling of milk from the paralysed side of the mouth.

Most **facial nerve palsies** resolve spontaneously within days, although full recovery may require weeks to months. Examine carefully for other cranial nerve palsies, paediatric follow up will be required.

A **small jaw** may be familial or may occur as part of a syndrome such as Pierre-Robin. Look for an associated cleft palate. Will need senior review.

Dysmorphic facies (expressions) are usually familial, so always look at the parents. If you suspect a syndrome seek senior advice who may consider chromosomal analysis or geneticist referral.

Eye Assessment:

Before the examination practitioners should establish: baby's family history (childhood eye disorders, particularly congenital cataract and retinoblasoma).

- Bilateral examination.
- Bilateral examination covers:
- Eye opening – presence of eyes.
- Position and symmetry.
- Size and colour.
- Presence of red reflex (a reflection from the back of the eye that is similar to the red eye effect sometimes seen in flash photography).
- If no red reflex, or a weak red reflex, is seen, it may mean there is cloudiness in the lens.

You should be able to elicit a red reflex by illuminating the eye with the ophthalmoscope.

Look at the contour, slant and position of the eyelids apprature in relation to the nose bridge. Observe the size of the eye, the clarity of the cornea, the shape and position of the pupil. The sclera should be white. If yellow consider jaundice. If blue consider osteogenesis imperfecta. Haemorrhages are common.

Eye discharge is common in neonates but can be caused by infection (conjunctivitis) and blockage of the lachrymal duct.

If the discharge is abundant or there is associated erythema or swelling, consider swabbing and chloramphenicol ointment (more effective than drops as they remain in contact with the eye for longer). Once organism identified; specific treatment for **ophthamia neonatorum** can be instituted. Systemic complications like rhinitis, otitis and neumonitis are not common but should be noted.
The cornea should be clear. A white corneal opacity with conjunctivitis indicates keratitis which is rare but serious and should generate an urgent opinion from ophthalmology.

- **Gonoccocal** infection is a hyperacute infaection 1-3 days in association with peri-orbital oedema. Intensive treatment is required for both eyes.
- **Staphylococcal** conjunctivitis occurs at 2-5 days and is less severe.
- **Chlamydial** infection occurs at 4-28 days.

Florid conjunctivitis associated with peri-orbital swelling suggestive of orbital cellulitis must be treated with systemic antibiotics since the risk of infection spreading into the cranial cavity is high.
A blocked lachrymal duct will usually resolve with time. GP should be advised to refer to Opthalmology if symptoms persist beyond 9 months of age.

Squints are common and intermittent, and usually correct themselves within 6 months. If squint remains fixed parents should be advised to contact their general practitioner (GP). Epicanthic folds or a broad nasal bridge often give the appearance of a squint.

Epicanthic folds are a normal finding in Down's syndrome.

NIPE SMART will automatically generate a referral letter to the consultant ophthalmologist if follow up is required. If urgent please contact the ophthalmology team through switchboard, otherwise fax/send letter via internal post:

The following conditions always require referral to Mr Narman Puvanachandra, Consultant Ophthalmologist, or Mr Anas Injarie Consultant Ophthalmologist on extension 4374.
Babies with an abnormality of the eye identified at the newborn examination should attend an assessment appointment by 2 weeks of age.

- **Family History Retinoblastoma** – Any baby with a close relative with retinoblastoma should prompt referral.
- **Congenital Dacryocystosele** a benign, bluish-gray mass in the inferomedial canthus that forms as a result of a narrowing or obstruction of the nasolacrimal duct, usually during prenatal development.
- Congenital Dacryosistitis is a serious infection of the lacrimal sac (medial canthal region) associated with swelling and redness and an ill baby. They will need to be distinguished from Dacrocele and treated with IV antibiotics
- **Ptosis** if a drooping eyelid covers part of the pupil.
- **Anophthalmia** (absence of the eye).
- **Microphthalmia** may occur as a result of congenital infection or as part of a syndrome. It will interfere with vision. Further investigations, including a congenital infection screen, should also be considered (discuss with senior neonatal colleague).
- **Macrophthalmia** A large eye commonly results from congenital glaucoma. The drainage of fluid is blocked leading to a build-up of pressure in the eye.
- **Coloboma** is a defect in one of the structures of the eye including eyelids, iris, retia, choroid and optic nerve.
- **Aniridia** (partial or total absence of the iris) isolated or in association with Wilms tumour, WAGR or Gillispie Syndrome.
- A **white reflex**, rather than red occurs with congenital cataract, retinoblastoma (retinal tumour) or several other causes.
- A **cataract** is opacity of the lens which may or may not affect vision. They can be hereditary or attributable to congenital infection.

The Nose:

Look for clear nasal passages.

If **nasal flaring** is evident look for other signs of respiratory distress.

If **bilateral or unilateral choanal atresia** is suspected (respiratory distress, particularly while feeding) ensure a patent airway and refer to ENT surgeons, following senior review.

Snuffly noses are not uncommon and are not of concern if the baby is breathing and feeding well.

The Mouth:

Inspect

- The tongue for size and tongue tie.
- The gums for cysts, clefts and neonatal teeth.
- The lips and palate for clefts. When examining the palate use a light source to observe in addition to feel.

Tongue tie (ankyloglossia)
The presence of a prominent frenulum does not equate to a need for tongue tie division. The only indication is when the infant is struggling to breast or bottle feed in the presence of an obvious tongue tie. The infant and mother need to be assessed by the breast feeding link midwife or infant breast feeding co-ordinator. Surgeons will not usually accept a direct referral from the neonatal team.

Neonatal teeth are uncommon and if found should be referred to the orthodontic team as they may be loose and therefore inhaled.

A cleft lip and palate can usually be detected antenatally by routine ultrasound scans.

A cleft lip can be familial, occur as a result of chromosomal abnormalities or from maternal medication (e.g. phenytoin).

Half of all cleft cases involve both the lip and palate.

In all cases referral to the cleft team should be made urgently (contact details: 01223 596272 Fax: 01223 274244).
Please ensure that Cleft.Net.East is copied into all relevant patient correspondence including discharge letter and Echo results. These should be directed to Sandra Springer (secretary) who will pass this onto the Clinical nurse Specialist team, Dr Lucy Preston (lead Paediatrician) and the relevant cleft surgeon.

Cleft.Net.East, Box 46, Addenbrookes Hospital, Hills Road, Cambridge, CB2 0QQ

Emails: Sandra.springer@addenbrookes.nhs.uk, Lucy.preston@addenbrookes.nhs.uk

The suggested management and investigations outlined below is reproduced from the regional guideline.

