Approved by Quality & Patient Safety Committee
November 2020

DEVELOPMENTAL DYSPLASIA OF THE HIP

This Local Operating Procedure 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 Operating Procedure. 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.
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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. 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
        - Any infant with the following risk factors should be considered "high risk":
            - Breech presentation
            - DDH in a first degree relative
        - Perform hip examination (see below). If the hips examine normally, arrange hip ultrasound at 7 weeks of age (7 weeks corrected age in an early term [37-38 weeks] or preterm infant [<37 weeks]) and make an appointment after ultrasound for neonatal clinic (see below for arranging Outpatient Hip Ultrasound).

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- "Other at risk" infants
  - Any infant with a combination of 2 or more following risk factors:
    - Female
    - Foot deformities (including postural talipes)
    - Oligohydramnios
    - Torticollis
    - Birth weight >4 kg
  - Perform hip examination (see below). If the hips examine normally, arrange hip ultrasound at 7 weeks of age (7 weeks corrected age in an early term [37-38 weeks] or preterm infant [<37 weeks]) and make an appointment after ultrasound for neonatal clinic (see below for arranging Outpatient Hip Ultrasound).

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).

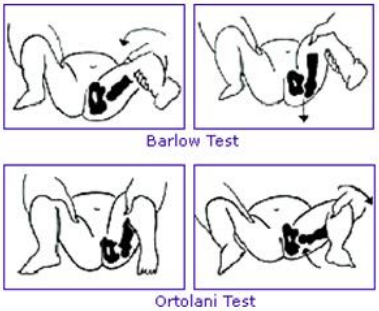

Figure 1. Barlow's and Ortolani's tests – Adapted from http://www.cssd.us/body.cfm?id=512.

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.
   - Call Sydney Children's Hospital Orthopaedic Registrar on the "bone phone" (0436 607 186) to request review.
   - For ongoing Orthopaedic Outpatient follow up at Sydney Children's Hospital fax referral letter to extension 21461.
   - If the newborn is placed in an abduction splint this is fitted by Sydney Children's Hospital Orthotics department. The Orthopaedic team will generally liaise directly with Orthotics but if needed you can contact the Orthotics department on extension 28184.

   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 (usually arranged by Orthopaedic team).

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4. If either hip is "subluxable" or "clicky" but is not dislocatable:
   - Arrange review by level 2 fellow/consultant if unsure of abnormal examination findings.
   - Arrange hip ultrasound at 7 weeks of age (7 weeks corrected age in an early term [37-38 weeks] or preterm infant [<37 weeks]) and make appointment after ultrasound for neonatal clinic (see below for arranging Outpatient Hip Ultrasound).

Arranging an Outpatient Hip Ultrasound

1. Parents make their own ultrasound appointments at the radiology provider of their choosing. We recommend Spectrum as they will email the results. A list of other bulk billing ultrasound providers surrounding RHW is provided on the parent handout (see appendices). It is important to clearly explain to parents when they need to book the ultrasound (i.e. 7 weeks corrected gestational age), and that **even if hip examination is normal** at the 6 week check with the GP the ultrasound **is still required**.
2. The parent handout also contains an email address which the results are emailed to seslhd-rhw-nccclinic@health.nsw.gov.au. Ask the parents to send an email to this address after their baby has had their ultrasound detailing where and when the ultrasound was done (this helps when chasing results if they are not automatically sent through).
3. Following the ultrasound they will then be seen in the neonatal clinic. The ward clerks on Oxford and Paddington ward will book in these appointments when the babies are 7 weeks old. Fill out a clinic referral form prior and give it to the parents (see appendices). Alternatively, you can call the neonatal clinic on extension 26044 to arrange for an appointment yourself.
4. For infants being discharged on weekends, provide parents with ultrasound request form and parent handout with list of ultrasound providers. Leave clinic referral on the ward clerks' desk and they will book in the appointment on Monday and send the parents a letter in the mail with appointment time and details.
5. Document risk of DDH and reason for hip ultrasound on eMR. Also document where the parents are booking the ultrasound (this helps when chasing results if they are not automatically sent through).
6. Ultrasound results will be checked by the neonatal fellow rostered for clinics each week. Generally if the ultrasound is reported as normal, the family will be contacted to advise them of the result and cancel the clinic appointment. Ultrasounds reports are sent to the family by post or email. 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.

Seven 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.

   N.B. All infants with an acetabulum that is dysplastic should have a hip x-ray at 6 months of age (see "Follow Up Ultrasound Assessments" below).

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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 extension 21461.

   N.B. If any hip cannot be abducted or is dislocatable, call Sydney Children's Hospital Orthopaedic Registrar on the "bone phone" (0436 607 186) to request review. For ongoing Orthopaedic Outpatient follow up at Sydney Children's Hospital fax referral letter to extension 21461.

