AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

DETECTION AND NONOPERATIVE MANAGEMENT OF PEDIATRIC DEVELOPMENTAL DYSPLASIA OF THE HIP IN INFANTS UP TO SIX MONTHS OF AGE

EVIDENCE-BASED CLINICAL PRACTICE GUIDELINE

Adopted by the American Academy of Orthopaedic Surgeons Board of Directors
September 5, 2014

This guideline has been endorsed by the following organizations:

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

The Pediatric Orthopaedic Society of North America

The Society for Pediatric Radiology

Society of Diagnostic Medical Sonography

Disclaimer
This Clinical Practice Guideline was developed by an AAOS clinician volunteer Work Group based on a systematic review of the current scientific and clinical information and accepted approaches to treatment and/or diagnosis. This Clinical Practice Guideline is not intended to be a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. Clinical patients may not necessarily be the same as those found in a clinical trial. Patient care and treatment should always be based on a clinician's independent medical judgment, given the individual patient's clinical circumstances.

Disclosure Requirement
In accordance with AAOS policy, all individuals whose names appear as authors or contributors to Clinical Practice Guideline filed a disclosure statement as part of the submission process. All panel members provided full disclosure of potential conflicts of interest prior to voting on the recommendations contained within this Clinical Practice Guidelines.

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FDA Clearance
Some drugs or medical devices referenced or described in this Clinical Practice Guideline may not have been cleared by the Food and Drug Administration (FDA) or may have been cleared for a specific use only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or device he or she wishes to use in clinical practice.

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I. SUMMARY OF RECOMMENDATIONS

The following is a summary of the recommendations of the AAOS' clinical practice guideline on Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age. All readers of this summary are strongly urged to consult the full guideline and evidence report for this information. We are confident that those who read the full guideline and evidence report will see that the recommendations were developed using systematic evidence-based processes designed to combat bias, enhance transparency, and promote reproducibility.

This summary of recommendations is not intended to stand alone. Treatment decisions should be made in light of all circumstances presented by the patient. Treatments and procedures applicable to the individual patient rely on mutual communication between patient guardian, physician, and other healthcare practitioners.

Strength	Overall Strength of Evidence	Description of Evidence Strength	Strength Visual
Strong	Strong	Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.	★★★★
Moderate	Moderate	Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.	★★★☆
Limited	Low Strength Evidence or Conflicting Evidence	Evidence from one or more "Low" strength studies with consistent findings **or** evidence from a single "Moderate" strength study for recommending for against the intervention or diagnostic or the evidence is insufficient **or** conflicting and does not allow a recommendation for or against the intervention.	★★☆☆
Consensus*	No Evidence	There is no supporting evidence. In the absence of reliable evidence, the work group is making a recommendation based on their clinical opinion. Consensus recommendations can only be created when not establishing a recommendation could have catastrophic consequences.	★☆☆☆

UNIVERSAL ULTRASOUND SCREENING

Moderate evidence supports not performing universal ultrasound screening of newborn infants.

Strength of Recommendation: Moderate ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. A **Moderate** recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the quality/applicability of the supporting evidence is not as strong.

EVALUATION OF INFANTS WITH RISK FACTORS FOR DDH

Moderate evidence supports performing an imaging study before 6 months of age in infants with one or more of the following risk factors: breech presentation, family history, or history of clinical instability.

Strength of Recommendation: Moderate ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. A **Moderate** recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the quality/applicability of the supporting evidence is not as strong.

IMAGING OF THE UNSTABLE HIP

Limited evidence supports that the practitioner might obtain an ultrasound in infants less than 6 weeks of age with a positive instability examination to guide the decision to initiate brace treatment.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from one or more "Low" strength studies with consistent findings, or evidence from a single Moderate quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means that the quality of the supporting evidence is unconvincing, or that well-conducted studies show little clear advantage to one approach over another.

IMAGING OF THE INFANT HIP

Limited evidence supports the use of an AP pelvis radiograph instead of an ultrasound to assess DDH in infants beginning at 4 months of age.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from one or more “Low” strength studies with consistent findings, or evidence from a single Moderate quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means that the quality of the supporting evidence is unconvincing, or that well-conducted studies show little clear advantage to one approach over another.

SURVEILLANCE AFTER NORMAL INFANT HIP EXAM

Limited evidence supports that a practitioner re-examine infants previously screened as having a normal hip examination on subsequent visits prior to 6 months of age.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from one or more “Low” strength studies with consistent findings, or evidence from a single Moderate quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means that the quality of the supporting evidence is unconvincing, or that well-conducted studies show little clear advantage to one approach over another.

STABLE HIP WITH ULTRASOUND IMAGING ABNORMALITIES

Limited evidence supports observation without a brace for infants with a clinically stable hip with morphologic ultrasound imaging abnormalities.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from one or more “Low” strength studies with consistent findings, or evidence from a single Moderate quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means that the quality of the supporting evidence is unconvincing, or that well-conducted studies show little clear advantage to one approach over another.

TREATMENT OF CLINICAL INSTABILITY

Limited evidence supports either immediate or delayed (2-9 weeks) brace treatment for hips with a positive instability exam.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from one or more “Low” strength studies with consistent findings, or evidence from a single Moderate quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means that the quality of the supporting evidence is unconvincing, or that well-conducted studies show little clear advantage to one approach over another.

TYPE OF BRACE FOR THE UNSTABLE HIP

Limited evidence supports use of the von Rosen splint over Pavlik, Craig, or Frejka splints for initial treatment of an unstable hip

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from one or more “Low” strength studies with consistent findings, or evidence from a single Moderate quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means that the quality of the supporting evidence is unconvincing, or that well-conducted studies show little clear advantage to one approach over another.

MONITORING OF PATIENTS DURING BRACE TREATMENT

Limited evidence supports that the practitioner perform serial physical examinations and periodic imaging assessments (ultrasound or radiograph based on age) during management for unstable infant hips.

Strength of Recommendation: Limited ★★☆☆

Description: Evidence from one or more “Low” strength studies with consistent findings, or evidence from a single Moderate quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means that the quality of the supporting evidence is unconvincing, or that well-conducted studies show little clear advantage to one approach over another.

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II. INTRODUCTION

OVERVIEW

This clinical practice guideline is based upon a systematic review of published articles related to the detection and early management of hip instability and dysplasia in typically developing children less than 6 months of age. This guideline provides practice recommendations for the early screening and detection of hip instability and dysplasia and also highlights gaps in the published literature that should stimulate additional research. This guideline is intended towards appropriately trained practitioners involved in the early examination and assessment of typically developing children for hip instability and dysplasia.

GOALS AND RATIONALE

The purpose of this clinical practice guideline is to improve the ability of practitioners to detect and manage hip instability and hip dysplasia in typically developing children less than 6 months of age based upon the current best evidence. Current evidence-based medicine (EBM) standards call for physicians to use the best available evidence in their clinical decisions. This clinical practice guideline includes a systematic literature review of treatment and diagnostic articles related to developmental dysplasia of the hip (DDH) published in or after 1966 and incidence/natural history articles published in or after 1950. This review demonstrates where there is good evidence, where evidence is lacking, and what topics future research must target in order to improve early screening, detection and the treatment of typically developing children less than 6 months of age with developmental dysplasia of the hip. AAOS staff and an interdisciplinary clinician work group systematically reviewed the available literature and wrote the following recommendation based upon a rigorous standardized process.

Many different providers may provide musculoskeletal care in many different settings. We created this guideline as an educational tool to guide qualified practitioners through a series of treatment decisions in an effort to improve the quality and efficiency of care. This guideline should not be construed as including all proper methods of care or excluding methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific procedure of treatment must be made in light of all circumstances presented by the patient and the needs and resources particular to the locality or practice setting.

INTENDED USERS

This guideline is intended for use by appropriately trained practitioners involved in the medical evaluation of typically developing children less than 6 months of age. This would include pediatricians, family physicians, qualified mid-level practitioners with appropriate physician oversight, radiologists who perform diagnostic imaging of children, and orthopedic surgeons. Typically physicians will have completed medical training, a qualified residency in their specialty area and some may have completed additional sub-specialty training. Mid-level providers would have completed a qualified training program in their specialty and would have additional training in the assessment of pediatric patients with appropriate supervision by a qualified physician pursuant to the laws of their practice environment. Allied health practitioners caring for children, practice managers, health care payers, governmental bodies, and health policy decision makers may also find this guideline useful as an evolving standard of evidence for the early diagnosis and management of DDH in typically developing children.

The early diagnosis and management of DDH is based upon the assumption that shared and informed decisions are made by the patient's guardians and the practitioner based upon a mutual communication and understanding of the available treatments and procedures applicable to the individual patient. Practitioner input based upon experience and knowledge of interpretation of clinical and imaging findings, conservative and surgical management options, and of additional accessible expertise increases the probability of optimally matching the right intervention to the right patient at the right time.

PATIENT POPULATION

This clinical practice guideline is applicable to the detection and management of DDH in typically developing children less than 6 months of age. It is <u>not</u> intended for use for children who have teratologic hip abnormalities or hip abnormalities associated with neuromuscular, genetic, or acquired complex musculoskeletal or developmental abnormalities.

BURDEN OF DISEASE/INCIDENCE AND PREVALENCE

DDH is a spectrum of anatomic abnormalities of the femoral head and acetabulum of the hip joint. There is inconsistent terminology used to describe these abnormalities and a lack of clarity around which recognized abnormalities of the hip in the newborn and early infancy periods are progressive and pathologic versus self-resolving and potentially within a range of normal development. While clinical terms such as "click, clunk, dislocatable, subluxatable, reducible, dysplastic, asymmetric thigh folds, and limited hip abduction" are common in papers related to this topic, no clear or widely accepted clinical definitions exist by which to compare patient populations to each other. In particular, the term "click" has been problematic as it has been used in screening literature as a term describing a range of situations from a normal snapping sensation to a surrogate for clinically detectable hip instability. Similarly, discussion of risk factors for terms such as "foot deformities, talipes, family history, first born, female, and intrauterine crowding/oligohydramnios" have been applied in a retrospective manner without specificity and without consideration of other variables. Imaging criteria are similarly vague. Included papers for this review demonstrated consistency of use of the Graf criteria for grading severity of sonographic hip dysplasia, but consistent radiographic criteria for defining dysplasia or dislocation were lacking.

Early detection and early management of DDH must take into account the early natural history of physiologic hip development. As a part of the development of this clinical practice guideline, the workgroup included a search for articles that defined the natural history of early clinical instability and early hip dysplasia as determined by either ultrasound or radiograph.

An estimation of the true incidence of the disorder is therefore uncertain. The reported incidence ranges are as high as 1:100 newborns for clinically detectable hip instability to 1-28:1000 newborns for clinically and/or radiographic hip dislocation that prompted an intervention [I-1, I-2]. Recent large ultrasound screening studies place the incidence of ultrasound detectable abnormalities leading to intervention at 5-7% of all newborns [I-3, I-5]. In the United States, there were approximately 3,952,940 live births in 2012 [I-6] suggesting a potential impact from 4,000 up to 276,700 newborn children/year in the United States.

The true prevalence of adult hip pathology attributable to DDH is unknown. It is widely believed that DDH is a condition that can lead to impaired function and quality of life for children and adults [I-2, I-8, I-10] and that detection of this condition in early childhood may allow interventions that can alter this. It is also believed that earlier treatment creates less potential harm to the child than later treatment with the aggregate risk of those harms being less than the risk of impaired function and quality of life of the untreated condition [I-4, I-11, I-18].

Current and evolving practice standards call for a musculoskeletal evaluation of all newborn children and also demand that practitioners be good stewards of health care resources in making such assessments and decisions for management. These methods may involve both clinical and imaging resources. In clinically normal hips imaging evaluation would be the only viable method to assess for hip problems that could have a potential to evolve into a future pathologic condition with adverse impact upon an individual's quality of life. Population screening using ultrasound has been practiced in Europe [I-3, I-10, I-19, I-20] and with an uncertain role in North America [I-1. I-2, I-8].

NATURAL HISTORY

Published works on the topic of DDH have used inconsistent terminology to describe abnormalities and have not clarified which recognized abnormalities of the hip in the newborn and early infancy are progressive and pathologic versus self-resolving and potentially within a range of normal development. As a part of the development of this clinical practice guideline, the workgroup attempted to identify as best as possible, the natural history of clinically unstable or ultrasound or radiographically abnormal hips detected in infancy with the natural duration of self-correction. The details of the review are listed in the natural history of DDH appendix within this CPG. The long-term natural history of DDH appears to be related to the type and severity of the hip abnormality. Mild dysplasia may never manifest clinically or become apparent until adult life, whereas severe dysplasia can present clinically with functional limitations during childhood. Interventions to alter the long- term natural history of DDH have included early bracing and a progressive range of manipulative and surgical options with advancing age of the child [I-31 to I-43]. In this review, included articles were examined specifically for information related to the resolution of clinical instability or ultrasound and radiographic hip dysplasia in untreated infants. All of the studies identified for this review indicate that most DDH discovered during the newborn period appear to represent hip laxity and immaturity. Approximately 60%–80% of abnormalities identified by physical examination and more than 90% identified by ultrasound (US) appear to resolve spontaneously in early infancy raising significant questions about whether or not such hips should be treated with bracing and at what age such treatment should be optimally applied.

ETIOLOGY

The etiology of DDH in typically developing children is unknown. Both genetic and environmental influences appear to play a role in the development of this condition [I-10, I-21]. Absence of a femoral head from within an acetabulum and alteration of proximal femoral anatomy has been linked to progressive changes of the acetabulum over time [I-22]. Risk factors for the development of progressive hip abnormality have been reported in observational series and are reported in the next section.

RISK FACTORS

The terminology used in defining risk factors for the presence of DDH is not precise in the published literature. Hip physical examination findings associated with DDH have semantic challenges, limited knowledge of normal ranges, and knowledge that the examination findings change over time. Case control and observational studies have suggested that "breech positioning at delivery, family history of DDH, limited hip abduction, talipes, female gender, swaddling, large birth size, and first born" have been associated with a higher probability of finding DDH [I-2, I-8, I-23].

EMOTIONAL AND PHYSICAL IMPACT

The emotional impact upon a family of detecting a non-apparent musculoskeletal problem in a newborn is unknown. There may be emotional impact upon parents who are given false positive screening information [I-24].

POTENTIAL BENEFITS, HARMS, AND CONTRAINDICATIONS

Most treatments are associated with known risks. In the case of screening and early intervention programs, potential harms may be related to either over diagnosis with increased rates of further evaluation and treatment that may be unnecessary and to under diagnosis that can lead to a late diagnosis with progression of deformity. Clinician input based upon experience decreases the probability of harms in both scenarios.

Intervention with splintage devices, more frequent visits to providers and increased rates of imaging occur in observational and case control series where the diagnosis of DDH is given [I-11, I-20, I-25, I-26, I-27, I-28, I-29]. Treatment of all forms for DDH has been associated with varying rates of avascular necrosis that represent a possibility of harm to individual patients.

Observational and case control studies suggest that the management of children who present with DDH at walking age or older has greater risk of being managed by open surgical hip reduction with its attendant risks of avascular necrosis, infection, hip stiffness, and early onset osteoarthritis as an adult [I-1, I-4, I-8, I-9, I-18, I-30, I-31]. The harms of late diagnosis with no treatment are not established. This guideline only addresses children up to six months of age.

III. METHODS

The methods used to perform this systematic review were employed to minimize bias and enhance transparency in the selection, appraisal, and analysis of the available evidence. These processes are vital to the development of reliable, transparent, and accurate clinical recommendations for treating developmental dysplasia of the hip.

This clinical practice guideline and the systematic review upon which it is based evaluate the effectiveness of treatments for developmental dysplasia of the hip. This section describes the methods used to prepare this guideline and systematic review, including search strategies used to identify literature, criteria for selecting eligible articles, determining the strength of the evidence, data extraction, methods of statistical analysis, and the review and approval of the guideline. The AAOS approach incorporates practicing physicians (clinical experts) and methodologists who are free of potential conflicts of interest as recommended by guideline development experts.[M-1]

The AAOS understands that only high-quality guidelines are credible, and we go to great lengths to ensure the integrity of our evidence analyses. The AAOS addresses bias beginning with the selection of work group members. Applicants with financial conflicts of interest (COI) related to the guideline topic cannot participate if the conflict occurred within one year of the start date of the guideline's development or if an immediate family member has, or has had, a relevant financial conflict. Additionally, all work group members sign an attestation form agreeing to remain free of relevant financial conflicts for two years following the publication of the guideline.

This guideline and systematic review were prepared by the AAOS Developmental Dysplasia of the Hip guideline clinician work group (clinical experts) with the assistance of the AAOS Evidence-Based Medicine (EBM) Unit in the Department of Research and Scientific Affairs (methodologists) at the AAOS. To develop this guideline, the work group held an introductory meeting on June 11-12, 2011 to establish the scope of the guideline and the systematic reviews. The clinical experts defined the scope of the guideline by creating preliminary recommendations (Questions) that directed the literature search. When necessary, these clinical experts also provided content help, search terms and additional clarification for the AAOS Medical Librarian. The Medical Librarian created and executed the search(s). The supporting group of methodologists (AAOS EBM Unit) reviewed all abstracts, recalled pertinent full-text articles for review and evaluated the quality of studies meeting the inclusion criteria. They also abstracted, analyzed, interpreted, and/or summarized the relevant evidence for each recommendation and prepared the initial draft for the final meeting. Upon completion of the systematic reviews, the clinician work group participated in a three-day recommendation meeting on October 4-6, 2013. At this meeting, the clinician experts and methodologists then evaluated and integrated all material to develop the final recommendations. The final recommendations and rationales were edited, written, and voted on at the final meeting. The draft guideline recommendations and rationales received final review by the methodologists to ensure that these recommendations and rationales were consistent with the data. The draft was then completed and submitted for peer review on 4-14-14.

The resulting draft guidelines were then peer-reviewed, edited in response to that review and subsequently sent for public commentary, where after additional edits were made. Thereafter, the draft guideline was sequentially approved by the AAOS Committee on Evidence-Based Quality and Value, AAOS Council on Research and Quality, and the AAOS Board of Directors (see Appendix II for a description of the AAOS bodies involved in the approval process). All AAOS guidelines are reviewed and updated or retired every five years in accordance with the criteria of the National Guideline Clearinghouse.

Thus the process of AAOS guideline development incorporates the benefits from clinical physician expertise as well as the statistical knowledge and interpretation of non-conflicted methodologists. The process also includes an extensive review process offering the opportunity for over 200 clinical physician experts to provide input into the draft prior to publication. This process provides a sound basis for minimizing bias, enhancing transparency and ensuring the highest level of accuracy for interpretation of the evidence.

FORMULATING PRELIMINARY RECOMMENDATIONS

The work group began work on this guideline by constructing a set of preliminary recommendations. These recommendations specify [what] should be done in [whom], [when], [where], and [how often or how long]. They function as questions for the systematic review, not as final recommendations or conclusions. Preliminary recommendations are almost always modified on the basis of the results of the systematic review. Once established, these *a priori* preliminary recommendations cannot be modified until the final work group meeting.

FULL DISCLOSURE INFORMATION

Each preliminary recommendation developed by the work group is addressed in this guideline. This is of critical importance because it ensures full disclosure of all the data the work group considered. It also prevents bias that could result from failure to make such disclosure.

STUDY SELECTION CRITERIA

We developed *a priori* article inclusion criteria for our review. These criteria are our "rules of evidence" and articles that did not meet them are, for the purposes of this guideline, not evidence.

To be included in our systematic reviews (and hence, in this guideline) an article had to be a report of a study that:

- Study must be of Developmental Dysplasia of the Hip
- Article must be a full article report of a clinical study
- Study must appear in a peer-reviewed publication
- Study must be published in English
- Study must be published in or after 1950
- Study must be of humans

- Study must not be an in vitro study
- Study must not be a biomechanical study
- Study must not have been performed on cadavers
- Study should have 10 or more patients per group
- All study follow up durations are included
- Study results must be quantitatively presented
- For any given follow-up time point in any included study, there must be ≥ 50% patient follow-up
- Retrospective non-comparative case series, medical records review, meeting abstracts, historical articles, editorials, letters, and commentaries are excluded
- Case series studies that give patients the treatment of interest AND another treatment are excluded
- Case series studies that have non-consecutive enrollment of patients are excluded
- All studies of "Very Low" strength of evidence are excluded
- Quantitatively presented results

When a study's "duration of symptoms" is not the same as those examined by the work group (i.e. 0-2 weeks, 2-6 weeks, etc.) the study will be assigned to the appropriate "duration of symptoms" group based upon the mean duration of symptoms. If a range rather than mean is provided, the higher end of the range will dictate which "duration of symptoms" group the study will be assigned to. For example, a study reporting patient symptoms of 0-4 weeks would be included in the time frame "2-6 weeks" created by the work group.

We did not include systematic reviews or meta-analyses compiled by others or guidelines developed by other organizations. These documents are developed using different inclusion criteria than those specified by the AAOS work group. Therefore they may include studies that do not meet our inclusion criteria. We recalled these documents, if the abstract suggested they might provide an answer to one of our recommendations, and searched their bibliographies for additional studies to supplement our systematic review.

BEST EVIDENCE SYNTHESIS

When determining the best available evidence, we first include the highest-strength studies available for the outcomes examined. If there are two or more high-strength studies, the recommendation grade is strong. In this case, moderate- and low- strength evidence do not influence the grade of the recommendation. If there is one high- or at least two moderate- strength studies, the recommendation grade is moderate. If there is one moderate- or at least one low- strength studies, the recommendation grade is limited. Consensus based recommendations are established only when the rules for consensus recommendations apply (Table 8). A summary of the evidence that met the initial inclusion criteria, but was not best available evidence was created for each recommendation and can be viewed by recommendation in Appendix XII.

MINIMALLY CLINICALLY IMPORTANT IMPROVEMENT

Wherever possible, we consider the effects of treatments in terms of the minimally clinically important difference (MCII) in addition to whether their effects are statistically significant. The MCI is the smallest clinical change that is important to patients, and recognizes the fact that there are some treatment-induced statistically significant improvements that are too small to matter to patients. However, there were no occurrences of validated MCID outcomes in the studies included in this clinical practice guideline.

When MCID values from the specific guideline patient population are not available, we use the following measures listed in order of priority:

1) MCID/MID
2) PASS or Impact
3) Another validated measure
4) Statistical Significance

LITERATURE SEARCHES

We begin the systematic review with a comprehensive search of the literature. Articles we consider were published prior to September 2013 in four electronic databases; PubMed, EMBASE, CINAHL, and The Cochrane Central Register of Controlled Trials. The medical librarian conducts the search using key terms determined from the work group's preliminary recommendations.

We supplement the electronic search with a manual search of the bibliographies of all retrieved publications, recent systematic reviews, and other review articles for potentially relevant citations. Recalled articles are evaluated for possible inclusion based on the study selection criteria and are summarized for the work group who assist with reconciling possible errors and omissions.

The study attrition diagram in Appendix III provides a detailed description of the numbers of identified abstracts and recalled and selected studies that were evaluated in the systematic review of this guideline. The search strategies used to identify the abstracts are contained in Appendix IV.

METHODS FOR EVALUATING EVIDENCE

STUDIES OF INTERVENTION/PREVENTION

QUALITY

As noted earlier, we judge quality based on *a priori* research questions and use an automated numerical scoring process to arrive at final ratings. Extensive measures are taken to determine quality ratings so that they are free of bias.

We evaluate the quality of evidence separately for each outcome reported in every study using research design domains suggested by GRADE work group members and others.[M2, M3] The GRADE evidence appraisal system is used in the Cochrane Collaboration[M4] and has been developed for studies evaluating matched control groups. We incorporate a coding scheme adaptable to all research designs that involves incremental increases or decreases based on the following criteria:

- The study was prospective (with prospective studies, it is possible to have an a priori hypothesis to test; this is not possible with retrospective studies.)
- The statistical power of the study
- The assignment of patients to groups was unbiased
- There was sufficient blinding to mitigate against a placebo effect
- The patient groups were comparable at the beginning of the study
- The treatment was delivered in such a way that any observed effects could reasonably be attributed to that treatment
- Whether the instruments used to measure outcomes were valid
- Whether there was evidence of investigator bias

Each of the above quality domains is rated for possible flaws based on up to four indicator questions that define them. See Appendix V for a discussion of the AAOS appraisal system. Domains are considered “flawed” if one indicator is coded “No” or at least two defining questions are “Unclear.” The Statistical Power domain is considered flawed if sample size is too small to detect at least a small effect size of 0.2.

If there are flawed domains then the evidence quality is downgraded according to the reductions shown in Table 1. As an example, the evidence reported in a randomized controlled trial (RCT) for any given outcome is rated as “High” quality if zero or one domain is flawed. If two or three domains are flawed, the rating is reduced to “Moderate.” If four or five domains are flawed, the quality of evidence is downgraded to “Low.” The quality of evidence is reduced to “Very Low” if six or more domains are flawed. As indicated above, very low quality evidence is not included in this AAOS guideline.

Table 1. Relationship between Quality and Domain Scores for Interventions

Number of Domains With No More Than One “Unclear” Answer	**Strength of Evidence**
0	High
1-2	Moderate
3-4	Low
>5	Very Low

Some flaws are so serious that we automatically term the evidence as being of “Very Low” quality if a study exhibits them. These serious design flaws are:

- Non-consecutive enrollment of patients in a case series
- Case series that gave patients the treatment of interest AND another treatment
- Measuring the outcome of interest one way in some patients and measuring it in another way in other patients
- Low Statistical Power

Conversely, the quality of research articles may be upgraded if the research is of high applicability or if providing the intervention decreases the potential for catastrophic harm, such as loss of life or limb. The criteria, based on the G.R.A.D.E. methodology, which can be used to upgrade the quality of a study, are as follows:

- The study has a large (>2) or very large (>5) magnitude of treatment effect: used for non-retrospective observational studies;
- All plausible confounding factors would reduce a demonstrated effect or suggest a spurious effect when results show no effect;
- Consideration of the dose-response effect.

Quality is one of two dimensions that determine the strength of the final recommendations.

APPLICABILITY

The applicability (also called "generalizability" or "external validity") of an outcome is one of the factors used to determine the strength of a recommendation. We categorize outcomes according to whether their applicability is "High", "Moderate", or "Low." As with quality, we separately evaluate the applicability for each outcome a study reports.

The applicability of a study is evaluated using the PRECIS instrument.[M5] The instrument was originally designed to evaluate the applicability of randomized controlled trials, but it can also be used for studies of other design. For example, the existence of an implicit control group in a case series (see above) make it useful for evaluating outcomes from these latter studies.

This instrument is comprised of the 10 questions that are briefly described in Table 2. All 10 questions are asked of all studies, regardless of design. The questions are divided into four domains. These domains and their corresponding questions are given in Table 2.

Table 2. Brief Description of the PRECIS Questions and Domains

Question	Domain
All Types of Patients Enrolled	Participants
Flexible Instructions to Practitioners	Interventions and Expertise
Full Range of Expt'l Practitioners	Interventions and Expertise
Usual Practice Control	Interventions and Expertise
Full Range of Control Practitioners	Interventions and Expertise
No Formal Follow-up	Interventions and Expertise
Usual and Meaningful Outcome	Interventions and Expertise
Compliance Not Measured	Compliance and Adherence
No Measure of Practitioner Adherence	Compliance and Adherence
All Patients in Analysis	Analysis

Each study is assumed to have "High" applicability at the start, and applicability is downgraded for flawed domains as summarized in Table 3.

Table 3. Relationship between Applicability and Domain Scores for Studies of Treatments

Number of Flawed Domains	Applicability
0	High
1, 2, 3	Moderate
4	Low

A study's applicability is "High" if there is only one "Unclear" answer in one domain and the answers to all of the questions for all other domains is "Yes." A study's applicability is low if there is one "Unclear" answer in one domain and the answers to all of the questions for all other domains is "No." A study's applicability is "Moderate" under all other conditions.

STUDIES OF SCREENING AND DIAGNOSTIC TESTS

QUALITY

As with our appraisal of the quality of studies of intervention, our appraisal of studies of screening and diagnostic tests is a domain-based approach conducted using *a priori* questions and scored by a computer program. The questions we used are those of the QUADAS instrument[M6] and the six domains we employed are listed below:

1. Participants (whether the spectrum of disease among the participants enrolled in the study is the same as the spectrum of disease seen in actual clinical practice)
2. Reference Test (whether the reference test , often a "gold standard," and the way it was employed in the study ensures correct and unbiased categorization of patients as having or not having disease)
3. Index Test (whether interpretation of the results of the test under study, often called the "index test", was unbiased)
4. Study Design (whether the design of the study allowed for unbiased interpretation of test results)
5. Information (whether the same clinical data were available when test results were interpreted as would be available when the test is used in practice)
6. Reporting (whether the patients, tests, and study protocol were described well enough to permit its replication)

We characterized a study that has no flaws in any of its domains as being of "High" quality, a study that has one flawed domain as being of "Moderate" quality, a study with two flawed domains as being of "Low" quality, and a study with three or more flawed domains as being of "Very Low" quality (Table).We characterized a domain as "flawed" if one or more questions addressing any given domain are answered "No" for a given screening/diagnostic/test, or if there are two or more "Unclear" answers to the questions addressing that domain.

We considered some design flaws as so serious that their presence automatically guarantees that a study is characterized as being of "Very Low" quality regardless of its domain scores. These flaws are:

- The presence of spectrum bias (occurs when a study does not enroll the full spectrum of patients who are seen in clinical practice. For example, a diagnostic case control study enrolls only those known to be sick and those known to be well, a patient population quite different from that seen in practice. Because diagnostic case control studies enroll only the easy to diagnose patients, these kinds of studies typically overestimate the abilities of a diagnostic test.)
- Failure to give all patients the reference standard regardless of the index test results
- Non-independence of the reference test and the index text

Table 4. Relationship Between Domain Scores and Quality of Screening/Diagnostic Tests

Number of Flawed Domains	Quality
0	High
1	Moderate
2	Low
≥3	Very Low

APPLICABILITY

We judged the applicability of evidence pertinent to screening and diagnostic tests using a modified version of the PRECIS instrument, implying that the questions are determined *a priori*. As before, scoring was accomplished by a computer. The applicability domains we employed for screening and diagnostic tests were:

1. Patients (i.e., whether the patients in the study are like those seen in actual clinical practice)
2. Index Test (i.e., whether the test under study could be used in actual clinical practice and whether it was administered in a way that reflects its use in actual practice)
3. Directness (i.e., whether the study demonstrated that patient health is affected by use of the diagnostic test under study)
4. Analysis (i.e., whether the data analysis reported in the study was based on a large enough percentage of enrolled patients to ensure that the analysis was not conducted on “unique” or “unusual” patients)

We characterized a domain as “flawed” if one or more questions addressing any given domain are answered “No” for a given screening/diagnostic/test, or if there are two or more “Unclear” answers to the questions addressing that domain. We characterized the applicability of a screening/diagnostic test as “High” if none of its domains are flawed, “Low” if all of its domains are flawed, and “Moderate” in all other cases (Table 5).

Table 5. Relationship Between Domain Scores and Applicability for Studies of Screening/Diagnostic Tests

Number of Flawed Domains	Applicability
0	High
1,2, 3	Moderate
4	Low

STUDIES OF PROGNOSTICS

QUALITY

Our appraisal of studies of prognostics is a domain-based approach conducted using *a priori* questions, and scored by a computer program for the questions we used and the domains to which they apply). The five domains we employed are:

1. Prospective (A variable is specified as a potential prognostic variable *a priori*. This is not possible with retrospective studies.)
2. Power (Whether the study had sufficient statistical power to detect a prognostic variable as statistically significant)
3. Analysis (Whether the statistical analyses used to determine that a variable was rigorous to provide sound results)
4. Model (Whether the final statistical model used to evaluate a prognostic variable accounted for enough variance to be statistically significant)
5. Whether there was evidence of investigator bias

We separately determined a quality score for each prognostic reported by a study. We characterized the evidence relevant to that prognostic variable as being of "High" quality if there are no flaws in any of the relevant domains, as being of "Moderate" quality if one of the relevant domains is flawed, as "Low" quality if there are two flawed domains, and as "Very Low" quality if three or more relevant domains are flawed (Table 5). We characterized a domain as "flawed" if one or more questions addressing any given domain are answered "No" for a given prognostic variable, or if there are two or more "Unclear" answers to the questions addressing that domain.

Table 6. Relationship Between Quality and Domain Scores for Studies of Prognostics

Number of Flawed Domains	Quality
0	High
1	Moderate
2	Low
≥3	Very Low

APPLICABILITY

We separately evaluated the applicability of each prognostic variable reported in a study, and did so using a domain-based approach for the relevant questions and the domains they address) that involves predetermined questions and computer scoring. The domains we used for the applicability of prognostics are:

1. Patients (i.e. whether the patients in the study and in the analysis were like those seen in actual clinical practice)
2. Analysis (i.e., whether the analysis was conducted in a way that was likely to describe variation among patients that might be unique to the dataset the authors used)
3. Outcome (i.e., whether the prognostic was a predictor of a clinically meaningful outcome)

We characterized the evidence relevant to that prognostic as being of "High" applicability if there are no flaws in any of the relevant domains, as being of "Low" applicability if all three domains are flawed, and as of "Moderate" applicability in all other cases (Table 6). We characterized a domain as "flawed" if one or more questions addressing any given domain are answered "No" for a given prognostic variable, or if there are two or more "Unclear" answers to the questions addressing that domain.

Table 7. Relationship Between Domain Scores and Applicability for Studies of Prognostics

Number of Flawed Domains	Applicability
0	High
1,2	Moderate
3	Low

FINAL STRENGTH OF EVIDENCE

To determine the final strength of evidence for an outcome, the strength is initially taken to equal quality. An outcome's strength of evidence is increased by one category if its applicability is "High", and an outcome's strength of evidence is decreased by one category if its applicability is "Low." If an outcome's applicability is "Moderate", no adjustment is made to the strength of evidence derived from the quality evaluation.

DEFINING THE STRENGTH OF THE RECOMMENDATIONS

Judging the strength of evidence is only a stepping stone towards arriving at the strength of a guideline recommendation. The strength of recommendation also takes into account the quality, quantity, and the trade-off between the benefits and harms of a treatment, the magnitude of a treatment's effect, and whether there is data on critical outcomes.

Strength of recommendation expresses the degree of confidence one can have in a recommendation. As such, the strength expresses how possible it is that a recommendation will be overturned by future evidence. It is very difficult for future evidence to overturn a recommendation that is based on many high quality randomized controlled trials that show a large effect. It is much more likely that future evidence will overturn recommendations derived from a few small case series. Consequently, recommendations based on the former kind of evidence are given a high strength of recommendation and recommendations based on the latter kind of evidence are given a low strength.

To develop the strength of a recommendation, AAOS staff first assigned a preliminary strength for each recommendation that took only the final strength of evidence (including quality and applicability) and the quantity of evidence (see Table 8).

Table 8. Strength of Recommendation Descriptions

Strength	Overall Strength of Evidence	Description of Evidence Strength	Strength Visual
Strong	Strong	Evidence from two or more “High” strength studies with consistent findings for recommending for or against the intervention.	
Moderate	Moderate	Evidence from two or more “Moderate” strength studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.	
Limited	Low Strength Evidence or Conflicting Evidence	Evidence from two or more “Low” strength studies with consistent findings **or** evidence from a single study for recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.	
Consensus*	No Evidence	There is no supporting evidence. In the absence of reliable evidence, the work group is making a recommendation based on their clinical opinion. Consensus recommendations can only be created when not establishing a recommendation could have catastrophic consequences.	

WORDING OF THE FINAL RECOMMENDATIONS

To prevent bias in the way recommendations are worded, the AAOS uses specific predetermined language stems that are governed by the evidence strengths. Each recommendation was written using language that accounts for the final strength of the recommendation. This language, and the corresponding strength, is shown in Table 9.

Table 9. AAOS Guideline Language Stems

Guideline Language	Strength of Recommendation
Strong evidence supports that the practitioner should/should not do X, because…	Strong
Moderate evidence supports that the practitioner could/could not do X, because…	Moderate
Limited evidence supports that the practitioner might/might not do X, because…	Limited
In the absence of reliable evidence, it is the ***opinion*** of this work group that…*	Consensus*

**Consensus based recommendations are made according to specific criteria. These criteria can be found in Appendix VI.*

APPLYING THE RECOMMENDATIONS TO CLINICAL PRACTICE

To increase the practicality and applicability of the guideline recommendations in this document, the information listed in Table 10 provides assistance in interpreting the correlation between the strength of a recommendation and patient counseling time, use of decision aids, and the impact of future research

Table 10. Clinical Applicability: Interpreting the Strength of a Recommendation

Strength of Recommendation	Patient Counseling (Time)	Decision Aids	Impact of Future Research
Strong	Least	Least Important, unless the evidence supports no difference between two alternative interventions	Not likely to change
Moderate	Less	Less Important	Less likely to change
Limited	More	Important	Change possible/anticipated
Consensus	Most	Most Important	Impact unknown

VOTING ON THE RECOMMENDATIONS

The recommendations and their strength were voted on by the work group members during the final meeting. If disagreement between the work group occurred, there was further discussion to see whether the disagreement(s) could be resolved. Up to three rounds of voting were held to attempt to resolve disagreements. If disagreements were not resolved following three voting rounds, no recommendation was adopted. Lack of agreement is a reason that the strength for some recommendations can be labeled "Limited."

STATISTICAL METHODS

ANALYSIS OF DIAGNOSTIC DATA

Likelihood ratios, sensitivity, specificity and 95% confidence intervals were calculated to determine the accuracy of diagnostic modalities based on two by two diagnostic contingency tables extracted from the included studies. When summary values of sensitivity, specificity, or other diagnostic performance measures were reported, estimates of the diagnostic contingency table were used to calculate likelihood ratios. Likelihood ratios (LR) indicate the magnitude of the change in probability of disease due to a given test result. For example, a positive likelihood ratio of 10 indicates that a positive test result is 10 times more common in patients with disease than in patients without disease. Likelihood ratios are interpreted according to previously published values, as seen in Table below.

Table 11. Interpreting Likelihood Ratios

Positive Likelihood Ratio	Negative Likelihood Ratio	Interpretation
>10	<0.1	Large and conclusive change in probability
5-10	0.1-0.2	Moderate change in probability
2-5	0.2-0.5	Small (but sometimes important change in probability)
1-2	0.5-1	Small (and rarely important) change in probability

ANALYSIS OF INTERVENTION/PREVENTION DATA

When possible, we recalculate the results reported in individual studies and compile them to answer the recommendations. The results of all statistical analysis conducted by the AAOS Clinical Practice Guidelines Unit are conducted using STATA 12. STATA was used to determine the magnitude, direction, and/or 95% confidence intervals of the treatment effect. For data reported as means (and associated measures of dispersion) the mean difference between groups and the 95% confidence interval was calculated and a two-tailed t-test of independent groups was used to determine statistical significance. When published studies report measures of dispersion other than the standard deviation the value was estimated to facilitate calculation of the treatment effect. In studies that report standard errors or confidence intervals the standard deviation was back-calculated. In some circumstances statistical testing was conducted by the authors and measures of dispersion were not reported. In the absence of measures of dispersion, the results of the statistical analyses conducted by the authors (i.e. the p-value) are considered as evidence. For proportions, we report the proportion of patients that experienced an outcome along with the percentage of patients that experienced an outcome. The variance of the arcsine difference was used to determine statistical significance.[M7] P-values < 0.05 were considered statistically significant.

We performed meta-analyses using the random effects method of DerSimonian and Laird.[M8] A minimum of four studies was required for an outcome to be considered by meta-analysis. Heterogeneity was assessed with the I-squared statistic. Meta-analyses with I-squared values less than 50% were considered as evidence. Those with I-squared larger than 50% were not considered as evidence for this guideline. All meta-analyses were performed using STATA 12 and the “metan” command. The arcsine difference was used in meta-analysis of proportions. In order to overcome the difficulty of interpreting the magnitude of the arcsine difference, a summary odds ratio is calculated based on random effects meta-analysis of proportions and the number needed to treat (or harm) is calculated. The standardized mean difference was used for meta-analysis of means and magnitude was interpreted using Cohen’s definitions of small, medium, and large effect.

PEER REVIEW

Following the final meeting, the guideline draft undergoes peer review for additional input from external content experts. Written comments are provided on the structured review form (see Appendix VII). All peer reviewers are required to disclose their conflicts of interest. To guide who participates, the work group identifies specialty societies at the introductory meeting. O*rganizations*, not *individuals*, are specified.

The specialty societies are solicited for nominations of individual peer reviewers approximately six weeks before the final meeting. The peer review period is announced as it approaches and others interested are able to volunteer to review the draft. The chair of the AAOS committee on Evidence Based Quality and Value reviews the draft of the guideline prior to dissemination.

Some specialty societies (both orthopaedic and non-orthopaedic) ask their evidence-based practice (EBP) committee to provide review of the guideline. The organization is responsible for coordinating the distribution of our materials and consolidating their comments onto one form. The chair of the external EBP committees provides disclosure of their conflicts of interest (COI) and manages the potential conflicts of their members.

Again, the AAOS asks for comments to be assembled into a single response form by the specialty society and for the individual submitting the review to provide disclosure of potentially conflicting interests. The peer review stage gives external stakeholders an opportunity to provide evidence-based direction for modifications that they believe have been overlooked. Since the draft is subject to revisions until its approval by the AAOS Board of Directors as the final step in the guideline development process, confidentiality of all working drafts is essential.

The manager of the evidence-based medicine unit drafts the initial responses to comments that address methodology. These responses are then reviewed by the work group chair and vice-chair, who respond to questions concerning clinical practice and techniques. The director of the Department of Research and Scientific Affairs provides input as well. All comments received and the initial drafts of the responses are also reviewed by all members of the work group. All changes to a recommendation as a result of peer review are based on the evidence and undergoes majority vote by the work group members via teleconference. Final revisions are summarized in a detailed report that is made part of the guideline document throughout the remainder of the review and approval processes.

The AAOS believes in the importance of demonstrating responsiveness to input received during the peer review process and welcomes the critiques of external specialty societies. Following final approval of the guideline, all individual responses are posted on our website http://www.aaos.org/research/guidelines/guide.asp with a point-by-point reply to each non-editorial comment. Reviewers who wish to remain anonymous notify the AAOS to have their names de-identified; their comments, our responses, and their COI disclosures are still posted.

Review of the Management of Developmental dysplasia of the hip guideline was requested of 25 organizations and 27 external content experts were nominated to represent them. Fifteen individuals returned comments on the structured review form (see Appendix VIII).

PUBLIC COMMENTARY

After modifying the draft in response to peer review, the guideline was subjected to a thirty day period of "Public Commentary." Commentators consist of members of the AAOS Board of Directors (BOD), members of the Council on Research and Quality (CORQ), members of the Board of Councilors (BOC), and members of the Board of Specialty Societies (BOS). The guideline is automatically forwarded to the AAOS BOD and CORQ so that they may review it and provide comment prior to being asked to approve the document. Members of the BOC and BOS are solicited for interest. If they request to see the document, it is forwarded to them for comment. Based on these bodies, over 200 commentators have the opportunity to provide input into this guideline. Of these five members returned public comments.

THE AAOS GUIDELINE APPROVAL PROCESS

This final guideline draft must be approved by the AAOS Committee on Evidence-Based Quality and Value, the AAOS Council on Research and Quality, and the AAOS Board of Directors. These decision-making bodies are described in Appendix II and are not designated to modify the contents. Their charge is to approve or reject its publication by majority vote.

REVISION PLANS

This guideline represents a cross-sectional view of current treatment and may become outdated as new evidence becomes available. This guideline will be revised in accordance with new evidence, changing practice, rapidly emerging treatment options, and new technology. This guideline will be updated or withdrawn in five years in accordance with the standards of the National Guideline Clearinghouse.

GUIDELINE DISSEMINATION PLANS

The primary purpose of the present document is to provide interested readers with full documentation about not only our recommendations, but also about how we arrived at those recommendations. This document is also posted on the AAOS website at http://www.aaos.org/research/guidelines/guide.asp.

Shorter versions of the guideline are available in other venues. Publication of most guidelines is announced by an Academy press release, articles authored by the work group and published in the Journal of the American Academy of Orthopaedic Surgeons, and articles published in AAOS *Now*. Most guidelines are also distributed at the AAOS Annual Meeting in various venues such as on Academy Row and at Committee Scientific Exhibits.

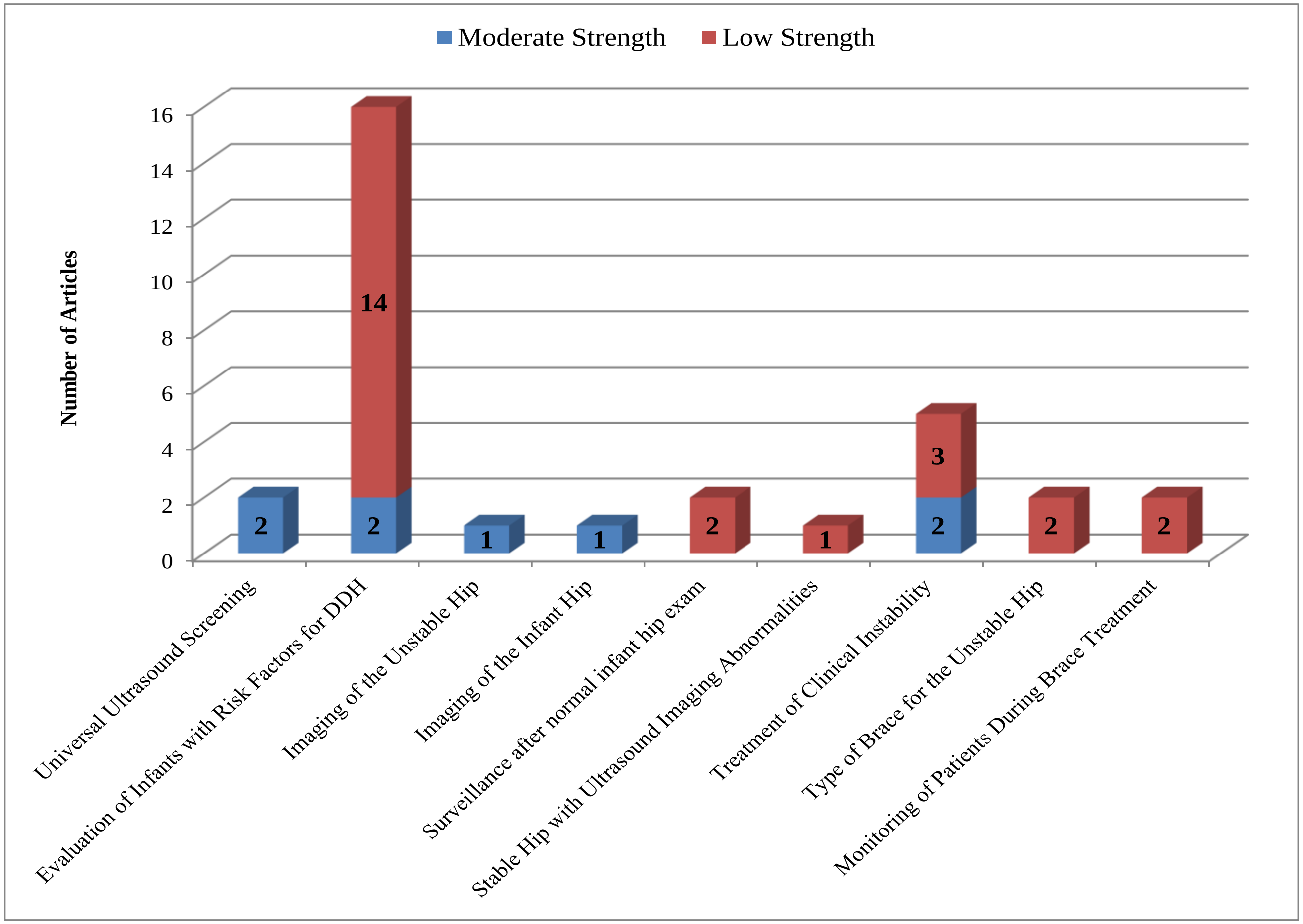
Selected guidelines are disseminated by webinar, an Online Module for the Orthopaedic Knowledge Online website, Radio Media Tours, Media Briefings, and by distributing them at relevant Continuing Medical Education (CME) courses and at the AAOS Resource Center.

Other dissemination efforts outside of the AAOS will include submitting the guideline to the National Guideline Clearinghouse and distributing the guideline at other medical specialty societies' meetings.

IV. RECOMMENDATIONS

NUMBER AND STRENGTH OF ARTICLES PER RECOMMENDATION

Figure 1. Number of Articles per Recommendation by Strength of Study



UNIVERSAL ULTRASOUND SCREENING

Moderate evidence supports not performing universal ultrasound screening of newborn infants.

Strength of Recommendation: Moderate

RATIONALE

There is moderate evidence to not do universal screening of all infants for DDH. Two moderate strength studies showed no statistical difference between universal and selective ultrasound screening of the infant hip for diagnosis of late presenting DDH.[1,2] Holen augmented clinical screening with either universal or selective (risk) ultrasound. The rate of late cases in Holen's study was 0.13/1000 with universal ultrasound screening and 0.65/1000 with selective (risk) screening. The difference in late detection was not statistically significant. Rosendahl used three matched study groups: general ultrasound screening, risk factor screening and only clinical screening. Late cases identified by group were 0.3/1000, 0.7/1000 and 1.3/1000 respectively and these differences were not statistically significant.

Screening of all infants with ultrasound has the potential to lead to over-treatment. Rosendahl's study found that general ultrasound screening resulted in a higher treatment rate (3.4%) than either selective ultrasound screening (2.0%) or clinical screening (1.8%). The higher rate with universal screening is statistically significant. Universal ultrasound screening requires considerable diagnostic and therapeutic effort and these studies which involve large numbers of newborns indicate that such a commitment of resources will not significantly impact the prevalence of late cases.

Risks and Harms of Recommendation

There is a potential to miss a case of DDH in an infant with a normal clinical examination and no risk factors. This could lead to a late diagnosis with concerns for a potential of higher rate of treatment complications as a result of late diagnosis.

SUPPORTING EVIDENCE
QUALITY AND APPLICABILITY

Table 12. Quality and Applicability: Studies for Universal Ultrasound Screening

●: Domain free of flaws
○: Domain flaws present
◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Holen KJ 2002	Instability at birth	●	○	●	●	●	○	●	Moderate	●	○	●	○	Moderate	Moderate
Holen KJ 2002	Dysplasia after 6-11 years	●	○	●	●	●	○	●	Moderate	●	○	●	○	Moderate	Moderate
Rosendahl K. 1994	Dysplasia within neonatal period	●	○	●	○	●	○	●	Moderate	●	○	●	●	Moderate	Moderate
Rosendahl K. 1994	Treatment with a splint within 42.4 months	●	○	●	○	●	○	●	Moderate	●	○	●	●	Moderate	Moderate

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Rosendahl K. 1994	Abnormality at a mean age of 4.5 months (2.5-18)	●	○	●	○	●	○	●	Moderate	●	○	●	●	Moderate	Moderate
Rosendahl K. 1994	Acetabular dysplasia at a mean age of 4.5 months (2.5-18)	●	○	●	○	●	○	●	Moderate	●	○	●	●	Moderate	Moderate
Rosendahl K. 1994	Radiographic subluxation at a mean age of 4.5 months (2.5-18)	●	○	●	○	●	○	●	Moderate	●	○	●	●	Moderate	Moderate
Rosendahl K. 1994	Dislocation at a mean age of 4.5 months (2.5-18)	●	○	●	○	●	○	●	Moderate	●	○	●	●	Moderate	Moderate

FINAL STRENGTH OF EVIDENCE

Moderate

RESULTS

Table 13. Imaging of the Unstable Hip (Universal Ultrasound Versus Risk-Stratified Ultrasound)

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Holen KJ 2002	15,178	Universal ultrasound	Selective ultrasound	-	Dysplasia after 6-11 years	RR=0.205 (0.024, 1.757)	Not significant	Moderate
Holen KJ 2002	15,178	Universal ultrasound	Selective ultrasound	-	Neonatal treatment with Frejka pillow	RR=1.12 (0.803, 1.562)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Dysplasia within neonatal period	Universal vs. Selective RR=1.07 (0.752, 1.52)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Dysplasia within neonatal period	Universal vs. No ultrasound RR=0.887 (0.629, 1.251)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Dysplasia within neonatal period	Selective vs. No ultrasound RR=1.12 (0.823, 1.527)	Not significant	Moderate

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Treatment with a splint within 42.4 months	Universal vs. Selective RR=1.68 (1.282, 2.197)	Significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Treatment with a splint within 42.4 months	Universal vs. No ultrasound RR=1.88 (1.410, 2.511)	Significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Treatment with a splint within 42.4 months	Selective vs. No ultrasound RR=1.121 (0.823, 1.527)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Abnormality at a mean age of 4.5 months (2.5-18)	Universal vs. Selective RR=0.675 (0.226, 2.012)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Abnormality at a mean age of 4.5 months (2.5-18)	Universal vs. No ultrasound RR=0.543 (0.186, 1.587)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Abnormality at a mean age of 4.5 months (2.5-18)	Selective vs. No ultrasound RR=0.805 (0.327, 1.979)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Acetabular dysplasia at a mean age of 4.5 months (2.5-18)	Universal vs. Selective RR=0.810 (0.229, 2.867)	Not significant	Moderate

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Acetabular dysplasia at a mean age of 4.5 months (2.5-18)	Universal vs. No ultrasound RR=0.869 (0.233, 3.233)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Acetabular dysplasia at a mean age of 4.5 months (2.5-18)	Selective vs. No ultrasound RR=1.073 (0.328, 3.514)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Radiographic subluxation at a mean age of 4.5 months (2.5-18)	Universal vs. Selective RR=0.607 (0.055, 6.695)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Radiographic subluxation at a mean age of 4.5 months (2.5-18)	Universal vs. No ultrasound RR=0.362 (0.038, 3.479)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Radiographic subluxation at a mean age of 4.5 months (2.5-18)	Selective vs. No ultrasound RR=0.596 (0.099, 3.566)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Dislocation at a mean age of 4.5 months (2.5-18)	Universal vs. Selective RR=0.405 (0.017, 9.935)	Not significant	Moderate
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Dislocation at a mean age of 4.5 months (2.5-18)	Universal vs. No ultrasound RR=0.217 (0.010, 4.523)	Not significant	Moderate

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Rosendahl K. 1994	11,925	Universal ultrasound	Selective ultrasound	No ultrasound	Dislocation at a mean age of 4.5 months (2.5-18)	Selective vs. No ultrasound RR=0.447 (0.041, 4.929)	Not significant	Moderate

EVALUATION OF INFANTS WITH RISK FACTORS FOR DDH

Moderate evidence supports performing an imaging study before 6 months of age in infants with one or more of the following risk factors: breech presentation, family history, or history of clinical instability.

Strength of Recommendation: Moderate

RATIONALE

If the risk factors of family and/or breech presentation are present, there is moderate evidence to support selective ultrasound screening between 2-6 weeks of age for infants who otherwise have a normal clinical hip examination or an AP radiograph at 4 months of age. There were two studies of moderate strength that confirm significance for selective prospective screening by ultrasound in infants with history of possible clinical instability and/or risk factors: breech and family history to prevent late dislocations and need for surgery.[16, 17]

Of the 10 studies of low strength the various risk factors included were: breech, family history, sex, combination of sex and breech, combination of sex and family history, hip click, first born, swaddling, and talipes.

Breech literature included six studies all of low study strength. The results of these studies were meta-analyzed and the meta-analysis overwhelmingly supported breech presentation as a risk factor for neonatal instability. The literature terminology on breech is: breech at birth, breech delivery, and breech position at the third trimester; there is no literature to substantiate a particular duration of breech positioning as a risk factor.

Family history: four articles of low strength all showing statistical significance for family history as a risk factor for DDH.[4, 5, 13, 18] There was one study which showed no statistical significance.[3]

One study compared treatment for dislocatable hips (at age less than one week) with no treatment for stable hips with positive family history.[8] The outcome was residual dysplasia at five months and was noted to be significant for the no treatment category. The authors further treated these patients from the no treatment category at age five months and compared them with the original cohort of Barlow positive patients treated at age less than one week. This time around, the outcome parameter was residual dysplasia at two years and was again noted to be significant. Other outcome measures included AVN at two years, which was not significant, and treatment failure, which was noted to be significant. This study did not have a true comparative group for analysis. There was a combination of dislocated and dislocatable hips in the Barlow positive category, which confounds the analysis.

The literature definitions of family history of DDH range from unspecified hip disorders to hip dislocation and from first degree relative (parents and siblings), to any relative (even if distant or vague) with hip problems or DDH (all other articles). Three articles listed family history, but did not specify the relationships or specific hip problems.[3, 5, 7]

One study compared ultrasound screening in infants who had risk factors alone with those who had "doubtful" clinical instability.[17] Rate of detection of dislocation as confirmed by ultrasound was 13/1000 (7 to 24) vs 87/ 1000 (57 to 126/1000) respectively.

There is no substantiation in the literature of the optimal age for imaging studies in these infants with risk factors.[8] One study performed hip radiographs at 4 months of age. Two studies[14, 15] performed ultrasound between 2-6 weeks of age.

Examination of other quoted risk factors was done. Evidence was not found to include foot abnormalities, gender, oligohydramnios, and torticollis as risk factors for DDH.

Risks and harms

There is a potential risk of over diagnosis and treatment.