Isolated cleft lip

- Standard postnatal examination (NIPE)
- Blood tests e.g. genomic microarray not usually indicated unless there are other concerns
- Consider genomic array and referral to genetics if there are any additional features suggestive of a syndromic cause (e.g. IUGR, dysmorphic features, other congenital anomalies, developmental delay) or if there is a family history
- Clinical photographs
- No echocardiogram if heart sounds clinically normal
- Basic life support training for parents
- Paediatric outpatient follow-up locally at 6-8 weeks of age to assess growth, if well no further paediatric appointments needed
- Surgery at around 3-6 months, follow-up by cleft multi-disciplinary team

Cleft lip and cleft palate

- Standard postnatal examination (NIPE)
- Nurse in lateral position unless otherwise indicated
- Senior paediatric assessment to assess for potential additional anomalies
- Blood tests e.g. genomic microarray not usually indicated unless there are other concerns or severe anomaly
- Consider genomic array and referral to genetics if there are any additional features suggestive of a syndromic cause (e.g. IUGR, dysmorphic features, other congenital anomalies, developmental delay) or if there is a family history
- Clinical photographs
- Referral to local audiology for regular follow-up after neonatal hearing screen
- Basic life support training for parents
- Pre-operative echocardiogram to be performed locally if possible, otherwise contact Dr Wilf Kelsall to arrange in Cambridge
- Paediatric outpatient follow-up at 6-8 weeks, to assess growth, further follow-up as per clinical need
- Surgery for cleft lip around 3-4 months and palate from 6-9 months. Long term follow-up by cleft multi-disciplinary team only, unless other concerns

Isolated cleft palate

- Examine for evidence of micrognathia/glossoptosis and/or airway obstruction.
- Nurse in lateral position unless otherwise indicated.
- Consider need for airway management if upper airway obstruction (UAO) present.
- If UAO present offer nil orally until assessed by Cleft Clinical Nurse Specialist; support with IV fluids/NG feeds as appropriate.
- Standard postnatal examination.
- Senior paediatric assessment to assess for potential additional anomalies.
- Genomic microarray (EDTA).
- Consider genetics referral as ~50% have a syndromic basis which may not be identified by genetic blood test (22q11DS will be identified by the array but some other associated syndromes will not be detected with this methodology).
- Referral to local audiology for regular follow-up after neonatal hearing screen.
- Basic life support training for parents.
- Pre-operative echocardiogram to be performed locally if possible, otherwise contact Dr Wilf Kelsall to arrange in Cambridge.
- Paediatric outpatient follow-up at 6-8 weeks, to assess growth, further paediatric appointments needed at 6 and 12 months to assess development.
- Surgery for palate from 6-9 months. Surgery may be deferred in complex patients, please keep Cleft team informed of developments and associated conditions. Long term follow-up by cleft multi-disciplinary team only, unless other concerns.

The Neck

Seek senior neonatal advice for:

- Webbing of the neck is associated with Turner's syndrome.
- A shortened neck may be a result of vertebral anomalies such as Klippel-Feil syndrome (also includes decreased range of motion and low hairline).
- Abnormal swelling of the neck may result from a cystic hygroma (multicystic lesion) or tumour.
- Branchial cleft remnants are rare and occur when tissues in the neck and collarbone area fail to develop normally. They manifest as small pits, tags or lumps around the neck. They are prone to infection and will need surgical review.

Examination of the Newborn Chest and Respiratory System:

Risk Factors for respiratory disease:

- Prematurity.
- Delayed onset of breathing at birth or need for prolonged resuscitation.
- History of viscid meconium noted in airway.

- Antenatal polyhydramnios.
- Major congenital malformations and syndromes.
- Predisposing factors for congenital infection (e.g. prolonged rupture of membranes, chorioamnionitis, offensive liquor, maternal fever in labour, fetal tachycardia in second stage).

Observation

Careful note should be taken during the first hour of life of:

- Colour.
- Respiratory rate.
- Presence of grunting or respiratory distress.

In infants in the above risk categories or who have evidence of respiratory compromise observations should be repeated hourly for at least the first 4 hours of life.

Clinical Examination

Colour Observe the colour of the baby's skin, lips and oral mucous membranes. In a normal neonate the lips and oral mucous membranes are pink and well perfused. Duskiness of the hands and feet ('acrocyanosis') is common in newborns and is normal within 48 hours of delivery.

Pallor – consider poor perfusion, acidosis, anaemia, hypovolaemia.

Cyanosis – may be generalized or of lips, tongue and mucous membranes. Indicates respiratory disease or congenital heart disease. If in doubt arrange for baby to have oxygen saturation (SaO_2) measured urgently on the neonatal unit. Normal post-ductal oxygen saturation is ≥95% in air.

Respiratory rate – It is important to observe the baby at rest. Count the baby's respiratory rate for a full minute. Normal respiratory rate in a newborn is 40-60 breaths per minute. A baby's rate will vary somewhat according to environment (for example is generally faster with increased environmental temperature). There may be substantial variation in the rhythm of baby's breathing pattern, with alternating periods of slower and faster breathing, particularly according to the baby's concurrent overall activity. Brief apnoeic pauses (up to 10 seconds) and sighs are quite normal, and also occur during normal sleep. Longer pauses in breathing are abnormal.

Tachypnoea – Respiratory rate >60/min is abnormal. Consider possible respiratory disease, sepsis, heart failure, severe metabolic acidosis.

Apnoeas – Prolonged or frequent apnoeas are abnormal. Consider respiratory disease, sepsis, neurological abnormalities (eg seizures).

Grunting Persistent expiratory grunting is always abnormal. Grunting occurs as the infant closes the glottis in an attempt to maintain an increased intrathoracic pressure in the face of alveolar collapse. Consider respiratory disease, sepsis, hypothermia, hypoglycaemia, acidosis.

Recession – Easiest to see if the baby is undressed. All inspiratory movements should normally be quiet and there should be no significant recession. In a normal infant there may be very minimal indrawing of the abdomen with inspiration (due to the relatively-

compliant cartilaginous chest wall). Anything more than slight indrawing is abnormal. A baby with difficulty breathing will show recession of the lower costal margin, in-drawing of the intercostal muscles between ribs with each breath, and sometimes also incession of the sternum with inspiration. Looking in the suprasternal notch, one may also note in a baby with respiratory distress that the trachea moves inwards with respiration - 'tracheal tug'. Nasal flaring may be noted immediately after birth but should settle quickly.

