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Hip Pain and Movement Dysfunction Associated With Nonarthritic Hip Joint Pain: A Revision

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health from the Academy of Orthopaedic Physical Therapy and American Academy of Sports Physical Therapy of the American Physical Therapy Association

J Orthop Sports Phys Ther. 2023:53(7).CPG1-CPG70. doi:10.2519/jospt.2023.0302

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Summary of Recommendations

DIAGNOSIS - CLINICAL ASSESSMENT AND TESTING

C Clinicians may use the flexion, adduction, internal rotation (FADIR) test and flexion, abduction, and external rotation (FABER) test during clinical assessment to identify those without femoroacetabular impingement syndrome (FAIS) when these tests are negative.

C Clinicians may include the ligamentum teres test during clinical assessment to identify those with and without a ligamentum teres tear.

EXAMINATION - OUTCOME MEASURES

A Clinicians should continue to use the International Hip Outcome Tool (iHOT), Copenhagen Hip and Groin Outcome Score (HAGOS), Hip Outcome Score (HOS) ADL, and/or HOS Sports-Related Activities (SRA) at baseline and at least 1 other follow-up point, which includes discharge to assess the impact of impairments of body function and structure on activity limitations and participation restrictions in those with nonarthritic hip joint pain.

C Clinicians may use a patient-reported outcome measure (PROM) to assess for depression, anxiety, low self-efficacy, and kinesiophobia at baseline and at least 1 other follow-up point that includes discharge in those with nonarthritic hip joint pain.

EXAMINATION - PHYSICAL IMPAIRMENTS

B Clinicians should continue to assess impairments of body function, including objective and reproducible measures of hip pain, mobility, muscle strength, and movement coordination and specifically perform measures of range of motion (ROM) and strength for hip internal rotation (IR), external rotation (ER), flexion, extension, abduction, and adduction, at baseline and at least 1 other follow-up point that includes discharge for individuals with nonarthritic hip joint pain.

EXAMINATION - ACTIVITY LIMITATION AND PHYSICAL PERFORMANCE MEASURES

B Clinicians should include measures of function and postural control, in the form of performance tests such as the single-leg squat test (SLST), Star Excursion Balance Test (SEBT), hop distance, and single-leg sit to stand, as well as timed measures of function at baseline and at least 1 other follow-up point that includes discharge for individuals with nonarthritic hip joint pain.

INTERVENTIONS - MULTIMODAL INTERVENTION

B Clinicians should utilize multimodal interventions consisting of activity modification and exercises for strengthening hip-specific muscles (iliopsoas, gluteus medius, gluteus maximus, hip internal, and external rotators), trunk musculature (abdominals and paraspinals), and general lower extremity musculature combined with additional interventions such as manual therapy, postural and movement correction, stretching, and balance exercises, when treating individuals with nonarthritic hip joint pain, particularly FAIS and labral injuries.

INTERVENTIONS - MOVEMENT PATTERN TRAINING

C Clinicians may provide movement pattern training to optimize lower extremity movement patterns associated with pain during activities of daily living for patients with nonarthritic hip joint pain and associated movement dysfunction.

INTERVENTIONS - THERAPUETIC EXERCISE

C Clinicians may use therapeutic exercises and activities to address joint mobility, muscle flexibility, and muscle strength deficits identified during the physical examination of patients with nonarthritic hip joint pain.

INTERVENTIONS - PATIENT EDUCATION AND COUNSELING

C Clinicians may use patient education and counseling for modifying aggravating factors and managing pain associated with nonarthritic hip joint pain related to FAIS.

INTERVENTIONS - BRACING

D Based on conflicting evidence, a recommendation cannot be made for the use of bracing as a stand-alone intervention.

INTERVENTIONS - MANUAL THERAPY

F Joint mobilization procedures may be used when pain or capsular restrictions are suspected to impair hip mobility. Soft tissue mobilization procedures may be used when muscles and their related fascia are suspected to impair hip mobility in patients with FAIS.

INTERVENTIONS - NEUROMUSCULAR RE-EDUCATION

F Clinicians may utilize progressive neuromuscular re-education procedures to diminish movement coordination impairments identified in patients with nonarthritic hip joint pain.

List of Abbreviations

ACR: American College of Rheumatology
ADL: activity of daily living
AOPT: Academy of Orthopaedic Physical Therapy
APTA: American Physical Therapy Association
CHJP: chronic hip joint pain
CI: confidence interval
CPG: clinical practice guideline
CT: computerized tomography
DDH: developmental dysplasia of the hip
dGEMRIC: delayed gadolinium-enhanced MRI of cartilage
EQ-5D: EuroQol-5 Dimension
ER: external rotation
FABER: flexion, abduction, external rotation
FADIR: flexion, adduction, internal rotation
FAI: femoroacetabular impingement
FAIS: femoroacetabular impingement syndrome
HAGOS: Copenhagen Hip and Groin Outcome Score
HOOS: Hip Disability and Osteoarthritis Outcome Score
HOS: Hip Outcome Score
HSAS: Hip Sports Activity Scale
ICC: intraclass correlation coefficient
ICD: International Classification of Diseases and Related Health Problems
ICF: International Classification of Functioning, Disability and Health
iHot: International Hip Outcome Tool
IR: internal rotation
JOSPT: *Journal of Orthopaedic & Sports Physical Therapy*
LCEA: lateral center edge angle
MCID: minimal clinically important difference
MDC: minimal detectable change
mHHS: Modified Harris Hip Score
MR: magnetic resonance
MRI: magnetic resonance imaging
NAHS: Nonarthritic Hip Score
NSAIDs: nonsteroidal anti-inflammatory drugs
OA: osteoarthritis
PAO: periacetabular osteotomy
PASS: patient acceptable symptom state
PRO: patient-reported outcome
PROM: patient-reported outcome measure
PROMIS: Patient-Reported Outcomes Measurement Information System
QoL: quality of life
RCT: randomized controlled trial
ROM: range of motion
RR: relative risk
SDT: step-down test
SEBT: Star Excursion Balance Test
SHV: subjective hip value
SLST: single-leg squat test
SR: systematic review
SRA: sports-related activities
THA: total hip arthroplasty

Introduction

AIM OF THE GUIDELINES

The *Academy of Orthopaedic Physical Therapy* has an ongoing effort to create evidence-based practice guidelines for orthopaedic physical therapy management of patients with musculoskeletal impairments described in the World Health Organization's International Classification of Functioning, Disability and Health (ICF).[207]

The purposes of these clinical guidelines are to:

- Describe evidence-based physical therapy practice, including diagnosis, prognosis, intervention, and assessment of outcome, for musculoskeletal disorders commonly managed by orthopaedic and sports physical therapists
- Classify and define common musculoskeletal conditions using the World Health Organization's terminology related to impairments of body function and body structure, activity limitations, and participation restrictions
- Identify interventions supported by current best evidence to address impairments of body function and structure, activity limitations, and participation restrictions associated with common musculoskeletal conditions.
- Identify appropriate outcome measures to assess changes resulting from physical therapy interventions in body function and structure as well as in activity and participation of the individual

- Provide a description to policy makers, using internationally accepted terminology, of the practice of orthopaedic and sports physical therapists
- Provide information for payers and claims reviewers regarding the practice of orthopaedic and sports physical therapy for common musculoskeletal conditions
- Create a reference publication for orthopaedic physical therapy clinicians, academic instructors, clinical instructors, students, interns, residents, and fellows regarding the best current practice of orthopaedic and sports physical therapy

STATEMENT OF INTENT

These guidelines are not intended to be construed or to serve as a standard of medical care. Standards of care are determined on the basis of all clinical data available for an individual patient and are subject to change as scientific knowledge and technology advance and patterns of care evolve. These parameters of practice should be considered guidelines only. Adherence to them will not ensure a successful outcome in every patient, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgment regarding a particular clinical procedure or treatment plan must be made in light of the clinical data presented by the patient; the diagnostic and treatment options available; and the patient's values, expectations, and preferences. However, we suggest that significant departures from accepted guidelines should be documented in the patient's medical records at the time the relevant clinical decision is made.

SCOPE AND RATIONALE

These guidelines are a revision of those published in 2014, titled Nonarthritic Hip Joint Pain.[50] The clinical practice guideline (CPG) development team changed the title to "Hip Pain and Movement Dysfunction Associated With Nonarthritic Hip Joint Pain" to be consistent with current terminology, the shortened term "nonarthritic hip joint pain" was used throughout the document. For the purposes of these guidelines, nonarthritic hip joint pain refers to a collection of conditions that involve intra-articular structures of the hip, including femoroacetabular impingement syndrome (FAIS), developmental dysplasia of the hip (DDH), hip instability, acetabular labral tears, osteochondral lesions, loose bodies, and ligamentum teres tears. Other terms used in the literature to represent this collection of conditions include the following: hip-related groin pain, hip-related pain, chronic hip joint pain (CHJP), and prearthritic hip disease/pain. These terms may be used in this guideline when included within the text of a study that is being summarized. Diagnoses of nonarthritic hip joint pain conditions are made by clinicians based on a combination of subjective history and clinical examination, which may be aided by imaging modalities. The coexistence and potential interactive nature of multiple nonarthritic hip joint pain conditions are discussed in a manner consistent with patterns commonly observed in the clinical setting.

These guidelines provide recommendations for diagnosis, examination, and intervention pertinent to physical therapy as part of nonoperative care for patients with nonarthritic hip joint pain. Surgery may be an option for patients with nonarthritic hip joint pain who have not responded to nonoperative intervention. Literature focusing on surgical intervention and postoperative rehabilitation is discussed to the extent that such information contributes to nonoperative physical therapy recommendations. Postoperative rehabilitation is not within the scope of this CPG. Finally, this CPG excluded interventions outside the scope of physical therapy practice including but not limited to pharmacological agents unless directly compared to physical therapy management.

The scope of these guidelines is limited to literature specific to nonarthritic hip joint pain conditions. Although examination and intervention procedures reported to be useful in other musculoskeletal disorders of the pelvis and hip region may be appropriate for patients with nonarthritic hip joint pain, the focus of these clinical guidelines is to analyze the literature and make recommendations specifically related to nonarthritic hip joint pain. Extra-articular conditions may coexist with nonarthritic hip joint pain conditions; however, to the extent possible, studies that focused on extra-articular sources of pain were excluded from this guideline. Additionally, there is a growing body of evidence related to pain science, and while the findings from this literature may be appropriate for patients with nonarthritic hip joint pain, these studies were not included.

Methods

Content experts were appointed by the Academy of Orthopaedic Physical Therapy (AOPT) to conduct a review of the literature and develop an updated CPG for hip pain and movement dysfunction associated with nonarthritic hip joint pain. This revision aims to provide a concise summary of the contemporary evidence since the publication of the original guideline and to develop new recommendations or revise previously published recommendations to support

evidence-based practice. The authors of this guideline revision worked with the CPG editors and medical librarians for methodological guidance. One author (R.L.M.) served as the team's methodologist. The research librarians were chosen for their expertise in systematic review (SR) and rehabilitation literature searching and to perform systematic searches for concepts associated with classification, examination, and intervention strategies for hip pain and movement dysfunction associated with nonarthritic hip joint pain. Briefly, the following databases were searched from January 2013 to July 2022: MEDLINE, CINAHL, Cochrane Library, and PEDro (see **APPENDIX A** for full search strategies and **APPENDIX B** for search dates and results, available at www.orthopt.org).

The authors declared relationships and developed a conflict management plan, which included submitting a conflict-of-interest form to the AOPT. Articles that were authored by a reviewer were assigned to an alternate reviewer. Funding was provided to the CPG development team for travel and expenses for CPG development training by the AOPT. The CPG development team maintained editorial independence from funding agencies, including the AOPT Board of Directors.

Articles contributing to recommendations were reviewed based on specified inclusion and exclusion criteria, with the goal of identifying evidence relevant to physical therapist clinical decision making for patients with nonarthritic hip joint pain. The title and abstract of each article were reviewed independently by 2 members of the CPG development team for inclusion (see **APPENDIX C** for inclusion and exclusion criteria, available at www.orthopt.org). Full-text review was then similarly conducted to obtain the final set of articles for contribution to recommendations. The team leader (K.R.E.) provided the final decision on discrepancies that were not resolved by the review team (see **APPENDIX D** for the flow chart of articles, available at www.orthopt.org). Data extraction and assignment of level of evidence were also performed and were confirmed by members of the CPG development team. Articles related to topics for which recommendations were not provided, which included pathoanatomical features, clinical course, clinical management, differential diagnosis, and imaging, were not subject to the SR process and were not included in the flow chart. Evidence tables for this CPG are available on the Clinical Practice Guidelines page of the AOPT website (www.orthopt.org).

This guideline was issued in 2023 based on the published literature through July 2022 and will be considered for review in 2028, or sooner if new evidence becomes available. Any updates to the guideline in the interim period will be noted on the AOPT website (www.orthopt.org http://www.orthopt.org).

LEVELS OF EVIDENCE

Individual clinical research articles were graded according to criteria adapted from the Centre for Evidence-Based Medicine, Oxford, UK (http://www.cebm.net) for diagnostic, prospective, and therapeutic studies.[170] In teams of two, each reviewer independently assigned a level of evidence and evaluated the quality of each article using a critical appraisal tool (see **APPENDICES D** and **E** for the levels-of-evidence table and details on procedures used for assigning levels of evidence, available at www.jospt.org). If the 2 content experts did not agree on a grade of evidence for a particular article, a third content expert was used to resolve the issue. The evidence update was organized from the highest level of evidence to the lowest level of evidence. An abbreviated version of the grading system is provided in **TABLE 1**.

STRENGTH OF EVIDENCE AND GRADES OF RECOMMENDATION

The strength of the evidence supporting the recommendations was graded according to the established methods provided below (**TABLE 2**). Each team developed recommendations based on the strength of evidence, including how directly the studies addressed the question relating to nonarthritic hip joint pain. In developing their recommendations, the authors considered the strengths and limitations of the body of evidence and the health benefits, side effects, and risks of tests and interventions.

REVIEW PROCESS

The AOPT selected consultants from the following areas to serve as reviewers throughout the development of these CPGs:

- Athletic training
- Claims review
- Coding
- Guideline methodology
- Hip pain rehabilitation
- Medical practice guidelines
- Manual therapy

TABLE 1 Levels of Evidence

I	Evidence obtained from high-quality diagnostic studies, prospective studies, systematic reviews, or randomized controlled trials
II	Evidence obtained from lesser-quality diagnostic studies, systematic reviews, prospective studies, or randomized controlled trials (eg, weaker diagnostic criteria and reference standards, improper randomization, no blinding, <80% follow-up)
III	Case-controlled studies or retrospective studies
IV	Case series
V	Expert opinion

TABLE 2 Grades of Recommendation

Grades of Recommendation		Strength of Evidence	Level of Obligation
A	Strong evidence	A preponderance of level I and/or level II studies support the recommendation. This must include at least 1 level I study	Must or should
B	Moderate evidence	A single high-quality randomized controlled trial or a preponderance of level II studies support the recommendation	Should
C	Weak evidence	A single level II study or a preponderance of level III and IV studies, including statements of consensus by content experts, support the recommendation	May
D	Conflicting evidence	Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies	
E	Theoretical/foundational evidence	A preponderance of evidence from animal or cadaver studies, from conceptual models/principles, or from basic sciences/bench research supports this conclusion	May
F	Expert opinion	Best practice based on the clinical experience of the guideline development team	May

- Movement science
- Orthopaedic physical therapy clinical practice
- Orthopaedic physical therapy residency education
- Orthopaedic surgery
- Outcomes research
- Patients with nonarthritic hip joint pain
- Physical therapy academic education
- Physical therapy patient perspective
- Rheumatology
- Sports physical therapy residency education
- Sports rehabilitation

Identified reviewers who are experts in hip injury management and rehabilitation reviewed a prepublication draft of this CPG content and methods for integrity, accuracy, validity, usefulness, and impact. Any comments, suggestions, or feedback from the expert reviewers were delivered to the author and editors for consideration and appropriate revisions. These guidelines were also posted for public comment on the AOPT website (**www.orthopt.org**), and a notification of this posting was sent to the members of the AOPT. Any comments, suggestions, and feedback gathered from public commentary were sent to the authors and editors to consider and make appropriate revisions in the guideline prior to submitting them for publication to the *Journal of Orthopaedic & Sports Physical Therapy* (*JOSPT*).

