DEVELOPMENTAL DYSPLASIA OF THE HIP SCREENING

The following guidelines are based on best available evidence and/or consensus achieved among the neonatologists at the Royal Hospital for Women and paediatric orthopaedic surgeons at Sydney Children's Hospital. This LOP is developed to guide safe clinical practice in Newborn Care Centre (NCC) at The Royal Hospital for Women. Individual patient circumstances may mean that practice diverges from this Local Operations Procedure (LOP).

INTRODUCTION
Developmental dysplasia of the hip (DDH) represents a spectrum of dynamic abnormalities of the hip joint. The problem arises due to a disruption of the normal anatomical relationship between the femoral head and the acetabulum. This disruption is critical as it is the dynamic relationship of these structures that allows normal development of the joint in the first few months of life. Clinical screening will detect most cases of neonatal hip instability, however, late presentation of DDH (with dislocation) still occurs in infants who have had a normal newborn clinical examination. The consequences of undiagnosed hip dislocation are potentially devastating. Moderate to severe osteoarthritis can occur as soon as the second decade, resulting in multiple surgeries and lifelong disability. Universal ultrasound screening at birth is not recommended due to a high false positive rate, which is not only costly but may result in over-treatment and consequent clinical harms (such as avascular necrosis). Optimal management therefore requires a combination of careful clinical examination, assessment of risk factors, targeted screening and ongoing clinical assessment throughout infancy.

1. AIM
- To identify and investigate infants at risk of DDH and organise appropriate follow-up and referral in a timely manner.

2. PATIENT
- Neonates.

3. STAFF
- Medical and nursing staff.

4. EQUIPMENT
- N/A

5. CLINICAL PRACTICE
Mandatory Hip Examination [see appendices for summary]
NB. All newborn infants should have their hips examined before discharge as part of their newborn examination.

1. Assess the newborn infant for any risk factors for DDH.
    - "High risk" infant
        i. Any infant with the following risk factors should be considered "high risk":
            1. Breech presentation
            2. DDH in a first degree relative
        ii. Perform hip examination (see below). If the hips examine normally, arrange hip ultrasound at 6 weeks of age (6 weeks corrected age in an early term [37-38 weeks] or preterm infant [<37 weeks]) and make an appointment after ultrasound for neonatal clinic.
    - "Other at risk" infants
        i. Any infant with a combination of 2 or more following risk factors:
            1. Female
            2. Foot deformities (including postural talipes)
            3. Oligohydramnios
            4. Torticollis
            5. Birth weight >4 kg

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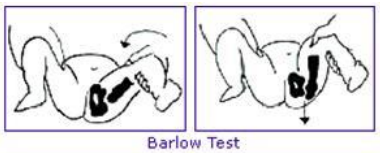
DEVELOPMENTAL DYSPLASIA OF THE HIP SCREENING cont'd

ii. Perform hip examination (see below). If the hips examine normally, arrange hip ultrasound at 6 weeks of age (6 weeks corrected age in an early term [37-38 weeks] or preterm infant [<37 weeks]) and make an appointment after ultrasound for neonatal clinic.

2. Perform hip examination (should be performed within the first 3-5 days of life prior to hospital discharge).
   - Examine the hips by gently abducting and adducting each hip.
   - Perform Barlow and Ortolani manoeuvres on each hip. The Barlow manoeuvre (test) attempts to dislocate the flexed hip with a postero-lateral movement of the proximal femur. The Ortolani manoeuvre (test) attempts to reduce the dislocated hip back into the acetabulum by moving the femoral head anteriorly whilst the hip is abducted (see Figure 1).



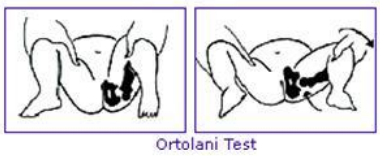


Figure 1. Barlow's and Ortolani's tests – Adapted from http://www.cssd.us/body.cfm?id=512.

