Screening, assessment and management of DEVELOPMENTAL DYSPLASIA OF THE HIP

Clinical Practice Guideline
Resource Manual
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Main Message

The purpose of this document is to provide guidance to clinicians regarding the screening, assessment and management of Developmental Dysplasia of the Hip (DDH) across Hunter New England Area Health Service.

This guideline is designed for use with the full-term infant with no obvious neuromuscular or orthopaedic condition. Clinicians are encouraged to monitor for hip instability in all babies when medically stable, including pre-term infants¹.

This guideline provides:
- an overview of the risk factors for DDH
- recommended procedure for the physical examination of the hips
- recommended clinical pathways for screening and assessment of the hips at birth prior to discharge from hospital, at child and family health nurse consultations and general practitioner reviews.
- procedures for the treatment of DDH using a pavlik harness.

This guideline reflects what is currently recognised as best practice within the literature regarding the management of DDH. It should be used as a guide to assist clinicians when making management decisions, however each child should be individually evaluated and a clinical decision made according to that child’s specific situation.

Practice Alert:

This guideline is not designed as an educational tool.

All clinicians involved in the screening, assessment and management of DDH require training regarding examination and/or management of this condition. Training should be received from experienced colleagues or sought from a tertiary hospital within the clinical area.

Recommended educational resources can be found on page 12 of this document.
Background

Definition

Developmental Dysplasia of the Hip (DDH) is a condition that affects the neonatal and infant hip joint. DDH is a term used to describe a spectrum of abnormalities affecting the relationship of the femoral head to the acetabulum. These may include an immature hip, a hip with mild acetabular dysplasia, a hip that is dislocatable, a hip that is subluxated, or a hip that is frankly dislocated.

In many circumstances, symptoms of DDH may be present at birth, however will resolve within the first weeks of life. Alternatively, the hip may be stable at birth and develop an abnormality; hence the use of the term Developmental Dysplasia of the Hip (DDH), rather than Congenital Dysplasia of the Hip (CDH), as this condition was previously known.

Incidence

Although there are some inconsistencies in the literature regarding incidence of DDH, it is generally accepted that approximately:

- 1 in 100 infants will be identified as having some hip instability at birth
- 1-2 in 1000 infants will be born with a dislocated hip

Given the spectrum of DDH, each case may present with differing symptoms, severity and response to treatment.

Importance of Early Identification and Intervention

It is widely recognised that the earlier an abnormality of the infant hip is detected, the simpler and more effective the treatment will be. Although formal evidence supporting the effectiveness of routine screening for DDH is minimal, the American Academy of Pediatrics recognises that implementation of a surveillance and screening program for the early detection of DDH will minimise the number of late presentation cases. Concerns exist regarding the treatment of infant hips where diagnosis has not been confirmed or has been misdiagnosed.

Well-trained clinicians, irrespective of profession, are much more effective at identifying true symptoms of DDH than those who have less training and experience. This highlights the importance of widespread education among clinicians regarding physical examination of the hip.
Risk Factors

Risk factors play an important role in the identification of DDH. Infants with significant or multiple risk factors are considerably more likely to develop DDH than children without those risk factors, and as such, risk factors provide important information when making decisions regarding the management of an infant's hip/s.

Risk Factors associated with DDH include:\(^1,11\):

- Breech Presentation
- Family History of DDH (especially if in parent or sibling)
- Female Baby (DDH is four times more likely to occur in a female infant)
- Large Baby (>4kg)
- Overdue > 42 weeks
- Oligohydramnios
- Associated with Plagiocephaly, Torticollis and foot deformities
- First born baby or multiple pregnancies (twins or triplets etc)

The left hip is affected in 75% of cases, due to the position of the hip in relation to the mother's spine in utero\(^9\). Risk factors such as oligohydramnios, large or overdue baby and first born or multiple pregnancies increase the risk of DDH as they are associated with decreased intrauterine space.

The most significant risk factors for DDH are breech presentation and family history\(^1\). The American Association of Pediatrics recommends routine ultrasound screening at 6 weeks of age for female babies born in the breech position, with optional screening for breech males and females with a family history of DDH\(^1\).

