Approved by Safety & Quality Committee
19 August 2021

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.

INTRODUCTION

Developmental dysplasia of the hip (DDH) represents a spectrum of dynamic abnormalities of the hip joint. 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. 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. Identify 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
        - Infant with trisomy 21
    - "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

…./2

DEVELOPMENTAL DYSPLASIA OF THE HIP (cont'd)

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).

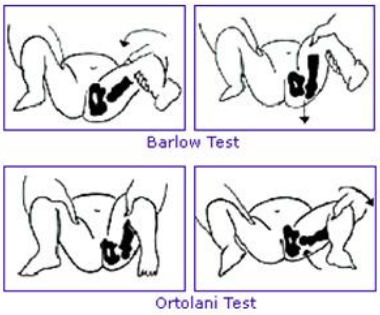


Figure 1. Barlow's and Ortolani's tests – Adapted from http://www.cssd.us/body.cfm?id=512.

3. If hip examination is normal and no risk factors:
   - Advise routine care including a hip examination by their chosen GP/paediatrician at 6-8 weeks of age as part of their health check.
4. If hip examination is normal but risk factors are identified:
   - Advise parents to schedule a hip ultrasound at 6-8 weeks of age (6-8 weeks corrected age in preterm infants <37 weeks) followed by an appointment with their chosen GP/paediatrician (see below for arranging an outpatient hip ultrasound).
5. If either hip cannot be abducted (already dislocated) or if either hip is dislocatable:
   - Arrange a 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).
6. If either hip is "subluxable" or "clicky" but is not dislocatable:
   - Arrange review by level 2 fellow/consultant if unsure of abnormal examination findings.
   - Advise parents to schedule a hip ultrasound at 6-8 weeks of age (6-8 weeks corrected age in preterm infants <37 weeks) followed by an appointment with their chosen GP/paediatrician (see below for arranging an outpatient hip ultrasound).

DEVELOPMENTAL DYSPLASIA OF THE HIP (cont'd)

Arranging an Outpatient Hip Ultrasound

1. Provide parents with a medical imaging request form for hip ultrasound (see appendices).
2. Parents make their own ultrasound appointments at the radiology provider of their choosing. A list of 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/paediatrician, the ultrasound **is still required**.
3. Following the ultrasound they will then be seen by their chosen GP/paediatrician. The ward clerks on Oxford and Paddington ward will book in these appointments with the GP/paediatrician prior to discharge for when the babies are 7 weeks old. Fill out a referral letter prior to discharge and give it to the parents (see appendices). Also provide the "Ultrasound Screening" flow chart for the GP/paediatrician (see appendices). Select the consultant on call for level 2 as the referring consultant.
4. For infants being discharged on weekends, provide parents with ultrasound request form and parent handout with list of ultrasound providers. The weekend JMO must hand over weekend discharges to the JMO on Monday. The JMO on Monday should inform the ward clerks to book in an appointment 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.
6. Provide parents with DDH fact sheet (see appendices). https://www.schn.health.nsw.gov.au/files/factsheets/developmental_dysplasia_of_the_hip_ddh-en.pdf

Parents/carers should leave with the following documents (all found in appendices):
For parents
- **Introductory letter with instructions**
- **Parent fact sheet**
- **Medical imaging request form**

For GP/paediatrician
- **Referral letter**
- **Ultrasound screening flow chart**

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).
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.

DEVELOPMENTAL DYSPLASIA OF THE HIP (cont'd)

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.
  - 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.

DEVELOPMENTAL DYSPLASIA OF THE HIP (cont'd)

- 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.