SUPPORTING EVIDENCE

QUALITY AND APPLICABILITY

Table 14. Quality and Applicability: Studies for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Burger BJ 1990	Dysplasia at 5 months	●	○	○	○	○	○	●	Low	●	○	●	○	Moderate	Low
Burger BJ 1990	Dysplasia at 2 years	●	○	○	○	○	○	●	Low	●	○	●	○	Moderate	Low
Burger BJ 1990	AVN after 2 years	●	○	○	○	○	○	●	Low	●	○	●	○	Moderate	Low
Burger BJ 1990	Negative predictive value of exam for dysplasia at 2 years	●	○	○	○	○	○	●	Low	●	○	●	○	Moderate	Low

Table 15. Quality and Applicability: Prognostic Studies for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

Study	Prognostic	Prospective	Analysis	Investigator Bias	Model	*Quality*	Patients	Analysis	Outcomes	*Applicability* Study	*Strength*
Akman A. 2007	Breech	●	○	●	○	Low	●	○	●	Moderate	Low
Akman A. 2007	Sex	●	○	●	○	Low	●	○	●	Moderate	Low
Akman A. 2007	First born	●	○	●	○	Low	●	○	●	Moderate	Low
Akman A. 2007	Sex & swaddling	●	○	●	○	Low	●	○	●	Moderate	Low
Akman A. 2007	Family history	●	○	●	○	Low	●	○	●	Moderate	Low
Bache CE. 2002	Breech	●	○	●	○	Low	●	○	●	Moderate	Low
Bache CE. 2002	Sex	●	○	●	○	Low	●	○	●	Moderate	Low
Bache CE. 2002	Sex & Breech	●	○	●	○	Low	●	○	●	Moderate	Low
Bache CE. 2002	Family history	●	○	●	○	Low	●	○	●	Moderate	Low
Bache CE. 2002	Sex & Family history	●	○	●	○	Low	●	○	●	Moderate	Low

Table 15. Quality and Applicability: Prognostic Studies for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

Study	Prognostic	Prospective	Analysis	Investigator Bias	Model	*Quality*	Patients	Analysis	Outcomes	*Applicability* Study	*Strength*
Baronciani D. 1997	Breech	●	○	●	○	Low	●	○	●	Moderate	Low
Baronciani D. 1997	Sex	●	○	●	○	Low	●	○	●	Moderate	Low
Baronciani D. 1997	First born	●	○	●	○	Low	●	○	●	Moderate	Low
Baronciani D. 1997	Family history	●	○	●	○	Low	●	○	●	Moderate	Low
Boo NY. 1989	Breech	●	○	●	○	Low	●	○	●	Moderate	Low
Cunningham KT. 1984	Breech	●	○	●	○	Low	●	○	●	Moderate	Low
Cunningham KT. 1984	Click	●	○	●	○	Low	●	○	●	Moderate	Low
Goss PW. 2002	Breech	●	○	●	○	Low	●	○	●	Moderate	Low
Hinderaker T. 1994	Breech	○	○	●	●	Low	●	○	●	Moderate	Low
Hinderaker T. 1994	Breech (Vaginal)	○	○	●	●	Low	●	○	●	Moderate	Low

Table 15. Quality and Applicability: Prognostic Studies for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

Study	Prognostic	Prospective	Analysis	Investigator Bias	Model	*Quality*	Patients	Analysis	Outcomes	*Applicability* Study	*Strength*
Hinderaker T. 1994	Breech (C. Section)	○	○	●	●	Low	●	○	●	Moderate	Low
Jones DA. 1989	Breech	●	○	●	○	Low	○	○	●	Moderate	Low
Jones DA. 1989	Click	●	○	●	○	Low	○	○	●	Moderate	Low
Jones DA. 1989	Family history	●	○	●	○	Low	○	○	●	Moderate	Low
Khan MR. 1992	Breech	●	○	●	○	Low	○	○	●	Moderate	Low
Khan MR. 1992	Sex	●	○	●	○	Low	○	○	●	Moderate	Low
Kian C. 1996	Breech	●	○	●	○	Low	○	○	●	Moderate	Low
Rosendahl K. 1996	Breech	●	○	●	●	Low	●	○	●	Moderate	Low
Rosendahl K. 1996	Sex	●	○	●	●	Low	●	○	●	Moderate	Low
Rosendahl K. 1996	Sex & Breech	●	○	●	●	Low	●	○	●	Moderate	Low

Table 15. Quality and Applicability: Prognostic Studies for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

Study	Prognostic	Prospective	Analysis	Investigator Bias	Model	*Quality*	Patients	Analysis	Outcomes	*Applicability* Study	*Strength*
Rosendahl K. 1996	Family history	●	○	●	●	Low	●	○	●	Moderate	Low
Rosendahl K. 1996	Sex & Family history	●	○	●	●	Low	●	○	●	Moderate	Low
Rosendahl K. 1996	Family history: one 1st degree relative	●	○	●	●	Low	●	○	●	Moderate	Low
Rosendahl K. 1996	Family history: two 2nd degree relatives	●	○	●	●	Low	●	○	●	Moderate	Low

Table 16. Quality and Applicability for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Bond C. 1997	Average alpha angle <60 degrees at 3 months	●	○	○	○	○	●	○	Low	●	○	●	●	Moderate	Low
Bond C. 1997	Femoral head coverage <50% at 3 months	●	○	○	○	○	●	○	Low	●	○	●	●	Moderate	Low
Paton R. 1999	Ultrasound detected dislocation before 6 months of age	●	○	○	○	●	○	○	Low	●	●	●	●	High	Moderate
Paton R. 2005	Ultrasound detected instability at 2-9 weeks	●	●	○	○	●	●	○	Moderate	●	○	●	○	Moderate	Moderate
Paton R. 2005	Dislocation and type-3 dysplasia at 2-9 weeks	●	●	○	○	●	●	○	Moderate	●	○	●	○	Moderate	Moderate

Table 16. Quality and Applicability for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Paton R. 2005	Ultrasound detected instability at 2-9 weeks	●	●	○	○	●	●	○	Moderate	●	○	●	○	Moderate	Moderate

Table 17. Quality and Applicability for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Garvey M. 1992	Mild radiographic acetabular dysplasia at 4 months	●	○	○	○	○	●	●	Low	●	○	●	●	Moderate	Low
Garvey M. 1992	Moderate radiographic acetabular dysplasia at 4 months	●	○	○	○	○	●	●	Low	●	○	●	●	Moderate	Low
Garvey M. 1992	Severe radiographic acetabular dysplasia at 4 months	●	○	○	○	○	●	●	Low	●	○	●	●	Moderate	Low
Garvey M. 1992	Mild radiographic acetabular dysplasia at 15 months	●	○	○	○	○	●	●	Low	●	○	●	●	Moderate	Low

Table 17. Quality and Applicability for Evaluation of Infants with Risk Factors for DDH

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Garvey M. 1992	Moderate radiographic acetabular dysplasia at 15 months	●	○	○	○	○	●	●	Low	●	○	●	●	Moderate	Low
Garvey M. 1992	Severe radiographic acetabular dysplasia at 15 months	●	○	○	○	○	●	●	Low	●	○	●	●	Moderate	Low

RESULTS

Table 18. Evaluation of Infants with Risk Factors for DDH

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Burger BJ. 1990	729	Barlow doubtful	Barlow doubtful, family history negative	Dysplasia at 5 months	RR=5.00 (2.676, 9.374)	Significant	Low
Burger BJ. 1990	729	Barlow doubtful	Barlow doubtful, family history negative	Dysplasia at 2 years	RR=3.92 (1.447, 10.625)	Significant	Low
Burger BJ. 1990	729	Barlow doubtful	Barlow doubtful, family history negative	AVN after 2 years	RR=4.46 (0.089, 223.54)	Not significant	Low
Burger BJ. 1990	1,281	Barlow negative, family history positive	Barlow doubtful, family history negative	Dysplasia at 5 months	RR=5.07 (3.065, 8.377)	Significant	Low
Burger BJ. 1990	1,281	Barlow negative, family history positive	Barlow doubtful, family history negative	Dysplasia at 2 years	RR=4.57 (2.162, 9.652)	Significant	Low
Burger BJ. 1990	1,281	Barlow negative, family history positive	Barlow doubtful, family history negative	AVN after 2 years	RR=2.61 (0.107, 63.972)	Not significant	Low

Table 19. Evaluation of Infants with Risk Factors for DDH (Accuracy of Physical Exam)

Study	N	Group	Outcome	Results	Significance	Study strength
Burger BJ 1990	14,264	Universal Barlow screening	Sensitivity of exam for dysplasia at 2 years	9.81%	N/A	Low
Burger BJ 1990	14,264	Universal Barlow screening	Specificity of exam for dysplasia at 2 years	99.22%	N/A	Low
Burger BJ 1990	14,264	Universal Barlow screening	Positive predictive value of exam for dysplasia at 2 years	22.1%	N/A	Low
Burger BJ 1990	14,264	Universal Barlow screening	Negative predictive value of exam for dysplasia at 2 years	98.0%	N/A	Low

Table 20. Evaluation of Infants with Risk Factors for DDH (Risk Factor: Breech)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Bache CE. 2002	57,972 (hips)	Breech	No risk	Rate of U/S abnormality at 6 weeks;	RR=2.09 (0.123, 4.07)	Not significant	Low
Bache CE. 2002	57,972 (hips)	Breech	No risk	Treatment required at 6 weeks	RR=4.87 (2.82, 6.93)	Significant	Low
Boo NY. 1989	52,379	Breech	No risk	Neonatal instability	RR= 49.62 (47.33, 51.91)	Significant	Low
Goss PW. 2002	5,166	Breech	Non-breech	Neonatal instability	RR=6.74 (4.68, 8.79)	Significant	Low
Hinderaker T. 1994	917,865	Breech	Non-breech	Neonatal instability	RR= 4.78 (2.82, 6.74)	Significant	Low
Hinderaker T. 1994	862,212	Breech (vaginal)	Non-breech (vaginal)	Neonatal instability	RR= 4.91 (2.94, 6.87)	Significant	Low
Hinderaker T. 1994	55,653	Breech (C. section)	Non-breech (C. section)	Neonatal instability	RR= 4.19 (2.22, 6.16)	Significant	Low
Jones DA. 1989	78	Breech	Non-breech	Neonatal instability	OR=5.49 (2.38, 12.64)	Significant	Low
Khan MR. 1992	1,698	Breech	Non-breech	Neonatal instability	RR= 2.50 (0.09, 4.50)	Not significant	Low

Table 21. Evaluation of Infants with Risk Factors for DDH (Risk Factor: Sex)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Akman A. 2007	403	Female	Male	DDH at 6.4 months (4 weeks-10 months)	RR=1.94 (0.66, 5.69)	Not significant	Low
Bache CE. 2002	58,646 (hips)	Female	Male	Treatment at 6 weeks	RR=12.47 (6.92, 22.46)	Significant	Low
Baronciani D. 1997	4,648	Female	Male	Type IIa sonographic abnormality within 1 week or at mean of 22 days	RR=1.29 (1.21, 1.37)	Significant	Low
Baronciani D. 1997	4,648	Female	Male	Types IIc-IId sonographic abnormalities within 1 week or at mean of 22 days	RR: 3.14 (2.34, 4.20)	Significant	Low
Baronciani D. 1997	4,648	Female	Male	Types III-IV sonographic abnormalities within 1 week or at mean of 22 days	RR: 8.18 (2.85, 23.42)	Significant	Low
Khan MR. 1992	2,222	Female	Male	Hip instability within 48 hours of birth	RR= 2.44 (1.52, 3.93)	Significant	Low
Rosendahl K. 1996	3,613	Female	Male	Immature hip within 3 months of life	RR=1.81 (1.52, 2.16)	Significant	Low
Rosendahl K. 1996	3,613	Female	Male	Minor dysplasia (Graf Type IIc/D, 43 degrees to less than 50 degrees, and IIa) within 3 months of life	RR=4.64 (2.80, 7.71)	Significant	Low
Rosendahl K. 1996	3,613	Female	Male	Major dysplasia (Graf Type III a/b and IV, less than 43 degrees) within 3 months of life	RR=5.49 (1.89, 15.9)	Significant	Low

Table 22. Evaluation of Infants with Risk Factors for DDH (Incidence Study: Sex)

Study	N	Group 1	Group 2	Outcome	Results	Overall Incidence	Significance	Study strength
Boo NY. 1989	52, 379	Female	Male	Neonatal dysplasia	Females 2.27 times more likely	0.7/1000	N/A	Low
Goss PW. 2002	5,166	Female	Male	Neonatal instability	Females 3.35 times more likely	19.4/1000	N/A	Low
Goss PW. 2002	5,166	Female	Male	Splinted NHI at age < 1 week	Females 3.35 times more likely	19.4/1000	N/A	Low
Hinderaker T. 1994	1,059,479	Female	Male	Neonatal instability	Females 1.5 times more likely	9/1000	N/A	Low

Table 23. Evaluation of Infants with Risk Factors for DDH (Risk Factor: Click)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Cunningham KT. 1984	7,864	Clicking hips	Non-clicking hips	Dysplasia at 2-9 months	RR= 56.19 (25.01, 126.24)	Significant	Low
Jones DA. 1989	426	Clicking hips	Non-clicking hips	Neonatal instability (click)	OR=10.36 (6.04, 12.78)	Significant	Low
Jones DA. 1989	426	Clicking hips	Non-clicking hips	Neonatal instability (Ortolani positive)	OR=90.94 (63.8, 1295)	Significant	Low

Table 24. Evaluation of Infants with Risk Factors for DDH (Incidence Study: Click)

Study	Group	N	Outcome	Overall incidence	Significance	Study strength
Kian CA. 1996	General cohort	20,295	Neonatal instability (click)	68.83/1000	N/A	Low
Kian CA. 1996	Clicking hips	1,397	Radiographic acetabular dysplasia at 3 months	244.09/1000	N/A	Low
Kian CA. 1996	Clicking hips	1,397	Acetabular dysplasia at 1 year	81.60/1000	N/A	Low

Table 25. Evaluation of Infants with Risk Factors for DDH (Risk Factor: Gender and Breech)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Bache CE 2002	28,316 (hips)	Female breech	Female no risk	Rate of U/S abnormality at 6 weeks	RR=1.75 (1.49, 2.06)	Significant	Low
Bache CE 2002	28,316 (hips)	Female breech	Female no risk	Treatment rate at 6 weeks	RR=3.99 (2.54, 6.27)	Significant	Low
Rosendahl K 1996	1,644	Female breech	Female no risk	Dysplasia within first 3 months	RR=2.0 (1.10, 3.61)	Significant	Low
Rosendahl K 1996	1,644	Female breech	Female no risk	Immature hip within first 3 months	RR= 0.84 (0.512, 1.38)	Not significant	Low

Table 26. Evaluation of Infants with Risk Factors for DDH (Risk Factor: Gender and Family History)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Bache CE 2002	27,388 (hips)	Female family history	Female no risk	Rate of U/S abnormality at 6 weeks	RR= 3.23 (2.60, 4.00)	Significant	Low
Bache CE 2002	27,388 (hips)	Female family history	Female no risk	Treatment rate at 6 weeks	RR= 2.67 (0.99, 7.20)	Not significant	Low
Rosendahl K 1996	1,688	Female family history	Female no risk	Dysplasia within first 3 months	RR= 1.63 (0.94, 2.85)	Not significant	Low
Rosendahl K 1996	1,688	Female family history	Female no risk	Immature hip within first 3 months	RR= 0.997 (0.68, 1.46)	Not significant	Low

Table 27. Evaluation of Infants with Risk Factors for DDH (Risk Factor: First Born)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Akman A. 2007	497	First born	Non-first born	Neonatal dysplasia	OR=0.62 (0.10, 2.90)	Not significant	Low
Baronciani D 1997	4,648	First born	No risk	Type IIa sonographic abnormality (within 1 week or at mean of 22 days)	RR=1.03 (0.97, 1.10)	Not Significant	Low
Baronciani D 1997	4,648	First born	No risk	Types IIc-IId sonographic abnormalities (within 1 week or at mean of 22 days)	RR=1.01 (0.78, 1.32)	Not Significant	Low
Baronciani D 1997	4,648	First born	No risk	Types III-IV sonographic abnormalities (within 1 week or at mean of 22 days)	RR=1.36 (0.65, 2.87)	Not Significant	Low

Table 28. Evaluation of Infants with Risk Factors for DDH (Incidence Study: First Born)

Study	Group	N	Outcome	Overall incidence	Significance	Study strength
Khan MR. 1992	First born	81	Neonatal instability	185/1000	N/A	Low

Table 29. Evaluation of Infants with Risk Factors for DDH (Risk Factor: Gender and Swaddling)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Akman A. 2007	403	Female swaddling	No swaddling	DDH at 6.4 months (4 weeks-10months)	OR=6.1 (11, 35.2)	Significant	Low

Table 30. Evaluation of Infants with Risk Factors for DDH (Risk Factor: Family History)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Akman A. 2007	403	Family history	Non-family history	DDH at 6.4 months (4 weeks-10months)	OR=1.12 (0.50, 10.7)	Not significant	Low
Bache CE. 2002	56,306 (hips)	Family history	No risk	Rate of U/S abnormality at 6 weeks	RR=3.60 (2.95, 4.38)	Significant	Low
Bache CE. 2002	56,306 (hips)	Family history	No risk	Treatment required at 6 weeks	RR= 4.74 (2.22, 10.12)	Significant	Low

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Baronciani D 1997	4,281	Family history	Non-family history	Type IIa sonographic abnormality within 1 week or at mean of 22 days	RR= 0.93 (0.83, 1.04)	Not significant	Low
Baronciani D 1997	4,281	Family history	Non-family history	Types IIc-IId sonographic abnormalities	RR= 2.14 (1.56, 2.92)	Significant	Low
Baronciani D 1997	4,281	Family history	Non-family history	Types III-IV sonographic abnormalities within 1 week or at mean of 22 days	RR= 3.35 (1.50, 7.48)	Significant	Low
Jones DA. 1989	426	Family history	Non-family history	Neonatal instability	OR=11.35 (3.60, 35.8)	Significant	Low
Rosendahl K. 1996	3,471	Family history	No risk	Dysplasia within first 3 months	RR= 2.92 (1.97, 4.34)	Significant	Low
Rosendahl K. 1996	3,471	Family history	No risk	Immature within first 3 months	RR=1.76 (1.40, 2.21)	Significant	Low
Rosendahl K. 1996	3,317	Family history: one 1st degree relative	No risk	Dysplasia within first 3 months	RR=2.24 (1.23, 4.08)	Significant	Low
Rosendahl K. 1996	3,317	Family history: one 1st degree relative	No risk	Immature within first 3 months	RR=1.36 (0.95, 1.95)	Not significant	Low

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Rosendahl K. 1996	3,320	Family history: two 2nd degree relatives	No risk	Dysplasia within first 3 months	RR= 1.20 (0.53, 2.68)	Not significant	Low
Rosendahl K. 1996	3,320	Family history: two 2nd degree relatives	No risk	Immature within first 3 months	RR=0.82 (0.51, 1.31)	Not significant	Low

Table 31. Evaluation of Infants with Risk Factors for DDH (Incidence Study: Talipes)

Study	Group	N	Outcome	Overall incidence	Significance	Study strength
Khan MR. 1992	Talipes	81	Neonatal instability	37/1000	N/A	Low

Table 32. Evaluation of Infants with Risk Factors for DDH (Ultrasound for Babies with Positive Risk Factors but Normal Physical Exam)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study Strength
Bond C. 1997	101 (hips)	Clicking hips	Non-clicking hips	Average alpha angle <60 degrees at 3 months	RR=0.609 (0.012, 30.096)	Not significant	Low
Bond C. 1997	101 (hips)	Clicking hips	Non-clicking hips	Femoral head coverage <50% at 3 months	RR=0.609 (0.012, 30.096)	Not significant	Low
Paton R. 1999	1,107	Positive risk factors only	Clinical instability	Ultrasound detected dislocation before 6 months of age	RR=0.153 (0.076, 0.308)	Significant	Moderate
Paton R. 1999	818	Breech	Clinical instability	Ultrasound detected dislocation before 6 months of age	RR=0.194 (0.092, 0.409)	Significant	Moderate
Paton R. 1999	344	Family history	Clinical instability	Ultrasound detected dislocation before 6 months of age	RR=0.197 (0.027, 1.427)	Not significant	Moderate
Paton R. 1999	426	Foot abnormality	Clinical instability	Ultrasound detected dislocation before 6 months of age	RR=0.082 (0.011, 0.597)	Significant	Moderate
Paton R. 2005	2,578	Positive risk factors only	Clinical instability	Ultrasound detected instability at 2-9 weeks	RR=2.130 (1.329, 3.413)	Significant	Moderate
Paton R. 2005	3,462	Breech	Clinical instability	Dislocation and type-3 dysplasia at 2-9 weeks	RR=1.501 (1.026, 2.196)	Significant	Moderate
Paton R. 2005	2,346	Family history	Clinical instability	Ultrasound detected instability at 2-9 weeks	RR=2.735 (1.568, 4.770)	Significant	Moderate
Paton R. 2005	2,553	Foot deformity	Clinical instability	Ultrasound detected instability at 2-9 weeks	RR=1.221 (0.672, 2.220)	Not significant	Moderate

Table 33. Evaluation of Infants with Risk Factors for DDH (Radiographic Imaging After 4 Months for Babies with Risk Factors)

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Garvey M. 1992	116	Family history	N/A	N/A	Radiographic acetabular dysplasia at 4 months (mild to severe) (incidence/1000)	181 (116-263)	N/A	Low
Garvey M. 1992	116	Family history	N/A	N/A	Radiographic acetabular dysplasia at 4 months (severe) (incidence/1000)	43 (14-98)	N/A	Low
Garvey M. 1992	116	Family history	N/A	N/A	Radiographic acetabular dysplasia at 4 months (Moderate) (incidence/1000)	69(30-131)	N/A	Low
Garvey M. 1992	116	Family history	N/A	N/A	Radiographic acetabular dysplasia at 4 months (Mild) (incidence/1000)	69(30-131)	N/A	Low
Garvey M. 1992	143	Breech Delivery	N/A	N/A	Radiographic acetabular dysplasia at 4 months (mild to severe) (incidence/1000)	84(44-141)	N/A	Low

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Garvey M. 1992	143	Breech Delivery	N/A	N/A	Radiographic acetabular dysplasia at 4 months (severe) (incidence/1000)	7(.1-38)	N/A	Low
Garvey M. 1992	143	Breech Delivery	N/A	N/A	Radiographic acetabular dysplasia at 4 months (Moderate) (incidence/1000)	28(8-70)	N/A	Low
Garvey M. 1992	143	Breech Delivery	N/A	N/A	Radiographic acetabular dysplasia at 4 months (Mild) (incidence/1000)	49(20-98)	N/A	Low
Garvey M. 1992	98	Persistent click	N/A	N/A	Radiographic acetabular dysplasia at 4 months (mild to severe) (incidence/1000)	133(73-216)	N/A	Low
Garvey M. 1992	98	Persistent click	N/A	N/A	Radiographic acetabular dysplasia at 4 months (severe) (incidence/1000)	0/98	N/A	Low

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Garvey M. 1992	98	Persistent click	N/A	N/A	Radiographic acetabular dysplasia at 4 months (Moderate) (incidence/1000)	71(29-142)	N/A	Low
Garvey M. 1992	98	Persistent click	N/A	N/A	Radiographic acetabular dysplasia at 4 months (Mild) (incidence/1000)	61.2(23-139)	N/A	Low
Garvey M. 1992	256	Family history or breech or click in patients who were radiographically normal at 4 months	N/A	N/A	Developed radiographic dysplasia at 15 months	0/256 patients	N/A	low
Garvey M. 1992	357	Family history or breech or persistent click	N/A	N/A	Radiographic abnormality at 4 months (incidence/1000)	129(96-168)	N/A	Low
Garvey M. 1992	357	Family history or breech or persistent click	N/A	N/A	Treatment required at 4 months (incidence/1000)	34(17-58)	N/A	Low

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Garvey M. 1992	46	Radiographic abnormality at 4 months	N/A	N/A	No treatment required (incidence/1000)	739 (589-857)	N/A	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Mild radiographic acetabular dysplasia at 4 months	Family history vs. Breech RR=1.41 (0.526, 3.770)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Mild radiographic acetabular dysplasia at 4 months	Family history vs. Persistent click RR=1.13 (0.405, 3.136)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Mild radiographic acetabular dysplasia at 4 months	Breech vs. Persistent click RR=0.80 (0.277, 2.307)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Moderate radiographic acetabular dysplasia at 4 months	Family history vs. Breech RR=2.47 (0.761, 7.983)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Moderate radiographic acetabular dysplasia at 4 months	Family history vs. Persistent click RR=0.966 (0.363, 2.568)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Moderate radiographic acetabular dysplasia at 4 months	Breech vs. Persistent click RR=.392 (0.118, 1.302)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Severe radiographic acetabular dysplasia at 4 months	Family history vs. Breech RR=4.22 (0.502, 35.551)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Severe radiographic acetabular dysplasia at 4 months	Family history vs. Persistent click RR=9.308 (0.521, 166.26)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Severe radiographic acetabular dysplasia at 4 months	Breech vs. Persistent click RR=2.06 (0.090, 50.12)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Mild radiographic acetabular dysplasia at 15 months	Family history vs. Breech RR=1.23 (0.025, 61.562)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Mild radiographic acetabular dysplasia at 15 months	Family history vs. Persistent click RR=0.846 (0.017, 42.258)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Mild radiographic acetabular dysplasia at 15 months	Breech vs. Persistent click RR=0.688 (0.014, 34.362)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Moderate radiographic acetabular dysplasia at 15 months	Family history vs. Breech RR=1.23 (0.025, 61.562)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Moderate radiographic acetabular dysplasia at 15 months	Family history vs. Persistent click RR=0.846 (0.017, 42.258)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Outcome	Results	Significance	Strength
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Moderate radiographic acetabular dysplasia at 15 months	Breech vs. Persistent click RR=0.688 (0.014, 34.362)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Severe radiographic acetabular dysplasia at 15 months	Family history vs. Breech RR=1.23 (0.025, 61.562)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Severe radiographic acetabular dysplasia at 15 months	Family history vs. Persistent click RR=0.846 (0.017, 42.258)	Not significant	Low
Garvey M. 1992	357	Family history	Breech presentation at birth	Persistent click	Severe radiographic acetabular dysplasia at 15 months	Breech vs. Persistent click RR=0.688 (0.014, 34.362)	Not significant	Low

Figure 2. Meta-Analysis of the Breech Risk Factor

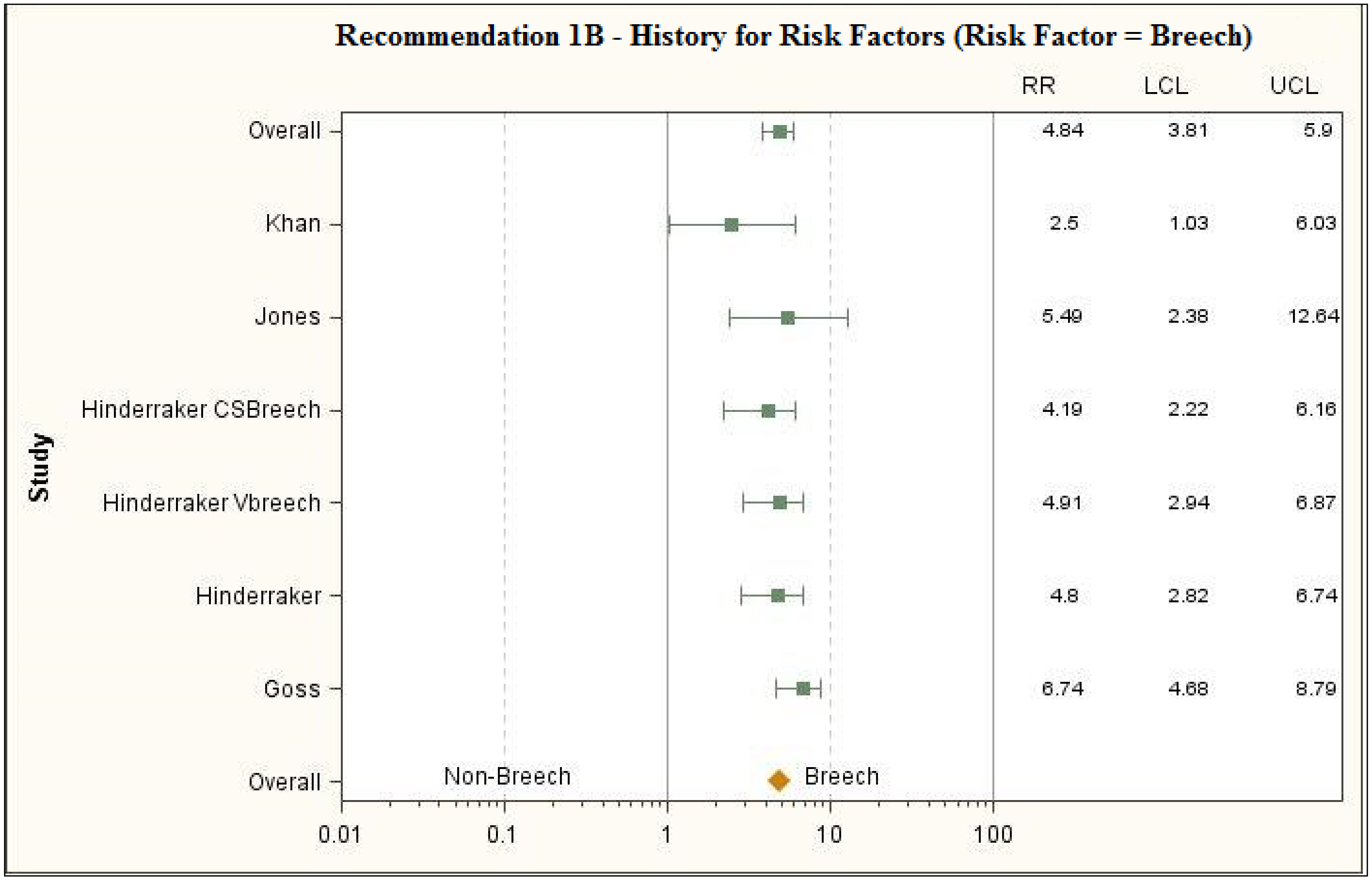
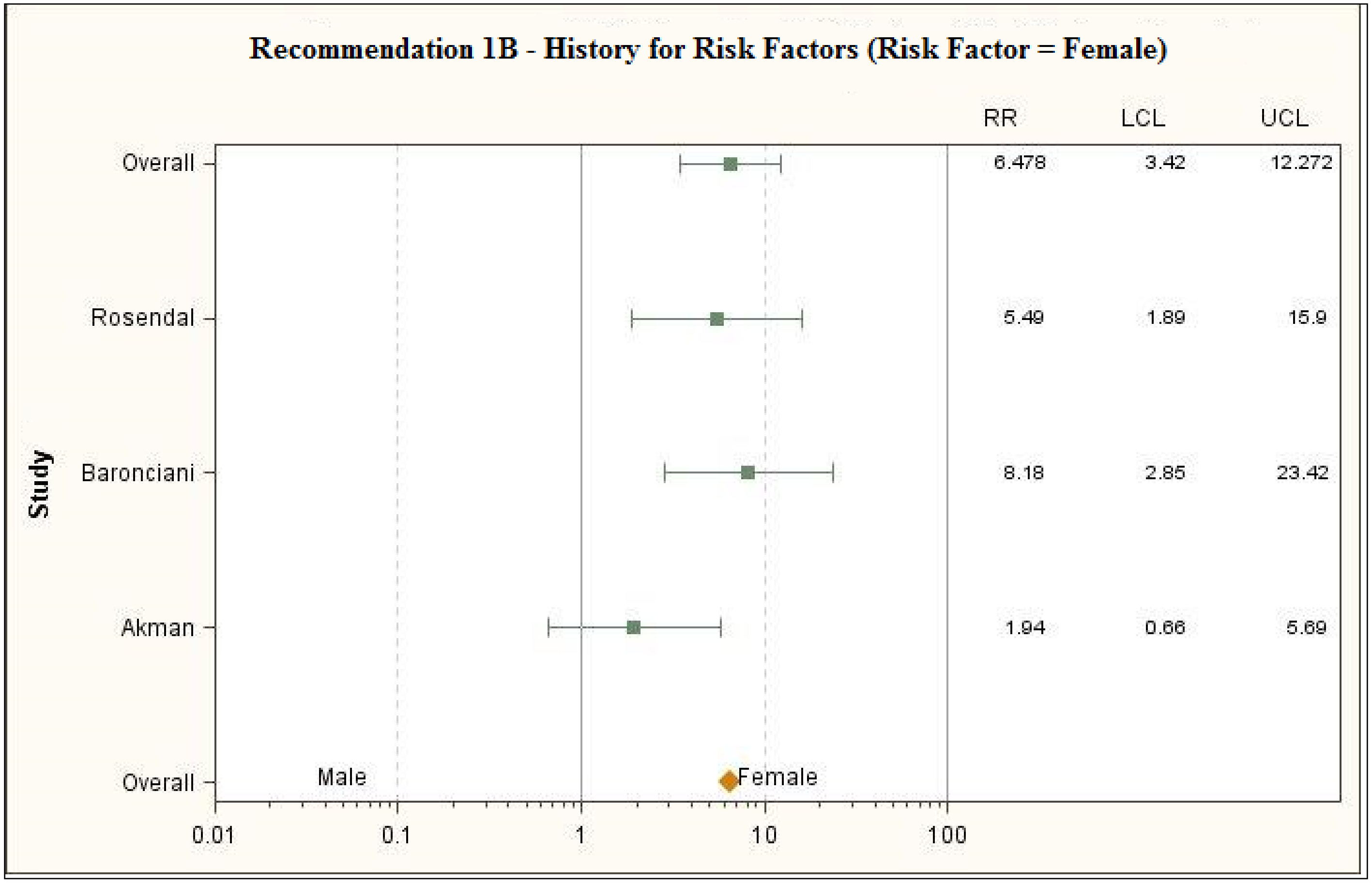


Figure 3. Meta-Analysis of the Female Risk Factor



IMAGING OF THE UNSTABLE HIP

Limited evidence supports that the practitioner might obtain an ultrasound in infants less than 6 weeks of age with a positive instability examination to guide the decision to initiate brace treatment.

Strength of Recommendation: Limited ★★☆☆

RATIONALE

If faced with an unstable hip examination, there is limited evidence to support the use of sequential ultrasound to aid in determining when to initiate brace treatment for infants up to 8 weeks of age. Fewer children may undergo brace treatment with no difference in the occurrence of late dysplasia. One moderate strength study showed fewer children in the ultrasound group had abduction splinting in the first two years than did those in the no ultrasound group (0·78; 0·65–0·94; p=0·01). [19] The primary outcome was the appearance on hip radiographs by two years. Secondary outcomes included surgical treatment, abduction splinting, level of mobility, resource use, and costs. Analysis was by intention to treat. Protocol compliance was high, and radiographic information was available for 91% of children by 12–14 months and 85% by 2 years. By age 2 years, subluxation, dislocation, or acetabular dysplasia were identified by radiography on one or both hips of 21 children in each of the groups (relative risk 1·00; 95% CI 0·56–1·80).

Surgical treatment was required by 21 infants in the ultrasound group (6·7%) and 25 (7·9%) in the no-ultrasound group (0·84; 0·48–1·47). One child from the ultrasound group and four from the no-ultrasound group were not walking by 2 years (0·25; 0·03–2·53; p=0·37). Initially this study was graded as high strength, but was downgraded to moderate strength because the rate of splint treatment was not the primary outcome. Additionally, it is unclear that all subjects were normal infants with DDH and no confounding diagnoses.

In this study infants with hips that had minor instability were not immediately treated. Experienced doctors performed the clinical examinations. Even though there is even distribution between the groups in terms of number of history of instability, subgroup analysis of dislocated versus dysplastic hip results were not available.

Harms

There is a potential delay of necessary treatment.

SUPPORTING EVIDENCE
QUALITY AND APPLICABILITY

Table 34. Quality and Applicability for Imaging of the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Elbourne D. 2002	Borderline-abnormal radiographic appearance at age 2	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Avascular necrosis present	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Avascular necrosis suspected	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Treatment rate	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D.	Treatment rate	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate

Table 34. Quality and Applicability for Imaging of the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
2002	among subgroup with bilateral hip abnormality on physical exam														
Elbourne D. 2002	Splint treatment rate	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Surgical treatment rate	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Hip related hospital admissions	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Total hospital admissions	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Treatment rate: subgroup who	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate

Table 34. Quality and Applicability for Imaging of the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
	warranted referral to specialist														
Elbourne D. 2002	Treatment rate: subgroup with clinical suspicion warranting early prophylactic splinting	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Treatment rate among subgroup with previous instability, suspicious results of clinical exam, or both	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Treatment rate among subgroup with clinical diagnosis of dislocatable/subluxat	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate

Table 34. Quality and Applicability for Imaging of the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
	able/dislocated hip														
Elbourne D. 2002	Splint treatment rate among subgroup with unilateral hip abnormality	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Splint treatment rate among subgroup with bilateral hip abnormality	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Operative treatment rate among subgroup with unilateral hip abnormality	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate

Table 34. Quality and Applicability for Imaging of the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Elbourne D. 2002	Operative treatment rate among subgroup with bilateral hip abnormality	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Splint treatment rate among subgroup who warranted referral to specialist	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Splint treatment rate among subgroup with clinical suspicion warranting early prophylactic splinting	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Operative treatment rate among subgroup	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate

Table 34. Quality and Applicability for Imaging of the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
	who warranted referral to specialist														
Elbourne D. 2002	Operative treatment rate among subgroup with clinical suspicion warranting early prophylactic splinting	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Splinting treatment rate among subgroup with previous instability, results of clinical exam, or both	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Splinting treatment rate among subgroup with clinical	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate

Table 34. Quality and Applicability for Imaging of the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
	diagnosis of dislocatable/subluxatable/dislocated hip														
Elbourne D. 2002	Operative treatment rate among subgroup with previous instability, suspicious results of clinical exam, or both	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate
Elbourne D. 2002	Operative treatment rate among subgroup with clinical diagnosis of dislocatable/subluxatable/dislocated hip	●	●	●	●	●	○	●	Moderate	○	○	●	●	Moderate	Moderate

RESULTS

Table 35. Ultrasound Screening for Children with Positive Instability

Study	Outcome	Follow up time	Age	Treatment Group	Control Group	N	Results	Favors
Elbourne D. 2002	borderline-abnormal radiographic appearance at age 2	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	629	RR=1.00 (0.56, 1.80)	NS
Elbourne D. 2002	avascular necrosis present	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	629	RR=0.50 (0.05, 5.50)	NS
Elbourne D. 2002)	avascular necrosis suspected	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	629	RR=1.61 (0.53, 4.85)	NS
Elbourne D. 2002	Treatment rate	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	427	RR=.72 (.57-.90)	ultrasound for clinically unstable hips
Elbourne D. 2002)	Treatment rate among subgroup with bilateral hip abnormality on physical exam	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	202	RR=.96 (.73–1.26)	NS
Elbourne D. 2002)	Splint treatment rate	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	629	RR=0.78 (0.65, 0.94)	ultrasound for clinically unstable hips
Elbourne D. 2002	surgical treatment rate	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	629	RR=0.84 (0.48, 1.47)	NS
Elbourne D. 2002	hip related hospital admissions	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	629	RR=0.77 (0.46, 1.29)	NS

Study	Outcome	Follow up time	Age	Treatment Group	Control Group	N	Results	Favors
Elbourne D. 2002	total hospital admissions	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	629	RR=2.22 (1.46, 3.39)	NS
Elbourne D. 2002	Treatment rate: subgroup who warranted referral to specialist	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	445	RR=.86 (.64–1.19)	NS
Elbourne D. 2002	Treatment rate: subgroup with clinical suspicion warranting early prophylactic splinting	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	184	RR=.71 (.61–.82)	ultrasound for clinically unstable hips
Elbourne D. 2002	Treatment rate among subgroup with previous instability, suspicious results of clinical exam, or both	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	270	RR=.63(.35–1.13)	NS
Elbourne D. 2002	Treatment rate among subgroup with clinical diagnosis of dislocatable/subluxatable/dislocated hip	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	359	RR=.83 (.72–96)	ultrasound for clinically unstable hips
Elbourne D. 2002	Splint treatment rate among subgroup with unilateral hip abnormality	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	427	RR=.72 (.56–91)	ultrasound for clinically unstable hips
Elbourne D. 2002	Splint treatment rate among subgroup with bilateral hip abnormality	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	202	RR=.92 (.69–1.22)	NS
Elbourne D. 2002	operative treatment rate among subgroup with unilateral hip abnormality	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	427	RR=.55 (.25–1.22)	NS
Elbourne D. 2002	operative treatment rate among subgroup with bilateral hip abnormality	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	202	RR=1.41 (.62–3.21)	NS

Study	Outcome	Follow up time	Age	Treatment Group	Control Group	N	Results	Favors
Elbourne D. 2002	splint treatment rate among subgroup who warranted referral to specialist	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	445	RR= 0.87 (0.64–1.19)	NS
Elbourne D. 2002	splint treatment rate among subgroup with clinical suspicion warranting early prophylactic splinting	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	184	RR=0·69 (0·59–0·80)	ultrasound for clinically unstable hips
Elbourne (2002)	Operative treatment rate among subgroup who warranted referral to specialist	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	445	RR=1·03 (0·50–2·11)	NS
Elbourne D. 2002	operative treatment rate among subgroup with clinical suspicion warranting early prophylactic splinting	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	184	RR=0·60 (0·24–1·47)	NS
Elbourne D. 2002	splinting treatment rate among subgroup with previous instability, results of clinical exam, or both	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	270	RR=0·63 (0·34–1·17)	NS
Elbourne D. 2002	Splinting treatment rate among subgroup with clinical diagnosis of dislocatable/subluxatable/dislocated hip	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	359	RR=0·82 (0·70–0·96)	ultrasound for clinically unstable hips
Elbourne D. 2002	operative treatment rate among subgroup with previous instability, suspicious results of clinical exam, or both	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	270	RR=0·79 (0·22–2·87)	NS
Elbourne D. 2002	Operative treatment rate among subgroup with clinical diagnosis of dislocatable/subluxatable/dislocated hip	2 years	at least 2 weeks	Ultrasound screening for clinical instability	no ultrasound screening for clinical instability	359	RR=0·86 (0·47–1·59)	NS
Paton R. 1999	Ultrasound detected dislocation rate per 1000	followed for 5 years	0 to 2 weeks	ultrasound for clinical instability	ultrasound for patients with risk factors but no instability	1107	Clinical instability= 87 (57-126)/risk factors only 13(7-24)	ultrasound for clinically unstable hips

Study	Outcome	Follow up time	Age	Treatment Group	Control Group	N	Results	Favors
Paton R. 2005	number needed to detect one dislocation	followed for 10 years	0 to 2 weeks	ultrasound for clinical instability only	ultrasound for patients with risk factors but no instability	2578	Clinical instability 1:8.5(6.6-11.2)/risk factor referrals only= 1:88(59.7-138)	ultrasound for clinically unstable hips

IMAGING OF THE INFANT HIP

Limited evidence supports the use of an AP pelvis radiograph instead of an ultrasound to assess DDH in infants beginning at 4 months of age.

Strength of Recommendation: Limited ★★☆☆

RATIONALE

There is limited evidence that an AP pelvis radiograph is preferred to the use of ultrasound to assess for DDH in infants from 4-6 months of age. This evidence does not distinguish between children with normal or abnormal physical examinations or between children with and without risk factors for DDH. One moderate-strength study investigated the radiographic assessment of every ultrasound positive hip in children four to six months of age.[20] Seventy-four infants with ultrasound positive hips for acetabular dysplasia who met criteria for treatment received an AP pelvis radiograph. Of these 74 infants, 30 were found to have satisfactory acetabular indices and did not receive treatment.

Limitations of this study include the lack of long-term follow-up of the infants to determine if the radiographic assessment altered outcome and failed to address the optimal time of conversion from ultrasound to radiographic assessment in infants with DDH.

Risks and Harms of Recommendation:

Radiographs involve exposure to ionizing radiation.

SUPPORTING EVIDENCE
QUALITY AND APPLICABILITY

Table 36. Quality and Applicability: Studies for Imaging of the Infant Hip

●: Domain free of flaws

○: Domain flaws present

Study	Test	Reporting (Penalty)	Index Test	Reference Test	Participants	Information	Study Design	*Quality*	Participants	Index Test	Directness of Results	Analysis	*Applicability*	*Strength*
Tudor A. 2007	Treatment needed based upon abnormality at 4-6 months	○	●	○	●	●	○	Low	●	●	●	●	High	Moderate
Tudor A. 2007	AI ≥30 degrees at 4-6 months	○	●	○	●	●	○	Low	●	●	●	●	High	Moderate
Tudor A. 2007	AI ≥31 degrees at 4-6 months	○	●	○	●	●	○	Low	●	●	●	●	High	Moderate
Tudor A. 2007	AI ≥32 degrees at 4-6 months	○	●	○	●	●	○	Low	●	●	●	●	High	Moderate

FINAL STRENGTH OF EVIDENCE

Limited

RESULTS

Table 37. Imaging of the Infant Hip (Imaging Exam Transition from Ultrasound to Radiograph at 4-6 months)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Strength
Tudor A. 2007	715	Ultrasound at 4-6 months	Radiograph at 4-6 months	Treatment needed based upon abnormality at 4-6 months	RR=1.68 (1.17, 2.42)	Significant	Moderate
Tudor A. 2007	715	Abnormal on ultrasound	Radiograph of babies abnormal on ultrasound	AI ≥30 degrees at 4-6 months	T=5.6 p<0.01	Significant	Moderate
Tudor A. 2007	715	Abnormal on ultrasound	Radiograph of babies abnormal on ultrasound	AI ≥31 degrees at 4-6 months	T=6.5 p<0.01	Significant	Moderate
Tudor A. 2007	715	Abnormal on ultrasound	Radiograph of babies abnormal on ultrasound	AI ≥32 degrees at 4-6 months	T=6.8 p<0.01	Significant	Moderate

SURVEILLANCE AFTER NORMAL INFANT HIP EXAM

Limited evidence supports that a practitioner re-examine infants previously screened as having a normal hip examination on subsequent visits prior to 6 months of age.

Strength of Recommendation: Limited ★★☆☆

RATIONALE

If faced with a child who has a normal physical examination, there is limited evidence that performing subsequent hip physical examination screening of children up to 6 months of age will detect additional children with DDH. The reviewed literature does not include the screening of children up to walking age when other examination findings such as gait abnormalities may allow for detection of additional children with DDH. One low strength study presented evidence that repeated studies at three months were productive in identifying late diagnosed DDH. [22] Another low strength study noted that exams at eight months of age had a high rate of false positives, but no yield of true positives.[21]

There is no literature to define the optimal frequency or duration of follow-up surveillance.

Risks and Harms

There is a potential risk of over diagnosis and treatment.

SUPPORTING EVIDENCE

QUALITY AND APPLICABILITY

Table 38. Quality and Applicability: Surveillance after normal infant hip exam

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Myles JW 1990	Instability at birth	●	○	○	○	○	○	●	Low	●	○	●	●	Moderate	Low
Myles JW 1990	Instability at birth or 3 months	●	○	○	○	○	○	●	Low	●	○	●	●	Moderate	Low
Myles JW 1990	Late presenting dysplasia	●	○	○	○	○	○	●	Low	●	○	●	●	Moderate	Low
Cooke SJ 2011	Instability at birth or 8 months	●	○	○	●	○	○	○	Low	●	○	●	●	Moderate	Low

RESULTS

Table 39. Surveillance after normal infant hip exam (Subsequent Screening)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study strength
Myles JW 1990	8,661	Primary clinical screening	Secondary clinical screening for previously negative clinical exam	Instability at birth:	RR=3.33 (2.50, 4.44)	Significant	Low
Myles JW 1990	7,806	1 year span: Primary clinical screening only	2 year span: Secondary clinical screening for previously negative clinical exam	Instability at birth or 3 months	RR=38.76 (15.89, 94.53)	Significant	Low
Myles JW 1990	7,806	1 year span: Primary clinical screening only	2 year span: Secondary clinical screening for previously negative clinical exam	Late presenting dysplasia	RR=2.51 (0.74, 8.58)	Not significant	Low
Cooke SJ 2011	1,030	Clinical screening within neonatal period	Secondary clinical screening at 8 months	Instability at birth or 8 months	RR=0.013 (0.001, 0.214)	Significant	Low

STABLE HIP WITH ULTRASOUND IMAGING ABNORMALITIES

Limited evidence supports observation without a brace for infants with a clinically stable hip with morphologic ultrasound imaging abnormalities.

Strength of Recommendation: Limited ★★☆☆

RATIONALE

For an infant with a normal physical examination and ultrasound abnormalities, there is limited evidence to support observation without treatment of that infant with serial ultrasound evaluation up to 6 weeks of age. One low-strength study evaluated a group of at-risk patients who were evaluated by ultrasound between two and six weeks of age with clinically stable hips showing ultrasonographic abnormalities that were randomized to treatment with Pavlik harness or observation.[23]The two primary outcome measures were the acetabular coverage on ultrasound and acetabular index on radiograph. While acetabular coverage, measured ultrasonographically, improved in both groups, and was statistically better in the splinted group at the final, three month follow-up, there was no difference in acetabular index.

Risks and Harms

The risk of implementing this recommendation is that necessary treatment could be delayed.

SUPPORTING EVIDENCE

QUALITY AND APPLICABILITY

Table 40. Quality and Applicability: Stable Hip with Ultrasound Imaging Abnormalities

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Wood MK. 2000	Change in acetabular cover percentage after 3 months	●	○	○	○	●	○	○	Low	●	○	○	○	Moderate	Low
Wood MK. 2000	Acetabular index after 3 months	●	○	○	○	●	○	○	Low	●	○	○	○	Moderate	Low

RESULTS

Table 41. Stable Hip with Ultrasound Imaging Abnormalities (Treatment Versus Surveillance)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study Strength
Wood MK. 2000	44	Pavlik harness for 6-12 weeks (aged 2-6 weeks)	Observation until aged 3 to 4 months	Change in acetabular cover percentage after 3 months	9.6%; Improvement greater in the splinted group (p<.003)	Significant	Low
Wood MK. 2000	44	Pavlik harness for 6-12 weeks (aged 2-6 weeks)	Observation until aged 3 to 4 months	Acetabular index after 3 months	MD=.51 (p>.05)	Not significant	Low

TREATMENT OF CLINICAL INSTABILITY

Limited evidence supports either immediate or delayed (2-9 weeks) brace treatment for hips with a positive instability exam.

Strength of Recommendation: Limited

RATIONALE

For infants with a positive hip instability exam, there is conflicting evidence about whether a period of observation or immediate brace treatment leads to a difference in later dysplasia or persistent hip instability leading to later brace treatment. One moderate strength and three low strength studies looked at radiographic differences between an early versus late brace treatment group. [24, 25(follow-up), 26, 27, 28] None of these studies differentiate dislocated from dislocatable hips.

Gardiner found a significant difference in the radiographic appearance of the femoral capital epiphysis and delayed iliac indentation at 6 months for a no treatment group compared to a brace group.[25] Twenty-nine percent of the non-treatment group had cross-over and were treated at two weeks. Limitations were not defining the femoral capital epiphyseal ossification subcategories and iliac indentation and not explaining the relevance of either.

Molto compared Von Rosen splinting immediately after birth to splinting after two weeks. [26] The outcome criterion was acetabular index. They noted a significant improvement in the acetabular index at 15 months in the immediate treatment group (76 patients) as compared to the 27 patients in the second group treated after two weeks.

Paton reported on 75 hips in 2 groups, including 37 patients (59 hips) in the early splint treatment group versus 11 patients (16 hips) in the late splint treatment group.[27] Outcome measures included continued instability that required late splint treatment after six weeks, radiographic abnormality, AVN, or surgical intervention at walking age. Authors noted no significant differences when treatment started at less than one week in the early treatment group versus nine weeks on average in the delayed treatment group. This study included both dislocatable and dislocated hips with outcome measures not specifically correlated to the nature of the instability.

Risk/Harms:

The risks/harms of this recommendation are overtreatment and the potential complications and burden of care.

SUPPORTING EVIDENCE

QUALITY AND APPLICABILITY

Table 42. Quality and Applicability: Studies for Treatment of Clinical Instability

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Gardiner H. 1990	Sonographic instability at 6-8 weeks	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate
Gardiner H. 1990	Sonographic instability at 6 months	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate
Gardiner H. 1990	Sonographic instability at 1 year	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate
Gardiner H. 1990	Absence of one or	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
	both femoral capital epiphyses at 6 months														
Gardiner H. 1990	AVN at 6 months	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate
Gardiner H. 1992	Femoral capital epiphysis at 6 months on radiograph	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate
Gardiner H. 1992	Iliac indentation at 6 months on radiograph	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate
Gardiner H. 1992	Acetabular Angle at 6 months on radiograph	●	○	●	●	●	○	○	Moderate	●	○	○	●	Moderate	Moderate
Molto L. 2002	Acetabular index > 25 degrees at 3 months	●	○	○	○	●	○	○	Low	●	○	●	●	Moderate	Low

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Molto L. 2002	Acetabular index > 25 degrees at 15 months	●	○	○	○	●	○	○	Low	●	○	●	●	Moderate	Low
Molto L. 2002	Acetabular index > 30 degrees at 3 months	●	○	○	○	●	○	○	Low	●	○	●	●	Moderate	Low
Molto L. 2002	Acetabular index > 30 degrees at 15 months	●	○	○	○	●	○	○	Low	●	○	●	●	Moderate	Low
Paton R. 2004	Late splintage required after 6 weeks	●	○	○	○	●	●	○	Low	●	●	○	●	Moderate	Low
Paton R. 2004	Radiographic abnormality at walking age	●	○	○	○	●	●	○	Low	●	●	○	●	Moderate	Low
Paton R. 2004	AVN at walking age	●	○	○	○	●	●	○	Low	●	●	○	●	Moderate	Low

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Paton R. 2004	Surgical intervention at walking age	●	○	○	○	●	●	○	Low	●	●	○	●	Moderate	Low
Wilkinson A. 2002	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low
Wilkinson A. 2002	c/b ratio >.75 at 6-12 months (radiograph)	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low
Wilkinson A. 2002	moderately dysplastic or worse hips at 6-12 months (radiograph)	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low
Wilkinson A. 2002	Further treatment with plaster or surgery at 6-12 months	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low
Wilkinson A. 2002	Further treatment with plaster at 6-12 months	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Wilkinson A. 2002	Surgery at 6-12 months	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low

RESULTS

Table 43. Treatment of Clinical Instability (Treatment Versus No Treatment)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Strength
Gardiner H. 1990	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	Sonographic instability at 6-8 weeks	RR=0.556 (0.143, 2.17)	Not significant	Moderate
Gardiner H. 1990	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	Sonographic instability at 6 months	RR=0.46 (0.09, 2.39)	Not significant	Moderate
Gardiner H. 1990	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	Sonographic instability at 1 year	RR=0.46 (0.04, 4.91)	Not significant	Moderate
Gardiner H. 1990	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	Absence of one or both femoral capital epiphyses at 6 months	RR=1.62 (0.77, 3.43)	Not significant	Moderate
Gardiner H. 1990	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	AVN at 6 months	RR=1.05 (0.02, 51.6)	Not significant	Moderate

Study	N	Group 1	Group 2	Outcome	Results	Significance	Strength
Gardiner H. 1992	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	Femoral capital epiphysis at 6 months on radiograph (Means: 1.57) (SD: 1.05)	T-test=2.30 $p<0.05$	Significant	Moderate
Gardiner H. 1992	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	Iliac indentation at 6 months on radiograph (Means: 1.95) (SD: 0.75)	T-test=3.38 $p<0.01$	Significant	Moderate
Gardiner H. 1992	79	Treatment (splint)	No treatment (29% splinted at 2 weeks)	Acetabular Angle at 6 months on radiograph (Means: 26.28) (SD: 4.85)	T-test=0.63 $p>.05$	Not significant	Moderate
Wilkinson A. 2002	80 (hips)	Treatment (Pavlik)	No treatment	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Pavlik vs. No splint SWMD= 0.48 (0.39, 0.42)	Significant	Low
Wilkinson A. 2002	80 (hips)	Treatment (Pavlik)	No treatment	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Pavlik vs. No splint RD= -0.03 (-0.23, 0.18)	Significant	Low
Wilkinson A. 2002	80 (hips)	Treatment (Pavlik)	No treatment	C/B ratio >.75 at 6-12 months (radiograph)	Pavlik vs. No splint RD= 0.00 (0.00, 0.00)	Not significant	Low
Wilkinson A. 2002	80 (hips)	Treatment (Pavlik)	No treatment	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Pavlik vs. No splint RD= 0.16 (0.16, 0.16)	Significant	Low
Wilkinson A.	80 (hips	Treatment (Pavlik)	No treatmen	Further treatment (plaster and/or operation) at 6-12 months	Pavlik vs. No splint	Not significant	Low

Study	N	Group 1	Group 2	Outcome	Results	Significance	Strength
2002	)		t		RD= 0.03 (-0.17, 0.20)		
Wilkinson A. 2002	80 (hips)	Treatment (Pavlik)	No treatment	Plaster at 6-12 months	Pavlik vs. No splint RD= 0.02 (-0.17, 0.20)	Not significant	Low
Wilkinson A. 2002	80 (hips)	Treatment (Pavlik)	No treatment	Operation at 6-12 months	Pavlik vs. No splint RD= 0.02 (-0.09, 0.12)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Treatment (Craig)	No treatment	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Craig vs. No splint SWMD= 0.14 (-0.20, 0.44)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Treatment (Craig)	No treatment	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Craig vs. No splint RD= -0.07 (-0.29, 0.16)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Treatment (Craig)	No treatment	C/B ratio >.75 at 6-12 months (radiograph)	Craig vs. No splint RD= 0.08 (-0.16, 0.33)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Treatment (Craig)	No treatment	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Craig vs. No splint RD= -0.02 (-0.20, 0.16)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Treatment (Craig)	No treatment	Further treatment (plaster and/or operation) at 6-12 months	Craig vs. No splint RD= -0.13 (-0.32, 0.07)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Treatment (Craig)	No treatment	Plaster at 6-12 months	Craig vs. No splint RD= -0.11 (-0.11, -0.11)	Significant	Low
Wilkinson A. 2002	65 (hips)	Treatment (Craig)	No treatment	Operation at 6-12 months	Craig vs. No splint RD= -0.02 (-0.02, -0.02)	Significant	Low
Wilkinso	63	Treatment	No	Mean (+/-) improvement on ultrasound between 1st exam and 12-20		Not	Low

Study	N	Group 1	Group 2	Outcome	Results	Significance	Strength
n A. 2002	(hips)	(Von Rosen)	treatment	weeks	Von Rosen vs. No splint SWMD= -0.64 (-1.20, 0.02)	significant	
Wilkinson A. 2002	63 (hips)	Treatment (Von Rosen)	No treatment	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Von Rosen vs. No splint RD= -0.27 (-0.46, -0.09)	Significant	Low
Wilkinson A. 2002	63 (hips)	Treatment (Von Rosen)	No treatment	C/B ratio >.75 at 6-12 months (radiograph)	Von Rosen vs. No splint RD= 0.05 (-0.20, 0.30)	Not significant	Low
Wilkinson A. 2002	63 (hips)	Treatment (Von Rosen)	No treatment	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Von Rosen vs. No splint RD= -0.16 (-0.28, -0.04)	Significant	Low
Wilkinson A. 2002	63 (hips)	Treatment (Von Rosen)	No treatment	Further treatment (plaster and/or operation) at 6-12 months	Von Rosen vs. No splint RD= -0.27 (-0.41, -0.13)	Significant	Low
Wilkinson A. 2002	63 (hips)	Treatment (Von Rosen)	No treatment	Plaster at 6-12 months	Von Rosen vs. No splint RD= -0.22 (-0.35, -0.08)	Significant	Low
Wilkinson A. 2002	63 (hips)	Treatment (Von Rosen)	No treatment	Operation at 6-12 months	Von Rosen vs. No splint	Not significant	Low

Study	N	Group 1	Group 2	Outcome	Results	Significance	Strength
					RD= -0.05 (-0.13, 0.02)		
Wilkinson A. 2002	134 (hips)	Treatment (all splint)	No treatment	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	All splint vs. No splint SWMD= 0.07 (-2.05, 1.83)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Treatment (all splint)	No treatment	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	All splint vs. No splint RD= -0.10 (-0.28, 0.07)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Treatment (all splint)	No treatment	C/B ratio >.75 at 6-12 months (radiograph)	All splint vs. No splint RD= 0.04 (-0.15, 0.23)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Treatment (all splint)	No treatment	Moderately dysplastic or worse hips at 6-12 months (radiograph)	All splint vs. No splint RD= 0.02 (-0.12, 0.17)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Treatment (all splint)	No treatment	Further treatment (plaster and/or operation) at 6-12 months	All splint vs. No splint RD= -0.10 (-0.26, 0.07)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Treatment (all splint)	No treatment	Plaster at 6-12 months	All splint vs. No splint RD= -0.08 (-0.23, 0.07)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Treatment (all splint)	No treatment	Operation at 6-12 months	All splint vs. No splint RD= -0.01 (-0.10, 0.07)	Not significant	Low

Table 44. Treatment of Clinical Instability (Early Splinting Versus Delayed Splinting)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Strength
Molto L. 2002	111 (hips)	Immediate treatment after birth (Von Rosen)	Treatment after 2 weeks (Von Rosen)	Acetabular index > 25 degrees at 3 months	RR=1.44 (0.796, 2.600)	Not significant	Low
Molto L. 2002	111 (hips)	Immediate treatment after birth (Von Rosen)	Treatment after 2 weeks (Von Rosen)	Acetabular index > 25 degrees at 15 months	RR=2.43 (1.085, 5.463)	Significant	Low
Molto L. 2002	111 (hips)	Immediate treatment after birth (Von Rosen)	Treatment after 2 weeks (Von Rosen)	Acetabular index > 30 degrees at 3 months	RR=1.25 (0.329, 4.725)	Not significant	Low
Molto L. 2002	111 (hips)	Immediate treatment after birth (Von Rosen)	Treatment after 2 weeks (Von Rosen)	Acetabular index > 30 degrees at 15 months	RR=1.84 (0.077, 44.229)	Not significant	Low
Paton R. 2004	75 (hips)	Early treatment (at <1 week)	Delayed treatment (at average 9 weeks)	Late splintage required after 6 weeks	RR=0.015 (0.001, 0.243)	Not significant	Low
Paton R. 2004	75 (hips)	Early treatment (at <1 week)	Delayed treatment (at average 9 weeks)	Radiographic abnormality at walking age	RR=0.094 (0.004, 2.215)	Not significant	Low
Paton R. 2004	75 (hips)	Early treatment (at <1 week)	Delayed treatment (at average 9 weeks)	AVN at walking age	RR=0.283 (0.001, 13.760)	Not significant	Low
Paton R. 2004	75 (hips)	Early treatment (at <1 week)	Delayed treatment (at average 9 weeks)	Surgical intervention at walking age	RR=0.057 (0.003, 1.125)	Not significant	Low

TYPE OF BRACE FOR THE UNSTABLE HIP

Limited evidence supports use of the von Rosen splint over Pavlik, Craig, or Frejka splints for initial treatment of an unstable hip.