Practice Alert:

Within Hunter New England Area Health Services, routine ultrasound screening at 6 weeks of age is recommended for:

1. All breech presentations
2. Children with a significant family history (parent of sibling) with DDH

If there are 4 or more risk factors present, regardless of what those risk factors are, it is recommended that the infant is closely monitored for DDH (reviewed at all well checks) with the option of ultrasound screening\(^13\).
Physical Examination

Physical examination is vital in the initial identification of DDH. The following is a general overview of the procedure for physical examination of the infant hips. Please note that the reliability of physical examination changes as the child grows, therefore examination techniques vary depending on the age of the child.

Prior to physical examination, the examiner should:

- Gain consent from the parent/guardian
- Ensure a warm, quiet environment for the examination to occur
- Ensure the infant is well, relaxed and fed
- Remove clothing from the lower limbs
- Place the child on a firm, flat examination surface

Birth to 3 months of age

- **Ortolani Test (reduction test)**
  “The Ortolani is performed with the newborn supine and the examiner’s index and middle fingers placed along the greater trochanter with the thumb placed along the inner thigh. The hip is flexed to 90° but not more, and the leg is held in neutral rotation. The hip is gently abducted while lifting the leg anteriorly. With this maneuver, a “clunk” is felt as the dislocated femoral head reduces into the acetabulum”

- **Barlow Test (stress test)**
  “The Barlow provocative test is performed with the newborn positioned supine and the hips flexed to 90°. The leg is then gently adducted while posteriorly directed pressure is placed on the knee. A palpable clunk or sensation of movement is felt as the femoral head exits the acetabulum posteriorly. This is a positive Barlow sign”

After 3 months of age, the Ortolani and Barlow tests may be unreliable, therefore additional means of examination, used in combination with the Ortolani and Barlow tests, are necessary. The screening techniques described below are also used with infants 0-3 months of age.

Older Infants (> 3 months of age)

- **Check for restricted abduction at the hips**
  Limited abduction is the most sensitive sign associated with DDH in the older infant. With the infant in supine, on a firm, flat surface with pelvis stabilised and hips and knees at 90°, abduct and adduct the hips to check for asymmetrical or restricted range of motion. This manoeuvre should be performed gradually and may need to be repeated a number of times, to ensure an accurate result is obtained. Normal range of motion at the hip is abduction to 60° or more, with range less than this suggestive of DDH.

- **Check for leg length discrepancy**
  Total leg length discrepancy should be assessed in prone with hips and knees extended, as well as assessing for leg length discrepancy using the Galeazzi Test. This test should be conducted with the infant in supine, on a firm, flat surface with the pelvis stabilised and level. Hips are flexed to 90° and placed in neutral adduction/abduction, with knees in flexion. In this position, the vertical level of the knees can be assessed for asymmetry.

- **Check for asymmetrical thigh and gluteal skin folds**
  With the infant in prone, knees extended, check for asymmetrical thigh or gluteal folds. Note that asymmetrical skin folds alone do not constitute a diagnosis of DDH, however this information can be used in combination with other physical signs during assessment.

In children who are walking, a limp may be present or the child may toe-walk on the affected side. If DDH is present in both hips, increased lumbar lordosis, prominent buttocks, or a waddling gait may be present.
Practice Alert:

Abnormal development of the acetabulum cannot be determined by physical examination, but requires imaging techniques to be identified. For this reason, it is important to consider risk factors, not solely results of the physical examination, when making decisions regarding management of the infant's hip/s.
**CLINICAL PATHWAY:**
Examination following birth – prior to discharge from hospital

**PHYSICAL EXAMINATION**
By Medical Practitioner, Midwife or other (according to hospital policy)

Neonatal Hip Instability form completed and placed in infant’s PHR / result and plan clearly documented in PHR

**OUTCOME**

- **Normal Hip/s**
  - Routine follow up by GP and CFHN as per infant’s PHR

- **Breech presentation and/or family history**
  - Prior to discharge: Book ULTRASOUND for 6 weeks of age
  - Refer to ORTHOPAEDIC SURGEON or PAEDIATRICIAN or GP

- **Unsure**
  - Refer to ORTHOPAEDIC SURGEON or PAEDIATRICIAN or GP

- **Dislocatable Hip/s**
  - Immediate referral to ORTHOPAEDIC SURGEON or PAEDIATRICIAN
  - Contact above for instruction re: timely and suitable follow-up
  - Prior to discharge: Book ULTRASOUND for 6 weeks of age

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**Figure 1 – Clinical Pathway: Examination at birth and pathway for discharge from Hospital**

**All infants should have a hip examination prior to being discharged from hospital following birth.**
This examination may be conducted by clinicians from various disciplines, as per institutional policy. Findings of this examination, including risk factors, should be documented according to organisational documentation requirements.

