

# Screening for Developmental Dysplasia of the Hip: Recommendation Statement

US Preventive Services Task Force

The authors have indicated they have no relationships relevant to this article to disclose.

**T**HE US PREVENTIVE Services Task Force (USPSTF) concludes that evidence is insufficient to recommend routine screening for developmental dysplasia of the hip (DDH) in infants as a means to prevent adverse outcomes (I recommendation).\*

The pathophysiology and natural history of DDH are poorly understood. There is evidence that screening leads to earlier identification; however, 60% to 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. There is poor evidence (poor-quality studies) of the effectiveness of both surgical and nonsurgical interventions; avascular necrosis of the hip (AVN) is reported in 0% to 60% of children who are treated for DDH. Thus, the USPSTF was unable to assess the balance of benefits and harms of screening for DDH but was concerned about the potential harms associated with treatment of infants identified by routine screening.

## CLINICAL CONSIDERATIONS

- This USPSTF screening recommendation applies only to infants who do not have obvious hip dislocations or other abnormalities evident without screening. DDH represents a spectrum of anatomic abnormalities in which the femoral head and the acetabulum are aligned improperly or grow abnormally. DDH can lead to premature degenerative joint disease, impaired walking, and pain. Risk factors for DDH include female gender, family history of DDH, breech positioning, and in utero postural deformities. However, the majority of cases of DDH have no identifiable risk factors.
- Screening tests for DDH have limited accuracy. The most common methods of screening are serial physical examinations of the hip and lower extremities using the Barlow and Ortolani procedures and ultrasonography. The Barlow examination is performed by adducting a flexed hip with gentle posterior force to identify a dislocatable hip. The Ortolani examination is performed by abducting a flexed hip with gentle anterior force to relocate a dislocated hip. Data assessing the relative value of limited hip abduction as a screening tool are sparse and suggest that the test is of little value in early infancy and is of somewhat greater value as infants age.

\* Standard language associated with the grade I recommendation is "The USPSTF concludes that the evidence is insufficient to recommend for or against routinely providing [the service]." For this specific recommendation, the USPSTF modified the language to indicate the lack of evidence that screening for a condition with a poorly defined natural history would improve health outcomes while there is evidence that interventions cause known harms.

[www.pediatrics.org/cgi/doi/10.1542/peds.2005-1995](http://www.pediatrics.org/cgi/doi/10.1542/peds.2005-1995)

doi:10.1542/peds.2005-1995

Recommendations made by the USPSTF are independent of the US Government. They should not be construed as an official position of the Agency for Healthcare Research and Quality or the US Department of Health and Human Services.

This recommendation statement is AHRQ Publication AHRQ 05(06)-0585-A August, 2005, and was first published in *Pediatrics*. 2006;117:898-902

### Abbreviations

USPSTF—US Preventive Services Task Force

DDH—developmental dysplasia of the hip

AVN—avascular necrosis of the hip

AAP—American Academy of Pediatrics

Accepted for publication Aug 12, 2005

Address correspondence to Ned Calonge, MD, MPH, US Preventive Services Task Force, c/o Program Director, USPSTF, Agency for Healthcare Research and Quality, 540 Gaither Rd, Rockville, MD 20850. E-mail: [uspstf@ahrq.gov](mailto:uspstf@ahrq.gov)

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275); published in the public domain by the American Academy of Pediatrics

- Treatments for DDH include both nonsurgical and surgical options. Nonsurgical treatment with abduction devices is used in early treatment and includes the commonly prescribed Pavlik method. Surgical intervention is used when DDH is severe or diagnosed late or after an unsuccessful trial of nonsurgical treatments. Evidence of the effectiveness of interventions is inconclusive because of a high rate of spontaneous resolution, absence of comparative studies of intervention versus nonintervention groups, and variations in surgical indications and protocols. AVN is the most common and most severe potential harm of both surgical and nonsurgical interventions and can result in growth arrest of the hip and eventual joint destruction with significant disability.