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 extension 21461.
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.
   - Call Sydney Children's Hospital Orthopaedic Registrar on the "bone phone" (0436 607 186).
   - These infants can either be referred to Orthopaedic Outpatients or 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.
   - Call Sydney Children's Hospital Orthopaedic Registrar on the "bone phone" (0436 607 186).
   - For ongoing Orthopaedic Outpatient follow up at Sydney Children's Hospital fax referral letter to extension 21461.

   N.B. If any hip cannot be abducted or is dislocatable, call Sydney Children's Hospital Orthopaedic Registrar on the "bone phone" (0436 607 186) to request review. For ongoing Orthopaedic Outpatient follow up at Sydney Children's Hospital fax referral letter to extension 21461.

5. DOCUMENTATION

- eMR
- Infant My Health Record (blue book)

6. 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.

DEVELOPMENTAL DYSPLASIA OF THE HIP cont'd

  - Acetabular dysplasia – incomplete bony modelling leaving a shallow, flattened socket.
  - 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.

DEVELOPMENTAL DYSPLASIA OF THE HIP cont'd

7. RELATED POLICIES/PROCEDURES/CLINICAL PRACTICE LOP

- N/A

8. RISK RATING

- Low

9. NATIONAL STANDARD

- Standard 1 – Clinical Governance
- Standard 5 – Comprehensive Care
- Standard 6 – Communication for Safety

10. REFERENCES

- Committee on Quality Improvement, Subcommittee on Developmental Dysplasia of the Hip. Clinical Practice Guideline: Early Detection of Developmental Dysplasia of the Hip. Pediatrics 2000;105:896-905.
- Screening for Developmental Dysplasia of the Hip: Recommendation Statement. Pediatrics 2006;117:898-902.
- 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.

11. ABBREVIATIONS AND DEFINITIONS OF TERMS

NCC	Newborn Care Centre	GP	General Practitioner
DDH	Developmental dysplasia of the hip	XR	X-ray
RHW	Royal Hospital for Women	SCH	Sydney Children's Hospital

12. AUTHOR

Primary	Sep 2016	T Schindler (Staff Specialist Neonatologist), S Bolisetty (Lead Clinician), A Gray (SCH Paediatric Orthopaedic Surgeon)
Revised	Apr 2017 Apr 2020	D Carr (NCC JMO), T Schindler (Staff Specialist Neonatologist), S Bolisetty (Lead Clinician) M Musarra (NCC JMO), R Prasad (NCC Fellow), T Schindler (Staff Specialist Neonatologist)

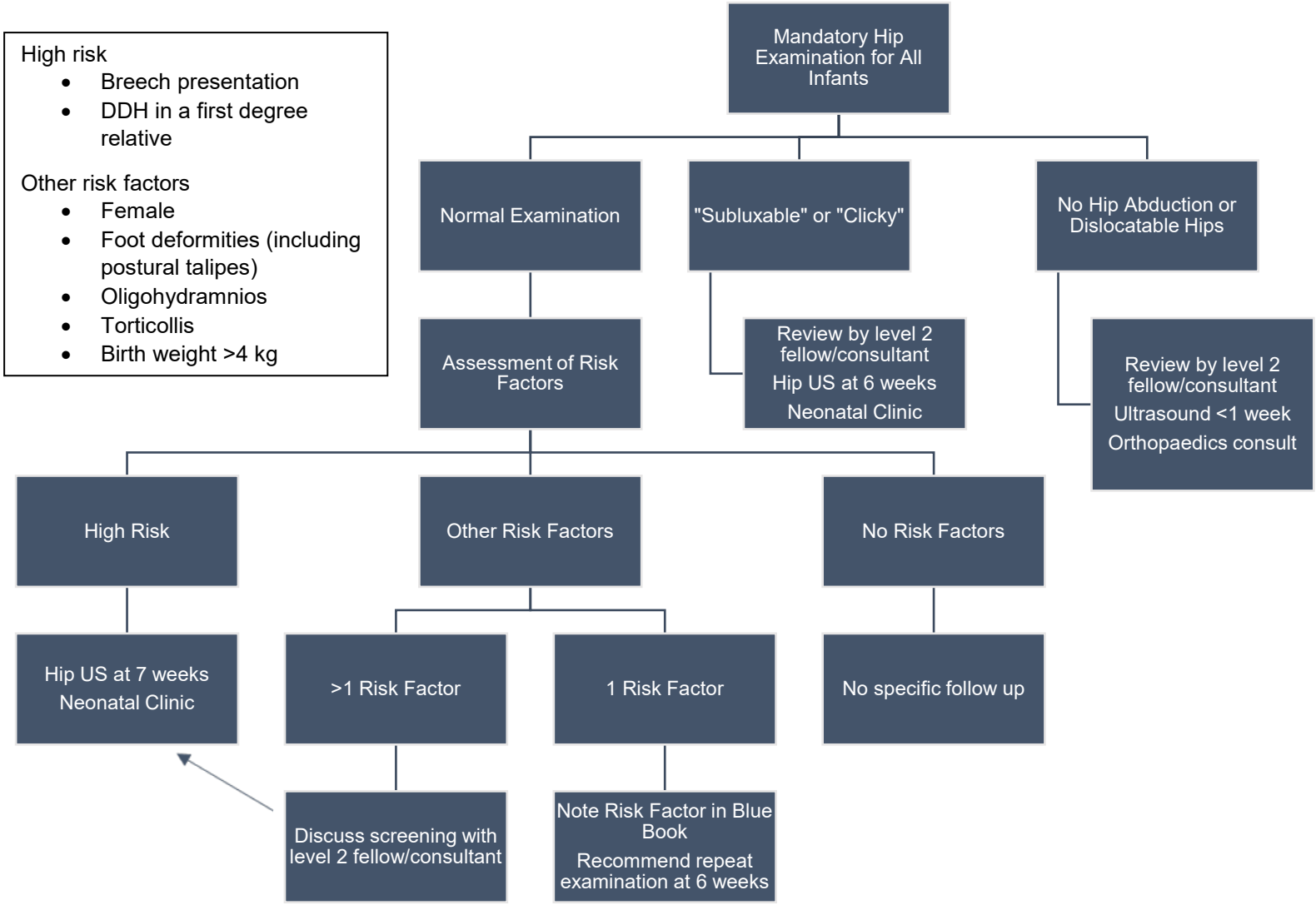
REVISION & APPROVAL HISTORY
November 2020 Revision approved by NCC LOPs Committee
April 2017 Revision approved by NCC LOPs Committee
September 2016 Primary Document created and approved by NCC LOPs Committee

