Clinical Practice Policy:	BWH DPNBM Guidelines for Initial Evaluation of Newborns with Developmental Dysplasia of the Hip
Effective Date:	January, 2016
Approved By:	Department of Pediatric Newborn Medicine Clinical Practice Council 11/10/16 CWN PPG 12/14/17 BWH SPP Steering 12/21/17 Nurse Executive Board/CNO 1/25/17

I.

Purpose

To provide guidelines for the diagnosis and management of newborns equal to or greater than 35 weeks with developmental dysplasia of the hip (DDH) during the birth hospitalization. Both diagnosis and management of DDH continue to be controversial with many gaps in the literature. Therefore, the recommendations within this CPG are developed from both evidence-based research and expert consensus.

II.

Background

Developmental dysplasia of the hip (DDH) is defined as a developmental deformation of the hip joint in which the acetabulum is dysplastic (shallow) and the head of the femur may be partially or completely displaced from the acetabulum. It encompasses a spectrum of conditions ranging from mild acetabular dysplasia to complete dislocation of the femoral head. Because many of these findings may not be present at birth, the term ***developmental*** has replaced ***congenital*** regarding this disorder.

While the incidence of DDH can be as high as 20 cases per 1000 livebirths, it resolves spontaneously in 70-90% of neonates within the first several weeks. The incidence of established dislocation in an untreated population is estimated at 1-2 cases per 1000 livebirths.[1,2]

Early detection of DDH is important because non-operative treatment is frequently successful when initiated before 6 months of age, thus avoiding the need for invasive surgical treatment. The long-term sequelae of persistent untreated DDH include gait disturbances, early-onset osteoarthritis of the hip and hip deformities requiring early hip replacement. Despite a normal newborn and infant hip exam, a late-onset hip dislocation still occurs in about 1 in 5000 infants by 18 months. [2,3]

Risk Factors

The strongest risk factors for DDH are breech presentation, female sex and family history in a first-degree relative. Other risk factors to consider include being the first born and swaddling with the hips in extension.[3,4] Breech presentation is probably the single most important risk factor with DDH reported in 2-20% of all newborns presenting in the breech position. Frank breech in a girl seems to have the highest risk. However, about 75% of DDH occurs in female infants without any identified risk factors emphasizing the importance of careful physical exam of all newborn hips.[2] Other associated findings likely related to fetal position and limited intrauterine space include oligohydramnios, large-for-gestational age, congenital calcaneovalgus foot deformity and torticollis.[5,6]

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Policies

A. Swaddling

- Tight swaddling of the lower extremities with the hips extended should be avoided. Cultures that carry their children in the straddle position have very low rates of hip dislocation compared to cultures that wrap their infants tightly with the lower limbs together and extended.
- The concept of safe swaddling, which does not restrict hip motion but rather allows the hips to remain in the naturally flexed and abducted position, has been shown to lessen the risk of DDH.[2]

Infant hips should be positioned in slight flexion and abduction during swaddling. The knees should also be maintained in slight flexion. Additional free movement in the direction of hip flexion and abduction may have some benefit [http:// hipdysplasia.org]. Avoidance of forced or sustained passive hip extension and adduction in the first few months of life is essential for proper hip development.

Safe swaddling technique - Notice that while the upper extremities are securely wrapped, the hips and lower extremities are free to move with hip flexion and abduction.

B. Physical Exam

- The AAP, the Pediatric Orthopedic Society of North America, the American Academy of Orthopedic Surgeons, and the Canadian DDH Task Force recommend newborn and periodic screening examinations for DDH to include evaluation for positive Ortolani maneuver in newborns and young infants, detection of limb-length discrepancy, asymmetric thigh or buttock (gluteal) creases, limited abduction (generally positive after 3 months of age) and associated findings of torticollis, ligamentous laxity, and foot deformity.[4]
- The Ortolani (reducing a dislocated hip) and Barlow (dislocating an unstable hip) maneuvers continue to be the recommended physical exam tests for the detection of DDH in early infancy with the former maneuver being the most important clinical test for detecting hip dysplasia in the newborn.[2]

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- Positive tests are characterized by a distinct "clunk" on exam.
  - Little force is required for the performance of either of these tests and forceful maneuvers should be avoided.[2-4]
- A subluxable hip is characterized by a feeling of looseness or a sliding movement without the characteristic "clunk" associated with a positive Ortolani or Barlow maneuver.Soft tissue high-pitched "clicks" without hip instability are not predictive of DDH [3].Asymmetric thigh or buttock creases, an apparent or true short leg, or limited abduction can be found in DDH, in other orthopedic disorders, and in completely healthy infants. [3,7]
- By 2-3 months, the Ortolani and Barlow maneuvers are less useful, and limited abduction on physical exam becomes the preferred examination method.[2,3]
- Both the training and experience of the healthcare provider performing these maneuvers has been shown to influence their accuracy.[2-4]
  - Therefore, it is important that all residents and medical students who rotate through the Department of Pediatric Newborn Medicine at BWH be instructed by experienced senior clinicians in both the Ortolani and Barlow maneuvers and evaluated on their competency in these maneuvers during their rotations. In addition, the importance of family history as related to the above risk factors needs to be emphasized to trainees.