**The neonatal hip instability form should be completed and placed in the infant’s Personal Health Record (PHR).** This form will identify potential risk factors in the infant, assist in ensuring appropriate physical examination is carried out and document referral process if applicable. (See Appendix 1 for sample and how to obtain this form)

A normal hip is classified as one that does not present with hip instability, when significant risk factors are not present (see page 5 of this document for details regarding risk factors). Further referral is not required for these infants. Routine examination of the infant’s hips will be conducted by the child and family health nurse and/or GP at 1-4 week, 6-8 week and at 6 month Child Health Checks, in accordance with schedule in infant’s PHR.

For a breech presentation or if there is a family history (sibling or parent history) of DDH, an Ultrasound should be booked for when the infant is 6 weeks of age. It is recommended that this ultrasound is booked and the family provided with the appointment details prior to discharge from hospital. A referral to the Orthopaedic Surgeon, Paediatrician or GP should be made **prior to discharge** for all babies born in the breech position or with a family history of DDH, to ensure ultrasound results are followed up and the hip/s are monitored appropriately.

If, following physical examination of the hip, the examiner is unsure of hip stability, a referral should be made **prior to discharge** to the Orthopaedic Surgeon, Paediatrician or GP to ensure the hip/s are monitored appropriately.

If the infant has dislocatable hip/s at birth, **immediate contact and referral** should be made **prior to discharge** to the Orthopaedic Specialist or Paediatrician to confirm diagnosis and ensure that treatment is commenced. The child may then be referred for treatment via a brace/harness (physiotherapy or an alternative discipline may manage brace/harness treatment in each area).
All infants should have had a hip examination following birth prior to discharge from hospital, and the neonatal hip instability form completed and added to the infant’s PHR. This form will provide information regarding risk factors and the stability of the hip at birth.

All infants who were a breech presentation, as well as those with a family history of DDH (parent or sibling) or if the child has significant risk factors (see page 5 of this document for details regarding risk factors) a referral should have been made to the Orthopaedic Surgeon, Paediatrician or GP for the hip/s to be monitored. If these risk factors are present and a referral has not been made, the Child and Family Health Nurse should make a referral to the General Practitioner. The Child and Family Health Nurse is encouraged to monitor the hip/s of those children with significant risk factors on a more regular basis than the PHR suggests for the general population, ideally at each well consultation.

If the hip examination identifies that the infant has normal hips, the hips should be monitored at 6-8 weeks and 6 months according to the PHR schedule of the child health checks. Note that physical examination of the hip changes when the infant reaches 3 months of age – see page 6 of this booklet for details regarding physical examination.

If the physical examination identifies dislocatable hip/s or you are unsure of hip stability, an urgent referral should be made to the GP (and Paediatric Physiotherapist if available) to ensure that the child is referred on to Orthopaedic Surgeon or Paediatrician for appropriate management of the hip. When referring to the GP, a clinical note template is available on CHIME to assist in ensuring the child is reviewed by the GP in a timely manner.

For those children with physical signs of DDH, it is recommended that physical examination of the hip be carried out by the Child and Family Health Nurse at all well consultations until the child is walking.
Review of the infant hips should occur within 2 weeks of referral. The timeframe in which DDH is identified and treatment begun can have a significant influence on the overall outcome for the infant with DDH.

Physical examination should be conducted and risk factors noted. It is recommended that all babies born in the breech position, as well as those with a family history (parent or sibling) of DDH, undergo ultrasound screening at 6 weeks of age – the General Practitioner should ensure that this ultrasound has been booked and follow up on results as recommended in the ultrasound report.

If physical examination shows normal hips, and there are no significant risk factors present, it is recommended that hips be monitored as per the infant’s PHR until the child is walking.