Signs of Neonatal Respiratory Distress
Tachypnoea
Recession
Nasal flaring
Grunting
Apnoea
Tracheal tug
Head bobbing
'See-saw' respirations

Auscultation Place the stethoscope over all regions of the lungs – front, sides, back, and at the top and bottom in all areas. Normal breath sounds are soft and whispering. 'Gurgling' noises may be transmitted from the upper airway, especially if secretions are present. If breath sounds appear to be absent in any region, listen carefully for a longer period; the absence of breath sounds may indicate significant underlying pathology, e.g. collapse/ consolidation, pneumothorax, effusion, diaphragmatic hernia.

Other abnormal findings on observation that may signal an underlying/potential respiratory problem:

Excessive frothing/secretions or choking - Consider oesophageal atresia. Pass a nasogastric tube and check for an acid reaction with pH paper.

Prominent chest hyperexpansion/'barrel-shaped' chest *(increased antero-posterior diameter)* - consider pneumothorax/aspiration syndrome/congenital diaphragmatic hernia

Cyanosis or breathlessness that improves with crying – consider choanal atresia.

Scaphoid abdomen - consider congenital diaphragmatic hernia

Management of Newborns with Respiratory Problems

Acute cardio-respiratory collapse

All babies with acute cardio-respiratory collapse should be resuscitated according to Newborn Life Support Guidelines.

These infants should be stabilised prior to transfer to the Neonatal Unit, which should always be undertaken using a transport incubator. The duty middle grade neonatal doctor/ANNP or Consultant should be informed and accompany any baby transferred as an emergency to the Neonatal Unit.

Abnormal Respiratory Signs Infants with abnormal respiratory signs (with the exception of isolated grunting) should be given free-flow oxygen and be referred immediately to the duty neonatal team. They will undertake an assessment of the baby and admit the infant to the Neonatal Unit for further observation and assessment. This assessment may include monitoring of heart rate, oxygen saturations and a capillary blood gas. Such infants may require immediate resuscitation and stabilisation prior to transfer. Transfer to NICU should always be undertaken using a transport incubator.

Grunting from birth or isolated grunting Infants with grunting as the only feature may in some circumstances be observed and managed on the postnatal ward. All babies who are grunting at any stage should be reviewed immediately by the neonatal ST Trainee/ANNP who will undertake a capillary blood gas and measure the oxygen saturations. The attending midwife should measure the axillary temperature and blood glucose and should take remedial action if these are abnormal. If these assessments are satisfactory the infant may continue to be observed on the postnatal ward for the time being. However babies who develop other signs of respiratory distress, **or** who show other non-specific features such as lethargy, poor feeding or poor perfusion **or** who have one of the risk factors above (see page 10) will need admission to NICU.

If the baby continues to grunt persistently then the middle grade ST trainee/ANNP should be asked to review at 2 hours of age, to repeat the investigations and consider admission. Any infant in whom the grunting has not settled by 4 hours postnatal age should automatically be admitted to NICU.

Late-onset Grunting Infants with late onset grunting (i.e. not present in the first hour) should be considered as having sepsis until proven otherwise. Such infants warrant immediate review and admission to NICU.

Examination of the CVS:

Despite advance in antenatal scanning, most congenital heart disease (CHD) is still undiagnosed at birth and babies continue to present with cyanosis or a heart murmur.

Even in the experienced hand, the neonatal check fails to detect many babies who are later found to have significant heart disease. Although it will never be possible to detect all lesions it is to be hoped that careful examination should diagnose the majority.

All babies born in hospital or admitted in postnatal ward after birth outside hospital (this could be for maternal or neonatal reasons) should have their oxygen saturations checked postnatally 4-8 hours after birth. This will be performed by midwives/midwifery care assistant (MCA).

Practitioners undertaking the routine neonatal examination should ensure that oxygen saturations have been recorded in the baby notes. If oxygen saturations have not been performed, the midwife looking after the baby should be requested to do this. If the baby is more than 8 hours old then the test should still be undertaken as it still has value in screening for congenital heart disease. Refer to Trust Guideline on Routine Oxygen Saturation Measurement of the Newborn (Trustdocs ID: 10566)

History

- **Family history of congenital heart disease (first degree relative).**

- **Fetal trisomy 21 or other trisomy diagnosed (these babies have high risk of cardiac defects and require continued surveillance).**
- **Cardiac abnormality suspected from the antenatal scan.**
- Maternal medical history e.g. drug-related teratogens during pregnancy, for example, antiepileptic and psychotrophic, alcohol intake, maternal exposure to viruses, congenital infections, maternal diabetes (type1), systemic lupus erythematosus (SLE), CHD.

Parents should be asked if:

- The baby ever gets breathless or changes colour at rest or with feeding.
- The baby's feeding behaviours and energy levels are normal.
- The baby is ever too tired to feed, quiet, lethargic, or has poor muscle tone.

Examination

Observation

- Any dysmorphic features e.g. features of Down's syndrome (40-50% have heart defects).
- Observe for signs and symptoms of respiratory distress, such as tachypnoea, retractions and grunting.
- General appearance, colour and peripheral perfusion.

Palpation

Palpation covers:

- Femoral and brachial pulses for strength rhythm and volume.
- Assessment of perfusion through capillary fill time.
- Position of cardiac apex (to exclude dextrocardia).
- Palpation of liver to exclude hepatomegaly – may be present in congestive heart failure.
- +/- thrill.
- No babies should be discharged from the hospital until the femoral pulses have been documented to be palpable.

Auscultation

Auscultation covers:

- Presence of a murmur – systolic / diastolic – loudness.
- Quality of heart sounds at the following 5 sites:
- Second intercostal spaces adjacent to the sternum: left (pulmonary area).
- Second intercostal spaces adjacent to the sternum: right (aortic area).
- Lower left sternal border in the 4th intercostal space (tricuspid area).
- Apex (mitral area).
- Midscapulae (coarctation area).

Cyanosis implies that the baby has a dusky blue hue. A degree of peripheral cyanosis is not uncommon, and if cyanosis is suspected it is important that central cyanosis is confirmed.