Strength of Recommendation: Limited ★★☆☆

RATIONALE

There are no high quality comparative effectiveness studies between different types of braces for the treatment of DDH. Limited evidence suggests that rigid braces may have higher rates of resolution of hip dysplasia than non-rigid braces. Two low strength studies compared rigid bracing to soft bracing for initial treatment of unstable hips in infants. [29, 30] Heikkila compared the Frejka pillow with the von Rosen splint.[29] There were 920 patients treated with Frejka pillow and 180 patients treated with von Rosen splint. Fifty-five of 920 from the Frejka pillow group had treatment failure, while 1 out of 180 from the von Rosen splint group failed treatment. These differences were significant. A limitation of this study is that it was a historical comparative study of two cohorts over two time periods. AVN rates were inadequately reported. The authors did not differentiate between dislocated and dislocatable hips.

Three splints were compared in the Wilkinson study: Craig, Pavlik, and von Rosen.[30] Four of 28 in the Craig splint group, 13 of 43 in the Pavlik group, and 0 of 26 in the von Rosen group required further treatment in the form of plaster or operation.

This recommendation is based on the braces that were studied, but other similar fixed-position braces may or may not work as well as the braces mentioned in the evidence.

Risks and Harms

Nineteen percent of the patients in the rigid brace group experienced skin irritation[29]. There is a potential risk of AVN with all bracing; the relative risk is unknown between rigid and soft bracing.

SUPPORTING EVIDENCE
QUALITY AND APPLICABILITY

Table 45. Quality and Applicability: Studies for Type of Brace for the Unstable Hip

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	**Outcome**	**Prospective**	**Group Assignment**	**Blinding**	**Group Comparability**	**Treatment Integrity**	**Measurement**	**Investigator Bias**	***Quality***	**Participants**	**Intervention and Expertise**	**Compliance and Adherence**	**Analysis**	***Applicability*** **Study**	***Strength***
Heikkila E. 1988	Treatment failure, follow up to walking age	○	○	○	●	●	○	○	Low	●	○	●	●	Moderate	Low
Heikkila E. 1988	Traction and plastering at 3 years	○	○	○	●	●	○	○	Low	●	○	●	●	Moderate	Low
Heikkila E. 1988	AVN at 3 yrs	○	○	○	●	●	○	○	Low	●	○	●	●	Moderate	Low
Wilkinson A. 2002	Acetabular angle ≥ 28 degrees at 6-12	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
	months (radiograph)														
Wilkinson A. 2002	C/B ratio >.75 at 6-12 months (radiograph)	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low
Wilkinson A. 2002	Moderately dysplastic or worse hips at 6-12 months (radiograph)	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low
Wilkinson A. 2002	Further treatment with plaster at 6-12 months	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low
Wilkinson A. 2002	Surgery at 6-12 months	○	○	○	○	●	●	○	Low	●	●	●	○	Moderate	Low

RESULTS

Table 46. Type of Brace for the Unstable Hip (Treatment-Rigid Versus Soft Brace)

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Heikkila E. 1988	1100	Von Rosen	Frejka pillow	-	-	Treatment failure, follow up to walking age	RR=0.093 (0.013, 0.667)	Significant	Low
Heikkila E. 1988	1100	Von Rosen	Frejka pillow	-	-	Traction and plastering at 3 years	RR=0.100 (0.014, 0.721)	Significant	Low
Heikkila E. 1988	1100	Von Rosen	Frejka pillow	-	-	AVN at 3 yrs	RR=0.426 (0.056, 3.255)	Not significant	Low
Wilkinson A. 2002	71 (hips)	Von Rosen	Pavlik	Craig	No splint	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Craig vs. Pavlik SWMD= -0.30 (-0.63, 0.03)	Not significant	Low
Wilkinson A. 2002	71 (hips)	Von Rosen	Pavlik	Craig	No splint	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Craig vs. Pavlik RD= -0.04 (-0.26, 0.18)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	71 (hips)	Von Rosen	Pavlik	Craig	No splint	C/B ratio >.75 at 6-12 months (radiograph)	Craig vs. Pavlik RD= 0.08 (-0.15, 0.32)	Not significant	Low
Wilkinson A. 2002	71 (hips)	Von Rosen	Pavlik	Craig	No splint	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Craig vs. Pavlik RD= -0.18 (-0.37, 0.01)	Not significant	Low
Wilkinson A. 2002	71 (hips)	Von Rosen	Pavlik	Craig	No splint	Further treatment (plaster and/or operation) at 6-12 months	Craig vs. Pavlik RD= -0.16 (-0.35, 0.03)	Not significant	Low
Wilkinson A. 2002	71 (hips)	Von Rosen	Pavlik	Craig	No splint	Plaster at 6-12 months	Craig vs. Pavlik RD= -0.13 (-0.30, 0.05)	Not significant	Low
Wilkinson A. 2002	71 (hips)	Von Rosen	Pavlik	Craig	No splint	Operation at 6-12 months	Craig vs. Pavlik RD= -0.03 (-0.14, 0.07)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	54 (hips)	Von Rosen	Pavlik	Craig	No splint	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Von Rosen vs. Craig SWMD= -0.76 (-1.05, -0.76)	Significant	Low
Wilkinson A. 2002	54 (hips)	Von Rosen	Pavlik	Craig	No splint	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Von Rosen vs. Craig RD= -0.21 (-0.40, -0.01)	Significant	Low
Wilkinson A. 2002	54 (hips)	Von Rosen	Pavlik	Craig	No splint	C/B ratio >.75 at 6-12 months (radiograph)	Von Rosen vs. Craig RD= -0.03 (-0.30, 0.23)	Not significant	Low
Wilkinson A. 2002	54 (hips)	Von Rosen	Pavlik	Craig	No splint	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Von Rosen vs. Craig RD= -0.14 (-0.27, -0.01)	Significant	Low
Wilkinson A. 2002	54 (hips)	Von Rosen	Pavlik	Craig	No splint	Further treatment (plaster and/or operation) at 6-12 months	Von Rosen vs. Craig RD= -0.14 (-0.27, -0.01)	Significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	54 (hips)	Von Rosen	Pavlik	Craig	No splint	Plaster at 6-12 months	Von Rosen vs. Craig RD= -0.11 (-0.22, 0.01)	Not significant	Low
Wilkinson A. 2002	54 (hips)	Von Rosen	Pavlik	Craig	No splint	Operation at 6-12 months	Von Rosen vs. Craig RD= -0.04 (-0.10, 0.03)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Von Rosen	Pavlik	Craig	No splint	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Craig vs. No splint SWMD= 0.14 (-0.20, 0.44)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Von Rosen	Pavlik	Craig	No splint	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Craig vs. No splint RD= -0.07 (-0.29, 0.16)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Von Rosen	Pavlik	Craig	No splint	C/B ratio >.75 at 6-12 months (radiograph)	Craig vs. No splint RD= 0.08 (-0.16, 0.33)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	65 (hips)	Von Rosen	Pavlik	Craig	No splint	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Craig vs. No splint RD= -0.02 (-0.20, 0.16)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Von Rosen	Pavlik	Craig	No splint	Further treatment (plaster and/or operation) at 6-12 months	Craig vs. No splint RD= -0.13 (-0.32, 0.07)	Not significant	Low
Wilkinson A. 2002	65 (hips)	Von Rosen	Pavlik	Craig	No splint	Plaster at 6-12 months	Craig vs. No splint RD= -0.11 (-0.11, -0.11)	Significant	Low
Wilkinson A. 2002	65 (hips)	Von Rosen	Pavlik	Craig	No splint	Operation at 6-12 months	Craig vs. No splint RD= -0.02 (-0.02, -0.02)	Significant	Low
Wilkinson A. 2002	69 (hips)	Von Rosen	Pavlik	Craig	No splint	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Von Rosen vs. Pavlik SWMD= -1.03 (-1.23, -0.41)	Significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	69 (hips)	Von Rosen	Pavlik	Craig	No splint	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Von Rosen vs. Pavlik RD= -0.25 (-0.42, -0.08)	Significant	Low
Wilkinson A. 2002	69 (hips)	Von Rosen	Pavlik	Craig	No splint	C/B ratio >.75 at 6-12 months (radiograph)	Von Rosen vs. Pavlik RD= 0.05 (-0.19, 0.29)	Not significant	Low
Wilkinson A. 2002	69 (hips)	Von Rosen	Pavlik	Craig	No splint	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Von Rosen vs. Pavlik RD= -0.33 (-0.47, -0.19)	Significant	Low
Wilkinson A. 2002	69 (hips)	Von Rosen	Pavlik	Craig	No splint	Further treatment (plaster and/or operation) at 6-12 months	Von Rosen vs. Pavlik RD= -0.30 (-0.44, -0.17)	Significant	Low
Wilkinson A. 2002	69 (hips)	Von Rosen	Pavlik	Craig	No splint	Plaster at 6-12 months	Von Rosen vs. Pavlik RD= -0.23 (-0.36, -0.11)	Significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	69 (hips)	Von Rosen	Pavlik	Craig	No splint	Operation at 6-12 months	Von Rosen vs. Pavlik RD= -0.07 (-0.15, 0.01)	Not significant	Low
Wilkinson A. 2002	80 (hips)	Von Rosen	Pavlik	Craig	No splint	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Pavlik vs. No splint SWMD= 0.48 (0.39, 0.42)	Significant	Low
Wilkinson A. 2002	80 (hips)	Von Rosen	Pavlik	Craig	No splint	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Pavlik vs. No splint RD= -0.03 (-0.23, 0.18)	Significant	Low
Wilkinson A. 2002	80 (hips)	Von Rosen	Pavlik	Craig	No splint	C/B ratio >.75 at 6-12 months (radiograph)	Pavlik vs. No splint RD= 0.00 (0.00, 0.00)	Not significant	Low
Wilkinson A. 2002	80 (hips)	Von Rosen	Pavlik	Craig	No splint	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Pavlik vs. No splint RD= 0.16 (0.16, 0.16)	Significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	80 (hips)	Von Rosen	Pavlik	Craig	No splint	Further treatment (plaster and/or operation) at 6-12 months	Pavlik vs. No splint RD= 0.03 (-0.17, 0.20)	Not significant	Low
Wilkinson A. 2002	80 (hips)	Von Rosen	Pavlik	Craig	No splint	Plaster at 6-12 months	Pavlik vs. No splint RD= 0.02 (-0.17, 0.20)	Not significant	Low
Wilkinson A. 2002	80 (hips)	Von Rosen	Pavlik	Craig	No splint	Operation at 6-12 months	Pavlik vs. No splint RD= 0.02 (-0.09, 0.12)	Not significant	Low
Wilkinson A. 2002	63 (hips)	Von Rosen	Pavlik	Craig	No splint	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	Von Rosen vs. No splint SWMD= -0.64 (-1.20, 0.02)	Not significant	Low
Wilkinson A. 2002	63 (hips)	Von Rosen	Pavlik	Craig	No splint	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	Von Rosen vs. No splint RD= -0.27 (-0.46, -0.09)	Significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	63 (hips)	Von Rosen	Pavlik	Craig	No splint	C/B ratio >.75 at 6-12 months (radiograph)	Von Rosen vs. No splint RD= 0.05 (-0.20, 0.30)	Not significant	Low
Wilkinson A. 2002	63 (hips)	Von Rosen	Pavlik	Craig	No splint	Moderately dysplastic or worse hips at 6-12 months (radiograph)	Von Rosen vs. No splint RD= -0.16 (-0.28, -0.04)	Significant	Low
Wilkinson A. 2002	63 (hips)	Von Rosen	Pavlik	Craig	No splint	Further treatment (plaster and/or operation) at 6-12 months	Von Rosen vs. No splint RD= -0.27 (-0.41, -0.13)	Significant	Low
Wilkinson A. 2002	63 (hips)	Von Rosen	Pavlik	Craig	No splint	Plaster at 6-12 months	Von Rosen vs. No splint RD= -0.22 (-0.35, -0.08)	Significant	Low
Wilkinson A. 2002	63 (hips)	Von Rosen	Pavlik	Craig	No splint	Operation at 6-12 months	Von Rosen vs. No splint RD= -0.05 (-0.13, 0.02)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	134 (hips)	Von Rosen	Pavlik	Craig	No splint	Mean (+/-) improvement on ultrasound between 1st exam and 12-20 weeks	All splint vs. No splint SWMD= 0.07 (-2.05, 1.83)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Von Rosen	Pavlik	Craig	No splint	Acetabular angle ≥ 28 degrees at 6-12 months (radiograph)	All splint vs. No splint RD= -0.10 (-0.28, 0.07)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Von Rosen	Pavlik	Craig	No splint	C/B ratio >.75 at 6-12 months (radiograph)	All splint vs. No splint RD= 0.04 (-0.15, 0.23)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Von Rosen	Pavlik	Craig	No splint	Moderately dysplastic or worse hips at 6-12 months (radiograph)	All splint vs. No splint RD= 0.02 (-0.12, 0.17)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Von Rosen	Pavlik	Craig	No splint	Further treatment (plaster and/or operation) at 6-12 months	All splint vs. No splint RD= -0.10 (-0.26, 0.07)	Not significant	Low

Study	N	Group 1	Group 2	Group 3	Group 4	Outcome	Results	Significance	Study Strength
Wilkinson A. 2002	134 (hips)	Von Rosen	Pavlik	Craig	No splint	Plaster at 6-12 months	All splint vs. No splint RD= -0.08 (-0.23, 0.07)	Not significant	Low
Wilkinson A. 2002	134 (hips)	Von Rosen	Pavlik	Craig	No splint	Operation at 6-12 months	All splint vs. No splint RD= -0.01 (-0.10, 0.07)	Not significant	Low

MONITORING OF PATIENTS DURING BRACE TREATMENT

Limited evidence supports that the practitioner perform serial physical examinations and periodic imaging assessments (ultrasound or radiograph based on age) during management for unstable infant hips.

Strength of Recommendation: Limited ★★☆☆

RATIONALE

If brace treatment is initiated, there is limited evidence that episodic serial physical and imaging reassessments during the treatment cycle can lead to changes or duration of the treatment plan. Two low strength studies report monitoring of brace treatment using physical exam, ultrasound, and radiography following the appearance of the ossific nucleus.[31, 32] Both studies identified failure of reduction or persistent dysplasia in patients undergoing brace treatment. These findings necessitated a change in treatment plan or duration. No parameters for optimal timing or frequency of imaging were established by research protocol.

Risks and Harms:

Radiographs involve exposure to ionizing radiation.

SUPPORTING EVIDENCE

QUALITY AND APPLICABILITY

Table 47. Quality and Applicability: Monitoring of Patients during Brace Treatment

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Cashman J. 2002	Reduction failure which needed surgery at 6.5± 2.7 yrs	●	○	○	○	○	●	○	Low	●	○	●	○	Moderate	Low
Cashman J. 2002	Persistent late acetabular dysplasia at 6.5± 2.7 yrs	●	○	○	○	○	●	○	Low	●	○	●	○	Moderate	Low
Cashman J. 2002	Late dysplasia that needed surgery at 6.5± 2.7 yrs	●	○	○	○	○	●	○	Low	●	○	●	○	Moderate	Low

●: Domain free of flaws

○: Domain flaws present

◐: Moderate power

Study	Outcome	Prospective	Group Assignment	Blinding	Group Comparability	Treatment Integrity	Measurement	Investigator Bias	*Quality*	Participants	Intervention and Expertise	Compliance and Adherence	Analysis	*Applicability* Study	*Strength*
Cashman J. 2002	AVN at 6.5± 2.7 yrs	●	○	○	○	○	●	○	Low	●	○	●	○	Moderate	Low
Swaroop V. 2009	Reduction failure within 3 years	○	○	○	●	●	○	○	Low	●	●	●	○	Moderate	Low
Swaroop V. 2009	Surgical intervention within 3 years	○	○	○	●	●	○	○	Low	●	●	●	○	Moderate	Low
Swaroop V. 2009	AVN within 3 years	○	○	○	●	●	○	○	Low	●	●	●	○	Moderate	Low

RESULTS

Table 48. Monitoring of Patients during Brace Treatment (Monitoring while Treatment in Brace)

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study Strength
Cashman J. 2002	546 (hips)	Weekly ultrasound and radiography every 4 months for the 1st year after the appearance of ossific nucleus in the capital epiphysis. Radiography conducted every 6 months for the following 2 years, and annually thereafter	N/A	Pavlik harness failed reduction: surgery required (rate/1000 hips) (95% CI)	33 (20-52)	N/A	Low
Cashman J. 2002	528 (hips)	Weekly ultrasound and radiography every 4 months for the 1st year after the appearance of ossific nucleus in the capital epiphysis. Radiography conducted every 6 months for the following 2 years, and annually thereafter	N/A	Persistent Late acetabular dysplasia in patients initially thought to be successfully treated with Pavlik harness (rate/1000 hips) (95% CI)	25 (13-42)	N/A	Low
Cashman J. 2002	528 (hips)	Weekly ultrasound and radiography every 4 months for the 1st year after the appearance of ossific nucleus in the capital epiphysis. Radiography conducted every 6 months for the following 2 years, and annually thereafter	N/A	Late dysplasia that needed surgery at 6.5± 2.7 yrs (rate/1000 hips) (95% CI)	7.5 (2.119.3)	N/A	Low
Cashman J. 2002	546 (hips)	Weekly ultrasound and radiography every 4 months for the 1st year after the appearance of ossific nucleus in the capital epiphysis. Radiography conducted every 6 months for the following 2 years, and annually thereafter	N/A	AVN at 6.5± 2.7 yrs	7.5 (2.119.3)	N/A	Low

Study	N	Group 1	Group 2	Outcome	Results	Significance	Study Strength
Swaroop V. 2009	96 (hips)	Monitoring: weekly clinical exam and radiograph every 3 months	Monitoring: Weekly Ultrasound and radiograph every 3 months	Reduction failure within 3 years	RR=2.26 (0.637, 7.993)	Not Significant	Low
Swaroop V. 2009	96 (hips)	Monitoring: weekly clinical exam and radiograph every 3 months	Monitoring: Weekly Ultrasound and radiograph every 3 months	Surgical intervention within 3 years	RR=2.26 (0.637, 7.993)	Not Significant	Low
Swaroop V. 2009	96 (hips)	Monitoring: weekly clinical exam and radiograph every 3 months	Monitoring: Weekly Ultrasound and radiograph every 3 months	AVN within 3 years	RR=2.55 (0.106, 61.001)	Not Significant	Low

V. FUTURE RESEARCH

This clinical practice guideline is focused on early detection by the clinical and imaging screening of populations of infants and on the early management of DDH. The grades of recommendations for this clinical practice guideline range from limited to moderate strength. Of 3990 citations on the topic of DDH, 42 articles were ultimately included as evidence related to the recommendations in this guideline and 18 articles met our inclusion criteria for an assessment of the natural history for DDH in infancy. It has a large potential impact due to the size of populations to be screened and the functional limitations that can be created by late diagnosis and management of individuals with this condition.

We found significant gaps in the evidence that can be used to derive practice guidelines for the early diagnosis and management of DDH. There is considerable confusion related to the terminology and definitions that have been used in research related to DDH and about what defines a pathologic condition versus an expected developmental variation based upon the age and status of a child is needed. There are additional gaps in knowledge of the basic pathophysiology of DDH, understanding of the long term impact of DDH upon the health status and well-being of affected individuals, the appropriateness of DDH for public health screening programs as they are practiced today, the optimal diagnostic tools to be used to detect the condition, and the relative efficacy and value of recommended interventions. Additional research is needed to create clarity in these areas. The large numbers of patients who need to be assessed and the severity of functional limitations that can be created by late diagnosis and management of individuals with this condition suggests that research inclusive of comparative effectiveness research design would be of great advantage.

Specifically, future research areas should attempt to:

- Establish clear, widely accepted, reproducible criteria and definitions for:
    - Clinical terms that describe hip stability
    - Radiographic and ultrasound criteria for dysplasia and dislocation based upon age.
    - Historical and clinical risk factors to be assessed for all children that are related to DDH.
    - What constitutes “standard” brace treatment of DDH
    - What are outcomes criteria that define successful or failed treatment for DDH
- Establish universally accepted and reproducible ranges of normal values across ages for sonographic and/or radiographic hip measures or any future surrogates for normal hip development.
- Establish clear relationships between these surrogates for hip development and demonstrate long-term functional limitations that are correlated to surrogate values that fall outside of the normal ranges.
- Define the benefits and harms of late diagnosis of DDH
- Define the harms of early diagnosis and treatment of DDH

- Standardize follow-up times after bracing to improve objective testing of outcomes

Provide research design that is applicable to routine practice situations and allows for comparison of alternative methods of diagnosis and treatment.

VI. APPENDIXES

APPENDIX I. WORK GROUP ROSTER

Kishore Mulpuri, MBBS, MS (Orth), MHSc (Epi) – *Chair*
Representing Society(ies):
American Academy of Orthopaedic Surgeons/ Pediatric Orthopaedic Society of North America
Assistant Professor
University of British Columbia
Department of Orthopaedics
Paediatric Orthopaedic Surgeon
BC Children's Hospital
A207A-4480 Oak Street
Vancouver, BC V6H 3V4

Kit M. Song, MD, MHA – *Vice Chair*
American Academy of Orthopaedic Surgeons/ Pediatric Orthopaedic Society of North America
3160 Geneva St.
Los Angeles, CA 90020

Richard Henry Gross, MD
Representing Society(ies):
American Academy of Orthopaedic Surgeons
Medical University of South Carolina
Dept. of Othopaedic Surgery
171 Ashley Ave. CSB-708
Charleston, South Carolina 29425

Gary B. Tebor, MD
Representing Society(ies):
American Academy of Orthopaedic Surgeons
Chief Section Pediatric Orthopaedics
30 Hagen Dr.
Rochester, NY 14625

Norman Yoshinobu Otsuka, MD
Representing Society(ies):
American Academy of Orthopaedic Surgeons
NYU Hospital for Joint Diseases
NYU Langone Medical Center
301 East 17th Street
New York, NY 10003

John P. Lubicky, MD, FAAOS, FAAP
Representing Society(ies):
American Academy of Orthopaedic Surgeons
Professor of Orthopaedic Surgery & Pediatrics
West Virgina University School of Medicine
Rm 3402B WVU HSC, South
PO Box 9196
Morgantown, WV 26506

Elizabeth Ann Szalay, MD
Representing Society(ies):
American Academy of Orthopaedic Surgeons
Carrie Tingley Hospital
1127 University Blvd NE
Albuquerque, NM 87102-1715

H. Theodore Harcke, MD
Representing Society(ies):
Society for Pediatric Radiology
3205 Coachman Rd
Wilmington, DE 19803

Bonnie Zehr, MD, FAAP
Representing Society(ies):
American Academy of Pediatrics
160 N. Pointe Blvd Ste 110
Lancaster, PA 17601

Andrew Spooner, MD
Representing Society(ies):
American Academy of Pediatrics
333 Burnet Avenue, MLC-2007
Cincinnati, OH 45229

Doug Campos-Outcalt, MD, MPA
Representing Society(ies):
American Academy of Family Physicians
Department of Family, Community and Preventive Medicine
University of Arizona College of Medicine, Phoenix

Charlotte Henningsen, MS
Representing Society(ies):
Society of Diagnostic Medical Sonography
Professor, Dept of Diagnostic Medical Sonography
Florida Hospital of Health Sciences
671 Winyah Drive
Orlando, Florida 32803-1226

GUIDELINES OVERSIGHT CHAIRS

Michael Goldberg, MD
Children's Hospital and Regional Medical Ctr
1221 1st Ave. Apt # 24E
Seattle, WA 98101

W. Timothy Brox, MD
UCSF Fresno Orthopaedic
2823 Fresno St.,
7th Floor
Fresno, CA 93721

AAOS CLINICAL PRACTICE GUIDELINES SECTION LEADER

Kevin Shea, MD
Intermountain Orthopaedics
600 N. Robbins Rd Ste 400
Boise, ID 83702

AAOS COUNCIL ON RESEARCH AND QUALITY CHAIR

Kevin J. Bozic, MD, MBA
University of California, San Francisco
500 Parnassus, MU 320W
San Francisco, CA 94143-0728

ADDITIONAL CONTRIBUTING MEMBERS

The following participants contributed to the development of this guideline:

William L. Hennrikus, MD

Harish S. Hosalkar, MD

Harold Philip Lehmann, MD, PhD

Stuart L. Weinstein, MD

Lynn Fordham, MD

Neil D. Johnson, MBBS

Patricia Fontaine, MD

Matthew Barrett Dobbs, MD

Brian Coley, MD

<u>AAOS STAFF</u>

William Shaffer, MD
AAOS Medical Director

Deborah Cummins, PhD
AAOS Director of Research & Scientific Affairs
6300 N River Rd., Rosemont, IL 60018

Jayson N. Murray, MA
Manager, Evidence-Based Medicine Unit

Mukarram Mohiuddin, MPH
Lead Research Analyst

<u>FORMER STAFF</u>

Leeaht Gross, MPH

Peter Shores, MPH
Statistician

Anne Woznica, MLS
Medical Librarian

Yasseline Martinez
Administrative Coordinator

Kaitlyn Sevarino
Evidence-Based Medicine Coordinator

APPENDIX II

AAOS BODIES THAT APPROVED THIS CLINICAL PRACTICE GUIDELINE

Committee on Evidence Based Quality and Value

The committee on Evidence Based Quality and Value (EBQV) consists of twenty AAOS members who implement evidence-based quality initiatives such as clinical practice guidelines (CPGs) and appropriate use criteria (AUCs). They also oversee the dissemination of related educational materials and promote the utilization of orthopaedic value products by the Academy's leadership and its members.

Council on Research and Quality

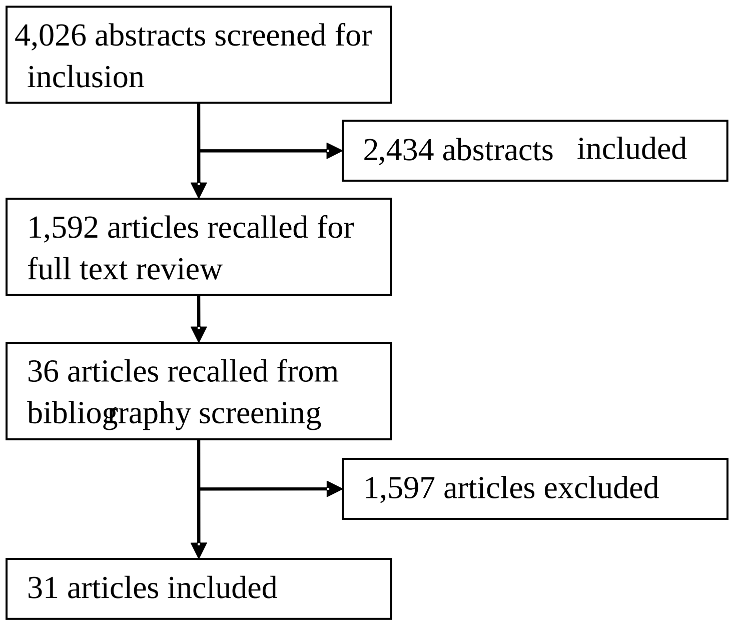
The Council on Research and Quality promotes ethically and scientifically sound clinical and translational research to sustain patient care in musculoskeletal disorders. The Council also serves as the primary resource for educating its members, the public, and public policy makers regarding evidenced-based medical practice, orthopaedic devices and biologics, regulatory pathways and standards development, patient safety, occupational health, technology assessment, and other related important errors.

The Council is comprised of the chairs of the committees on Biological Implants, Biomedical Engineering, Occupational Health and Workers' Compensation, Patient Safety, Research Development, U.S. Bone and Joint Decade, and chair and Appropriate Use Criteria and Clinical Practice Guideline section leaders of the Evidence Based Quality and Value committee. Also on the Council are the second vice-president, three members at large, and representatives of the Diversity Advisory Board, Women's Health Issues Advisory Board, Board of Specialty Societies (BOS), Board of Councilors (BOC), Communications Cabinet, Orthopaedic Research Society (ORS), Orthopedic Research and Education Foundation (OREF).

Board of Directors

The 17 member Board of Directors manage the affairs of the AAOS, set policy, and oversee the Strategic Plan.

APPENDIX III
STUDY ATTRITION FLOWCHART



APPENDIX IV

LITERATURE SEARCH STRATEGIES

MEDLINE

#1
"Hip Dislocation, Congenital"[mh]

#2
Hip Dislocation[mh]

#3
hip[mh] OR hip joint[mh] OR femur head[mh]

#4
Joint Instability[mh] OR "Bone Diseases, Developmental"[mh:noexp]

#5
#3 AND #4

#6
#1 OR #2 OR #5

#7
Infant[mh] OR "Child, preschool"[mh]

#8
#6 AND #7

#9
hip[titl] OR hips[titl]

#10
dysplasia[tiab] OR dysplastic[tiab] OR dislocat*[tiab] OR luxation[tiab] OR subluxat*[tiab] OR instability[tiab] OR unstable[tiab] OR stability[tiab] OR abnormal*[tiab]

#11
screening[tiab] OR ultrasound[tw] OR exam[tiab] OR examination[tw]

#12
congenital[tw] OR developmental[tw]

#13
infan*[tw] OR newborn*[tw] OR babies[tiab] OR neonatal[tiab] OR pediatric[tiab] OR paediatric[tiab] OR early[titl]

#14
#9 AND #10 AND (#11 OR #12) AND (#7 OR #13)

#15
epidemiolog*[tw] OR incidence[tw] OR prevalence[mh] OR Risk factors[mh]

#16
#15 AND (#1 OR (#2 AND #12))

#17
hip/abnormalities[ot]

#18
#17 AND (#12 OR #13)

#19
#8 OR #14 OR #16 OR #18

#20
("2013/05/21"[Date - Entrez] : "2013/09/16"[Date - Entrez]) AND English[lang]

#21
(animal[mh] NOT human[mh]) OR veterinary[sh] OR cadaver[mh] OR cadaver*[titl] OR ((comment[pt] OR editorial[pt] OR letter[pt] OR "historical article"[pt]) NOT "clinical trial"[pt]) OR addresses[pt] OR news[pt] OR "newspaper article"[pt] OR pmcbook

#22
#19 AND #20 NOT #21

Results sorted by study type

#23
Medline[tw] OR systematic review[tiab] OR Meta-analysis[pt]

#24
"Clinical Trial"[pt] OR (clinical[tiab] AND trial[tiab]) OR random*[tw] OR "Therapeutic use"[sh]

#25
#22 AND #23

#26
#22 AND #24 NOT #23

#27
#22 NOT (#23 OR #24)

EMBASE

#1
'Congenital hip dislocation'/de OR 'hip dysplasia'/de

#2
'Hip dislocation'/de

#3
Hip/de OR 'Femur head'/de

#4
'Joint instability'/de OR 'Congenital bone disease'/de OR 'Joint malformation'/de

#5
#3 AND #4

#6
#1 OR #2 OR #5

#7
Infant/exp OR 'preschool child'/de OR toddler/de OR 'handicapped child'/de

#8
#6 AND #7

#9
hip:ti

#10
dysplasia:ti,ab OR dysplastic:ti,ab OR dislocat*:ti,ab OR luxation:ti,ab OR subluxat*:ti,ab OR instability:ti,ab OR unstable:ti,ab OR stability:ti,ab OR abnormal*:ti,ab

#11
screening OR ultrasound OR echography/exp OR exam OR examination OR examination/exp

#12
congenital:ti,ab OR developmental:ti,ab

#13

infant*:ti,ab OR infancy:ti,ab OR newborn*:ti,ab OR babies:ti,ab OR neonatal:ti,ab OR pediatric:ti,ab OR paediatric:ti,ab OR early:ti

#14
#9 AND #10 AND (#11 OR #12) AND (#7 OR #13)

#15
epidemiolog* OR incidence OR prevalence OR 'Risk factor'/de

#16
#15 AND (#1 OR (#2 AND #12))

#17
#8 OR #14 OR #16

#18
English:la AND [humans]/lim AND [embase]/lim AND [21-5-2013]/sd NOT [16-9-2013]/sd

#19
cadaver/de OR 'in vitro study'/exp OR 'abstract report'/de OR book/de OR editorial/de OR note/de OR (letter/de NOT 'types of study'/exp)

#20
#17 AND #18 NOT #19

Results sorted by study type

#21
'meta analysis':ti,ab,de OR 'systematic review':ti,ab,de OR medline:ti,ab,de

#22
random*:ti,ab,de OR 'clinical trial':ti,ab,de OR 'health care quality'/exp

#23
#20 AND #21

#24
#20 AND #22 NOT #21

#25
#20 NOT (#21 OR #22)

APPENDIX V
EVALUATION OF QUALITY

Quality questions are asked for every outcome reported in a study. They vary according to the rigor of a study's research design. Different questions are asked depending on if a study uses a controlled design with a no-treatment comparison group, is a crossover or historically controlled study, or case series. A total of 20 questions are asked for each type of research design and are described below:

Quality Questions and Domains for Four Designs of Studies of Interventions

Domain	Question:	Parallel, Contemporary Controls	Crossover Trials	Historical Controls	Case Series
Group Assignment	Stochastic	Yes	Yes	No	No
Group Assignment	Quasi-random Assignment	No	No	No	*NA
Group Assignment	Matched Groups	No	No	Yes	No
Group Assignment	Consecutive Enrollment	NA	NA	NA	Yes
Prospective	Prospective	Yes	Yes	Yes	Yes
Blinding	Blinded Patients	Yes	Yes	No	No
Blinding	Blinded Assessors	Yes	Yes	No	No
Blinding	Blinding Verified	Yes	Yes	No	No
Group Comparability	Allocation Concealment	Yes	Yes	No	No
Group Comparability	>80% Follow-up	Yes	Yes	No	Yes
Group Comparability	<20% Completion Difference	Yes	Yes	No	No
Group Comparability	Similar Baseline Outcome Values	Yes	NA	Yes	No
Group Comparability	Comparable Pt. Characteristics	Yes	NA	Yes	No
Group Comparability	Same Control Group Results	NA	Yes	NA	NA
Group Comparability	Same Experimental Group Results	NA	Yes	NA	NA
Treatment Integrity	Same Centers	Yes	Yes	Yes	No
Treatment Integrity	Same Treatment Duration in and across All Groups	Yes	Yes	Yes	No
Treatment Integrity	Same Concomitant Treatment to All Groups (controlled studies only)	Yes	Yes	Yes	NA
Treatment Integrity	No Confounding Treatment (case series only)	NA	NA	NA	Yes
Measurement	Same Instruments	Yes	Yes	Yes	Yes
Measurement	Valid Instrument	Yes	Yes	Yes	Yes
Bias	Article & Abstract Agree	Yes	Yes	Yes	Yes
Bias	All Outcomes Reported	Yes	Yes	Yes	Yes
Bias	A Priori Analysis	Yes	Yes	Yes	Yes

Domain	Question:	Parallel, Contemporary Controls	Crossover Trials	Historical Controls	Case Series
Statistical Power	Statistically Significant	High	High	High	High
Statistical Power	Number of patients in analysis	See below for further information			

*"NA" means "not asked."

The statistical power domain is assessed differently from the other domains. We characterize this domain as free from flaws if any one of the following is true:

- The results of a statistical test on the outcome of interest are statistically significant (statistical significance is indicative of adequate statistical power).
- The results of a statistical test of the outcome of interest are not statistically significant (or it is unclear whether the results are statistically significant), and the study is either an uncontrolled study in which data from 34 or more patients are included in the statistical analysis of the outcome of interest OR a controlled study in which data from 128 or more patients are included in the analysis of the outcome of interest.
- The study's results for the outcome of interest are used in a meta-analysis. We make this assumption because one reason for performing a meta-analysis is to compensate for the low statistical power of individual studies. Implicit in this assumption is a second assumption; that the power of the meta-analysis will be sufficient to detect an effect as statistically significant.

We term the power domain as flawed if all of the following are true:

- The results of a statistical test on the outcome of interest are either not statistically significant or it is unclear whether the results of statistical test on the outcome of interest are statistically significant.
- The study is an uncontrolled study in which data from fewer than 15 patients are included in the analysis of the outcome of interest OR the study is a controlled study in which data from fewer than 52 patients were included in the analysis of the outcome of interest.
- The results on the outcome of interest will not be used in a meta-analysis.

The numbers used to determine whether a study is of sufficient power are based on Cohen's[134] definitions of small, medium, and large effects. To compute the number of patients needed for an uncontrolled study using a pretest/posttest design, we consider a two-tailed paired samples t-test. We then determine whether or not sample size is sufficient to detect a large effect (defined as a standardized mean difference of ≥ 0.8) with alpha = 0.05 significance level and power = 80%. If a study does not have the ability to detect even a large effect as statistically significant, we characterize it as underpowered and the domain flawed.

To compute the number of patients needed for a controlled study, we consider a two-tailed independent samples t-test with equal size groups, and then determine if sample size is adequate for detecting a large effect, again with alpha = 0.05 and power = 80%. Similar to the above, we term a study as underpowered and the domain flawed if it does not enroll enough patients to detect a large effect size. It is viewed as adequately powered if it enrolls enough patients to detect a small effect.

Quality Domains for Incidence and Prevalence studies

#	Domain	Relationship between Quality and Domain Scores for Incident and Prevalence studies
1	Outcome: Whether the study is measuring the incidence/prevalence of a clinically meaningful event.	0 Flawed Domains = High Quality Study 1 Flawed Domain = Moderate Quality Study 2 Flawed Domains = Low Quality Study ≥ 3 Flawed Domains = Very Low Quality Study
2	Measurement: Whether the study measured the disease/disorder/condition in a way that would lead to accurate estimates of incidence or prevalence.	
3	Participant: Whether those who were studied were representative of the population of interest.	
4	Investigator Bias: Whether author biases could have prejudiced the results.	

Quality Domains for Screening & Diagnosis studies

#	Domain	Relationship between Quality and Domain Scores for Screening and Diagnosis studies
1	Participants: Whether the spectrum of disease among the participants enrolled in the study is the same as the spectrum of disease seen in actual clinical practice	0 Flawed Domains = High Quality Study 1 Flawed Domain = Moderate Quality Study 2 Flawed Domains = Low Quality Study ≥ 3 Flawed Domains = Very Low Quality Study
2	Reference Test: Whether the reference test , often a "gold standard" and the way it was employed in the study ensures correct and unbiased categorization of patients as having or not having disease	
3	Index Test: Whether interpretation of the results of the test under study, often called the "index test", was unbiased	
4	Study Design: Whether the design of the study allowed for unbiased interpretation of test results	
5	Information: Whether the same clinical data were available when test results were interpreted as would be available when the test is used in practice	
6	Reporting: Whether the patients, tests, and study protocol were described well enough to permit its replication	

Quality Domains for Prognostic studies

Domain		Relationship between Quality and Domain Scores for Prognosis Studies
1	Prospective: With prospective studies, a variable is specified as a potential prognostic variable a priori. This is not possible with retrospective studies.	0 Flawed Domains = High Quality Study 1 Flawed Domain = Moderate Quality Study 2 Flawed Domains = Low Quality Study ≥ 3 Flawed Domains = Very Low Quality Study
2	Power: Whether the study had sufficient statistical power to detect a prognostic variable as statistically significant.	
3	Analysis: Whether the statistical analyses used to determine that a variable was rigorous to provide sound results.	
4	Model: Whether the final statistical model used to evaluate a prognostic accounted for enough variance to be statistically significant.	
5	Bias: Whether there was evidence of investigator bias.	

Quality Domains for Treatment studies

#	Domains	Relationship between Quality and Domain Scores for Treatment studies
1	The study addressed a hypothesis	0 Flawed Domains = High Quality Study 1 – 2 Flawed Domain = Moderate Quality Study 3 – 4 Flawed Domains = Low Quality Study ≥ 5 Flawed Domains = Very Low Quality Study
2	The assignment of patients to groups was unbiased	
3	There was sufficient blinding to mitigate against a placebo effect	
4	The patient groups were comparable at the beginning of the study	
5	The treatment was delivered in such a way that any observed effects could reasonably be attributed to that treatment	
6	Whether the instruments used to measure outcomes were valid	
7	Whether there was evidence of investigator bias	

APPLICABILITY

We determine the applicability of a study using the PRECIS instrument.[135] This instrument consists of 10 questions. The domains that each question applies to are shown in the table below.

Applicability Questions and the Domains for Studies of Interventions

Question	Domain
All Types of Patients Enrolled	Participants
Flexible Instructions to Practitioners	Interventions and Expertise
Full Range of Expt'l Practitioners	Interventions and Expertise
Usual Practice Control	Interventions and Expertise
Full Range of Control Practitioners	Interventions and Expertise
No Formal Follow-up	Interventions and Expertise
Usual and Meaningful Outcome	Interventions and Expertise
Compliance Not Measured	Compliance and Adherence
No Measure of Practitioner Adherence	Compliance and Adherence
All Patients in Analysis	Analysis

Applicability Domains for Incident and Prevalence studies

Domain	Relationship between Applicability and Domain Scores for Incidence and Prevalence studies
Participants (i.e. whether the participants in the study were like those seen in the population of interest)	0 Flawed Domains = High Quality Study 1 – 2 Flawed Domain = Moderate Quality Study ≥ 3 Flawed Domains = Low Quality Study
Analysis (i.e., whether participants were appropriately included and excluded from the analysis)	
Outcome (i.e., whether the incidence/prevalence estimates being made were of a clinically meaningful outcome)	

Applicability Questions and Domains for Screening and Diagnostic Studies

Domain	Relationship between Applicability and Domain Scores for Screening and Diagnosis studies
Participants: whether the patients in the study are like those seen in actual clinical practice	0 Flawed Domains = High Quality Study 1 – 3 Flawed Domain =
Index Test: whether the test under study could be used in actual clinical practice and whether it was administered in a way that reflects its use in actual practice	

<table>
<tr><td>Directness: whether the study demonstrated that patient health is affected by use of the diagnostic test under study</td><td rowspan="2">Moderate Quality Study

≥ 4 Flawed Domains = Low Quality Study</td></tr>
<tr><td>Analysis: whether the data analysis reported in the study was based on a large enough percentage of enrolled patients to ensure that the analysis was not conducted on “unique” or “unusual” patients</td></tr>
</table>

Applicability Domains for Prognostic studies

<table>
<tr><th colspan="2">Domain</th><th>Relationship between Applicability and Domain Scores for Prognostic Studies</th></tr>
<tr><td>1</td><td>Patients: Whether the patients in the study and in the analysis were like those seen in actual clinical practice.</td><td rowspan="3">0 Flawed Domains = High Quality Study

1 – 2 Flawed Domain = Moderate Quality Study

≥ 3 Flawed Domains = Low Quality Study</td></tr>
<tr><td>2</td><td>Analysis: Whether the analysis was not conducted in a way that was likely to describe variation among patients that might be unique to the dataset the authors used.</td></tr>
<tr><td>3</td><td>Outcome: Whether the prognostic was a predictor of a clinically meaningful outcome.</td></tr>
</table>

Applicability Domains for Treatment studies

<table>
<tr><th colspan="2">Domain</th><th>Relationship between Applicability and Domain Scores
for Treatment Studies</th></tr>
<tr><td>1</td><td>Patients: whether the patients in the study are like those seen in actual clinical practice</td><td rowspan="4">0 Flawed Domains = High Quality Study

1 – 3 Flawed Domain = Moderate Quality Study

≥ 4 Flawed Domains = Low Quality Study</td></tr>
<tr><td>2</td><td>Interventions and Expertise: whether the treatments are delivered as they would be in actual clinical practice and whether the clinicians providing then are like those in actual clinical practice</td></tr>
<tr><td>3</td><td>Compliance and Adherence (i.e., whether the steps taken in the study to ensure patient compliance and adherence to treatment regimens would make the compliance/adherence in the study different from that seen in actual clinical practice)</td></tr>
<tr><td>4</td><td>Analysis: whether the data analysis reported in the study was based on a large enough percentage of enrolled patients to ensure that the analysis was not conducted on “unique” or “unusual” patients.</td></tr>
</table>

Criteria to upgrade the Quality of a research article

Research articles may be adjusted upwards if the research is of high applicability or if providing the intervention decreases the potential for catastrophic harm, such as loss of life or limb. The EBQV expanded the above criteria based on the G.R.A.D.E. methodology, so that it now includes the following:

- The study has a large (>2) or very large (>5) magnitude of treatment effect: used for non-retrospective observational studies;
- All plausible confounding factors would reduce a demonstrated effect or suggest a spurious effect when results show no effect;
- Consideration of the dose-response effect.

Reference: *GRADE handbook for grading quality of evidence and strength of recommendation.* The GRADE Working Group; 2009.

APPENDIX VI
OPINION BASED RECOMMENDATIONS

A guideline can contain recommendations for which there is no evidence. Work groups might make the decision to issue opinion-based recommendations. Although expert opinion is a form of evidence, it is also important to avoid liberal use in a guideline since research shows that expert opinion can be incorrect.

Opinion-based recommendations are developed only in instances where not establishing a recommendation would lead to catastrophic consequences for a patient (e.g. loss of life or limb). To ensure that an opinion-based recommendation is absolutely necessary, the AAOS has adopted rules to guide the content of the rationales that are based on those outlined by the U.S. Preventive Services Task Force (USPSTF).(Petitti et al. 199-205) Specifically, rationales based on expert opinion must:

- Not contain references to or citations from articles not included in the systematic review.

- Not contain the AAOS guideline language “the practitioner should/should not”, “the practitioner could/could not” or “The practitioner might/might not.”

- Contain an explanation of the potential preventable burden of disease. This involves considering both the incidence and/or prevalence of the disease, disorder, or condition and the associated burden of suffering. To paraphrase the USPSTF, when evidence is insufficient, provision of a treatment (or diagnostic) for a serious condition might be viewed more favorably than provision of a treatment (or diagnostic) for a condition that does not cause as much suffering. The AAOS understands that evaluating the “burden of suffering” is subjective and involves judgment. This evaluation should be informed by patient values and concerns. It is not appropriate for a guideline to recommend widespread use of a technology backed by little data and for which there is limited experience. Such technologies are addressed in the AAOS’ Technology Overviews.

- Address potential harms.

- Address apparent discrepancies in the logic of different recommendations. If there are no relevant data for several recommendations and the work group chooses to issue an opinion-based recommendation in some cases but not in other cases, the rationales must explain why.

- Consider current practice. The USPSTF specifically states that clinicians justifiably fear not providing a service that is practiced on a widespread basis will lead to litigation.(Petitti et al. 199-205) Not providing a service that is not widely available or commonly used has less serious consequences than not providing a treatment accepted by the medical profession that patients expect. The patient’s “expectation of treatment” must be tempered by the treating physician’s guidance about the reasonable outcomes that the patient can expect.

- Justify when applicable why a more costly device, drug, or procedure is being recommended.

Work group members write the rationales for opinion based recommendations on the first day of the final work group meeting. When the work group reconvenes on the second day, members approve the rationales. If the work group cannot adopt a rationale after three votes, the rationale and the opinion-based recommendation will be withdrawn.

Sometimes work group members change their views. At any time during the discussion of the rationales, any member of the work group can make a motion to withdraw a recommendation

APPENDIX VII
STRUCTURED PEER REVIEW FORM

Peer reviewers are asked to read and review the draft of the clinical practice guideline with a particular focus on their area of expertise. Their responses to the answers below are used to assess the validity, clarity, and accuracy of the interpretation of the evidence.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The overall objective(s) of the guideline is (are) specifically described.	○	○	○	○	○
2. The health question(s) covered by the guideline is (are) specifically described.	○	○	○	○	○
3. The guideline's target audience is clearly described.	○	○	○	○	○
4. The guideline development group includes individuals from all the relevant professional groups.	○	○	○	○	○
5. There is an explicit link between the recommendations and the supporting evidence.	○	○	○	○	○
6. Given the nature of the topic and the data, all clinically important outcomes are considered.	○	○	○	○	○
7. The patients to whom this guideline is meant to apply are specifically described.	○	○	○	○	○
8. The criteria used to select articles for inclusion are appropriate.	○	○	○	○	○
9. The reasons why some studies were excluded are clearly described.	○	○	○	○	○
10. All important studies that met the article inclusion criteria are included.	○	○	○	○	○
11. The validity of the studies is appropriately appraised.	○	○	○	○	○
12. The methods are described in such a way as to be reproducible.	○	○	○	○	○
13. The statistical methods are appropriate to the material and the objectives of this guideline.	○	○	○	○	○
14. Important parameters (e.g., setting, study population, study design) that could affect study results are systematically addressed.	○	○	○	○	○
15. Health benefits, side effects, and risks are adequately addressed.	○	○	○	○	○
16. The writing style is appropriate for health care professionals.	○	○	○	○	○
17. The grades assigned to each recommendation are appropriate.	○	○	○	○	○

Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline.

Would you recommend these guidelines for use in clinical practice?*

- Strongly Recommend
- Recommend
- Would Not Recommend
- Unsure

Additional Comments:

To view an exampleof the structured peer review form, please select the following link: Structured Peer Review Form

APPENDIX VIII
PARTICIPATING PEER REVIEW ORGANIZATIONS

Peer review of the guideline is completed by interested external organizations. The AAOS solicits reviewers for each guideline. They consist of experts in the topic area and represent professional societies other than AAOS. Review organizations are nominated by the work group at the introductory meeting. For this guideline, 25 organizations were invited to review the full guideline. Seven societies participated in the review of the guideline on detection and nonoperative management of developemental dysplasia of the him in infants up to six months of age and have given consent to be listed below:

American College of Radiology
American Academy of Family Physicians
Academic Pediatric Association
American Academy of Pediatrics
Pediatric Orthopaedic Society of North America
International Hip Dysplasia Institute

Peer review comments will be available on www.aaos.org.

Participation in the AAOS guideline peer review process does not constitute an endorsement nor does it imply that the reviewer supports this document.

APPENDIX IX
CONFLICT OF INTEREST

Prior to the development of this guideline, work group members disclose conflicts of interest. They disclose COIs in writing to the American Academy of Orthopaedic Surgeons via a private on-line reporting database and also verbally at the recommendation approval meeting.

Disclosure Items: (n) = Respondent answered 'No' to all items indicating no conflicts. 1= Royalties from a company or supplier; 2= Speakers bureau/paid presentations for a company or supplier; 3A= Paid employee for a company or supplier; 3B= Paid consultant for a company or supplier; 3C= Unpaid consultant for a company or supplier; 4= Stock or stock options in a company or supplier; 5= Research support from a company or supplier as a PI; 6= Other financial or material support from a company or supplier; 7= Royalties, financial or material support from publishers; 8= Medical/Orthopaedic publications editorial/governing board; 9= Board member/committee appointments for a society.