DISSEMINATION AND IMPLEMENTATION TOOLS

In addition to publishing these guidelines in the *JOSPT*, these guidelines will be posted on CPG (free access) areas of the *JOSPT* and AOPT websites and submitted for free access on the ECRI Guidelines Trust (guidelines.ecri.org) and the Physiotherapy Evidence Database (www.PEDro.org.au). The planned implementation tools for patients, clinicians, educators, payers, policy makers, and researchers, and the associated implementation strategies are listed in **TABLE 3**.

ORGANIZATION OF THE GUIDELINE

For topics where an SR was outside the scope of this CPG, a scoping review and summary of the literature is provided. This includes pathoanatomical features, clinical course,

TABLE 3 Planned Strategies and Tools to Support the Dissemination and Implementation of This CPG

Tool	Strategy
JOSPT's "Perspectives for Patients" and "Perspectives for Practice" articles	Patient- and clinician-oriented guideline summaries available at www.jospt.org
Mobile app of guideline-based exercises for patients/clients and health care practitioners	Marketing and distribution of app via www.orthopt.org and www.handpt.org
Clinician's Quick-Reference Guide	Summary of guideline recommendations available at www.orthopt.org and www.handpt.org
JOSPT's Read for CreditSM continuing education units	Continuing education units available for physical therapists at www.jospt.org
Webinars and educational offerings for health care practitioners	Guideline-based instruction available for practitioners at www.orthopt.org and www.handpt.org
Mobile and web-based app of guideline for training of health care practitioners	Marketing and distribution of app via www.orthopt.org
Non-English versions of the guidelines and guideline implementation tools	Development and distribution of translated guidelines and tools to JOSPT's international partners and global audience via www.jospt.org
APTA's CPG+	Dissemination and implementation aids

Abbreviations: APTA, American Physical Therapy Association; CPG, clinical practice guideline.

clinical management, differential diagnosis, and imaging. When SRs were conducted to support specific recommendations, a summary recommendation from the 2014 CPG is provided, followed by updated summaries and corresponding evidence levels for studies conducted since January 2013, a synthesis of the literature and rationale for the recommendation(s), discussion of gaps in the literature when appropriate, and updated recommendation(s). Topics for which an SR was conducted, and recommendations provided include diagnosis, examination, and interventions.

Between 2013 and 2022, 3 randomized clinical trials were conducted comparing nonoperative to operative treatment for FAIS. Seven SRs and meta-analyses were published based upon a sample of the same 3 randomized control trials. A consensus was reached among the CPG development team to include the SR published by Ishøi et al,[90] which included the original randomized controlled trials (RCTs) and provided a thorough scope and quality of intervention analysis.[10,24,63,107]

CLASSIFICATION

The primary ICD-10 codes associated with nonarthritic hip joint pain are **M25.5 Pain in joint**, **M24.7 Protrusio acetabula**, **M24.0 Loose body in joint**, and **M24.2 Disorder of ligament**.

The corresponding ICD-9-CM codes and conditions are **719.45 Joint pain**, **718.65 Unspecified intrapelvic protrusion of acetabulum**, **718.15 Loose body in joint**, and **718.5 Other derangement of joint pelvic region and thigh**.

Other ICD-10 codes that may be associated with nonarthritic hip joint pain are as follows:

- M21.0 Valgus deformity, not elsewhere classified
- M21.1 Varus deformity, not elsewhere classified
- M21.2 Flexion deformity
- M24.3 Pathological dislocation and subluxation of joint, not elsewhere classified
- M24.4 Recurrent dislocation and subluxation of joint
- M24.5 Contracture of joint
- M24.6 Ankylosis of joint
- M24.9 Joint derangement, unspecified
- M25.0 Hemarthrosis
- M25.3 Other instability of joint
- M25.4 Effusion of joint
- M25.6 Stiffness of joint, not elsewhere classified
- M25.7 Osteophyte
- M25.8 Other specified joint disorders
- M25.9 Joint disorder, unspecified
- Q65.6 Unstable hip
- R29.4 Clicking hip
- S73 Dislocation, sprain, and strain of joint ligaments of hip

The primary ICF body function codes associated with nonarthritic hip joint pain are **b28016 Pain in joints**, **b7100 Mobility of a single joint**, and **b7150 Stability of a single joint**. Other ICF body function codes that may be associated with this condition are **b7300 Power of isolated muscles and muscle groups**, **b7401 Endurance of muscle groups**, **b7603 Supportive functions of arm and leg**, **b770 Gait pattern functions**, and **b7800 Sensation of muscle stiffness**.

The primary ICF body structure code associated with nonarthritic hip joint pain is **s75001 Hip joint**. Other ICF body structure codes associated with this condition are **s7402 Muscles of pelvic region** and **s7403 Ligaments and fasciae of pelvic region**.

The primary ICF activities and participation codes associated with nonarthritic hip joint pain are **d4103 Sitting**, **d4104 Standing**, **d4151 Maintaining a squatting position**, **d4153 Maintaining a sitting position**, **d4552 Running**, **d4500 Walking short distances**, and **d4501 Walking long distances**.

Other ICF activities and participation codes that may be associated with nonarthritic hip joint pain are as follows:

- d2303 Completing the daily routine
- d4101 Squatting
- d4154 Maintaining a standing position
- d4302 Carrying in the arms
- d4303 Carrying on shoulders, hip and back
- d4351 Kicking
- d4502 Walking on different surfaces
- d4551 Climbing
- d4553 Jumping
- d4600 Moving around within the home
- d4601 Moving around within buildings other than home
- d4602 Moving around outside the home and other buildings
- d465 Moving around using equipment
- d5204 Caring for toenails
- d5400 Putting on clothes
- d5401 Taking off clothes
- d5402 Putting on footwear
- d5403 Taking off footwear
- d5701 Managing diet and fitness
- d9201 Sports
- d9209 Recreation and leisure

CLINICAL GUIDELINES

Pathoanatomical Features

2023 UPDATE

Pain in the hip region can originate from nonmusculoskeletal, lumbosacral spine, intra-articular, and extra-articular sources. A consensus statement has outlined an evaluation algorithm to differentiate the musculoskeletal sources of regional hip pain.[193] Lumbosacral and extra-articular pathologies often coexist with intra-articular hip sources of hip pain.[193] Therefore, an understanding of the complex interaction between the spine, pelvis, hip joint, and the entire lower quarter is needed. This includes the relationship between the labrum, articular cartilage, and the bony architecture of the acetabulum and femur, as well as the ligaments and muscles that support the hip region.

Adequate strength and neuromuscular control of the lumbopelvic musculature are necessary to provide stability to the hip joint and control the pelvis during weight-bearing tasks.[156,204] The gluteus medius and gluteus minimus muscles provide frontal plane pelvic control during single-leg activities while the gluteus maximus acts as a tri-planar stabilizer by preventing forward trunk lean as well as controlling the pelvis during single-leg activities.[6,15] The proximity and location of the hip flexor complex in relation to the hip joint renders this structure likely to contribute anterior stability of the femoral head during static and dynamic activities. During dynamic activities, the external rotators help to prevent excessive femoral internal rotation (IR).[156] Finally, the transversus abdominis, multifidi, diaphragm, and pelvic floor muscles function to increase intra-abdominal pressure and provide stability to the lumbopelvic complex.[83,131,211]

A review of normal bony anatomy is described in the "Nonarthritic Hip Joint Pain Clinical Practice Guidelines" published in 2014.[50] Deviations from normal bony architecture of the femur and acetabulum, including FAI and acetabular dysplasia, can lead to overload of the chondrolabral and capsuloligamentous structures. Femoral version and abnormal pelvic alignment may also need to be considered when assessing for sources of mechanical hip joint pain.[122] The imaging section of this CPG discusses radiographic measurements used to define bony deviations associated with nonarthritic hip joint pain. Nonarthritic hip joint pain specifically refers to an intra-articular source of hip pain resulting from 1 or more of the following conditions: FAIS, DDH, acetabular dysplasia, hip instability, acetabular labral tears, osteochondral lesions, loose bodies, and ligamentum teres tears.

HIP DYSPLASIA

A number of terms have been introduced in the literature to describe morphological variations of the femur and the acetabulum, including hip dysplasia and DDH. The term DDH is generally used to describe a morphologic acetabular variation that presents briefly after birth and/or in pediatric patients. DDH in the pediatric population has unique pathoanatomical and treatment considerations.[215] In the context of this review, the term acetabular dysplasia will be used to discuss changes in the normal orientation (direction or version) or in the shape (inclination or depth) of the acetabulum.

Acetabular Dysplasia

The clinical diagnosis of acetabular dysplasia is often complex, multifactorial, and discussed with variable diagnostic criteria in the literature.[210] The numerous morphological variations associated with acetabular dysplasia may produce structural instability that results in disproportionate loading of the acetabular rim during activity. The sequalae of increased forces experienced at the acetabular labrum and cartilage have been associated with the onset of joint-related structural changes.[81,210]

Acetabular Depth

One form of acetabular dysplasia, characterized by a shallow acetabulum, is a well-recognized cause of hip pain in young adults. Borderline dysplasia has been introduced to describe less severe undercoverage of the femoral head in adolescent and young adult patients demonstrating signs and symptoms consistent with hip instability; however, the methods used to define borderline dysplasia have limitations.[56,140] The primary distinction between "borderline dysplasia" and acetabular dysplasia is based on radiographic measures of femoral head coverage. Most often, the acetabular deficiency is observed in the superolateral region. This acetabular deficiency results in decreased coverage of the femoral head and increased loading of the anterolateral acetabular rim and labrum.[81] Previous authors have reported a 1.0%-to-11.3% prevalence of acetabular dysplasia in the adult population, with females more commonly affected than males.[7,73,119,121,200,218] Freiman et al[56] found in their SR that the pooled prevalence of borderline dysplasia was 19.8% (16.7%-46.0%) in the asymptomatic general population and 12.8% (12.6%-16.0%) in individuals presenting with hip pain. Risk factors for the development of acetabular dysplasia include breech position in utero, primiparity, and family history.[3,35] The coexistence of cam morphology and acetabular dysplasia has been described.[87,206]

Authors have also reported that ligamentous laxity and abnormalities in collagen metabolism, estrogen metabolism, and pregnancy-associated pelvic instability are also associated with the development of acetabular dysplasia.

Acetabular Version

Global acetabular version refers to the orientation or direction of the hip socket in reference to the horizontal plane, with a normal acetabulum demonstrating approximately 20° of anteversion.[109] Global acetabular retroversion occurs when the opening of the acetabulum has a reduced anterior orientation, or in extreme cases, exhibits a lateral or posterolateral orientation.[44,151,174] Variations of innominate anatomy, such as an external rotation (ER) of the hemipelvis, have been associated with acetabular retroversion.[195] The incidence of acetabular retroversion has been reported in up to 20% of patients undergoing a total hip arthroplasty (THA) for osteoarthritis (OA) and between 16%-30% of patients with dysplastic hips.[128] Fujii et al[59] reported that individuals with developmental dysplasia and acetabular retroversion reported an earlier onset of pain than those with developmental dysplasia and acetabular anteversion. The term acetabular retroversion may also be used to characterize the focal anterosuperior overcoverage observed with pincer morphology.[214] Buddhdev et al[16] found that acetabular retroversion is more prevalent in patients with a slipped capital femoral epiphysis and is correlated to the severity of the capital slip.

Increased acetabular anteversion occurs when the opening of the hip socket is excessively oriented in an anterior direction (facing forward in relation to the pelvis). The increased forward orientation of the acetabulum results in decreased coverage of the femoral head anteriorly. Tannenbaum et al[196] reported that mean global acetabular anteversion was greater in females than males. Okuzu et al[162] retrospectively assessed radiographic factors associated with an anterior pelvic tilt in patients with hip OA and acetabular dysplasia, and found a significant correlation between anterior pelvic tilt and anterior acetabular coverage. Specifically, increased anterior pelvic tilt, defined as the angle formed by the pelvis and the sacral endplate, was associated with decreased acetabular anteversion. Kitamura et al[108] used an in silico finite element model to compare the effects of 3 different positions of pelvic tilt on joint contact area, contact pressure, and acetabular cartilage stress between 21 hips with acetabular dysplasia and 21 normal hips. They reported that at all 3 positions of pelvic tilt, the mean contact area was 0.6 to 0.7 times smaller, the mean maximum contact pressure was1.8 to 1.9 times higher, and the mean maximum equivalent cartilage stress was 1.3 to 2.8 times higher in dysplastic hips compared to normal hips. Additionally, transitioning from a 10° anterior tilt to a 10° posterior tilt resulted in decreased mean contact area and a corresponding increase in mean maximum contact pressure and an increase in median maximum equivalent stress for both dysplastic and normal hips. The observed increases in mean contact pressure and median maximum equivalent acetabular cartilage stress associated with posterior tilt were more significant in dysplastic hips than in normal hips, suggesting the potential relevance of pelvic tilt in modifying load in the dysplastic hip.[108]

FEMORAL NECK ABNORMALITIES

Although the shape and orientation of the femur changes through childhood and into adolescence, other factors such as trauma-induced fractures or conditions like cerebral palsy can also impact the shape and orientation of the femur. It is important to recognize that both the shape and orientation of the femur can impact the congruity, stability, and load-bearing function of the hip joint.

Femoral Inclination

In the frontal plane, the shaft of the femur bone connects proximally to the neck of the femur at an angle of 125°,[161] which is referred to as the angle of inclination. Angulations above 130° are described as coxa valga and below 120° coxa vara. During development, coxa valga inclination creates a lack of compression on the triradiate cartilage (the epiphyseal plate between the ilium, ischium, and pubis), resulting in a functional decrease in acetabular depth, which can promote the development of a shallow acetabulum or coxa plana.[123] Conversely, in coxa vara, where the femoral inclination angles the head of the femur more medially toward the triradiate cartilage, an increase in pressure on the triradiate cartilage may predispose the development of an overly deep socket (coxa profunda) or even a protrusio.[123] In adults with coxa valga or vara, the forces no longer act on open growth plates, but their altered inclination angulation of the femoral head directs the force into the acetabulum disproportionately creating issues of hip joint congruence.