- Infants are not uncommonly blue around the mouth, and if this observed you should check whether the tongue or lips has a similar colour.
- If the infant is genuinely centrally cyanosed then the baby should be admitted to the neonatal unit.
- If there is a continuing clinical doubt, check the baby's post ductal oxygen saturations, applying pulse oximeter probe to either foot for half an hour. Ensure a good pulsatile trace.
- If post ductal SaO_2 is below 95%, the infant must be admitted to the neonatal unit for investigation and monitoring.

Heart Murmurs

- Heart murmurs may be either innocent or pathological.
- Refer to the Trust guideline for the management of 'Heart Murmurs in Newborn Babies (Trustdocs ID: 1223).

Examination of the Abdomen and Genitalia

History Look for the following:

- Review antenatal scans and ask the parents if any abnormality was detected antenatally e.g. abdominal mass, cyst or renal abnormality.
- Check if there is a "Neonatal Alert" sticker on the notes or in the antenatal scans report and if any, refer to the "Neonatal Alert Folder" located on NICU reception.
- Follow the plan in the "Neonatal Alert".
- Discuss with the consultant covering postnatal ward if needed.

Examination should include the following:

1. A check of whether the baby has passed meconium and urine (enquiring about urine stream in a boy).
2. Inspection for abdominal distension, umbilical hernia, and the cord stump.
3. Palpation for any masses or organomegaly.
    a. Be gentle especially after feeds.
    b. Liver edge can be normally felt up to 2 cm below the right costal margin.
    c. Tip of the spleen can be felt up to 1 cm and is normal.
    d. Kidneys can be felt; note any abnormally large renal masses.
4. Auscultation need not form part of the routine abdominal examination.
5. Genitalia: check if male or female and if in doubt ask for senior review.

Male Genitalia

Associated risk factors include:

- A first degree family history of cryptorchidism (baby's father or sibling).
- Low birth weight.
- Small for gestational age or preterm birth.

a. Inspect the penile length (normally about 3 cm), occasionally can be buried in suprapubic fat.

b. Check the position of the urethral meatus; checking for hypospadias.

c. Inspect the shaft of the penis for curvature i.e. chordee.

d. Examine the scrotum for shape, colour and rugosity and feel for the testes; if one or both testes are undescended further assessment needs to be made (see below).

e. Inspect the groin for hernia: if present needs further review (see below).

Female Genitalia

f. Inspect the vulva: in full term babies the labia majora should cover the labia minora, note the size of the clitoris.

g. White mucoid vaginal discharge (occasionally blood stained) is normal.

h. Other normal findings: hymenal skin tags, mucoid cysts resolve spontaneously.

i. Inguinal hernias are rare and their presence should raise the possibility of other abnormalities in the genital tract.

6. Anus check position, patency and tone.

Problems and actions to be taken:

- Abdominal masses should receive senior review.
- Bile stained vomiting/abdominal distension/failure to pass meconium within 48 hours of birth needs emergency review by neonatal and surgical teams.
- For antenatally detected abnormalities (e.g. renal tract abnormalities) and where "Paed Alert" exists follow the plan and if in doubt discuss with senior neonatal colleague.
- Discuss with the parents any abnormal finding and the plan for investigations and follow up if indicated.
- Record findings, discussions with parents and plan in the relevant notes.

Inguinal Hernia

Refer to the surgical team before discharge. There is a high risk of incarceration at this age.

Hydrocele

This is likely to resolve when the persistent processus vaginalis (PPV) spontaneously closes before the age of two years. Reassure the parents and ask them to go to the GP if the swelling is still present after one year of age. Ensure there is no hernia (i.e. you can get above the swelling) and if in doubt refer to surgeons.

Umbilical Hernia

Reassure the parents that this is likely to decrease in size, no treatment is indicated. Pain or incarceration is uncommon and the need for later surgery very unlikely.

Testicular Torsion

Discoloration of scrotum, bruising, firmness, pain on handling with or without swelling could be a sign of testicular torsion. This is a surgical emergency and requires immediate referral to the paediatric surgical team.

Unilateral undescended testes

Most will descend spontaneously by three months of age. If not descended by 6 months GP should be asked to refer to the surgical team. An automated letter will print out from NIPE SMART with this information for the GP and parents. If there is any associated abnormality refer to the surgical team before discharge.

Unilateral undescended testis should be reviewed at 6 to 8 week NIPE examination (GP)

Bilateral undescended testes

Cryptorchidism affects approximately 2 to 6% of male babies born at term. It is associated with:

- A significant increase in the risk of testicular cancer (primarily seminoma)
- Reduced fertility when compared with normally descended testes
- Other urogenital problems such as hypospadias and testicular torsion
- Bilateral undescended testes in the newborn may be associated with ambiguous genitalia or an underlying endocrine disorder such as congenital adrenal hyperplasia.

Early diagnosis and intervention improves fertility, reduces the risk of torsion and may aid earlier identification of testicular cancer.

Screen positive following newborn examination
Bilateral undescended testes should be seen for assessment by a senior paediatrician within 24 hours of the examination to rule out metabolic and intersex conditions.

May require a karyotype and further investigation. Discuss with middle grade/consultant immediately. Inform the surgical team before discharge.

Hypospadias

Refer to the surgical team as an outpatient. There is usually no need for an urgent inpatient referral unless there are bilateral undescended testes or other pointers of ambiguous genitalia.

Inform the parents about the plan. Circumcision for any reason is contra-indicated when hypospadias is present. The prepuce may be required for the repair.

Ambiguous genitalia

If in doubt about the baby's sex, refer to middle grade/consultant immediately. Inform the parents that at present it is not possible to tell the sex of their baby. If it is the case, reassure them that the baby is otherwise healthy. Inform them that the baby will be reviewed by a senior member of the team and a number of investigations will be required to determine the baby's sex.

Examination of the Musculoskeletal system

History

Look for the following*:*

- Review antenatal scans and ask the parents if any abnormality was detected antenatally e.g. talipes.
- First degree family history of developmental dysplasia of the hips (DDH).
- Breech presentation at delivery.

Examination

It includes examination of the spine, extremities, and joints in particular the hip joint.

A lot can be gained from observing the baby's posture and movements before starting the formal examination.

There is also overlap between different systems examined, for example asymmetric Moro reflex could signify neurological abnormality e.g. Erb's palsy, but could be secondary to fractured clavicle, or contracture.

Examination of the spine

1. Inspect the back for any obvious curvature, or midline abnormalities over the spine e.g. swelling, dimple, hairy patch or birth mark; any may indicate an underlying vertebral or spinal abnormality.
2. Any midline lesion other than simple dimple in or just above the natal cleft should be investigated, discuss with middle grade/consultant.
3. Note movements of the lower limbs, assess tone.