3. If either hip cannot be abducted (already dislocated) or if either hip is dislocatable:
   - Arrange review by level 2 fellow/consultant to confirm abnormal examination.
   - Arrange outpatient hip ultrasound as soon as possible (within one week).
   - Call Sydney Children's Hospital physiotherapy department on 9382 1050 and request review.
   - Call Sydney Children's Hospital orthopaedic registrar to arrange review.
   - Fax a referral letter to 9382 1461.

   NB. If the newborn infant is placed in an abduction splint, such as a Von Rosen splint or a Pavlik harness, the baby must have an ultrasound one week later to ensure hip joint is aligned correctly.
4. If either hip is "subluxable" or "clicky" but is not dislocatable:
   - Arrange review by level 2 fellow/consultant to confirm abnormal examination.
   - Arrange hip ultrasound at 6 weeks of age (6 weeks corrected age in an early term [37-38 weeks] or preterm infant [<37 weeks]) and make appointment after ultrasound for neonatal clinic.

<u>Arranging an Outpatient Hip Ultrasound</u>

1. Make an appointment through the radiology department at Sydney Children's Hospital on extension 20301/20300. Ward clerks on the postnatal ward may assist.
2. Fax a **paper** referral to extension 20304 (do not generate in eMR). This must be clearly marked "outpatient".
3. Call the neonatal clinic on extension 26044 to arrange for an appointment after the ultrasound with any available consultant. Dr John Smyth, Dr Parag Mishra and Dr Srini Bolisetty have clinics to accommodate these infants.
4. Inform the parents of all follow up arrangements and provide a letter with the details [see template in appendices]. Infants can be discharged, particularly on weekends, pending these arrangements. In these cases, provide the parents with a letter that states that an ultrasound is required along with contact details for the postnatal ward if they don't receive a phone call or letter with follow up details [see template in appendices]. Make a note of any letters given to the parents in the blue book discharge check. Ensure that contact details for the family are up to date. Call the parents after arranging follow up. If uncontactable by phone, send the parents a letter with the follow up details.

DEVELOPMENTAL DYSPLASIA OF THE HIP SCREENING cont'd

5. Make a note of the ultrasound appointment in the postnatal ward diary on the day after the ultrasound. These results should be followed up by the postnatal ward JMO. If the ultrasound is reported as normal, contact the family to advise them of the result and cancel their clinic appointment. In these cases, it is important that the infant is examined by their GP or primary care provider. If the family has other concerns they may still attend the neonatal clinic.

Six Week Ultrasound Assessments [see appendices for summary]

1. If the femoral head coverage is >50% and the acetabulum appears normal:
    - Examine the infant. If the clinical examination is normal, no further investigation is indicated. If the infant does not attend clinic, advise the parents to have hips examined by the primary care provider.
2. If the femoral head coverage is 40-50% and/or the acetabulum appears mildly dysplastic:
    - Examine the infant to ensure the hips are stable.
    - Repeat ultrasound at 4 months of age.
3. If the femoral head coverage is <40% and/or the acetabulum appears moderately or severely dysplastic:
    - Examine the infant to ensure the hips are stable.
    - Notify Sydney Children's Hospital orthopaedic registrar and fax a referral letter to 9382 1461.

    N.B. If any hip cannot be abducted or is dislocatable, call Sydney Children's Hospital orthopaedic registrar and request urgent review. Fax a referral letter to 9382 1461.

Follow Up Ultrasound Assessments (Infants >3 months) [see appendices for summary]

1. If the acetabulum appears mildly dysplastic on any ultrasound:
    N.B. This includes cases where the acetabulum appears normal on a subsequent ultrasound.
    - Examine the infant to ensure the hips are stable.
    - Arrange hip x-ray at 6 months of age.
    - Notify Sydney Children's Hospital orthopaedic registrar and fax a referral letter to 9382 1461.
2. If the femoral head coverage is >50% and the acetabulum appears normal:
    - Examine the infant. If the clinical examination is normal, no further investigation is indicated. If the infant does not attend clinic, advise the parents to have hips examined by the primary care provider.
3. If the femoral head coverage is 40-50% and the acetabulum appears normal:
    - Examine the infant to ensure the hips are stable.
    - Notify Sydney Children's Hospital orthopaedic registrar (page #44107) and fax a referral letter to 9382 1461. Arrange follow up imaging as recommended by orthopaedic team.
    - These infants can continue to be monitored in the neonatal clinic at the discretion of the orthopaedic team.
4. If the femoral head coverage is <40% and/or the acetabulum appears moderately or severely dysplastic:
    - Examine the infant to ensure the hips are stable.
    - Notify Sydney Children's Hospital orthopaedic registrar and fax a referral letter to 9382 1461.