## DISCUSSION

DDH represents a spectrum of anatomic abnormalities in which the femoral head and the acetabulum are either in improper alignment or grow abnormally. Without the normal tight, concentric anatomic relationship between the femoral head and acetabulum, the hip joint may grow abnormally, resulting in permanent disability. The precise definition of DDH is controversial<sup>1,2</sup> and includes a spectrum of hip abnormalities including dysplastic, subluxated, dislocatable, and dislocated hips. Long-term complications of DDH include premature degenerative joint disease, impaired walking, and chronic pain.<sup>3</sup> The incidence of DDH in infants is influenced by a number of factors including diagnostic criteria, female gender, genetics, race, and age.<sup>4</sup> Reported incidence rates, varying between 1.5 and 20 per 1000 births,<sup>5</sup> have increased dramatically since the advent of clinical and sonographic screening, possibly resulting from overdiagnosis. A minority (10–27%) of all infants diagnosed with DDH in population-based studies have identified risk factors other than female gender.<sup>6–10</sup> Between 1% and 10% of infants with risk factors have DDH.<sup>7–9</sup>

The USPSTF examined the evidence to determine the benefits and harms of routine screening for DDH from birth through 6 months and for interventions up to 12 months in otherwise normal infants. The USPSTF found no direct evidence that screening for DDH leads to a reduced need for surgery or improved functional outcomes. Therefore, the USPSTF examined the evidence for accuracy of screening tools, efficacy of treatment, and harms of screening and treatment.

Several fair-quality case-control and observational studies found breech positioning, family history of DDH, and female gender to be most consistently associated with the diagnosis of DDH. However, the majority of cases of DDH have no identifiable risk factors.<sup>11</sup> There is evidence that screening leads to earlier identification; however, 60% to 80% of abnormal hips of newborns identified by physical examination resolved spontaneously by 2 to 8 weeks.<sup>3</sup> Ninety percent of the hips of

newborns with mild dysplasia identified by ultrasound resolved spontaneously between 6 weeks and 6 months.<sup>12–20</sup>

The USPSTF found poor-quality evidence regarding the accuracy of screening tests because of variable definitions of a positive result, the lack of a practical, confirmatory “gold-standard” diagnostic test for DDH, and the treatment of the majority of infants with a positive screening result. The USPSTF found fair-quality evidence that age may affect screening accuracy. Limited hip abduction is a relatively insensitive and nonspecific marker of DDH in early infancy but becomes more accurate after 3 to 6 months of age and with more severely affected hips.<sup>4,5</sup> A prospective observational study in infants >3 months old demonstrated that unilateral limited hip abduction had a sensitivity of 69% and a specificity of 54% compared with the reference standard of any ultrasound abnormality. In this study, for subluxable and dislocatable hips, the sensitivity of limited hip abduction was >82%.<sup>21</sup>

The USPSTF found poor-quality evidence regarding the effectiveness of both surgical and nonsurgical interventions. Evidence of the effectiveness of interventions is of poor quality because of a high rate of spontaneous resolution, limited study duration, significant loss to follow-up, and variations in surgical indications and protocols. The duration and specific approaches to preoperative and postoperative management are highly variable, as are nonsurgical treatment protocols.

A variety of abduction devices are used to treat DDH, including the commonly used Pavlik method and immobilization in a hip spica cast. Most surgical procedures involve reduction of the femoral head into the acetabulum, with or without additional procedures on the adductor tendons, the femur, or the acetabulum. Few studies measure functional outcomes (eg, amount of pain, gait) because poor functional outcomes may not be manifested until decades later. When functional outcomes are measured, the effect of interventions is very difficult to quantify because of lack of a comparison cohort, short follow-up, loss to follow-up, and unstandardized assessment methods. A single long-term retrospective case series of 119 children with DDH (with 152 treated hips), treated with surgery followed by an abduction brace at 1 to 96 months of age, used standardized scales to assess functional outcomes (hip pain and gait). Follow-up visits at 15 to 53 years after treatment found that 112 (75%) of 149 hips treated had good outcomes. However, study limitations included study design, issues of confounding, and treatment by a few surgeons.<sup>22</sup> Because no experimental or prospective cohort studies compare intervention with no intervention, the net benefits and harms of interventions for DDH are unclear for all infants and children.<sup>23</sup>