If the child was a breech presentation, has a family history (parent of sibling with DDH) or the practitioner is unsure of hip stability, the child should be referred for imaging. If the child is 6 weeks to 5 months of age, Ultrasound (US) is generally the most appropriate imaging technique. If the child is 5 months or greater, X-ray is generally the most appropriate imaging technique (between 4 and 6 months, US and X-ray are equally effective diagnostic tools). Note that if the child has significant risk factors, and has already undergone an ultrasound with normal results, further imaging is not necessary unless physical signs are present, or the clinician feels the significance of the risk factors (for example, extensive family history) warrants further investigations.

If physical examination shows dislocatable hip/s, an immediate referral should be made to an Orthopaedic Surgeon / Paediatrician. Referral for an ultrasound/xray to confirm diagnosis should also be made. Once diagnosis is confirmed by Orthopaedic Surgeon / Paediatrician, the child may be referred for treatment via a brace/harness (generally this requires referral to physiotherapy. In some areas other disciplines manage brace/harness treatment).
Physiotherapy Management of DDH using a brace / harness

Children who are diagnosed with DDH in the first 6 months of life may be treated with the application of a hip brace. In the HNEAHS the Pavlik Harness is generally utilised for this purpose, however other braces, such as the Dennis-Browne brace may also be used. This document will focus on the process of treatment using a Pavlik Harness.

Physiotherapists who receive a referral for an infant below 6 months of age with suspected or diagnosed DDH should review the risk factors of the infant and carry out a physical examination of the hip/s. Application of a pavlik harness should only occur if diagnosis has been confirmed by an Orthopaedic Surgeon or treating Paediatrician. The harness should be applied as soon as possible following confirmation of diagnosis.

Application of the Pavlik Harness:

1. With clothing removed, the baby is laid on top of the harness in supine
2. Shoulder and chest straps are adjusted and velcroed into position
3. Leg straps are adjusted and velcroed into position
4. The optimal hip position within the brace is hip flexion approximately 90° and hip abduction greater than or equal to 60°
5. Check to ensure room for growth at the straps – a finger should be able to be comfortably inserted behind each strap.
6. Reapply clothing over the harness

The harness should be kept on at all times, with weekly physiotherapy appointments to remove the harness, bathe the baby and re-apply a clean harness. Skin integrity should be checked at each weekly appointment. Duration of treatment using the harness should be determined in consultation with the Orthopaedic Surgeon. On completion of treatment using the pavlik harness, even if symptoms of DDH have resolved, the physiotherapist should ensure that the child has an appointment with the Orthopaedic Surgeon to review the hip/s once the child is walking.

Parent Education

It is the responsibility of the Physiotherapist to ensure that parents understand the care instructions for the pavlik harness. The following instructions are of particular importance:

- The harness must be kept on at all times, unless instructed by the Orthopaedic Surgeon to be removed
- For this reason, the baby must be sponged bathed with a damp cloth
- Skin care should be discussed and parents shown those areas that need to be checked regularly for signs of pressure
- Parents must not change the position of the harness – only the Physiotherapist or Orthopaedic Surgeon should change this position

A parent handout should be provided to all parents with a child placed in a pavlik harness. Appendix 2 of this document provides a parental handout on caring for a child in a pavlik harness.

Follow Up

The physiotherapist should:

- Ensure the parents have weekly Physiotherapy appointments for a bath / change of harness
- Ensure the parents have a follow-up appointment with the Orthopaedic Specialist
- Ensure the parents have contact details of the Physiotherapist

Practice Alert: Avascular necrosis has been identified as a risk associated with application of a pavlik harness. Parents should be informed of the risks associated with this treatment.
Resources

Below is a list of suggested resources that may assist clinicians in the assessment and management of the child with DDH.

Online Training Package
An online education package is currently being developed. Check HNEAHS intranet sites for availability of this package.