Examination of the upper limbs

1. Inspect the arms for shape, posture, symmetry and size.
2. Note any deformities.
3. Inspect the palm for number of fingers, and arrangement of creases.
4. Observe spontaneous movements of the shoulder, elbow and wrist joints: asymmetric movement might suggest fracture or Erb's palsy.
5. Test passive movements for muscle tone and range of motion.

6. Palpate both clavicles for swelling, tenderness or crepitus if suspecting a fracture.

Examination of the lower limbs

1. Inspect the legs and feet for shape, posture, symmetry and size.
2. Note any deformities.
3. Observe spontaneous movements.
4. Test passive movements for muscle tone and range of motion.
5. Note the position of the feet and ankles.

Examination of the hip joints
National hip risk factors

The NHS NIPE programme national hip risk factors are:

- First degree family history of hip problems in early life. This includes baby's parents or siblings who have had a hip problem that started as a baby or young child that needed treatment with a splint, harness or operation.
- Breech presentation at or after 36 completed weeks of pregnancy (as confirmed by ultrasound scan), irrespective of presentation at birth or mode of delivery. This includes breech babies who have had a successful external cephalic version (ECV).
- Breech presentation at delivery if this is earlier than 36 weeks gestation.
- For babies with any of the above risk factors, hip ultrasound examination should be arranged and in the case of multiple births with these risk factors, all babies in the pregnancy should have a hip ultrasound examination.

The rationale for this advice is that if one of the babies meets the criteria of breech presentation, as described above, it may be difficult to accurately identify which baby was affected.

6.3 Undertaking the examination

Before the examination practitioners should establish:

- Mother's recent obstetric history.
- Baby's family history.
- National hip risk factors.
- The examination should take place in a warm environment and on a firm flat surface with the baby undressed and settled.

Observation

Observation covers:

- Symmetry of leg length.
- Level of knees when hips and knees are both flexed.
- Symmetry of skin folds in the groin when baby is in ventral suspension6.

- If legs can be fully abducted.
- Manipulation.
- Undertake both the Ortolani and Barlow manoeuvres on each hip separately to assess hip stability.

Ortolani manoeuvre is used to screen for a dislocated hip.

Barlow manoeuvre is used to screen for dislocatable hip.

Refer to the "Trust Guideline for the management of Developmental Dysplasia of the Hip Trustdocs ID: 1189) for examination algorithm, risk factors and indications for ultrasound examination.

Problems and actions to be taken:

Simple sacrococcygeal pits/dimples

- If you can see the base and no other midline abnormality; no action indicated.
- If the base is not visible, and there is an additional cutaneous marker or other abnormalities, discuss with senior colleague regarding further investigations.

Polydactyly (hands and feet)

- Look specifically for any dysmorphic features.
- Middle grade review and inpatient referral to Mr Jonothan Clibbon, Consultant Plastic Surgeon on extension 4492.

Duplicated, missing or hypoplastic thumbs

- Absent and hypoplastic thumbs are more common than duplicated thumbs in Fanconi's anaemia (FA)
- Needs genetic referral to Dr Sarju Mehta, Department of Clinical Genetics, Box 134, Addenbrooke's Hospital, Hills Road, Cambridge, CB2 2QQ. Phone: 01223 217027, Fax: 01223 217054.

Erb's Palsy

- Middle grade review.
- Discuss investigations (chest x-ray) and on-going management with the attending consultant.
- Consider early referral to physiotherapy.

Fractured clavicle

- The most common birth trauma.
- X-ray confirms clinical suspicion.
- Explain to the parents the clinical and x-ray findings.
- Reassure the parents, heal spontaneously no action needed

Talipes

- *Postural* is fully correctable to neutral position by gentle passive movement.
- Reassure the parents that it is benign and self limiting.
- *Structural* need physiotherapy referral before discharge. See Trust Guideline for the Initial Management of Congenital Talipes (Trustdocs ID: 1296).
- For all cases of structural talipes arrange routine ultrasound of the hip joints.

Hip joints

- Ultrasound scans should be booked on all babies with clinically suspected instability of the hips as well as all babies with risk factors (breech presentation, family history of DDH or talipes). Refer to Trust Guideline for the Management of Developmental Dysplasia of the Hip (Trustdocs ID: 1189).

Neurological examination

General points

Much useful information regarding the neurological status of the newborn infant comes from general inspection and from observations during the other parts of the assessment.

Important information that relates to neurological assessment that can be gained from other parts of the newborn examination include:

- History: As with other systems, the family, maternal, pregnancy and birth history should be reviewed.
- Presence of dysmorphic features.
- Evidence of birth trauma, such as cephalhaematoma, bruising, lacerations, swelling.
- Skin lesions, including café au lait spots (neurofibromatosis), haemangiomas (port wine facial haemangioma in Sturge-Weber), depigmented areas (tuberous sclerosis).
- Abnormalities overlying the spine: the presence of hairy patches, dermal pits and vascular malformations over the spine and their role as occult markers of underlying spinal dysraphism are discussed elsewhere.
- The head circumference measurement taken at birth: if you have any concerns, measure the head circumference again.

The neurological assessment looks at movement and posture, tone, primitive reflexes, the quality of the cry and the overall behavioural status of the baby.

Suggested scheme for examination:

- Observe the infant lying supine, observe spontaneous movements.
- Passive movements of limbs, tendon reflexes, ankle clonus.
- Pull to sit.
- Upright suspension.
- Ventral suspension.

- Primitive reflexes – Moro and palmar.

Observe the infant lying supine

Attention to the overall *behavioural state* of the infant is a very sensitive indicator of the integrity of the nervous system.
An irritable infant will cry with minimal stimulation and is difficult to soothe
A lethargic infant is difficult to rouse.

Look at the posture and movements of the baby and if possible the quality of their cry.

Crying

- A loud, energetic cry is normal in the term baby.
- A weak or feeble cry can indicate the baby is generally unwell or that there is an abnormality of the nervous system such as weakness or reduced tone.
- A high pitched cry may be present in infants with neurological disturbance, metabolic problems or drug withdrawal.

Posture

- **Normal**

  It is normal to assume a flexed posture, with intermittent extension.
  The resting posture for the hands is one of loose fisting. Arms and legs are mostly adducted, held towards the body.