Kishore Mulpuri, MD, Workgroup Chair: 5 (DePuy, A Johnson & Johnson Company); 9 (Canadian Orthopaedic Association; International Hip Dysplasia Institute; Pediatric Orthopaedic Society of North America); Submitted on: 05/29/2014

Kit M Song, MD, Workgroup Vice-Chair: 7 (Hanley and Belfus); 9 (AAOS; Pediatric Orthopaedic Society of North America; Pediatric Orthopaedic Society of North America; Scoliosis Research Society; Scoliosis Research Society); Submitted on: 04/27/2014

Doug Campos-Outcalt, MD, MPA: (n); Submitted on: 03/07/2013

Richard H Gross, MD: 8 (Journal of Children's Orthopaedics; Journal of Childrens Orthopaedics; Journal of Pediatric Orthopedics); 9 (American Orthopaedic Association); Submitted on: 05/26/2014

H Theodore Harcke, MD: 4 (Johnson & Johnson); Submitted on: 08/06/2014

Charlotte Henningsen, MS, RT, RDMS, RVT, FSDMS: 2 (GE Healthcare); 3C (Kyoto); 7 (Elsevier); 9 (AIUM; Perinatal Quality Foundation); Submitted on: 08/08/2014

John Peter Lubicky, MD: 8 (Spine; Spine); 9 (Pediatric Orthopaedic Society of North America; Scoliosis Research Society); Submitted on: 04/01/2014

Norman Yoshinobu Otsuka, MD: 3C (Medsonics); 8 (American Journal of Orthopedics; Journal of Children's Orthopaedics; Journal of Orthopaedic Surgical Advances; Journal of Pediatric Orthopedics, Part B); 9 (AAOS; American Academy of Pediatrics; American College of Surgeons; Bone and Joint Decade, U.S.A.; Pediatric Orthopaedic Society of North America; Pediatric Orthopaedic Society of North America); Submitted on: 04/08/2014

Andrew Spooner, MD: (n); Submitted on: 08/07/2014

Elizabeth Ann Szalay, MD: 9 (AAOS); Submitted on: 08/11/2014

Gary Bruce Tebor, MD: (n); Submitted on: 08/05/2014

Bonnie Zehr, MD, FAAP: (n); Submitted on: 08/06/2014

Michael J Goldberg, MD: 3B (BioMarin Pharmaceutical); 8 (Journal Children's Orthopaedics); 9 (AAOS); Submitted on: 04/02/2014

William Timothy Brox, MD: 9 (American Orthopaedic Association; American Orthopaedic Association); Submitted on: 06/02/2014

David Jevsevar, MD, MBA: (n); Submitted on: 04/19/2014

Kevin John Bozic, MD, MBA: 9 (AAOS; American Association of Hip and Knee Surgeons; American Orthopaedic Association; California Joint Replacement Registry Project; California Orthopaedic Association; Orthopaedic Research and Education Foundation); Submitted on: 04/01/2014

William Shaffer: (n); Submitted on: 04/13/2014

Deborah Cummins, PhD: (n); Submitted on: 05/22/2014

Jayson Murray, MA: (n); Submitted on: 06/02/2014

Patrick Donnelly: (n); Submitted on: 04/01/2014

Anne Woznica: (n); Submitted on: 04/01/2014

Yasseline Martinez: (n); Submitted on: 07/31/2014

Kaitlyn Sevarino: (n); Submitted on: 07/22/2014

Peter Shores: (n); Submitted on: 07/31/2014

APPENDIX X
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Universal Ultrasound Screening

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Evaluation of Infants with Risk Factors for DDH

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Imaging of the Unstable Hip

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Imaging of the Infant Hip

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Surveillance after Normal Hip Exam

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Stable Hip with Ultrasound Imaging Abnormalities

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EXCLUDED STUDIES

Table 49. Excluded Studies for Universal Ultrasound Screening

Author	Year	Title	Reason for Exclusion
Akgun S;Bakar C;Budakoglu II;Tuncay C;Cemil T;	2008 Jun	Is clinical examination reliable in diagnosis of developmental dysplasia of the hip?	Incorrect patient population (age at ultrasound not exclusive to neonates)
Andersson JE;	2002	Neonatal hip instability: results and experiences from ten years of screening with the anterior-dynamic ultrasound method	Very low strength
Bar-On E;Meyer S;Harari G;Porat S;	1998 Mar	Ultrasonography of the hip in developmental hip dysplasia	Incorrect patient population (age at ultrasound not exclusive to neonates)
Bhalvani C;Madhuri V;	2011 Jun	Ultrasound profile of hips of South Indian infants	Incorrect patient population (age at ultrasound not exclusive to neonates)
Boeree NR;Clarke NM;	1994 Jul	Ultrasound imaging and secondary screening for congenital dislocation of the hip	Incorrect patient population (age at ultrasound not exclusive to neonates)

Author	Year	Title	Reason for Exclusion
Bond CD;Hennrikus WL;DellaMaggiore ED;	1997 Mar	Prospective evaluation of newborn soft-tissue hip 'clicks' with ultrasound	Incorrect patient population. (Age @ ultrasound > neonatal period)
Clarke NM;Clegg J;al-Chalabi AN;	1989 Jan	Ultrasound screening of hips at risk for CDH. Failure to reduce the incidence of late cases	Incorrect patient population. (Age @ ultrasound > neonatal period)
Czubak J;Kotwicki T;Ponitek T;Skrzypek H;	1998 Feb	Ultrasound measurements of the newborn hip. Comparison of two methods in 657 newborns	Not relevant (does not address recommendations)
Dahlstrom H;Oberg L;Friberg S;	1986 Oct	Sonography in congenital dislocation of the hip	Very low strength
De PM;	1991 Dec	Ultrasound screening for congenital dislocation of the hip. Results and correlations between clinical and ultrasound findings	Incorrect patient population (premature included)
Engesaeter LB;Wilson DJ;Nag D;Benson MK;	1990 Mar	Ultrasound and congenital dislocation of the hip. The importance of dynamic assessment	Incorrect patient population (age at ultrasound not exclusive to neonates)

Author	Year	Title	Reason for Exclusion
Finnbogason T;Jorulf H;	1997 Mar	Dynamic ultrasonography of the infant hip with suspected instability. A new technique	Incorrect patient population (age at ultrasound not exclusive to neonates)
Finnbogason T;Jorulf H;Soderman E;Rehnberg L;	2008 Mar	Anterior dynamic ultrasound and Graf's examination in neonatal hip instability	Does not address question of interest
Fox AE;Paton RW;	2010 Dec	The relationship between mode of delivery and developmental dysplasia of the hip in breech infants: a four-year prospective cohort study	Incorrect patient population (age at ultrasound not exclusive to neonates)
Gardiner HM;Clarke NM;Dunn PM;	1990 Sep	A sonographic study of the morphology of the preterm neonatal hip	Incorrect patient population (premature included)
Haggstrom JA;Brown JC;Schroeder BA;Bach SM;Huurman WW;Esposito P;Halamek LJ;	1990 Jun	Ultrasound in congenital hip disease. Part II--Prospective study	Very low strength
Jellicoe P;Aitken A;Wright K;	2007 May	Ultrasound screening in developmental hip dysplasia: do all scanned	Incorrect patient population (age at ultrasound not exclusive

Author	Year	Title	Reason for Exclusion
		hips need to be followed up?	to neonates)
Kamath S;Mehdi A;Wilson N;Duncan R;	2007 May	The lack of evidence of the effect of selective ultrasound screening on the incidence of late developmental dysplasia of the hip in the Greater Glasgow Region	Incorrect patient population (age at ultrasound not exclusive to neonates)
Kosar P;Ergun E;Unlubay D;Kosar U;	2009 Dec	Comparison of morphologic and dynamic US methods in examination of the newborn hip	Incorrect patient population (age at ultrasound not exclusive to neonates)
Kosar P;Ergun E;Yigit H;Gokharman FD;Kosar U;	2011 Jul	Developmental dysplasia in male infants: risk factors, instability and ultrasound screening	Incorrect patient population (age at ultrasound not exclusive to neonates)
Krismer M;Klestil T;Morscher M;Eggl H;	1996	The effect of ultrasonographic screening on the incidence of developmental dislocation of the hip	Incorrect patient population (age at ultrasound not exclusive to neonates)
Laborie LB;Bruranulls K;Davidsen	2013	Selective ultrasound	Insufficient data

Author	Year	Title	Reason for Exclusion
H;Aukland SM;Bjorlykke JA;Markestad T;Reigstad H;Indrekvam K;Engesaeter LB;Rosendahl K;		screening for developmental dysplasia of the hip in newborns: Effects on registered prevalence, treatment, follow-up and late detected cases. Preliminary results	
Laborie LB;Engesaeter IO;Lehmann TG;Eastwood DM;Engesaeter LB;Rosendahl K;	2013 Jun	Screening Strategies for Hip Dysplasia: Long-term Outcome of a Randomized Controlled Trial	< 50% patient follow-up
Langer R;Kaufmann HJ;	1987	Ultrasound screening of the hip in newborns for the diagnosis of congenital hip dysplasia	Incorrect patient population (pre-mature babies included)
Lewis K;Jones DA;Powell N;	1999 Nov	Ultrasound and neonatal hip screening: the five-year results of a prospective study in high-risk babies	insufficient data (age at US not provided)
Lipton GE;Guille JT;Altiok H;Bowen JR;Harcke HT;	2007 Jan	A reappraisal of the Ortolani examination in children with	Incorrect patient population (age at ultrasound not exclusive

Author	Year	Title	Reason for Exclusion
		developmental dysplasia of the hip	to neonates)
Novick G;Ghelman B;Schneider M;	1983 Oct	Sonography of the neonatal and infant hip	Incorrect patient population (age at ultrasound not exclusive to neonates)
Pashapour N;Golmahammadlou S;	2007 Mar	Study on the diagnosis time of developmental dysplasia of the hip	Incorrect patient population (age at ultrasound not exclusive to neonates)
Paton RW;Hinduja K;Thomas CD;	2005 Sep	The significance of at-risk factors in ultrasound surveillance of developmental dysplasia of the hip. A ten-year prospective study	Incorrect patient population (age at ultrasound not exclusive to neonates)
Paton RW;Hossain S;Eccles K;	2002 May	Eight-year prospective targeted ultrasound screening program for instability and at-risk hip joints in developmental dysplasia of the hip	Incorrect patient population (age at ultrasound not exclusive to neonates)
Paton RW;Srinivasan MS;Shah B;Hollis S;	1999 Mar	Ultrasound screening for hips at risk in	Incorrect patient population (age at

Author	Year	Title	Reason for Exclusion
		developmental dysplasia. Is it worth it?	ultrasound not exclusive to neonates)
Poul J;Garvie D;Grahame R;Saunders AJ;	1998 Jan	Ultrasound examination of neonate's hip joints	Very low strength
Reikeras O;Hinderaker T;Steen H;	1999 Oct	Reduced acetabular depth in hip instability in the newborn	Very low strength
Roovers EA;Boere-Boonekamp MM;Castelein RM;Zielhuis GA;Kerkhoff TH;	2005 Jan	Effectiveness of ultrasound screening for developmental dysplasia of the hip	Incorrect patient population (age at ultrasound not exclusive to neonates)
Roovers EA;Boere-Boonekamp MM;Mostert AK;Castelein RM;Zielhuis GA;Kerkhoff TH;	2005 Sep	The natural history of developmental dysplasia of the hip: sonographic findings in infants of 1-3 months of age	Incorrect patient population (age at ultrasound not exclusive to neonates)
Rosendahl K;Markestad T;Lie RT;	1992	Ultrasound in the early diagnosis of congenital dislocation of the hip: the significance of hip stability versus acetabular morphology	Does not address question of interest
Senaran H;Ozdemir HM;Ogun	2004 Aug	Value of limited hip	Incorrect patient

Author	Year	Title	Reason for Exclusion
TC;Kapicioglu MI;		abduction in developmental dysplasia of the hip	population (age at ultrasound not exclusive to neonates)
Suzuki S;Kasahara Y;Futami T;Ushikubo S;Tsuchiya T;	1991 Nov	Ultrasonography in congenital dislocation of the hip. Simultaneous imaging of both hips from in front	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Tuncay IC;Karaeminogullari O;Demirors H;Tandogan NR;	2005 May	Is prematurity important in ultrasonographic hip typing?	Incorrect patient population (premature included)
Vane AG;Gwynne Jones DP;Dunbar JD;Theis JC;	2005 May	The diagnosis and management of neonatal hip instability: results of a clinical and targeted ultrasound screening program	Incorrect patient population (age at ultrasound not exclusive to neonates)
von KR;Ihme N;Oberle D;Lorani A;Stark R;Altenhofen L;Niethard FU;	2003 Dec 6	Effect of ultrasound screening on the rate of first operative procedures for developmental hip dysplasia in Germany	Incorrect patient population (age at ultrasound not exclusive to neonates)
Zieger M;Hilpert S;	1987	Ultrasonography of the infant hip. Part IV:	Very low strength

Author	Year	Title	Reason for Exclusion
		Normal development in the newborn and preterm neonate	

Table 50. Excluded Studies for Universal Ultrasound Screening due to Not Best Available Evidence

Author	Year	Title	Reason for exclusion
Afaq AA;Stokes S;Fareed H;Zadeh HG;Watson M;	2011 Apr	Ultrasound in the selective screening of developmental dysplasia of the hip	Not best available evidence
Andersson JE;Funnemark PO;	1995 May	Neonatal hip instability: screening with anterior-dynamic ultrasound method	Not best available evidence
Baronciani D;Atti G;Andiloro F;Bartesaghi A;Gagliardi L;Passamonti C;Petrone M;	1997 Feb	Screening for developmental dysplasia of the hip: from theory to practice. Collaborative Group DDH Project	Not best available evidence
Boere-Boonekamp MM;Kerkhoff TH;Schuil PB;Zielhuis GA;	1998 Feb	Early detection of developmental dysplasia of the hip in The Netherlands: the validity of a standardized	Not best available evidence

Author	Year	Title	Reason for exclusion
		assessment protocol in infants	
Castelein RM;Sauter AJ;	1988 Nov	Ultrasound screening for congenital dysplasia of the hip in newborns: its value	Not best available evidence
Falliner A;Hahne HJ;Hassenpflug J;	1999 Apr	Sonographic hip screening and early management of developmental dysplasia of the hip	Not best available evidence
Giannakopoulou C;Aligizakis A;Korakaki E;Velivasakis E;Hatzidaki E;Manoura A;Bakataki A;Hadjipavlou A;	2002	Neonatal screening for developmental dysplasia of the hip on the maternity wards in Crete, Greece. correlation to risk factors	Not best available evidence
Holen KJ;Terjesen T;Tegnander A;Bredland T;Saether OD;Eik-Nes SH;	1994 Sep	Ultrasound screening for hip dysplasia in newborns	Not best available evidence
Jari S;Paton RW;Srinivasan MS;	2002 Jan	Unilateral limitation of abduction of the hip. A valuable clinical sign for DDH?	Not best available evidence
Jimenez C;Delgado-Rodriguez M;Lopez-Moratalla M;Sillero	1994	Validity and diagnostic bias in the clinical screening for congenital dysplasia of the hip	Not best available evidence

Author	Year	Title	Reason for exclusion
M;Galvez-Vargas R;			
Krolo I;Viskovic K;Kozic S;Marotti M;Klaric-Custovic R;Banak-Zahtila N;Ikic D;Premate-Milas L;	2003 Dec	The advancement in the early diagnostics of developmental hip dysplasia in infants--the role of ultrasound screening	Not best available evidence
Malkawi H;Tadros F;Khasawneh Z;Al-Asir B;	1997	Simple or stress sonographic hip screening in the newborn versus simple hip screening at the age of three to four months	Not best available evidence
Markovac Z;Matasovic T;Markovac D;	1995	Ultrasound determination of the hip joint laxity	Not best available evidence
Poul J;Bajerova J;Skotakova J;Jira I;		Selective treatment program for developmental dysplasia of the hip in an epidemiologic prospective study	Not best available evidence
Rosenberg N;Bialik V;	2002 Jun	The effectiveness of combined clinical-sonographic screening in the treatment of neonatal hip instability	Not best available evidence
Rosenberg N;Bialik V;Norman D;Blazer S;	1998	The importance of combined clinical and sonographic examination of instability of the neonatal hip	Not best available evidence

Author	Year	Title	Reason for exclusion
Rosendahl K;Markestad T;Lie RT;	1992 Feb	Congenital dislocation of the hip: a prospective study comparing ultrasound and clinical examination	Not best available evidence
Rosendahl K;Markestad T;Lie RT;	1996 Jan	Developmental dysplasia of the hip. A population-based comparison of ultrasound and clinical findings	Not best available evidence
Sosnierz A;Karel M;Maj S;Kolanko G;	1991 Jun	Ultrasound appearance of the hip joint in newborns during the first week of life	Not best available evidence
Teanby DN;Paton RW;	1997 Mar	Ultrasound screening for congenital dislocation of the hip: a limited targeted programme	Not best available evidence
Tegnander A;Terjesen T;Bredland T;Holen KJ;	1994	Incidence of late-diagnosed hip dysplasia after different screening methods in newborns	not best available evidence
Terjesen T;Bredland T;Berg V;	1989 Nov	Ultrasound for hip assessment in the newborn	Not best available evidence
Tonnis D;Storch K;Ulbrich H;	1990 Mar	Results of newborn screening for CDH with and without	Not best available evidence

Author	Year	Title	Reason for exclusion
		sonography and correlation of risk factors	
Treiber M;Tomazic T;Tekauc-Golob A;Zolger J;Korpar B;Burja S;Takac I;Sikosek A;	2008	Ultrasound screening for developmental dysplasia of the hip in the newborn: a population-based study in the Maribor region, 1997-2005	Not best available evidence
Wirth T;Stratmann L;Hinrichs F;	2004 May	Evolution of late presenting developmental dysplasia of the hip and associated surgical procedures after 14 years of neonatal ultrasound screening	Not best available evidence
Zenios M;Wilson B;Galasko CS;	2000 Oct	The effect of selective ultrasound screening on late presenting DDH	Not best available evidence

Table 51. Excluded Studies for Evaluation of Infants with Risk Factors for DDH

Author	Year	Title	Reason for exclusion
Abd el-Kader SM;	1989 Apr	Mehad: the Saudi tradition of infant wrapping as a possible aetiological factor in congenital dislocation of the hip	Incorrect patient population (age at presentation > neonatal period)

Author	Year	Title	Reason for exclusion
Abela M;Benson MKD;	2001	Risk factors in developmental dysplasia of the hip	Incorrect patient population (not exclusive to neonatal age group)
Abu Hassan FO;Shannak A;	2007 Sep	Associated risk factors in children who had late presentation of developmental dysplasia of the hip	Incorrect patient population (age at presentation > neonatal period)
Ando M;Gotoh E;	1990 May	Significance of inguinal folds for diagnosis of congenital dislocation of the hip in infants aged three to four months	Incorrect patient population. Not exclusive to neonatal age group
Arumilli BR;Koneru P;Garg NK;Davies R;Saville S;Sampath J;Bruce C;	2006 Sep	Is secondary radiological follow-up of infants with a family history of developmental dysplasia of the hip necessary?	Retrospective case series
Azzopardi T;Van EP;Cundy PJ;Tucker G;Chan A;	2011 Jan	Late diagnosis of developmental dysplasia of the hip: an analysis of risk factors	Very low strength
Berman L;Klenerman L;	1986 Sep 20	Ultrasound screening for hip abnormalities: preliminary findings in 1001 neonates	Incorrect patient population (ultrasound before 4 weeks of age)
Bialik V;Fishman J;Katzir J;Zeltzer M;	1986 Nov	Clinical assessment of hip instability in the newborn by an orthopedic surgeon and a pediatrician	Very low strength
Bjerkreim I;Arseth PH;	1978 May	Congenital dislocation of the hip in	Incorrect patient population (age

Author	Year	Title	Reason for exclusion
		Norway. Late diagnosis CDH in the years 1970 to 1974	at intervention>6 months)
Bower C;Stanley FJ;Kricker A;	1987 Nov	Congenital dislocation of the hip in Western Australia. A comparison of neonatally and postneonatally diagnosed cases	Very low strength
Bower C;Stanley FJ;Morgan B;Slattery H;Stanton C;	1989 Jan 16	Screening for congenital dislocation of the hip by child-health nurses in Western Australia	Very low strength
Carney BT;Vanek EA;	2006	Incidence of hip dysplasia in idiopathic clubfoot	Incorrect patient population (age at presentation>6 months)
Castelein RM;Korte J;	2001 Sep	Limited hip abduction in the infant	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Chaarani MW;Al Mahmeid MS;Salman AM;	2002 Jun	Developmental Dysplasia of the Hip before and after increasing community awareness of the harmful effects of swaddling	Very low strength
Chan A;McCaul KA;Cundy PJ;Haan EA;Byron-Scott R;	1997 Mar	Perinatal risk factors for developmental dysplasia of the hip	Very low strength
Clausen I;Nielsen KT;	1988	Breech position, delivery route and congenital hip dislocation	Very low strength

Author	Year	Title	Reason for exclusion
Cui W;Ma C;Tang Y;Chang V;Rao PV;Ariet M;Resnick MB;Roth J;	2005 Nov	Sex differences in birth defects: A study of opposite-sex twins	Very low strength
Curro V;Buffetti A;De LF;	1985	Clicking hip: A pathological sign?	Very low strength
Cyvin KB;	1977	Congenital dislocation of the hip joint	Very low strength
Czeizel A;Szentpetery J;Tusnady G;Vizkelety T;	1975 Jun	Two family studies on congenital dislocation of the hip after early orthopaedic screening Hungary	Retrospective case series
Czeizel A;Vizkelety T;Szentpeteri J;	1972 Feb	Congenital dislocation of the hip in Budapest, Hungary	Very low strength
Dai J;Shi D;Zhu P;Qin J;Ni H;Xu Y;Yao C;Zhu L;Zhu H;Zhao B;Wei J;Liu B;Ikegawa S;Jiang Q;Ding Y;	2008	Association of a single nucleotide polymorphism in growth differentiate factor 5 with congenital dysplasia of the hip: a case-control study	Incorrect patient population (age at presentation > neonatal period)
De PM;Moharamzadeh D;	2010 Dec	Developmental dysplasia of the hip in twins: the importance of mechanical factors in the etiology of DDH	Very low strength
Dogruel H;Atalar H;Yavuz OY;Sayli U;	2008 Jun	Clinical examination versus ultrasonography in detecting developmental dysplasia of the hip	< 50% patient follow-up
Doig JR;Shannon FT;	1975 Dec 10	Congenital dislocation of the hip an	insufficient data

Author	Year	Title	Reason for exclusion
		evaluation of neonatal diagnosis	
D'Souza L;Hynes D;McManus F;	1996 Mar	Radiological screening for congenital hip dislocation in the infant 'at risk'	Retrospective case series
Dunn PM;	1976 Sep	Perinatal observations on the etiology of congenital dislocation of the hip	Very low strength
Dunn PM;Evans RE;Thearle MJ;Griffiths HE;Witherow PJ;	1985 May	Congenital dislocation of the hip: early and late diagnosis and management compared	Very low strength
Duppe H;Danielsson LG;	2002 Aug	Screening of neonatal instability and of developmental dislocation of the hip. A survey of 132,601 living newborn infants between 1956 and 1999	Very low strength
Fazlagic S;Grubor P;Fazlagic S;	2010	Risk factors for development of hip disorder among newborn babies in Tesanj region	Insufficient data
Fiddian NJ;Gardiner JC;	1994 May	Screening for congenital dislocation of the hip by physiotherapists. Results of a ten-year study	Very low strength
Finnbogason T;Jorulf H;Soderman E;Rehnberg L;	2008 Mar	Neonatal hip instability: a prospective comparison of clinical examination and anterior dynamic ultrasound	Very low strength

Author	Year	Title	Reason for exclusion
Fredensborg N;	1976 May	The effect of early diagnosis of congenital dislocation of the hip	Retrospective case series
Fredensborg N;Nilsson BE;	1976 Sep	Overdiagnosis of congenital dislocation of the hip	Very low strength
Godward S;Dezateux C;	1998 Apr 18	Surgery for congenital dislocation of the hip in the UK as a measure of outcome of screening. MRC Working Party on Congenital Dislocation of the Hip. Medical Research Council	Very low strength
Gunther A;Smith SJ;Maynard PV;Beaver MW;Chilvers CE;	1993 Jan	A case-control study of congenital hip dislocation	Very low strength
Hadlow V;	1988 Nov	Neonatal screening for congenital dislocation of the hip. A prospective 21-year survey	Very low strength
Higuchi F;	1984 Dec	Genetic study on the congenital dislocation of the hip	Very low strength
Howie RN;Phillips LI;	1970 Feb	Congenital malformations in the newborn: a survey at the National Women's Hospital, 1964-67	Incorrect patient population (spina bifida included)
Hummer CD;MacEwen GD;	1972 Sep	The coexistence of torticollis and congenital dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)

Author	Year	Title	Reason for exclusion
Ishida K;	1977 Jul	Prevention of the development of the typical dislocation of the hip	Incorrect patient population (age at exam not exclusive to 0-6 months)
Jones D;	1977 Aug	An assessment of the value of examination of the hip in the newborn	Very low strength
Jones DA;Powell N;	1990 May	Ultrasound and neonatal hip screening. A prospective study of 'high risk' babies	Very low strength
Khassawneh M;Khader Y;Amarin Z;Sa'D SA;Alkafajei A;	2008 Dec	Traditional practices for newborns care: The north of jordan perspective	Survey study
Knox EG;Armstrong EH;Lancashire RJ;	1987 Dec	Effectiveness of screening for congenital dislocation of the hip	Very low strength
Kramer AA;Berg K;Nance WE;	1987 Feb	The effect of perinatal screening in Norway on the magnitude of noninherited risk factors for congenital dislocation of the hip	Very low strength
Krikler SJ;Dwyer NS;	1992 Sep	Comparison of results of two approaches to hip screening in infants	Very low strength
Kumar SJ;MacEwen GD;	1982 Apr	The incidence of hip dysplasia with metatarsus adductus	Incorrect patient population. Not exclusive to neonatal age group
Kutlu A;Memik R;Mutlu	1992 Sep	Congenital dislocation of the hip and its	Incorrect patient population (age

Author	Year	Title	Reason for exclusion
M;Kutlu R;Arslan A;		relation to swaddling used in Turkey	at presentation>6 months)
Lehmann EC;Street DG;	1981 Apr	Neonatal screening in Vancouver for congenital dislocation of the hip	Very low strength
Lennox IA;McLauchlan J;Murali R;	1993 Jan	Failures of screening and management of congenital dislocation of the hip	Insufficient data
Limpaphayom M;Jeeravipoolvarn P;Chomcharn U;	1978 Oct	Congenital hip dysplasia in Thai children	Very low strength
Lowry CA;Donoghue VB;Murphy JF;	2005 Jun	Auditing hip ultrasound screening of infants at increased risk of developmental dysplasia of the hip	Retrospective case series
MacKenzie IG;Wilson JG;	1981 Feb	Problems encountered in the early diagnosis and management of congenital dislocation of the hip	Very low strength
Macnicol MF;	1990 Nov	Results of a 25-year screening programme for neonatal hip instability	Very low strength
Mamouri GH;Khatami F;Hamedi AB;	2003	Congenital Dislocation of the hip in newborns in the City of Mashhad	Incorrect patient population (pre-mature included)
McKinnon B;Bosse MJ;Browning WH;	1984 Aug	Congenital dysplasia of the hip: the lax (subluxatable) newborn hip	Very low strength

Author	Year	Title	Reason for exclusion
Minihane KP;Grayhack JJ;Simmons TD;Seshadri R;Wysocki RW;Sarwark JF;	2008 Sep	Developmental dysplasia of the hip in infants with congenital muscular torticollis	Very low strength
Morrison DL;MacEwen GD;	1982	Congenital muscular torticollis: observations regarding clinical findings, associated conditions, and results of treatment	Retrospective case series
Mufti MH;	1988	Prime factors in the etiology of congenital dislocation of the hip and talipes equinovarus in Riyadh	Insufficient data
Nimityongskul P;Hudgens RA;Anderson LD;Melhem RE;Green AE;Saleeb SF;	1995 Nov	Ultrasonography in the management of developmental dysplasia of the hip (DDH)	Very low strength
Omeroglu H;Koparal S;	2001	The role of clinical examination and risk factors in the diagnosis of developmental dysplasia of the hip: a prospective study in 188 referred young infants	Incorrect patient population (age at presenation not exclusive to 0-6 month age group)
Paterson D;	1976 Nov	The early diagnosis and treatment of congenital dislocation of the hip	Very low strength
Paterson DC;	1976 Sep	The early diagnosis and treatment of congenital dislocation of the hip	Retrospective case series
Paton RW;Choudry Q;	2009 May	Neonatal foot deformities and their	Incorrect patient population. Not

Author	Year	Title	Reason for exclusion
		relationship to developmental dysplasia of the hip: an 11-year prospective, longitudinal observational study	exclusive to neonatal age group
Perry DC;Tawfiq SM;Roche A;Shariff R;Garg NK;James LA;Sampath J;Bruce CE;	2010 Nov	The association between clubfoot and developmental dysplasia of the hip	Incorrect patient population (age at presentation>neonatal period)
Pillai A;Joseph J;McAuley A;Bramley D;	2011 Jan	Diagnostic accuracy of static graf technique of ultrasound evaluation of infant hips for developmental dysplasia	Incorrect patient population (ultrasound before 4 weeks of age)
Place MJ;Parkin DM;Fritton JM;	1978 Jul 29	Effectiveness of neonatal screening for congenital dislocation of the hip	Very low strength
Poul J;Bajerova J;Sommernitz M;Straka M;Pokorny M;Wong FY;	1992 Sep	Early diagnosis of congenital dislocation of the hip	Very low strength
Ritter MA;	1973 Jan	Congenital dislocation of the hip in the newborn	Very low strength
Robinson GW;	1968 Mar	Birth characteristics of children with congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Sanfridson J;Redlund-Johnell I;Uden A;	1991 Apr	Why is congenital dislocation of the hip still missed? Analysis of 96,891 infants screened in Malmo 1956-1987	Very low strength

Author	Year	Title	Reason for exclusion
Simic S;Vukasinovic Z;Samardzic J;Pejcic I;Lukavac-Tesin M;Spasovski D;Bozinovic-Prekajski N;	2009 Jul	Does the gestation age of newborn babies influence the ultrasonic assessment of hip condition?	Incorrect patient population (pre-mature babies included)
Sionek A;Czubak J;Kornacka M;Grabowski B;	2008 Mar	Evaluation of risk factors in developmental dysplasia of the hip in children from multiple pregnancies: results of hip ultrasonography using Graf's method	Very low strength
Sommer J;	1971	Atypical hip clock in the newborn	retrospective case series
Stein-Zamir C;Volovik I;Rishpon S;Sabi R;	2008 Jun	Developmental dysplasia of the hip: risk markers, clinical screening and outcome	Very low strength
Stevenson DA;Mineau G;Kerber RA;Viskochil DH;Schaefer C;Roach JW;	2009 Jul	Familial predisposition to developmental dysplasia of the hip	Very low strength
Stoffelen D;Urlus M;Molenaers G;Fabry G;	1995	Ultrasound, radiographs, and clinical symptoms in developmental dislocation of the hip: a study of 170 patients	Incorrect patient population. Not exclusive to neonatal age group
Tanabe G;Kotakemori K;Miyake Y;Mohri M;	1972	Early diagnosis of congenital dislocation of the hip	Incorrect patient population (not exclusive to neonatal age group)
Tassanawipas A;Mahakkanukrauh	1990	Real-time ultrasonographic examination in congenital dislocation of the hip	Insufficient data

Author	Year	Title	Reason for exclusion
C;Chaikitpinyo S;Soontrapa S;			
Tejavej A;Siripoonya P;	1984 Oct	Breech presentation and the newborn hip	Very low strength
Tien YC;Su JY;Lin GT;Lin SY;	2001 May	Ultrasonographic study of the coexistence of muscular torticollis and dysplasia of the hip	Incorrect patient population. Not exclusive to neonatal age group
Tredwell SJ;Bell HM;	1981	Efficacy of neonatal hip examination	Very low strength
Vane AG;Gwynne Jones DP;Dunbar JD;Theis JC;	2005 May	The diagnosis and management of neonatal hip instability: results of a clinical and targeted ultrasound screening program	Incorrect patient population (not exclusive to 4 week-4 month age group)
Vedantam R;Bell MJ;	1995 Nov	Dynamic ultrasound assessment for monitoring of treatment of congenital dislocation of the hip	Retrospective case series
Von HJ;Green DW;Burke SW;Sindle K;Denneen J;Haglund-Akerlind Y;Widmann RF;	2006 Nov	The relationship between developmental dysplasia of the hip and congenital muscular torticollis	Very low strength
Walsh JJ;Morrissy RT;	1998 Mar	Torticollis and hip dislocation	Retrospective case series
Walter RS;Donaldson JS;Davis CL;Shkolnik A;Binns HJ;Carroll	1992 Feb	Ultrasound screening of high-risk infants. A method to increase early detection of congenital dysplasia of the	Incorrect patient population (not exclusive to 4 week-4 month age group)

Author	Year	Title	Reason for exclusion
NC;Brouillette RT;		hip	
Wang K;Shi D;Zhu P;Dai J;Zhu L;Zhu H;Lv Y;Zhao B;Jiang Q;	2010 Dec	Association of a single nucleotide polymorphism in Tbx4 with developmental dysplasia of the hip: a case-control study	Very low strength
Westberry DE;Davids JR;Pugh LI;	2003 Jul	Clubfoot and developmental dysplasia of the hip: value of screening hip radiographs in children with clubfoot	Retrospective case series
Wilkinson JA;	1972 Feb	A post-natal survey for congenital displacement of the hip	Insufficient data
Wynne-Davies R;Littlejohn A;Gormley J;	1982 Oct	Aetiology and interrelationship of some common skeletal deformities. (Talipes equinovarus and calcaneovalgus, metatarsus varus, congenital dislocation of the hip, and infantile idiopathic scoliosis)	Incorrect patient population (age at presentation>6 months)
Yau CH;Choi KY;Kwong NS;Lau PC;Yuen MK;Kwok NC;Chow YY;Siu SL;Li KW;Lam DK;	2012	Frequency of developmental dysplasia of the hip in breech-presented Chinese neonates in Hong Kong	Very low strength
Yiv BC;Saidin R;Cundy PJ;Tgetgel JD;Aguilar J;McCaul KA;Keane RJ;Chan	1997 Apr	Developmental dysplasia of the hip in South Australia in 1991: prevalence and risk factors	Very low strength

Author	Year	Title	Reason for exclusion
A;Scott H;			
Zhao D;Rao W;Zhao L;Liu J;Chen Y;Shen P;Du Q;Li L;	2013 Jul	Is it worthwhile to screen the hip in infants born with clubfeet?	Not exclusive to neonatal age group
Zieger M;Schulz RD;	1987	Ultrasonography of the infant hip. Part III: Clinical application	Very low strength

Table 52. Excluded Studies for Evaluation of Infants with Risk Factors for DDH due to Not Best Available Evidence

Author	Year	Title	Reason for exclusion
Al-Umran K;Ahlberg Dawodu AAH;El-Mouzan MI;Ahmad FA;	1988	Neonatal screening for hip instability: Five years' experience	Not best available evidence
Bjerkheim I;Hagen OH;Ikonomou N;Kase T;Kristiansen T;Arseth PH;	1993	Late diagnosis of developmental dislocation of the hip in Norway during the years 1980-1989	Not best available evidence
Clarke NM;Reading IC;Corbin C;Taylor CC;Bochmann T;	2012 May	Twenty years experience of selective secondary ultrasound screening for congenital dislocation of the hip	Not best available evidence
Czeizel A;Szentpetery J;Kellermann M;	1974 Nov	Incidence of congenital dislocation of the hip in Hungary	Not best available evidence
Gupta AK;Kumari S;Arora PL;Kumar R;Mehtani AK;Sood LK;	1992 Nov	Hip instability in newborns in an urban community	Not best available evidence
Heikkila E;	1984 Apr	Congenital dislocation of the hip in Finland. An epidemiologic analysis of 1035 cases	Not best available evidence

Author	Year	Title	Reason for exclusion
Hoaglund FT;Healey JH;	1990 Dec	Osteoarthrosis and congenital dysplasia of the hip in family members of children who have congenital dysplasia of the hip	Not best available evidence
Kramer AA;Berg K;Nance WE;	1988	Familial aggregation of congenital dislocation of the hip in a Norwegian population	Not best available evidence
Suzuki S;Yamamuro T;	1986 Feb	Correlation of fetal posture and congenital dislocation of the hip	Not best available evidence
Watanabe M;Yanagisawa M;	1988 Dec	Late diagnosis of congenital dislocation of the hip in the newborn	Not best available evidence
Wynne-Davies R;	1970 Dec	A family study of neonatal and late-diagnosis congenital dislocation of the hip	Not best available evidence

Table 53. Excluded Studies for Imaging of the Unstable Hip

Author	Year	Title	Reason for exclusion
Ang KC;Lee EH;Lee PY;Tan KL;	1997 Jul	An epidemiological study of developmental dysplasia of the hip in infants in Singapore	Very low strength
Catford JC;Bennet GC;Wilkinson JA;	1982 Nov 27	Congenital hip dislocation: an increasing and still uncontrolled disability?	Very low strength
Danielsson LG;	2000 May	Instability of the hip in neonates. An ethnic and geographical study in 24,101 newborn infants in Malmo	Very low strength
Gardner F;Dezateux C;Elbourne D;Gray A;King A;Quinn A;JR;Royer TD;Davis IS;	2005 Jan	The hip trial: psychosocial consequences for mothers of using ultrasound to manage infants with developmental hip dysplasia	Does not address question of interest
Gomes H;Menanteau B;Motte J;Robiliard P;	1987	Sonography of the neonatal hip: a dynamic approach	Very low strength
Holen KJ;Tegnander A;Terjesen T;Johansen OJ;Eik-Nes SH;	1997 Dec	Ultrasonography of clinically unstable hips. A prospective study of 143 neonates at birth and early follow-up	Very low strength

Author	Year	Title	Reason for exclusion
Malkawi H;Asir B;Tadros F;Khasawneh Z;	1992 Jun	Sonographic image of the newborn hip with positive Ortolani's sign	Very low strength
Mostert AK;Tulp NJ;Castelein RM;	2000 May	Results of Pavlik harness treatment for neonatal hip dislocation as related to Graf's sonographic classification	Incorrect patient population (age at ultrasound not exclusive to patients aged 0-6 months)
Saies AD;Foster BK;Lequesne GW;	1988 Jul	The value of a new ultrasound stress test in assessment and treatment of clinically detected hip instability	Very low strength
Van Moppes FI;De Jong RO;	1988	Ultrasound diagnosis of congenital hip dislocation and dysplasia	Incorrect patient population (age at presentation not exclusive to 0-6 months)

Table 54. Excluded Studies for Imaging of the Infant Hip

Author	Year	Title	Reason for exclusion
Bone CM;Hsieh GH;	2000 Mar	The risk of carcinogenesis from radiographs to pediatric orthopaedic patients	Retrospective case series

Author	Year	Title	Reason for exclusion
Clarke NM;Harcke HT;McHugh P;Lee MS;Borns PF;MacEwen GD;	1985 May	Real-time ultrasound in the diagnosis of congenital dislocation and dysplasia of the hip	Incorrect patient population (age range 1-32 months)
Harcke HT;Lee MS;Sinning L;Clarke NM;Borns PF;MacEwen GD;	1986 Aug	Ossification center of the infant hip: sonographic and radiographic correlation	Very low strength
Honda M;Arita S;Mitani S;Takeda Y;Ozaki T;Inamura K;Kanazawa S;	2010 Jun	Infant hip joint diagnostic support system based on clinical manifestations in X-ray images	Very low strength
Kalender W;Reither M;Schuster W;	1979 Oct	Reduction of dose in pelvic examinations of infants using modern X-ray techniques	Incorrect patient population (not human)
Krepler P;Mazoch R;Schwagerl W;Schuster E;	1982	Diagnosis and relevance of suspected dysplasia of the hip joint, radiologic investigation starting with the age of 3 months	Incorrect patient population (age range 2-12 months)
Krepler P;Vana N;Havranek C;	1977	Dosimetric studies in the radiological examination of the hips in young infants with a special fenestration method of gonad protection	Incorrect patient population (age range 3-12 months)
Lefaure C;Maccia C;Corlobe F;	1986	Cost-effectiveness and risk associated with infants' hip dysplasia screening in France	Very low strength

Author	Year	Title	Reason for exclusion
Morin C;Harcke HT;MacEwen GD;	2006 Apr	The infant hip: real-time US assessment of acetabular development	Incorrect patient population (age range 4-28 months)
Morin C;Zouaoui S;Delvalle-Fayada A;Delforge PM;Leclet H;	1999 Sep	Ultrasound assessment of the acetabulum in the infant hip	Incorrect patient population (age range 1-12 months)
Terjesen T;Runden TO;Tangerud A;	1989 Dec	Ultrasonography and radiography of the hip in infants	Incorrect patient population (age range 2-24 months)
Waugh R;McCallum HM;McCarty M;Montgomery R;Aszkenasy M;	2001 May	Paediatric pelvic imaging: optimisation of dose and technique using digital grid-controlled pulsed fluoroscopy	Very low strength

Table 55. Excluded Studies for Surveillance after normal infant hip exam

Author	Year	Title	Reason for exclusion
Hampshire AJ;Blair ME;Crown NS;Avery AJ;Brackenbury PB;Williams EI;	1999	Is pre-school child health surveillance an effective means of detecting key physical abnormalities?	Very low strength

Poul J;Bajerova J;Sommernitz M;Straka M;Pokorny M;Wong FY;	1992	Early diagnosis of congenital dislocation of the hip	Very low strength

Table 56. Excluded Studies for Stable Hip with Ultrasound Imaging Abnormalities

Author	Year	Title	Reason for exclusion
Bialik V;Bialik GM;Wiener F;	1998 Jan	Prevention of overtreatment of neonatal hip dysplasia by the use of ultrasonography	Retrospective case series
Bruras KR;Aukland SM;Markestad T;Sera F;Dezateux C;Rosendahl K;	2011 Mar	Newborns With Sonographically Dysplastic and Potentially Unstable Hips: 6-Year Follow-up of an RCT	Does not address question of interest
Rosendahl K;Dezateux C;Fosse KR;Aase H;Aukland SM;Reigstad H;Alsaker T;Moster D;Lie RT;Markestad T;	2010 Jan	Immediate treatment versus sonographic surveillance for mild hip dysplasia in newborns	Does not address question of interest
Terjesen T;Holen KJ;Tegnander A;	1996 Jul	Hip abnormalities detected by ultrasound in clinically normal newborn infants	Retrospective case series

Author	Year	Title	Reason for exclusion
Vrdoljak J;Irha E;	1998 Jun	Development and growth of immature hips	Retrospective case series

Table 57. Excluded Studies for Stable Hip with Ultrasound Imaging Abnormalities due to Not Best Available Evidence

Author	Year	Title	Reason for exclusion
Bialik V;Bialik GM;Blazer S;Sujov P;Wiener F;Berant M;	1999 Jan	Developmental dysplasia of the hip: a new approach to incidence	Not best available evidence
Castelein RM;Sauter AJ;de VM;van LB;	1992 Jul	Natural history of ultrasound hip abnormalities in clinically normal newborns	Not best available evidence
Chen HW;Chang CH;Tsai ST;Liu WJ;Chua C;Chen YY;Kuo KN;	2010 Sep	Natural progression of hip dysplasia in newborns: a reflection of hip ultrasonographic screenings in newborn nurseries up of an RCT	Not best available evidence
Kokavec M;Bialik V;	2007	Developmental dysplasia of the hip. Prevention and real	Not best available evidence

Author	Year	Title	Reason for exclusion
		incidence	
Koshimune G;	1985 Jun	Anteversion of the femoral neck in congenital dislocation of the hip	Not best available evidence
Reikeras O;Kristiansen LP;Gunderson R;	2002 Aug	Ultrasonography of the infant hip: the significance of provokable instability with normal morphology	Not best available evidence
Roovers EA;Boere-Boonekamp MM;Mostert AK;Castelein RM;Zielhuis GA;Kerkhoff TH;	2005 Sep	The natural history of developmental dysplasia of the hip: sonographic findings in infants of 1-3 months of age	Not best available evidence
Rosendahl K;Markestad T;Lie RT;	1996 Jan	Developmental dysplasia of the hip. A population-based comparison of ultrasound and clinical findings	Not best available evidence
Rosendahl K;Markestad T;Lie RT;	1992 Feb	Congenital dislocation of the hip: a prospective study comparing ultrasound and clinical examination	Not best available evidence
Sucato DJ;Johnston CE;Birch JG;Herring JA;Mack P;	1999 Nov	The natural history of hip abnormalities detected by ultrasound in clinically normal	Not best available evidence

Author	Year	Title	Reason for exclusion
		newborns: a 6-8 year radiographic follow-up study of 93 children	
Tegnander A;Holen KJ;Terjesen T;	1999 Aug	Outcome of ultrasonographic hip abnormalities in clinically stable hips	Not best available evidence
Tudor A;Sestan B;Rakovac I;Luke-Vrbanic TS;Prpic T;Rubinic D;Dapic T;	2007 Jun	The rational strategies for detecting developmental dysplasia of the hip at the age of 4-6 months old infants: a prospective study	Not best available evidence
Van Moppes FI;De Jong RO;	1988	Ultrasound follow-up of the 'immature' infant hip (Graf classification type IIa)	Not best available evidence

Table 58. Excluded Studies for Treatment of Clinical Instability

Author	Year	Title	Reason for exclusion
Artz TD;Lim WN;Wilson PD;Levine DB;Salvati EA;	1975 Jul	Neonatal diagnosis, treatment and related factors of congenital dislocation of the hip	Retrospective case series

Author	Year	Title	Reason for exclusion
Atalar H;Sayli U;Yavuz OY;Uras I;Dogruel H;	2007 Apr	Indicators of successful use of the Pavlik harness in infants with developmental dysplasia of the hip	Very low strength
Bialik V;Pery M;Kaftori JK;Fishman J;	1988	The use of ultrasound scanning in the management of developmental disorders of the hip	Very low strength
Borges JL;Kumar SJ;Guille JT;	1995 Jul	Congenital dislocation of the hip in boys	Very low strength
Bradley J;Wetherill M;Benson MK;	1987 Mar	Splintage for congenital dislocation of the hip. Is it safe and reliable?	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Burger BJ;Burger JD;Bos CF;Hermans J;Rozing PM;Vandenbroucke JP;	1993 Jun	Frejka pillow and Becker device for congenital dislocation of the hip. Prospective 6-year study of 104 late-diagnosed cases	Very low strength
Cyvin KB;	1977	A follow-up study of children with instability of the hip joint at birth. Clinical and radiological investigations with special reference to the anteversion of the femoral	Very low strength

Author	Year	Title	Reason for exclusion
		neck	
Cyvin KB;	1977	Unsatisfactory results of early treatment of infants with unstable hips at birth	Very low strength
Danielsson L;	2000 Jun	Late-diagnosed DDH: a prospective 11-year follow-up of 71 consecutive patients (75 hips)	Incorrect patient population (not exclusive to 0-6 months)
Eidelman M;Katzman A;Freiman S;Peled E;Bialik V;	2003 Jul	Treatment of true developmental dysplasia of the hip using Pavlik's method	Very low strength
Finlay HV;Maudsley RH;Busfield PI;	1967 Nov 18	Dislocatable hip and dislocated hip in the newborn infant	Incorrect patient population (teratologic included)
Graf R;Tschauner C;Klapsch W;	1993	Progress in prevention of late developmental dislocation of the hip by sonographic newborn hip 'screening': results of a comparative follow-up study	Very low strength
Holen KJ;Tegnander A;Terjesen T;Johansen OJ;Eik-Nes SH;	1997 Dec	Ultrasonography of clinically unstable hips. A prospective study of 143 neonates at birth	Very low strength

Author	Year	Title	Reason for exclusion
		and early follow-up	
Hunter V;Hoffer MM;Thomas L;Rosenfeld S;Weinert C;	1994 Jun	Ineffective hip rotation with Pavlik harness. Prospective study of 35 infant dislocations	Very low strength
Iwasaki K;	1983 Jul	Treatment of congenital dislocation of the hip by the Pavlik harness. Mechanism of reduction and usage	Incorrect patient population (not exclusive to 0-6 months of age)
Kitoh H;Kawasumi M;Ishiguro N;	2009 Sep	Predictive factors for unsuccessful treatment of developmental dysplasia of the hip by the Pavlik harness	Very low strength
Lauge-Pedersen H;Gustafsson J;Hagglund G;	2006 Apr	6 Weeks with the von Rosen splint is sufficient for treatment of neonatal hip instability	Retrospective case series
Lerman JA;Emans JB;Millis MB;Share J;Zurakowski D;Kasser JR;	2001 May	Early failure of Pavlik harness treatment for developmental hip dysplasia: clinical and ultrasound predictors	Very low strength
Luhmann SJ;Bassett GS;Gordon JE;Schootman M;Schoenecker PL;	2003 Feb	Reduction of a dislocation of the hip due to developmental dysplasia. Implications for the	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
		need for future surgery	
Malkawi H;	1998 Apr	Sonographic monitoring of the treatment of developmental disturbances of the hip by the Pavlik harness	Retrospective case series
Murnaghan ML;Browne RH;Sucato DJ;Birch J;	2011 Mar	Femoral nerve palsy in pavlik harness treatment for developmental dysplasia of the hip	Very low strength
Peled E;Bialik V;Katzman A;Eidelman M;Norman D;	2008 Apr	Treatment of Graf's ultrasound class III and IV hips using Pavlik's method	Very low strength
Pool RD;Foster BK;Paterson DC;	1986 May	Avascular necrosis in congenital hip dislocation. The significance of splintage	Very low strength
Rachbauer F;Sterzinger W;Klestil T;Krismer M;Frischhut B;	1994	Acetabular development following early treatment of hip dysplasia by Pavlik harness	Retrospective case series
Ramsey PL;Lasser S;MacEwen GD;	1976 Oct	Congenital dislocation of the hip. Use of the Pavlik harness in the child during the first six months of life	Very low strength

Author	Year	Title	Reason for exclusion
Ritter MA;	1973 Jan	Congenital dislocation of the hip in the newborn	Very low strength
Segal LS;Boal DK;Borthwick L;Clark MW;Localio AR;Schwentker EP;	1999 Mar	Avascular necrosis after treatment of DDH: the protective influence of the ossific nucleus	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Stein-Zamir C;Volovik I;Rishpon S;Sabi R;	2008 Jun	Developmental dysplasia of the hip: risk markers, clinical screening and outcome	Very low strength
Suzuki S;Kashiwagi N;Kasahara Y;Seto Y;Futami T;	1996 Jul	Avascular necrosis and the Pavlik harness. The incidence of avascular necrosis in three types of congenital dislocation of the hip as classified by ultrasound	Very low strength
Suzuki S;Yamamuro T;	1990 Aug	Avascular necrosis in patients treated with the Pavlik harness for congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Taylor GR;Clarke NM;	1997 Sep	Monitoring the treatment of developmental dysplasia of the hip with the Pavlik harness. The role of ultrasound	Very low strength

Author	Year	Title	Reason for exclusion
Tegnander A;Holen KJ;Anda S;Terjesen T;	2001 Jul	Good results after treatment with the Frejka pillow for hip dysplasia in newborns: a 3-year to 6-year follow-up study	Retrospective case series
Tredwell SJ;Davis LA;	1989 Jul	Prospective study of congenital dislocation of the hip	Very low strength
Ucar DH;Isiklar ZU;Kandemir U;Tumer Y;	2004 Mar	Treatment of developmental dysplasia of the hip with Pavlik harness: prospective study in Graf type IIc or more severe hips	Incorrect patient population (age at presentation not exclusive to 0-6 months)
van der Sluijs JA;De GL;Verbeke JI;Witbreuk MM;Pruys JE;van Royen BJ;	2009 Aug	Prolonged treatment with the Pavlik harness in infants with developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Viere RG;Birch JG;Herring JA;Roach JW;Johnston CE;	1990 Feb	Use of the Pavlik harness in congenital dislocation of the hip. An analysis of failures of treatment	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Visser JD;	1985 Jan	Dynamic splint for treatment of congenital dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)

Author	Year	Title	Reason for exclusion
Walther T;	1956 Jul	Congenital dysplasia of the hip joint in newborn infants (luxatio et subluxatio coxae congenita)	Very low strength
Weiner DS;Hoyt WA;O'dell HW;	1977 Apr	Congenital dislocation of the hip. The relationship of premanipulation traction and age to avascular necrosis of the femoral head	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Weissman SL;Salama R;	1969 Apr	Treatment of congenital dislocation of the hip in the newborn infant	Very low strength
White KK;Sucato DJ;Agrawal S;Browne R;	2010 Jan	Ultrasonographic findings in hips with a positive Ortolani sign and their relationship to Pavlik harness failure	Retrospective case series
Williamson J;	1972 Feb	Difficulties of early diagnosis and treatment of congenital dislocation of the hip in Northern Ireland	Very low strength
Yoshitaka T;Mitani S;Aoki K;Miyake A;Inoue H;	2001 Jul	Long-term follow-up of congenital subluxation of the hip	Incorrect patient population (comparison group age>6 months)

Table 59. Excluded Studies for Treatment of Clinical Instability due to Not Best available Evidence

Author	Year	Title	Reason for exclusion
Azzoni R;Cabitza P;	2011 Oct	A comparative study on the effectiveness of two different devices in the management of developmental dysplasia of the hip in infants	Not best available evidence
Bialik GM;Eidelman M;Katzman A;Peled E;	2009 Nov	Treatment duration of developmental dysplasia of the hip: age and sonography	Not best available evidence
Burger BJ;Burger JD;Bos CF;Obermann WR;Rozing PM;Vandenbroucke JP;	1990 Dec 22	Neonatal screening and staggered early treatment for congenital dislocation or dysplasia of the hip	Not best available evidence
Cashman JP;Round J;Taylor G;Clarke NM;	2002 Apr	The natural history of developmental dysplasia of the hip after early supervised treatment in the Pavlik harness. A prospective, longitudinal follow-up	Not best available evidence
Ganger R;Grill F;Leodolter S;	1992	Ultrasound screening of the hip in newborns: results and experience	Not best available evidence
Harding MG;Harcke HT;Bowen JR;Guille JT;Glutting J;	1997 Mar	Management of dislocated hips with Pavlik harness treatment and ultrasound monitoring	Not best available evidence

Author	Year	Title	Reason for exclusion
Inoue T;Naito M;Nomiyama H;	2001 Jul	Treatment of developmental dysplasia of the hip with the Pavlik harness: factors for predicting unsuccessful reduction	Not best available evidence
Kruczynski J;	1996 Apr	Avascular necrosis of the proximal femur in developmental dislocation of the hip. Incidence, risk factors, sequelae and MR imaging for diagnosis and prognosis	Not best available evidence
Limpaphayom M;Sa-Nguanngam B;	1978 Dec	A clinical trial on the use of a new hip splint and the spica cast for congenitally unstable or dislocated hips	Not best available evidence
Miranda L;Palomo JM;Monzonis J;Marti V;	1988 Nov	Prevention of congenital dislocation of the hip in the newborn	Not best available evidence
Pap K;Kiss S;Shisha T;Marton-Szucs G;Szoke G;	2006 Oct	The incidence of avascular necrosis of the healthy, contralateral femoral head at the end of the use of Pavlik harness in unilateral hip dysplasia	Not best available evidence
Sampath JS;Deakin S;Paton RW;	2003 May	Splintage in developmental dysplasia of the hip: how low can we go?	Not best available evidence
Suzuki S;	1993 May	Ultrasound and the Pavlik harness in CDH	Not best available evidence

Author	Year	Title	Reason for exclusion
Weissman SL;Salama R;	1966 Oct	Treatment of congenital dislocation of the hip in the newborn infant	Not best available evidence
Williams PR;Jones DA;Bishay M;	1999 Nov	Avascular necrosis and the Aberdeen splint in developmental dysplasia of the hip	Not best available evidence
Zgoda M;Wasilewski P;Wasilewska I;Golicki D;	2009 Nov 24	Influence of the treatment of developmental dysplasia of the hip by the abduction brace on locomotor development in children	Not best available evidence

Table 60. Excluded Studies for Type of Brace for the Unstable Hip

Author	Year	Title	Reason for exclusion
Al-Umran K;	1994 Jan	Neonatal hip instability in Saudi Arabia: Results and cost effectiveness	Very low strength
Atar D;Lehman WB;Tenenbaum Y;Grant AD;	1993 May	Pavlik harness versus Frejka splint in treatment of developmental dysplasia of the hip: bicenter study	Very low strength
Brien EW;Randolph DA;Zahiri CA;	2000 Oct	Radiographic analysis to determine the treatment	Very low strength

Author	Year	Title	Reason for exclusion
		outcome in developmental dysplasia of the hip	
Hansson G;Romanus B;Scheller S;	1988	Pitfalls of early diagnosis and treatment of congenital dislocation of the hip joint	Very low strength
Hinderaker T;Rygh M;Uden A;	2000 Oct	The von Rosen splint compared with the Frejka pillow. A study of 408 neonatally unstable hips	Very low strength
Hunter V;Hoffer MM;Thomas L;Rosenfeld S;Weinert C;	1994 Jun	Ineffective hip rotation with Pavlik harness. Prospective study of 35 infant dislocations	Very low strength
Lauge-Pedersen H;Gustafsson J;Hagglund G;	2006 Apr	6 Weeks with the von Rosen splint is sufficient for treatment of neonatal hip instability	Retrospective case series
Malkawi H;	1998 Apr	Sonographic monitoring of the treatment of developmental disturbances of the hip by the Pavlik harness	Retrospective case series
Rachbauer F;Sterzinger W;Klestil T;Krismer M;Frischhut B;	1994	Acetabular development following early treatment of hip dysplasia by Pavlik	Retrospective case series

Author	Year	Title	Reason for exclusion
		harness	
Taylor GR;Clarke NM;	1997 Sep	Monitoring the treatment of developmental dysplasia of the hip with the Pavlik harness. The role of ultrasound	Very low strength
Tegnander A;Holen KJ;Anda S;Terjesen T;	2001 Jul	Good results after treatment with the Frejka pillow for hip dysplasia in newborns: a 3-year to 6-year follow-up study	Retrospective case series
Terver SP;Constine RM;Csongradi J;Kleinman R;Bleck EE;	1979 Aug	Congenital dislocation of the hip--prognostic implications of early diagnosis	Very low strength
Ucar DH;Isiklar ZU;Kandemir U;Tumer Y;	2004 Mar	Treatment of developmental dysplasia of the hip with Pavlik harness: prospective study in Graf type IIc or more severe hips	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Van der Sluijs JA;De GL;Verbeke JI;Witbreuk MM;Pruys JE;van Royen BJ;	2009 Aug	Prolonged treatment with the Pavlik harness in infants with developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)

Table 61. Excluded Study for Type of Brace for the Unstable Hip due to Not Best Available Evidence

Author	Year	Title	Reason for exclusion
Miranda L;Palomo JM;Monzonis J;Marti V;	1988 Nov	Prevention of congenital dislocation of the hip in the newborn	Not best available evidence

Table 62. Excluded Studies for Monitoring of Patients during Brace Treatment

Author	Year	Title	Reason for exclusion
Bialik V;Pery M;Kaftori JK;Fishman J;	1988	The use of ultrasound scanning in the management of developmental disorders of the hip	Very low strength
Carmichael KD;Longo A;Yngve D;Hernandez JA;Swischuk L;	2008 Oct	The use of ultrasound to determine timing of Pavlik harness discontinuation in treatment of developmental dysplasia of the hip	Very low strength
El FJ;Abuamara S;Eurin D;Le DP;Dacher JN;	2004 Jan	Anterior axial ultrasound in monitoring infants with Pavlik harness	Retrospective case series
Gwynne Jones DP;Vane AG;Coulter G;Herbison P;Dunbar JD;	2006 Nov	Ultrasound measurements in the management of unstable hips treated with the pavlik harness: reliability and	Very low strength

Author	Year	Title	Reason for exclusion
		correlation with outcome	
Hunter V;Hoffer MM;Thomas L;Rosenfeld S;Weinert C;	1994 Jun	Ineffective hip rotation with Pavlik harness. Prospective study of 35 infant dislocations	Very low strength
Malkawi H;	1998 Apr	Sonographic monitoring of the treatment of developmental disturbances of the hip by the Pavlik harness	Retrospective case series
Polanuer PA;Harcke HT;Bowen JR;	1990 Mar	Effective use of ultrasound in the management of congenital dislocation and/or dysplasia of the hip	Very low strength
Rachbauer F;Sterzinger W;Klestil T;Krismer M;Frischhut B;	1994	Acetabular development following early treatment of hip dysplasia by Pavlik harness	Retrospective case series
Taylor GR;Clarke NM;	1997 Sep	Monitoring the treatment of developmental dysplasia of the hip with the Pavlik harness. The role of ultrasound	Very low strength

Author	Year	Title	Reason for exclusion
Tredwell SJ;Davis LA;	1989 Jul	Prospective study of congenital dislocation of the hip	Very low strength
Ucar DH;Isiklar ZU;Kandemir U;Tumer Y;	2004 Mar	Treatment of developmental dysplasia of the hip with Pavlik harness: prospective study in Graf type IIc or more severe hips	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Van der Sluijs JA;De GL;Verbeke JI;Witbreuk MM;Pruys JE;van Royen BJ;	2009 Aug	Prolonged treatment with the Pavlik harness in infants with developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)

Table 63. Studies that Did Not Meet Selection Criteria

Author	Year	Title	Reason for exclusion
	1973 Apr 30	Congenital dysplasia and dislocation of the hip	Background article
	2000 Apr	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	Duplicate study

Author	Year	Title	Reason for exclusion
	1995 Nov	Hip	Editorial
	2009 Jan	AIUM practice guideline for the performance of an ultrasound examination for detection and assessment of developmental dysplasia of the hip	Guideline
	2006 Jun 1	Screening for developmental dysplasia of the hip: recommendation statement	Guideline
	2006 Mar	Screening for developmental dysplasia of the hip: recommendation statement	Guideline
	2003 Oct	AIUM Practice Guideline for the performance of the ultrasound examination for detection of developmental dysplasia of the hip	Guideline
	2006 Jun	Guideline: Hip dysplasia screening has insufficient evidence	Guideline
Abdelnoor J;	1992	What are the risks of having a child with congenital dislocation of the hip after having had an affected one?	Not in English
Abraham E;Altiok H;Lubicky JP;	2004 Sep	Musculoskeletal manifestations of Russell-Silver syndrome	Incorrect patient population (age at presentation>6 months)
Abrams RA;Mubarak S;	1991 Mar	Musculoskeletal consequences of near-drowning in children	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Abramson SJ;	1992 Jan	Real time ultrasonographic evaluation of the infant hip	Commentary
Abril JC;Berjano P;Diaz A;	1999 Oct	Concordance between hip ultrasonography and hip arthrography in the assessment of developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Adam R;Hendry GM;Moss J;Wild SR;Gillespie I;	1986 Mar	Arthrosonography of the irritable hip in childhood: a review of 1 year's experience	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Agarwal A;Gupta N;	2012	Risk factors and diagnosis of developmental dysplasia of hip in children	Background article
Agus H;Bicimoglu A;Omeroglu H;Tumer Y;	2002 Mar	How should the acetabular angle of Sharp be measured on a pelvic radiograph?	Not relevant (does not address recommendations)
Agus H;Omeroglu H;Bicimoglu A;Tumer Y;	2010 Apr	Is Kalamchi and MacEwen Group I avascular necrosis of the femoral head harmless in developmental dysplasia of the hip?	Incorrect patient population (age at presentation>6 months)
Agus H;Omeroglu H;Ucar H;Bicimoglu A;Turmer Y;	2002 Jan	Evaluation of the risk factors of avascular necrosis of the femoral head in developmental dysplasia of the hip in infants younger than 18 months of age	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Aksoy MC;Ozkoc G;Alanay A;Yazici M;Ozdemir N;Surat A;	2002 Apr	Treatment of developmental dysplasia of the hip before walking: results of closed reduction and immobilization in hip spica cast	Retrospective case series

Author	Year	Title	Reason for exclusion
Albert MC;Drummond DS;O'Neill J;Watts H;	1992 May	The orthopedic management of conjoined twins: a review of 13 cases and report of 4 cases	Retrospective case series
-Alberta-Heritage-Foundation-for-Medical-Research;	2000	Metal-on-metal surface replacement of the hip for congenital hip dysplasia (Structured abstract)	Narrative review
Albinana J;Dolan LA;Spratt KF;Morcuende J;Meyer MD;Weinstein SL;	2004 Aug	Acetabular dysplasia after treatment for developmental dysplasia of the hip. Implications for secondary procedures	Incorrect patient population (age at presentation>6 months)
Albinana J;Morcuende JA;Delgado E;Weinstein SL;	1995 Nov	Radiologic pelvic asymmetry in unilateral late-diagnosed developmental dysplasia of the hip	Not relevant (does not address recommendations)
Albinana J;Morcuende JA;Weinstein SL;	1996 Jul	The teardrop in congenital dislocation of the hip diagnosed late. A quantitative study	Incorrect patient population (age at presentation>6 months)
Albinana J;Quesada JA;Certucha JA;	1993 Mar	Children at high risk for congenital dislocation of the hip: late presentation	Not relevant (does not address recommendations)
Alexander JE;Seibert JJ;Glasier	1989 Jan	High-resolution hip ultrasound in the limping child	Incorrect patient population (age at presentation not