There is insufficient evidence on the harms of screening for DDH. Potential harms from screening include

examiner-induced hip pathology caused by vigorous provocative testing, elevated risk for certain cancers from increased radiation exposure from follow-up radiographic tests, parental psychosocial stress from the diagnosis and therapy, and false-positive results that lead to unnecessary and potentially harmful follow-up and intervention.<sup>24</sup>

There is poor-quality evidence on the harms of treatment. The most common adverse effect from both surgical and nonsurgical interventions for DDH is AVN. The rates described in the literature for this adverse effect vary greatly (0–60%) for both surgical and nonsurgical interventions.<sup>25,26–44</sup> The reasons for this wide range of rates are most likely related to methodologic problems such as heterogeneous populations, a poorly standardized approach to interventions, inconsistent follow-up protocols, variable loss to follow-up, variable training among the treating physicians, and disparate health care systems in which treatment and follow-up are undertaken. Additional harms from abduction therapy that have been addressed in the literature are typically mild and self-limited and include rash, pressure sores, and femoral nerve palsy. The potential harms of surgical intervention include those associated with general anesthesia, intraoperative complications, and postoperative wound infections.

#### **FUTURE RESEARCH**

A more complete understanding of the natural history of spontaneous resolution of hip instability and dysplasia is needed before it will be possible to develop an evidence-based strategy for screening and treating hip abnormalities. Given the infrequent nature of DDH, multicenter studies of interventions that measure functional outcomes (including long-term outcomes) in a standardized fashion are needed. Studies designed to identify valid and reliable radiologic outcomes of DDH as proxy measures of functional outcomes are also needed. Determining patient preferences and identifying outcomes that are relevant to patients and families would be valuable. Similarly, controlled studies that assess the effects of delaying treatment on outcomes would allow physicians who care for children to better manage those with DDH.

#### **RECOMMENDATIONS OF OTHER GROUPS**

Recommendations for screening for DDH can be obtained from the Canadian Task Force on Preventive Care<sup>45</sup> ([www.ctfphc.org](http://www.ctfphc.org)) and the American Academy of Pediatrics<sup>46</sup> (AAP) (<http://aappolicy.aappublications.org>). The Canadian Task Force recommends serial clinical examinations of the hips in periodic health examinations of all infants until the age of 12 months and a supervised period of observation for newborns with clinically detected DDH. The Canadian Task Force does not recommend general ultrasound or radiographic screening for high-risk infants. The AAP recommends serial clinical

examinations of the hips, hip imaging for female infants born in the breech position, and optional hip imaging for boys born in the breech position or girls with a positive family history of DDH.<sup>1–4</sup> The AAP does not recommend general ultrasound screening.

This statement summarizes the USPSTF recommendation on screening for DDH. Explanations of the ratings and of the strength of overall evidence are given in Appendices 1 and 2, respectively. The complete information on which this statement is based, including evidence tables and references, is included in the systematic literature review<sup>47</sup> and evidence synthesis<sup>48</sup> on this topic, available on the USPSTF Web site ([www.preventiveservices.ahrq.gov](http://www.preventiveservices.ahrq.gov)). The recommendation is also posted on the Web site of the National Guideline Clearinghouse ([www.guideline.gov](http://www.guideline.gov)).

#### **APPENDIX 1: USPSTF RECOMMENDATIONS AND RATINGS**

The USPSTF grades its recommendations according to 1 of 5 classifications (A, B, C, D, I) reflecting the strength of evidence and magnitude of net benefit (benefits minus harms).