    N.B. If any hip cannot be abducted or is dislocatable, call Sydney Children's Hospital orthopaedic registrar and request urgent review. Fax a referral letter to 9382 1461.

6. DOCUMENTATION

- Integrated Clinical Notes
- Infant Blue Book

7. EDUCATIONAL NOTES

- Definitions:
    - Ligamentous laxity – transient ligamentous laxity that is thought to be an effect of transplacental maternal hormones lasting for a few days after birth.
    - Acetabular dysplasia – incomplete bony modelling leaving a shallow, flattened socket.

DEVELOPMENTAL DYSPLASIA OF THE HIP SCREENING cont'd

  - Subluxation – movement of the femoral head due to a deficient acetabular roof and an incompletely covered femoral head.
  - Dislocation – dislocation of the femoral head from the acetabulum, usually postero-laterally over the fibro-cartilaginous rim.
- DDH is detected by clinical examination in about 1-2% of infants but is dependent on the timing of examination. The exact incidence of DDH is difficult to define as the inclusion of ultrasonographic diagnoses is inconsistent in the literature. There is no "gold-standard" diagnostic test for DDH.
- Risk factors (de Hundt 2012):
  - Breech presentation (OR 5.7, 95% CI 4.4 – 7.4)
  - First degree relative with DDH (OR 4.8, 95% CI 2.8 – 8.2)
  - Clicking hips (OR 8.6, 95% CI 4.5 – 16.6)
  - Female (OR 3.8, 95% CI 3.0 – 4.6)
  - Foot deformities (OR 3.2, 95% CI 0.9 – 12.0)
  - Oligohydramnios (OR 2.5, 95% CI 0.8 – 8.2)
  - Torticollis (OR 1.15, 95% CI 0.1 – 9.2)
  - Birth weight >4 kg (OR 1.1, 95% CI 1.0 – 1.3);
    Birth weight <2.5 kg (OR 0.3, 95% CI 0.2 – 0.3)
  - Prematurity (OR 0.5, 95% CI 0.2 – 1.2)
- The risk of developmental dysplasia of the hip (DDH) in breech preterm infants is uncertain (Quan 2013; Lee 2016). We have therefore recommended the same screening guidelines for all infants irrespective of gestation.
- There is evidence that screening leads to earlier identification of DDH, however, 60-80% of the hips of newborns identified as abnormal or as suspicious for DDH by physical examination and >90% of those identified by ultrasound in the newborn period resolve spontaneously and require no intervention. This must be weighed against the potential harms associated with treatment of infants identified by routine screening.
- Clinical Diagnosis:
  - In the neonatal period, the diagnosis of DDH is made by physical examination. Frank dislocation is not common and manifests on examination as hips that are difficult to abduct. On routine newborn examination, you are most likely to find hips in which you can feel movement or that are dislocatable over the posterior margin of the acetabulum.
  - DDH is dynamic process and examination may be normal in the newborn period and become abnormal later. Examination of the hips should be a routine part of all infant screening examinations.
  - The physical signs change as the infants grows and after the age of three months the Barlow and Ortolani tests may be unreliable. Other physical signs and symptoms should be sought including asymmetric thigh or gluteal folds, leg length discrepancy, prominent greater trochanter, limited hip abduction, gait abnormalities, difficulty walking.
- Diagnostic imaging:
  - X-ray – the predominantly cartilaginous nature of the bones make x-rays an unsuitable means of assessing structure in the first few months after birth, although frank dislocation will be apparent on x-ray. After the first 4 months a number of useful measurements can be made as well as assessment of femoral epiphyseal ossification which is characteristically delayed in DDH.
  - Ultrasound allows static and dynamic analysis of the neonatal hip. The position of the femoral head, degree of acetabular coverage, stability on dynamic testing and confirmation of a satisfactory location for a splinted hip are all achieved with non-invasive ultrasonography.