Royal Children’s Hospital, Melbourne.
This 30 minute 3D animated audiovisual learning package explores the pathology and incidence of DDH, and provides a step-by-step guide to physical examination of the hip. This resource can be accessed via the HNE Intranet through ‘other useful links’, or at http://www.education.vic.gov.au/ecsmanagement/matchildhealth/learndevelop/hipdysplasia.htm

Developmental Dysplasia of the Hip – Parent Fact Sheet

Child Health Screening and Surveillance: A critical review of the evidence
Report prepared by Centre for Community Child Health, Royal Children’s Hospital Melbourne for the National Health and Medical Research Council (NHMRC)
Discussion paper reviewing current recommended practices regarding the assessment and management of DDH

Simulation ‘hippy’ dolls available at a number of sites across HNEAHS
Baby “hippy” dolls, that simulate the symptoms of DDH in the infant, enabling clinicians to practice examination techniques are available at many sites across the area health service.

- Maitland Hospital – Paediatric Medicine Department
- Manning Base Hospital – Paediatric Physiotherapy Department
- Tamworth Hospital – Paediatric Physiotherapy Department
- John Hunter Children’s Hospital – Paediatric Physiotherapy Department, Obstetrics and Gynaecology Physiotherapy Department, Paediatric Orthopaedic Department
References


13. Verbal consultation with the three primary Paediatric Orthopaedic Surgeons within HNEAHS at time of development of this guideline:
   - Dr Lynette Reece, Orthopaedic Surgeon, Maitland District Hospital
   - Prof Eric Ho, Paediatric Orthopaedic Surgeon, John Hunter Children’s Hospital
   - Dr Sandeep Tewari, Orthopaedic Surgeon, John Hunter Children’s Hospital and Manning Base Hospital
Appendix A: Neonatal Hip Instability Form

Front of form:

The above form can be altered to suit individual organisations and printed onto pads so that the form is easily accessible within both inpatient and outpatient settings.

To alter and order copies of the Hip Instability Form, please contact:

Rachel Hogan
SALMAT
Ph: 0409 928 104
rachel.hogan@salmat.com.au
Appendix B: Development Dysplasia of the Hips – Caring for your child in a Pavlik harness

What is DDH?
DDH is a condition that affects the formation of the hip joint in infants. It is usually detected by physical examination in the days following birth.

How common is it?
Around 1-2 in every 1000 babies will be diagnosed with DDH. It is more common in girls than boys, and is more likely if there is a family history of DDH or the child was carried in the breech position. First babies, large babies and those with another condition such as torticollis have an increased chance of developing DDH.

What treatment is required?
Children diagnosed within the first months of life are generally treated using a hip brace. This brace positions the hip in the most ideal position to allow the hip joint, and surrounding tissues, to develop. The later a child is diagnosed, the longer this brace may need to be worn.

Complications
In a small number of children, blood supply to the hip joint may be disrupted. This is called avascular necrosis and does not usually become evident until the child is older and walking.

Will further treatment be required?
Most hips will stabilise and no further treatment will be required.

In older children, or if hip bracing is not effective, surgical intervention, followed by the application of a hip spica plaster may be required to stabilise the hip joint.

Caring for your child in a Pavlik harness

Your Physiotherapist will fit and adjust the harness. Do not remove the harness or adjust the straps. The harness has been fitted in the best position to enable development of the hip joint, and adjusting this may impact on the treatment process.

Bathing
As the harness cannot be removed, you will need to bath your baby with a damp cloth. Weekly Physiotherapy appointments will be required so that you can bath your baby, and a clean harness can be applied.

Clothing
Disposable nappies work well underneath the harness and help to keep it dry. Clothing may need to be slightly larger than your baby previously required.

Skin Care
You should check your baby’s skin daily for any rubbing or chafing. Soft fleecy material can be applied to any areas that are rubbing (your physiotherapist can provide you with this). Skin creases should be checked daily, and a barrier cream such as zinc or castor oil used if irritation occurs. Excessive use of creams or powders is not recommended.

Positioning
Extensive movement of the legs, such as kicking is not recommended within the harness and should not be encouraged. Continue to encourage tummy time and play during your baby’s awake times. If you are having difficulty positioning your baby for feeding, speak to your physiotherapist about alternative options.

Physiotherapist Name: __________________
Phone Number: ________________________

Follow-up appointments:
Date: ___________________ Time: __________
Date: ___________________ Time: __________
Date: ___________________ Time: __________

It is the responsibility of the parent to ensure a follow-up appointment with the Orthopaedic Specialist has been booked.