C. Ultrasonography
- On ultrasonography, morphology of the femoral head and acetabulum are noted including any displacement.
- The degree of hip dysplasia is commonly graded using the Graf system from grade I (no abnormality) to grade IV (overt dislocation).[6]Though a few European countries practice universal screening with ultrasonography for DDH, this is generally not recommended in North America due to the low prevalence (1-2%) of DDH and the detection of many mild abnormalities which resolve spontaneously. [2,3,5]

D. Radiology
- Plain radiography is most useful by 4-6 months of age at which time the femoral head's secondary center of ossification forms.
- Therefore, plain radiographs are not recommended in the newborn period for evaluation of DDH.[3]

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E. Recommendations for Orthopedic Referral
- Treatment of neonatal DDH is not an emergency. In-hospital initiation of bracing is not required if infants with persistent instability are referred to the orthopedic surgeon within the first weeks of life.
  - Initiation of treatment is based on the clinical examination of instability.[2]
- With **positive risk factors** or a **positive** (subluxation or dislocation) ***or*** **equivocal** (mild instability, mildly limited abduction, leg length discrepancy, asymmetric thigh/gluteal folds) **hip exam**, an **orthopedic referral is recommended**.[2-4]
- With **no risk factors** and a **positive hip exam** (subluxation or dislocation), an **orthopedic referral is recommended**.[2-4]
- With **no risk factors** and an **equivocal exam** (mild instability, mildly limited abduction, leg length discrepancy, asymmetric thigh/gluteal folds), a **repeat hip exam in 2 weeks is recommended** with either serial follow-up exams or an orthopedic referral depending on the re-examination findings.[2-4]

F. Recommendation for Ultrasonography of the Hips
- It is acceptable to refer children with suspected DDH or with positive risk factors to a pediatric orthopedist without a prior ultrasound, which is preferable to obtaining an improperly timed or poorly performed study.[2]
- If the **hip exam is positive at birth**, hip US is generally performed within 1-2 weeks along with an orthopedic consultation
- If the **hip exam is negative at birth**, hip US is recommended at 4-6 weeks of age for a breech delivery or if two other risk factors are present (female sex, family history in first-degree relative).[3,4,8]
- The AAP recommends ultrasound for all breech infants (as opposed to just females) because some studies show a high incidence of hip abnormalities detected in older children of both sexes who are born breech.[3]

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APPENDIX WITH PICTORIAL DESCRIPTIONS OF MANEUVERS

ORTOLANI MANEUVER: The hip is dislocated. The examiner will test one hip at a time. The LEFT is being examined in the image below. The exam starts with the hip in adduction or neutral and gradually, with the middle finger on the greater trochanter, the hip will be abducted. A clunk of reduction can be felt.

BARLOW MANEUVER: The hip is located and reduced but with gentle adduction, the femoral head will dislocate out of the acetabulum.

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Terminology Used in Describing Developmental Dysplasia of the Hip [4]

Dislocation	Femoral head completely exits the acetabulum.
Dysplasia	Spectrum of the pathologic dysgenesis of the acetabulum or the femoral head that can usually be visualized radiographically but may or may not cause instability on examination.
Equivocal Examination	Mildly limited hip abduction (more than 60 degrees, and less than 20 degrees asymmetric compared with the unaffected side), leg length discrepancy, or asymmetric thigh/gluteal folds. Because of low specificity, asymmetric thigh/gluteal folds should be interpreted with caution if findings on examination are otherwise normal. Mild instability (defined below) is also considered an equivocal finding.
Hip Click	Benign palpable or audible hip sound, usually high-pitched and indistinct. Not associated with a sense of femoral head movement. Inconsequential and not predictive of developmental dysplasia of the hip.
Hip Clunk	Distinct and pronounced palpable (and at times audible) shift of femoral head, felt as the femoral head is dislocated or reduced on examination with the Ortolani and Barlow maneuvers.
Limited Hip Abduction	Abduction restricted to less than 60 degrees when tested at 90 degrees of hip flexion . Abduction limitation of 20 degrees or greater compared with the opposite hip . Limited abduction, regardless of age, warrants further evaluation.
Mild Instability	Hip characterized by a loose fit between femoral head and acetabulum, without overt subluxation or dislocation. On examination this can be appreciated as a "tennis ball moving within the bottom of a cereal bowl", there is no associated clunk.
Subluxation	Center of the femoral head moves to or toward edge of, but does not completely exit, the acetabulum Can be detected during the Ortolani and Barlow maneuvers as a softer clunk