- **Abnormal**

  Hypotonic: A baby with low tone will adopt a frog posture, in which all 4 limbs lie flat against the surface, with little resistance to gravity and reduced spontaneous movement. See Trust Guideline for the Assessment of a Floppy Baby (Trustdocs ID: 1203).

  Hypertonic: A baby with high tone will be in a predominant state of flexion or extension. For example, with cerebral irritation, they often adopt extensor posturing, with arching of the back, scissoring of the legs and adduction of the thumbs across the palms.

Spontaneous Movement

Observe the pattern and quality of movements of the head, limbs and body.

- **Normal**

  There should be symmetry of movement. The normal baby will flex and extend their fingers and toes in a series of symmetrical movements. There should be some antigravity movement in all 4 limbs.

- **Abnormal**

  Lack of movement may indicate nerve trauma or damage. Brachial plexus injury can lead to lack of movement of one arm. Brain injury can lead to various patterns of limb weakness and paucity of movement.

Jitteriness is common. It is characterised by rapid alternating movements of equal amplitude in both directions. Jittery movements can be elicited by environmental stimuli (noise or touch) and

can be stopped by flexing and holding the affected limb. Jitteriness is sometimes elicited by crying.

Excessive jitteriness can occur with drug withdrawal, hypoglycaemia and hypocalcaemia.

Jitteriness is distinct from the abnormal movements associated with seizures

- Jitteriness is stimulus sensitive, seizures are not.
- Jittering has symmetrical tremors, whereas seizure may be focal.
- Seizure movements often have fast and slow components.
- An infant with jitteriness never has accompanying autonomic physiological changes such as apnoea, tachycardia, hypertension.

Passive movement of the limbs

Tone

Observation of posture, as above, gives a good overall assessment of the tone. An assessment of the resistance to passive movement of the limbs gives an indication of tone in the limbs.

Both sides of the body and the upper and lower limbs should be compared. During passive flexion and extension of the arms and legs, the head must be in a midline position. Tone should be described as increased, decreased or normal.

- **Normal**

  There should be symmetrical resistance when comparing each side of the body and also when comparing arms and legs.

- **Abnormal**

  Hypotonic: focal brain injury can result in various patterns of hypotonia and weakness (e.g. hemiparesis). Cervical spinal cord injury can lead to flaccid weakness in the limbs. Generalised hypotonia may indicate lower motor neurone disease such as spinal muscular atrophy.

  Hypertonic: can be seen meningitis or, as a later development in hypoxic injury of the brain. Sometimes seen in conjunction with raised intracranial pressure and haemorrhage.

Tendon Reflexes

The patellar reflex is the easiest to elicit and the most reliable in the newborn. It is tested by tapping the patellar tendon just below the kneecap, while the examiner's hand supports the baby's knee in a flexed position.

- **Normal**

  Extension of the knee and visible contraction of the quadriceps muscle.

- **Abnormal**

  Usually, these will be absent or reduced (commonly in those conditions associated with hypotonia as outlined above). It is unusual to elicit exaggerated reflexes, but they are sometimes seen in, for example, infants with neonatal abstinence syndrome or cerebral irritability.

Ankle Clonus

Clonus is rapid movement across a joint following sudden stretching of a tendon. In the newborn examination, clonus is most easily elicited at the ankle.

- **Normal**

  Up to 10 beats of clonus

- **Abnormal**

  Sustained clonus may occur in, for example, cerebral irritation.

Pull To Sit

From the supine position, grasp the baby's shoulders or hands and pull slowly from a supine to sitting position.

- **Normal**

  The head leaves the bed almost immediately, lagging only minimally behind, when they have reached the sitting position, the head remains erect momentarily and then falls forward. Mild head lag is normal in the first weeks of life.

- **Abnormal**

  Excessive head lag indicates hypotonia. Do not place excessive stress on the baby's neck during this procedure.

Upright suspension

From the sitting position, lift the infant, supported under the axillae and around the chest. Be careful not to allow the baby to slip from your grip.

- **Normal**

  The infant will hold the posture for a short while and then slip through your hands.

- **Abnormal**

  The hypotonic infant will not be able to hold themselves up for any period of time and would begin to slip through your grip from the outset.

Ventral suspension

From the upright position, turn the baby onto the palm of your hand and hold in ventral suspension, facing downwards.

- **Normal**

  The baby will intermittently hold the head in line with the body and straighten his/her back. The limbs will hang down, but with some tone.

- **Abnormal**

  A hypotonic infant will droop around the examiner's hand. If hypertonic, they will hold the head and legs in line with the back for extended periods and feel stiff.

Primitive Reflexes

Moro

Hold the neonate in a supine position, with the head a few centimetres off the bed. Withdraw the hand supporting the head, allowing it to fall back into your hand.

- **Normal**

  The Moro response to this stimulus consists of abduction and extension of both arms, followed by opening of the palms. The arms are then brought in and flexed slightly, with closure of the fists.

- **Abnormal**

  Asymmetry of movements may indicate, e.g. brachial plexus injury. Complete absence suggests neurological depression.

Palmar grasp

Stimulating the palmer surface of the hand with a finger should cause the baby to grasp the finger. Attempts to withdraw lead to tightening of the grasp.

Monitoring compliance with the guidelines

1. Record kept of all junior doctors who attended the induction session on newborn examination, to ensure all attend.
2. Competency assessment in “newborn examination” log kept in an electronic form and in a signed paper form with requirement of all doctors being assessed as soon as possible after the induction week.
3. For critical incident reporting refer to the Trust Policy for the Reporting, Management and Investigation of Incidents, Near Misses and Serious Incidents.

Clinical audit standards derived from guideline

The Paediatric and Maternity Services are committed to the philosophy of clinical audit, as part of its Clinical Governance programme. The standards contained in this clinical guideline will be subject to continuous audit, with multidisciplinary review of the audit results at one of the monthly departmental clinical governance meetings. The results will also be summarised and a list of recommendations formed into an action plan, with a commitment to re-audit within three years, resources permitting.

All babies should have a newborn examination performed by an appropriately qualified examiner within 72 hours of birth.

Summary of development and consultation process undertaken before registration and dissemination

The guideline was drafted by the authors and initially distributed for comments to medical, nursing and midwifery colleagues in division 3. Following amendments the guideline was re-drafted and presented at a guideline meeting for the department.

This version has been endorsed by the Clinical Guidelines Assessment Panel.