FOR REVIEW: 2025

Developmental Dysplasia of the Hip
Examination & Assessment of Risk Factors

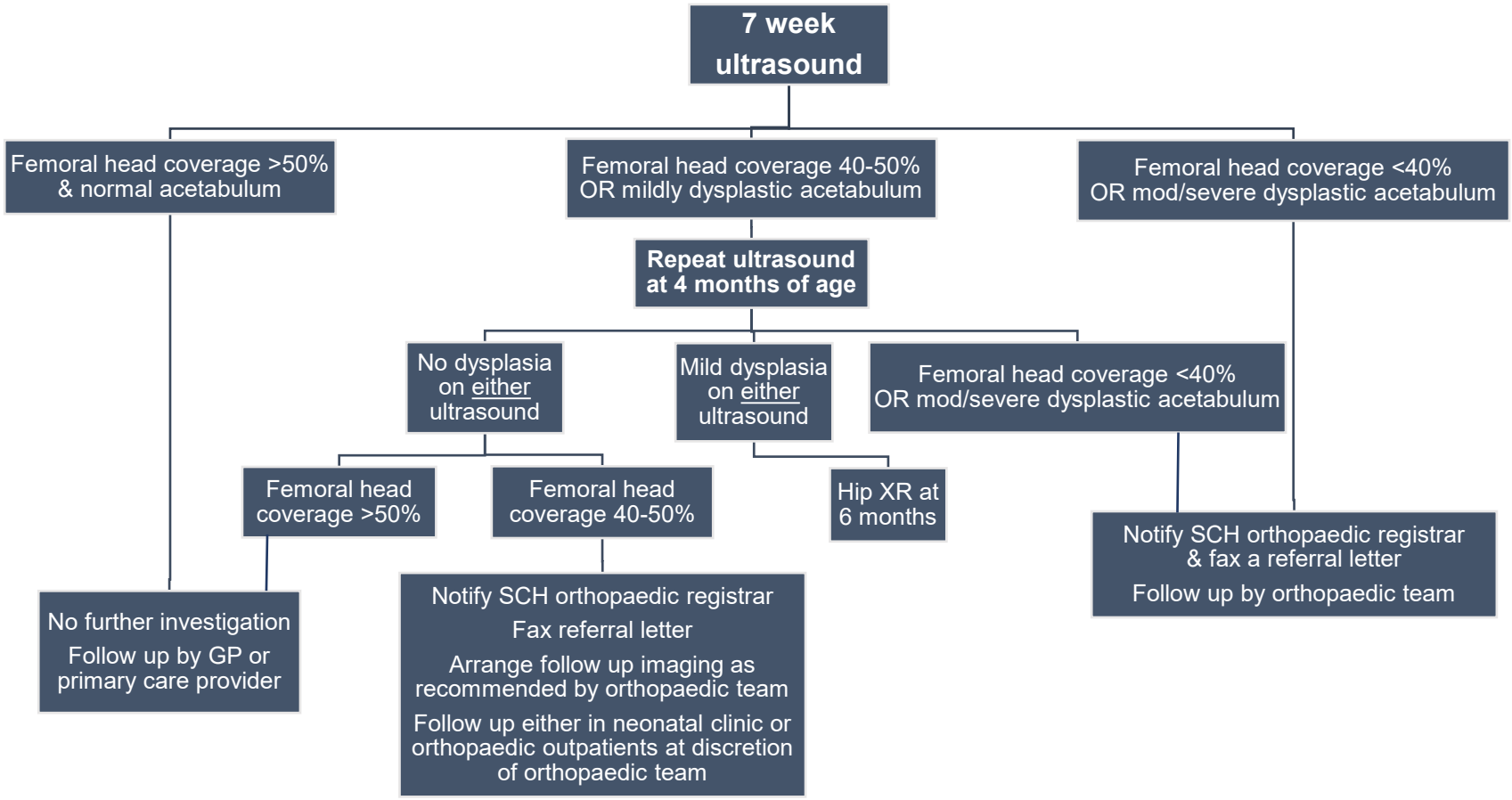
High risk
- Breech presentation
- DDH in a first degree relative