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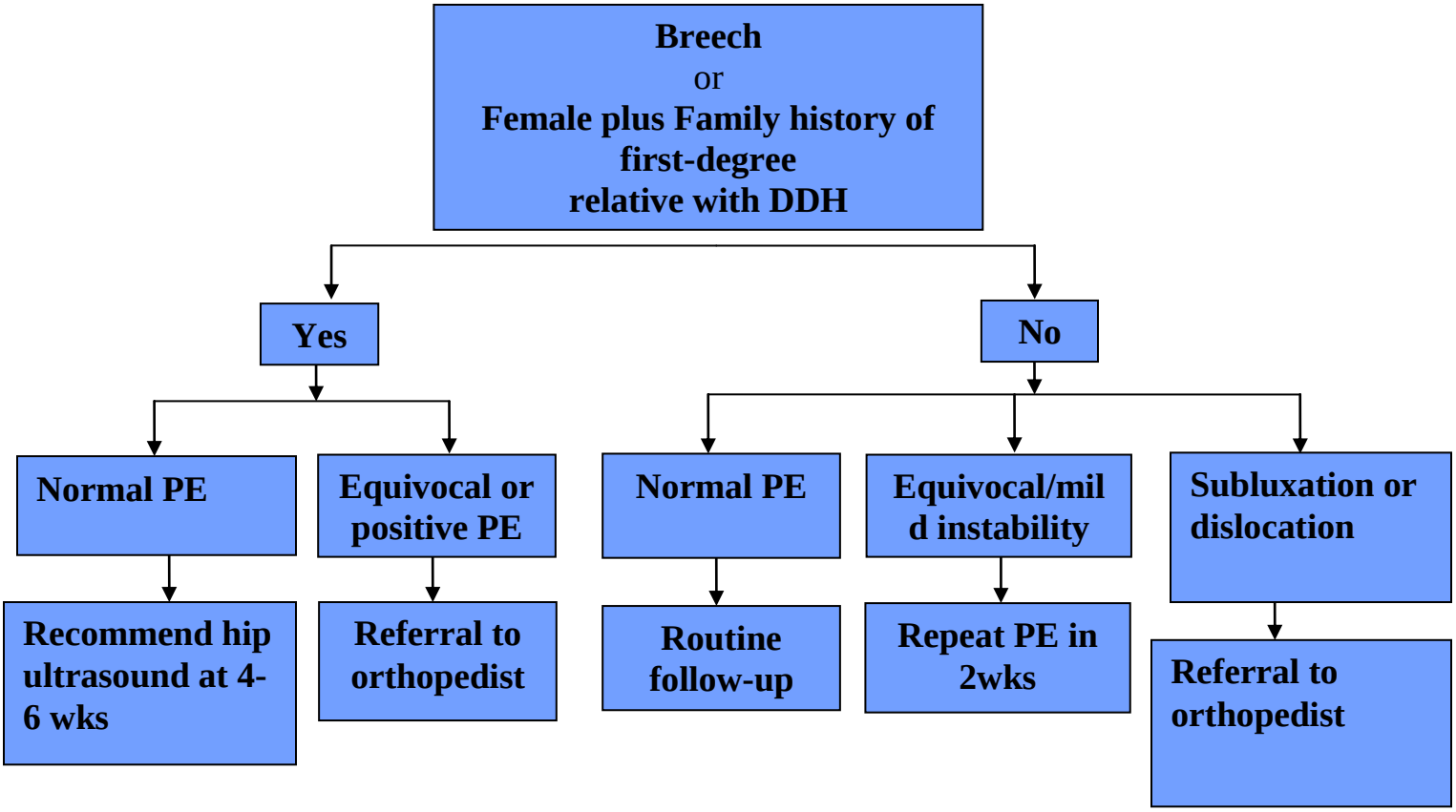
Management of Developmental Dysplasia of the Hip



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Bibliography

1. Clarke NM. Developmental dysplasia of the hip: Diagnosis and management to 18 months. *Instr Course Lect*. 2014;63:307-311.

2. Schwend RM, Schoenecker P, Richards BS, Flynn JM, Vitale M, Pediatric Orthopaedic Society of North America. Screening the newborn for developmental dysplasia of the hip: Now what do we do? *J Pediatr Orthop*. 2007;27(6):607-610.

3. Clinical practice guideline: Early detection of developmental dysplasia of the hip. committee on quality improvement, subcommittee on developmental dysplasia of the hip. American Academy of Pediatrics. *Pediatrics*. 2000;105(4 Pt 1):896-905.

4. Jackson JC, Runge MM, Nye NS. Common questions about developmental dysplasia of the hip. *Am Fam Physician*. 2014;90(12):843-850.

5. Shipman SA, Helfand M, Moyer VA, Yawn BP. Screening for developmental dysplasia of the hip: A systematic literature review for the US preventive services task force. *Pediatrics*. 2006;117(3):e557-76.

6. Bracken J, Ditchfield M. Ultrasonography in developmental dysplasia of the hip: What have we learned? *Pediatr Radiol*. 2012;42(12):1418-1431.

7. Fitch RD. Ultrasound for screening and management of developmental dysplasia of the hip. *N C Med J*. 2014;75(2):142-145.

8. Shorter D, Hong T, Osborn DA. Cochrane review: Screening programmes for developmental dysplasia of the hip in newborn infants. *Evid Based Child Health*. 2013;8(1):11-54.

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