7. RELATED POLICIES/PROCEDURES/CLINICAL PRACTICE LOP

- N/A

DEVELOPMENTAL DYSPLASIA OF THE HIP (cont'd)

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

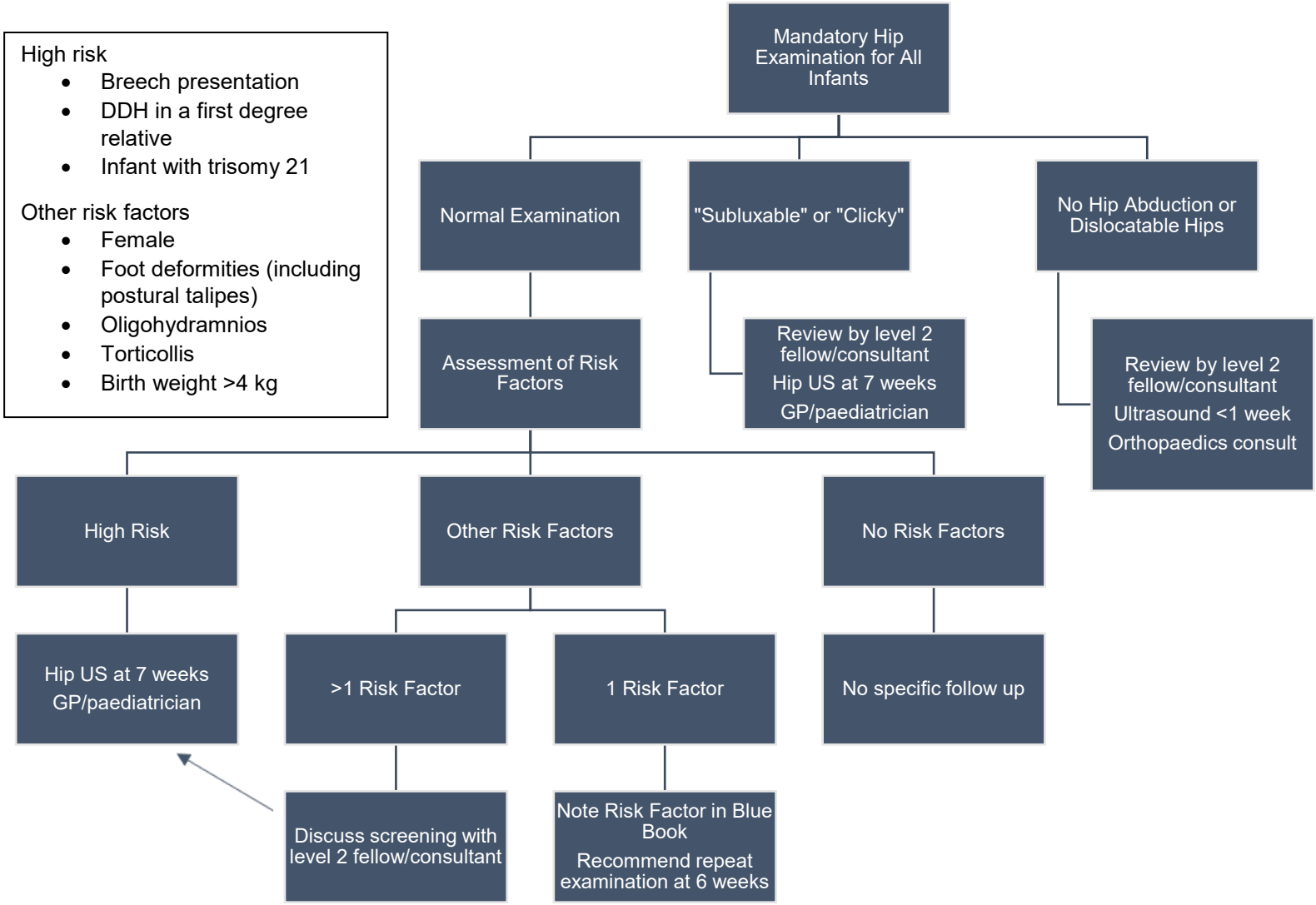
Primary	Sep 2016	T Schindler (Staff Specialist Neonatologist), S Bolisetty (Lead Clinician), A Gray (SCH Paediatric Orthopaedic Surgeon)
Revised	Apr 2017	D Carr (NCC JMO), T Schindler (Staff Specialist Neonatologist), S Bolisetty (Lead Clinician)
	Apr 2020	M Musarra (NCC JMO), R Prasad (NCC Fellow), T Schindler (Staff Specialist Neonatologist)
	July 2021	R Prasad (NCC Fellow), T Parmar (NCC Fellow), S Bolisetty (Medical Co-Director), T Schindler (Staff Specialist Neonatologist)