Author	Year	Title	Reason for exclusion
CM;Williamson SL;Aronson J;McCarthy RE;Rodgers AB;Corbitt SL;			exclusive to 0-6 months)
Alexiev VA;Harcke HT;Kumar SJ;	2006 Jan	Residual dysplasia after successful Pavlik harness treatment: early ultrasound predictors	< 50% patient follow-up
Aliabadi P;Baker ND;Jaramillo D;	1998 Jul	Hip arthrography, aspiration, block, and bursography	Background article
Alkalay I;	1980 Apr	Detection and treatment of congenital hip dislocation in babies at risk in Western Galilee	Retrospective case series
Alkalay I;Shmuel J;	1988 Dec	Detection and treatment of congenital dislocation of the hip in 'babies at risk' in Western Galillee	Not relevant (does not address recommendations)
Almby B;Grevsten S;Lonnerholm T;	1979	Hip joint instability after the neonatal period. II. The acetabular growth potential	Not relevant (does not address recommendations)
Almby B;Lonnerholm T;	1979	Hip joint instability after the neonatal period. I. Value of measuring the acetabular angle	Incorrect patient population (age at presentation>6 months)
Almby B;Lonnerholm T;	1978 Aug	Hip joint instability after the neonatal period. Diagnosis and treatment of 20 consecutive cases	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Almby B;Rehnberg L;	1977	Neonatal hip instability. Incidence, diagnosis and treatment at the university hospital, Uppsala, 1960-1964 and 1970-1974	Improper comparison group
Alonge TO;Dongo AE;Nottidge TE;Omololu AB;Ogunlade SO;	2004 Jan	Traditional bonesetters in south western Nigeria--friends or foes?	Retrospective case series
AlSiddiky AM;Bakarman KA;AlZain KO;Aljassir FF;Al-Ahaideb AS;Kremli MK;Zamzam MM;Mervyn LR;	2012 Jan	The early detection and management of unstable concentric closed reduction of DDH with percutaneous K-wire fixation in infants 6 to 12 months of age	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Altay,M.; Demirkale,I.; Senturk,F.; Firat,A.; Kapicioglu,S.	2013	Results of medial open reduction of developmental dysplasia of the hip with regard to walking age	Incorrect patient population (age at presentation>6 months)
Amato M;Claus R;Huppi P;	1992	Perinatal hip assessment in very low birth weight infants	Not relevant (does not address recommendations)
Amitai I;Yarom A;Bloch R;Pogrund H;	1982 Nov	Congenital dislocation of the hip and short maternal stature	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Amodio J;Rivera R;Pinkney L;Strubel N;Fefferman N;	2006 Aug	The relationship between alpha angle and resistive index of the femoral epiphysis in the normal and abnormal infant hip	Not relevant (does not address recommendations)
Amstutz HC;Su EP;Le Duff MJ;Fowble VA;	2011	Are there benefits to one- versus two-stage procedures in bilateral hip resurfacing?	Incorrect patient population (age at presentation>6 months)
Anand JK;Moden I;Myles JW;	1992	Incidence of neonatal hip instability: are there seasonal variations?	Not relevant (does not address recommendations)
Andersson JE;	1995 Nov	Neonatal hip instability: normal values for physiological movement of the femoral head determined by an anterior-dynamic ultrasound method	Not relevant (does not address recommendations)
Andersson JE;Vogel I;Uldbjerg N;	2002 Jan	Serum 17 beta-estradiol in newborn and neonatal hip instability	Not relevant (does not address recommendations)
Ando M;Gotoh E;Matsuura J;	1992 May	Tangential view arthrogram at closed reduction in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
ANDREN L;von RS;	1958 Feb	The diagnosis of dislocation of the hip in newborns and the primary results of immediate treatment	Published before 1966
Anwar MM;Sugano N;Masuhara K;Kadowaki T;Takaoka K;Ono K;	1993 Oct	Total hip arthroplasty in the neglected congenital dislocation of the hip. A five- to 14-year follow-up study	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Aoki K;Mitani S;Asaumi K;Akazawa H;Inoue H;	1999	Utility of MRI in detecting obstacles to reduction in developmental dysplasia of the hip: comparison with two-directional arthrography and correlation with intraoperative findings	Incorrect patient population (age at presentation>6 months)
Arac S;Bozkurt M;Kiter E;Gunal I;	2003	Medial approach without opening the joint capsule for developmental dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Arendar G;Samara E;Palmas C;	1999 Apr	Neonatal acquired paraplegia: retrospective review of 30 patients	Retrospective case series
Asher MA;	1986 Dec	Screening for congenital dislocation of the hip, scoliosis, and other abnormalities affecting the musculoskeletal system	Background article
Atasu M;Akkoyunlu U;Tokgozoglu N;Say B;	1972 Jan	The heritability of liability to congenital dislocation of the hip	Not relevant (does not address recommendations)
Avisse C;Gomes H;Delvinquiere V;Ouedraogo T;Lallemand A;Delattre JF;Flament JB;	1997	Anatomic study of the pre- and neonatal hip. Physiopathologic considerations on dysplasia and congenital dislocation of the hip	Incorrect patient population (cadavers included)
Azimi F;Edeiken J;MacEwen GD;	1974 Sep	Larsen's syndrome: Congenital dislocation of multiple large joints of the extremities associated with an unusual	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
		flat facies	
Azzoni R;Gorla P;Agosti A;Scheiber T;	1993 Jul	Ultrasonography in congenital dysplasia and immature hip in infants	Insufficient data
Azzoni R;Gorla P;Tessari L;	1993	Early diagnosis of congenital dysplasia of the infant hip by means of ultrasound screening	Not relevant (does not address recommendations)
Babcock DS;Hernandez RJ;Kushner DC;Cohen HL;Gelfand MJ;McAlister WH;Parker BR;Royal SA;Slovis TL;Smith WL;Strain JD;Strife JL;Tosi L;	2000 Jun	Developmental dysplasia of the hip. American College of Radiology. ACR Appropriateness Criteria	Systematic review
Babst D;Steppacher SD;Ganz R;Siebenrock KA;Tannast M;	2011	The iliocapsularis muscle: An important stabilizer in the dysplastic hip	Incorrect patient population (age at presentation>6 months)
Baden M;Ortiz A;Goyette RE;Kirks DR;	1974 Feb	Hypoplastic pelvis in association with multiple anomalies	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
Bailey EN;Kiehl PS;Akram DS;Loughlin HH;Metcalf TJ;Jain R;Perrin JM;	1974 Feb	Screening in pediatric practice	Background article
Bailey TE;Hall JE;	1985 Nov	Chiari medial displacement osteotomy	Incorrect patient population (age at presentation>6 months)
Bancroft LW;Merinbaum DJ;Zaleski CG;Peterson JJ;Kransdorf MJ;Berquist TH;	2007 Jun	Hip ultrasound	Background article
Barkin SZ;Kondo KL;Barkin RM;	2000 May	Avascular necrosis of the hip: a complication following treatment of congenital dysplasia of the hip	Incorrect patient population (< 10 patients per group)
Barlow TG;	1975 Aug	Neonatal hip dysplasia--treatment, results and complications	Retrospective case series
Barlow TG;	1968 Jul 19	Congenital dislocation of the hip	Background article
Barquet A;	1982 Oct	Avascular necrosis following traumatic hip dislocation in childhood: factors of influence	Incidence before 1950

Author	Year	Title	Reason for exclusion
Barquet A;	1979 Oct	Traumatic hip dislocation in childhood. A report of 26 cases and review of the literature	Incorrect patient population (age at presentation>6 months)
Barquet A;	1982 Mar	Traumatic anterior dislocation of the hip in childhood	Retrospective case series
Basch M;Bialik V;Fishman J;	1980 Apr	Early diagnosis at the CDH clinic	Not relevant (does not address recommendations)
Bassett GS;Barton KL;Skaggs DL;	1997 Jul	Laser Doppler flowmetry during open reduction for developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Bauchner H;	2000 Sep	Developmental dysplasia of the hip (DDH): an evolving science	Guideline
Beals RK;	2003 Jan	Familial primary acetabular dysplasia and dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Beals RK;	1998 Mar	Coxa vara in childhood: evaluation and management	Narrative review
Bearcroft PW;Berman LH;Robinson AH;Butler GJ;	1996 Jul	Vascularity of the neonatal femoral head: in vivo demonstration with power Doppler US	Not relevant (does not address recommendations)
Beckman L;Lemperg R;Nordtrom M;	1977 Feb	Congenital dislocation of the hip joint in northern Sweden	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Beddow FH;	1969 Nov	Facial paralysis complicating splintage for congenital dislocation of the hip in the newborn	Retrospective case series
Beek FJ;Nievelstein RJ;Pruijs HE;de Jong PA;Sakkers RJ;	2010 Nov	Transinguinal sonographic determination of the position of the femoral head after reposition and follow-up in a spica cast	Incorrect patient population (age at presentation>6 months)
Bellah R;	2001 Jul	Ultrasound in pediatric musculoskeletal disease: techniques and applications	Background article
Beluffi G;Sileo C;	2009 Aug	Neonatal clavicle dislocation	Incorrect patient population (< 10 patients per group)
Bennet GC;Rang M;Roye DP;Aprin H;	1982	Dislocation of the hip in trisomy 21	Incorrect patient population (age at presentation>6 months)
Bennett JT;MacEwen GD;	1989 Oct	Congenital dislocation of the hip. Recent advances and current problems	Narrative review
Bensahel H;Csukonyi Z;Huguenin P;	1988	Vascular disorders of the proximal femur following treatment of congenital hip dislocation	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Benson PF;Barbarik A;Brown SP;Mann TP;	1976 Mar	GM1-generalized gangliosidosis variant with cardiomegaly	Incorrect patient population (< 10 patients per group)
Berman L;Catterall	1986 Jan	Ultrasound of the hip: a review of the applications of a	Not relevant (does not address

Author	Year	Title	Reason for exclusion
A;Meire HB;		new technique	recommendations)
Berman L;Hollingdale J;	1987 Mar	The ultrasound appearance of positive hip instability tests	Incorrect patient population (< 10 patients per group)
Bernard AA;O'Hara JN;Bazin S;Humby B;Jarrett R;Dwyer NS;	1987 May	An improved screening system for the early detection of congenital dislocation of the hip	Not relevant (does not address recommendations)
Bertamino M;Rossi F;Pistorio A;Lucigrai G;Valle M;Viola S;Magni-Manzoni S;Malattia C;Martini A;Ravelli A;	2010 Feb	Development and initial validation of a radiographic scoring system for the hip in juvenile idiopathic arthritis	Not relevant (does not address recommendations)
Bertol P;Macnicol MF;Mitchell GP;	1982	Radiographic features of neonatal congenital dislocation of the hip	Retrospective case series
Betz RR;Cooperman DR;Wopperer JM;Sutherland RD;White JJ;Schaaf HW;Aschliman MR;Choi IH;Bowen JR;Gillespie R;	1990 May	Late sequelae of septic arthritis of the hip in infancy and childhood	Incidence before 1950
Bialik V;Berant M;	1997 Oct	'Immunity' of Ethiopian Jews to developmental	Not relevant (does not address

Author	Year	Title	Reason for exclusion
		dysplasia of the hip: a preliminary sonographic study	recommendations)
Bialik V;Reuveni A;Pery M;Fishman J;	1989 Mar	Ultrasonography in developmental displacement of the hip: a critical analysis of our results	Insufficient data
Bialik V;Wiener F;Benderly A;	1992	Ultrasonography and screening in developmental displacement of the hip	Incorrect patient population (age at presentation>6 months in comparison group)
Bianco AJ;	1969 May	Diagnosis of hip disease in infants and children	Commentary
Bicanic G;Delimar D;Delimar M;Pecina M;	2009 Apr	Influence of the acetabular cup position on hip load during arthroplasty in hip dysplasia	Incorrect patient population (age at presentation>6 months)
Bicimoglu A;Agus H;Omeroglu H;Tumer Y;	2003 Nov	Six years of experience with a new surgical algorithm in developmental dysplasia of the hip in children under 18 months of age	Incorrect patient population (age at presentation>6 months)
Bick U;Muller-Leisse C;Troger J;	1990	Ultrasonography of the hip in preterm neonates	Not relevant (does not address recommendations)
Bidar R;Kouyoumdjian P;Munini E;Asencio G;	2009 Dec	Long-term results of the ABG-1 hydroxyapatite coated total hip arthroplasty: Analysis of 111 cases with a minimum follow-up of 10 years	Incorrect patient population (age at presentation>6 months)
Binnet MS;Chakirgil GS;Adiyaman	1992 Jan	The relationship between the treatment of congenital dislocation of the hip and avascular necrosis	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
S;Ates Y;			months)
Bistolfi A;Crova M;Rosso F;Titolo P;Ventura S;Massazza G;	2011 Sep	Dislocation rate after hip arthroplasty within the first postoperative year: 36mm versus 28mm femoral heads	Not relevant (does not address recommendations)
Bitar K;Panagiotopoulou N;	2011	Association between mode of delivery and developmental dysplasia of the hip in breech infants: A systematic review of cohort studies	Not a full article
Bjelakovic G;Nikolova D;Gluud LL;Simonetti RG;Gluud C;	2012	Antioxidant supplements for prevention of mortality in healthy participants and patients with various diseases	Systematic review
Bjelakovic G;Nikolova D;Simonetti RG;Gluud C;	2008	Antioxidant supplements for preventing gastrointestinal cancers	Systematic review
Bjerkreim I;	1976 Sep	Congenital dislocation of the hip joint in Norway. A clinical-epidemiological study	Narrative review
Bjerkreim I;	1974	Congenital dislocation of the hip joint in Norway. I. Late-diagnosis CDH	Not relevant (does not address recommendations)
Bjerkreim I;	1974	Congenital dislocation of the hip joint in Norway. II. Detection of late cases	Retrospective case series

Author	Year	Title	Reason for exclusion
Bjerkreim I;	1974	Congenital dislocation of the hip joint in Norway. III. Neonatal CDH	Not relevant (does not address recommendations)
Bjerkreim I;Johansen J;	1987 Oct	Late diagnosed congenital dislocation of the hip	Not relevant (does not address recommendations)
Bjerkreim I;van der Hagen CB;	1974	Congenital dislocation of the hip joint in Norway. V. Evaluation of genetic and environmental factors	Retrospective case series
Black Y;	1979 Nov	Spica cast care in the infant with a congenital dislocated hip	Not relevant (does not address recommendations)
Blank E;	1981	Some effects of position on the roentgenographic diagnosis of dislocation at the infant hip	Background article
Bleck EE;	1982 Aug	Developmental orthopaedics. III: Toddlers	Background article
Bleck EE;	1984 Apr	Computerized axial tomography for developmental problems of the hip	Commentary
Bleck EE;	1976 Oct	Congenital dislocation of the hip--a preventable condition?	Commentary
Blockey NJ;	1984 Aug	Derotation osteotomy in the management of congenital dislocation of the hip	Incidence before 1950
Bloomfield L;Rogers C;Townsend J;Wolke D;Quist TE;	2003	The quality of routine examinations of the newborn performed by midwives and SHOs; an evaluation using video recordings	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
-BlueCross-BlueShield-Association;	2007	Metal-on-metal total hip resurfacing (Structured abstract)	Not a full article
Blumetti FC;Pinto JA;Gomes-Silva BN;Dobashi ET;Ishida A;	2009	Botulinum toxin A for the prevention of hip dislocation in cerebral palsy	Incorrect patient population (cerebral palsy included)
Boal DK;Schwenkter EP;	1985 Dec	The infant hip: assessment with real-time US	Incorrect patient population (neuromuscular disease included)
Boal DK;Schwentker EP;	1991 Apr	Assessment of congenital hip dislocation with real-time ultrasound: a pictorial essay	Background article
Boardman DL;Moseley CF;	1999 Mar	Finding patients after 40 years: a very long term follow-up study of the Colonna arthroplasty	Not relevant (does not address recommendations)
Boere-Boonekamp MM;Verkerk PH;	1998	Screening for developmental dysplasia of the hip	Systematic review
Bolland BJ;Wahed A;Al-Hallao S;Culliford DJ;Clarke NM;	2010 Oct	Late reduction in congenital dislocation of the hip and the need for secondary surgery: radiologic predictors and confounding variables	Incorrect patient population (age at presentation>6 months)
Bolton-Maggs BG;Crabtree SD;	1983 May	The opposite hip in congenital dislocation of the hip	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
			months)
Boniforti FG;Fujii G;Angliss RD;Benson MK;	1997 Jul	The reliability of measurements of pelvic radiographs in infants	Incorrect patient population (age at exam not exclusive to 0-6 month age group)
Boniforti FG;Fujii G;Benson MKD;	1999	Positioning the infant for a pelvic radiograph	Not relevant (does not address recommendations)
Borowski A;Thawrani D;Grissom L;Littleton AG;Thacker MM;	2009 Oct	Bilaterally dislocated hips treated with the Pavlik harness are not at a higher risk for failure	Not relevant (does not address recommendations)
Bos CF;Bloem JL;Obermann WR;Rozing PM;	1988 Mar	Magnetic resonance imaging in congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Bos CF;Bloem JL;Verbout AJ;	1991 Apr	Magnetic resonance imaging in acetabular residual dysplasia	Incorrect patient population (age at presentation>6 months)
Bos CF;Slooff TJ;	1984 Oct	Treatment of failed open reduction for congenital dislocation of the hip. A 10-year follow-up of 14 patients	Incorrect patient population (age at presentation>6 months)
Bowen JR;Foster BK;Hartzell CR;	1984 May	Legg-Calve-Perthes disease	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
			months)
Bowyer FM;Hoyle MD;McCall IW;Evans GA;	1985 Oct	Radiological evaluation of asymmetrical limitation of hip abduction during the first year of life	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Brinker MR;Palutsis RS;Sarwark JF;	1995 Feb	The orthopaedic manifestations of prune-belly (Eagle-Barrett) syndrome	Retrospective case series
Broekman BA;Dorr JP;	1991 Jun	Congenital kyphosis due to absence of two lumbar vertebral bodies	Incorrect patient population (< 10 patients per group)
Bronson WE;	2001	The pediatric hip	Narrative review
Brougham DI;Broughton NS;Cole WG;Menelaus MB;	1990 Jul	Avascular necrosis following closed reduction of congenital dislocation of the hip. Review of influencing factors and long-term follow-up	Incorrect patient population (age at presentation>6 months)
Brougham DI;Broughton NS;Cole WG;Menelaus MB;	1988 Nov	The predictability of acetabular development after closed reduction for congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Broughton NS;Brougham DI;Cole WG;Menelaus MB;	1989 Jan	Reliability of radiological measurements in the assessment of the child's hip	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Brown A;	1974 Apr 25	Congenital dislocation of the hip	Background article
Brown J;Dezateux C;Karnon J;Parnaby A;Arthur R;	2003 Sep	Efficiency of alternative policy options for screening for developmental dysplasia of the hip in the United Kingdom	Cost-effectiveness study
Bruning K;Heinecke A;Tonnis D;	1990	Technique and long-term results of acetabuloplasty	Not relevant (does not address recommendations)
Buchanan JR;Greer RB;	1978	Prevention of avascular necrosis during treatment of congenital dislocation of the hip	Retrospective case series
Buchanan JR;Greer RB;Cotler JM;	1981 Jan	Management strategy for prevention of avascular necrosis during treatment of congenital dislocation of the hip	Retrospective case series
Bucholz RW;Ezaki M;Ogden JA;	1982 Apr	Injury to the acetabular triradiate physeal cartilage	Incorrect patient population (< 10 patients per group)
Burck U;Riebel T;Held KR;Stoeckenius M;	1981 Nov	Bilateral femoral dysgenesis with micrognathia, cleft palate, anomalies of the spine and pelvis, and foot deformities. Clinical and radiological findings	Not in English
Burgess D;Wood B;Graham K;Dickson A;	1978 Dec 14	Orthopaedics. 2. Congenital dislocation of the hip	Background article
Burgos J;Gonzalez-	1995	Secondary avascular necrosis after treatment for	Incorrect patient population

Author	Year	Title	Reason for exclusion
Herranz P;Ocete G;Rapariz JM;		congenital dislocation of the hip	(age at presentation not exclusive to 0-6 month age group)
Burgos-Flores J;Ocete-Guzman G;Gonzalez-Herranz P;Hevia-Sierra E;Amaya-Alarcon S;	1993 Nov	Factors responsible for the development of avascular necrosis secondary to the treatment of congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Burke SW;Macey TI;Roberts JM;Johnston C;	1985 Jan	Congenital dislocation of the hip in the American black	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Buxton RA;Humphreys R;Yeates D;	2004 Oct	Neonatal hip surveillance and the early management of developmental dysplasia of the hip	Narrative review
Buxton RA;Macnicol MF;	2004 Mar	Infantile skeletal skew: the use of ultrasound in management	Retrospective case series
Cabaud HE;Westin GW;Connelly S;	1979 Oct	Tendon transfers in the paralytic hip	Not relevant (does not address recommendations)
Cady RB;	2006 Feb	Developmental dysplasia of the hip: definition, recognition, and prevention of late sequelae	Background article
Calvert PT;August AC;Albert JS;Kemp	1987 Aug	The Chiari pelvic osteotomy. A review of the long-term results	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
HB;Catterall A;			months)
Cameron HU;Botsford DJ;Park YS;	1996 Aug	Influence of the Crowe rating on the outcome of total hip arthroplasty in congenital hip dysplasia	Insufficient data
Camp J;Herring JA;Dworezynski C;	1994 Jan	Comparison of inpatient and outpatient traction in developmental dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Campbell JA;Hoffman EB;	1995 Mar	Tuberculosis of the hip in children	Incorrect patient population (age at presentation>6 months)
Capasso G;Maffulli N;	1990	Domiciliary management of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Capelli A;Verni E;D'Angelo G;Del PG;Beluzzi R;Martucci E;	1995 Oct	Changes in growth of the ilium after sopraacetabular osteotomy. Long-term evaluation	Incorrect patient population (age at presentation>6 months)
Cardinal E;White SJ;	1992	Imaging pediatric hip disorders and residual dysplasia of adult hips	Narrative review
Carney BT;Clark D;Minter CL;	2004	Is the absence of the ossific nucleus prognostic for avascular necrosis after closed reduction of developmental dysplasia of the hip?	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Caron KH;Bisset GS;	1990 Dec	Magnetic resonance imaging of pediatric atraumatic musculoskeletal lesions	Background article
Carr AJ;Jefferson RJ;Benson MK;	1993 Jan	Joint laxity and hip rotation in normal children and in those with congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Carroll KL;Moore KR;Stevens PM;	1998 Jan	Orthopedic procedures after rhizotomy	Incorrect patient population (age at presentation>6 months)
Carter CO;	1974 Nov	Recurrence risk of common congenital malformations	Narrative review
Carter CO;	1976 Jan	Genetics of common congenital malformations in man	Not relevant (does not address recommendations)
Case RD;Gargan MF;Grier D;Portinaro NMA;	2000	Confirmation of the reduction and containment of the femoral head with CT or MRI scans in DDH: The need for repeated scans	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Castaneda P;	2009	Pediatric hip dysplasia and evaluation with ultrasound	Narrative review
Castillo H;	1979 Nov	Congenital dislocation of the hip	Narrative review
Castillo R;Sherman FC;	1990 May	Medial adductor open reduction for congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Castillo-Zamora	2005 Jan	Dose minimization study of single-dose epidural	Not relevant (does not address

Author	Year	Title	Reason for exclusion
C;Castillo-Peralta LA;Nava-Ocampo AA;		morphine in patients undergoing hip surgery under regional anesthesia with bupivacaine	recommendations)
Catterall A;	1972	Coxa Plana	Background article
Catterall A;	1984 Aug	What is congenital dislocation of the hip?	Commentary
Catterall A;	1990	Congenital dislocation of the hip: the indications and technique of open reduction	Not relevant (does not address recommendations)
Catterall A;	1975 Mar 6	A symposium on diseases of the hip in childhood. The management of congenital dislocation of the hip	Not relevant (does not address recommendations)
Chafetz R;Hasara C;	2003	The impact of wheelchair and seating in children with SCI	Commentary
Chai AL;Sivanantham M;	1990 Jun	Congenital dislocation of hip in children: a review of patients treated in the Institute of Orthopaedics and Traumatology, General Hospital, Kuala Lumpur, 1975-1988	Not relevant (does not address recommendations)
Chaitow J;Lillystone D;	1984 Apr 28	Congenital dislocation of the hip. Incidence, and treatment of a local population group	Not relevant (does not address recommendations)
Chan A;Cundy PJ;Foster BK;Keane RJ;Byron-Scott R;	1999 Oct 30	Late diagnosis of congenital dislocation of the hip and presence of a screening programme: South Australian population-based study	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Chang CH;Chiang YT;Lee ZL;Kuo KN;	2007 Jun	Incidence of surgery in developmental dysplasia of the hip in taiwan	Incorrect patient population (age at presentation>6 months)
Chang CH;Kao HK;Yang WE;Shih CH;	2011 Jan	Surgical results and complications of developmental dysplasia of the hip--one stage open reduction and Salter's osteotomy for patients between 1 and 3 years old	Incorrect patient population (age at presentation>6 months)
Chang CH;Yang WE;Kao HK;Shih CH;Kuo KN;	2011 Apr	Predictive value for femoral head sphericity from early radiographic signs in surgery for developmental dysplasia of the hip	Retrospective case series
Chasiotis-Tourikis E;Varvarigou A;Yarmenitis S;Vandoros N;Beratis NG;	2003 Jul	Maternal smoking during pregnancy improves the anatomy of the hip joint in the female neonate	Not relevant (does not address recommendations)
Chen R;Weissman SL;Salama R;Klingberg MA;	1970 Nov	Congenital dislocation of the hip (CDH) and seasonality: the gestational age of vulnerability to some seasonal factor	Not relevant (does not address recommendations)
Cheng CC;Ko JY;	2010 May	Early reduction for congenital dislocation of the knee within twenty-four hours of birth	Not relevant (does not address recommendations)
Cheng JC;Au AW;	1994 Nov	Infantile torticollis: a review of 624 cases	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Cheng T;Feng JG;Liu T;Zhang XL;	2009	Minimally invasive total hip arthroplasty: a systematic review (Structured abstract)	Systematic review
Cherney DL;Westin GW;	1989 May	Acetabular development in the infant's dislocated hips	Incorrect patient population (age at presentation>6 months)
Chiari K;	1974 Jan	Medial displacement osteotomy of the pelvis	Narrative review
Chin MS;Betz BW;Halanski MA;	2011 Jul	Comparison of hip reduction using magnetic resonance imaging or computed tomography in hip dysplasia	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Chin MS;Shoemaker A;Reinhart DM;Betz BW;Maples DL;Halanski MA;	2011 Sep	Use of 1.5 Tesla and 3 Tesla MRI to evaluate femoral head reduction in hip dysplasia	Not relevant (does not address recommendations)
Choi IH;Yoo WJ;Cho TJ;Chung CY;	2006 Apr	Operative reconstruction for septic arthritis of the hip	Background article
Chotigavanichaya C;	1975 Jun	Traumatic dislocation of the hip joint in childhood	Incorrect patient population (age at presentation>6 months)
Chuinard EG;	1978 Mar	Lateral roentgenography in the diagnosis and treatment of dysplasia/dislocation of the hip	Narrative review

Author	Year	Title	Reason for exclusion
Chuinard EG;	1980 Apr	'Perthes-like' changes in congenital dislocation/dysplasia of the hip	Not relevant (does not address recommendations)
Chung SM;	1986 Dec	Diseases of the developing hip joint	Background article
Churgay CA;Caruthers BS;	1992 Mar	Diagnosis and treatment of congenital dislocation of the hip	Background article
Cibulka MT;	2004 Jun	Determination and significance of femoral neck anteversion	Narrative review
Clarke NM;	1994 May	Role of ultrasound in congenital hip dysplasia	Commentary
Clarke NM;;	1986 Sep	Sonographic clarification of the problems of neonatal hip instability	Very low strength
Clarke NM;Jowett AJ;Parker L;	2005 Jul	The surgical treatment of established congenital dislocation of the hip: results of surgery after planned delayed intervention following the appearance of the capital femoral ossific nucleus	Incorrect patient population (age at presentation>6 months)
Clarke NMP;	2004 Aug	(ii) Congenital dislocation of the hip	Narrative review
Clarke NMP;Sakthivel K;	2008 Jun	The diagnosis and management of congenital dislocation of the hip	Narrative review
Clarren SK;Smith DW;	1977 Nov	Congenital deformities	Narrative review

Author	Year	Title	Reason for exclusion
Clegg J;Bache CE;Raut VV;	1999 Sep	Financial justification for routine ultrasound screening of the neonatal hip	Cost-effectiveness study
Clohisy JC;Schutz AL;St JL;Schoenecker PL;Wright RW;	2009	Periacetabular osteotomy: a systematic literature review (Structured abstract)	Systematic review
Cobby M;Clarke N;Duncan A;	1991 Sep	Ultrasound of the infant hip	Background article
Cohen J;	1977 Jul	Skeletal problems of children	Background article
Coleman SS;	1995 Nov	The subluxating or wandering femoral head in developmental dislocation of the hip	Incorrect patient population (< 10 patients per group)
Coleman SS;	1975	Treatment of congenital dislocation of the hip in the older child	Commentary
Coleman SS;	1974 Jan	The incomplete pericapsular (Pemberton) and innominate (Salter) osteotomies; a complete analysis	Not relevant (does not address recommendations)
Connolly JF;	1975 Dec	Early diagnosis and mis-diagnosis of congenital dislocated hip	Incorrect patient population (< 10 patients per group)
Cooke SJ;Rees R;Edwards DL;Kiely NT;Evans GA;	2010 Jan	Ossification of the femoral head at closed reduction for developmental dysplasia of the hip and its influence on the long-term outcome	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Cooperman DR;Wallensten R;Stulberg SD;	1980 Mar	Post-reduction avascular necrosis in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Corea JR;	1992 Sep	Is congenital dislocation of the hip rare in Sri Lanka?	Insufficient data
Cotillo JA;Molano C;Albinana J;	1998 Jan	Correlative study between arthrograms and surgical findings in congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Cox SL;	1995	Problems of seating and mobility encountered by children with developmental dysplasia of the hip	Background article
Cox SL;Kernohan WG;	1998 Jul	They cannot sit properly or move around: seating and mobility during treatment for developmental dysplasia of the hip in children	Not relevant (does not address recommendations)
Cox TD;Auringer ST;Sumner TE;	1997	Hip ultrasonography in infants and children	Narrative review
Crawford AH;Carothers TA;	1982 Jan	Hip arthrography in the skeletally immature	Incorrect patient population (myelodysplasia included)
Crawford AH;Mehlman CT;Slovek RW;	1999 Sep	The fate of untreated developmental dislocation of the hip: long-term follow-up of eleven patients	Incorrect patient population (age at presentation>6 months)
Crellin RQ;	1974 Jan	Innominate osteotomy for congenital dislocation and subluxation of the hip; a follow-up study	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
			months)
Crowe JF;Mani VJ;Ranawat CS;	1979 Jan	Total hip replacement in congenital dislocation and dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Cunningham T;Jessel R;Zurakowski D;Millis MB;Kim YJ;	2006 Jul	Delayed gadolinium-enhanced magnetic resonance imaging of cartilage to predict early failure of Bernese periacetabular osteotomy for hip dysplasia	Incorrect patient population (age at presentation>6 months)
Curry LC;Gibson LY;	1992 May	Congenital hip dislocation: the importance of early detection and comprehensive treatment	Background article
Custis K;	1988 Dec	CT scanning in congenital dislocation of the paediatric hip	Incorrect patient population (< 10 patients per group)
Cvjeticanin S;Marinkovic D;	2005 Aug	Genetic variability in the group of patients with congenital hip dislocation	Not in English
Czeizel A;Tusnady G;Vaczo G;Vizkelety T;	1975 Jun	The mechanism of genetic predisposition in congenital dislocation of the hip	Not relevant (does not address recommendations)
Czubak J;	2004 Feb 28	Principles and techniques in the non-surgical treatment of developmental dysplasia of the hip	Not in English
Czubak J;Mazela	2003 Dec	Is twin pregnancy a risk factor for devolopmental	Not in English

Author	Year	Title	Reason for exclusion
JL;Majda W;Wozniak W;	30	dysplasia of the hip - retrospective analysis using ultrasonography	
Czubak J;Piontek T;Niciejewski K;Magnowski P;Majek M;Plonczak M;	2004 Feb 28	Retrospective analysis of the non-surgical treatment of developmental dysplasia of the hip using Pavlik harness and Frejka pillow: comparison of both methods	Not in English
Dahlstrom H;Friberg S;Oberg L;	1990 Mar	Stabilisation and development of the hip after closed reduction of late CDH	Incorrect patient population (< 10 patients per group)
Dal MA;Capelli A;Donzelli O;Libri R;Soncini G;	1984 Jun	Trochanteroplasty in the treatment of infantile septic arthritis of the hip	Incorrect patient population (age at presentation>6 months)
Dall G;	1979 Nov 24	Congenital dislocation of the hip. Management at the Princess Alice Orthopaedic Hospital	Commentary
Daniel J;Holland J;Quigley L;Sprague S;Bhandari M;	2012	Pseudotumors associated with total hip arthroplasty	Narrative review
Danielsson LG;Nilsson BE;	1984 Jun	Attitudes to CDH	Commentary
Darmonov AV;Zagora S;	1996 Mar	Clinical screening for congenital dislocation of the hip	Retrospective case series

Author	Year	Title	Reason for exclusion
David TJ;Parris MR;Poynor MU;Hawnaur JM;Simm SA;Rigg EA;McCrae FC;	1983 Jul 16	Reasons for late detection of hip dislocation in childhood	Retrospective case series
Davies SJ;Walker G;	1984 Aug	Problems in the early recognition of hip dysplasia	Retrospective case series
Davis J;Johnson C;	1980 Aug 28	Congenital dislocation of the hip - 1	Background article
Day RB;	1975 Aug	Congenital dysplasia of the hip in the newborn--a second look	Commentary
de HM;Vlemmix F;Bais JM;Hutton EK;de Groot CJ;Mol BW;Kok M;	2012 Nov	Risk factors for developmental dysplasia of the hip: a meta-analysis	Meta-analysis
de HM;Vlemmix F;Mol BWJ;Kok M;	2013 Jan	Comment on: A meta-analysis of common risk factors associated with the diagnosis of developmental dysplasia of the hip in newborns	Letter
De La Rocha,A.; Birch,J.G.; Schiller,J.R.	2012	Precocious appearance of the capital femoral ossific nucleus in larsen syndrome	Incorrect patient population (< 10 patients per group)
De Pellegrin MP;Mackenzie	2000 Sep	Ultrasonographic evaluation of hip morphology in osteochondrodysplasias	Incorrect patient population (age at presentation not

Author	Year	Title	Reason for exclusion
WG;Harcke HT;			exclusive to 0-6 months)
De PM;Moharamzadeh D;Fraschini G;	2007 Apr	Early diagnosis and treatment of DDH: A sonographic approach	Retrospective case series
De PM;Tessari L;	1996	Early ultrasound diagnosis of developmental dysplasia of the hip	Insufficient data
De SL;Legius E;Fabry G;Fryns JP;	1993	The Larsen syndrome. The diagnostic contribution of the analysis of the metacarpophalangeal pattern profile	Incorrect patient population (< 10 patients per group)
Delaney LR;Karmazyn B;	2011	Developmental Dysplasia of the Hip: Background and the Utility of Ultrasound	Narrative review
Dennert G;Zwahlen M;Brinkman M;Vinceti M;Zeegers-Maurice PA;Horneber M;	2011	Selenium for preventing cancer	Systematic review
DeRosa GP;Feller N;	1987 Dec	Treatment of congenital dislocation of the hip. Management before walking age	Retrospective case series
Desprechins B;Ernst C;de MJ;	2007 Jan	Screening for developmental dysplasia of the hip	Narrative review
Dessi A;Crisafulli M;Vannelli E;Fanos	2009 Jun	Ultrasound in developmental dysplasia of the hip: A screening study in Sardinian newborns	Retrospective case series

Author	Year	Title	Reason for exclusion
V;			
Dezateux C;Brown J;Arthur R;Karnon J;Parnaby A;	2003 Sep	Performance, treatment pathways, and effects of alternative policy options for screening for developmental dysplasia of the hip in the United Kingdom	Narrative review
Dezateux C;Elbourne D;Clarke N;Arthur R;Quinn A;King A;	2003	The MRC hip trial: a multicentre randomised trial of ultrasound imaging in infants with clinical hip instability detected by screening [abstract]	Duplicate study (duplicate with Ultrasonography in the diagnosis and management of developmental hip dysplasia (UK Hip Trial): clinical and economic results of a multicentre randomised controlled trial)
Dezateux C;Godward S;	1996 May	A national survey of screening for congenital dislocation of the hip	Insufficient data
Dezateux C;Godward S;	1995	Evaluating the national screening programme for congenital dislocation of the hip	Narrative review
Dezateux C;Rosendahl K;	2007 May 5	Developmental dysplasia of the hip	Narrative review
Dhar S;Taylor JF;Jones WA;Owen R;	1990 Mar	Early open reduction for congenital dislocation of the hip	Retrospective case series

Author	Year	Title	Reason for exclusion
Di ML;Carey-Smith R;Tucker K;	2008 Jun	Open reduction of developmental hip dysplasia using a medial approach: a review of 24 hips	Retrospective case series
Dias JJ;Thomas IH;Lamont AC;Mody BS;Thompson JR;	1993 May	The reliability of ultrasonographic assessment of neonatal hips	Not relevant (does not address recommendations)
Dickerson RC;	1968 May	Congenital subluxation of the hip	Incorrect patient population (age at presentation>6 months)
Dickob M;Martini T;	1996 Mar	The cementless PM hip arthroplasty. Four-to-seven-year results	Incorrect patient population (age at presentation>6 months)
Diepstraten AF;	1985 Feb	Open reduction of congenital hip dislocation. Advantages of the Ferguson medial approach	Not relevant (does not address recommendations)
Dillon JE;Connolly SA;Connolly LP;Kim YJ;Jaramillo D;	2005 Nov	MR imaging of congenital/developmental and acquired disorders of the pediatric hip and pelvis	Background article
Dommisse GF;de Wet IS;Scholtze O;Hamersma T;de Beer MG;	1979 Dec 8	Juvenile fibromatosis and other diseases of connective tissue	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
Domzalski M;Synder M;	2004 Apr	Avascular necrosis after surgical treatment for development dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Donaldson JS;Feinstein KA;	1997 Jun	Imaging of developmental dysplasia of the hip	Narrative review
Donell ST;Darrah C;Nolan JF;Wimhurst J;Toms A;Barker TH;Case CP;Tucker JK;	2010 Nov	Early failure of the Ultima metal-on-metal total hip replacement in the presence of normal plain radiographs	Incorrect patient population (age at presentation>6 months)
Dora C;Zurbach J;Hersche O;Ganz R;	2000 Sep	Pathomorphologic characteristics of posttraumatic acetabular dysplasia	Incorrect patient population (age at presentation>6 months)
Dorn U;Neumann D;	2005 Feb	Ultrasound for screening developmental dysplasia of the hip: a European perspective	Narrative review
Dornacher D;Cakir B;Reichel H;Nelitz M;	2010 Jan	Early radiological outcome of ultrasound monitoring in infants with developmental dysplasia of the hips	Retrospective case series
Dornacher D;Lippacher S;Reichel H;Nelitz M;	2013 Jan	Mid-term results after ultrasound-monitored treatment of developmental dysplasia of the hips: to what extent can a physiological development be expected?	Insufficient data

Author	Year	Title	Reason for exclusion
Doudoulakis JK;Cavadias A;	1993 Apr	Open reduction of CDH before one year of age. 69 hips followed for 13 (10-19) years	Retrospective case series
Doyle SM;Bowen JR;	1999 Sep	Types of persistent dysplasia in congenital dislocation of the hip	Background article
Dreinhofer KE;Schwarzkopf SR;Haas NP;Tscherne H;	1994 Jan	Isolated traumatic dislocation of the hip. Long-term results in 50 patients	Incorrect patient population (age at presentation>6 months)
Dryden C;White MP;	2006 Nov	Rate of referral of breech infants for hip ultrasound: an audit cycle	Not relevant (does not address recommendations)
Duni A;	2009	Developmental dysplasia of the hip in a developing country. Rebuilding the strategy for early diagnosis and management	Not relevant (does not address recommendations)
Dunn DM;O'Riordan SM;	1981 Apr	Late diagnosis of congenital dislocation of the hip	Not relevant (does not address recommendations)
Dunn P;	1974 Nov	Congenital postural deformities: further perinatal associations	Narrative review
Dunn PM;	1973 Nov 10	'The newborn, now or never'	Narrative review
Dunn PM;	1976 Sep	The anatomy and pathology of congenital dislocation of the hip	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Dvonch VM;	1986 Nov	Congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Dwek JR;	2009 Aug	The hip: MR imaging of uniquely pediatric disorders	Background article
Dwyer NS;	1987 Jun	Congenital dislocation of the hip: to screen or not to screen	Commentary
Dykes RG;	1975 May 28	Congenital dislocation of the hip in Southland	Incorrect patient population (incidence prior to 1950)
Dyson PH;Lynskey TG;Catterall A;	1987 Sep	Congenital hip dysplasia: problems in the diagnosis and management in the first year of life	Retrospective case series
Dziewulski M;Dziewulski W;Barcinska-Wierzejska I;	2001	The importance of early diagnosis and treatment of developmental dysplasia of the hips	Not in English
Eastwood DM;	2003 Feb 15	Neonatal hip screening	Narrative review
Eastwood DM;Cole WG;	1995 Sep	A graphic method for timing the correction of leg-length discrepancy	Retrospective case series
Eastwood DM;de GA;	2010	Clinical examination for developmental dysplasia of the hip in neonates: how to stay out of trouble	Incorrect patient population (< 10 patients per group)
Eastwood	2011 Jan	Guided growth: recent advances in a deep-rooted	Narrative review

Author	Year	Title	Reason for exclusion
DM;Sanghrajka AP;		concept	
Eberle CF;	1982	Pelvic obliquity and the unstable hip after poliomyelitis	Incorrect patient population (neuromuscular disease included)
Eberle CF;	2003 Sep	Plastazote abduction orthosis in the management of neonatal hip instability	Retrospective case series
Edelson JG;Hirsch M;Weinberg H;Attar D;Barmeir E;	1984 Aug	Congenital dislocation of the hip and computerised axial tomography	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Eggli KD;King SH;Boal DK;Quiogue T;	1994 Dec	Low-dose CT of developmental dysplasia of the hip after reduction: diagnostic accuracy and dosimetry	Incorrect patient population (age at presentation>6 months)
Egund N;Wingstrand H;	1989 Jul	Pitfalls in ultrasonography of hip joint synovitis in the child	Incorrect patient population (age at presentation>6 months)
Ehrlich MG;Broudy AG;	1978 Apr	Compression plate fixation of subtrochanteric osteotomies in children	Not relevant (does not address recommendations)
Elander G;	1986 Sep	Breast feeding of infants diagnosed as having congenital hip joint dislocation and treated in the von Rosen splint	Not relevant (does not address recommendations)
Elder G;Harvey EJ;	2004 Aug	Surgical images: musculoskeletal. Imaging in musculoskeletal trauma: the value of magnetic	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
		resonance imaging for traumatic pediatric hip dislocations	
El-Sayed MM;	2009 Jul	Single-stage open reduction, Salter innominate osteotomy, and proximal femoral osteotomy for the management of developmental dysplasia of the hip in children between the ages of 2 and 4 years	Incorrect patient population (age at presentation>6 months)
el-Shazly M;Trainor B;Kernohan WG;Turner I;Haugh PE;Johnston AF;Mollan RA;	1994 Jul	Reliability of the Barlow and Ortolani tests for neonatal hip instability	Not relevant (does not address recommendations)
Elsworth C;Walker G;	1986 Mar	The safety of the Denis Browne abduction harness in congenital dislocation of the hip	Retrospective case series
Emerson DS;Brown DL;Mabie BC;	1988 Dec	Prenatal sonographic diagnosis of hip dislocation	Incorrect patient population (< 10 patients per group)
Emneus H;	1968 Aug	A note on the Ortolani--von Rosen--Palmen treatment of congenital dislocation of the hip	Narrative review
Emneus H;	1966	Some new aspects of the treatment of cong. dislocation of the hip (CDH) according to Palmen-von Rosen	Not relevant (does not address recommendations)
Endo M;Iinuma TA;Umegaki Y;Tateno Y;Tanaka	1977 Jan	Automated diagnosis of congenital dislocation of the hip	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
H;			
Engesaeter IO;Lie SA;Lehmann TG;Furnes O;Vollset SE;Engesaeter LB;	2008 Jun	Neonatal hip instability and risk of total hip replacement in young adulthood: follow-up of 2,218,596 newborns from the Medical Birth Registry of Norway in the Norwegian Arthroplasty Register	Retrospective case series
Engh CA;Ho H;Powers CC;Huynh C;Beykirch SE;Hopper RH;	2011 Jun	Osteolysis propensity among bilateral total hip arthroplasty patients	Incorrect patient population (age at presentation>6 months)
Erdemli B;Yilmaz C;Atalar H;Guzel B;Cetin I;	2005 Dec	Total hip arthroplasty in developmental high dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Ergun UG;Uzel M;Celik M;Ekerbicer H;	2007 Aug	The knowledge, attitude and practice of the primary and secondary care nurse-midwife practitioners on developmental dysplasia of hip	Not relevant (does not address recommendations)
Erkula G;Celikbas E;Kilic BA;Demirkan F;Kiter AE;	2004 Jan	The acetabular teardrop and ultrasonography of the hip	Not relevant (does not address recommendations)
Evans EH;Low J;Allen BL;	1975 Jul	The Pavlik harness for congenital dislocated hips	Background article
Ewald E;Kiesel E;	2013 Jan 1	Screening for developmental dysplasia of the hip in	Background article

Author	Year	Title	Reason for exclusion
		newborns	
Exner GU;	1988 Nov	Ultrasound screening for hip dysplasia in neonates	Retrospective case series
Fabry G;	2010 Feb	Clinical practice: the hip from birth to adolescence	Background article
Fabry G;	1977 Jul	Torsion of the femur	Not relevant (does not address recommendations)
Fairbank JC;Howell P;Nockler I;Lloyd-Roberts GC;	1986 Sep	Relationship of pain to the radiological anatomy of the hip joint in adults treated for congenital dislocation of the hip as infants: a long-term follow-up of patients treated by three methods	Incorrect patient population (incidence prior 1950)
Fakoor M;Aliakbari A;Javaherizadeh H;	2011	Study of acetabular index before and after salter innominate osteotomy	Not relevant (does not address recommendations)
Falliner A;Schwinzer D;Hahne HJ;Hedderich J;Hassenpflug J;	2006 Jan	Comparing ultrasound measurements of neonatal hips using the methods of Graf and Terjesen	Not relevant (does not address recommendations)
Farber JM;	1992 Sep	A helpful radiographic sign in CDH	Incorrect patient population (< 10 patients per group)
Faure C;Schmit P;Salvat D;	1984	Cost-benefit evaluation of systematic radiological diagnosis of congenital dislocated hip	Cost-effectiveness study
Fedrizzi	1997 Sep	Ultrasonography in the early diagnosis of hip joint	Incorrect patient population

Author	Year	Title	Reason for exclusion
MS;Ronchezel MV;Hilario MO;Lederman HM;Sawaya S;Goldenberg J;Sole D;		involvement in juvenile rheumatoid arthritis	(age at presentation>6 months)
Feldman G;Dalsey C;Fertala K;Azimi D;Fortina P;Devoto M;Pacifici M;Parvizi J;	2010 Feb	The Otto Aufranc Award: Identification of a 4 Mb region on chromosome 17q21 linked to developmental dysplasia of the hip in one 18-member, multigeneration family	Not relevant (does not address recommendations)
Ferguson AB;	1976 Apr	Primary recognition and treatment of congenital dislocation of the hip	Retrospective case series
Ferguson AB;	1973 Jun	Primary open reduction of congenital dislocation of the hip using a median adductor approach	Retrospective case series
Ferrari D;Libri R;Donzelli O;	2011 Nov	Trochanteroplasty to treat sequelae of septic arthritis of the hip in infancy. Case series and review of the literature	Retrospective case series
Ferre RL;Schachter S;	1974 Jan	Congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Ferrer-Torrelles M;Ceballos T;Ferrer-	1990	Development of the hip joint in relation to congenital dislocation	Background article

Author	Year	Title	Reason for exclusion
Loewinsohn A;			
Ferrick M;Armstrong DG;	2003 Dec	Pediatric hip disorders	Narrative review
Ferris B;Leyshon A;Catterall A;	1991 Sep	Congenital hip dislocation or dysplasia with subluxation: a radiologic study	Incorrect patient population (age at presentation>6 months)
Ferris H;Ryan CA;McGuinness A;	1997 Apr	Decline in the incidence of late diagnosed congenital dislocation of the hip	Retrospective case series
Fettweis E;	1990	Treatment of congenital dislocation of the hip in a squatting position, Fettweis method	Retrospective case series
Field RE;Buchanan JA;Copplemans MG;Aichroth PM;	1994 Nov	Bone-marrow transplantation in Hurler's syndrome. Effect on skeletal development	Incorrect patient population (age at presentation>6 months)
Filipe G;Carlioz H;	1982 Oct	Use of the Pavlik harness in treating congenital dislocation of the hip	Retrospective case series
Finne PH;Dalen I;Ikonomou N;Ulimoen G;Hansen TW;	2008 Jun	Diagnosis of congenital hip dysplasia in the newborn	Retrospective case series
Finsterbush A;Pogrund H;	1980 Apr	Pelvic obliquity as a factor in dysplastic hip in infancy	Incorrect patient population (age at presentation not

Author	Year	Title	Reason for exclusion
			exclusive to 0-6 months)
Firth GB;Robertson AJ;Schepers A;Fatti L;	2010 Sep	Developmental dysplasia of the hip: open reduction as a risk factor for substantial osteonecrosis	Incorrect patient population (age at presentation>6 months)
Fish DN;Herzenberg JE;Hensinger RN;	1991 Mar	Current practice in use of prereduction traction for congenital dislocation of the hip	Insufficient data
Fisher R;O'Brien TS;Davis KM;	1991 Sep	Magnetic resonance imaging in congenital dysplasia of the hip	Incorrect patient population (< 10 patients per group)
Fisher RL;	1974 May	Unusual spondyloepiphyseal and spondylometaphyseal dysplasias of childhood	Incorrect patient population (< 10 patients per group)
Fixsen J;	1981 Sep	Congenital abnormalities of the limbs	Commentary
Fixsen JA;	1974 Oct 31	Orthopaedic examination of the newborn	Background article
Fixsen JA;	1987 May	Anterior and posterior displacement of the hip after innominate osteotomy	Incorrect patient population (age at presentation>6 months)
Fleissner PR;Ciccarelli CJ;Eilert RE;Chang FM;Glancy GL;	1994 Sep	The success of closed reduction in the treatment of complex developmental dislocation of the hip	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Flynn JM;Ramirez N;Betz R;Mulcahey MJ;Pino F;Herrera-Soto JA;Carlo S;Cornier AS;	2010 Apr	Steel syndrome: dislocated hips and radial heads, carpal coalition, scoliosis, short stature, and characteristic facial features	Incorrect patient population (age at presentation>6 months)
Fogarty EE;Accardo NJ;	1981	Incidence of avascular necrosis of the femoral head in congenital hip dislocation related to the degree of abduction during preliminary traction	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Forlin E;Choi IH;Guille JT;Bowen JR;Glutting J;	1992 Sep	Prognostic factors in congenital dislocation of the hip treated with closed reduction. The importance of arthrographic evaluation	Incorrect patient population (age at presentation>6 months)
Forst J;Forst C;Forst R;Heller KD;	1997	Pathogenetic relevance of the pregnancy hormone relaxin to inborn hip instability	Not relevant (does not address recommendations)
Foster BK;	1995 Feb	Initial screening and diagnosis of and referral for developmental dysplasia of the hip	Insufficient data
Foster BK;	1993 Jun	Pediatric hip and pelvis disorders	Narrative review
Fowler EG;Hester DM;Oppenheim WL;Setoguchi Y;Zernicke RF;	1999 Nov	Contrasts in gait mechanics of individuals with proximal femoral focal deficiency: Syme amputation versus Van Nes rotational osteotomy	Incorrect patient population (age at presentation>6 months)
Franchin F;Lacalendola	1992	Ultrasound for early diagnosis of hip dysplasia	Retrospective case series

Author	Year	Title	Reason for exclusion
G;Molfetta L;Mascolo V;Quagliarella L;			
Franchin F;Patella V;Moretti B;Losito A;	1990 Dec	Derotation osteotomy in the treatment of congenital dislocation of the hip: a review of long-term results	Incorrect patient population (age at presentation>6 months)
Fredensborg N;	1976 Aug	The results of early treatment of typical congenital dislocation of the hip in Malmo	Retrospective case series
Fredensorg N;	1976 Apr	Observations in children with congenital dislocation of the hip	Incorrect patient population (myelodysplasia included)
French LM;Dietz FR;	1999 Jul	Screening for developmental dysplasia of the hip	Narrative review
Fried A;Seelenfreund M;	1969 Oct	The treatment of congenital dislocation of the hip by the Pavlik strap brace	Retrospective case series
Fritsch EW;Schmitt E;Mittelmeier H;	1996 Feb	Radiographic course after acetabuloplasty and femoral osteotomy in hip dysplasia	Not relevant (does not address recommendations)
Fuchs-Winkelmann S;Peterlein CD;Tibesku CO;Weinstein SL;	2008 Apr	Comparison of pelvic radiographs in weightbearing and supine positions	Incorrect patient population (age at presentation>6 months)
Fujii M;Mitani	2004	Significance of preoperative position of the femoral	Incorrect patient population

Author	Year	Title	Reason for exclusion
S;Aoki K;Endo H;Kadota H;Inoue H;		head in failed closed reduction in developmental dislocation of the hip: surgical results	(age at presentation>6 months)
Fujioka F;Terayama K;Sugimoto N;Tanikawa H;	1995 Nov	Long-term results of congenital dislocation of the hip treated with the Pavlik harness	Retrospective case series
Fukushima M;	1994 Apr	Treatment of congenital subluxation and dislocation of the hip by knee splint harness	Retrospective case series
Fulton MJ;Barer ML;	1984 May 1	Screening for congenital dislocation of the hip: an economic appraisal	Cost-effectiveness study
Furnes O;Lie SA;Espehaug B;Vollset SE;Engesaeter LB;Havelin LI;	2001 May	Hip disease and the prognosis of total hip replacements. A review of 53,698 primary total hip replacements reported to the Norwegian Arthroplasty Register 1987-99	Incorrect patient population (age at presentation>6 months)
Furness S;Roberts H;Marjoribanks J;Lethaby A;Hickey M;Farquhar C;	2009	Hormone therapy in postmenopausal women and risk of endometrial hyperplasia	Systematic review
Gage JR;Cary JM;	1980 Jul	The effects of trochanteric epiphyseodesis on growth of the proximal end of the femur following necrosis of the capital femoral epiphysis	Retrospective case series

Author	Year	Title	Reason for exclusion
Gage JR;Winter RB;	1972 Mar	Avascular necrosis of the capital femoral epiphysis as a complication of closed reduction of congenital dislocation of the hip. A critical review of twenty years' experience at Gillette Children's Hospital	Incidence before 1950
Gaines RW;Frederick KJ;	1987 Mar	Congenital dislocation of the hip. Detection and management	Background article
Galante J;	1971 Mar	Total hip replacement	Incorrect patient population (age at presentation>6 months)
Galante VN;Caiaffa V;Franchin F;Colasuonno R;	1990 Dec	The treatment of infantile coxa vara with the external circular fixator	Incorrect patient population (< 10 patients per group)
Galasko CS;Galley S;Menon TJ;	1980 Apr	Detection of congenital dislocation of the hip by an early screening program, with particular reference to false negatives	Not relevant (does not address recommendations)
Gallino L;Pountain G;Mitchell N;Ansell BM;	1984	Developmental aspects of the hip in juvenile chronic arthritis. A radiological assessment	Not relevant (does not address recommendations)
Gamble JG;Mochizuki C;Bleck EE;Rinsky LA;	1985 Sep	Coxa magna following surgical treatment of congenital hip dislocation	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Gamble JG;Rinsky LA;Lee JH;	1988 Aug	Orthopaedic aspects of central core disease	Incorrect patient population (age at presentation>6 months)
Gao GX;Liang D;Wang CW;Fan Y;Zheng YY;	1985 Oct	Acetabuloplasty for congenital dislocation of the hip in children	Incorrect patient population (age at presentation>6 months)
Garavaglia C;	1970 Nov	Early diagnosis of congenital dysplasia of the hip; new roentgenologic signs	Not relevant (does not address recommendations)
Garcia-Cimbrelo E;Munuera L;	1993 Oct	Low-friction arthroplasty in severe acetabular dysplasia	Incorrect patient population (age at presentation>6 months)
Garne E;Loane M;Dolk H;Barisic I;Addor M;Arriola L;Bakker M;Calzolari E;Matias DC;Doray B;Gatt M;Melve KK;Nelen V;O'Mahony M;Pierini A;Randrianaivo-Ranjatoelina H;Rankin J;Rissmann	2012 Mar	Spectrum of congenital anomalies in pregnancies with pregestational diabetes	Retrospective case series

Author	Year	Title	Reason for exclusion
A;Tucker D;Verellun-Dumoulin C;Wiesel A;			
Gartland JJ;Benner JH;	1976 Jul	Traumatic dislocations in the lower extremity in children	Background article
Garvey M;Donoghue VB;Gorman WA;O'Brien N;Murphy JF;	1992 Sep	Radiographic screening at four months of infants at risk for congenital hip dislocation	Does not address question of interest (dropped at Final Meeting)
Geitung JT;Rosendahl K;Sudmann E;	1996 Apr	Cost-effectiveness of ultrasonographic screening for congenital hip dysplasia in new-borns	Not relevant (does not address recommendations)
Gelfer P;Kennedy KA;	2008 Sep	Developmental dysplasia of the hip	Narrative review
Gentile S;	2010	Antipsychotic therapy during early and late pregnancy. a systematic review	Systematic review
Gerber JD;Ney DR;Magid D;Fishman EK;	1991 Jan	Simulated femoral repositioning with three-dimensional CT	Incorrect patient population (< 10 patients per group)
Gerscovich EO;Greenspan	1994 Feb	Three-dimensional sonographic evaluation of developmental dysplasia of the hip: preliminary findings	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
A;Cronan MS;Karol LA;McGahan JP;			
Gillam SJ;Foss M;Woolaway M;	1990 Jun	Late presentation of congenital dislocation of the hip: an audit	Retrospective case series
Gillies D;Wells D;	2005	Positioning for acute respiratory distress in hospitalised infants and children	Systematic review
Gillow J;	1980 Aug 28	Nursing care study: Congenital dislocation of the hip - 2	Incorrect patient population (< 10 patients per group)
Glick JM;	1988	Hip arthroscopy using the lateral approach	Not relevant (does not address recommendations)
Glover SD;Benson MK;	1989 May	Iliotibial band contracture after using the Pavlik harness	Incorrect patient population (< 10 patients per group)
Godward S;Dezateux C;	1996 Sep	Validation of the reporting bases of the orthopaedic and paediatric surveillance schemes	Not relevant (does not address recommendations)
Gogus MT;Aksoy MC;Atay OA;Acaroglu RE;Surat A;	1997 Oct	Treatment of congenital dislocation of the hip. Results of closed reduction and immobilization in the hip spica cast	Retrospective case series
Goldberg MJ;	2000	Clinical practice guideline: early detection of developmental dysplasia of the hip [quick reference guide for clinicians]	Guideline