8. RELATED POLICIES/PROCEDURES/CLINICAL PRACTICE LOP

- N/A

9. RISK RATING

- Low

DEVELOPMENTAL DYSPLASIA OF THE HIP SCREENING cont'd

10. NATIONAL STANDARD

- Standard 11 - Service Delivery
- Standard 12 - Provision of Care

11. REFERENCES

- Barlow T. Early diagnosis and treatment of congenital dislocation of the Hip. Journal of Bone and Joint
- Surgery 1962;44:292.
- Rosendahl K. Ultrasound screening for developmental dysplasia of the hip in the neonate: The effect on treatment rate and prevalence of late cases. Pediatrics 1994;94:47-52.
- U.S. Preventive Service Task Force. Screening for developmental dysplasia of the hip: recommendation statement. Am Fam Physician 2006;73:1992-6.
- de Hundt M, Vlemmix F, Bais JM, Hutton EK, de Groot CJ, Mol BW, Kok M. Risk factors for developmental dysplasia of the hip: a meta-analysis. Eur J Obstet Gynecol Reprod Biol 2012;165:8-17.
- Quan T, Kent AL, Carlisle H. Breech preterm infants are at risk of developmental dysplasia of the hip. J Paediatr Child Health 2013;49:658-63.
- Lee J, Spinazzola RM, Kohn N, Perrin M, Milanaik RL. Sonographic screening for developmental dysplasia of the hip in preterm breech infants: do current guidelines address the specific needs of premature infants? J Perinatol 2016;36:552-6.

12. ABBREVIATIONS AND DEFINITIONS OF TERMS

NCC	Newborn Care Centre		
DDH	Developmental dysplasia of the hip		

AUTHOR:

Primary	Sept 2016	Tim Schindler, Srinivas Bolisetty, Angus Gray
Revised	Apr 2017	David Carr, Tim Schindler, Srinivas Bolisetty

REVISION & APPROVAL HISTORY

Amendments 3/4/17 Neonatal Quality Committee
Endorsed Neonatal Services Division Quality Committee

FOR REVIEW : OCTOBER 2019

Newborn Care Division
Royal Hospital for Women
Barker Street Randwick NSW 2031
Locked Bag 2000
Randwick NSW 2031
Tel: (02) 9382 6160
Fax: (02) 9382 6191

Dear Parent,

This letter is to confirm that your baby has been booked in for a Hip Ultrasound and Neonatology Clinic Review on the following dates.

Hip Ultrasound at _____ on _____ at Sydney Children's Hospital Medical Imaging Department on Level 0 (Barker Street Entrance).

Newborn Clinic appointment at _____ on _____ at Royal Hospital for Women Outpatients clinic on the Ground floor.

Please bring your baby's new Medicare card and blue book to this appointment.

Kind Regards,

Medical Officer

Newborn Care Centre

Royal Hospital for Women

Newborn Care Division
Royal Hospital for Women
Barker Street Randwick NSW 2031
Locked Bag 2000
Randwick NSW 2031
Tel: (02) 9382 6160
Fax: (02) 9382 6191

Dear Parent,

Your baby has been recommended to have a 6 week old screening ultrasound for Developmental Dysplasia of the Hip. Your baby will also be booked in for a Newborn Clinic follow up appointment. This will be organised by the Paediatric Doctor. You should receive a call and letter from the doctor with the ultrasound and clinic appointment date/time. If you do not receive a call or want further clarification, please contact your Postnatal ward on either 93826398 (Oxford Ward) or 93826348 (Paddington Ward).