REVISION & APPROVAL HISTORY
July 2021 Revision approved by NCC LOPs Committee
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: 2026

Developmental Dysplasia of the Hip
Examination & Assessment of Risk Factors

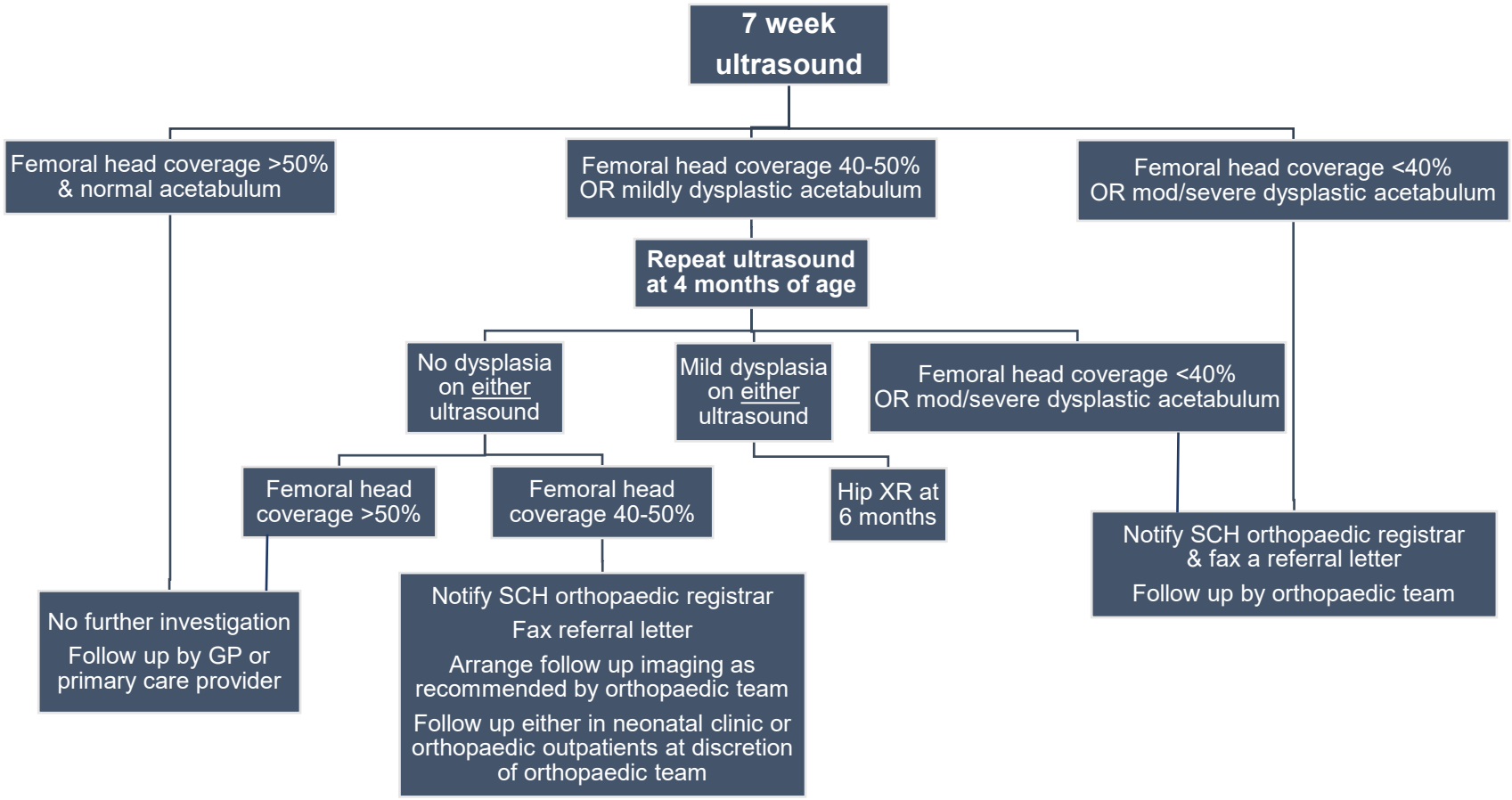
High risk
- Breech presentation
- DDH in a first degree relative
- Infant with trisomy 21

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



Affix Patient Sticker

Dear Parent/s,

Your baby has been identified to be at risk of abnormal development of the hip, medically known as developmental dysplasia of the hip (DDH) or hip dysplasia.