Author	Year	Title	Reason for exclusion
Goldberg MJ;	2001 Apr	Early detection of developmental hip dysplasia: synopsis of the AAP Clinical Practice Guideline	Narrative review
Goldberg VM;	1993	Anatomic cementless total hip replacement: design considerations and early clinical experience	Not relevant (does not address recommendations)
Goldman AB;	1980	Arthrography of the hip joint	Background article
Goldman AB;Schneider R;Wilson PD;	1978 Jun	Proximal focal femoral deficiency	Not relevant (does not address recommendations)
Goldman SM;Sievers ML;Carlile WK;Cohen SL;	1972 May	Roentgen manifestations of diseases in Southwestern Indians	Not relevant (does not address recommendations)
Gomes H;Ouedraogo T;Avisse C;Lallemand A;Bakhache P;	1998	Neonatal hip: from anatomy to cost-effective sonography	Incorrect patient population (cadavers included)
Good C;Walker G;	1984 Aug	The hip in the moulded baby syndrome	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Goto K;Akiyama H;Kawanabe K;So K;Morimoto	2009 Dec	Long-Term Results of Cemented Total Hip Arthroplasty for Dysplasia, With Structural Autograft Fixed With Poly-l-Lactic Acid Screws	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
T;Nakamura T;			
Graf R;	1980	The diagnosis of congenital hip-joint dislocation by the ultrasonic Combound treatment	Background article
Graf R;	1992 Aug	Hip sonography--how reliable? Sector scanning versus linear scanning? Dynamic versus static examination?	Commentary
Graf R;	1983 Jul	New possibilities for the diagnosis of congenital hip joint dislocation by ultrasonography	Insufficient data
Graf R;	1984 Nov	Fundamentals of sonographic diagnosis of infant hip dysplasia	Not relevant (does not address recommendations)
Graf R;	1981	The ultrasonic image of the acetabular rim in infants. An experimental and clinical investigation	Not relevant (does not address recommendations)
Graf R;	1984	Classification of hip joint dysplasia by means of sonography	Study performed on cadavers
Grammatopoulos G;Pandit H;Glyn-Jones S;McLardy-Smith P;Gundle R;Whitwell D;Gill HS;Murray DW;	2010	Optimal acetabular orientation for hip resurfacing	Not relevant (does not address recommendations)
Granata C;Magni E;Merlini	1990 Apr	Hip dislocation in spinal muscular atrophy	Incorrect patient population (neuromuscular disease

Author	Year	Title	Reason for exclusion
L;Cervellati S;			included)
Gray A;Elbourne D;Dezateux C;King A;Quinn A;Gardner F;	2005 Nov	Economic evaluation of ultrasonography in the diagnosis and management of developmental hip dysplasia in the United Kingdom and Ireland	Cost-effectiveness study
Gray K;Pacey V;Gibbons P;Little D;Frost C;Burns J;	2012	Interventions for congenital talipes equinovarus (clubfoot)	Systematic review
Grech P;	1972 Jul	Arthrography in hip dysplasia in infants	Narrative review
Green DM;Breslow NE;Beckwith JB;Norkool P;	1993	Screening of children with hemihypertrophy, aniridia, and Beckwith-Wiedemann syndrome in patients with Wilms tumor: a report from the National Wilms Tumor Study	Incorrect patient population (age at presentation>6 months)
Green K;Oddie S;	2008 Sep	The value of the postnatal examination in improving child health	Narrative review
Green NE;Griffin PP;	1982 Dec	Hip dysplasia associated with abduction contracture of the contralateral hip	Retrospective case series
Green NE;Lowery ER;Thomas R;	1993 Jul	Orthopaedic aspects of prune belly syndrome	Incorrect patient population (age at presentation>6 months)
Greene WB;Drennan	1982 Jan	A comparative study of bilateral versus unilateral	Incorrect patient population

Author	Year	Title	Reason for exclusion
JC;		congenital dislocation of the hip	(age at presentation>6 months)
Greenhill BJ;Hugosson C;Jacobsson B;Ellis RD;	1993 May	Magnetic resonance imaging study of acetabular morphology in developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Gregersen HN;	1969	Congenital dislocation of the hip. Results of early treatment	Retrospective case series
Gregosiewicz A;Wosko I;	1988 Jan	Risk factors of avascular necrosis in the treatment of congenital dislocation of the hip	Retrospective case series
Greinwald JH;Bauman NM;	1999 Dec	Larsen's syndrome	Incorrect patient population (< 10 patients per group)
Grill F;Bensahel H;Canadell J;Dungl P;Matasovic T;Vizkelety T;	1988 Jan	The Pavlik harness in the treatment of congenital dislocating hip: report on a multicenter study of the European Paediatric Orthopaedic Society	Retrospective case series
Grissom LE;Harcke HT;	1999 Feb	Ultrasonography and developmental dysplasia of the infant hip	Narrative review
Grissom LE;Harcke HT;	1994 Jan	Sonography in congenital deficiency of the femur	Not relevant (does not address recommendations)
Grissom LE;Harke	1999	Developmental Dysplasia of the Pediatric Hip with	Not relevant (does not address

Author	Year	Title	Reason for exclusion
HT;		Emphasis on Sonographic Evaluation	recommendations)
Gross RH;Wisnefske M;Howard TC;Hitch M;	1982	The Otto Aufranc Award Paper. Infant hip screening	Not relevant (does not address recommendations)
Gross RM;Hitch MS;	1979 May	Screening of newborn infants for hip dysplasia - the role of the orthopedic nurse	Insufficient data
Gross TP;Liu F;	2012 Jan	Prevalence of dysplasia as the source of worse outcome in young female patients after hip resurfacing arthroplasty	Incorrect patient population (age at presentation>6 months)
Grubor P;Asotic M;Biscevic M;Grubor M;	2012	The importance of the first ultrasonic exam of newborn hips	Retrospective case series
Grubor,P.; Grubor,M.; Domuzin,M.; Golubovic,I.	2012	Value of the first examination for developmental dysplasia of the hip - our experiences	Retrospective case series
Gruen TA;Poggie RA;Lewallen DG;Hanssen AD;Lewis RJ;O'Keefe TJ;Stulberg SD;Sutherland CJ;	2005 Apr	Radiographic evaluation of a monoblock acetabular component: a multicenter study with 2- to 5-year results	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Guenther KP;Tomczak R;Kessler S;Pfeiffer T;Puhl W;	1995 Nov	Measurement of femoral anteversion by magnetic resonance imaging--evaluation of a new technique in children and adolescents	Not relevant (does not address recommendations)
Gugenheim JJ;Gerson LP;Sadler C;Tullos HS;	1982 Oct	Pathologic morphology of the acetabulum in paralytic and congenital hip instability	Incorrect patient population (age at presentation>6 months)
Guidera KJ;Einbecker ME;Berman CG;Ogden JA;Arrington JA;Murtagh R;	1990 Dec	Magnetic resonance imaging evaluation of congenital dislocation of the hips	Incorrect patient population (age at presentation>6 months)
Guille JT;Pizzutillo PD;MacEwen GD;	2000 Jul	Development dysplasia of the hip from birth to six months	Narrative review
Gul R;Coffey JC;Khayyat G;McGuinness AJ;	2002 Jul	Late presentation of developmental dysplasia of the hip	Retrospective case series
Gulan G;Matovinovic D;Nemec B;Rubinic D;Ravlic-Gulan J;	2000 Dec	Femoral neck anteversion: values, development, measurement, common problems	Narrative review
Gulati V;Eseonu	2013 Apr	Developmental dysplasia of the hip in the newborn: A	Systematic review

Author	Year	Title	Reason for exclusion
K;Sayani J;Ismail N;Uzoigwe C;Choudhury MZ;Gulati P;Aqil A;Tibrewal S;	18	systematic review	
Gunay C;Atalar H;Dogruel H;Yavuz OY;Uras I;Sayli U;	2009 Jun	Correlation of femoral head coverage and Graf alpha angle in infants being screened for developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Gur E;Sarlak O;	1990	The complications of Salter innominate osteotomy in the treatment of congenital dislocation of hip	Incorrect patient population (age at presentation>6 months)
Gustilo RB;Cushing R;Anderson AS;	1966 Jun	Management of subluxation and dislocation in early infancy	Retrospective case series
Haake M;Wirth T;Griss P;	1995	False-positive sonographic hip examinations in newborns with congenital varus deformity of the proximal femur	Incorrect patient population (< 10 patients per group)
Haasbeek JF;Wright JG;Hedden DM;	1995 Oct	Is there a difference between the epidemiologic characteristics of hip dislocation diagnosed early and late?	Not relevant (does not address recommendations)
Habermann ET;Sterling A;Dennis RI;	1976 Jun	Larsen's syndrome: a heritable disorder	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
Hadley NA;Brown TD;Weinstein SL;	1990 Jul	The effects of contact pressure elevations and aseptic necrosis on the long-term outcome of congenital hip dislocation	Not relevant (does not address recommendations)
Hadlow VD;	1979 Feb 28	Congenital dislocation of the hip over a ten-year period	Retrospective case series
Haggstrom JA;Brown JC;Schroeder BA;Bach SM;Huurman WM;Esposito P;Halamek LJ;	1990 Jun	Ultrasound in congenital hip disease. Part 1--Review of technique	Commentary
Halanski MA;Noonan KJ;Hebert M;Nemeth BA;Mann DC;Leverson G;	2006 Aug	Manual versus digital radiographic measurements in acetabular dysplasia	Incorrect patient population (cerebral palsy included)
Hallan G;Dybvik E;Furnes O;Havelin LI;	2010	Metal-backed acetabular components with conventional polyethylene: A review of 9113 primary components with a follow-up of 20 years	Incorrect patient population (age at presentation>6 months)
Hallel T;Salvati EA;	1978 May	Septic arthritis of the hip in infancy: end result study	Incorrect patient population (age at presentation not exclusive to 0-6 months)

Author	Year	Title	Reason for exclusion
Hamanishi C;Tanaka S;	1994 Jun	Turned head--adducted hip--truncal curvature syndrome	Not relevant (does not address recommendations)
Hampton S;Read B;Nixon W;	1988 Jan	Diagnosis of congenital dislocated hips (CDH)	Background article
Handelsman JE;Weinberg J;	2008 Mar	Iliac apophyseal displacement: an alternative in pediatric pelvic osteotomies	Incorrect patient population (cerebral palsy included)
Hangen DH;Kasser JR;Emans JB;Millis MB;	1995 Nov	The Pavlik harness and developmental dysplasia of the hip: has ultrasound changed treatment patterns?	Not relevant (does not address recommendations)
Hanis SB;Kau CH;Souccar NM;English JD;Pirttiniemi P;Valkama M;Harila V;	2010 Nov	Facial morphology of Finnish children with and without developmental hip dysplasia using 3D facial templates	Not relevant (does not address recommendations)
Hanratty BM;Thompson NW;Cowie GH;Thornberry GD;	2004 Nov	'The lucky penny'--an incidental finding of hip dysplasia in a child with foreign body ingestion	Incorrect patient population (< 10 patients per group)
Hansson G.	2013	Information for Physicians Treating Children in the Original von Rosen Splint	Background article
Hansson G;Althoff	1990 Mar	The Swedish experience with Salter's innominate	Incorrect patient population

Author	Year	Title	Reason for exclusion
B;Bylund P;Jacobsson B;Lofberg AM;Lonnerholm T;		osteotomy in the treatment of congenital subluxation and dislocation of the hip	(age at presentation>6 months)
Hansson G;Jacobsen S;	1997 Sep	Ultrasonography screening for developmental dysplasia of the hip joint	Commentary
Hansson G;Nachemson A;Palmen K;	1983 Jul	Screening of children with congenital dislocation of the hip joint on the maternity wards in Sweden	Narrative review
Harcke HT;	1992 Aug	Imaging in congenital dislocation and dysplasia of the hip	Background article
Harcke HT;	2005 May	Imaging methods used for children with hip dysplasia	Commentary
Harcke HT;	1995	Hip in infants and children	Narrative review
Harcke HT;	1994 Feb	Screening newborns for developmental dysplasia of the hip: the role of sonography	Not relevant (does not address recommendations)
Harcke HT;Clarke NM;Lee MS;Borns PF;MacEwen GD;	1984 Mar	Examination of the infant hip with real-time ultrasonography	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Harcke HT;Grissom LE;	1999 Jul	Pediatric hip sonography. Diagnosis and differential diagnosis	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Harcke HT;Grissom LE;	1990 Oct	Performing dynamic sonography of the infant hip	Not relevant (does not address recommendations)
Harcke HT;Kumar SJ;	1991 Apr	The role of ultrasound in the diagnosis and management of congenital dislocation and dysplasia of the hip	Narrative review
Harris EJ;	1997 Jan	Hip instability encountered in pediatric podiatry practice	Incorrect patient population (< 10 patients per group)
Harris IE;Dickens R;Menelaus MB;	1992 Aug	Use of the Pavlik harness for hip displacements. When to abandon treatment	Retrospective case series
Harris WA;Yngve DA;Herndon WA;	1985 Nov	Whistling face syndrome	Incorrect patient population (< 10 patients per group)
Harrold AJ;	1977 Apr 23	Problems in congenital dislocation of the hip	Narrative review
Hart ES;Albright MB;Rebello GN;Grottkau BE;	2006 Mar	Developmental dysplasia of the hip: nursing implications and anticipatory guidance for parents	Narrative review
Hassan FA;	2009	Compliance of parents with regard to Pavlik harness treatment in developmental dysplasia of the hip	Background article
Hatata MZ;Aboloyoun N;Bilke EM;Stuecker R;	2009 Sep	Clinical and radiological aspects of closed reduction in developmental dysplasia of the hip treated in the first six months	Retrospective case series

Author	Year	Title	Reason for exclusion
Hattori T;Ono Y;Kitakoji T;Takashi S;Iwata H;	1999 May	Soft-tissue interposition after closed reduction in developmental dysplasia of the hip. The long-term effect on acetabular development and avascular necrosis	Incorrect patient population (age at presentation>6 months)
Hau R;Dickens DR;Nattrass GR;O'Sullivan M;Torode IP;Graham HK;	2000 May	Which implant for proximal femoral osteotomy in children? A comparison of the AO (ASIF) 90 degree fixed-angle blade plate and the Richards intermediate hip screw	Not relevant (does not address recommendations)
Haynes RJ;	2001	Developmental dysplasia of the hip: etiology, pathogenesis, and examination and physical findings in the newborn	Commentary
Hazel JR;Beals RK;	1989 Jul	Diagnosing dislocation of the hip in infancy	Retrospective case series
Hedequist D;Kasser J;Emans J;	2003 Mar	Use of an abduction brace for developmental dysplasia of the hip after failure of Pavlik harness use	Retrospective case series
Heeg M;Visser JD;Oostvogel HJ;	1988 Jan	Injuries of the acetabular triradiate cartilage and sacroiliac joint	Incorrect patient population (< 10 patients per group)
Heikkila E;Ryoppy S;	1984 Apr	Treatment of congenital dislocation of the hip after neonatal diagnosis	Retrospective case series
Heikkila E;Ryoppy S;Louhimo I;	1984 Jun	Late diagnosis in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Heinrich SD;Missinne LH;MacEwen GD;	1992 Aug	The conservative management of congenital dislocation of the hip after walking age	Background article
Heintjes EM;Berger M;Bierma-Zeinstra-Sita MA;Bernsen R;Verhaar-Jan AN;Koes BW;	2003	Exercise therapy for patellofemoral pain syndrome	Systematic review
Heintjes EM;Berger M;Bierma-Zeinstra-Sita MA;Bernsen R;Verhaar-Jan AN;Koes BW;	2004	Pharmacotherapy for patellofemoral pain syndrome	Systematic review
Hennessy MJ;	1982 Jun	Congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Hennessy MJ;Haas RH;	1988	The orthopedic management of Rett syndrome	Incorrect patient population (age at presentation>6 months)
Henriksson L;	1980	Measurement of femoral neck anteversion and inclination. A radiographic study in children	Not relevant (does not address recommendations)
Hensinger RN;	1987 Oct	Congenital dislocation of the hip. Treatment in infancy to walking age	Background article

Author	Year	Title	Reason for exclusion
Hensinger RN;	1985	Congenital dislocation of the hip: treatment in infancy to walking age	Background article
Hensinger RN;	1979	Congenital dislocation of the hip	Background article
Hensinger RN;Jones ET;	1982 Feb	Developmental orthopaedics. I: the lower limb	Narrative review
Herman TE;Siegel MJ;	2008 Feb	Type IV lumbosacrococcygeal agenesis infant of diabetic mother	Incorrect patient population (< 10 patients per group)
Hernandez RJ;	1984 Jan	Concentric reduction of the dislocated hip. Computed-tomographic evaluation	Incorrect patient population (< 10 patients per group)
Hernandez RJ;	1983 Feb	Evaluation of congenital hip dysplasia and tibial torsion by computed tomography	Background article
Hernandez RJ;Cornell RG;Hensinger RN;	1994 Jul	Ultrasound diagnosis of neonatal congenital dislocation of the hip. A decision analysis assessment	Not relevant (does not address recommendations)
Hernandez RJ;Poznanski AK;	1985 Jul	CT evaluation of pediatric hip disorders	Background article
Hernandez RJ;Tachdjian MO;Dias LS;	1982 Aug	Hip CT in congenital dislocation: appearance of tight iliopsoas tendon and pulvinar hypertrophy	Incorrect patient population (neuromuscular disease included)
Herold HZ;	1989 Aug	Pediatric update #9. Revision surgery in congenital	Incorrect patient population

Author	Year	Title	Reason for exclusion
		dislocation of the hip	(< 10 patients per group)
Herold HZ;	1983 Sep	Salvage operations for failure of previous surgery in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Herold HZ;	1980 Apr	Avascular necrosis of the femoral head in congenital dislocation of the hip	Retrospective case series
Herring JA;	1992 Aug	Conservative treatment of congenital dislocation of the hip in the newborn and infant	Narrative review
Herring JA;Coleman SS;	1982 Oct	Femoral lengthening	Incorrect patient population (< 10 patients per group)
Herring JA;DeRosa GP;	1986 May	Congenital dislocation of the hip with persistent subluxation	Incorrect patient population (< 10 patients per group)
Herring JA;McCarthy RE;	1986 Jan	Fracture dislocation of the capital femoral epiphysis	Incorrect patient population (< 10 patients per group)
Hetsroni I;Weigl D;	2006 Jan	Referred knee pain in posterior dislocation of the hip	Incorrect patient population (< 10 patients per group)
Hiertonn T;James U;	1968 Aug	Congenital dislocation of the hip. Experiences of early diagnosis and treatment	Retrospective case series
Hilt NE;	1982 Mar	Musculoskeletal assessment: screening for congenital dislocation of the hip	Background article

Author	Year	Title	Reason for exclusion
Hinderaker T;Uden A;Reikeras O;	1993 Feb	Effect of effusion on hip joint stability in the newborn. A postmortal study	Incorrect patient population (< 10 patients per group)
Hiroshima K;Inoue A;Kajiura I;Ono K;	1979	Psoas transfer for the treatment of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Hirsch C;Scheller S;	1970	Result of treatment from birth of unstable hips. A 5-year follow-up	Retrospective case series
Hirsch PJ;Hirsch SA;Reedman L;	1980 Jun	Hip dysplasia in infancy. Diagnosis and treatment	Narrative review
Hirsch PJ;Hirsch SA;Reedman L;	1977 Jun	Evaluation for hip dysplasia in infancy. The significance of X-ray in diagnosis	Retrospective case series
Hirsch PJ;Hirsch SA;Reedman L;Weiss AB;Rineberg BA;	1982 Jul	Treatment of hip dysplasia in the first nine months	Narrative review
Hjelmstedt A;Asplund S;	1983 Sep	Congenital dislocation of the hip: a biomechanical study in autopsy specimens	Study performed on cadavers
Ho KWK;Whitwell GS;Young SK;	2012	Reducing the rate of early primary hip dislocation by combining a change in surgical technique and an increase in femoral head diameter to 36 mm	Incorrect patient population (age at presentation>6 months)
Hobbs	2007 May	Developmental dysplasia of the hip	Narrative review

Author	Year	Title	Reason for exclusion
DL;Mickelsen W;Johnson C;			
Hogh J;Macnicol MF;	1987 May	The Chiari pelvic osteotomy. A long-term review of clinical and radiographic results	Incorrect patient population (age at presentation>6 months)
Holen KJ;Tegnander A;Eik-Nes SH;Terjesen T;	1999 Sep	The use of ultrasound in determining the initiation of treatment in instability of the hip in neonates	Very low strength
Hollingworth P;	1995 Jan	Differential diagnosis and management of hip pain in childhood	Narrative review
Holmes J;Cornes MJ;Foldi B;Miller F;Dabney K;	2011	Clinical epidemiologic characterization of orthopaedic and neurological manifestations in children with leukodystrophies	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Holmes L;Cornes MJ;Foldi B;Miller F;Dabney K;	2011 Jul	Clinical epidemiologic characterization of orthopaedic and neurological manifestations in children with leukodystrophies	Duplicate study
Holroyd B;Wedge J;	2009 Jun	Developmental dysplasia of the hip	Narrative review
Hooper G;	1980 Nov	Congenital dislocation of the hip in infantile idiopathic scoliosis	Incorrect patient population (neuromuscular disease included)
Hopkins J;	1975 May	Proceedings: Neonatal hip examination screening	Not a full article

Author	Year	Title	Reason for exclusion
Horn BD;Moseley CF;	1992 Apr	Current concepts in the management of pediatric hip disease	Narrative review
Horstmann H;Mahboubi S;	1987 Oct	The use of computed tomography scan in unstable hip reconstruction	Incorrect patient population (cerebral palsy included)
Horton WA;Collins DL;DeSmet AA;Kennedy JA;Schimke RN;	1980	Familial joint instability syndrome	Retrospective case series
Hosalkar HS;Jones S;Chowdhury M;Chatoo M;Hill RA;	2003 Mar	Connecting bar for hip spica reinforcement: does it help?	Not relevant (does not address recommendations)
Hosny GA;Fattah HA;	1998 Apr	Salter's innominate osteotomy: the biologic stimulating effect	Incorrect patient population (age at presentation>6 months)
Hougaard K;Thomsen PB;	1989 Mar	Traumatic hip dislocation in children. Follow up of 13 cases	Incorrect patient population (age at presentation>6 months)
Howell CJ;Wynne-Davies R;	1986 Mar	The tricho-rhino-phalangeal syndrome. A report of 14 cases in 7 kindreds	Incorrect patient population (age at presentation>6 months)
Howlett,J.P.;	2009	The association between idiopathic clubfoot and	Incorrect patient population

Author	Year	Title	Reason for exclusion
Mosca,V.S.; Bjornson,K.		increased internal hip rotation	(age at presentation>6 months)
Hu Z;Xu Y;Liang J;Li K;Liao Q;	2009	Effect of abducens orthosis combined with walker on developmental dysplasia of the hip	Not in English
Hubbard AM;	2001 Jul	Imaging of pediatric hip disorders	Background article
Hubbard AM;Dormans JP;	1995 May	Evaluation of developmental dysplasia, Perthes disease, and neuromuscular dysplasia of the hip in children before and after surgery: an imaging update	Not relevant (does not address recommendations)
Huckstep RL;	1968 Jul	The management of osteomyelitis in East Africa	Narrative review
Huffam WH;	1975 May	Proceedings: The indication for innominate osteotomy in the treatment of congenital dislocation of the hip	Not a full article
Hughes JR;	1974 Nov	Acetabular dysplasia in congenital dislocation of the hip	Commentary
Hugosson C;Bahabri S;McDonald P;al-Dalaan A;al-Mazyed A;	1994	Radiological features in congenital camptodactyly, familial arthropathy and coxa vara syndrome	Incorrect patient population (< 10 patients per group)
Hui FC;Aadalen RJ;Winter RB;	1978 Mar	Hip disease in children	Background article
Hunka L;Said SE;MacKenzie	1982 Nov	Classification and surgical management of the severe sequelae of septic hips in children	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
DA;Rogala EJ;Cruess RL;			months)
Huo MH;Parvizi J;Bal BS;Mont MA;	2009	What's new in total hip arthroplasty	Narrative review
Huo MH;Zurauskas A;Zatorska LE;Keggi KJ;	1998	Cementless total hip replacement in patients with developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Hurley A;	2009 Sep	DDH: causes and examination	Narrative review
Hyun WK;Morcuende JA;Dolan LA;Weinstein SL;	2000	Acetabular development in developmental dysplasia of the hip complicated by lateral growth disturbance of the capital femoral epiphysis	Incidence before 1950
Ilfeld FW;Westin GW;Makin M;	1986 Feb	Missed or developmental dislocation of the hip	Retrospective case series
Imatani J;Miyake Y;Nakatsuka Y;Akazawa H;Mitani S;	1995 May	Coxa magna after open reduction for developmental dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Imrie M, Scott V, Stearns P, Bastrom T, Mubarak SJ.	2010 Feb	Is ultrasound screening for DDH in babies born breech sufficient?	Retrospective case series

Author	Year	Title	Reason for exclusion
Inan M;Chan G;Bowen JR;	2008 Jan	The correction of leg-length discrepancy after treatment in developmental dysplasia of the hip by using a percutaneous epiphysiodesis	Incorrect patient population (age at presentation>6 months)
Inan M;Harma A;Ertem K;	2006 Sep	Stabilization of osteotomies in children with developmental dislocated hip using external fixation	Incorrect patient population (age at presentation>6 months)
Inao S;Gotoh E;Ando M;	1994 Sep	Total hip replacement using femoral neck bone to graft the dysplastic acetabulum. Follow-up study of 18 patients with old congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Irha E;Vrdoljak J;Vrdoljak O;	2004 Jan	Evaluation of ultrasonographic angle and linear parameters in the diagnosis of developmental dysplasia of the hip	Improper comparison group
Ishihara K;Miyanishi K;Ihara H;Jingushi S;Torisu T;	2010	Subchondral insufficiency fracture of the femoral head may be associated with hip dysplasia : A pilot study	Incorrect patient population (age at presentation>6 months)
Ishii Y;Ponseti IV;	1978 Nov	Long-term results of closed reduction of complete congenital dislocation of the hip in children under one year of age	Retrospective case series
Ishii Y;Weinstein SL;Ponseti IV;	1980 Nov	Correlation between arthrograms and operative findings in congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Ishikawa N;	2008 Jun	The relationship between neonatal developmental	Not relevant (does not address

Author	Year	Title	Reason for exclusion
		dysplasia of the hip and maternal hyperthyroidism	recommendations)
Ismail AM;Macnicol MF;	1998 Mar	Prognosis in Perthes' disease: a comparison of radiological predictors	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Jacobs P;	1966 Dec	Detection of early congenital dislocation of the hip	Narrative review
Jacofsky DJ;Stans AA;Lindor NM;	2003 Mar	Bilateral hip dislocation and pubic diastasis in familial nail-patella syndrome	Incorrect patient population (< 10 patients per group)
James U;Sevastikoglou JA;	1970	Analysis of a material of congenital dislocation of the hip	Retrospective case series
Jaramillo D;Villegas-Medina O;Laor T;Shapiro F;Millis MB;	1998 Jun	Gadolinium-enhanced MR imaging of pediatric patients after reduction of dysplastic hips: assessment of femoral head position, factors impeding reduction, and femoral head ischemia	Incorrect patient population (age at presentation>6 months)
Jay MS;Saphyakhajon P;Scott R;Linder CW;Grossman BJ;	1981 Nov	Bone and joint changes following burn injury	Incorrect patient population (< 10 patients per group)
Jensen BA;Reimann I;Fredensborg N;	1986 Aug	Collagen type III predominance in newborns with congenital dislocation of the hip	Not relevant (does not address recommendations)
Jequier S;Rosman M;	1979 Jun	The double-headed femur--a complication of treatment of congenital hip dislocation	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
Jessel RH;Zurakowski D;Zilkens C;Burstein D;Gray ML;Kim YJ;	2009 May	Radiographic and patient factors associated with pre-radiographic osteoarthritis in hip dysplasia	Incorrect patient population (age at presentation>6 months)
Jingushi S;Ohfuji S;Sofue M;Hirota Y;Itoman M;Matsumoto T;Hamada Y;Shindo H;Takatori Y;Yamada H;Yasunaga Y;Ito H;Mori S;Owan I;Fujii G;Ohashi H;Iwamoto Y;Miyanishi K;Iga T;Takahira N;Sugimori T;Sugiyama H;Okano K;Karita T;Ando K;Hamaki T;Hirayama T;Iwata	2010 Sep	Multiinstitutional epidemiological study regarding osteoarthritis of the hip in Japan	Incorrect patient population (age at presentation>6 months)
Johnson AH;Aadalen RJ;Eilers VE;Winter RB;	1981 Mar	Treatment of congenital hip dislocation and dysplasia with the Pavlik harness	Retrospective case series

Author	Year	Title	Reason for exclusion
Johnson AJ;Zywiel MG;Hooper H;Mont MA;	2011	Narrowed indications improve outcomes for hip resurfacing arthroplasty	Incorrect patient population (age at presentation>6 months)
Johnson ND;Wood BP;Jackman KV;	1988 Jul	Complex infantile and congenital hip dislocation: assessment with MR imaging	Incorrect patient population (age at presentation>6 months)
Jolles BM;Bogoch ER;	2006	Posterior versus lateral surgical approach for total hip arthroplasty in adults with osteoarthritis	Systematic review
Jomha NM;McIvor J;Sterling G;	1995 Jan	Ultrasonography in developmental hip dysplasia	Not relevant (does not address recommendations)
Jones D;Dezateux CA;Danielsson LG;Paton RW;Clegg J;	2000 Mar	At the crossroads--neonatal detection of developmental dysplasia of the hip	Commentary
Jones DA;	1991 Mar	Neonatal hip stability and the Barlow test. A study in stillborn babies	Incorrect patient population (< 10 patients per group)
Jones DA;	1994 Jul	Principles of screening and congenital dislocation of the hip	Narrative review
Jones GT;Schoenecker PL;Dias LS;	1992 Nov	Developmental hip dysplasia potentiated by inappropriate use of the Pavlik harness	Retrospective case series

Author	Year	Title	Reason for exclusion
Jones KL;Robinson LK;	1983 May	An approach to the child with structural defects	Background article
Jones R;Khan R;Hughes S;Dubowitz V;	1979 Feb	Congenital muscular dystrophy: the importance of early diagnosis and orthopaedic management in the long-term prognosis	Incorrect patient population (age at presentation>6 months)
Jonides L;Rudy C;Walsh S;	1996 Mar	Developmental dysplasia of the hip: what's new in the 1990's?	Background article
Joseph K;MacEwen GD;Boos ML;	1982 May	Home traction in the management of congenital dislocation of the hip	Not relevant (does not address recommendations)
Joseph KN;Meyer S;	1996	Discrepancies in ultrasonography of the infant hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Judge H;	1981 Jun 17	Spotlight on children: a clicky hip	Commentary
Jung S;Borland S;Matewski D;	2009 Dec	Early diagnostic procedures in primary care and hospital for children with a painful hip. A prospective study	Not relevant (does not address recommendations)
Juttmann RE;Hess J;Van Oortmarssen GJ;Van der Maas PJ;	2001	Patient follow up screening evaluations. Examples with regard to congenital hip dislocation and congenital heart disease	Background article
Kaar SG;Cooperman DR;Blakemore	2002 Jan	Association of bladder exstrophy with congenital pathology of the hip and lumbosacral spine: a long-term	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
LC;Thompson GH;Petersilge CA;Elder JS;Heiple KG;		follow-up study of 13 patients	months)
Kadkhoda M;Chung SM;Adebonojo FO;	1976 Mar	Congenital dislocation of the hip--diagnostic screening and treatment. A comparative study of two populations of infants and children	Incorrect patient population (age at presentation>6 months in comparison group)
Kahle WK;Anderson MB;Alpert J;Stevens PM;Coleman SS;	1990 Aug	The value of preliminary traction in the treatment of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Kahle WK;Coleman SS;	1992 Sep	The value of the acetabular teardrop figure in assessing pediatric hip disorders	Retrospective case series
Kaijser M;Larsson J;Rosenberg L;Josephson T;	2009 Jul	Anterior dynamic ultrasound of the infant hip: evaluation of investigator dependence	Not relevant (does not address recommendations)
Kain MSH;Novais EN;Vallim C;Millis MB;Kim Y;	2011 May 4	Periacetabular osteotomy after failed hip arthroscopy for labral tears in patients with acetabular dysplasia	Incorrect patient population (age at presentation>6 months)
Kalamchi A;MacEwen GD;	1980 Sep	Avascular necrosis following treatment of congenital dislocation of the hip	Retrospective case series
Kalamchi A;MacFarlane R;	1982 Mar	The Pavlik harness: results in patients over three months of age	Retrospective case series

Author	Year	Title	Reason for exclusion
Kalamchi A;Schmidt TL;MacEwen GD;	1982 Sep	Congenital dislocation of the hip. Open reduction by the medial approach	Incorrect patient population (age at presentation>6 months)
Kamath S;Bramley D;	2005 May	Is 'clicky hip' a risk factor in developmental dysplasia of the hip?	Incorrect patient population (age at presentation>6 months)
Kamath SU;Bennet GC;	2005 Jun	Re-dislocation following open reduction for developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Kamath SU;Bennet GC;	2004 May	Does developmental dysplasia of the hip cause a delay in walking?	Incorrect patient population (age at presentation>6 months)
Kamegaya M;Moriya H;Tsuchiya K;Akita T;Ogata S;Someya M;	1989 May	Arthrography of early Perthes' disease. Swelling of the ligamentum teres as a cause of subluxation	Incorrect patient population (age at presentation>6 months)
Kamegaya M;Shinohara Y;Shinada Y;Moriya H;Koizumi W;Tsuchiya K;	1994 Jan	The use of a hydroxyapatite block for innominate osteotomy	Incorrect patient population (age at presentation>6 months)
Kane TP;Harvey	2003 Jul	Radiological outcome of innocent infant hip clicks	Very low strength

Author	Year	Title	Reason for exclusion
JR;Richards RH;Burby NG;Clarke NM;			
Kaniklides C;Dimopoulos P;	1996 Nov	Radiological measurement of femoral head position in Legg-Calve-Perthes disease	Not relevant (does not address recommendations)
Karlberg J;Hagglund G;Stromqvist B;	1991 Aug	Immobilization related to early linear growth	Not relevant (does not address recommendations)
Karmazyn BK;Gunderman RB;Coley BD;Blatt ER;Bulas D;Fordham L;Podberesky DJ;Prince JS;Paidas C;Rodriguez W;	2009 Aug	ACR Appropriateness Criteria on developmental dysplasia of the hip--child	Appropriateness Criteria article
Karski T;	1990	Our philosophy in the early and late treatment of congenital hip dysplasia	Not in English
Karski T;Wosko I;Ostrowski J;Gil L;	1990	Over-head extension--one of the methods of early treatment of CDH	Not in English
Kashiwagi N;Suzuki S;Kasahara Y;Seto Y;	1996 Mar	Prediction of reduction in developmental dysplasia of the hip by magnetic resonance imaging	Incorrect patient population (age at presentation not exclusive to 0-6 months)

Author	Year	Title	Reason for exclusion
Katz JF;Siffert RS;	1975 Jan	Capital necrosis, metaphyseal cyst and subluxation in coxa plana	Narrative review
Kauppila O;	1975	The perinatal mortality in breech deliveries and observations on affecting factors. A retrospective study of 2227 cases	Not relevant (does not address recommendations)
Kaushal V;Kaushal SP;Bhakoo ON;	1976 Jan	Congenital dysplasia of the hip in northern India	Insufficient data
Kay RM;Watts HG;Dorey FJ;	1997 Mar	Variability in the assessment of acetabular index	Not relevant (does not address recommendations)
Kaye JJ;Winchester PH;Freiberger RH;	1975 Mar	Neonatal septic 'dislocation' of the hip: true dislocation or pathological epiphyseal separation?	Incorrect patient population (< 10 patients per group)
Kayser R;Mahlfeld K;Grasshoff H;Merk HR;	2005 Oct	Proximal focal femoral deficiency -- a rare entity in the sonographic differential diagnosis of developmental dysplasia of the hip,	Not relevant (does not address recommendations)
Keller MS;	1989	Infant hip	Not relevant (does not address recommendations)
Keller MS;Chawla HS;Weiss AA;	1986 May	Real-time sonography of infant hip dislocation	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Keller MS;Nijs EL;	2009 Apr	The role of radiographs and US in developmental dysplasia of the hip: how good are they?	Narrative review

Author	Year	Title	Reason for exclusion
Keller MS;Weltin GG;Rattner Z;Taylor KJ;Rosenfield NS;	1988 Dec	Normal instability of the hip in the neonate: US standards	Not relevant (does not address recommendations)
Kelly JJ;	1968 Sep	Albright's hereditary osteodystrophy associated with disc calcification and bilateral dislocation of the hips	Retrospective case series
Kelly TE;Lichtenstein JR;Dorst JP;	1977	An unusual familial spondyloepiphyseal dysplasia: 'spondyloperipheral dysplasia'	Incorrect patient population (< 10 patients per group)
Kelsey JL;	1977 Sep	The epidemiology of diseases of the hip: a review of the literature	Narrative review
Kepley RF;Weiner DS;	1981	Treatment of congenital dysplasia-subluxation of the hip in children under one year of age	Retrospective case series
Keret D;Harrison MH;Clarke NM;Hall DJ;	1984 Jul	Coxa plana--the fate of the physis	Incorrect patient population (age at presentation>6 months)
Kernohan WG;Cowie GH;Mollan RA;	1991 Nov	Vibration arthrometry in congenital dislocation of the hip	Retrospective case series
Kernohan WG;Nugent GE;Haugh PE;Trainor	1993 Sep	Sensitivity of manual palpation in testing the neonatal hip	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
BP;Mollan RA;			
Kernohan WG;Trainor B;Nugent G;Walker P;Timoney M;Mollan R;	1993 Mar	Low-frequency vibration emitted from unstable hip in human neonate	Not relevant (does not address recommendations)
Kernohan WG;Trainor BP;Haugh PE;Johnston AF;Mollan RA;	1992 Oct	The Belfast hip screener: from infancy to maturity	Narrative review
Kershaw CJ;Ware HE;Pattinson R;Fixsen JA;	1993 Sep	Revision of failed open reduction of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Khan F;Ng L;Gonzalez S;Hale T;Turner SL;	2008	Multidisciplinary rehabilitation programmes following joint replacement at the hip and knee in chronic arthropathy	Systematic review
Khoshhal KI;Kremli MK;Zamzam MM;Akod OM;Elofi OA;	2005 Jul	The role of arthrography-guided closed reduction in minimizing the incidence of avascular necrosis in developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Khoury NJ;Birjawi GA;Chaaya	2003 Oct	Use of limited MR protocol (coronal STIR) in the evaluation of patients with hip pain	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
M;Hourani MH;			months)
Kim HT;Kim JI;Yoo CI;	2000 Nov	Acetabular development after closed reduction of developmental dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Kim HT;Wenger DR;	1997 Sep	The morphology of residual acetabular deficiency in childhood hip dysplasia: three-dimensional computed tomographic analysis	Not relevant (does not address recommendations)
Kim JH;Oh JH;Han I;Kim H;Chung SW;	2011 Sep	Grafting using injectable calcium sulfate in bone tumor surgery: Comparison with demineralized bone matrix-based grafting	Incorrect patient population (age at presentation>6 months)
Kim NH;Park BM;Lee HM;	1990 Jun	Congenital dislocation of the hip--a long-term follow-up in Korea	Incorrect patient population (age at presentation>6 months)
Kim SN;Shin YB;Kim W;Suh H;Son HK;Cha YS;Chang JH;Ko HY;Lee IS;Kim MJ;	2011 Aug	Screening for the coexistence of congenital muscular torticollis and developmental dysplasia of hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Kim YJ;Jaramillo D;Millis MB;Gray ML;Burstein D;	2003 Oct	Assessment of early osteoarthritis in hip dysplasia with delayed gadolinium-enhanced magnetic resonance imaging of cartilage	Incorrect patient population (age at presentation>6 months)
Kindsfater KA;Politi	2011 Apr	The incidence of femoral component version change in	Incorrect patient population

Author	Year	Title	Reason for exclusion
JR;Dennis DA;Sychterz Terefenko CJ;		primary THA using the S-ROM femoral component	(age at presentation>6 months)
Kitakoji T;Kitoh H;Katoh M;Kurita K;Nogami K;Ishiguro N;	2005 Sep	Home traction in the treatment schedule of overhead traction for developmental dysplasia of the hip	Not relevant (does not address recommendations)
Kitoh H;Kaneko H;Ishiguro N;	2009 Dec	Radiographic analysis of movements of the acetabulum and the femoral head after Salter innominate osteotomy	Not relevant (does not address recommendations)
Klasen HJ;	1979	Traumatic dislocation of the hip in children	Incidence before 1950
Kleinman PK;Spevak MR;	1990 Sep	Advanced pediatric joint imaging	Background article
Klisic P;Rakic D;Pajic D;	1984 Nov	Triple prevention of congenital dislocation of the hip	Not relevant (does not address recommendations)
Klisic P;Zivanovic V;Brdar R;	1988 Jan	Effects of triple prevention of CDH, stimulated by distribution of 'baby packages'	Insufficient data
Knight KG;	1977 Jun	Congenital dysplasia of the hip	Background article
Koch A;Jozwiak M;	2011 Mar	Unilateral and bilateral neurogenic dislocation of the hip joint--which deformity is more difficult to treat?	Incorrect patient population (cerebral palsy included)
Kocher MS;	2000 Dec	Ultrasonographic screening for developmental dysplasia	Narrative review

Author	Year	Title	Reason for exclusion
		of the hip: an epidemiologic analysis (Part I)	
Kocher MS;	2001 Jan	Ultrasonographic screening for developmental dysplasia of the hip: an epidemiologic analysis (Part II)	Narrative review
Kocon H;Komor A;Struzik S;	2004	Orthotic treatment of developmental hip dysplasia	Not in English
Koczewski P;Napiontek M;	2001 Aug	Perthes' disease or late avascular necrosis after developmental dislocation of the hip? 10 children followed for 6-35 years	Incorrect patient population (age at presentation>6 months)
Kohler G;Hell AK;	2003 Sep 6	Experiences in diagnosis and treatment of hip dislocation and dysplasia in populations screened by the ultrasound method of Graf	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Kokavec M;Fristßkovß M;	2008	Efficacy of antiseptics in the prevention of post-operative infections of the proximal femur, hip and pelvis regions in orthopedic pediatric patients. Analysis of the first results	Not in English
Kokavec M;Makai F;Maresch P;	2003 Mar	Present status of screening and prevention of developmental dysplasia of the hip in the Slovak Republic	Not a full article
Kokavec M;Makai F;Olos M;Bialik V;	2006 Mar	Pavlik's method: a retrospective study	Retrospective case series
Kolihova	1980	Neonatal surgery II	Background article

Author	Year	Title	Reason for exclusion
E;Krolupper M;Tosovsky V;Stryhal F;			
Kollmer CE;Betz RR;Clancy M;Steel HH;	1991	Relationship of congential hip and foot deformities: a national Shriners Hospital survey	Insufficient data
Konigsberg DE;Karol LA;Colby S;O'Brien S;	2003 Jan	Results of medial open reduction of the hip in infants with developmental dislocation of the hip	Retrospective case series
Kotnis R;Spiteri V;Little C;Theologis T;Wainwright A;Benson MK;	2008 May	Hip arthrography in the assessment of children with developmental dysplasia of the hip and Perthes' disease	Incorrect patient population (age at presentation>6 months)
Koureas G;Wicart P;Seringe R;	2007	Etiology of developmental hip dysplasia or dislocation: review article	Narrative review
Kramer J;Schleberger R;Steffen R;	1990 Sep	Closed reduction by two-phase skin traction and functional splinting in mitigated abduction for treatment of congenital dislocation of the hip	Insufficient data
Krasny R;Casser HR;Requardt H;Botschek A;	1993	A new holder and surface MRI coil for the examination of the newborn infant hip	Not relevant (does not address recommendations)
Kremli M;	2002 Apr	Bioabsorbable rods in Salter's osteotomy	Incorrect patient population

Author	Year	Title	Reason for exclusion
			(age at presentation>6 months)
Kremli MK;Alshahid AH;Khoshhal KI;Zamzam MM;	2003 Oct	The pattern of developmental dysplasia of the hip	Not relevant (does not address recommendations)
Kremli MK;Zamzam M;Taha WS;Khoshhal KI;al-Zahrani S;	1999	The hamstring stretch sign. A reliable clinical test for the detection of Congenital Dislocation and Dysplasia of the Hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Krol E;Popko J;Szeparowicz P;	2003 Dec 30	Clinical value of neonatal screening for congenital dysplasia of the hip	Not in English
Kruczynski J;	1995 Jun	Avascular necrosis after nonoperative treatment of developmental hip dislocation. Prognosis in 36 patients followed 17-26 years	Retrospective case series
Kudrna JC;	2005 Sep	Femoral version: definition, diagnosis, and intraoperative correction with modular femoral components	Background article
Kulshrestha R;Nath LM;Upadhyaya P;	1983 Jan	Congenital malformations in live born infants in a rural community	Insufficient data
Kumar S;Jain AK;	2005 Feb	Neglected traumatic hip dislocation in children	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Kumar SJ;	1981	Hip spica application for the treatment of congenital dislocation of the hip	Not relevant (does not address recommendations)
Kutlu A;Ayata C;Ogun TC;Kapicioglu MI;Mutlu M;	2000 Sep	Preliminary traction as a single determinant of avascular necrosis in developmental dislocation of the hip	Incorrect patient population (comparison group age>6 months)
Kyu H;Thu A;Cook PJ;	1981	Human genetics in Burma	Not relevant (does not address recommendations)
Lachman RS;Rimoin DL;Hollister DW;	1974	Hip arthrography in the epiphyseal dysplasias	Incorrect patient population (< 10 patients per group)
Ladino Torres MF;DiPietro MA;	2009 Oct	Developmental Dysplasia of the Hip	Narrative review
Lambeek A;de HM;Vlemmix F;Akerboom B;Bais J;Papatsonis D;Mol B;Kok M;	2012	Risk of developmental dysplasia of the hip in breech presentation: the effect of successful external cephalic version	Not relevant (does not address recommendations)
Langer LO;Brill PW;Ozonoff MB;Pauli RM;Wilson WG;Alford BA;Pavlov H;Drake	1990 Jun	Spondylometaphyseal dysplasia, corner fracture type: a heritable condition associated with coxa vara	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
DG;			
Langer R;	1987	Ultrasonic investigation of the hip in newborns in the diagnosis of congenital hip dislocation: classification and results of a screening program	Insufficient data
Langer R;Langer M;Zwicker C;	1988	Ultrasonography of the hip joint in skeletal dysplasias and chromosomal aberrations	Incorrect patient population (skeletal dysplasia included)
Langkamer VG;Clarke NM;Witherow P;	1991 Nov	Complications of splintage in congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Lapunzina P;Camelo JS;Rittler M;Castilla EE;	2002 Feb	Risks of congenital anomalies in large for gestational age infants	Incorrect patient population (stillborns included)
Larson AN;Stans AA;Sierra RJ;	2011 Jul	Ischial spine sign reveals acetabular retroversion in Legg-Calve-Perthes disease	Incorrect patient population (age at presentation>6 months)
Lasda NA;Levinsohn EM;Yuan HA;Bunnell WP;	1978 Dec	Computerized tomography in disorders of the hip	Incorrect patient population (< 10 patients per group)
Lasovetskaya L;	2009	Osteopathic treatment of infants with hip dysplasia during their first year of life	Not in English
Lauritzen J;	1971	Treatment of congenital dislocation of the hip in the	Retrospective case series

Author	Year	Title	Reason for exclusion
		newborn	
Lawler LP;Sponsellar P;Fishman EK;	2004	Helical single and multidetector row CT with three-dimensional volume rendering of the young hip	Not relevant (does not address recommendations)
Leck I;	1986 Jan	An epidemiological assessment of neonatal screening for dislocation of the hip	Narrative review
Leck I;	1976 Jan	Descriptive epidemiology of common malformations (excluding central nervous system defects)	Narrative review
Lee DY;Choi IH;Lee CK;Cho TJ;	1991 Jan	Assessment of complex hip deformity using three-dimensional CT image	Incorrect patient population (< 10 patients per group)
Lee J;	2008 Dec	Developmental dysplasia of the hip: universal or selective ultrasound screening?	Narrative review
Lee TW;Skelton RE;Skene C;	2001 Sep	Routine neonatal examination: effectiveness of trainee paediatrician compared with advanced neonatal nurse practitioner	Incorrect patient population (age at presentation>6 months)
Lee Y;Chung CY;Koo K;Lee KM;Kwon DG;Park MS;	2011	Measuring acetabular dysplasia in plain radiographs	Not relevant (does not address recommendations)
Lehman WB;Grant AD;Nelson	1983 Feb	Hospital for Joint Diseases' traction system for preliminary treatment of congenital dislocation of the	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
J;Robbins H;Milgram J;		hip	
Lehman WL;Grogan DP;	1985 Aug	Innominate osteotomy and varus derotational osteotomy in the treatment of congenital dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Lehmann EC;	1977 Mar	Newborn screening for congenital dislocation of the hip in British Columbia	Commentary
Lehmann HP;Hinton R;Morello P;Santoli J;	2000 Apr	Developmental dysplasia of the hip practice guideline: technical report. Committee on Quality Improvement, and Subcommittee on Developmental Dysplasia of the Hip	Systematic review
Lejman T;Strong M;Michno P;	1995 Jan	Capsulorrhaphy versus capsulectomy in open reduction of the hip for developmental dysplasia	Incorrect patient population (age at presentation>6 months)
Lempicki A;	2003 Jun 30	Proposed standards for prevention and early treatment of congenital dislocation of the hip	Not in English
Lempicki A;Wierusz-Kozlowska M;Kruczynski J;	1990	Abduction treatment in late diagnosed congenital dislocation of the hip. Follow-up of 1,010 hips treated with the Frejka pillow 1967-76	Incorrect patient population (age at presentation>6 months)
Lerch GL;Marino RV;	1985 Aug	Diagnostic techniques for congenital hip disease: reliability and interexaminer agreement	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Ley CC;Villar RN;Ronen A;	1990 Aug	Splinting for CDH: temporary splinting for the neonate	Not relevant (does not address recommendations)
Li LY;Zhang LJ;Zhao Q;Wang EB;	2009 Mar	Measurement of acetabular anteversion in developmental dysplasia of the hip in children by two- and three-dimensional computed tomography	Incorrect patient population (age at presentation>6 months)
Li N;	2011 Feb	Value of ultrasonometry of acetabular cartilage thickness in the evaluation of infant developmental dysplasia of the hip	Not in English
Li YH;Hafeez M;Emery RJ;Leong JC;	1995 Nov	The c/b ratio in the radiological monitoring of the hip joint in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Liang D;Shi YQ;Zheng YY;	1988 Jun	Limited immobilization in treatment of congenital hip dislocation	Incorrect patient population (age at presentation>6 months)
Ligier JN;Prevot J;Lascombes P;	1988 Jun	Computerised tomography in non-treated congenital hip dislocation	Incorrect patient population (< 10 patients per group)
Lincoln TL;Vandevenne JE;Rinsky LA;Butts K;Lang P;	2002 Oct	Dynamic magnetic resonance guided treatment of developmental dysplasia of the hip	Incorrect patient population (< 10 patients per group)
Linden B;Jonsson K;Redlund-Johnell I;	2003 Jan	Osteochondritis dissecans of the hip	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
			months)
Lindstrom JR;Ponseti IV;Wenger DR;	1979 Jan	Acetabular development after reduction in congenital dislocation of the hip	Incidence before 1950
Linnebank F;Witkamp TD;Scholten ET;	1986	Radiation exposure and image quality in computed tomography for hip joint measurements in children	Commentary
Liu HP;Li YJ;Wang CX;Li SH;Zhao ZW;Wang JH;	2011	Clinical study on the prevention of heterotopic ossification after total hip arthroplasty by Xiaozhong Zhitong	Not in English
Liu JS;Kuo KN;Lubicky JP;	1996 May	Arthrographic evaluation of developmental dysplasia of the hip. Outcome prediction	Not relevant (does not address recommendations)
Livingstone B;Hirst P;	1986 Jun	Orthopedic disorders in school children with Down's syndrome with special reference to the incidence of joint laxity	Incorrect patient population (age at presentation>6 months)
Lloyd-Roberts GC;	1976 Apr	Some aspects of orthopaedic surgery in childhood	Narrative review
Logan S;	1991 Jun	Outcome measures in child health	Narrative review
Lohmander LS;Wingstrand H;Heinegard D;	1988	Transient synovitis of the hip in the child: increased levels of proteoglycan fragments in joint fluid	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Lopez-Camelo JS;Castilla EE;Orioli IM;	2010 Oct	Folic acid flour fortification: Impact on the frequencies of 52 congenital anomaly types in three South American countries	Narrative review
Lotito FM;Sadile F;Cigala F;	2007	Surgical treatment of hip dislocation in early infancy	Incorrect patient population (age at presentation>6 months)
Ludwig K;Ahlers K;Sandmann C;Gosheger G;Kloska S;Vieth V;Meier N;Heindel W;	2003	Dose reduction of radiographs of the pediatric pelvis for diagnosing hip dysplasia using a digital flat-panel detector system	Not in English
Luhmann SJ;Schoenecker PL;Anderson AM;Bassett GS;	1998 Dec	The prognostic importance of the ossific nucleus in the treatment of congenital dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Luterkort M;Persson PH;Polberger S;Bjerre I;	1986 Sep	Hip joint instability in breech pregnancy	Not relevant (does not address recommendations)
Ma R;Ji S;Zhou Y;Liu W;Zhang L;	1997 May	Evolutionary regularity of acetabular dysplasia after reduction of developmental dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Ma RX;Ji SJ;Zhou	1991 Nov	Intramedullary pressure changes in proximal femur	Not relevant (does not address

Author	Year	Title	Reason for exclusion
YD;Liu WD;		before and after treatment of congenital dislocation of the hip. Evaluation of the development of the femoral head	recommendations)
Ma RX;Ji SJ;Zhou YD;Liu WD;Ji SR;	1989 Jul	Intramedullary pressure in the proximal femur before and after treatment of congenital dislocation of the hip in children	Incorrect patient population (age at presentation>6 months)
Mabry IR;Luckhaupt S;	2006 Sep 15	Screening for developmental dysplasia of the hip. (Quiz 1005-6)	Incorrect patient population (< 10 patients per group)
Mabry IR;Luckhaupt S;	2006	Screening for developmental dysplasia of the hip	Duplicate study
MacEwen GD;	1976 Oct	Anteversion of the femur	Narrative review
MacEwen GD;Mason B;	1988 Oct	Evaluation and treatment of congenital dislocation of the hip in infants	Narrative review
MacEwen GD;Millet C;	1990 Feb	Congenital dislocation of the hip	Background article
MacEwen GD;Zembo MM;	1987 Dec	Current trends in the treatment of congenital dislocation of the hip	Narrative review
MacKenzie IG;	1972 Feb	Congenital dislocation of the hip. The development of a regional service	Retrospective case series
MacLennan	1997 Sep	Symptom-giving pelvic girdle relaxation of pregnancy,	Not relevant (does not address

Author	Year	Title	Reason for exclusion
AH;MacLennan SC;		postnatal pelvic joint syndrome and developmental dysplasia of the hip. The Norwegian Association for Women with Pelvic Girdle Relaxation (Landforeningen for Kvinner Med Bekkenlosningsplager)	recommendations)
Macnicol MF;Bertol P;	2005 Nov	The Salter innominate osteotomy: should it be combined with concurrent open reduction?	Incorrect patient population (age at presentation>6 months)
Madhuri V;Gahukamble AD;Dutt V;Tharyan P;	2011	Interventions for treating femoral shaft fractures in children and adolescents	Systematic review
Mahan ST;Kasser JR;	2008 Jan	Does swaddling influence developmental dysplasia of the hip?	Narrative review
Mahan ST;Katz JN;Kim YJ;	2009 Jul	To screen or not to screen? A decision analysis of the utility of screening for developmental dysplasia of the hip	Systematic review
Makin M;Yosipovitch Z;	1980 Apr	Congenital dislocation of the hip	Commentary
Maldjian C;Patel TY;Klein RM;Smith RC;	2007 Mar	Efficacy of MRI in classifying proximal focal femoral deficiency	Incorrect patient population (age at presentation>6 months)
Malvitz	1994	Closed reduction for congenital dysplasia of the hip.	Incidence before 1950

Author	Year	Title	Reason for exclusion
TA;Weinstein SL;		Functional and radiographic results after an average of thirty years	
Mandell GA;Harcke HT;Kumar SJ;	1991 Dec	Congenital disorders of the extremities	Background article
Mandell GA;Harcke HT;Scott CI;Caro PA;Einsig HJ;Bowen JR;	1992 Apr	Protrusio acetabuli in neurofibromatosis: nondysplastic and dysplastic forms	Incorrect patient population (age at presentation>6 months)
Mankey MG;Arntz GT;Staheli LT;	1993 Sep	Open reduction through a medial approach for congenital dislocation of the hip. A critical review of the Ludloff approach in sixty-six hips	Incorrect patient population (age at presentation>6 months)
Marafioti RL;Westin GW;	1980 Jul	Factors influencing the results of acetabuloplasty in children	Incorrect patient population (age at presentation>6 months)
Maric Z;Stein SR;	1994 Dec	Voluntary habitual dislocation of the hip in children	Incorrect patient population (< 10 patients per group)
Marsh JL;Vannier MW;	1983 Aug	Surface imaging from computerized tomographic scans	Incorrect patient population (< 10 patients per group)
Marti RK;Schuller HM;van Steijn MJ;	1994 Sep	Superolateral bone grafting for acetabular deficiency in primary total hip replacement and revision	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Mathie AG;Benson MK;Wilson DJ;	1991 May	Lessons in the investigation of irritable hip: failure of ultrasound to detect haemarthrosis	Incorrect patient population (< 10 patients per group)
Matin P;	1983 Apr	Bone scintigraphy in the diagnosis and management of traumatic injury	Insufficient data
Matles AL;	1967 May	The importance of early diagnosis of congenital dislocation of the hip	Commentary
Matles AL;	1966 Jan 3	Early signs of congenital dislocation of the hip	Letter
Matles AL;	1966 Dec	A review of 73 cases of congenital dislocation of the hip	Retrospective case series
Matsoukas JA;	1977	Limitation of abduction of hips in the newborn. Is it a clinical sign or a phenocopy of congenital hip dislocation?	Not relevant (does not address recommendations)
Matsushita T;Miyake Y;Akazawa H;Eguchi S;Takahashi Y;	1999	Open reduction for congenital dislocation of the hip: comparison of the long-term results of the wide exposure method and Ludloff's method	Incorrect patient population (age at presentation>6 months)
Maxwell SL;Ruiz AL;Lappin KJ;Cosgrove AP;	2002 Apr 27	Clinical screening for developmental dysplasia of the hip in Northern Ireland	Incorrect patient population (age at presentation not exclusive to 0-6 months in comparison group)
McAlister WH;Applewhite	1987 Sep	Roentgen rounds #90. Newborn with club feet and dislocatable hips, knees, and elbows. Campomelic	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
T;Taysi K;Gilula LA;		dysplasia	
McCarroll HR;McCarroll HR;	1980	Primary anterior congenital dislocation of the hip in infancy	Incorrect patient population (< 10 patients per group)
McCarthy JJ;Scoles PV;MacEwen GD;	2005 Jun	Developmental dysplasia of the hip (DDH)	Narrative review
McDonald S;Hetrick SE;Green S;	2004	Pre-operative education for hip or knee replacement	Systematic review
McEvoy A;Paton RW;	1997 Aug	Ultrasound compared with radiographic assessment in developmental dysplasia of the hip	Insufficient data (ages at exams not provided)
McHale KA;Corbett D;	1989	Parental noncompliance with Pavlik harness treatment of infantile hip problems	Background article
McHugh A;	1978 Apr 6	Congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
McKenzie AR;	1972 Feb	Congenital dislocation of the hip: a 12-year survey	Incorrect patient population (age at presentation>6 months)
McKibbin B;Freedman L;Howard C;Williams LA;	1988 May	The management of congenital dislocation of the hip in the newborn	Retrospective case series