Kind Regards,

Medical Officer

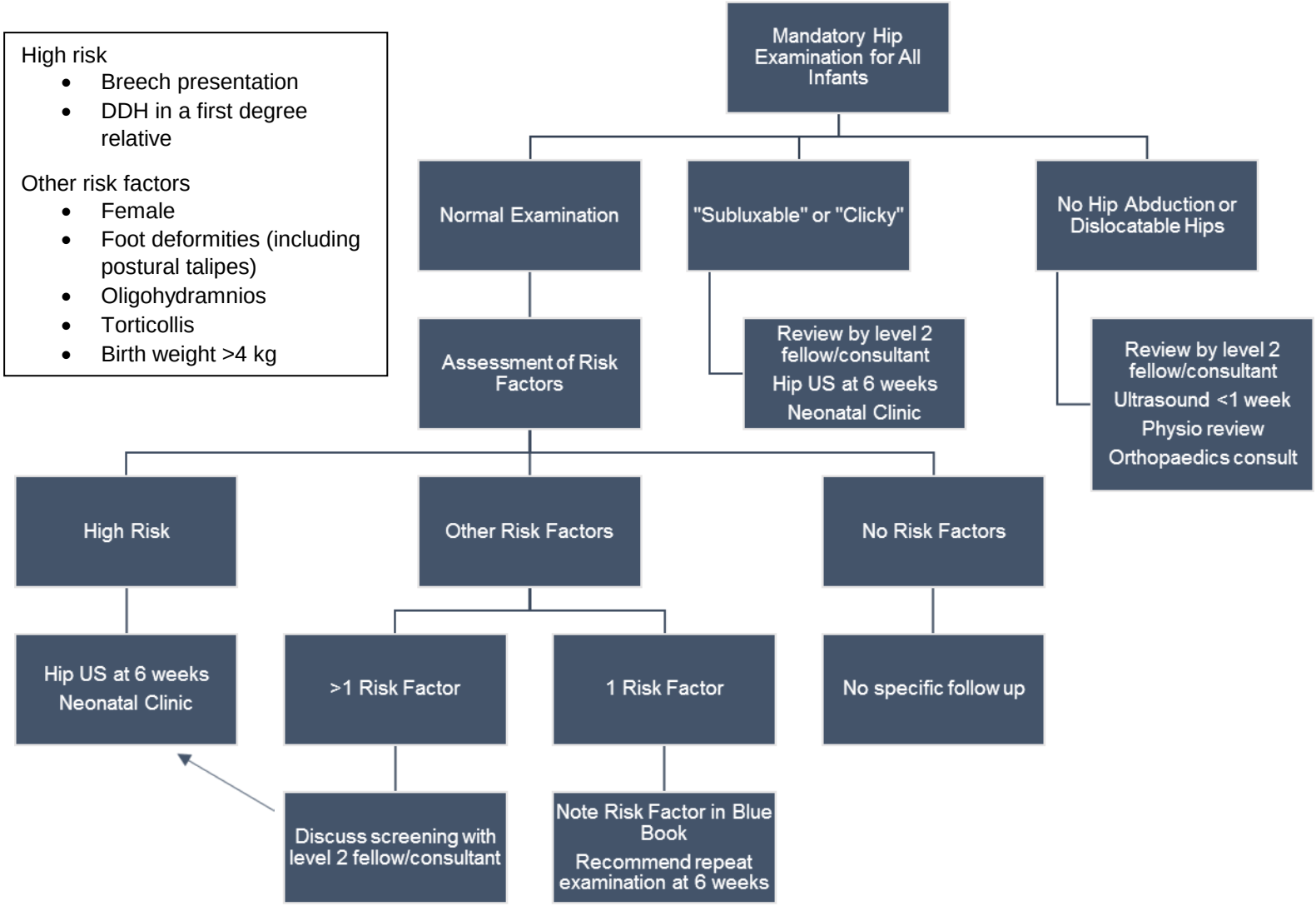
Newborn Care Centre

Royal Hospital for Women

Developmental Dysplasia of the Hip
Examination & Assessment of Risk Factors

High risk
- Breech presentation
- DDH in a first degree relative

Other risk factors
- Female
- Foot deformities (including postural talipes)
- Oligohydramnios
- Torticollis
- Birth weight >4 kg



Developmental Dysplasia of the Hip
Ultrasound Screening

NB. This flow diagram must be used in conjunction with a clinical examination. If any hip cannot be abducted or is dislocatable, call Sydney Children's Hospital orthopaedic registrar and request urgent review