Distribution list / dissemination method

Trust Intranet

References / source documents

Ainsworth SB, Wyllie JP, Wren C (1999) Prevalence and clinical significance of cardiac murmurs in neonates. **Archives of Disease in Childhood. Fetal and Neonatal Edition;** 80: F43-45

Baston H, Durward H (2001) **Examination of the Newborn: A Practical Guide.** Routledge: London

Davis L, McDonald S (2008) **Examination of the Newborn and Neonatal Health: A Multidimensional Approach.** Churchill Livingstone: London

National Institute for Health and Clinical Excellence (2006) **Postnatal Care: Routine Postnatal Care of Recently Delivered Women and their Babies.** http://www.nice.org.uk/guidance/CG37

National Institute for Health and Clinical Excellence (2005) **Division of Ankyloglossia (Tongue-tie) for Breastfeeding.** Interventional Procedure Guidance 149. http://www.nice.org.uk/IPG149

National Institute for Health and Clinical Excellence (2010) **Neonatal Jaundice.** http://publications.nice.org.uk/neonatal-jaundice-cg98

NHS Quality Improvement Scotland (2008) **Best Practice Statement: Routine Examination of the Newborn.** http://www.healthquality.org/nhsqis/4273.html

Rennie JM (2005) **Roberton's Textbook of Neonatology,** 4th edition. Churchill Livingstone: London

Robinson AJ, Russell S, Rimmer S (2005) The value of ultrasonic examination of the lumbar spine in infants with specific reference to cutaneous markers of occult spinal dysraphism. **Clinical Radiology**; 60: 72-77

Tappero EP, Honeyfield ME (2003) **Physical Assessment of the Newborn: A Comprehensive Approach to the Art of Physical Examination** 3rd edition. Neonatal Network: California

Public health England (Updated 24 April 2018) Newborn and infant physical examination screening programme handbook. https://www.gov.uk/government/publications/newborn-and-infant-physical-examination-programme-handbook/newborn-and-infant-physical-examination-screening-programme-handbook

Wren C, Richmond S, Donaldson L (1999) Presentation of congenital heart disease in infancy: implications for routine examination. **Archives of Disease in Childhood. Fetal and Neonatal Edition;** 80: F49-53

Appendix 1

Newborn and Infant Physical Examination (NIPE) Competency Assessment

All members of staff expected to carry out NIPE will be observed and assessed to be competent in performing the examination as regards to the standards set out below.

Standards for the Examination

Preparing for the Examination

- Purpose and procedure of examination explained to the parents and verbal consent taken.
- Family, maternal and perinatal histories are reviewed and documented.
- The condition of the baby since birth has been considered and discussed with the parents and is documented.
- Note the baby's weight and head circumference and decide if appropriate for gestational age.

Observation

- The routine examination of the newborn begins with the overall observation of the baby.

Performing the examination

Top to Toe assessment

- The examiner complies with hand hygiene and infection control standards.
- Exposed parts of the baby are examined first.
- Colour of the baby assessed.
- Respiratory effort is assessed.
- A cardio-vascular assessment is undertaken, including femoral pulsation.
- Aspects of the baby cry noted.
- Posture, tone and movements assessed.
- Facial features noted e.g. eyes, ears, nose.
- Red reflex checked both eyes.
- Mouth examined - palate checked.
- Neck checked to identify contractures, swelling or fistula. Clavicle palpated.
- Abdominal examination performed; bimanual palpation to detect any renal masses.
- Gender and appearance of genitalia is assessed and patency and position of anus examined.
- Palpation for testes.
- Umbilical cord inspected.
- Following gentle abduction the hips are tested using both the Barlow and Ortolani's tests.

- Back and spine examination takes place.
- Hands; palms examined. Feet are observed and examined to identify postural abnormalities.
- Head examined for size (OFC), fontanelles and sutures.
- Reflexes: Moro, grasp, rooting, sucking.
- Any skin lesions are identified.

Communication and Documentation

- The findings of the examination are discussed with the parents and any questions/queries answered.
- The findings of the examination are appropriately and accurately recorded in the Kardex and Child Health Record (red book).

Referral

- Respond to any abnormal finding appropriately as per unit guidelines e.g. Heart murmur, breech.
- The parents are given a full explanation of the reason and time scale of the referral.

Adapted from Best Practice Statement (May 2008): Routine examination of the newborn, NHS Quality improvement Scotland

Appendix 2

Competencies in Assessment of the New born (NIPE)

Summary of completion

…….. (print preceptees' name) has demonstrated competency in all of the above aspects of assessment of a new born (NIPE).
.

Preceptees' signature ……

Preceptors' name …… Signature ……

Date *(dd/mm/yyyy)*.....

Competencies in Assessment of the Newborn (NIPE)

Performance criteria	The midwife will demonstrate:	1	2	3	4	5	6	7	8	9	10
1	Review the baby's notes before the assessment is conducted										
1.1	Review the mother's obstetric history, noting the outcome and dates of previous pregnancies										
1.2	Identify the mother's last menstrual period and relate to the reputed gestational age of the baby and Ultrasound reports										
1.3	Note the mother's age and social background										
1.4	Examine the maternal family history, highlighting any relevant conditions, which may impact on the health of the new born										
2	Review the antenatal period and identify the nature and extent of any complications										
2.1	Consider any relevant investigations or diagnostic procedures										
2.2	Evaluate any prescribed treatments										
3	Identify the onset of labour and the time when the membranes were ruptured										
3.1	Appraise the length of the first and second stage of labour										
3.2	Examine the occurrence of any fetal heart rate variations and annotate fully										
3.3	Consider the mode of delivery and its possible impact on the new born										
4	Appraise the Apgar scores at 1 and 5 minutes										
4.1	Evaluate any resuscitation procedures, particularly noting the extent and length										
4.2	Appraise the type and dosage of any drugs administered since birth										
4.3	Refer to any investigations carried out on the baby										
4.4	Judge the physical characteristics of birth weight, head circumference in accordance with the reputed gestational age and align with current growth charts. (WHO 2012).										
5	Ensures the baby's physical status is commensurate with an effective examination										
5.1	Enables effective communication of a sensitive and confidential nature between parent and examiner										
5.2	Ensures the baby's safety and comfort before and during and completion of the assessment.										
6	Explains reasons for undertaking the examination and provides an overview of the examination process.										
6.1	Determines the parent's understanding of the nature of the examination										
6.2	Elicits parent's views of health/wellness status and identifies any anxieties.										
6.3	Ensures the parent is aware of the benefits and limitations of the physical examination and screening tests in general.										