Author	Year	Title	Reason for exclusion
McLoughlin,L.; Groarke,P.; Curtin,W.	2012	Are nullclicky hipsnull and nullasymmetric skin foldsnull good indicators of developmental dysplasia of the hip (DDH)?	Insufficient data
McNally EG;Tasker A;Benson MK;	1997 Sep	MRI after operative reduction for developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
McQueary FG;Johnston RC;	1988 Sep	Coxarthrosis after congenital dysplasia. Treatment by total hip arthroplasty without acetabular bone-grafting	Not relevant (does not address recommendations)
Medalie JH;Makin M;Alkalay E;Yofe J;Cochavi Z;Ehrlich D;	1966 Mar	Congenital dislocation of the hip--a clinical-epidemiological study, Jerusalem 1954 to 1960. I. Retrospective incidence study	Not relevant (does not address recommendations)
MEDBO IU;	1961	Early diagnosis and treatment of hip joint dysplasia	Retrospective case series
Meek RD;Allan DB;	2005	Cemented versus cementless surgical approach for total hip arthroplasty revision	Not relevant (does not address recommendations)
Melkonian GJ;	1987 May	Congenital hip dysplasia	Background article
Meloche AT;	1987 May	Disorders of the knee: genu valgum and chondromalacia patellae	Narrative review
Melzer C;Wulker N;	1990	Potential mistakes in hip-joint sonography	Narrative review
Mendes	1980 Apr	Early detection and treatment of congenital dislocation	Insufficient data

Author	Year	Title	Reason for exclusion
DG;Roffman M;		of the hip in the newborn	
Menelaus MB;	1990 May	The early diagnosis and treatment of congenital dislocation of the hip	Narrative review
Milani C;Ishida A;Laredo FJ;Dobashi ET;	2000 Jun	Racial and geographic differences of Wiberg's angle from 400 ultrasonographic normal hips in Italian and Brazilian infants younger than 3 months old	Not relevant (does not address recommendations)
Miller F;Slomczykowski M;Cope R;Lipton GE;	1999 Jul	Computer modeling of the pathomechanics of spastic hip dislocation in children	Incorrect patient population (< 10 patients per group)
Millis MB;Hall JE;	1979 Dec	Transiliac lengthening of the lower extremity. A modified innominate osteotomy for the treatment of postural imbalance	Not relevant (does not address recommendations)
Millis MB;Share JC;	1992 Jan	Use of ultrasonography in dysplasia of the immature hip	Not relevant (does not address recommendations)
Mirdad T;	2002 Jul	Incidence and pattern of congenital dislocation of the hip in Aseer region of Saudi Arabia	Incorrect patient population (age at presentation>6 months)
Mitani S;Oda K;Tanabe G;	1993 May	Prediction for prognosis from radiologic measurements of patients treated with the Pavlik harness for congenital dislocation of the hip	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Mitchell CS;Parisi MT;	1998 Jan	Pediatric acetabuloplasty procedures: radiologic evaluation	Not relevant (does not address recommendations)
Mitchell GP;	1979 Jan	Orthopaedic problems in children	Background article
Mitchell GP;	1970 Dec	Congenital dislocation of the hip	Commentary
Mitchell GP;	1977 Jan	Congenital dislocation of the hip	Narrative review
Mitchell GP;	1972 Feb	Problems in the early diagnosis and management of congenital dislocation of the hip	Not relevant (does not address recommendations)
Mitchell PD;Chew NS;Goutos I;Healy JC;Lee JC;Evans S;Hulme A;	2007 Jul	The value of MRI undertaken immediately after reduction of the hip as a predictor of long-term acetabular dysplasia	Not relevant (does not address recommendations)
Moberg A;Hansson G;Kaniklides C;	2000 Oct	Acetabulum-head index measured on arthrograms in children with Legg-Calve-Perthes disease	Incorrect patient population (age at presentation>6 months)
Moen C;Lindsey RW;	1986 Jul	Computerized tomography with routine arthrography in early evaluation of congenital hip dysplasia	Incorrect patient population (< 10 patients per group)
Molina Guerrero JA;Munuera ML;Esteban MB;	1990	Acetabular development in congenital dislocation on the hip	Incorrect patient population (age at presentation>6 months)
Mollan RA;Bogues	1983 Aug	A new aid in screening for congenital dislocation of the	Not relevant (does not address

Author	Year	Title	Reason for exclusion
BA;Cowie GH;		hip	recommendations)
Molloy MK;	1986 Sep	The unstable paralytic hip: treatment by combined pelvic and femoral osteotomy and transiliac psoas transfer	Incorrect patient population (neuromuscular disease included)
Monk CJ;Dowd GS;	1980 Apr	Monthly screening in the first six months of life for congenital hip dislocation	Retrospective case series
Monticelli G;	1976 Sep	Intertrochanteric femoral osteotomy with concentric reduction of the femoral head in treatment of residual congenital acetabular dysplasia	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Mooney JF;Emans JB;	1995 Aug	Developmental dislocation of the hip: a clinical overview	Background article
Moore FH;	1989 Jan	Examining infants' hips--can it do harm?	Insufficient data
Moore FH;	1974 Feb 23	Screening for congenital dislocation of the hip	Insufficient data
Morcuende JA;Meyer MD;Dolan LA;Weinstein SL;	1997 Jun	Long-term outcome after open reduction through an anteromedial approach for congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Morcuende JA;Weinstein SL;	1994 Nov	New developments in developmental dysplasia of the hip	Background article
Morey SS;	2001 Feb 1	AAP develops guidelines for early detection of	Guideline

Author	Year	Title	Reason for exclusion
		dislocated hips	
Morin C;Rabay G;Morel G;	1998 Mar	Retrospective review at skeletal maturity of the factors affecting the efficacy of Salter's innominate osteotomy in congenital dislocated, subluxed, and dysplastic hips	Incorrect patient population (age at presentation>6 months)
Morino T;Miyake Y;Matsushita T;Itadera E;	1998	Pavlik harness applications for congenital dislocation of the hip. How short can they be made?	Not relevant (does not address recommendations)
Morita S;Akahoshi Y;	1968 May 1	A follow up study of closed reduction of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Morley DJ;Weaver DD;Garg BP;Markand O;	1982 Jun	Hyperexplexia: an inherited disorder of the startle response	Incorrect patient population (< 10 patients per group)
Morrissy RT;	1984	Fractured hip in childhood	Background article
Morrissy RT;Cowie GH;	1987 Sep	Congenital dislocation of the hip. Early detection and prevention of late complications	Commentary
Moseley CF;	2001	Developmental hip dysplasia and dislocation: management of the older child	Narrative review
Moss GD;Cartlidge PH;Speidel BD;Chambers TL;	1991 Apr 13	Routine examination in the neonatal period	Retrospective case series

Author	Year	Title	Reason for exclusion
Motta F;	1989	Ultrasonography in the diagnosis of congenital hip dysplasia in the newborn	Not relevant (does not address recommendations)
Mubarak S;Garfin S;Vance R;McKinnon B;Sutherland D;	1981 Oct	Pitfalls in the use of the Pavlik harness for treatment of congenital dysplasia, subluxation, and dislocation of the hip	Retrospective case series
Mulley DA;	1984 Aug	Harnessing babies' dysplastic hips	Background article
Mulliken BD;Nayak N;Bourne RB;Rorabeck CH;Bullas R;	1996 Jan	Early radiographic results comparing cemented and cementless total hip arthroplasty	Incorrect patient population (age at presentation>6 months)
Mulroy RD;Harris WH;	1990 Dec	Failure of acetabular autogenous grafts in total hip arthroplasty. Increasing incidence: a follow-up note	Incorrect patient population (age at presentation>6 months)
Munar A;Gamboa OA;Ortiz N;	2007	Homeopathy for osteoarthritis	Systematic review
Mundy L;Merlin T;	2003	Ultrasound screening for hip dysplasia: a new screening programme for the early detection of hip dysplasia in neonates. Horizon Scanning Prioritising Summary - Volume 2 (Brief record)	Narrative review
Murray KA;Crim JR;	2001	Radiographic imaging for treatment and follow-up of developmental dysplasia of the hip	Narrative review

Author	Year	Title	Reason for exclusion
Murray RO;	1976 Jan	Iatrogenic lesions of the skeleton. Caldwell lecture, 1975	Narrative review
Murray T;Cooperman DR;Thompson GH;Ballock T;	2007 Feb	Closed reduction for treatment of development dysplasia of the hip in children	Incorrect patient population (age at presentation>6 months)
Myers J;Hadlow S;Lynskey T;	2009 Feb	The effectiveness of a programme for neonatal hip screening over a period of 40 years: a follow-up of the New Plymouth experience	Retrospective case series
Nade S;	1983 May	Acute septic arthritis in infancy and childhood	Narrative review
Nakamura J;Kamegaya M;Saisu T;Someya M;Koizumi W;Moriya H;	2007 Feb	Treatment for developmental dysplasia of the hip using the Pavlik harness: long-term results	Retrospective case series
Nakamura Y;Mitsui H;Kikuchi A;Toh S;Katano H;	2011 Jan	Total Hip Arthroplasty Using a Cylindrical Cementless Stem in Patients With a Small Physique	Incorrect patient population (age at presentation>6 months)
Nam YT;Shin T;Yoshitake J;	1989 Mar 1	Induced hypotension for surgical repair of congenital dislocation of the hip in children	Incorrect patient population (age at presentation>6 months)
Nancheva	2012	Ketofol (Ketamine/Propofol) vs Ketamin/ Midazolam in	Not relevant (does not address

Author	Year	Title	Reason for exclusion
J;Shosholcheva M;Samardziski M;Gorgieva D;		babies for short-term orthopaedic procedures	recommendations)
Nanda A;Lionel J;Al-Tawari AA;Anim JT;	2004 Mar	What syndrome is this? Autosomal recessive type II cutis laxa	Incorrect patient population (< 10 patients per group)
Napiontek M;Rzymski K;	1991 Dec	Femoral head anteposition after surgery of congenital dislocation of the hip. A computerised tomography study of 22 hips suspected of anterior dislocation	Not in English
Nattrass GR;Pirpiris M;	2002 Dec	Pediatric hip disorders	Narrative review
Naumann T;Zahniel K;	1990 Nov	Comparing the rate of femoral head necrosis of two different treatments of congenital dislocation of the hip	Not relevant (does not address recommendations)
Nehme A;Trousdale R;Tannous Z;Maalouf G;Puget J;Telmont N;	2009 Nov	Developmental dysplasia of the hip: is acetabular retroversion a crucial factor?	Incorrect patient population (age at presentation>6 months)
Newbury-Ecob RA;Young ID;	1993 Jan	Dominant inheritance of microcephaly, short stature and congenital dislocation of the hips	Incorrect patient population (< 10 patients per group)
Nichol C;	1977 Jul	Congenital dislocated hip	Background article
Noble TC;Pullan	1978 Aug	Difficulties in diagnosing and managing congenital	Not relevant (does not address

Author	Year	Title	Reason for exclusion
CR;Craft AW;Leonard MA;	26	dislocation of the hip	recommendations)
Noritake K;Yoshihashi Y;Hattori T;Miura T;	1993	Acetabular development after closed reduction of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Not provided	1971 Feb 20	Aetiology of congenital dislocation of the hip	Background article
Novacheck TF;	1996 Aug	Developmental dysplasia of the hip	Incorrect patient population (< 10 patients per group)
Novick GS;	1988 Jan	Sonography in pediatric hip disorders	Narrative review
Nugent G;	1987 Jul 15	Parental understanding of congenital hip dislocation	Insufficient data
O'Brien T;Barry C;	1990 Dec	The importance of standardised radiographs when assessing hip dysplasia	Not relevant (does not address recommendations)
O'Brien T;Millis MB;Griffin PP;	1986 Sep	The early identification and classification of growth disturbances of the proximal end of the femur	Incidence before 1950
O'Brien T;Waldron B;	1989 Jun	Radiographic changes in the ossific nucleus in congenital dislocation of the hip	Retrospective case series
Oda H;Igarashi M;Hayashi	1984 Mar	Soft tissue collagen in congenital dislocation of the hip. Biochemical studies of the ligamentum teres of the	Not in English

Author	Year	Title	Reason for exclusion
Y;Karube S;Inoue S;Sakaguchi R;Kimizuka M;		femur and the hip joint capsule	
O'Donnell TM;Chung WK;Neil MJ;	2011 Jun	Periprosthetic stress fractures at the sleeve/stem junction of the Sivash-Range of Motion modular femoral stem	Incorrect patient population (age at presentation>6 months)
Offierski CM;	1981 Aug	Traumatic dislocation of the hip in children	Retrospective case series
Ogata S;Moriya H;Tsuchiya K;Akita T;Kamegaya M;Someya M;	1990 Mar	Acetabular cover in congenital dislocation of the hip	Not relevant (does not address recommendations)
O'Grady MJ;Mujtaba G;Hanaghan J;Gallagher D;	2010 Jun	Screening for developmental dysplasia of the hip: current practices in Ireland	Not a full article
Oh CW;Guille JT;Kumar SJ;Lipton GE;MacEwen GD;	2005 May	Operative treatment for type II avascular necrosis in developmental dysplasia of the hip	Incorrect patient population (incidence before 1950)
Oh CW;Joo SY;Kumar SJ;MacEwen GD;	2009 Jun	A radiological classification of lateral growth arrest of the proximal femoral physis after treatment for developmental dysplasia of the hip	Incidence before 1950
Oh CW;Thacker MM;Mackenzie	2006 Jun	Coxa vara: a novel measurement technique in skeletal dysplasias	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
WG;Riddle EC;			
Oh WH;	1976 Apr	Dislocation of the hip in birth defects	Background article
O'Hara JN;Bernard AA;Dwyer NS;	1988 May	Early results of medial approach open reduction in congenital dislocation of the hip: use before walking age	Retrospective case series
Ohmori T;Endo H;Mitani S;Minagawa H;Tetsunaga T;Ozaki T;	2009 Jun	Radiographic prediction of the results of long-term treatment with the Pavlik harness for developmental dislocation of the hip	Not relevant (does not address recommendations)
Omeroglu H;Agus H;Bicimoglu A;Tumer Y;	2002 Jul	Analysis of a radiographic assessment method of acetabular cover in developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Omeroglu H;Agus H;Bicimoglu A;Tumer Y;	2012 Jan	Evaluation of experienced surgeons' decisions regarding the need for secondary surgery in developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Omeroglu H;Bicimoglu A;Koparal S;Seber S;	2001 Apr	Assessment of variations in the measurement of hip ultrasonography by the Graf method in developmental dysplasia of the hip	Not relevant (does not address recommendations)
Omeroglu H;Tumer Y;Bicimoglu A;Agus H;	1999	Intraobserver and interobserver reliability of Kalamchi and Macewen's classification system for evaluation of avascular necrosis of the femoral head in developmental	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
		hip dysplasia	
Omeroglu H;Ucar DH;Tumer Y;	2006 Mar	A new, objective radiographic classification system for the assessment of treatment results in developmental dysplasia of the hip	Not relevant (does not address recommendations)
Omololu B;Ogunlade SO;Alonge TO;	2005 Apr	Pattern of congenital orthopaedic malformations in an African teaching hospital	Incorrect patient population (age at presentation>6 months)
Ortiz-Neira CL;Paolucci EO;Donnon T;	2012 Mar	A meta-analysis of common risk factors associated with the diagnosis of developmental dysplasia of the hip in newborns	Meta-analysis
Ortolani M;	1976 Sep	Congenital hip dysplasia in the light of early and very early diagnosis	Commentary
Ortolani M;Gerardi A;Rabassini A;Ortolani L;	1996	A minimal diagnostic iter in congenital dysplasia of the hip (CDH)	Commentary
Ortolani M;Rabassini A;Gerardi A;Ortolani L;	1996	Echographic diagnosis of congenital dysplasia of the hip. Diagnostic value of the beta angle: A critical review of the literature as compared to personal experience	Retrospective case series
Osarumwense D;Popple D;Kershaw IF;Kershaw	2007 Nov	What follow-up is required for children with a family history of developmental dysplasia of the hip?	Retrospective case series

Author	Year	Title	Reason for exclusion
CJ;Furlong AJ;			
O'Sullivan ME;O'Brien T;	1994 Jan	Acetabular dysplasia presenting as developmental dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Owen R;	1968 Aug	Early diagnosis of the congenitally unstable hip	Narrative review
Pai VS;	1992	The management of unreduced traumatic dislocation of the hip in developing countries	Incorrect patient population (age at presentation>6 months)
Paille P;Quesnel C;Baunin C;Railhac JJ;	1988	Computed arthrography: its role in the screening of joint diseases in pediatric radiology	Incorrect patient population (age at presentation>6 months)
Paleg G;	2005 Apr	Intervening care	Commentary
Palmen K;	1984	Prevention of congenital dislocation of the hip. The Swedish experience of neonatal treatment of hip joint instability	Commentary
Palmen K;	1961 Nov	Preluxation of the hip joint. Diagnosis and treatment in the newborn and the diagnosis of congenital dislocation of the hip joint in Sweden during the years 1948-1960	Incidence before 1950
Palmen K;	1970	Preluxation of the hip in the newborn. The diagnostic work in Sweden during the years 1953-1966	Retrospective case series

Author	Year	Title	Reason for exclusion
Palmen K;von RS;	1975 Apr	Late diagnosis dislocation of the hip joint in children	Retrospective case series
Pan KL;Rasit H;	2004 Dec	A modified method of traction for young children with congenital dislocation of the hip as a preliminary to reduction	Incorrect patient population (< 10 patients per group)
Panagiotopoulou N;Bitar K;Hart WJ;	2012 Dec	The association between mode of delivery and developmental dysplasia of the hip in breech infants: a systematic review of 9 cohort studies	Systematic review
Papavasiliou VA;Piggott H;	1983 Feb	Acetabular floor thickening and femoral head enlargement in congenital dislocation of the hip: lateral displacement of femoral head	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Parkin DM;	1980 Mar	The efficiency of notification of congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Parkin DM;	1981 Dec	How successful is screening for congenital disease of the hip?	Narrative review
Patel H;	2001 Jun 12	Preventive health care, 2001 update: screening and management of developmental dysplasia of the hip in newborns	Systematic review
Paterson CR;Beal RJ;Dent JA;	1992 Aug 22	Osteogenesis imperfecta: fractures of the femur when testing for congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Paton RW;	2005 Oct	Management of neonatal hip instability and dysplasia	Narrative review

Author	Year	Title	Reason for exclusion
Paton RW;	2005 Oct	Screening for hip abnormality in the neonate	Narrative review
Paton RW;	2009	Developmental dysplasia of the hip: Ultrasound screening and treatment. How are they related?	Narrative review
Patterson CC;Kernohan WG;Mollan RA;Haugh PE;Trainor BP;	1995 Jan	High incidence of congenital dislocation of the hip in Northern Ireland	Incorrect patient population (cerebral palsy included)
Pavlov H;Goldman AB;Freiberger RH;	1980 Jun	Infantile coxa vara	Incorrect patient population (age at presentation>6 months)
Paz JE;Otano L;Gadow EC;Castilla EE;	1992 Oct	Previous miscarriage and stillbirth as risk factors for other unfavourable outcomes in the next pregnancy	Incorrect patient population (stillborns included)
Pazonyi I;Kun A;Czeizel A;	1982	Congenital postural deformity association	Not relevant (does not address recommendations)
Peled E;Eidelman M;Katzman A;Bialik V;	2008 Apr	Neonatal incidence of hip dysplasia: ten years of experience	Not relevant (does not address recommendations)
Pemberton PA;	1974 Jan	Pericapsular osteotomy of the ilium for the treatment of congenitally dislocated hips	Retrospective case series

Author	Year	Title	Reason for exclusion
Peterlein CD;Fuchs-Winkelmann S;Schuttler KF;Lakemeier S;Timmesfeld N;Gorg C;Schofer MD;	2012 May 12	Does Probe Frequency Influence Diagnostic Accuracy in Newborn Hip Ultrasound?	Not relevant (does not address recommendations)
Peterlein CD;Schuttler KF;Lakemeier S;Timmesfeld N;Gorg C;Fuchs-Winkelmann S;Schofer MD;	2010	Reproducibility of different screening classifications in ultrasonography of the newborn hip	Not relevant (does not address recommendations)
Peterson HA;	1993 Sep	Premature physeal arrest of the distal tibia associated with temporary arterial insufficiency	Incorrect patient population (< 10 patients per group)
Petra M;Benson MKD;	2001	Long-term outcomes in developmental dysplasia of the hip	Narrative review
Petrella R;Rabinowitz JG;Steinmann B;Hirschhorn K;	1993 Aug 15	Long-term follow-up of two sibs with Larsen syndrome possibly due to parental germ-line mosaicism	Incorrect patient population (< 10 patients per group)
Petrini A;Grassi G;	1983 Jun	Long term results in traumatic dislocation of the hip in children	Incidence before 1950

Author	Year	Title	Reason for exclusion
Pettersson H;Daneman A;Harwood-Nash DC;	1983	Computed tomography in pediatric orthopedic radiology	Background article
Pettersson H;Theander G;	1979	Ossification of femoral head in infancy. II. Ossification in infants treated for congenital dislocation	Retrospective case series
Phillipi CA;Remmington T;Steiner RD;	2008	Bisphosphonate therapy for osteogenesis imperfecta	Systematic review
Phillips LI;	1968 Aug	Congenital dislocation of the hip in the newborn. A survey at National Women's Hospital 1954-68	Not relevant (does not address recommendations)
Pitkow RB;	1975 Jul	External rotation contracture of the extended hip. A common phenomenon of infancy obscuring femoral neck anteversion and the most frequent cause of out-toeing gait in children	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Pizzutillo PD;	1994	Developmental dysplasia of the hip	Background article
Pompe van Meerdervoort HF;	1974 Dec 7	Congenital dislocation of the hip in black patients	Incorrect patient population (< 10 patients per group)
Pompe van Meerdervoort HF;	1976 Oct 30	Congenital musculoskeletal malformation in South African Blacks: a study of incidence	Incorrect patient population (neuromuscular disease included)

Author	Year	Title	Reason for exclusion
Ponseti IV;	1982 Jun	Early diagnosis and pathology of congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Ponseti IV;	1966 Oct	Non-surgical treatment of congenital dislocation of the hip	Commentary
Popko J;Zalewski W;Krol E;Szeparowicz P;	2006 Feb 28	Long-term outcome of early treatment of developmental hip dysplasia using an abduction splint	Not in English
Portinaro NM;Matthews SJ;Benson MK;	1994 Mar	The acetabular notch in hip dysplasia	Narrative review
Portinaro NM;Murray D;Benson MK;	1997 Jan	Acetabular notch	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Portinaro NM;Pelillo F;Cerutti P;	2007 Mar	The role of ultrasonography in the diagnosis of developmental dysplasia of the hip	Narrative review
Pospischill R;Weninger J;Ganger R;Altenhuber J;Grill F;	2012 Jan	Does open reduction of the developmental dislocated hip increase the risk of osteonecrosis?	Incorrect patient population (age at presentation>6 months in comparison group)
Pous JG;Camous JY;el BS;	1992 Aug	Cause and prevention of osteochondritis in congenital dislocation of the hip	Narrative review

Author	Year	Title	Reason for exclusion
Powell EN;Gerratana FJ;Gage JR;	1986 Mar	Open reduction for congenital hip dislocation: the risk of avascular necrosis with three different approaches	Incorrect patient population (age at presentation>6 months)
Powers JA;Bach PJ;	1977 Nov	Coxa magna	Incorrect patient population (age at presentation>6 months)
Pratt WB;Freiberger RH;Arnold WD;	1982 Jan	Untreated congenital hip dysplasia in the Navajo	Retrospective case series
Price CT;	2012 May 9	Swaddling and Hip Dysplasia: New Observations: Commentary on an article by Enbo Wang, MD, PhD, et al.: 'Does Swaddling Influence Developmental Dysplasia of the Hip? An Experimental Study of the Traditional Straight-Leg Swaddling Model in Neonatal Rats'	Commentary
Puhan MA;Woolacott N;Kleijnen J;Steurer J;	2003 Dec	Observational studies on ultrasound screening for developmental dysplasia of the hip in newborns - a systematic review	Systematic review
Quick TJ;Eastwood DM;	2005 Mar	Pediatric fractures and dislocations of the hip and pelvis	Narrative review
Quinland WR;Brady PG;Regan BF;	1978 Sep 29	Late diagnosis of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Quinn RH;Renshaw TS;DeLuca PA;	1994 Sep	Preliminary traction in the treatment of developmental dislocation of the hip	Retrospective case series
Race C;Herring JA;	1983 May	Congenital dislocation of the hip: an evaluation of closed reduction	Incorrect patient population (age at presentation>6 months)
Rafique A;Set P;Berman L;	2007 Feb	Late presentation of developmental dysplasia of the hip following normal ultrasound examination	Incorrect patient population (< 10 patients per group)
Rakovac I;Tudor A;Sestan B;Prpic T;Gulan G;Madarevic T;Santic V;Ruzic L;	2011 Oct	New 'L value' parameter simplifies and enhances hip ultrasound interpretation in the detection of developmental dysplasia of the hip	Not relevant (does not address recommendations)
Ramavat LG;	1978 Feb	Diamond Blackfan syndrome with congenital dislocation of right hip	Incorrect patient population (< 10 patients per group)
Ramsey PL;	1977 Jun	The changing signs of congenital hip dislocation	Not relevant (does not address recommendations)
Ramwadhdoebe S;Buskens E;Sakkers RJ;Stahl JE;	2009 Dec	A tutorial on discrete-event simulation for health policy design and decision making: optimizing pediatric ultrasound screening for hip dysplasia as an illustration	Not relevant (does not address recommendations)
Ramwadhdoebe S;Van Merode GG;Boere-	2010	Implementation by simulation; strategies for ultrasound screening for hip dysplasia in the Netherlands	Cost-effectiveness study

Author	Year	Title	Reason for exclusion
Boonekamp MM;Sakkers RJ;Buskens E;			
Ranawat V;Rosendahl K;Jones D;	2009 Feb	MRI after operative reduction with femoral osteotomy in developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Rao S;Thurston AJ;	1986 Oct 8	Congenital dislocation of hip in the newborn: a postnatal survey	Retrospective case series
Rathjen KW;Johnston CE;	1985 Dec	Residual subluxation following medial approach open reduction in congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Rehm A;Divekar A;Conybeare ME;	2003 Sep	External fixation for femoral derotation osteotomy in developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Reigstad A;	1980 Jul	Traumatic dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Reimers J;Bialik V;	1981	Influence of femoral rotation on the radiological coverage of the femoral head in children	Not relevant (does not address recommendations)
Rejholec M;	1992	Contemporary trends in orthopaedics of the hip joint. 1. Surgical treatment of congenital dislocation of the hip joint	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Rejholec M;Sosna A;Dupal P;	1993 Oct	Overhead traction in the treatment of congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Rejholec M;Stryhal F;	1991 Jul	Behavior of the proximal femur during the treatment of congenital dysplasia of the hip: a clinical long-term study	Incorrect patient population (age at presentation>6 months)
Rejholec M;Stryhal F;Rybka V;Popelka S;	1990 Jan	Chiari osteotomy of the pelvis: a long-term study	Incorrect patient population (age at presentation>6 months)
Renshaw TS;	1978 Apr	Sacral agenesis	Retrospective case series
Renshaw TS;Cary JM;Gage JR;	1981 Jul	An update: detection of congenital dysplasia of the hip	Commentary
Reynolds D;	1992	The unheard cry (diagnosis and management of hip dysplasia in adults)	Commentary
Richards BS;	1988 Jun	Partial sacral agenesis with congenital hip dislocation	Incorrect patient population (< 10 patients per group)
Riddlesberger MM;	1981 Sep	Computed tomography of the musculoskeletal system	Narrative review
Riddlesberger MM;Kuhn JP;	1983 Feb	The role of computed tomography in diseases of the musculoskeletal system	Narrative review
Ringrose CA;	1975 Dec	Congenital dislocation of the hip as a cause of	Incorrect patient population

Author	Year	Title	Reason for exclusion
	15	malpresentation during labor	(< 10 patients per group)
Rit J;Kusswetter W;	1982	Early diagnosis of congenital dislocation of the hip. First experimental examinations and results	Not relevant (does not address recommendations)
Roach JW;Hobatho MC;Baker KJ;Ashman RB;	1997 Mar	Three-dimensional computer analysis of complex acetabular insufficiency	Incorrect patient population (age at presentation>6 months)
Robinson HJ;Shannon MA;	1989 May	Avascular necrosis in congenital hip dysplasia: the effect of treatment	Incidence before 1950
Rodriguez JA;Huk OL;Pellicci PM;Wilson PD;	1995 Aug	Autogenous bone grafts from the femoral head for the treatment of acetabular deficiency in primary total hip arthroplasty with cement. Long-term results	Incorrect patient population (age at presentation>6 months)
Roovers EA;Boere-Boonekamp MM;Geertsma TS;Zielhuis GA;Kerkhoff AH;	2003 Jul	Ultrasonographic screening for developmental dysplasia of the hip in infants. Reproducibility of assessments made by radiographers	Not relevant (does not address recommendations)
Roper A;	1976 May	Hip dysplasia in the African Bantu	Incorrect patient population (< 10 patients per group)
Roposch A;Graf R;Wright JG;	2006 Jun	Determining the reliability of the Graf classification for hip dysplasia	Not relevant (does not address recommendations)
Roposch A;Liu	2011 Dec	Standardized diagnostic criteria for developmental	Insufficient data

Author	Year	Title	Reason for exclusion
LQ;Hefti F;Clarke NM;Wedge JH;		dysplasia of the hip in early infancy	
Roposch A;Liu LQ;Offiah AC;Wedge JH;	2011 Dec 21	Functional outcomes in children with osteonecrosis secondary to treatment of developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Roposch A;Moreau NM;Uleryk E;Doria AS;	2006 Dec	Developmental dysplasia of the hip: quality of reporting of diagnostic accuracy for US	Systematic review
Roposch A;Odeh O;Doria AS;Wedge JH;	2011 Oct	The presence of an ossific nucleus does not protect against osteonecrosis after treatment of developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Roposch A;Stohr KK;Dobson M;	2009 Apr	The effect of the femoral head ossific nucleus in the treatment of developmental dysplasia of the hip. A meta-analysis	Systematic review
Roposch A;Wright JG;	2007 Feb	Increased diagnostic information and understanding disease: uncertainty in the diagnosis of developmental hip dysplasia	Narrative review
Rosen A;Gamble JG;Vallier H;Bloch D;Smith L;Rinsky LA;	1999 Apr	Analysis of radiographic measurements as prognostic indicators of treatment success in patients with developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Rosendahl	1995	Reliability of ultrasound in the early diagnosis of	Not relevant (does not address

Author	Year	Title	Reason for exclusion
K;Aslaksen A;Lie RT;Markestad T;		developmental dysplasia of the hip	recommendations)
Rosendahl K;Dezateux C;	2009	The use of imaging in epidemiological studies: Developmental dysplasia of the hip	Narrative review
Rosendahl K;Dezateux C;Fosse KR;Aase H;Aukland SM;Reigstad H;Alsaker T;Moster D;Lie RT;Markestad T;	2010 Jan	Congenital dysplasia of the hip in newborns. A randomised, controlled trial on the effect of abduction treatment.	Duplicate study (duplicate with Immediate treatment versus sonographic surveillance for mild hip dysplasia in newborns)
Rosendahl K;Markestad T;Lie RT;	1995	The effect of ultrasound screening on late developmental dysplasia of the hip	Letter
Rosendahl K;Markestad T;Lie RT;Sudmann E;Geitung JT;	1995 Jun	Cost-effectiveness of alternative screening strategies for developmental dysplasia of the hip	Cost-effectiveness study
Rosendahl K;Toma P;	2007 Aug	Ultrasound in the diagnosis of developmental dysplasia of the hip in newborns. The European approach. A review of methods, accuracy and clinical validity	Narrative review
Rosman MA;Jequier S;	1982 Jan	The double-headed femur	Incorrect patient population (< 10 patients per group)

Author	Year	Title	Reason for exclusion
Rouault K;Scotet V;Autret S;Gaucher F;Dubrana F;Tanguy D;El Rassi CY;Fenoll B;Ferec C;	2010 Sep	Evidence of association between GDF5 polymorphisms and congenital dislocation of the hip in a Caucasian population	Not relevant (does not address recommendations)
Rouault K;Scotet V;Autret S;Gaucher F;Dubrana F;Tanguy D;Yaacoub El RC;Fenoll B;Ferec C;	2009 Aug	Do HOXB9 and COL1A1 genes play a role in congenital dislocation of the hip? Study in a Caucasian population	Not relevant (does not address recommendations)
Royle SG;	1992 May	Investigation of the irritable hip	Incorrect patient population (age at presentation>6 months)
Rubini M;Cavallaro A;Calzolari E;Bighetti G;Sollazzo V;	2008 Apr	Exclusion of COL2A1 and VDR as developmental dysplasia of the hip genes	Not relevant (does not address recommendations)
Rungee JL;Reinker KA;	1992 Jan	Ossific nucleus eccentricity in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Sakai T;Nishii T;Takao M;Ohzono	2012 Feb 22	High Survival of Dome Pelvic Osteotomy in Patients with Early Osteoarthritis from Hip Dysplasia	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
K;Sugano N;			months)
Sakai T;Ohzono K;Nishii T;Miki H;Takao M;Sugano N;	2010 Jun	A modular femoral neck and head system works well in cementless total hip replacement for patients with developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Salter RB;	1968 May 18	Etiology, pathogenesis and possible prevention of congenital dislocation of the hip	Commentary
Salter RB;Kostuik J;Dallas S;	1969 Jan	Avascular necrosis of the femoral head as a complication of treatment for congenital dislocation of the hip in young children: a clinical and experimental investigation	Not relevant (does not address recommendations)
Salter RB;Thompson GH;	1984 Apr	Legg-Calve-Perthes disease. The prognostic significance of the subchondral fracture and a two-group classification of the femoral head involvement	Not relevant (does not address recommendations)
Salvati EA;Wilson PD;	1974 Jan	Treatment of irreducible hip subluxation by Chiari's iliac osteotomy. A report of results in 19 cases	Retrospective case series
Sambandam SN;Hull J;Jiranek WA;	2009 Dec	Factors predicting the failure of Bernese periacetabular osteotomy: a meta-regression analysis	Systematic review
Sanders FBM;Bozon LAM;Ruijs JHJ;Rosenbusch G;Gardeniers JWM;	1988	Ultrasound assessment of the infant hip for congenital dysplasia: technical aspects and related pitfalls	Commentary

Author	Year	Title	Reason for exclusion
Sangavi SM;Szoke G;Murray DW;Benson MK;	1996 Nov	Femoral remodelling after subtrochanteric osteotomy for developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Sankar WN;Flynn JM;	2008 Jun	The development of acetabular retroversion in children with Legg-Calve-Perthes disease	Not relevant (does not address recommendations)
Sankar WN;Young CR;Lin AG;Crow SA;Baldwin KD;Moseley CF;	2011 Apr	Risk factors for failure after open reduction for DDH: a matched cohort analysis	Incorrect patient population (age at presentation>6 months)
Saraste H;Aparisi T;	1987	The correlation of arthrography with the results of treatment in late diagnosed congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Scapinelli R;Ortolani M;	1980 Apr	Open reduction (Ludloff approach) of congenital dislocation of the hip before the age of two years	Insufficient data
Schaming D;Gorry M;Soroka K;Catullo ME;	1990 Apr	When babies are born with orthopedic problems	Background article
Scherl SA;	2004 Feb	Common lower extremity problems in children	Background article
Schmidt GL;Sciulli R;Altman GT;	2005 Jun	Knee injury in patients experiencing a high-energy traumatic ipsilateral hip dislocation	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Schofield CB;Smibert JG;	1990 Jan	Trochanteric growth disturbance after upper femoral osteotomy for congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Schuler P;Feltes E;Kienapfel H;Griss P;	1990 Sep	Ultrasound examination for the early determination of dysplasia and congenital dislocation of neonatal hips	Commentary
Schulz RD;Zieger M;	1986	The present standard of ultrasonography in newborn and young infant hips	Background article
Schuster RO;Port M;	1977 Sep	Abnormal pronation in children. An hormonal etiology	Narrative review
Schwend RM;Schoenecker P;Richards BS;Flynn JM;Vitale M;	2007 Sep	Screening the newborn for developmental dysplasia of the hip: now what do we do?	Commentary
Scott ST;	1989 Nov	Infant hip ultrasound	Commentary
Seber S;Gunal I;Munger A;Turgut A;Gokturk E;	2000	Interspinous distance in congenital dislocation of the hip	Not relevant (does not address recommendations)
Senaran H;Bowen JR;Harcke HT;	2007 Mar	Avascular necrosis rate in early reduction after failed Pavlik harness treatment of developmental dysplasia of the hip	Retrospective case series
Serafimov L;	1974 Jan	Biomechanical influence of the innominate osteotomy on the growth of the upper part of the femur	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
			months)
Sewell MD;Eastwood DM;	2011 Sep	Screening and treatment in developmental dysplasia of the hip-where do we go from here?	Narrative review
Sewell MD;Rosendahl K;Eastwood DM;	2009	Developmental dysplasia of the hip	Narrative review
Sewell MD;Rosendahl K;Eastwood DM;	2009	Developmental dysplasia of the hip	Duplicate study
Seyler TM;Marker DR;Boyd HS;Zywiel MG;McGrath MS;Mont MA;	2009 Nov 1	Preoperative evaluation to determine candidates for metal-on-metal hip resurfacing	Incorrect patient population (age at presentation>6 months)
Shackelford GD;Barton LL;McAlister WH;	1975 Sep	Calcified subcutaneous fat necrosis in infancy	Incorrect patient population (< 10 patients per group)
Sharpe P;Mulpuri K;Chan A;Cundy PJ;	2006 May	Differences in risk factors between early and late diagnosed developmental dysplasia of the hip	Not relevant (does not address recommendations)
Sharrard WJ;	1978 Jun	Neonatal diagnosis of congenital dislocation of hip	Commentary
Sharwood PF;	1981 Dec	The irritable hip syndrome in children. A long-term follow-up	Retrospective case series

Author	Year	Title	Reason for exclusion
Sherlock DA;Gibson PH;Benson MK;	1985 May	Congenital subluxation of the hip. A long-term review	Incorrect patient population (age at presentation>6 months)
Shih JS;Chen HT;Liu HC;	1980 Oct	Interim follow-up studies of innominate osteotomy for congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Shipman SA;Helfand M;Moyer VA;Yawn BP;	2006 Mar	Screening for developmental dysplasia of the hip: a systematic literature review for the US Preventive Services Task Force	Systematic review
Shoppee K;	1992 Sep	Developmental dysplasia of the hip	Background article
Shorter D;	2011	Screening programmes for developmental dysplasia of the hip in newborn infants (Cochrane review) [with consumer summary]	Systematic review
Shorter D;Hong T;Osborn DA;	2011	Screening programmes for developmental dysplasia of the hip in newborn infants	Systematic review
Shorter D;Hong T;Osborn DA;	2013	Screening programmes for developmental dysplasia of the hip in newborn infants	Systematic review
Siebner R;Merlob P;Kaiserman I;Sack J;	1992 Sep 1	Congenital anomalies concomitant with persistent primary congenital hypothyroidism	Not relevant (does not address recommendations)
Simon EA;Saur	2004 Nov	Inter-observer agreement of ultrasonographic	Not relevant (does not address

Author	Year	Title	Reason for exclusion
F;Buerge M;Glaab R;Roos M;Kohler G;	13	measurement of alpha and beta angles and the final type classification based on the Graf method	recommendations)
Simpson JL;Elias S;Martin AO;Palmer MS;Ogata ES;Radvany RA;	1983 Jun 1	Diabetes in pregnancy, Northwestern University series (1977-1981). I. Prospective study of anomalies in offspring of mothers with diabetes mellitus	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Singh JA;Wilt T;MacDonald R;	2006	Chondroitin for osteoarthritis	Systematic review
Sink EL;Beaule PE;Sucato D;Kim Y;Millis MB;Dayton M;Trousdale RT;Sierra RJ;Zaltz I;Schoenecker P;Monreal A;Clohisy J;	2011	Multicenter study of complications following surgical dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Skaggs DL;Kaminsky C;Tolo VT;Kay RM;Reynolds RA;	1998 Nov	Variability in measurement of acetabular index in normal and dysplastic hips, before and after reduction	Not relevant (does not address recommendations)
Skinner HB;Scherger JE;	1999 Dec	Identifying structural hip and knee problems. Patient age, history, and limited examination may be all that's needed	Background article

Author	Year	Title	Reason for exclusion
Skirving AP;Scadden WJ;	1979 Aug	The African neonatal hip and its immunity from congenital dislocation	Study performed on cadavers
Skirving AP;Sims TJ;Bailey AJ;	1984	Congenital dislocation of the hip: a possible inborn error of collagen metabolism	Not relevant (does not address recommendations)
Smaill GB;	1968 Aug	Congenital dislocation of the hip in the newborn	Insufficient data
Smergel E;Losik SB;Rosenberg HK;	2004 Dec	Sonography of hip dysplasia	Narrative review
Smith BG;Kasser JR;Hey LA;Jaramillo D;Millis MB;	1997 Sep	Postreduction computed tomography in developmental dislocation of the hip: part I: analysis of measurement reliability	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Smith BG;Millis MB;Hey LA;Jaramillo D;Kasser JR;	1997 Sep	Postreduction computed tomography in developmental dislocation of the hip: part II: predictive value for outcome	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Smith MA;	1981 Aug	Use of the Pavlik harness in nonoperative management of congenital dislocation of the hip	Retrospective case series
Smith MG;	1984 May	The results of neonatal treatment of congenital hip dislocation: a personal series	Retrospective case series
Smith WS;Badgley CE;Orwig JB;Harper JM;	1968 Sep	Correlation of postreduction roentgenograms and thirty-one-year follow-up in congenital dislocation of the hip	Incidence before 1950

Author	Year	Title	Reason for exclusion
Smolkin T;Soudack M;Goldstein I;Sujov P;Makhoul IR;	2008 Apr	Prune belly syndrome: expanding the phenotype	Incorrect patient population (< 10 patients per group)
Soboleski DA;Babyn P;	1993 Oct	Sonographic diagnosis of developmental dysplasia of the hip: importance of increased thickness of acetabular cartilage	Not relevant (does not address recommendations)
Sochart DH;Paton RW;	1996 Nov	Role of ultrasound assessment and harness treatment in the management of developmental dysplasia of the hip	Retrospective case series
Solomon L;McLaren P;Irwig L;Gear JS;Schnitzler CM;Gear A;Mann D;	1986 Jan 4	Distinct types of hip disorder in Mseleni joint disease	Incorrect patient population (age at presentation>6 months)
Somerville EW;	1977 Jul	Persistent foetal alignment of the hip. Clinic	Commentary
Somerville EW;	1967 May	Results of treatment of 100 congenitally dislocated hips	Incorrect patient population (age at presentation>6 months)
Song FS;McCarthy JJ;MacEwen GD;Fuchs KE;Dulka SE;	2008 Mar	The incidence of occult dysplasia of the contralateral hip in children with unilateral hip dysplasia	Incorrect patient population (age at presentation>6 months)
Song KM;Lapinsky A; O;Grifka J;	2000 May	Determination of hip position in the Pavlik harness in unicompartmental arthritis of the knee	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Sosna A;Rejholec M;	1992 Sep	Ludloff's open reduction of the hip: long-term results	Incorrect patient population (age at presentation>6 months)
Specht EE;	1974 Feb	Congenital dislocation of the hip	Background article
Spencer S;Millis MB;Kim YJ;	2006 May	Early results of treatment of hip impingement syndrome in slipped capital femoral epiphysis and pistol grip deformity of the femoral head-neck junction using the surgical dislocation technique	Not relevant (does not address recommendations)
Sponseller PD;	1995 Feb	Screening and ultrasound for neonatal hip instability	Commentary
Sponseller PD;Tomek IM;Pyertiz RE;	1997 Oct	Developmental dysplasia of the hip in Marfan syndrome	Incorrect patient population (< 10 patients per group)
Springer BD;Connelly SE;Odum SM;Fehring TK;Griffin WL;Mason JB;Masonis JL;	2009 Sep	Cementless Femoral Components in Young Patients. Review and Meta-Analysis of Total Hip Arthroplasty and Hip Resurfacing	Systematic review
Staheli LT;	1981	Slotted acetabular augmentation	Not relevant (does not address recommendations)
Staheli LT;Coleman	1984	Congenital hip dysplasia	Background article

Author	Year	Title	Reason for exclusion
SS;Hensinger RN;Ogden JA;Salter RB;Tachdjian MO;			
Staheli LT;Dion M;Tuell JI;	1978 Nov	The effect of the inverted limbus on closed management of congenital hip dislocation	Not relevant (does not address recommendations)
Standen PJ;	1983 Nov	The long-term psychological adjustment of children treated for congenital dislocation of the hip	Not relevant (does not address recommendations)
Standing Medical Advisory Committee	1986 Sep	Screening for the detection of congenital dislocation of the hip	Background article
Stanitski CL;	2005 Nov	Subsequent orthotic management of developmental dysplasia of the hip	Commentary
Stanton RP;Capecci R;	1992 Nov	Computed tomography for early evaluation of developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Stasikelis PJ;Allen BL;	2004 Mar	Osteonecrosis after proximal femoral osteotomy in spastic encephalopathy	Incorrect patient population (< 10 patients per group)
Stasikelis PJ;Ridgeway SR;Pugh LI;Allen BL;	2001 Jan	Epiphyseal changes after proximal femoral osteotomy	Retrospective case series
Statewide maternity	2009 July	Examination of the newborn baby	Guideline

Author	Year	Title	Reason for exclusion
and neonatal clinical guidelines program;			
Steele GD;Fehring TK;Odum SM;Dennos AC;Nadaud MC;	2011 Sep	Early failure of articular surface replacement XL total hip arthroplasty	Incorrect patient population (age at presentation>6 months)
Stefanich RJ;Moskowitz A;	1987 Feb	Hip flexion deformity secondary to acute pyogenic psoas abscess	Incorrect patient population (age at presentation>6 months)
Stevens B;Stockwell M;Browne G;Dent P;Gafni A;Martin R;Anderson M;	1995	Evaluation of a home-based traction program for children with congenital dislocated hips and Legg Perthes disease	Incorrect patient population (age at presentation>6 months)
Stevens PM;Arms D;	2000 Mar	Postaxial hypoplasia of the lower extremity	Incorrect patient population (age at presentation>6 months)
Stewart RJ;Patterson CC;Mollan RA;	1986 Aug	Ossification of the normal femoral capital epiphysis	Insufficient data
Stockwell M;Stevens B;Browne G;Dent P;Gafni A;Anderson M;Martin R;	1994	An innovative model of system-linked community care: home-based traction as an alternative to institutional treatment	Background article

Author	Year	Title	Reason for exclusion
Stone MH;Clarke NM;Campbell MJ;Richardson JB;Johnson PA;	1990 Aug 18	Comparison of audible sound transmission with ultrasound in screening for congenital dislocation of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Stone MH;Richardson JB;Bennet GC;	1987 Apr 25	Another clinical test for congenital dislocation of the hip	Not relevant (does not address recommendations)
Storer SK;Skaggs DL;	2006 Oct 15	Developmental dysplasia of the hip	Narrative review
Stover B;Bragelmann R;Walther A;Ball F;	1993	Development of late congenital hip dysplasia: significance of ultrasound screening	< 50% patient follow-up
Stromqvist B;Sunden G;	1989 Mar	CDH diagnosed at 2 to 12 months of age--treatment and results	Retrospective case series
Suda H;Hattori T;Iwata H;	1995 Sep	Varus derotation osteotomy for persistent dysplasia in congenital dislocation of the hip. Proximal femoral growth and alignment changes in the leg	Incorrect patient population (age at presentation>6 months)
Sun DZ;Jiang HZ;Yang WM;Duan DS;	1989 Mar	Preoperative intermittent manual traction in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Sun DZ;Liu YH;Zhang MJ;Li	1990 Sep	Salter's osteotomy for the management of joint capsule	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
ZY;Liu K;			months)
Suzuki R;	1979	Complications of the treatment of congenital dislocation of the hip by the Pavlik harness	Retrospective case series
Suzuki R;Sato K;	1968 Jun	Evaluation of Pavlik's bandage method for the treatment of congenital hip dislocation	Insufficient data
Suzuki S;	1994 May	Reduction of CDH by the Pavlik harness. Spontaneous reduction observed by ultrasound	Incorrect patient population (< 10 patients per group)
Suzuki S;Awaya G;Wakita S;Maekawa M;Ikeda T;	1987 Apr	Diagnosis by ultrasound of congenital dislocation of the hip joint	Not relevant (does not address recommendations)
Suzuki S;Kasahara Y;Yamamoto A;Seto Y;Furukawa K;Nishino Y;	1993	Measurement of acetabular angle using ultrasound	Not relevant (does not address recommendations)
Suzuki S;Seto Y;Futami T;Kashiwagi N;	2000	Preliminary traction and the use of under-thigh pillows to prevent avascular necrosis of the femoral head in Pavlik harness treatment of developmental dysplasia of the hip	Not relevant (does not address recommendations)
Symington AJ;Pinelli J;	2006	Developmental care for promoting development and preventing morbidity in preterm infants	Systematic review

Author	Year	Title	Reason for exclusion
Synder M;Forlin E;Xin S;Bowen JR;	1992 Jul	Results of the Kalamchi modification of salter osteotomy in the treatment of developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Synder M;Harcke HT;Domzalski M;	2006 Apr	Role of ultrasound in the diagnosis and management of developmental dysplasia of the hip: an international perspective	Narrative review
Synder M;Niedzielski K;Grzegorzewski A;	2003 Dec 30	Ultrasound of hip joint in newborns and infants	Not in English
Szalay EA;Harriman D;Eastlund B;Mercer D;	2008 Apr	Quantifying postoperative bone loss in children	Incorrect patient population (age at presentation>6 months)
Szalay EA;Roach JW;Houkom JA;Wenger DR;Herring JA;	1986 Jan	Extension-abduction contracture of the spastic hip	Incorrect patient population (cerebral palsy included)
Szoke N;Kuhl L;Heinrichs J;	1988 Jan	Ultrasound examination in the diagnosis of congenital hip dysplasia of newborns	Not relevant (does not address recommendations)
Szulc W;	1989	Long-term results after Colonna's operation	Incorrect patient population (age at presentation>6 months)
Szulc W;	1991 Nov	The frequency of occurrence of congenital dysplasia of	Not relevant (does not address

Author	Year	Title	Reason for exclusion
		the hip in Poland	recommendations)
Tachdjian MO;Dias L;	1977 Sep	Orthopedic problems in children	Background article
Takagi T;Mitani S;Aoki K;Miyake A;Inoue H;	2002 Mar	Three-dimensional assessment of the hip joint by two-directional arthrography	Incorrect patient population (age at presentation>6 months)
Takahashi I;	1985 Nov	Functional treatment of congenital dislocation of the hip using Pavlik harness (Riemenbugel)	Retrospective case series
Takashi S;Hattori T;Konishi N;Iwata H;	1998 Nov	Acetabular development after Salter's innominate osteotomy for congenital dislocation of the hip: evaluation by three-dimensional quantitative method	Incorrect patient population (age at presentation>6 months)
Tallent MB;Simmons RL;Najarian JS;	1970 Mar 16	Birth defects in child of male recipient of kidney transplant	Letter
Tan L;Aktas S;Copuroglu C;Ozcan M;Ture M;	2001 Oct	Reliability of radiological parameters measured on anteroposterior pelvis radiographs of patients with developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Tanaka T;Yoshihashi Y;Miura T;	1994 Jan	Changes in soft tissue interposition after reduction of developmental dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Tarczynska	2000	Biomechanical prenatal factors for the development of	Not in English

Author	Year	Title	Reason for exclusion
M;Karski T;		congenital hip dysplasia	
Tavares JO;	2004 Sep	Modified Pemberton acetabuloplasty for the treatment of congenital hip dysplasia	Incorrect patient population (age at presentation>6 months)
Tavares JO;Gottwald DH;Rochelle JR;	1994 Sep	Guided abduction traction in the treatment of congenital hip dislocation	Retrospective case series
Tax HR;	1975 Jan	Dangers posed to the hips of infants by counter splints used to treat internal rotations of the legs	Narrative review
Tegnander A;Terjesen T;	1999 Nov	Reliability of ultrasonography in the follow-up of hip dysplasia in children above 2 years of age	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Teng JB;Yu CW;Wang YZ;Mu KX;	2012 Jun	Sonographic detection of unilateral hip dislocation in a spica cast after closed reduction for developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Terjesen T;	1992 Jan	Closed reduction guided by dynamic ultrasound in late-diagnosed hip dislocation	Incorrect patient population (age at presentation>6 months)
Terjesen T;	1998 Dec	Ultrasonography for evaluation of hip dysplasia. Methods and policy in neonates, infants, and older children	Narrative review
Terjesen	2012 Jul	Reliability of radiographic parameters in adults with hip	Incorrect patient population

Author	Year	Title	Reason for exclusion
T;Gunderson RB;		dysplasia	(age at presentation>6 months)
Tessari L;De PM;	1992	Morphological or functional criteria in evaluation of the newborn hip?	Commentary
The-Medical-and-Health-Research-Council-of-The-Netherlands-;	2007	General ultrasound screening for developmental dysplasia of the hip at three months of age: an implementation study (Project record)	Not in English
The-Medical-and-Health-Research-Council-of-The-Netherlands-;	2007	Predicting efficient implementation and costs; ultrasound screening for developmental dysplasia of the hip (Project record)	Not in English
Theodorou SD;Gerostathopoulos N;	1989 Sep	Congenital dislocation of the hip. Observations on the early diagnosis and results of treatment with an abduction brace in infants two to nine months of age in Greece	Retrospective case series
Thieme WT;Wynne-Davies R;	1968 Aug	Clinical examination and urinary oestrogen assays in newborn children with congenital dislocation of the hip	Not relevant (does not address recommendations)
Thomas CL;Gage JR;Ogden JA;	1982 Jul	Treatment concepts for proximal femoral ischemic necrosis complicating congenital hip disease	Incidence before 1950
Thomas TL;	1983 Feb	Treatment of congenital dislocation of the hip	Commentary

Author	Year	Title	Reason for exclusion
Thompson RC;	1972 Sep	A new physical test in dislocation of the hip	Insufficient data
Timmler T;Wierusz K;Markuszewski J;niak W;	2005	The hip joints of preterm neonates in sonographic evaluation	Not in English
Timmler T;Wierusz-Kozlowska M;Wozniak W;Markuszewski J;Lempicki A;	2003 Dec 30	Development and remodeling of the hip joint of preterm neonates in sonographic evaluation	Not in English
Toby EB;Koman LA;Bechtold RE;Nicastro JN;	1987 Nov	Postoperative computed tomographic evaluation of congenital hip dislocation	Incorrect patient population (age at presentation>6 months)
Tokunaga K;Aslam N;Zdero R;Schemitsch EH;Waddell JP;	2011	Effect of prior salter or chiari osteotomy on THA with developmental hip dysplasia	Incorrect patient population (age at presentation>6 months)
Toma P;Valle M;Rossi U;Brunenghi GM;	2001 Oct	Paediatric hip--ultrasound screening for developmental dysplasia of the hip: a review	Systematic review
Toms AP;Marshall TJ;Cahir J;Darrah C;Nolan J;Donell ST;Barker T;Tucker	2008 Jan	MRI of early symptomatic metal-on-metal total hip arthroplasty: a retrospective review of radiological findings in 20 hips	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
JK;			
Tong SH;Eid MA;Chow W;To MK;	2011 Aug	Screening for developmental dysplasia of the hip in Hong Kong	Retrospective case series
Tonnis D;	1976 Sep	An evaluation of conservative and operative methods in the treatment of congenital hip dislocation	Insufficient data
Torisu T;Fujikawa Y;Yano H;Masumi S;	1993 Jun	Association of HLA-DR and HLA-DQ antigens with congenital dislocation and dysplastic osteoarthritis of the hip joints in Japanese people	Incorrect patient population (age at presentation>6 months)
Torisu T;Izumi H;Fujikawa Y;Masumi S;	1995 Feb	Bipolar hip arthroplasty without acetabular bone-grafting for dysplastic osteoarthritis. Results after 6-9 years	Incorrect patient population (age at presentation>6 months)
Torok G;	1973 Jan	Results of early surgical treatment of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Torok G;Mozes G;	1988	Congenital dislocation of the hip without acetabular dysplasia	Incorrect patient population (< 10 patients per group)
Townsend DJ;Tolo VT;	1994 Mar	Congenital dislocation of the hip	Narrative review
Traina GC;	1989 Sep	Congenital dislocation of the hip. A protocol for early diagnosis	Narrative review

Author	Year	Title	Reason for exclusion
Trainor B;Haugh P;Kernohan G;Mollan R;	1994 Sep	Hip screening: are health visitors adequately prepared?	Not relevant (does not address recommendations)
Tran-Minh VA;Pracros JP;Berard J;Foray P;Morin de Finfe CH;Pasquier JM;Meyer P;	1993 May	Sonography of the hip and soft tissues of the thigh in children	Background article
Tredwell SJ;	1992 Aug	Neonatal screening for hip joint instability. Its clinical and economic relevance	Commentary
Treguier C;Baud C;Ferry M;Ferran JL;Darnault P;Chapuis M;Marleix S;Fraisse B;Violas P;	2011 Oct	Irreducible developmental dysplasia of the hip due to acetabular roof cartilage hypertrophy. Diagnostic sonography in 15 hips	Retrospective case series
Treguier C;Chapuis M;Branger B;Bruneau B;Grellier A;Chouklati K;Proisy M;Darnault P;Violas P;Pladys P;Gandon Y;	2012 Oct 20	Pubo-femoral distance: an easy sonographic screening test to avoid late diagnosis of developmental dysplasia of the hip	Not relevant (does not address recommendations)