As per our guidelines, your baby will require a **hip ultrasound at 6-8 weeks from your baby's expected date of delivery**.

Some infants are known to develop DDH. DDH is an abnormal development of the hip joint. In babies with DDH, the ball at the top of the thigh bone (called the head of the femur bone) is not stable within the socket (called the acetabulum). The ligaments of the hip joint that hold it together may also be loose. Sometimes, the hips can dislocate early in life and this may not be noticed until your child starts to walk. Correction may involve a range of options ranging from a hip brace to an operation.

It is important to do early screening for DDH to avoid any permanent impairment of the hip.

Steps to obtain your baby's hip ultrasound and paediatrician/GP appointments:

STEP 1
Prior to your discharge from the hospital, our team will organise an appointment with your chosen GP/paediatrician to review your baby.

Please ensure the hip ultrasound is done 1 week prior to this appointment so the result is available for the doctor.

STEP 2
Please arrange an ultrasound at any of the imaging centres using the outpatient medical imaging request form provided to you. Some of the local imaging centres are outlined below:

- **Spectrum Medical Imaging (https://www.spectrumradiology.com.au)**
  Multiple locations (including Randwick-Silver Street, Bondi Junction, Maroubra, Eastgardens)
  Phone: 02 9197 8000
- **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/)**
  Randwick – Phone: 02 9650 4962
  Bondi Junction – Phone: 02 9389 9499

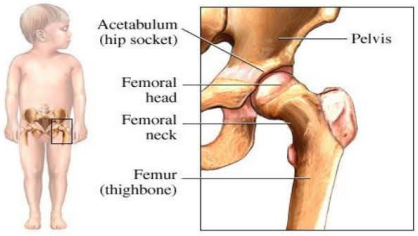
FACTSHEET

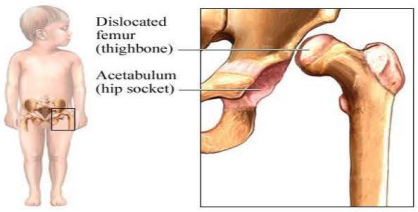
Developmental dysplasia of the hip (DDH)

What is DDH?

DDH occurs when a baby's hip joint does not grow normally. The ball at the top of the thighbone (called the femoral head) is not in the right place. It should be in the cup-shaped socket of the pelvis (called the acetabulum).

Tendons and muscles hold the femoral head in the socket. If the tendons are loose or stretched, the femoral head will move out of the socket and the hip will not grow normally.





Images used with kind permission from Orthopaedic Surgeon

Who to check

A healthcare worker should check all babies and children for DDH:

- At birth
- One week after birth
- At 6 weeks after birth
- At 6 months after birth
- When they begin to walk

How common is DDH?

Some events may increase your baby's chances of having DDH. These are called risk factors and include:

Breech presentation (born feet first)	10 times increased risk
Female baby	4 times increased risk
Low fluid around the baby in the womb (oligohydramnios)	4 times increased risk
A baby with a birth weight over 4kg	2 times increased risk
A first born baby	2 times increased risk
A baby who is overdue by more than 2 weeks	1.5 times increased risk
A family history of DDH	
Other tendon problems, such as club foot and/or neck stiffness	

Will my next baby have DDH?

DDH can run in the family. Newborn hip checks are very important for babies with risk factors. A hip ultrasound is also useful at 6 weeks of age, along with another hip check by a healthcare worker.

the children's hospital at Westmead
The Sydney children's Hospitals Network

SYDNEY CHILDREN'S HOSPITAL RANDWICK
The Sydney children's Hospitals Network

HNEkidshealth
Children, Young People & Families

This document was last reviewed on 22 November 2017

Are there signs I should look for?