- A. The USPSTF strongly recommends that clinicians provide [the service] to eligible patients. The USPSTF found good evidence that [the service] improves important health outcomes and concludes that benefits substantially outweigh harms
- B. The USPSTF recommends that clinicians provide [the service] to eligible patients. The USPSTF found at least fair evidence that [the service] improves important health outcomes and concludes that benefits outweigh harms
- C. The USPSTF makes no recommendation for or against routine provision of [the service]. The USPSTF found at least fair evidence that [the service] can improve health outcomes but concludes that the balance of benefits and harms is too close to justify a general recommendation
- D. The USPSTF recommends against routinely providing [the service] to asymptomatic patients. The USPSTF found at least fair evidence that [the service] is ineffective or that harms outweigh benefits
- I. The USPSTF concludes that the evidence is insufficient to recommend for or against routinely providing [the service]. Evidence that [the service] is effective is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.

#### **APPENDIX 2: USPSTF STRENGTH OF OVERALL EVIDENCE**

The USPSTF grades the quality of the overall evidence for a service on a 3-point scale (good, fair, poor).

### Good

Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes.

### Fair

Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies, generalizability to routine practice, or indirect nature of the evidence on health outcomes.

### Poor

Evidence is insufficient to assess the effects on health outcomes because of limited number or power of studies, important flaws in their design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes.

### MEMBERS OF THE USPSTF

The members of the USPSTF at the time that this recommendation was finalized were Ned Calonge, MD, MPH, chair, USPSTF (chief medical officer and state epidemiologist, Colorado Department of Public Health and Environment, Denver, CO); Janet D. Allan, PhD, RN, CS, vice-chair, USPSTF (dean, School of Nursing, University of Maryland, Baltimore, MD); Alfred O. Berg, MD, MPH (professor and chair, Department of Family Medicine, University of Washington, Seattle, WA); Paul S. Frame, MD (family physician, Tri-County Family Medicine, Cohocton, NY; clinical professor of family medicine, University of Rochester, Rochester, NY); Joxel Garcia, MD, MBA (deputy director, Pan American Health Organization, Washington, DC); Leon Gordis, MD, MPH, DrPH (professor, Epidemiology Department, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD); Kimberly D. Gregory, MD, MPH (director, Women's Health Services Research and Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, Cedars-Sinai Medical Center, Los Angeles, CA); Russell Harris, MD, MPH (professor of medicine, Sheps Center for Health Services Research, University of North Carolina School of Medicine, Chapel Hill, NC); Mark S. Johnson, MD, MPH (professor and chair, Department of Family Medicine, University of Medicine and Dentistry of New Jersey-New Jersey Medical School, Newark, NJ); Jonathan D. Klein, MD, MPH (associate professor, Department of Pediatrics, University of Rochester School of Medicine, Rochester, NY); Carol Loveland-Cherry, PhD, RN (executive associate dean, Office of Academic Affairs, University of Michigan School of Nursing, Ann Arbor, MI); Virginia A. Moyer, MD, MPH (professor, Department of Pediatrics, University of Texas Health Science Center, Houston, TX); Judith K. Ockene, PhD (professor of medicine and chief of the Division of Preventive and Behavioral Medicine, University of Massachusetts Med-

ical School, Worcester, MA); Diana B. Petitti, MD, MPH (senior scientific advisor for health policy and medicine, regional administration, Kaiser Permanente Southern California, Pasadena CA); Albert L. Siu, MD, MSPH (professor and chairman, Brookdale Department of Geriatrics and Adult Development, Mount Sinai Medical Center, New York, NY); Steven M. Teutsch, MD, MPH (executive director, Outcomes Research and Management, Merck & Company, Inc, West Point, PA); and Barbara P. Yawn, MD, MSc (director of research, Olmstead Research Center, Rochester, MN). For a list of current USPSTF members, go to [www.ahrq.gov/clinic/uspstfab.htm](http://www.ahrq.gov/clinic/uspstfab.htm).

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