Femoral Version

Femoral version refers to the positional relationship between the proximal femoral neck and distal femoral condyles in the transverse plane. Under normal anatomical conditions, the proximal femur is considered anteverted, such that the femoral neck projects slightly anterior in relation to the distal femoral condyles. Excessive anteversion of the femur occurs when the femoral neck is excessively rotated in the anterior direction, whereas excessive retroversion indicates either a loss of the normal anterior rotation of the neck or posteriorly projected neck in relation to the femoral condyles. Excessive femoral anteversion is characterized by an increased amount of hip IR range of motion (ROM) and decreased hip ER ROM.[199] Conversely,

excessive femoral retroversion will result in the opposite findings of increased hip ER ROM and decreased hip IR ROM.[199] Increased femoral anteversion may increase the risk of instability by placing stress on the anterior capsule. Reduced femoral anteversion may increase the risk for anterior impingement because it decreases fermoracetabular clearance for flexion and more so with flexion and IR, thus increasing the risk for labral injury,[91] and for developing later hip OA.[198] The combined effect of femoral and acetabular version on development of FAIS has been discussed and can be represented by the McKibbin Index.[125] The McKibbin Index is a summary measurement of femoral and acetabular version with normal values ranging from 20° to 50°.[125]

FEMOROACETABULAR IMPINGEMENT

The relationship among bony morphology and presence of hip joint–related symptoms is still under investigation; therefore, terminology has been recommended to differentiate between the presence of bony morphology and the symptomatic condition. The term femoroacetabular impingement (FAI) is used when describing morphological variation of the acetabulum and/or femur that results in early contact of the proximal femur and the acetabulum during movement. The term FAIS has been introduced to establish a movement-related disorder that includes related symptoms and clinical findings.[70] Imaging findings of FAI are common in the general population, ranging from 9% to 25% in asymptomatic males and 2% to 10% in asymptomatic females; therefore, the diagnosis and treatment of FAIS should occur in the presence of symptoms and positive clinical signs, in addition to imaging findings of morphological variation.[67,68,71,100,118,172,187]

While the morphological development of FAI is not fully understood, evidence suggests that development of cam-type morphology is a result of alterations of the capital femoral epiphysis secondary to repetitive sports-related loading of the joint during adolescence.[5,18,19] Conversely, a pincer morphology has been associated with the presence of global acetabular overcoverage, including global acetabular retroversion, protrusion acetabuli, or coxa profunda, as well as focal overcoverage of the anterosuperior acetabular wall.[18,166,188] A mixed-type impingement refers to coexisting cam and pincer deformities. Genetics may play a role in the development of both cam and pincer-type morphologies. Pollard et al[171] found that siblings of individuals with a cam-type morphology had a 2.8 times increased risk of having cam morphology compared to the control group of spouses. Additionally, those authors reported that siblings of patients with a pincer morphology demonstrated a relative risk (RR) of 2.0 to have the same bony characteristic.[171] However, the authors recommended caution when interpreting these findings, because the role of environmental factors within families, such as participation in sporting activities, were not accounted for in the analysis.

Evidence from observational and cross-sectional studies suggests cam morphology with related symptoms is more commonly reported in younger, athletic males, whereas pincer morphology and associated symptoms are more commonly reported in middle-aged active females.[61,67,126,127,167] Numerous authors have demonstrated a high prevalence of cam-type morphology in young active males participating in high-level impact sports, including hockey, soccer, and football.[5,64,97,101,111,168] In a cohort of soccer athletes undergoing primary hip arthroscopy for FAIS, females displayed smaller cam-type morphologies compared to males.[134]

HIP INSTABILITY

Hip instability is an increasingly recognized source of pain and dysfunction among young, active individuals.[30,45,148] Hip instability is broadly described as extraphysiologic movement of the hip joint, which results in pain and functional impairments that may contribute to the development of OA.[26,34,92,99] As the normal hip is a constrained ball and socket joint, pain associated with hip instability is believed to be caused by excessive translation of the femoral head within the acetabulum.[92,99] Hip instability is a complicated and multifactorial problem that can arise due to alterations in bony morphology, as well as abnormalities in the structure and mechanical behaviors of the supporting hip soft tissues.[2,30,31,144] Additionally, hip instability can result secondary to combined abnormality of both bone and soft tissue structures.[179] Bony incongruence at the hip joint due to a mismatch between the femur and acetabulum can cause hip instability secondary to a morphologic alteration.[110,180] One example is acetabular dysplasia that results in a lack of coverage of the femoral head by the acetabulum. Other structural causes of hip instability are alterations in femoral structure, such as in conditions of excessive femoral anteversion or coxa valga.[29,189,190] These alterations in femoral morphology can also lead to a structural incongruence, thereby resulting in instability.[29,189,190] The iliofemoral ligament has been identified as the primary restraint to hip ER and anterior translation of the femoral head.[1,153,169] Iatrogenic hip instability has been found to occur after hip arthroscopic surgery, which involves surgical capsulotomy of these supporting ligaments.[163,217] Hip instability can also arise due to excessive laxity of the anterior hip soft tissue structures, specifically the anterior capsuloligamentous structures and the labrum.[99]

Individuals with a genetic predisposition, such as Ehlers-Danlos syndrome or benign hypermobility syndrome, may be at higher risk for developing the presentation of hip instability due to inherent generalized tissue laxity.[120] Moreover, excessive laxity

of the anterior capsuloligamentous structures of the hip may develop as the result of activities that involve repetitive and forceful ER and extension.[42,45,99] This may include such athletic activities as dance, gymnastics, golf, and tennis.[43,45] Clinically, hip instability that is driven by subtle structural and functional soft tissue issues, such as ligamentous laxity or muscular weakness, in people with or without morphologic alterations has been referred to as "hip microinstability".[99] Although hip microinstability is an evolving and difficult to diagnose condition, it is reported to most commonly be present in patients who perform repetitive hip rotational movements under an axial load.[99,186] A cadaveric study by Johannsen et al[95] found cyclic stretching of the anterior hip capsule resulted in increased hip rotation and femoral head displacement. Similarly, Han et al[74] found laboratory-induced capsular laxity led to an increase in hip rotation ROM and femoral head translation. These in vitro experimental studies highlight the role that the soft tissue structures play in maintaining hip stability during function, and underscore how alterations in soft tissue structure and/or function may result in hip microinstability.

Clinical Course

2023 UPDATE

While the clinical course of nonarthritic hip joint pain is not fully understood, the body of evidence pertinent to these conditions has grown since publication of the 2014 CPG. Existing literature is inconsistent in defining morphological variation of the hip joint and often focuses on imaging findings.[38] When assessing the relationship between FAI morphology and hip OA development, the presence of symptoms may not be considered.[202] Additionally, morphological characteristics that represent FAI and acetabular dysplasia may be observed concurrently in patients.

Current evidence suggests that both hip dysplasia and cam morphology are associated with the development of hip OA.[23] Casartelli et al[23] conducted an SR and meta-analysis to assess the available evidence for hip morphology as a risk factor for developing hip OA. The authors noted an association was consistently observed for acetabular dysplasia and hip OA, with prospective studies identifying hips with a lateral center edge angle (LCEA) less than 25° as being 2.3 times more likely to develop OA compared to those hips with an LCEA greater than or equal to 25°.[23] When cam morphology was investigated, prospective studies reported hips that developed OA had a 16.1° larger alpha angle than those that did not develop OA. Hips with alpha angle measurements greater than 60° were 2.5 times more likely to develop OA compared to hips with alpha angle measurements less than or equal to 60°.[23] While an association between pincer morphology (LCEA > 39°) and the presence of OA was described in cross-sectional studies, prospective studies did not support an association. Although the body of evidence related to morphological variations of the hip joint is growing, inconsistent definitions and lack of clinical context support the need for further research.[23]

Clinical Management

2023 UPDATE

The body of literature describing clinical management of nonarthritic hip joint pain through nonsurgical and surgical intervention has evolved since the 2014 CPG was published. Importantly, consensus recommendations support nonsurgical intervention including physical therapist management as an initial intervention for many patients with nonarthritic hip joint pain.[193]

Anti-inflammatory agents are often recommended for pain relief and inflammation; however, evidence to support this intervention in patients with nonarthritic hip pain is lacking. Both over-the-counter and prescribed anti-inflammatory agents, including nonsteroidal anti-inflammatory drugs and COX-2 inhibitors, may be prescribed as part of an intervention program. However, it should be noted that this class of drugs is not without risk for serious adverse events, including greater risk of gastrointestinal bleeding.

In individuals with FAIS, nonsurgical management is supported by consensus statements and evidence demonstrating clinical improvement with physical therapist management.[105,193]

Kemp et al[105] recommended exercise-based intervention for a minimum of 3-month duration; however, this recommendation was based on limited evidence. Ishøi et al[90] conducted an SR reporting multimodal physical therapy interventions that included 1 or more of the following: muscle strengthening exercises, manual therapy intervention, functional retraining, and movement pattern training as having a small- to medium-sized effect on clinical outcomes compared to modalities, stretching, and/or advice. The authors also noted while physical therapist management demonstrated inferior outcomes when compared to surgery (small effect size based on moderate quality of evidence), evidence for comparing surgical and nonsurgical intervention ranged from very low to moderate quality.[90]

Evidence assessing the effectiveness of nonsurgical intervention for patients with hip dysplasia is lacking. Physical therapist management for this population should be based upon examination findings and functional deficits identified during clinical evaluation. The established association between the severity of acetabular dysplasia and OA may play a role in timing of surgical intervention and role for physiotherapy interventions. Wyatt and Beck[212] noted the importance of considering both short-term resolution of symptoms and the possible long-term consequence of progression to hip OA. In female patients, a 1° decrease in LCEA below 28° increases risk of developing radiographic OA and undergoing a THA by 13% (odds ratio [OR] = 0.87; 95% CI: 0.78, 0.96) and 18% (OR = 0.82; 95% CI: 0.75, 0.89), respectively.[197]

Cheng et al[27] analyzed the rate of continued nonsurgical management versus progression to surgery at a minimum of a 1-year follow-up in 713 patients (830 hips) diagnosed with either FAIS or acetabular dysplasia, at a tertiary care center. Patient ages ranged from 13 to 40 years (25.4 ± 8.1 years), and they were 72.7% female with a mean follow-up of 2.6 years (1.0-4.8–year range). The authors found that at a minimum of 1-year follow-up, 429 out of 830 of the hips (51.7%; 95% CI: 48.2%, 55.1%) included did not progress to surgery. Younger age (OR = 0.95/year; 95% CI: 0.93, 0.98), pain duration longer than 6 months (ORs = 1.87, 2.03; P≤.027), worse physical function (OR = 0.96/Patient-Reported Outcomes Measurement Information System [PROMIS] point, 0.92-0.99), diagnosis of FAIS (OR = 3.47 [2.05–5.89]) acetabular dysplasia (OR = 2.75 [1.73-4.35]), and/or presence of labral tears (OR = 10.71 [6.98-16.47]) were identified as predictors for progression to surgery. Radiographic dysplasia with an LCEA less than 20° increased the likelihood of surgery in all subgroups (ORs = 2.05-8.47, P≤.008).[27] In patients with severe cam FAIS (α > 63°), a larger alpha angle was associated with an increased likelihood of surgery (OR = 1.03/degree, 1.00-1.06).[27]

Arthroscopic osteoplasty is the most common intervention to address morphologic variations of impingement contributing to pain in patients with FAIS.[129] Repair procedures have surpassed resection as the most performed procedure to address acetabular labral tears.[129,175] Limited evidence suggests superior outcomes associated with labral repair.[114] Labral reconstruction has emerged as an option in select cases such as the presence of large irreparable tears or revision procedures.[17] When capsuloligamentous laxity is considered a primary source of joint instability, capsular repair or plication procedures may be performed in conjunction with labral procedures to restore stability to the hip joint.[33]

Since the publication of the 2014 CPG, most surgical literature has focused on arthroscopy to address FAIS and acetabular labral tears. Lee et al[124] conducted an SR to evaluate function as assessed by patient-reported outcomes (PROs) and 10-year or longer survivorship after primary hip arthroscopy. Four level III and 8 level IV studies were included. Eight studies reported significant improvement after hip arthroscopy at minimum of 10 years after surgery. Five of 12 studies reported 80% achievement of minimal clinically important difference (MCID) and 75% achievement of patient acceptable symptom state (PASS) for at least 1 of the included PROs.[124] These findings were consistent with the outcomes reported by Kyin et al[117] who examined 5-year outcomes. However, both studies reported highly variable revision rates and conversion rates to THA. Chondral damage, presence of OA, and increased age were the most cited predictors for suboptimal outcomes.[117,124]

Since the publication of the 2014 CPG, the body of evidence to support periacetabular osteotomy (PAO) for treatment of acetabular dysplasia has expanded. Arthroscopic interventions to address soft tissue pathology in the setting of mild/borderline dysplasia have been described with variable success.[60,136] Tan et al[194] conducted an SR and meta-analysis of the current literature on survivorship characteristics of patients undergoing PAO surgery. Twenty-four level IV studies (3471 patients, 3655 hips) met inclusion criteria with a mean follow-up of 54.2 months (range, 1-336 months). The authors reported that the median survival time for a PAO was 16 years, with a 10-year survivorship rate of 75.9% and a 20-year survivorship rate of 36.5% for patients undergoing this procedure for acetabular dysplasia.[194] Age greater than 40 years and a Tönnis grade 2 or higher were associated with negative outcomes. Curley et al[32] conducted an SR examining the return-to-sport rate in athletes who underwent a PAO for symptomatic acetabular dysplasia. In this study, the term "competitive athlete" was broadly defined as participation in any sport at any level from recreational to professional. Six level III and IV studies met the inclusion criteria, and the authors reported a greater than 70% return-to-sport rate in these competitive athletes.[32]

The timing of surgery and outcomes at 2 and 5 years following hip arthroscopy in patients with FAIS has been investigated in a pair of level III cohort studies.[115,116] A cohort study by Kunze et al[115] assessed the outcomes of 1049 patients (mean age, 32.3 ± 12.4 years) who underwent hip arthroscopy for FAIS to determine timing of surgical intervention. Patients with a minimum follow-up of 2 years (mean time, 30.8 ± 6.7 months) after undergoing arthroscopic surgery to address FAIS were included. Clinical outcomes were assessed by PROs for nonarthritic hip joint pain including the Hip Outcome Score-Activities of Daily Living (HOS-ADL), Hip Outcome Score-Sports-Related Activities (HOS-SRA), Modified Harris Hip Score (mHHS), International Hip Outcome Tool-12 (iHOT-12), and visual analog scales for pain and satisfaction. With the exception of the iHOT-12 (P = .028), PRO scores of patients who underwent hip arthroscopy for FAIS within 3 to 6 months of symptom onset were no different than patients who waited between 6 and 12 months. However, when compared to patients who waited greater than 12 months, patients undergoing surgery within 3 to 6 months demonstrated significantly higher postoperative scores on all PROs. Undergoing surgery within 3 to 6 months of symptom onset was associated with achieving the MCID on the HOS-ADL (OR = 1.81; 95% CI: 1.20, 2.73) and HOS-SRA (OR = 1.90; 95% CI: 1.11, 3.17), as well as achieving the PASS on the HOS-ADL (OR = 1.85; 95% CI: 1.34, 2.56) and HOS-SRA (OR = 1.58; 95% CI: 1.14, 2.18). The authors note that while these results may assist in surgical timing, the results should be confirmed in a prospective study.[115]

Kunze et al[116] conducted a retrospective comparative trial to determine the effect of preoperative symptom duration on 5-year clinical outcomes following arthroscopy for FAIS. At a minimum of 5 years, 310 out of 389 (79.7%) patients (63.9% female; mean age, 34.1 ± 11.9 years) were available for follow-up assessment who met inclusion criteria. The patients were dichotomized to patients with a preoperative symptom duration of less than 2 years or preoperative symptom duration greater than 2 years. Five-year clinical outcomes including the HOS-ADL, HOS-SRA, mHHS, and pain and satisfaction scores were compared between patients experiencing preoperative symptoms less than 2 years and greater than 2 years in duration. The authors found preoperative symptoms of greater than 2 years was an independent predictor for worse performance on the HOS-ADL, HOS-SRA, mHHS, and pain scale (P<.05). The likelihood of achieving the MCID for the HOS-ADL (OR = 0.53, P = .037), HOS-SRA (OR = 0.38, P = .003), and mHHS (OR = 0.43, P = .009) was significantly less in patients with preoperative symptoms greater than 2 years. Additionally, patients with a greater than 2-year symptom duration were less likely to achieve a PASS for the HOS-SRA (OR = 0.44, P = .006) and mHHS (OR = 0.46, P = .006). Finally, there was a significantly lower likelihood of patients with a greater than 2-year symptom duration to reach a substantial clinical benefit for the HOS-ADL (OR = 0.50, P = .011), HOS-SRA (OR = 0.52, P = .020), and mHHS (OR = 0.47, P = .007).[116]

The clinical management of patients diagnosed with nonarthritic hip joint pain is evolving. Although the number of studies reporting positive outcomes for arthroscopy for FAIS has increased, the quality of evidence ranges from very low to moderate. While studies comparing clinical outcomes between physical therapist management and arthroscopy tend to favor surgery, clinicians should note the small effect sizes and that both interventions have shown improvement in patients with FAIS.