If you see any of these signs, you should have your child checked by a healthcare worker:

- Uneven skin creases near your child's bottom
- Your child does not move their leg normally
- Your child leans to one side when they stand or walk (uneven leg length)
- Your child is not sitting by 10 months of age or walking by 18 months of age
- Your child's foot is turned out
- Your child has a 'waddling' gait when they walk
- You have difficulty parting the legs for nappy changes

What treatment will be needed?

The treatment plan for you child will be guided by their age and the abnormality to the hip. Newborns with DDH respond well to treatment in a soft brace (called a Pavlik harness) for six to ten weeks. The brace helps the hip develop and grow normally. The Pavlik harness will not cause long-term delay to your baby's development. Your baby will catch up once the brace is off.

What if treatment does not improve my baby's hip?

Some baby's hips do not improve with early treatment, and DDH can be found in older children. X-rays are used to look at your child's hips after six months of age. If the socket of the pelvis is too shallow and the femoral head is too small, the femoral head may easily move in and out of the socket. A femoral head that stays outside the socket is dislocated.

If not found before walking age, a dislocated hip can cause a painless 'waddling' walk. As the child grows older, their hip will become stiff and painful (called arthritis).

Will surgery be needed?

Surgery may be needed for children older than six months, or children whose hips do not improve after wearing the Pavlik harness.

The type of surgery needed will depend on the age of your child and the abnormality to the hip. Your doctor will discuss the type of surgery needed.

If surgery is needed, a plaster lower body cast (called a hip Spica) will hold your child's hip in place. This may be for a few months. The hospital staff will show you how to care for your child.

A few children may not improve after treatment. They may require surgery between two to four years of age. All surgery has risks and benefits. Your child's surgeon will tell you about the risks and benefits before the surgery.

How successful is the treatment?

Most children's hips grow normally after they finish treatment in the Pavlik harness.

Some children have problems for several years. All children need regular hip checks until they finish growing. A small number of children may have arthritis later in life if the shape of the hip does not improve.

How active will my child be?

Most children lead a normal, active life after treatment for DDH.

Remember:

- Most cases of DDH are found early and improve with simple treatment.
- Most children have no major problems after they finish treatment.
- Your baby should have regular hip checks by your GP or healthcare worker in the first year of life.

References

Commonwealth Government of Australia (2013) Community Care Child Co-operative, Developmental Milestones & the Early Years Learning Framework and the National Quality Standards <https://www.dss.gov.au/sites/default/files/documents/05_2015/developmental-milestones.pdf>

Hart, E., Albright, M., Rebello, G. & Grottkau, B. (2006) Developmental Dysplasia of the Hip – Nursing implications and anticipatory guidance for parents Orthopaedic Nursing 25(2):100-109

Affix Patient Sticker

REFERRAL LETTER

Date:

Dr _____
Address: _____
_____
_____
Phone: _____

Reason for referral: Developmental Dysplasia of Hip screening and follow up

Date and time of appointment:

Dear Dr _____

We will be grateful for your review of the above named baby at risk of developmental dysplasia of the hip (DDH). The risk factors for DDH for this baby are indicated below:

- ☐ Breech
- ☐ Abnormal hip examination
- ☐ Oligohydramnios
- ☐ Torticollis
- ☐ DDH in first degree relative
- ☐ Talipes/ foot deformities
- ☐ Female
- ☐ Large for dates

Our team has advised parent/s to organise a hip ultrasound prior to their visit to your clinic.

Please find enclosed a suggested flow chart developed by our team, outlining the management of DDH for your perusal.

Kind Regards,

Name:

NCC Registrar/Resident to

- ☐ Dr John Smyth (Provider No 378277W)
- ☐ Prof Ju Lee Oei (Provider No 0061946Y)
- ☐ Prof Kei Lui (Provider No 0481274W)
- ☐ Dr Meredith Ward (Provider No 2110437J)
- ☐ Dr Parag Mishra (Provider No 2409585Y)
- ☐ Dr Srini Bolisetty (Provider No 2320102H)
- ☐ Dr Tim Schindler (Provider No 2745775X)

Royal Hospital for Women
Barker Street
Randwick NSW 2031
Tel: (02) 9382 6160

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:

Please forward a copy of the results to:
Dr _____
Address: _____
_____
_____