6.4	Obtains permission to undertake the examination in accordance with NHS Trust policy/standards of professional practice.										
6.5	Draws upon professional and legal codes/guidance for practice to make an informed decision regarding the appropriateness and timeliness of the examination and to support dialogue with parents.										
6.6	Provides any supplementary information such as leaflets where appropriate.										
7	Identify the bell and the diaphragm and identify the following auscultatory sites: aortic, pulmonic, tricuspid and mitral										
7.1	Use the bell correctly to identify low pitched sounds										
7.2	Use the diaphragm correctly to identify high pitched sounds										
7.3	Listen with stethoscope bell to the four auscultatory sites and repeat the above sequence with the stethoscope diaphragm										
7.4	Identify the rate, rhythm and the normal heart sounds S1 and S 2										
8	Identify the parts of the ophthalmoscope and assemble and check the ophthalmoscope head										
8.1	Describe the function of each of these parts: the viewing apertures the aperture selection dials the lens selector dial the lens indicator and the diopters										
8.2	Demonstrate the correct technique of using the ophthalmoscope during eye examinations										
9	Identify peripheral pulse sites										
9.1	Demonstrate correct technique for palpating femoral pulses										
9.2	Identify the presence of femoral pulses										
	Describe normal blood flow through the femoral pulses										
10	Describe the abdominal contents										
10.1	Identify the position of abdominal contents										
10.2	On inspection describe the normal features of the abdomen: Skin, Shape, Umbilicus/cord										
10.3	Palpate the abdomen musculature										
10.4	Describe through palpation normal abdominal contents										
11	Demonstrate a systematic approach to the assessment of the newborn										
11.1	Identify normal/abnormal skin conditions										
11.2	Inspection and palpation of the head, identifying normal and abnormal characteristics										
11.3	Identify normal and abnormal features										
11.4	Inspection of ears, their position and size										
11.5	Identify general shape of the nose, patency of the nares										
11.6	Inspection of the eyes for any abnormalities, noting size and dimension of the eye, colour of the sclera, persistent										

	strabismus or nystagmus										
11.7	Identify and inspect the optic disc										
11.8	Inspect the iris for colobomata (keyhole shaped pupil)										
11.9	Inspect the cornea for size										
11.10	Inspect the mouth, observe for any asymmetry of the corners of the mouth and naso-lobial folds										
11.11	Inspection of the inside of the mouth for any variations from normal										
12	Inspection of the neck for general shape and symmetry										
12.1	Palpate for lumps/swellings and test for full range of movements										
12.2	Inspect for congenital abnormalities										
12.3	Palpate the clavicles for fractures										
13	Inspection of the chest wall										
13.1	Identify and observe normal breathing patterns										
13.2	Palpate pericardium for any thrills or pronounced ventricular heave										
13	Palpate peripheral pulses										
13.3	Demonstrate procedure for auscultation of the heart										
13.4	Identify normal heart rate rhythm and normal heart sounds S1 and S2										
13.5	Demonstrate underpinning knowledge related to heart murmurs										
13.6	Identify asymptomatic heart murmur and action to be taken										
14	Inspection of the abdomen, shape and size										
14.1	Inspection of umbilicus, cord and surrounding skin area										
14.2	Demonstrate the procedure for abdominal palpation										
14.3	Palpate the abdominal musculature and abdominal contents										
15	Inspect the penis for length and position of urethral meatus										
15.1	Inspect the shaft of the penis for curvature or latent chordee										
15.2	Identify normal urinary stream										
15.3	Examine the scrotum for rugosity and feel for testes, both testes should be palpable even if retractile										
15.4	Examine the groins for indirect herniae										
15.5	Inspect the position and patency of the anus										
16	Inspect the vulva for normality										
16.1	Check for vaginal discharge										
16.2	Examine the groin for inguinal herniae										
17	Inspect arms for length, shape, posture and symmetry										
17.1	Inspect arm movement to elicit motion in the shoulder, elbow, wrist and hand										
17.2	Examine the hand for normal/abnormal flexion and deformities of the fingers										
17.3	Inspect the feet for general configuration and for any congenital abnormalities										
17.4	Examine the feet and ankles for abnormalities of position										
17.5	Identify syndactyly and other minor variations of the feet										

18	Demonstrate the underpinning knowledge of the relevant anatomical structures and the physiological function of the hip joint and head of femur										
18.1	Examination of the legs for length and symmetry of creases										
18.2	Perform Ortolani's and Barlow's Tests for identifying hip dysplasia										
18.3	Identify the difference between a ligamentous click from a dislocated clunk										
18.4	Where abnormality of the hip has been identified demonstrate appropriate action to be taken										
19	Explore the baby's activities with the mother										
19.1	Observe for normal posture, bearing in mind that the presentation at birth can influence posture for several days										
19.2	Examine spontaneous motor activity by observing limb movement										
19.3	Examine muscle tone and strength by assessing resistant passive movements										
19.4	Observe type of cry										
19.5	Examine reflex responses										
19.6	Identify abnormal neurological responses and appropriate action to be taken										
19.7	Feeding history										
19.8	Utilise and evaluate a range of communication skills appropriate to the care situation										
20	Effective communication is promoted in ways which are consistent with the role of the midwife										
20.1	Clear proposals for action are presented at an appropriate time with right level of detail										
20.2	Confidentiality is maintained in accordance with professional requirements										
20.3	Effective and constructive communications are maintained with other professionals involved in the baby's care										
21	Parents are protected from undue intrusions										
21.2	Parents feelings and needs are responded to appropriately										
21.2	Communication with parents is consistent with their understanding, preferred form of communication and manner of expression										
21.3	The manner, level and pace of communication is appropriate to parents' abilities and personal beliefs and preferences										
21.4	Any obstacles which may make communication difficult are minimised										
21.5	Effective communication is encouraged by appropriate facial expression, body language, sensory contact, position and environment										
21.6	Where the initial form of communication is not effective, different approaches are used or sought										
21.7	Information given by parents are checked with her/him for										

	accuracy										
22	Accurate information should be directed to the appropriate agency										
22.1	Referral to information is given in a manner, level and pace consistent with the role of the midwife										
22.2	Referral policy is adhered to										
22.3	Record findings on NIPE Smart System										

	Signature of assessor	**Date** *(dd/mm/yyyy)*
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Summary of completion

…… *(print preceptees' name) has demonstrated competency in all of the above aspects of assessment of a new born (NIPE).*

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Preceptees' signature ……

Preceptors' name …… Signature ……

Date *(dd/mm/yyyy)*.....