The current state of available evidence and clinician consensus continues to support the recommendation of a trial of nonsurgical treatment for a minimal duration of 3 months for the majority of patients with nonarthritic hip joint pain. Treatment should be impairment based and should follow evidence-based practice. Patients should be reassessed at regular intervals using PROs that have been validated for patients with nonarthritic hip joint pain. Worsening of hip-related symptoms and functional status, a period of minimal improvement approaching 6 months from symptom onset, or patients' unwillingness to participate in rehabilitation should be considered indications for additional medical evaluation. The decision to participate and length of rehabilitation episode should be individualized and may be affected by numerous factors such as comorbidities, patient goals and occupational demands, concerns for joint stability, and factors that may contribute to premature joint degeneration. The complex nature and multitude of interventions available to patients with nonarthritic hip joint pain warrants a multidisciplinary, patient-centered approach.

It should be noted that the ultimate success of physical therapist management will be dependent on a variety of patient-related factors. Patients who are not improving to an acceptable level should be referred to an appropriate medical provider for potential surgical consultation. It is the opinion of the authors of this CPG that those who potentially have significant bony abnormalities that are contributing to their clinical presentation of hip joint pain should be considered for surgical consultation earlier in the medical management process. Additionally, consideration for earlier referral for surgical consultation may be made for those who want to maintain a high level of activity, such as athletes. Patients presenting with soft tissue–related ROM restrictions, strength deficits, and poor neuromuscular control may represent good candidates for physical therapist management, particularly if they are able to comply with education in the avoidance of pain-provoking activities.

Diagnosis

CLINICAL ASSESSMENT/TESTING

2014 Recommendation

C Clinicians should use the clinical findings of anterior groin or lateral hip pain or generalized hip joint pain that is reproduced with the hip flexion, adduction, internal rotation (FADIR) test or the hip flexion, abduction, external rotation (FABER) test, along with consistent imaging findings, to classify a patient with nonarthritic hip joint pain.

Evidence Update

II A cohort study found the ligamentum teres test to have a sensitivity of 0.09, specificity of 0.85, negative predictive value of 91%, and positive predictive value of 84%, in 75 patients (mean age, 34.2 years; 29 females, 46 males) undergoing arthroscopic hip surgery. The ligamentum teres test is positive when pain is reproduced at the end range of IR and/or ER with the hip in 70° flexion and 30° short of full abduction.[160]

II In 109 subjects (mean age, 27.8 years; 65 females, 44 males) undergoing hip arthroscopy, the abduction-hyperextension-external rotation, prone instability, and the hyperextension-external rotation tests predicted arthroscopically confirmed hip microinstability in 86.3% to 90.9% of patients when a positive result was obtained on any of the 3 tests. However, a negative test result did not conclusively rule out hip instability as only the abduction-hyperextension-external rotation test performed above 75% for the negative predictive value.[85]

III An umbrella review by Fernandes et al,[55] which included 6 SRs and a total of 24 studies, found that clinical tests for FAIS generally had high sensitivity but lower specificity. The diagnostic accuracy for 9 special tests for FAIS varied greatly across studies and was found to fall in the following ranges: FADIR sensitivity = 0.08-1.00, specificity = 0.03-1.0 (19 studies); FABER sensitivity = 0.41-0.98, specificity = 0.18-1.00 (8 studies); resisted straight-leg raise sensitivity = 0.06-0.75, specificity = 0.29-1.00 (3 studies); posterior impingement sensitivity = 0.18-0.21, specificity not reported (2 studies); scour sensitivity = 0.50-0.88, specificity of 0.29-0.43 (1 study); IROP sensitivity = 0.8-1.0, specificity = 0.15-0.18 (1 study); log roll sensitivity = 0.30; specificity not reported (1 study); maximum squat test sensitivity = 0.75, specificity = 0.41 (1 study); foot progression angle walking sensitivity = 0.61, specificity = 0.56 (1 study). Consistent with other studies,[72,138] a review by Ishøi et al[90] noted generally low diagnostic effectiveness of tests to identify FAIS, with a pain-free FADIR test or no restricted ROM with the FABER test compared to the unaffected side, being the best tests to rule out those without FAIS. Because of the high sensitivity but lower specificity, it has been suggested that the FADIR be used as a screening tool for FAIS. However, the FADIR was found inadequate in differentiating between cam or pincer morphology.[21]

III The prone apprehension relocation test was found to have excellent interrater reliability (K = 0.81; 95% CI: 0.69, 0.93) in a retrospective study of 190 hips (96 patients; average age, 32 ± 12.1 years; 61 females, 35 males).[205]

IV An SR by Cohen et al[30] identified 9 studies of level IV evidence and summarized that an individual with microinstability typically presents with a history of anterior hip pain and pain with hip extension and ER on physical exam.

Evidence Synthesis

Based on the evidence, an ability to accurately diagnose those with FAIS using clinical examination testing is limited. A summary of level III studies found that the FABER, maximal squat, FADIR, foot progression angle, IR with over pressure, scour, and resisted straight-leg raise (Stinchfield test) may serve as screening assessments to identify those who do not have FAIS as sensitivities of these tests were generally high. However, none of these tests could adequately identify those with FAIS due to low specificity. A finding of no pain with FADIR and no restricted ROM with FABER compared with the unaffected side was recommended as the best test result to identify those without FAIS. There was evidence with 1 level II cohort study to support the ligamentum teres test to accurately identify those with and without a ligamentum teres tear. Another level II cohort study found that the abduction-hyperextension-external rotation, prone instability, and the hyperextension-external rotation tests have high specificity but low sensitivity for hip instability. The benefits of performing these clinical tests are that those without FAIS may be identified when select tests are negative and that those with and without a ligamentum teres tear can be identified. The harms of performing these tests include potential aggravation of a patient's symptoms.

Gaps in Knowledge

There is a lack of high-quality evidence to support the use of clinical examination testing in identifying specific pathoanatomy in those with nonarthritic hip joint pain. This includes

FAIS and instability. Further studies are needed to better identify if a cluster of clinical examination findings can be used to help place individuals into appropriate classification-based treatment categories.

2023 Recommendation

C Clinicians may use FADIR and FABER during clinical assessment to identify those without FAIS when these tests are negative.

C Clinicians may include the ligamentum teres test during clinical assessment to identify those with and without a ligamentum teres tear.

DIFFERENTIAL DIAGNOSIS

Physical therapists should be able to identify musculoskeletal and nonmusculoskeletal conditions that mimic the clinical presentation of nonarthritic hip joint pain conditions and promptly refer patients to other health care professionals for further evaluation and management, if appropriate. The steps in developing a differential diagnosis include history taking, physical examination, and possibly, imaging. A list of potential, but not all-inclusive, differential diagnoses for nonarthritic hip joint pain is as follows:

- Lumbosacral spine pathology
- Nerve entrapment (lateral femoral cutaneous, obturator)
- Hip osteoarthrosis
- Iliopsoas tendinitis/bursitis
- Adductor strain
- Obturator internus strain
- Inguinal hernia
- Athletic pubalgia (sports hernia)
- Osteonecrosis of femoral head
- Stress fracture (proximal femur or pelvic)
- Avulsion injury (sartorius or rectus femoris tendon)
- Myositis ossificans
- Heterotopic ossification of hip joint
- Neoplasm (benign or malignant)
- Legg-Calvé-Perthes disease
- Slipped capital femoral epiphysis
- Osteomyelitis
- Psoas abscess
- Septic arthritis
- Rheumatoid arthritis
- Prostatitis
- Metabolic bone disease
- Urogenital disorders

IMAGING

Imaging studies are used in conjunction with clinical findings to rule out serious diagnoses such as cancer, osteonecrosis, or fracture. Imaging may also provide information regarding the bony structure of the femur and pelvis, as well as related soft tissue. Information from imaging studies should be evaluated in the context of the entire clinical presentation, where the clinician should have an understanding of imaging applications (eg, determining diagnosis, monitoring disease progression), associated results, and how these applications and results affect clinical decisions related to patient management. The clinician should also be aware that, often, findings from imaging are incidental and impact patient management only to the extent of providing education and reassurance to the patient.

The American College of Radiology (ACR) has produced the "ACR Appropriateness Criteria" as an evidence-based guideline to assist providers in making the most appropriate imaging choices, including recommendations for patients with acute and chronic hip pain (https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria).These ACR Appropriateness Criteria state that hip and pelvic radiographs are recommended as the initial choice for imaging in those with acute or chronic hip pain. Findings on the hip and pelvic radiographs may lead to diagnosis such as radiographic OA or lead to additional examinations or imaging for other conditions such as bone tumor. When assessing for radiographic changes of OA, the Tonnis Classification is commonly used and defined as follows: Grade 0 (no signs of OA); Grade 1 (Mild; increased sclerosis, slight narrowing of the joint space, no or slight loss of head sphericity); Grade 2 (Moderate; small cysts, moderate narrowing of the joint space, moderate loss of head sphericity); Grade 3 (Severe; large cysts, severe narrowing or obliteration of the joint space, severe deformity of the head). The anteroposterior pelvic radiograph is most useful for assessing acetabular over- and undercoverage of the femoral head, associated with FAI or DDH, respectively. Specialized views, such as the false profile, frog lateral, elongated femoral neck lateral (Dunn) views,[46,146] or cross-table lateral,[48] allow for radiographic assessment measures of femoral head and neck deformities. The clinician is encouraged to refer to Clohisy et al[28] for a thorough description of the measurement methods and representative figures. Acetabular depth is commonly defined by the lateral center edge angle of Wiberg[208] and is the angle measured between a vertical line from the center of the femoral head and a line from the lateral edge of the acetabulum. The angle formed normally is between 25° and 39°. Values less than 25° indicate lateral acetabular undercoverage,[37] where values above 39° indicate lateral or excessive acetabular overcoverage.[9,151,154,198,208] Radiographic indicators of pincer morphology associated with acetabular retroversion include the crossover [54] and ischial spine signs.[98] Cam morphology is identified on the lateral radiographic views and quantified by measuring the alpha angle[158] and anterior offset distance.[9,13,146] The alpha angle is

measured as the angle between a line connecting the center of the formal head and a line from a point on the anterolateral head-neck junction where the radius of the femoral head begins to increase beyond the spherical shape found more centrally in the acetabulum. A large alpha angle greater than 60° is suggestive of cam morphology.[146] However, it should be noted that variations of suggested normal measurements related to cam morphology exist within the literature.[146] In addition, the relationship between pain and bony abnormalities has not been fully established.

If further information is needed beyond radiographs, magnetic resonance (MR) arthrography or MR imaging (MRI) without contrast are the next imaging studies recommended. Evidence suggests both MR arthrography and MRI without contrast are both able to identify labral tears accurately.[84,93,147,219] However, MR arthrography may better evaluate capsular volume and acetabular chondral delamination. Noncontrast MRI is recommended when extra-articular conditions are suspected to contribute to the patient's symptoms. These conditions may include the following: trochanteric, iliopsoas, ischial, and subiliacus bursitis; abductor, adductor, and hamstring tendinosis and tears; athletic pubalgia; and extra-articular impingements. Diagnostic ultrasound may be an alternative to noncontrast MRI in evaluating extra-articular soft tissues in the region of the hip and may also identify fluid collections associated with paralabral cysts. Dynamic ultrasonography may be used to assess bony impingement and/or joint instability.

Fluoroscopic or ultrasound-guided anesthetic and/or corticosteroid injections can be a useful tool in identifying the source of chronic hip pain.[132,216] In addition to intra-articular injections, selective trochanteric and iliopsoas bursal/peritendinous injections can be performed for both diagnostic and therapeutic purposes using anesthetic and/or corticosteroid injectate, respectively. Symptomatic relief following selective injection of particular structure(s) can help to define the etiology of the patient's symptoms and can guide future therapy.

In addition to radiographs and either noncontrast MRI or MR arthrography, computed tomography (CT) is often used for preoperative assessment of bony anatomy in the setting of FAI and hip dysplasia. CT data generated three-dimensional reconstructions with virtual models can assess bony morphology throughout a patient's hip ROM. Limited images of the knees may be obtained as part of the hip CT to evaluate for femoral version, which can contribute to abnormal mechanics of the hip.

Examination

OUTCOME MEASURES

2014 Recommendation

A Clinicians should use a validated outcome measure, such as the Hip Outcome Score (HOS), Copenhagen Hip and Groin Outcome Score (HAGOS), or International Hip Outcome Tool-33 (iHOT-33), before and after interventions intended to alleviate the impairments of body function and structure, activity limitations, and participation restrictions in individuals with nonarthritic hip joint pain.

Evidence Update

II An SR by Impellizzeri et al[89] identified 6 SRs and 10 additional studies, which found evidence to support the use of the iHOT-33, iHOT-12, HAGOS, and HOS in those with hip-related pain.

II The PROMIS Physical Function (PF) displays excellent to good correlation with other hip-specific patient-reported outcome measures (PROMs).[159] In 197 patients (mean age, 32.8 years; 151 females, 46 males) with clinical findings that indicated the potential need for arthroscopic hip surgery to address FAIS, the PROMIS PF scores demonstrated excellent correlation with HOS-ADL (r = 0.801, P<.001) scores, very good correlation with mHHS (r = 0.721, P<.001) and iHOT-12 (r = 0.722, P<.001) scores, and good correlation with HOS-SRA (r = 0.675, P<.001) scores.[159]

II Hip-specific function of 24 patients with symptomatic acetabular dysplasia scheduled for PAO (mean age, 24 years; 24 females) were compared to 21 controls (mean age, 25 years; 19 females, 2 males) and found significant differences between patients with hip dysplasia and controls for the 5 PRO instruments given to each group (Hip Disability and Osteoarthritis Outcome Score (HOOS) Pain, 47.8 vs 99.2; HOOS-PS (short version), 61.9 vs 99.2; iHOT-12, 32.2 vs 99.2; mHHS, 54.5 vs 90.6; PROMIS PF, 41.4 vs 65.6; and PROMIS Pain Interference (PI), 62.0 vs 39.1 [all P<.0001]).[184]

III The 4 iHOT-33 subscale scores were found to be valid for use in patients with hip/groin pain who were not seeking surgery. In 278 patients with hip/groin pain (mean age, 31 years; 93 females) and 55 pain-free control participants (mean age, 29 years; 14 females), the subscales scores correlated to HAGOS scores (r range, 0.58-0.76; P<.001). Acceptable test-retest reliability (intraclass correlation coefficient [ICC], 0.88-0.78) over 6 months with 95% confidence minimal detectable change (MDC 95) values ranging between 19.9 and 26.2 points on the 4 subscales and 16.6 for the iHOT-33 total score was noted.[182]

III The iHOT-33, HOS-ADL, HOS-SRA, HAGOS, mHHS, and HOOS were studied in 30 patients (mean age, 24 years; 15 females, 15 males) undergoing nonsurgical management for hip and/or groin pain with clinical signs of FAIS. Among those patients whose symptoms remained stable, the ICC (3,1) for the iHOT-33, HOS-ADL, HOS-SRA, HAGOS, mHHS, and HOOS ranged between 0.73 and 095 over 7 to 14 days (mean, 7.5 days). The MDC 95 at the individual level was calculated as follows: iHOT-33 total = 15.6; HOS-ADL = 17.8; HOS-SRA = 28.9; HAGOS subscales range, 15.3 to 22.3; mHHS = 21.1; NHS = 12.4, HOOS range, 12.3 to 29.4.[82]