Author	Year	Title	Reason for exclusion
Trevor D;Johns DL;Fixsen JA;	1975 May	Acetabuloplasty in the treatment of congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Trias A;	1966 Jul	Are we missing dislocations of the hip at birth	Commentary
Trigui M;Pannier S;Finidori G;Padovani JP;Glorion C;	2008 Sep	Coxa vara in chondrodysplasia: prognosis study of 35 hips in 19 children	Incorrect patient population (age at presentation>6 months)
Tschauner C;	1990	Earliest diagnosis of congenital dislocation of the hip by ultrasonography. Historical background and present state of Graf's method	Commentary
Tsukada S;Wakui M;	2012 Mar	Bulk Femoral Head Autograft Without Decortication in Uncemented Total Hip Arthroplasty. Seven- to Ten-Year Results	Incorrect patient population (age at presentation>6 months)
Tucci JJ;Kumar SJ;Guille JT;Rubbo ER;	1991 Jul	Late acetabular dysplasia following early successful Pavlik harness treatment of congenital dislocation of the hip	Retrospective case series
Tudor A;Dalen L;Dugan R;Tomislav P;Ratko S;	2005 Jun	Prognostic value of refined Wiberg's angle in hip development	Incorrect patient population (age at presentation>6 months)
Tumer Y;Ward WT;Grudziak J;	1997 Mar	Medial open reduction in the treatment of developmental dislocation of the hip	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
			months)
Ucar DH;Isiklar ZU;Stanitski CL;Kandemir U;Tumer Y;	2004 Sep	Open reduction through a medial approach in developmental dislocation of the hip: a follow-up study to skeletal maturity	Incorrect patient population (age at presentation>6 months)
Uden A;Lindhagen T;	1988 Dec	Inguinal hernia in patients with congenital dislocation of the hip. A sign of general connective tissue disorder	Incorrect patient population (age at presentation>6 months)
Upadhyay SS;Burwell RG;Moulton A;	1986 Aug	Femoral anteversion in Perthes' disease with observations on irritable hips. Application of a new method using ultrasound	Incorrect patient population (age at presentation>6 months)
Uyttendaele D;Burssens P;De GW;Claessens H;	1990	Treatment of the irreducible hip	Incorrect patient population (age at presentation>6 months)
Valdiserri L;Donzelli O;Di Gennaro GL;	1997 Apr	The treatment of congenital hip dysplasia	Narrative review
Valdiserri L;Stilli S;Gasbarrini A;	1995 Jul	Complications of varus derotation osteotomy in the treatment of CHD during growth	Incorrect patient population (age at presentation>6 months)
Valdiserri L;Stilli S;Gasbarrini A;Fabbri N;	1997 Apr	Complications in acetabuloplasty in the treatment of CHD during the growth age	Incorrect patient population (age at presentation>6 months)

Author	Year	Title	Reason for exclusion
Vale L;Wyness L;McCormack K;McKenzie L;Brazzelli M;Stearns SC;	2002	A systematic review of the effectiveness and cost-effectiveness of metal-on-metal hip resurfacing arthroplasty for treatment of hip disease	Systematic review
Valman HB;Finlay HV;	1980 Jan 19	Dislocated and dislocatable hip in the newborn	Background article
Valman HV;	1978 Feb	Congenital dislocation of the hip joint	Commentary
Valmassy RL;Day S;	1985 Sep	Congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
van de Sande MA;Melisie F;	2012 Aug	Successful Pavlik treatment in late-diagnosed developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
van den Broek HA;Vegter J;	1983	Traction radiography of the hip and fluid in the hip joint	Retrospective case series
van dH;Kooijman MA;Havinga ME;van der Geest IC;Jacobs W;Anderson PG;	2003 Apr	Teardrop-femoral head distance after shelf acetabuloplasty for Perthes' disease	Incorrect patient population (age at presentation>6 months)
van Douveren FQ;Pruijs	2003 Jan	Ultrasound in the management of the position of the femoral head during treatment in a spica cast after	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
HE;Sakkers RJ;Nievelstein RA;Beek FJ;		reduction of hip dislocation in developmental dysplasia of the hip	months)
van Sleuwen BE;Engelberts AC;Boere-Boonekamp MM;Kuis W;Schulpen TW;L'Hoir MP;	2007 Oct	Swaddling: a systematic review	Systematic review
VanderHave KL;Raab GE;	2004 Dec	Pediatric hip disorders	Narrative review
Vandevenne JE;Lincoln T;Butts PK;Rinsky L;Lang PK;	2009 Apr	Magnetic resonance imaging-guided closed reduction treatment for developmental dysplasia of the hip	Not relevant (does not address recommendations)
Vedantam R;Douglas DL;	1994 Nov	Congenital dislocation of the knee as a consequence of persistent amniotic fluid leakage	Incorrect patient population (< 10 patients per group)
Venbrocks R;Verhestraeten B;Fuhrmann R;	1990	The importance of sonography and radiography in diagnosis and treatment of congenital dislocation of the hip	Not relevant (does not address recommendations)
Vendittoli P;Ganapathi M;Roy	2010 Jan	A comparison of clinical results of hip resurfacing arthroplasty and 28 mm metal on metal total hip	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
AG;Lusignan D;Lavigne M;		arthroplasty: A randomised trial with 3-6 years follow-up	months)
Vengust R;Antolic V;Kralj-Iglic V;Iglic A;Zupanc O;	2000	Biochemical aspects of Salter's osteotomy for treatment of acetabular dysplasia	Incorrect patient population (age at presentation>6 months)
Vengust R;Daniel M;Antolic V;Zupanc O;Iglic A;Kralj-Iglic V;	2001 Oct	Biomechanical evaluation of hip joint after Salter innominate osteotomy: a long-term follow-up study	Incorrect patient population (age at presentation>6 months)
Vergara J;Repetto G;Alvarez J;	1992 Jan	The axonal microtubular density is higher than normal in fibres innervating spastic muscles	Incorrect patient population (< 10 patients per group)
Vicar AJ;Coleman CR;	1984 Sep	A comparison of the anterolateral, transtrochanteric, and posterior surgical approaches in primary total hip arthroplasty	Incorrect patient population (age at presentation>6 months)
Villar RN;Scott PM;Ronen A;	1987 Aug	Splinting for CDH--initial impressions of a 'user-friendly' alternative	Background article
Visser JD;	1984	Functional treatment of congenital dislocation of the hip	Background article
Visser JD;Jonkers A;Hillen B;	1982 Jun	Hip joint measurements with computerized tomography	Incorrect patient population (< 10 patients per group)
Vitale MG;Skaggs DL;	2001 Nov	Developmental dysplasia of the hip from six months to four years of age	Narrative review

Author	Year	Title	Reason for exclusion
Vo NJ;Gash J;Browning J;Hutson RK;	2004 Apr	Pelvic imaging in the stable trauma patient: is the AP pelvic radiograph necessary when abdominopelvic CT shows no acute injury?	Incorrect patient population (age at presentation>6 months)
Vogel I;Andersson JE;Uldbjerg N;	1998 Jul	Serum relaxin in the newborn is not a marker of neonatal hip instability	Not relevant (does not address recommendations)
Von JU;Overhoff HM;Lazovic D;	2000	3-D visualization of the newborn's hip joint using ultrasound and automatic image segmentation	Not relevant (does not address recommendations)
Von Rose;	1962 May	Diagnosis and treatment of congenital dislocation of the hip hoint in the new-born	Incorrect patient population (teratologic disorder included)
Von RS;	1968	Early treatment for congenital dislocation of the hip	Not in English
Von RS;	1970	Instability of the hip in the newborn. Fifteen years experience in Malmo	Retrospective case series
Von RS;	1968 Aug	Further experience with congenital dislocation of the hip in the newborn	Retrospective case series
Voutsinas S;Anagnostopoulos D;Papadopoulos H;Moutzouris T;Iliopoulos S;	1997 Oct	Internal fixation of hip osteotomy in children. Successful healing in 26 children without postoperative casting	Not relevant (does not address recommendations)
Voutsinas SA;MacEwen	1984	Home traction in the management of congenital dislocation of the hip	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
GD;Boos ML;			months)
Vrdoljak J;Bojic D;	1998 Dec	Echosonogrametric diagnosis of developmental dysplasia of the hip	Incorrect patient population (age at presentation not exclusive to 0-6 months in comparison group)
Vrdoljak J;Bojic D;	1998 Dec	Development of bony acetabulum in newborns with developmental hip dysplasia	Not relevant (does not address recommendations)
Waheed KAI;Velineni R;Jani B;	2008 Jun	Is early ultrasound screening for developmental dysplasia of the hip necessary?	Article not available
Wald NJ;Terzian E;Vickers PA;Weatherall JA;	1983 Jul 30	Congenital talipes and hip malformation in relation to amniocentesis: a case-control study	Not relevant (does not address recommendations)
Walker JM;	1977 Mar 5	Congenital hip disease in a Cree-Ojibwa population: a retrospective study	Incidence before 1950
Walker JM;	1981 Jul	Histological study of the fetal development of the human acetabulum and labrum: significance in congenital hip disease	Study performed on cadavers
Walker JM;	1980 Jul	Growth characteristics of the fetal ligament of the head of femur: significance in congenital hip disease	Study performed on cadavers
Walter RP;Holroyd	2009 Apr	Avoiding the unsanitary hip spica	Insufficient data

Author	Year	Title	Reason for exclusion
B;Metcalfe JE;			
Walton MJ;Isaacson Z;McMillan D;Hawkes R;Atherton WG;	2010 Jul	The success of management with the Pavlik harness for developmental dysplasia of the hip using a United Kingdom screening programme and ultrasound-guided supervision	Retrospective case series
Wang L;Trousdale RT;Ai S;An KN;Dai K;Morrey BF;	2012 May	Dislocation after total hip arthroplasty among patients with developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Ward WT;Vogt M;Grudziak JS;Tumer Y;Cook PC;Fitch RD;	1997 May	Severin classification system for evaluation of the results of operative treatment of congenital dislocation of the hip. A study of intraobserver and interobserver reliability	Incorrect patient population (age at presentation>6 months)
Warner JG;Paton RW;	1998 Oct	The 'black hole' sign: a visual ultrasonographic sign of hip dislocation	Insufficient data
Way S;	1991 Mar 27	Midwifery. Screening for congenital dislocation of the hip	Narrative review
Wechsler RJ;Schwartz AM;	1981	Ischemic necrosis of the contralateral hip as a possible complication of untreated congenital hip dislocation	Incorrect patient population (< 10 patients per group)
Wedge JH;	2003 Aug	Ultrasonography in neonatal hip instability reduced the need for splints	Commentary
Weinberg H;Pogrund	1980 Apr	Effect of pelvic inclination on the pathogenesis of	Not relevant (does not address

Author	Year	Title	Reason for exclusion
H;		congenital hip dislocation	recommendations)
Weiner DS;	1976 Nov	Congenital dislocation of the hip associated with congenital muscular torticollis	Incorrect patient population (neuromuscular disease included)
Weiner DS;	1980 Apr	Avascular necrosis as a treatment complication in congenital dislocation of the hip in children under one year of age	Retrospective case series
Weiner DS;Jonah D;Kopits S;	2010 Jun	The 3-dimensional configuration of the typical hip and knee in diastrophic dysplasia	Incorrect patient population (age at presentation>6 months)
Weinstein SL;	1990 Feb	Closed versus open reduction of congenital hip dislocation in patients under 2 years of age	Commentary
Weinstein SL;	1980 Apr	The medial approach in congenital dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Weinstein SL;	1997 May	Traction in developmental dislocation of the hip. Is its use justified?	Narrative review
Weinstein SL;Mubarak SJ;Wenger DR;	2004	Developmental hip dysplasia and dislocation: Part I	Narrative review
Weinstein	2004	Developmental hip dysplasia and dislocation: Part II	Narrative review

Author	Year	Title	Reason for exclusion
SL;Mubarak SJ;Wenger DR;			
Weinstein SL;Ponseti IV;	1979 Jan	Congenital dislocation of the hip	Retrospective case series
Weintroub S;Green I;Terdiman R;Weissman SL;	1979 Jan	Growth and development of congenitally dislocated hips reduced in early infancy	Incorrect patient population (age at presentation>6 months)
Weisl H;Fairclough JA;Jones DG;	1988 Jan	Stabilisation of the hip in myelomeningocele. Comparison of posterior iliopsoas transfer and varus-rotation osteotomy	Incorrect patient population (neuromuscular disease included)
Wells L;	1996 Jun	Common lower extremity problems in children	Background article
Wenger DR;	1985	Childhood hip sepsis: improving the yield of good results	Incorrect patient population (age at presentation>6 months)
Wenger DR;Frick SL;	1999 Sep	Early surgical correction of residual hip dysplasia: the San Diego Children's Hospital approach	Narrative review
Wenger DR;Mubarak SJ;Henderson PC;Miyanji F;	2008 Jun	Ligamentum teres maintenance and transfer as a stabilizer in open reduction for pediatric hip dislocation: surgical technique and early clinical results	Incorrect patient population (age at presentation>6 months)
West LA;Ballock	2004 Sep	High incidence of hip dysplasia but not slipped capital	Not a full article

Author	Year	Title	Reason for exclusion
RT;		femoral epiphysis in patients with Prader-Willi syndrome	
Westberry DE;Davids JR;	2009 Jan	Proximal focal femoral deficiency (PFFD): management options and controversies	Narrative review
Westhoff B;Wild A;Seller K;Krauspe R;	2003 Jul	Magnetic resonance imaging after reduction for congenital dislocation of the hip	Not relevant (does not address recommendations)
Westin GW;Ilfeld FW;Provost J;	1976 Sep	Total avascular necrosis of the capital femoral epiphysis in congenital dislocated hips	Incorrect patient population (age at presentation>6 months)
Westwell A;	1985 Jul	Bilateral femoral shaft derotation osteotomies	Incorrect patient population (< 10 patients per group)
Wheeler MW;Weinstein SL;Ponseti IV;	1979 Jul	Congenital dislocation of the hip	Narrative review
Whitehouse GH;	1978 Jul	Radiological aspects of posterior dislocation of the hip	Incorrect patient population (age at presentation>6 months)
Wientroub S;Grill F;	2000 Jul	Ultrasonography in developmental dysplasia of the hip	Narrative review
Wiersma JA;	1976 Oct	Use of the Pavlik splint in treatment of congenital dysplasia and dislocation of the hip in the newborn	Retrospective case series

Author	Year	Title	Reason for exclusion
Wilkes JB;	1986 Nov	Screening for congenital dislocation of the hip (CDH): professional guidelines	Commentary
Wilkinson JA;	1966 Nov	Breech malposition and intra-uterine dislocations	Commentary
Wilkinson JA;	1987	The epidemiology of congenital dislocation of the hip	Narrative review
Wilkinson JA;	1975 Aug	Failures in the management of congenital hip displacement in the newborn	Retrospective case series
Wilkinson JA;Sedgwick EM;	1988 Nov	Occult spinal dysraphism in established congenital dislocation of the hip	Incorrect patient population (neuromuscular disease included)
Williams L;Wientroub S;Canario AT;Fixsen JA;	1982 Oct	Severe Perthes disease noted 5 years after the successful conservative treatment of congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Williams N;Foster BK;Cundy PJ;	2012 Sep	Is swaddling damaging our babies' hips?	Editorial
Willis RB;	2001	Developmental dysplasia of the hip: assessment and treatment before walking age	Narrative review
Wilson JC;	1967 Aug	Fractures and dislocations in childhood	Narrative review
Windhagen H;Thorey	2005	The effect of functional splinting on mild dysplastic hips after walking onset	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
F;Kronewid H;Pressel T;Herold D;Stukenborg-Colsman C;			months)
Wingstrand H;	1997 Oct	Intracapsular pressure in congenital dislocation of the hip	Incorrect patient population (< 10 patients per group)
Winter RB;	1976 Nov	Avascular necrosis as a complication of congenital dislocation of the hip: a 20-year evaluation	Commentary
Witt C;	2003 Apr	Detecting developmental dysplasia of the hip	Narrative review
Witting M;Boere-Boonekamp MM;Fleuren MA;Sakkers RJ;Ijzerman MJ;	2012 Feb 22	Determinants of parental satisfaction with ultrasound hip screening in child health care	Not relevant (does not address recommendations)
Witting M;Boere-Boonekamp MM;Fleuren MA;Sakkers RJ;Ijzerman MJ;	2012	Predicting participation in ultrasound hip screening from message framing	Not relevant (does not address recommendations)
Wolff AB;Oetgen ME;DeLuca PA;	2008 Sep	Intraoperative use of 3-d fluoroscopy in the treatment of developmental dislocation of the hip in an infant	Incorrect patient population (< 10 patients per group)
Wolinski AP;McCall	1984 Sep	Femoral neck growth deformity following the irritable	Incorrect patient population

Author	Year	Title	Reason for exclusion
IW;Evans G;Park WM;		hip syndrome	(< 10 patients per group)
Wong-Chung J;Ryan M;O'Brien TM;	1990 Jul	Movement of the femoral head after Salter osteotomy for acetabular dysplasia	Incorrect patient population (age at presentation>6 months)
Wray DG;Muddu BN;	1983 Sep	Congenital dislocation of the hip. The high incidence of familial aetiology--a study of 130 cases	Retrospective case series
Wulach A;	1979 Oct	The use of zonography to demonstrate the head of the femur in infants in POP hip-spica	Not relevant (does not address recommendations)
Wynne-Davies R;	1972 Aug	The epidemiology of congenital dislocation of the hip	Commentary
Wynne-Davies R;	1970 Nov	Acetabular dysplasia and familial joint laxity: two etiological factors in congenital dislocation of the hip. A review of 589 patients and their families	Not relevant (does not address recommendations)
Wynne-Davies R;Gormley J;	1978 Feb	The aetiology of Perthes' disease. Genetic, epidemiological and growth factors in 310 Edinburgh and Glasgow patients	Not relevant (does not address recommendations)
Yamada N;Maeda S;Fujii G;Kita A;Funayama K;Kokubun S;	2003 Nov	Closed reduction of developmental dislocation of the hip by prolonged traction	Incorrect patient population (age at presentation>6 months)
Yamamuro T;Ishida	1984 Apr	Recent advances in the prevention, early diagnosis, and	Commentary

Author	Year	Title	Reason for exclusion
K;		treatment of congenital dislocation of the hip in Japan	
Yamashita DD;Arnet GF;	1980 Aug	Trismus-pseudocamptodactyly syndrome	Incorrect patient population (< 10 patients per group)
Yazgan H;Keles E;Gebesci A;Demirdoven M;Basturk B;Etlik O;	2012	Our four-years results of developmental hip dysplasia screening program in newborns	Not in English
Yngve D;Gross R;	1990 Nov	Late diagnosis of hip dislocation in infants	Not relevant (does not address recommendations)
Yoon JP;Le Duff MJ;Takamura KM;Hodge S;Amstutz HC;	2011 Sep	Mid-to-long term follow-up of transcend metal-on-metal versus interseal metal-on-polyethylene bearings in total hip arthroplasty	Not relevant (does not address recommendations)
Yosipovitch Z;	1980 Apr	Hip deformities after successful treatment of congenital dislocation of the hip in infancy	Retrospective case series
Young M;	1975 Mar 6	Nursing treatment of congenital dislocation of the hip	Commentary
Yousefzadeh DK;	1992 Apr	Neonatal and pediatric sonography	Narrative review
Yun AG;Severino R;Reinker K;	2005 Feb	Varus derotational osteotomy for spastic hip instability: the roles of femoral shortening and obturator	Incorrect patient population (age at presentation>6

Author	Year	Title	Reason for exclusion
		neurectomy	months)
Zamzam MM;Kremli MK;Khoshhal KI;Abak AA;Bakarman KA;AlSiddiky AM;AlZain KO;	2008 Jul	Acetabular cartilaginous angle: a new method for predicting acetabular development in developmental dysplasia of the hip in children between 2 and 18 months of age	Incorrect patient population (age at presentation not exclusive to 0-6 months)
Zieger M;	1986	Ultrasound of the infant hip. Part 2. Validity of the method	Insufficient data
Zieger M;Hilpert S;Schulz RD;	1986	Ultrasound of the infant hip. Part 1. Basic principles	Not relevant (does not address recommendations)
Zieger M;Schulz RD;	1986	Method and results of ultrasound in hip studies	Not relevant (does not address recommendations)
Zimberg-Bossira A;Smolkin T;Gildish A;Moustafa-Hawash N;Blazer S;Gershoni-Baruch R;Makhoul IR;	2011 Oct	'Pure' partial trisomy 11q (11q23.1->11qter): Expanding the phenotype	Incorrect patient population (< 10 patients per group)

ADDITIONAL ARTICLES RECALLED FROM SYSTEMATIC REVIEW SCREENING

Table 64. Additional Articles Recalled from Systematic Review Screening

Author	Year	Title	Reason for Exclusion
Aronsson DD;Goldberg MJ;Kling TF;Roy DR;	1994	Developmental dysplasia of the hip	Background article
Campos-Outcalt D;	2007	Screening for dysplasia of the hip: weigh harms and benefits.	Letter
Chen IH;Kuo KN;Lubicky JP;	1994	Prognosticating factors in acetabular development following reduction of developmental dysplasia of the hip	Incorrect patient population (age at presentation>6 months)
Connolly P;Weinstein SL;	2007	The course and treatment of avascular necrosis of the femoral head in developmental dysplasia of the hip	Background article
Glazener CMA;Ramsay CR;Campbell MK;Booth P;Duffty P;Lloyd DJ;	1999	Neonatal examination and screening trial (NEST): a randomised, controlled, switchback trial of alternative policies for low risk infants. BMJ	Not relevant (does not address recommendations)

Author	Year	Title	Reason for Exclusion
Graf R;	1985	Ultrasonography of the infantile hip.	Incorrect patient population (age at presentation>6 months)
Gross RH;	1984	Hip problems in children. Aids to early recognition	Background article
Harcke HT;Grissom LE;Finkelstein MS;	1988	Evaluation of the musculoskeletal system with sonography	Background article
Harcke HT;Walter RS;	1995	Ultrasound screening for dysplasia of the hip. Pediatrics	Letter
Harcke HT;	1999	Developmental dysplasia of the hip: a spectrum of abnormality	Commentary
Harcke HT;Grissom LE;	1994	Infant hip sonography: current concepts	Background article
Hennrikus WL;	1999	Developmental dysplasia of the hip: diagnosis and treatment in children younger than 6 months	Background article
Herring JA;	2002	Developmental dysplasia of the hip	Background article

Author	Year	Title	Reason for Exclusion
Holen K J;Tegnander A;Terjesen T;Eik-Nes S H;	1998	The effect of ultrasonographic hip joint screening in newborns-a prospective, randomized study.	Insufficient data (conference proceeding abstract)
Johnson ND;	1986	Ultrasound for kids?	Commentary
Kawaguchi AT;Otsuka NY;Delgado ED;Genant HK;Lang P;	2000	Magnetic resonance arthrography in children with developmental hip dysplasia	Incorrect patient population (age at presentation>6 months)
Laaveg S;Ponseit I;	1980	Long-term results of treatment of congenital club foot	Not relevant (does not address recommendations)
Leck I;	2000	Congenital dislocation of the hip	Background article
Lehmann HP;	2003	Ultrasonography in the diagnosis and management of development hip dysplasia (UK Hip Trial): clinical and economic results of a multicentre randomised controlled trial.	Cost-effectiveness study
Macfarlane A;	1987	Screening for cogenital	Background article

Author	Year	Title	Reason for Exclusion
		dislocation of the hip	
Miralles M;Gonzalez G;Pulpeiro JR;Millán JM;Gordillo I;Serrano C;Olcoz F;Martinez A.	1989	Sonography of the painful hip in children: 500 consecutive cases.	Incorrect patient population (age at presentation>6 months)
MULLER GM;SEDDON HJ;	1953	Late results of treatment of congenital dislocation of the hip.	Incidence before 1950
Murphy SB;Ganz R;Müller ME;	1995	The prognosis in untreated dysplasia of the hip. A study of radiographic factors that predict the outcome.	Not relevant (does not address recommendations)
O'Connor J;Macewen GD;Kalamchi A;	1981	Evaluation of the pavlik harness in the treatment of congenital dislocation of the hip	Retrospective case series
Pavlik A;	1957	The functional method of treatment using a harness with stirrups as the primary method of conservative therapy for infants with congenital dislocation of the hip.	Retrospective case series

Author	Year	Title	Reason for Exclusion
Price CT;	1979	Congenital clubfoot.	Background article
Robertson N;	1984	The routine clinical neonatal examination	Background article
Ruhmann O;Lazovic D;Bouklas P;Schmolke S;Flamme CH;	2000	Ultrasound examination of neonatal hip: correlation of twin pregnancy and congenital dysplasia	Not relevant (does not address recommendations)
Short MA;Brooks-Brunn JA;Reeves DS;Yeager J;Thorpe JA;	1996	The effects of swaddling versus standard positioning on neuromuscular development in very low birth weight infants.	Incorrect patient population (focusing on neuromuscular development)
Song KM;Morton AA;Koch KD;Herring JA;Browne RH;Hanway JP;	1998	Chronic musculoskeletal pain in childhood.	Not relevant (does not address recommendations)
Terjesen T;Holen KJ;Tegnander A;	1998	Delayed decision-making using ultrasound reduces the treatment rate in neonatal hip instability	Insufficient data
Von RS;	1956	Early diagnosis and treatment of congenital dislocation of the hip joint	Narrative review

Author	Year	Title	Reason for Exclusion
Weinstein SL;	1992	Congenital hip dislocation. Long-range problems, residual signs, and symptoms after successful treatment.	Background article
Wilkinson JA;	1993	Prevention of developmental dysplasia of the hip.	Background article
Wilkinson JA;	1982	The surgical treatment of congenital dislocation of the hip joint.	Commentary
Woolacott NF;Puhan MA;Steurer J;Kleijnen J;	2005	Ultrasonography in screening for developmental dysplasia of the hip in newborns: systematic review	Systematic review
Wynne-Davies R;	1970 Dec	A family study of neonatal and late-diagnosis congenital dislocation of the hip	Not best available evidence (Universal Ultrasound Screening)

APPENDIX XI
NATURAL HISTORY FIGURES

Figure 5. Natural History of Barlow Positive Patients

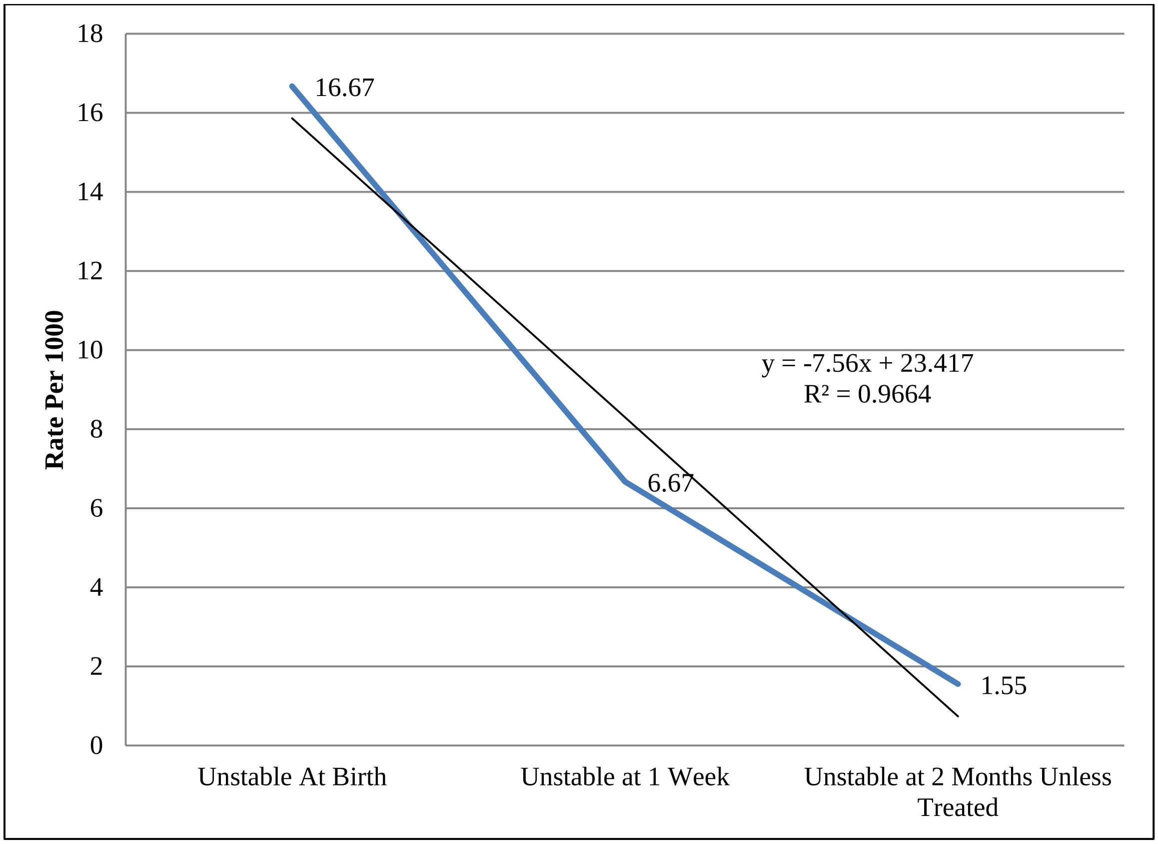


Figure 6. Natural History of Barlow Positive and Sonographic Abnormal Patients

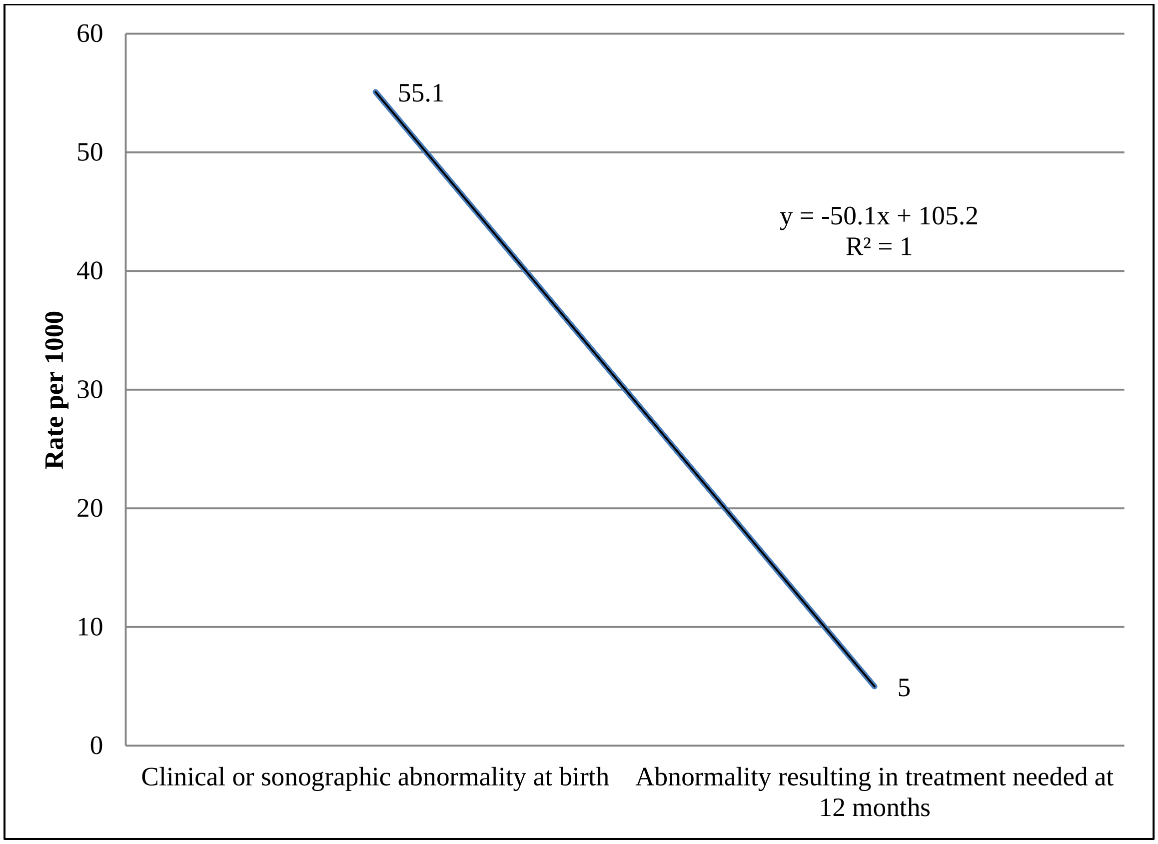


Figure 7. Untreated Congenital Hip Disease. A Study of the Epidemiology, Natural History, and Social Aspects of the Disease in a Navajo Population Children born between 1955-1961 (Rabin DL Et. Al. 1965)

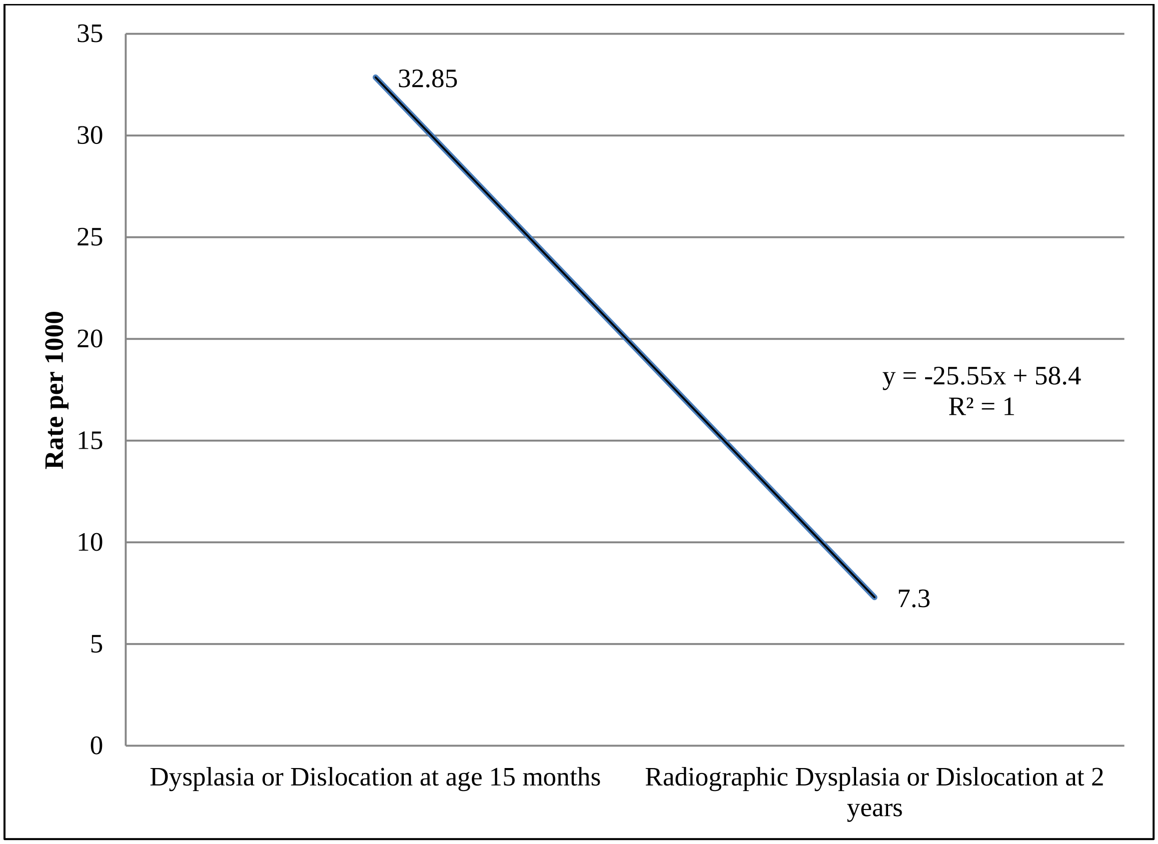


Figure 8. Natural History of Mean Center Edge Angle among Patients Aged 1 to 35 Years

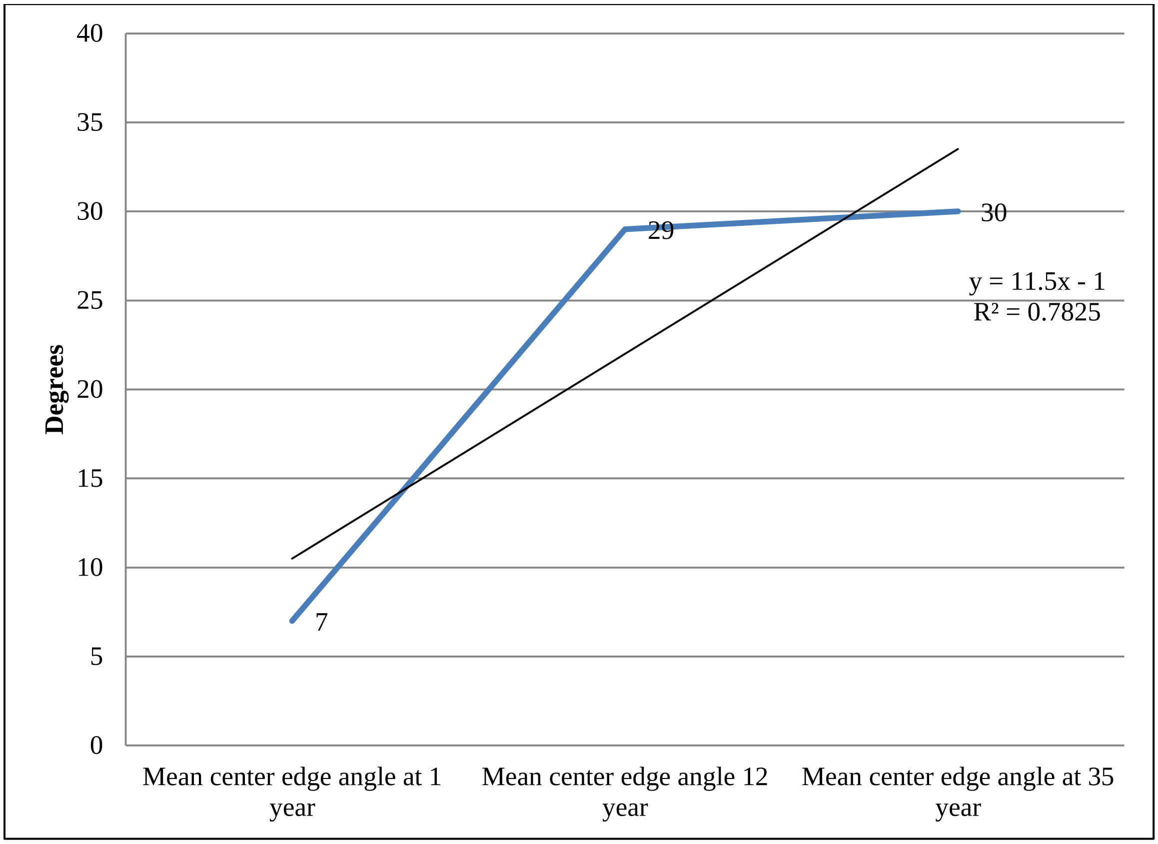


Figure 9. Natural History of Clinically Normal but Sonographically Abnormal Patients from Birth to 8 Months of Age

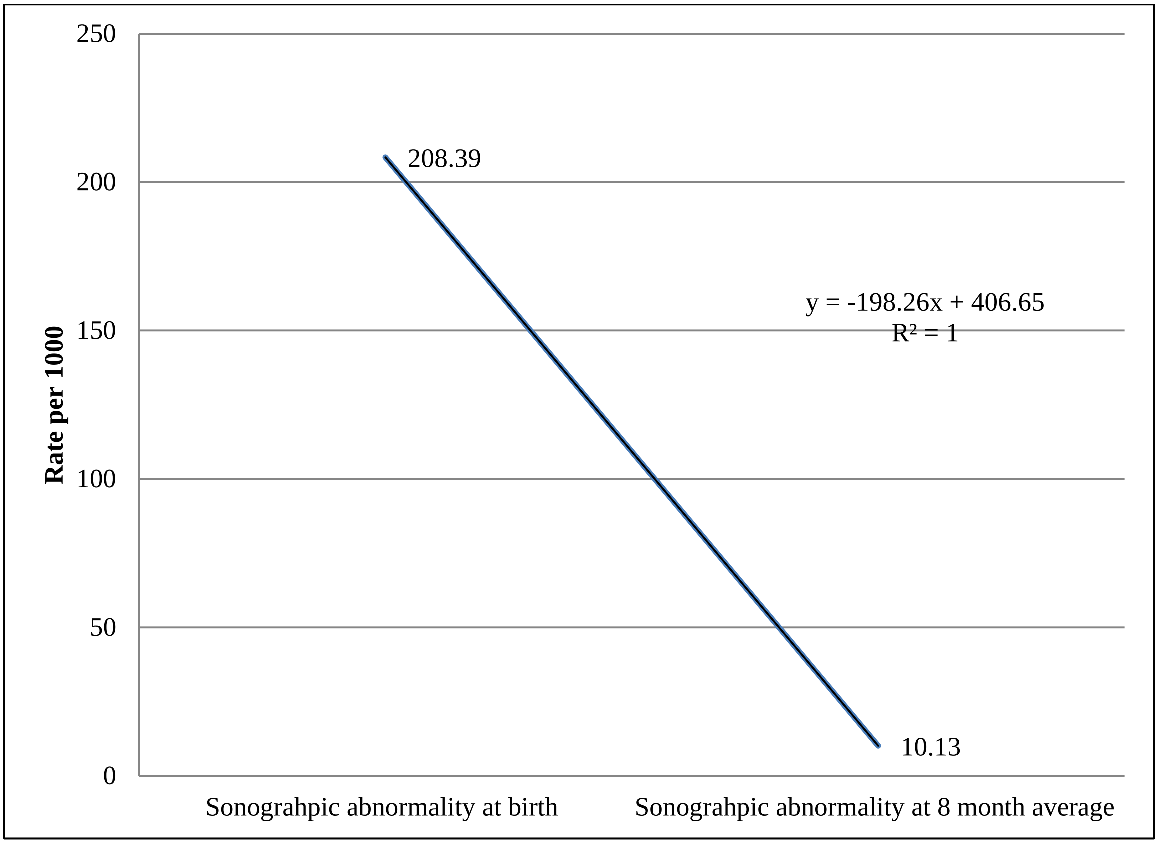


Figure 10. Natural History of Sonographically Abnormal Patients from Birth to 15 Weeks of Age

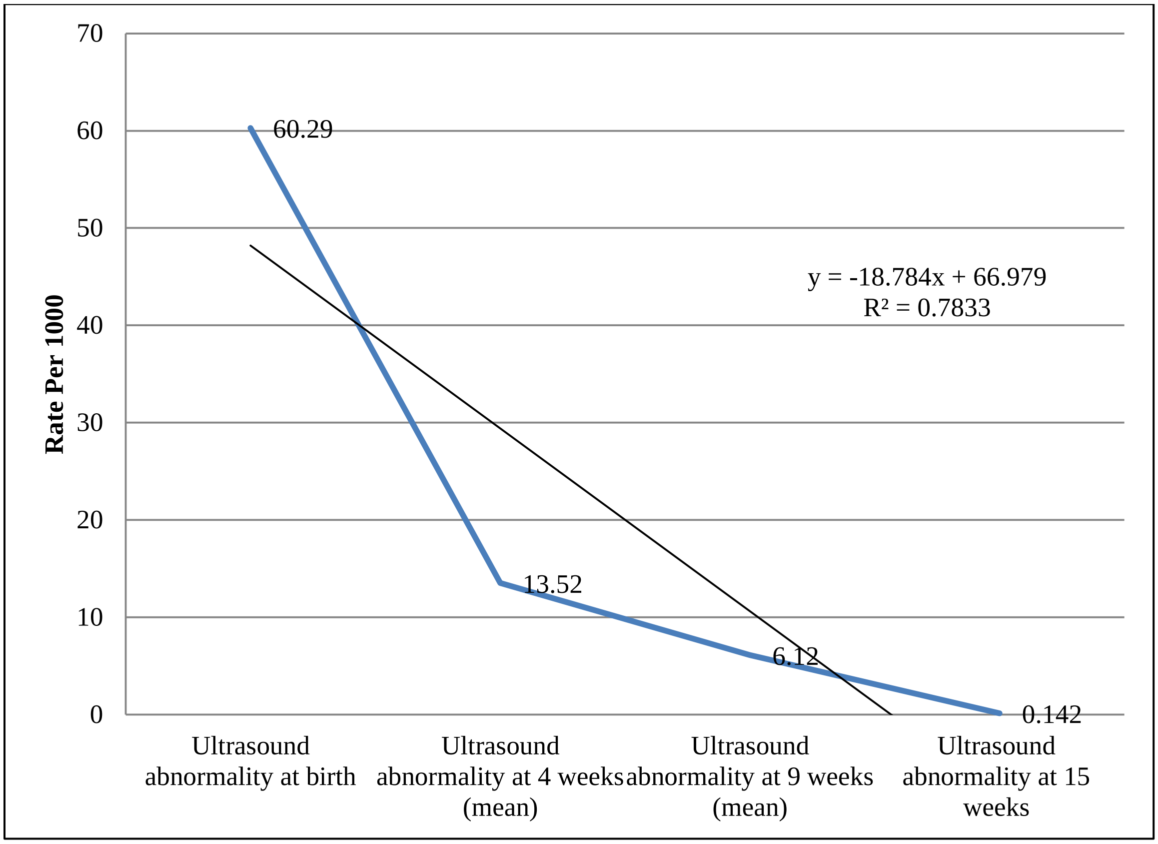


Figure 11. Natural History of Clinically Normal but Sonographically Abnormal Females at Birth

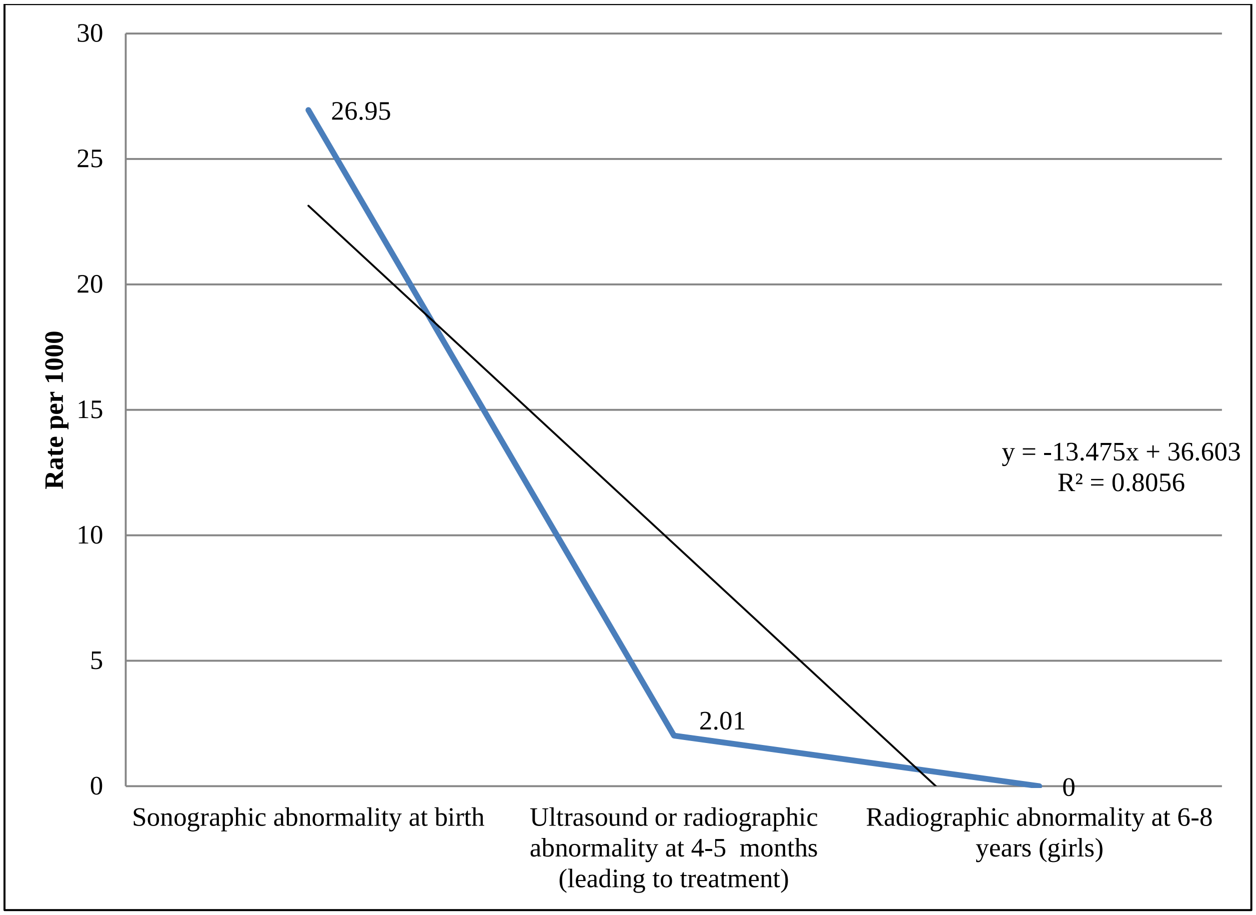


Figure 12. Natural History of Clinically Normal but Sonographically Abnormal Patients at Birth

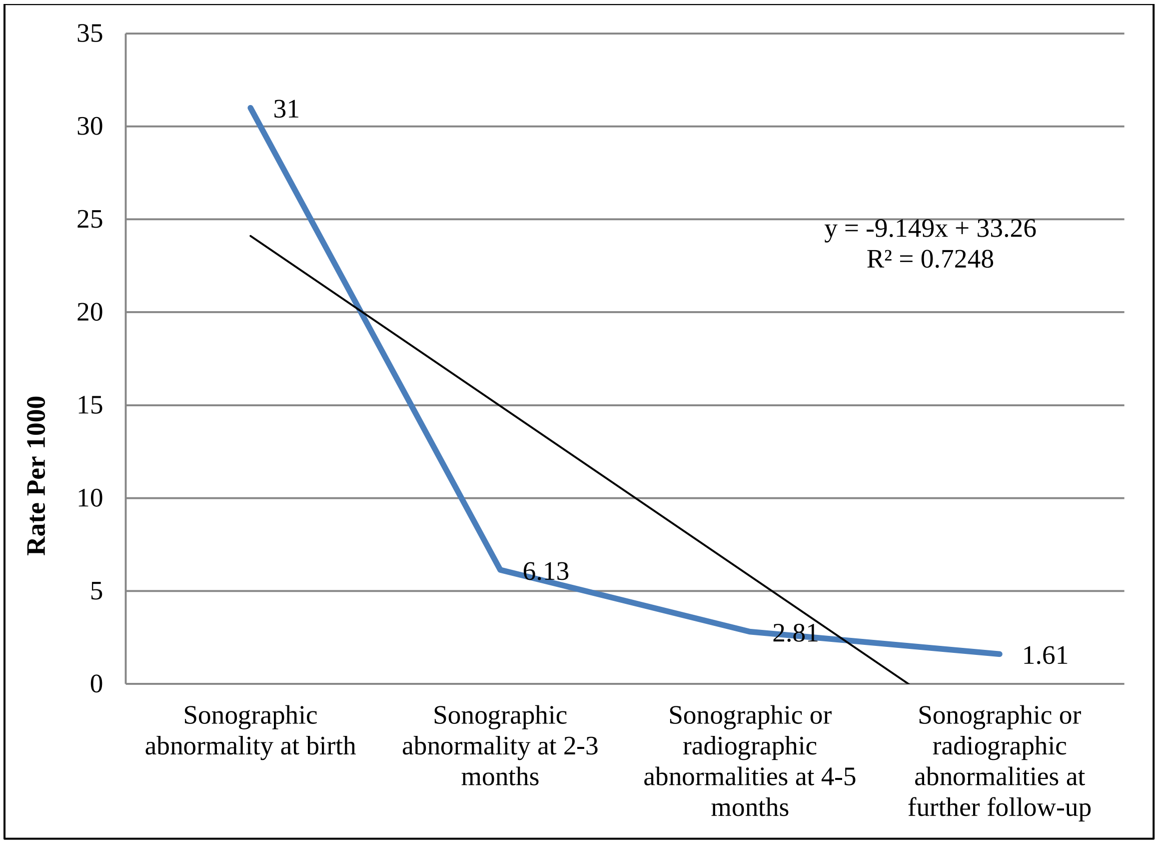
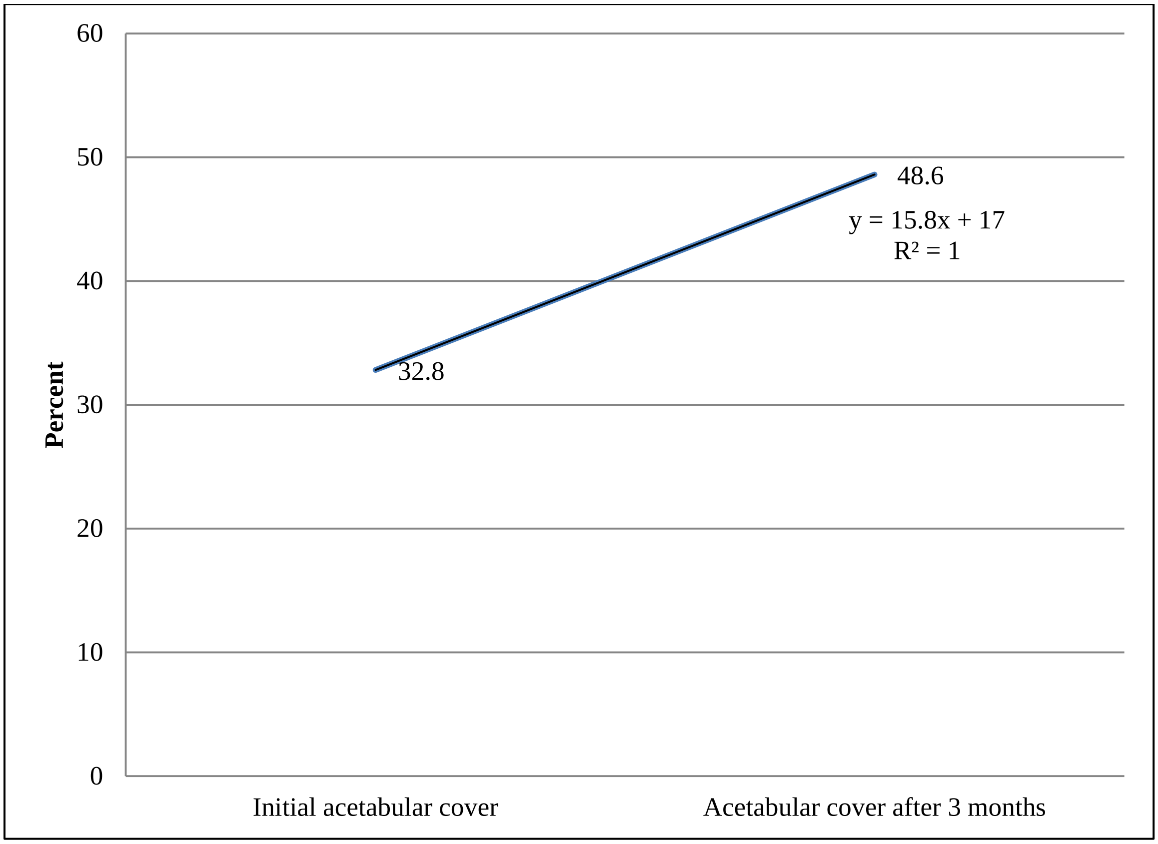


Figure 13. Natural History of Acetabular Cover among Patients with Dysplastic Hips



APPENDIX XII
LETTERS OF ENDORSEMENT FROM EXTERNAL ORGANIZATIONS

Pediatric Orthopaedic Society of North America

6300 N. River Road, Suite 727
Rosemont, Illinois 60018-4226
P: (847) 698-1692 • F: (847) 823-0536 • email : posna@aaos.org
www.posna.org

August 28, 2014

Kevin Shea, MD,
AAOS Clinical Practice Guidelines Section Leader
of the Committee on Evidence-Based Quality and Value

Dear Dr. Shea,

The Pediatric Orthopaedic Society of North America has voted to endorse the AAOS Clinical Practice Guideline the Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age. This endorsement implies permission for the AAOS to officially list our organization as an endorser of this guideline and reprint our logo in the introductory section of the guideline document.

Sincerely,

Gregory A. Mencio, MD
President

The Society For Pediatric Radiology

1891 Preston White Drive
Reston, VA 20191
Phone: 703-648-0680
Email: spr@acr.org
Web: http://www.pedrad.org

The SPR Research and Education Foundation

August 28, 2014

To: Kevin Shea, MD, AAOS *Clinical Practice Guidelines Section Leader of the Committee on Evidence-Based Quality and Value*

Dear Dr. Shea:

The Society for Pediatric Radiology is pleased to endorse the American Academy of Orthopaedic Surgeons Clinical Practice Guideline *"on Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age."* This endorsement implies permission for the AAOS to officially list our organization as an endorser of this guideline and reprint our logo in the introductory section of the guideline document.

On behalf of the SPR Board of Directors and members, we wish to thank the AAOS for inviting the SPR to participate in this process. We also thank Dr. H. Theodore Harcke for his excellent service as SPR's representative and the SPR MSK and US committees for their careful review of the Guideline and guidance to the Board.

Sincerely,

Richard A. Barth, MD
Chair, SPR Board of Directors

cc: SPR Board of Directors
H. Theodore Harcke, MD
SPR MSK Committee
SPR US Committee
Jayson Murray, AAOS Staff

Society of Diagnostic Medical Sonography
2745 N Dallas Pkwy Ste 350
Plano, TX 75093-8730
(214) 473-8057 / (800) 229-9506
(214) 473-8563 FAX
www.sdms.org

August 27, 2014

Kevin Shea, MD
Clinical Practice Guidelines Section Leader
Committee on Evidence-Based Quality and Value
American Academy of Orthopaedic Surgeons
6300 North River Road
Rosemont, Illinois 60018-4262

Dear Dr. Shea:

The Society of Diagnostic Medical Sonography (SDMS) Board of Directors has voted to endorse the American Academy of Orthopaedic Surgeons's (AAOS) *Clinical Practice Guideline on the Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age*. Permission is also granted to the AAOS to list the SDMS as an endorsing organization for this guideline and to reprint our logo in the introductory section of the guideline document. Requests for a color or black-and-white SDMS logo can be directed to Kelly Stafford, MPA, CAE, Director of the SDMS Communications & Marketing Department, at kstafford@sdms.org or 214-473-8057 x 169.

Thank you for inviting the SDMS to participate in the development process and review of this clinical practice guideline. If you have any questions, feel free to contact me at kkuntz@sdms.org or Donald Kerns, JD, CAE, the SDMS Chief Executive Officer at dkerns@sdms.org or 214-473-8057 x184.

Sincerely,

Kathryn Kuntz

Kathryn Kuntz, MEd, RT(R), RDMS, RVT, FSDMS