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



Neonatal Follow- Up Clinic
Outpatients Department, Level 0
The Royal Hospital for Women, Barker St
Randwick NSW 2031
Tel: (02) 9382 6044

Dear Parents

Re: Attach Baby Sticker

The RHW Neonatal Team would like to see your baby in our Newborn Follow-up Clinic (which is held in the antenatal clinic at RHW) after your discharge from the hospital. We would like to see your baby when they are _____ weeks (age) to follow up on:

The following imaging is required:

You need to phone one of the imaging centres below to say that you have a booking form and require a booking for your baby. We recommend Spectrum imaging, but other alternatives are listed also. The ultrasound should be completed at least 2 days prior to your Newborn Clinic appointment (remember to take the ultrasound booking form to the imaging centre with you).

Don't forget to take this referral letter to your booking appointment.

Once your baby has had their ultrasound, please send an email to seslhd-rhw-nccclinic@health.nsw.gov.au detailing the date of ultrasound, and where you had the ultrasound done. This will make it easier for our doctors to follow up on the results.

Preferred Imaging Centre:
Spectrum Medical Imaging (https://www.spectrumradiology.com.au)
Multiple locations (including Randwick-Silver Street, Bondi Junction, Maroubra, Eastgardens)
Phone: 02 9197 8000

Alternative Imaging Centres:
PRP Diagnostic Imaging (http://www.prpimaging.com.au/)
Byron Kennedy Hall, Entertainment Quarter, Lang Road, Moore Park
Phone: 02 8075 3400

iMED Radiology Network (https://i-med.com.au/)
Two locations: Randwick (Phone 02 9650 4962) and Bondi Junction (Phone 9389 9499)

Newborn Follow-up Clinic
Outpatients Department
Level 0
The Royal Hospital for Women
Barker Street
Randwick NSW 2031

Tel: (02) 9382 6044/ 9382 6045
Fax: (02) 9382 6118

Date:

Attach patient sticker

Dear Doctor

☐ Dr Parag Mishra	2409585Y	
☐ Dr Srini Bolisetty	2320102H	*** **Next available in___ weeks**
☐ Dr John Smyth	378277W	

Reason for referral:
Please follow up post hip ultrasound for risk of developmental dysplasia of the hip.
Risk factors:

Regards,

Name:

NCC Registrar/Resident for Dr Ju Lee Oei (Provider No. 0061946Y)

Health
South Eastern Sydney
Local Health District

Medical Imaging Department
Prince of Wales Hospital
Level 0 Barker St
Randwick NSW 2031
P: (02)93820300 F: (02)93820304
Open Monday to Friday 8.30am to 5.00 pm

OUTPATIENT MEDICAL IMAGING REQUEST

Patient Details:

Surname: Given Name(s):

MRN: Date of Birth: Sex:

Address: Telephone/Mobile:

Modality: Examination(s) Requested:

- ☐ X-RAY
- ☐ CT*
- ☐ Ultrasound
- ☐ OPG
- ☐ Intervention*
- ☐ DSA-Angiography*
- ☐ Fluoroscopy
- ☐ Mammography

Please use MRI specific forms for MRI requests.

Clinical Details:

* For examinations/procedures requiring contrast please provide most recent creatinine / eGFR result.

Referring Doctor Details :

Name: Provider No:

Address: Phone No:

Signature : Date: Fax No:

FOR ALL BOOKINGS CALL (02)93820300 AND FOLLOW THE PROMPTS. NO BOOKING NEEDED IF ONLY X-RAY REQUIRED
PLEASE BRING WITH YOU THIS REQUEST FORM, ALL PREVIOUS IMAGING/REPORTS and YOUR MEDICARE CARD

Office use only:

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