III The subjective hip value (SHV) consists of only 1 question: "What is the overall percent value of your hip if a completely normal hip represents 100%?" In 65 patients with FAIS (mean age, 41 years; 27 females, 38 males) and dysplasia (n = 56; mean age, 28 years; 38 females, 18 males) the SHV correlated to mHHS (r = 0.716, P = .001) and iHOT-33 (r = 0.746, P = .001). In 56 patients with dysplasia (mean age, 28 years; 38 females, 18 males), the SHV correlated to mHHS (r = 0.669, P = .001) and iHOT-33 (r = 0.567, P = .001).[113]

III Self-reported function, as assessed with the iHOT-12, was associated with the Pain Self-Efficacy Questionnaire (rho r_s = 0.71, P<.001) and the Tampa Scale of Kinesiophobia (rho r_s = −0.56, P<.001) in 51 patients (mean age, 35.7; 42 females, 9 males) with FAIS. Those with self-reported depression and/or anxiety scored higher on the Pain Catastrophizing Scale (27.1 vs 16.3; P = .01) and the Tampa Scale of Kinesiophobia (45.6 vs 41.4; P = .04) and lower on the Pain Self-Efficacy Questionnaire (31.1 vs 41.6; P = .006) than those without self-reported depression and/or anxiety.[94]

III In a cohort of 165 soccer players (mean age, 26 years; 35 females) with a positive FADIR, the presence or absence of cartilage defects and/or labral tears did not affect iHOT-33 and HAGOS scores (unadjusted indirect effect estimates ranged from 0.167 (95% CI: −1.81, 0.847; P = .75) to 0.825 (95% CI: −0.898, 2.548; P = .35).[181]

III There is evidence to support German and French versions of both the iHOT-12 and iHOT-33,[11,12,40,41] as well as evidence to support Dutch and Brazilian versions of the HOS[62,176] and HAGOS.[145,192] There is also evidence to support a Turkish version of the Nonarthritic Hip Score (NAHS).[80]

Evidence Synthesis and Rationale

Additional evidence based on primarily level II and III studies, specifically to assess outcomes of nonsurgical rehabilitation in those with nonarthritic hip joint pain, supports the use of the iHOT, HAGOS, HOS, PROMIS PF+PI, HOOS, and mHHS. Specific MDC values were identified as follows: iHOT-33 = 15.6, HOS-ADL = 17.8, HOS-SRA = 28.9, HAGOS = 15.3-22.3. These MDC values may allow clinicians to identify a change in score that may be discernable. Evidence also suggests mental health issues may be present in those with nonarthritic hip joint pain, and therefore, assessing for depression, anxiety, low self-efficacy, and kinesiophobia may be indicated.[88,177] Because no harm has been documented when using PROMs, and patients with nonarthritic hip pain complain of impaired physical function, a strong recommendation to use PROMs to assess self-reported function is warranted.

Gaps in Knowledge

An essential psychometric property in outcome assessment is the ability to define a patient's current status, as well as change in status. This can be done using clinically important outcome values such as MCID, PASS, substantial clinical benefit, and maximal outcome improvement. Research is needed to further define the psychometric properties and clinically important outcome values of PROMs under different time frames with specific subgroups of patients with nonarthritic hip joint pain. Further studies are needed to define the usefulness of specific PROMs of depression, anxiety, low self-efficacy, and kinesiophobia.

2023 Recommendation

A Clinicians should continue to use the iHOT, HAGOS, HOS-ADL, and/or HOS-SRA at baseline and at least 1 other follow-up point, which includes discharge to assess the impact of impairments of body function and structure on activity limitations and participation restrictions in those with nonarthritic hip joint pain.

C Clinicians may use a PROM to assess for depression, anxiety, low self-efficacy, and kinesiophobia at baseline and at least 1 other follow-up point that includes discharge in those with nonarthritic hip joint pain.

Physical Impairments

2014 Recommendation

B When evaluating patients with suspected or confirmed hip pathology over an episode of care, clinicians should assess impairments of body function, including objective and reproducible measures of hip pain, mobility, muscle power, and movement coordination.

Evidence Update

III Less hip flexion ROM (mean difference, 13°; 95% CI: 8°, 18°), IR ROM (mean difference, 4°; 95% CI: 1°, 8°), and ER ROM (mean difference, 5°; 95% CI: 1°, 10°) were found in 30 subjects (mean age, 37 years; 22 females, 8 males) with symptomatic intra-articular hip pathology compared to 32 asymptomatic participants (mean age, 30 years;19 females, 13 males).[173] When 54 male athletes with FAIS (mean age, 25.2 years) were compared to 66 asymptomatic males (mean age, 24.08 years), hip flexion (112° vs 117°; P = .004), abduction (33° vs 44°, P<.001), and IR (33° vs 53°, P<.001) values for the FAIS group were reduced compared with controls.[150] Similar loss of IR ROM findings was identified in other studies.[137,203] Estberger et al[52] found that hip IR of 27° or less had good sensitivity (81%) and specificity (85%) to detect an alpha angle above 60° in 72 subjects (mean age, 35 years; 36 females, 36 males) in those with hip and groin pain.

III A cross-sectional study compared 36 individuals with a cam morphology on MRI to 53 individuals without and found those with a cam had reduced IR supine with the hip flexed (right: cam = 24°; noncam = 29° [P = .022]; left: cam = 26°, noncam = 31° [P = .028]), IR sitting (right: cam = 29°, noncam = 37° [P = .001]; left: cam = 31.5°, noncam = 38° [P = .006]), and supine hip flexion (right: cam = 117°, noncam = 122° [P = .05]; left: cam = 116°, noncam = 124.5° [P = .001]), and a positive impingement test (right: χ^2 = 6.628 [P = .010]; left: χ^2 = 7.675 [P = .006]).[4] In adolescent athletes (26 hips; age range, 12-18 years), decreased hip IR (RR = 1.2; 95% CI: 1.1, 1.3; P = .003) and decreased hip flexion (RR = 1.4; 95% CI: 1.1, 1.6; P = .001) were associated with an increased risk of degenerative changes on MRI at 5-year follow-up.[213]

III Thirty-three subjects (mean age, 35 years; 10 females, 23 males) with hip-related groin pain showed reduced hip IR ROM in 90° of flexion (mean difference, –4.5°; 95% CI: –8.6°, –0.4°) and neutral (mean difference, –7.3°; 95% CI: –11.9°, –2.6°) compared to 37 patients (mean age, 33 years; 23 females, 24 males) with non–hip-related groin pain.[164] Hip IR ROM in 60 professional male soccer players (mean age, 23.1 years) was lower in those with a history of hip-related groin injury (21.1° ± 6.8° vs 28.3° ± 8.9°; P<.001).[191]

III A cross-sectional study of 38 subjects with CHJP and 38 matched asymptomatic participants (CHJP [mean age, 28.1 ± 5.0 years; 32 females, 6 males], asymptomatic [mean age, 27.7 ± 5.6 years; 32 females, 6 males]) found Craig's test to be valid as a significant difference was found between those with MRI-identified femoral anteversion, normal range, and femoral retroversion (24° ± 7° vs 15° ± 6° vs 8° ± 7°; P<.01). Additionally, those with femoral anteversion had less ER ROM(33° ± 7° vs 45° ± 10°) and more IR ROM (43° ± 8° vs 22° ± 16°) than patients with normal version values.199 Similarly, a cohort study of 221 patients (mean age, 32.5 years; 157 females, 64 males) undergoing hip arthroscopy found greater IR ROM in those with femoral anteversion and acetabular anteversion when compared to those with femoral retroversion and acetabular retroversion (44.2° vs 20.1°; P<.001).[25]

III A case control study of 134 patients with FAIS (mean age, 39.7 ± 10.8 years; 72 males) and 134 matched asymptomatic participants (mean age, 39.3 ± 10.9 years; 72 males) found significant differences (P<.05) between groups in peak torque for measures of concentric and eccentric knee extension and flexion, and concentric hip abduction, adduction, ER, and IR (mean difference range, 0.14-0.64 N·m/kg; effect size range, 0.55-0.91 N·m/kg).[66] Malloy et al[133] also found patients with FAIS (n = 34; mean age, 30 ± 7.0 years; 23 females, 11 males) had reduced muscle strength of the external rotators (FAIS, 1 ± 0.3 N/kg, vs asymptomatic participants, 1.2 ± 0.3 N/kg; P = .034), internal rotators (FAIS, 0.8 ± 0.3 N/kg, vs asymptomatic participants, 1 ± 0.3 N/kg; P = .03), and flexors (FAIS, 4 ± 1.1 N/kg vs asymptomatic participants, 4.8 ± 1.2 N/kg; P = .013) when compared to asymptomatic participants (n = 26; mean age, 27.3 ± 7 years; 17 females, 9 males). Sixty subjects (mean age, 36 years; 38 females) with FAIS demonstrated a strength deficit of 15%-21% (P<.001) and 10%-25% (P<.03) of the hip flexors and extensors, respectively, on the affected hip compared to the unaffected hip.[106] Similar strength deficits were noted by Wierks et al[209] in patients with hip pain prior to surgery.

III In 83 subjects (mean age, 39 years; 40 females, 43 males) scheduled for surgery secondary to FAIS, greater hip abduction (adjusted r^2 = 0.29, P<.001) and adduction (adjusted r^2 = 0.32, P<.001) strength was associated with higher iHOT-33 scores. For every additional 1 N·m/kg of hip abduction and adduction peak torque. an average increase of 22 and 21 points, respectively, can be expected on the iHOT-33.[65] Similarly, in 114 individuals (mean age, 32 years; 46 females) scheduled for hip arthroscopy, those with more severe symptoms and functional limitations had less hip extension, flexion, abduction, adduction, and ER and IR strength compared to those with

mild symptoms and functional limitations ($P<.01$).[57] In addition, greater adduction strength was associated with better PROMs (Spearman's rho, 0.408-0.463; $P = .02$-$.04$).[173]

III Fifteen females (mean age, 28 years) with CHJP demonstrated decreased hip abductor strength (74.6 ± 16.8 N·m vs 93.6 ± 20.2 N·m; $P = .009$) when compared to asymptomatic participants, matched by age, sex, and body mass index.[135] In 34 subjects (21 females [mean age, 26 years], 13 males [mean age, 24 years]) with FAIS, hip abductor strength deficits in females were negatively associated with performance on the Oxford Hip Score ($r = -0.480$, $P = .032$), whereas hip flexor strength deficits were associated to cam deformity in males ($r = 0.724$, $P = .012$).[130] In addition, lower isometric hip abduction strength (mean difference, −0.30 N·m; 95% CI: −0.58, −0.01) was found when 15 individuals (mean age, 25 years; 4 females, 11 males) with symptomatic FAIS were compared to asymptomatic participants.[36] An SR by Mayne et al[139] found 1 study that examined hip strength in those with CHJP. This study identified weakness of the hip IR, ER, and abductors with handheld dynamometry (16%-28% difference, $P<.01$) in 35 participants with CHJP (mean age, 28.2 years; 28 females, 7 males) and 35 (mean age, 28.0 years; 28 females, 7 males) asymptomatic participants.[77] In 40 (mean age, 28.2 years; 33 females, 7 males) individuals with hip-related groin pain, weaker hip abduction was associated ($r = .47$, $P \leq .01$) with less hip flexion during a single-leg squat.[76]

IV A case series of 50 patients (mean age, 32.0 years; 18 females, 32 males) undergoing hip arthroscopy found strength deficits in the hip abductors (8.7%) and flexors (8%) compared to the patients' contralateral limbs.[155]

Evidence Synthesis and Rationale

Consistent with the 2014 CPG,[50] deficits in hip ROM and muscle strength have been identified as impaired body function measures in those with nonarthritic hip pain. Level III evidence supports measuring hip IR, ER, flexion, abduction, and extension ROM in those with hip and groin pain, with hip IR and flexion being most impaired in those with FAIS. Level III evidence also supports measuring the strength of the hip flexors, extensors, abductors, adductors, external rotators, and internal rotators with a handheld dynamometer. Although there is no strong evidence for measuring impairments of body structure and function, there were no reported harms.

Gaps in Knowledge

There is a lack of high-quality evidence that has studied physical impairment measures of body function in those with nonarthritic intra-articular hip joint pain. Studies are needed to better determine if physical impairments measures can be used in conjunction with classification-based treatment categories.

2023 Recommendation

B Clinicians should continue to assess impairments of body function, including objective and reproducible measures of hip pain, mobility, muscle strength, and movement coordination and specifically perform measures of ROM and strength for hip IR, ER, flexion, extension, abduction, and adduction, at baseline and at least 1 other follow-up point that includes discharge for individuals with nonarthritic hip joint pain.

Activity Limitation - Physical Performance Measures

2014 CPG Recommendation

None provided.

Evidence Update

II Validity of functional testing including self-selected walking speed (meter per second), sit to stand 5 times (seconds), and timed stair ascent (seconds) was measured in 24 symptomatic subjects (mean age, 24 years; 24 females) with hip dysplasia. Symptomatic subjects performed worse ($P<.001$-$.0027$) when compared to 21 asymptomatic females (mean age, 24 years; 19 females, 2 males). These performance measures demonstrated excellent test-retest reliability (ICC [2,1], 0.97-0.99) with sit to stand 5 times and timed stairs ascent being moderately correlated with the iHOT-12 (Spearman rank $r = -0.632$; -0.538, respectively).[184]

III Performance on the Star Excursion Balance Test (SEBT) was compared between 15 patients with FAIS (mean age, 25 years; 9 females, 6 males) and 15 asymptomatic participants (mean age, 32 years; 8 females, 7 males). Patients with FAIS scored lower on the symptomatic side in the posterolateral and posteromedial directions by 12% ($P = .006$) and 9% ($P = .001$), respectively. In those with FAIS, SEBT in the posterolateral and posterior medial

directions correlated with the HAGOS symptoms and pain intensity subscale scores (r^s = 0.55-0.75, P = .034-.001).[96] Freke et al[58] and Palsson et al[164] reported similar findings in individuals with FAIS when assessing SEBT performance.

III In a cross-sectional analysis of 39 patients (mean age, 36 years; standard deviation [SD], 10; 28 females, 11 males) with FAIS who were seeking medical care for hip-related groin pain, frontal plane impairments were more commonly identified than sagittal plane impairments during assessment of seated posture, sit to stand, standing posture, single-leg stance, single-leg squat, and walking tasks. A greater number of frontal plane impairments was significantly associated with worse function as measured by lower iHOT-33 scores (r = −0.36, P = .01), indicating that movement may be more impaired in individuals with worse self-reported function.[14] Clinical rating of movement pattern quality in 6 functional tasks (single-limb standing, squat, frontal lunge, hop lunge, bridge, plank) in 34 patients (mean age, 25 ± 5 years; 22 females, 12 males) with FAIS showed generally good intrarater agreement for overall ratings (Gwet's agreement coefficient range, 0.44-0.96) and fair to moderate intrarater agreement for segmental ratings (Gwet's agreement coefficient range, 0.23-1.00). Interrater agreements were overall lower (Gwet's agreement coefficient range, 0.00-1.00). Poor performers, as rated by the highly experienced physical therapist only, demonstrated lower hip abductor strength (P<.05).[22]

III Twenty individuals with FAIS (mean age, 32.2 years; 5 females, 15 males) were compared to 22 asymptomatic participants (mean age, 30.0 years; 7 females, 15 males). Those with FAIS demonstrated poorer performance compared with asymptomatic participants in self-selected walking velocity (1.32 vs 1.51 m/s, P = .002), timed stair ascent (5.92 vs 3.05 seconds, P = .017), and sit to stand 5 times (10.75 vs 5.53 seconds, P = .005.) Deficits in activities involving hip flexion, timed to ascent stairs, and sit to stand 5 times were associated (r = −0.7, P<.001) with increased reports of disability.[185]

III Roughead et al[178] compared 183 symptomatic (38 females [mean age, 26 years; SD, 7], 145 males [mean age, 27 years; SD, 7]) and 61 asymptomatic (38 females [mean age, 26 ± 7 years], 14 males [mean age, 27 ± 7 years]) soccer players with hip/groin pain and positive FADIR test, and found those with symptoms could not hop as far (adjusted mean difference, −9 cm; 95% CI: −15, −2; P = .012) or perform as many 1-leg sit to stand (adjusted mean difference, −7 repetitions; 95% CI: −11, −3; P = .001) as those without symptoms. When 54 male athletes with FAIS (mean age, 25.28 years) were compared to 66 asymptomatic men (mean age, 24.08 years), those with FAIS had significantly slower times during the 10-m sprint (3%, P = .002) and agility T test (8%, P<.001). No differences between groups were identified for squat depth.[150]

III An SR by McGovern et al[142] identified evidence to support the use of the single-leg squat test (SLST) and step-down test (SDT) as an assessment of neuromuscular control for the trunk, pelvis, hip, and knee in those with nonarthritic intra-articular hip pain. An additional study found that in 45 subjects (mean age, 28.5 years; 27 females, 18 males) with nonarthritic hip pain, those who passed or failed the SLST and SDT differed on the following measures: VAS pain for the SLST (3.6 vs 5.8, P<.001), VAS pain for the SDT (3.0 vs 5.6, P = .001), HOS-ADL for the SLST (78.8 vs 68.7, P = .029), HOS-SRA for the SLST (65.88 vs 48.9, P = .009), and HOS-SRA for the SDT (70.4 vs 50.5, P = .015). Interrater reliability was moderate to excellent for both the SLST (0.603-0.939) and SDT (0.745-0.943).[141]

Evidence Synthesis and Rationale

Level II evidence supports the validity and reliability of measures of activity limitation, including self-selected walking speed, 5 times sit to stand, and timed stair ascent, in those with dysplasia. Level III evidence supports these activity limitation measures in those with FAIS. There is evidence for reliability and validity of the SLST, SEBT, hop distance, and single-leg sit to stand in those with FAIS. The benefit of performing these tests is that clinicians may use them to document the impact of impairments of body structure and function on activity limitations and participation restrictions. The harms of performing these tests include potential aggravation of a patient's symptoms.

Gaps in Knowledge

There is a lack of high-quality evidence on measures of activity limitations and participation restrictions in those with nonarthritic hip joint pain. Further studies are needed to better define the usefulness and interpretation of direct measures of activity limitations and participation restrictions. In addition, research is needed to better link physical impairments measures of body structure and function to limitations in activity and participation restrictions.

2023 Recommendation

B Clinicians should include measures of function and postural control, with performance tests such as SLST, SEBT, hop distance, single-leg sit to stand, and timed measures of function at baseline and at least 1 other follow-up point that includes discharge for individuals with nonarthritic hip joint pain.

Interventions

Nonoperative interventions for patients diagnosed with nonarthritic hip joint pain were presented in the 2014 CPG.[50] Due to the limited quality of evidence, all intervention recommendations were based on expert opinion. Since that time, the amount and quality of research related to nonoperative management of nonarthritic hip joint conditions has increased. This has resulted in an expanded number of intervention categories and, at times, language that is different from the initial CPG.

The 2014 CPG included recommendations that were based on expert opinion for patient education and counseling, manual therapy, therapeutic exercise and activities, and neuromuscular re-education. The 2023 CPG addresses the original intervention categories along with additional categories: movement pattern training, multimodal intervention, and bracing. Clinicians should recognize that the evidence to support isolated effects of most intervention categories is still limited. Two new categories for 2023, movement pattern training and multimodal intervention, are supported by weak and moderate evidence, respectively.

Two prevailing trends play a significant role in the 2023 CPG intervention recommendations. The majority of studies investigate intervention for patients with FAIS. A smaller number and lower quality studies have investigated patient populations with other nonarthritic hip joint pain diagnoses such as microinstability or borderline hip dysplasia. Additionally, an emphasis has been placed upon comparing surgical and nonoperative interventions for patients with FAIS in the literature. Although results have generally favored surgical outcomes, the findings from studies comparing surgical and nonoperative treatment of FAIS have provided support for multimodal nonoperative intervention programs.[90] These findings provide a rationale for considering the recommendation of physical therapist management as a first line of intervention for patients diagnosed with FAIS.

Given the variability of impairments and activity limitations experienced by individuals with nonarthritic hip joint pain conditions, interventions should be based upon clinical examination findings and tailored to meet the specific needs of each patient. Clinicians should consider the updated evidence-based recommendations presented in this guideline in the appropriate context of clinical experience and patient preference when determining specific intervention recommendations for individuals with nonarthritic hip joint pain. Clinicians should utilize appropriate objective clinical impairment and performance measures to determine response to treatment, guide intervention selection, and exercise dosing. Additionally, clinical and performance measures can also be utilized to provide guidance related to activity resumption and participation recommendations.

MULTIMODAL INTERVENTION

A combination of interventions that may include education, manual therapy, neuromuscular re-education, therapeutic exercise, or training for correction of posture and movement during functional activities can collectively be considered multimodal intervention. Education may include information about the health condition or activity modification. Manual therapy interventions include techniques to address capsular and periarticular soft tissue restrictions suspected to impair hip mobility. Neuromuscular re-education may include various strategies to address impairments in balance, coordination, and kinesthetic sense. Therapeutic exercises use varied approaches to address impairments in muscle flexibility, muscle strength, muscle power deficits, and deconditioning. Clinicians should avoid prescribing symptom-provoking exercises or activities that require ROM that may create hip joint impingement in the case of FAIS or place excessive stress on capsuloligamentous structures in the case of hip instability. Task-specific training may be incorporated to educate a patient in how to optimize their lower extremity movement patterns during symptom-provoking activities.

2014 CPG Recommendation

None

Evidence Update

Ishøi et al[90] conducted an SR of 14 randomized control trials that examined the effect of multimodal physical therapy intervention on PROMs for individuals with FAIS, labral tears, or mixed populations with hip-related joint pain (no OA). Studies that allowed hip injections as part of nonoperative care were excluded. The authors concluded that "Prescribed physiotherapy consisting of hip strengthening, hip joint manual therapy techniques, functional activity-specific retraining and education showed a small to medium effect size compared with a combination of passive modalities, stretching and advice (very low to low quality of evidence; interpretation of evidence: very uncertain, but may slightly improve outcomes). Prescribed physiotherapy was, however, inferior to hip arthroscopy (small effect size; moderate quality of evidence; interpretation of evidence: hip arthroscopy probably increases outcome slightly). For both domains [surgical and nonoperative], the overall quality of evidence ranged from very low to moderate

indicating that future research on diagnosis and treatment may alter the conclusions from this review." [90]

I Griffin et al[69] conducted a randomized control trial comparing hip arthroscopy plus usual care postoperative physical therapy to personalized physical therapy in patients with FAIS. Personalized physical therapy consisted of individualized programs with structured exercise (strengthening, stretching), manual therapy, education, and injections for pain relief as needed and was provided in 6 to 10 visits over 12 to 24 weeks. At 12 months after randomization, hip-related quality of life (QoL), as measured by the iHOT-33, improved in both groups. Patients in the hip arthroscopy group improved from a mean iHot-33 score of 39.2 (±20.9) to 58.8 (±27.2). Patients in the physical therapy intervention group improved from 35.6 (±18.2) to 49.7 (±25.5). Hip arthroscopy led to greater improvement than personalized physical therapy, and this difference was clinically significant at 12 months (iHot-33 mean difference, 6.8; 95% CI: 1.7, 12.0; $P = .0093$). This study did not demonstrate cost effectiveness of hip arthroscopy compared with personalized hip therapy within the first 12 months.

I Using the same protocol as Griffin et al,[69] Hunter et al[86] compared personalized physical therapy and arthroscopic surgery. The primary outcome was cartilage regeneration, as assessed by delayed gadolinium-enhanced MRI of cartilage (dGEMRIC). Imaging data were available for 53/99 (54%) of recruited patients. Assessment of cartilage metabolism through dGEMRIC showed no significant difference ($P = .14$) between personalized physical therapy and arthroscopic hip surgery at 12 months after randomization. Clinically important improvements were noted for both groups on the 5-level EuroQol-5 Dimension (EQ-5D-5L), iHOT-33, and all HOOS subscales at 12 months. There were significant between-group differences favoring surgery ($P = .003$).

III Pennock et al[165] conducted a prospective cohort study that followed 76 adolescent patients (mean age, 15.3 years; range, 10.4-21.4 years) with FAIS who participated in a graduated management protocol. The protocol consisted of an initial trial of rest, physical therapy, and activity modification (discontinuance of sports, running, jumping, and high hip flexion for 6 weeks). Patients who remained symptomatic were then offered a steroid injection. Patients with recurrent symptoms were subsequently offered arthroscopic treatment. mHHS and NAHS assessments were collected at 12 and 24 months. Sixty-five hips (70%) were managed with physical therapy, rest, and activity modification alone. Eleven hips (12%) required a steroid injection but did not progress to surgery. Seventeen hips (18%) required arthroscopic management. All 3 groups saw similar improvements in mHHS ($P = .961$) and NAHS ($P = .975$) with mean improvements of 20.3 ± 16.8 and 13.2 ± 15.5, respectively. A majority (82%) of adolescent patients presenting with FAI syndrome was managed nonoperatively (posture, strength, trunk stabilization, flexibility, and activity modification), with significant improvements in outcome scores (mHHS, NAHS) at a mean follow-up of 24 months.

III Murtha et al[152] completed a secondary analysis including a subset of patients who had FAIS and an MRI-documented labral tear from the study of Pennock et al.[165] This secondary analysis reported clinical outcomes at an average of 36 months of follow-up in patients (36 hips from 33 patients). The authors reported that 42% (15/36) of hips were managed with physical therapy and activity modifications alone, 28% (10/36) of hips progressed to a steroid injection but did not require surgery, and 31% (11/36) required arthroscopic intervention. Seventy-three percent of hips treated with activity modification alone, 80% treated with an injection, and 82% of hips treated with arthroscopic repair met the MCID ($P = .859$) for the mHHS. At an average of 36 months of follow-up, the majority of adolescent patients with an acetabular labral tear achieved the MCID utilizing a graduated management protocol.

III Zogby et al[220] reported on the long-term follow-up of the cohort studied by Pennock et al.[165] Data from 51 (n = 69 hips) of the original 76 patients were available at a mean 5-year follow-up, with the mean mHHS and NAHS of 89.5 ± 10.8 and 88.1 ± 12, respectively. There was no significant difference in mHHS or the NAHS scores between those who completed nonoperative treatment only (50/69 subjects) and those who completed nonoperative treatment and arthroscopic surgery (12/69 subjects) groups at 5-year follow-up ($P>.6$). There was no difference in the proportion of hips meeting the MCID for the mHHS based on treatment course ($P = .99$). Nonoperative management of FAIS was effective in a majority of adolescent patients. Significant improvements in PROs persisted at a mean 5-year follow-up.

IV Ejnisman et al[49] conducted a retrospective case series to determine the clinical outcomes of individuals diagnosed with microinstabilty after completing a course of physical therapy. Sixty-four subjects (63 females, 1 male), with a mean age of 32.2 ± 10.5 years, were initially identified through clinical examination and had to demonstrate a positive finding on at least 1 of 3 hip instability tests to be considered for the study. Subjects were offered nonsteroidal anti-inflammatory drugs (NSAIDs) or an intra-articular injection if pain prevented them from exercising. However, the frequency and response to this option could not be determined. Subjects

attended 2 weekly formal physical therapy sessions for 6 weeks. They were also instructed to perform a home exercise program daily. Exercises intended to recruit gluteal muscles prior to hamstring muscles when producing hip extension were incorporated into the program. Follow-up data were available for 47 (73%) subjects. Thirty percent ultimately had surgery. Of the 33 (70%) subjects who did not undergo surgery, mHHS increased by 18 points ($P<.01$) and the iHOT-33 increased by 21 points ($P<.01$), suggesting that hip microinstability can be initially treated nonoperatively.

IV Kawai et al[102] conducted a retrospective analysis of 35 (22 females) patients to determine the short-term outcomes of patients with acetabular labral tears or FAIS that underwent physical therapy for a minimum of 2 months. Additionally, the authors investigated the relationship of labral injury severity as determined by MRI results. Labral tears were confirmed by MRI and graded for severity using the Czerny classification system. Nonoperative treatment included physical therapy, activity modification (which included refraining from activities that caused groin pain), and NSAIDS. After treatment, the iHOT-12 score increased by 29 points ($P<.001$) at 4.7 months. This increase surpassed the iHOT-12 MCID of 13. Eight (22%) patients underwent surgery. Additional analysis showed that patients with severe labral tears were less likely to report improvement and more likely to undergo surgery. It should be noted that although patients with classic DDH were excluded, patients with borderline dysplasia were included in this study.

IV Monn et al[149] analyzed midterm (4.6 ± 0.5 years) outcomes from a prior case series that evaluated the short-term (18 weeks) responsiveness of 26 out of 34 (76%) patients with FAIS who completed a 12-week, semistandardized, progressive exercise therapy program.[20] This study reported on 19 out of 34 (56%) patients who completed the exercise program and did not undergo hip surgery. The exercise therapy program consisted of two 45-to-60–minute sessions supervised by a physical therapist and two 15-minute home program sessions per week. Supervised sessions were structured to include warm-up activity, 4 hip-specific strengthening exercises, 2 functional lower extremity strengthening activities, 2 lumbopelvic stabilization exercises, and 2 postural balance exercises. Home program sessions included a warm-up activity, followed by a single hip abductor or extensor strengthening exercise, 1 functional lower extremity strengthening activity, and 1 lumbopelvic stabilization exercise. Intensity and complexity were progressed across 3 phases. The primary outcome measures were the HOS-ADL and HOS-SRA scales to represent pain and function, EQ-5D VAS for QoL, Hip Sports Activity Scale (HSAS) for sports participation, and Global Treatment Outcome for therapy responsiveness. When assessed at a 4.6-year follow-up interval, patients that participated in a nonoperative, progressive exercise therapy program demonstrated improved HOS-ADL scores ($P = .002$), HOS-SRA ($P = .002$), and EQ-5D VAS scores ($P = .013$). HSAS scores did not significantly improve. No significant differences were observed between midterm HOS-ADL, HOS-SRA, HSAS, and EQ-5D VAS, and previously reported 18-week follow-up scores.

Evidence Synthesis and Rationale

Prior to 2022, 7 SRs and meta analyses compared nonoperative to operative treatment for FAI syndrome.[90,107,183,24,47,63,10] The reviews reported similar findings based upon a sample of the same 3 randomized control trials. A consensus agreement was reached among the CPG authors to include the SR by Ishøi et al[90] due to its thorough scope and quality of intervention analysis.

One SR and 8 individual studies included multimodal interventions. The common populations represented across studies were FAIS and labral tears. All studies included education for activity modification and strengthening exercises. Activity modification included a period of rest from sports and avoidance of pain-provoking positions or movements during functional activities. Decreasing the amount of hip flexion was often part of the instructions for activity modification. Strengthening exercises most commonly focused on improving strength in specific hip muscles (iliopsoas, gluteus medius, gluteus maximus, hip internal, and external rotators), trunk musculature (abdominals and paraspinals), and general musculature of the thigh and leg. Activity modification and strengthening were combined in various ways with exercises for flexibility or balance, manual therapy techniques, or training for muscle activation or movement control. Three studies included only adolescents with FAIS and examined the use of a 3-phase protocol starting with physical therapy (multimodal), then adding a hip injection if needed, followed by arthroscopic surgery for nonresponders. A majority of adolescents responded to physical therapy alone or physical therapy plus a hip injection, supporting the use of a trial of nonoperative care in this population.

Gaps in Knowledge

There are several limitations in the current literature on multimodal interventions for individuals with nonarthritic hip joint–related pain. First, terminology used to categorize interventions is inconsistent. For example, across studies, terms used to describe exercise included any of the following: therapeutic exercise, stability exercises (implying strength), hip-specific strengthening, functional lower extremity strengthening, trunk exercises,

or flexibility exercises. Without knowing the specific exercise(s) included under each category, it is very difficult to replicate and compare effectiveness. Other common limitations include a lack of detail in describing exercises, the dosage of exercises, and criteria for progression. Compliance for performing home exercises or adhering to activity modifications is not reported. Hence, based on the current literature, there is no consensus on the "best physical therapist management" for this population.[39] Although limited evidence shows favorable outcomes for hip arthroscopy over nonoperative treatment, if optimal nonoperative treatment has not been determined, it makes comparison studies difficult to interpret. Multimodal nonoperative treatment appears to improve functional outcomes in this population, but more high-quality research is needed to clearly identify the optimal combination of interventions, as well as the details of those interventions.

2023 CPG Recommendation

B Clinicians should utilize multimodal interventions consisting of activity modification and exercises for strengthening specific hip muscles (iliopsoas, gluteus medius, gluteus maximus, and the internal and external rotators), trunk musculature (abdominals and paraspinals) and general lower extremity musculature (lunges, squats, step-ups), combined with additional interventions such as manual therapy, postural and movement correction, stretching, and balance exercises, when treating individuals with nonarthritic hip joint pain, particularly FAIS and labral injuries.

MOVEMENT PATTERN TRAINING

Movement pattern training uses personalized, task-specific training to educate a patient in how to optimize their lower extremity movement patterns during activities that are reported by the patient as symptom provoking.[78] These symptom-provoking activities may include ADL (eg, stair descent), work activities (sitting at a desk), and fitness activities (eg, cycling). The physical therapist performs a series of assessments, observing the patient's movement during standard tests and those activities the patient reported as symptom provoking. The goal of the assessment is to identify the patient's lower extremity movement pattern that is consistently associated with an increase in pain. For example, a common movement pattern noted is excessive hip adduction motion during tasks such as stair negotiation and squatting. When the patient reports increased pain with a movement test or activity, follow-up tests are performed by asking the patient to perform the same movement test or activity with a modified movement pattern. If the patient reports decreased pain with the modified movement compared to the previously performed test, the identified movement pattern is further implicated as a contributor to the pain problem.[201] Specific practice of those activities with modified movement patterns is then prescribed.[75,78] Patients are encouraged to use these modified movement patterns while performing their daily activities.

2014 CPG Recommendation

None

Evidence Update

II Harris-Hayes et al[75] completed a proof-of-concept RCT (n = 35) using a wait-list design to compare movement pattern training to no treatment for patients with CHJP. All patients enrolled in this study had signs and symptoms consistent with hip joint pain; however, the bony morphology varied. Some patients had impingement morphology (cam, pincer) or acetabular dysplasia; however, others had no signs of FAIS or DDH. Compared to the wait-list group, the movement pattern training group reported significant improvements on the HOOS subscales of symptoms (mean difference, 12.8; 95% CI: 3.1, 22.5), ADL (mean difference, 8.6; 95% CI: 1.2, 16.1), and Sport (mean difference, 9.4; 95% CI: 0.1, 18.8) after 6 weeks of treatment. In a follow-up study, those who were initially randomized to the wait-list group were also provided movement pattern training.[79] Pre- and posttreatment comparisons were performed including data from all patients who received movement pattern training (n = 28). After treatment, patients reported significant improvements in patient-reported function, quantified using the MHHS and HOOS subscales (P<.02). They also demonstrated a 2.4°+ 6.0° reduction in hip adduction motion during a single-leg squat (P = .045) and a 13% increase in hip abductor strength (P = .01) compared to pretreatment values. In this cohort, greater hip adduction motion reduction displayed after treatment was associated with greater improvement in MHHS.

II Harris-Hayes et al[78] completed a pilot RCT (n = 46) to compare movement pattern training to a standard rehabilitation approach, consisting of lower extremity and trunk strengthening and lower extremity flexibility, and reported results immediately and 12 months after treatment completion. After 12 weeks of treatment, both groups reported clinically significant improvements in pain and function,[78] represented by changes in all HOOS subscales, ranging from 12 to 24 points on a 100-point scale. These changes were sustained 12 months after treatment completion. Immediately after treatment, both groups demonstrated a 6%-to-22% improvement hip muscle strength; however, no differences existed between groups.[78]

Compared to the standard group, those who participated in movement pattern training displayed greater reductions in hip adduction (mean difference, −7.2°; 95% CI: −12.9°, −1.4°) and pelvic drop (mean difference, 3.0°; 95% CI: 0.4°, 5.6°) during a single-leg squat.[78] The effects of treatment on muscle strength and lower extremity movement patterns were not assessed 12 months after treatment.

II Koch et al[112] conducted a secondary analysis to assess changes in gluteal muscle structure (muscle volume and fatty infiltration) and function with treatment, using a subset of data (n = 27) from the Harris-Hayes pilot RCT[78] comparing movement pattern training to the standard approach. After 12 weeks of treatment, the standard group displayed a significant increase of 4% in gluteus medius muscle volume compared to 1% in the movement pattern training group (P = .04). Both groups displayed an increase in hip abductor strength (14% movement pattern training, 15% standard) and a decrease in the proportion of fat in the gluteus minimus and gluteus maximus muscles (P<.02).

Evidence Synthesis and Rationale

A proof of concept and a pilot study provide preliminary evidence regarding the effectiveness of movement pattern training for patients with nonarthritic hip joint pain. Movement pattern training has typically involved optimizing lower extremity movement patterns during activities that are reported by the patient as symptom provoking. This movement pattern training resulted in improvements in patient-reported pain and function, lower extremity movement patterns, and hip muscle strength. Improvements in patient-reported function and hip muscle strength were similar to improvements noted among patients who participated in standard rehabilitation. In 1 small cohort, a greater reduction in hip adduction motion during a task was associated with a greater improvement in patient-reported function. The studies reviewed in this guideline were designed to assess safety and feasibility and were not powered to find group differences; therefore, a weak recommendation is made based on level II evidence.

Gaps in Knowledge

A larger clinical trial is warranted to further assess the effects of movement pattern training, to address remaining uncertainty due to small sample size and posttreatment follow-up limited to 12 months after treatment.

2023 CPG Recommendation

C Clinicians may provide movement pattern training to optimize lower extremity movement patterns associated with pain during ADL for patients with nonarthritic hip joint pain and associated movement dysfunction.

THERAPEUTIC EXERCISE

2014 CPG Recommendation

F Clinicians may utilize therapeutic exercises and activities to address joint mobility, muscle flexibility, muscle strength, muscle power deficits, deconditioning, and metabolic disorders identified during the physical examination of patients with nonarthritic hip joint pain.

Evidence Update

II In a prospective, pilot randomized controlled study, Aoyama et al[8] compared the effect of adding trunk stabilization exercises to a program consisting of hip and pelvic muscle training exercises in 20 female patients (45.1 ± 8.8 years) diagnosed with FAIS. The control intervention included hip abduction, buttock elevation (bridging), and pelvic tilting exercises. The trunk stabilization intervention included the same exercises in the control intervention with the addition of prone plank and quadruped contralateral arm and leg raise exercises. The authors found that those completing the trunk stabilization intervention demonstrated significant improvements in hip joint flexion ROM and hip abduction strength in as early as 4 weeks when compared to those completing the control intervention (P<.05). Those completing the trunk stabilization intervention demonstrated significant improvement on the Vail Hip score (81.6 ± 18.5 vs 61.1 ± 11.6; P<.05) and iHOT-12 (78.7 ± 22.4 vs 53.0 ± 22.3; P<.01) PROMs at 8 weeks when compared to those completing the control intervention.

III McGovern et al[143] conducted a retrospective case series study of 46 patients (30.0 ± 12.0 years) with nonarthritic hip joint pain examining the effect of an 8-week structured exercise program on functional movement control and self-reported functional ability. Functional movement control was assessed using the SLST and SDT. A previously established protocol for conducting both tests on patients with nonarthritic hip joint pain was used.[142] Three trials for each test were evaluated for 6 deviation criteria and given a summary score (0 = best, 6 = worst) for each trial. The lowest score was used to grade performance for each test. Improvement was considered as any decrease in total score from the initial to follow-up assessment. Functional ability was assessed using the HOS-ADL and HOS-SRA. Patients attended supervised physical therapy 1 time per week. A home-exercise program was performed on weekdays when the patient was not attending supervised physical therapy. Patients were instructed to complete 4 out of 12 possible exercises while not repeating an exercise on consecutive days. Various and, at times, overlapping nonarthritic hip joint pain conditions were represented: acetabular labral tear (n = 46, 100%), FAI (n = 21, 46%), structural instability (n = 13,

28%), chondral deformities (n = 9, 20%), dysplasia (n = 8, 17%), and ligamentum teres pathology (n = 2, 4%). Thirty out of 46 patients improved their functional movement control during performance of the SLST, whereas 31 out of 46 improved performances of the SDT. There was a significant difference in HOS scores for those individuals that improved functional performance and those that did not improve ($P<.012$).

Evidence Synthesis and Rationale

Impairments in joint mobility, muscle flexibility, muscle strength, muscle power, and muscle endurance may be noted during clinical examination of individuals with nonarthritic hip joint pain. Limited evidence suggests the benefit of therapeutic exercise on pain and self-reported function within 6 to 8 weeks of initiating treatment.[8,143] Strengthening exercises should address muscles of the hip, pelvis, and trunk regions. Strengthening exercises that are performed in weight-bearing positions should be performed in a manner that promotes appropriate control of the hip and pelvic complex throughout the activity. Current consensus statements recommend physical therapist management that includes therapeutic exercise up to a period of 3 months for patients with FAIS.[105,193]

Gaps in Knowledge

The specific effect of therapeutic exercise on clinical outcomes has not been fully established. The majority of intervention studies for patients with nonarthritic hip joint pain evaluate outcomes related to multimodal interventions. Therapeutic exercise is consistently described as a component of multimodal intervention protocols. Therapeutic exercise can be an ambiguous term, describing a wide scope of activities that may be intended to improve impairments in pain, strength, flexibility, endurance, and movement quality. Further research is needed to determine the isolated effect of therapeutic exercise on patients with nonarthritic hip joint pain. Lack of detail in reporting limits clinicians' ability to replicate and determine patients' response to therapeutic exercise in the nonarthritic hip joint pain population.[51]

2023 CPG Recommendation

C Clinicians may use therapeutic exercises and activities to address joint mobility, muscle flexibility, and muscle strength deficits identified during the physical examination of patients with nonarthritic hip joint pain.

PATIENT EDUCATION AND COUNSELING

2014 CPG Recommendation

F Clinicians may utilize patient education and counseling for modifying aggravating factors and managing pain associated with nonarthritic hip joint pain.

Evidence Update

IV Kekatpure et al[103] conducted a retrospective case series study of 87 patients (45.1 ± 13 years) diagnosed with FAIS. All patients underwent a 12-week nonoperative intervention trial consisting of activity modification education that included instruction to avoid squatting, leg crossing, pivoting, excessive physical activity, and sitting on the floor; and a standardized regimen of NSAIDs. Arthroscopic surgery was performed if a patient did not achieve satisfactory clinical improvement after the 12-week intervention. Baseline and follow-up clinical scores were collected for the mHHS, NAHS, and Western Ontario and McMaster Universities Arthritis Index (WOMAC). At follow-up, 54.6% of patients could perform normal daily activities following nonoperative treatment, and 45.4% of patients were not satisfied after nonoperative treatment and underwent arthroscopic hip surgery. Both groups showed significant improvements for all outcome scores, with no significant differences between groups at final follow-up.

Evidence Synthesis and Rationale

A single retrospective case series supports education related to activity modification with suggestions for patients to limit positions, such as squatting, leg crossing, pivoting, excessive physical activity, and sitting on the floor, that are often described as painful in the presence of FAIS. These patient education recommendations are consistent with previous consensus statement recommendations for patients with FAIS.[193]

Gaps in Knowledge

More research is needed to determine the role of patient education in treating patients with nonarthritic hip joint pain.[104] The majority of intervention studies focus on patients with FAIS and evaluate outcomes related to multimodal interventions. While often noted to be a part of multimodal intervention programs, these studies do not consistently describe the specific components included in patient education. However, common educational themes are centered on recommendations for activity modification and information pertinent to the patient's diagnosis. There are no studies that describe and independently evaluate the clinical effectiveness of patient education and counseling for patients with other nonarthritic hip joint pain conditions such as acetabular dysplasia or microinstability.

2023 CPG Recommendation

C Clinicians may use patient education and counseling for modifying aggravating factors and managing pain associated with nonarthritic hip joint pain related to FAIS.

BRACING

2014 CPG Recommendation

None

Evidence Update

III Eyles et al[53] conducted a parallel, 2-arm (19 patients in each arm), exploratory randomized trial to determine if using a hip unloader brace could improve hip health QoL in patients with FAIS or symptomatic acetabular tears. Hip health QoL was assessed with the iHot-33 and HAGOS instruments. This study utilized a usual nonoperative care group with patients receiving any combination of education, advice, watchful waiting, analgesics, NSAIDs, corticosteroid injection, and referral for physical therapy. Patients in the brace group received usual nonoperative care and a novel hip unloader brace. The brace used elastic components in an attempt to control hip adduction, IR, and flexion, along with trunk flexion and dynamic anterior tilt movement. The patient was instructed to initially wear the brace for 2 hours per day for 1 week, with an incremental increase up to 4 hours/day. The authors found between-group differences favored the brace group for hip health QoL as indicated by a mean between-group difference of 19.4 for the iHOT-33 (95% CI: 1.68, 37.06; $P = .03$). Additionally, the brace group showed moderate effects on the HAGOS pain, symptoms, physical function in daily living, and QoL subscale scores. However, they also recognized wide confidence intervals for estimates and small sample size as study weaknesses. Three adverse events were reported including increased lower back or lower extremity discomfort that participants believed to be related to study interventions.

IV Newcomb et al[157] conducted a prospective, single-arm cohort study of 25 patients (8 females; 27.1 ± 5.3 years) diagnosed with FAIS. The purposes of the study were to determine if wearing a light-weight elastic brace immediately reduced the range of hip IR, flexion, adduction, and pain when performing functional tasks during three-dimensional kinematic assessment and if continued daily use of the brace for 4 weeks would improve PROs. Seventeen patients agreed to wear the brace daily and were included in analysis. PROs included the iHot-33, HAGOS, and global rating of change. While using the brace subtly limited hip motions that often are associated with symptoms in patients with FAIS while performing functional tasks, it did not immediately reduce pain. Those patients that wore the brace for 4 weeks did not report significant improvements in pain or patient-reported clinical outcomes. Time spent using the brace was highly variable, averaging 5.8 (±2.1) hours per day. Variation of time spent wearing the brace was not correlated with changes in pain of function. Patients in the brace intervention group provided global rating of change scores after 4 weeks. Ten (59%) participants reported decreased pain, 13 (76%) reported improved function, and 10 (59%) stated overall improvement.

Evidence Synthesis and Rationale

Two underpowered studies report the clinical effects of elastic unloader braces that attempt to control hip adduction, IR, and flexion, along with trunk flexion and dynamic anterior tilt movement in treating patients with FAIS and symptomatic acetabular labral tears.

Gaps in Knowledge

More research is needed to determine the benefit of bracing in treating patients with nonarthritic hip joint pain. Limited evidence provides conflicting findings regarding potential benefit of using an elastic unloader brace on QoL, pain, other symptoms, and function.

2023 CPG Recommendation

D Based on conflicting evidence, a recommendation cannot be made for the use of bracing as a standalone intervention.

MANUAL THERAPY

2014 CPG Recommendation

F In the absence of contraindications, joint mobilization procedures may be indicated when pain or capsular restrictions are suspected to impair hip mobility, and soft tissue mobilization procedures may be indicated when muscles and their related fascia are suspected to impair hip mobility.

Evidence Update

None

Gaps in Knowledge

More research is needed to determine the role of manual therapy in treating patients with nonarthritic hip joint pain. Joint mobility impairments of the hip may be noted during clinical examination of individuals with nonarthritic hip joint pain. The specific effect of manual therapy on clinical outcomes has not been established. Manual therapy techniques intended to address joint mobility impairments have been included as part of multimodal intervention studies.[90] However, the methodology of those studies does not allow clinicians to determine the isolated effect of manual therapy techniques when treating this population. In addition, insufficient or incomplete description of techniques often does not allow clinicians to consistently reproduce these interventions. The current recommendation is consistent with previous consensus statement recommendations for patients with FAIS.[193]

2023 CPG Recommendation

F

Joint mobilization procedures may be used when pain or capsular restrictions are suspected to impair hip mobility. Soft tissue mobilization procedures may be used when muscles and their related fascia are suspected to impair hip mobility in patients with FAIS.

NEUROMUSCULAR RE-EDUCATION

2014 CPG Recommendation

F

Clinicians may utilize neuromuscular re-education procedures to diminish movement coordination impairments identified in patients with nonarthritic hip joint pain.

Evidence Update

None

Gaps in Knowledge

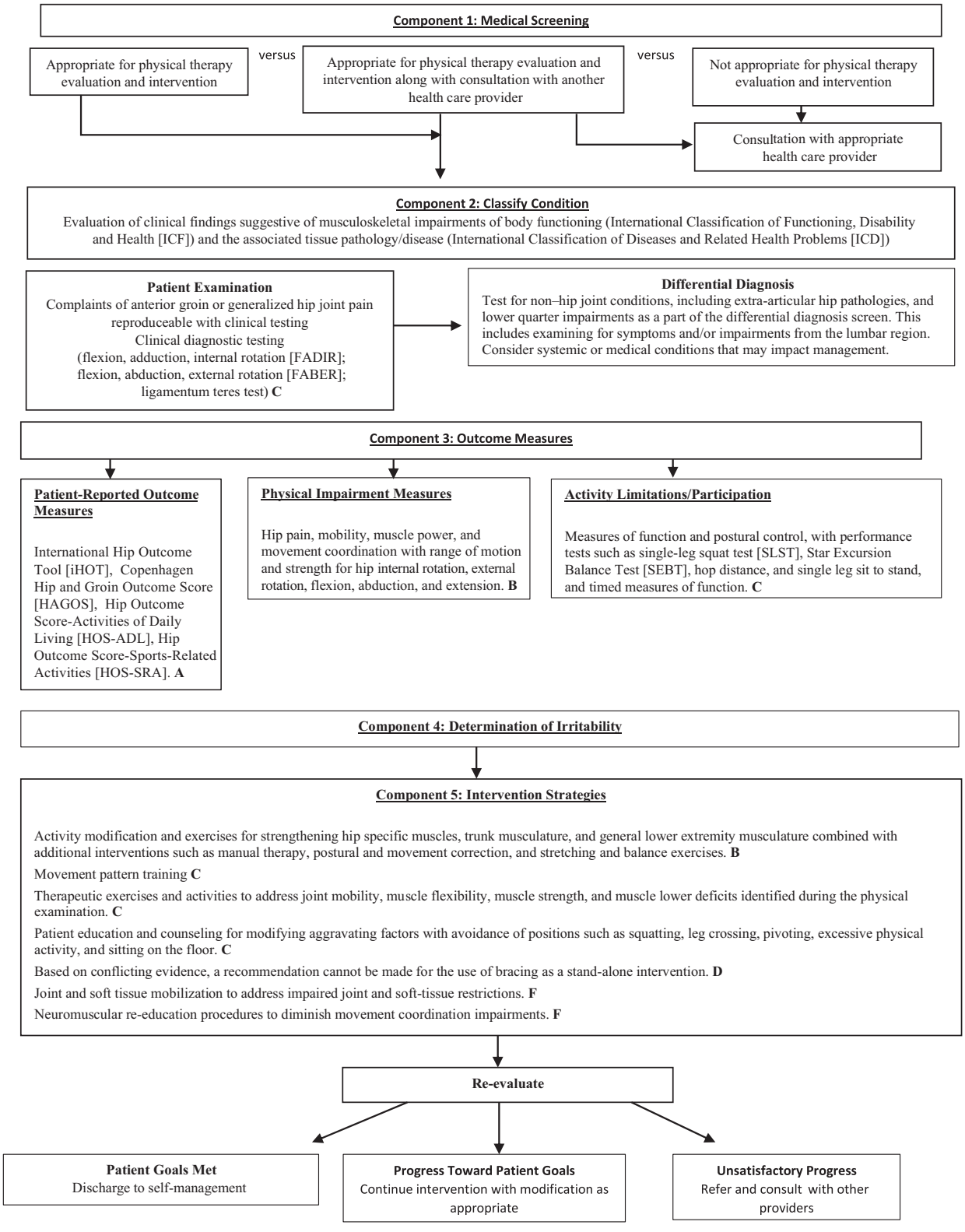
Research is needed to determine the role of neuromuscular re-education in treating patients with nonarthritic hip joint pain. Neuromuscular impairments of the lower extremities may be noted during clinical examination of individuals with nonarthritic hip joint pain. Techniques intended to address movement coordination impairments have been included as part of multimodal intervention studies.[90] However, the methodology of those studies does not allow clinicians to determine the isolated effect of neuromuscular re-education for treating this population. In addition, insufficient description of neuromuscular re-education techniques often does not allow clinicians to consistently reproduce these interventions. The 2014 CPG recommended clinicians consider using proprioceptive/perturbation training techniques that are intended to improve efficiency in joint stabilization, acceleration, and deceleration. As indicated, clinicians may initially utilize predictable, single plane, low-intensity movements, that are progressed to power-based multiplanar movements, that may be elicited in an unpredictable fashion in variable training environments. The current recommendation is consistent with previous consensus statement recommendations for subjects with FAIS.[193]

2023 CPG Recommendation

F

Clinicians may utilize progressive neuromuscular re-education procedures to diminish movement coordination impairments identified in patients with nonarthritic hip joint pain.

DECISION TREE



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APPENDIX A

SEARCH STRATEGIES AND SEARCH RESULTS

Nonarthritic Hip Pain Outcomes
Search Strategies: Run on October 22, 2021
Total Number of Search Results: 8485
Number of Unique Results: 6077

PubMed Search Strategy

No.	Search Terms	Concept
1	(Acetabulum[mesh] OR "Hip Joint"[mesh] OR "Round Ligament of Femur"[mesh] OR Acetabulum[tw] OR Acetabulums[tw] OR Cotyloid Cavity[tw] OR Cotyloid Cavities[tw] OR Acetabula[tw] OR Acetabulas[tw] OR Hip[mesh] OR Hip[tw] OR Hips[tw] OR Coxa[tw] OR Coxas[tw] OR "Acetabulofemoral Joint"[tw] OR "Acetabulofemoral Joints"[tw] OR "Femur Round Ligament"[tw] OR "Femur Round Ligaments"[tw] OR "Ligamentum Capitis Femoris"[tw] OR "Ligamentum Capitis Femori"[tw] OR "Ligamentum Teres Femoris"[tw] OR "Ligamentum Teres Femori"[tw] OR "Round Ligament of Femur"[tw]) NOT ("Round Ligament of Liver"[Mesh] OR Liver[ti])	Hip
2	(Periarthritis[mesh] OR Pain[mesh:noexp] OR "Acute Pain"[mesh] OR "Chronic Pain"[mesh] OR "Musculoskeletal Pain"[mesh:noexp] OR Arthralgia[Mesh:NoExp] OR "Joint Diseases"[mesh:noexp] OR Periarthritis[tw] OR Periarthritides[tw] OR Pain[tiab] OR Pains[tw] OR Painful[tw] OR Ache[tw] OR Aches[tw] OR Arthralgia[tw] OR Arthralgias[tw] OR Polyarthralgia[tw] OR Polyarthralgias[tw] OR "Joint Disease"[tw] OR "Joint Diseases"[tw] OR Arthropathies[tw] OR Arthropathy[tw] OR Contracture[tw] OR Contractures[tw] OR "Adhesive Capsulitis"[tw] OR "Labrochondral Tear"[tw] OR "Labrochondral Tears"[tw] OR "Labrochondral Pathology"[tw]) NOT ("Osteoarthritis, Hip"[Majr] OR Osteoarthritis[ti])	Pain/injury
3	#1 AND #2	Hip + pain/injury
4	("Femoracetabular Impingement"[mesh] OR "Hip Injuries"[mesh] OR "Hip Joint/injuries"[Mesh] OR "Femoracetabular Impingement"[tw] OR "Femoracetabular Impingements"[tw] OR "Femoroacetabular Impingement"[tw] OR "Femoroacetabular Impingements"[tw] OR "Femoro-Acetabular Impingement"[tw] OR "Femoro Acetabular Impingement"[tw] OR "Femoro-Acetabular Impingements"[tw] OR "Femoral Acetabular Impingement"[tw] OR "Femoral Acetabular Impingements"[tw] OR "Hip Injuries"[tw] OR "Hip Injury"[tw] OR "Hip Joint Injury"[tw] OR "Hip Joint Injuries"[tw] OR "Hip Dislocation"[tw] OR "Hip Dislocations"[tw] OR "Hip Displacement"[tw] OR "Hip Displacements"[tw] OR "Hip Dysplasia"[tw] OR "Hip Impingement"[tw] OR "Hip Impingements"[tw] OR "Hip Instability"[tw] OR "Hip Instabilities"[tw] OR "Hip Microinstability"[tw] OR "Hip Microinstabilities"[tw] OR "Hip Micro-instability"[tw] OR "Hip Micro-instabilities"[tw] OR "Acetabular Labral Tear"[tw] OR "Acetabular Labral Tears"[tw] OR "Hip Labral Tear"[tw] OR "Hip Labral Tears"[tw] OR "Intra-Articular Hip Disorder"[tw] OR "Intra-Articular Hip Disorders"[tw] OR "Intraarticular Hip Disorder"[tw] OR "Intraarticular Hip Disorders"[tw] OR "Intra-Articular Hip Disease"[tw] OR "Intra-Articular Hip Diseases"[tw] OR "Intraarticular Hip Disease"[tw] OR "Intraarticular Hip Diseases"[tw] OR "Ligamentum Teres Injury"[tw] OR "Ligamentum Teres Injuries"[tw] OR "Ligamentum Teres Tear"[tw] OR "Ligamentum Teres Tears"[tw] OR "Ligamentum Capitis Injury"[tw] OR "Ligamentum Capitis Injuries"[tw] OR "Ligamentum Capitis Tear"[tw] OR "Ligamentum Capitis Tears"[tw] OR "Non-Arthritic Hip Pain"[tw] OR "Pre-Arthritic Hip Pain"[tw] OR "Non-Arthritic Hip Joint Pain"[tw] OR "Pre-Arthritic Hip Joint Pain"[tw] OR "Hip Arthroscopy"[tiab])	Phrases for hip pain/injury
5	#3 OR #4	Either set
6	("Sensitivity and Specificity"[Mesh] OR "Validation Studies as Topic"[Mesh] OR "Reproducibility of Results"[Mesh] OR "Matched-Pair Analysis"[mesh] OR "Psychometrics"[Mesh] OR "Predictive Value of Tests"[Mesh] OR "Prognosis"[Mesh] OR sensitivity[tw] OR specificity[tw] OR reproducibility[tw] OR reproducible[tw] OR validity[tw] OR validation[tw] OR reliability[tw] OR reliable[tw] OR responsiveness[tw] OR consistency[tw] OR consistencies[tw] OR consistent[tw] OR "log-likelihood ratio"[tw] OR "likelihood-ratio"[tw] OR "likelihood ratio"[tw] OR "LR test"[tw] OR "exploratory research"[tw] OR "comparative study"[tw] OR "cross-sectional study"[tw] OR "matched controls"[tw] OR "pain-free controls"[tw] OR "asymptomatic controls"[tw] OR "disease-free controls"[tw] OR psychometrics[tw] OR "predictive value of test*"[tw] OR "predictive value of results"[tw] OR "negative predictive value"[tw] OR "positive predictive value"[tw] OR "negative predictive values"[tw] OR "positive predictive values"[tw] OR "diagnostic accuracy"[tw] OR "diagnosis accuracy"[tw] OR "diagnostic utility"[tw] OR prognosis[tw] OR "prognostic factor"[tw] OR "prognostic factors"[tw] OR "internal consistency"[tw] OR "coefficient of variation"[tw])	Measurement properties

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Terms	Concept
7	("Gait"[Mesh] OR "Gait Analysis"[Mesh] OR "Range of Motion, Articular"[Mesh] OR "Rehabilitation"[Mesh] OR "Muscle Strength Dynamometer"[Mesh] OR "Return to Sport"[Mesh] OR "One-leg hip test"[tw] OR "single-leg stance"[tw] OR "one-leg stance"[tw] OR "one-legged stance test"[tw] OR "step-down test"[tw] OR "step down test"[tw] OR "single leg squat test"[tw] OR gait[tw] OR "range of motion"[tw] OR "joint flexibility"[tw] OR "full movement"[tw] OR "movement pattern"[tw] OR "movement patterns"[tw] OR rehabilitation[tw] OR "internal rotation"[tw] OR "external rotation"[tw] OR dynamometry[tw] OR dynameter[tw] OR "muscle weakness" OR "muscle strength"[tw] OR "hip weakness"[tw] OR "hip strength"[tw] OR "muscle function"[tw] OR gluteal[tw] OR gluteals[tw] OR gluteus[tw] OR adductor[tw] OR abductor[tw] OR "hip extensor"[tw] OR "hip extensors"[tw] OR "biceps femoris"[tw] OR semitendinosus[tw] OR semimembranosus[tw] OR "internal rotator"[tw] OR "internal rotators"[tw] OR "external rotator"[tw] OR "external rotators"[tw] OR "lateral rotator"[tw] OR "lateral rotators"[tw] OR "hip flexion"[tw] OR "back-to-sport"[tw] OR "return-to-sport"[tw] OR "back to sport"[tw] OR "return to sport"[tw] OR "back-to-sports"[tw] OR "return-to-sports"[tw] OR "back to sports"[tw] OR "return to sports"[tw] OR "sporting activity resumption"[tw] OR "recreational activities resumption"[tw] OR "return to recreation"[tw] OR "return to recreational"[tw] OR "return to play"[tw]) OR ("Pain"[Majr] OR "International Hip Outcome Tool"[tw] OR i-HOT[tiab] OR IHOT[tiab] OR "pain rating"[tw] OR "pain scale"[tw] OR "visual analogue scale"[tw] OR "visual analog scale"[tw] OR "numerical rating scale"[tw] OR "non-arthritic hip score"[tw] OR NAHS[tiab] OR "lower extremity functional scale"[tw] OR LEFS[tiab] OR "tegner activity level scale"[tw] OR "hip sports activity scale"[tw] OR HSAS[tiab] OR "patient-reported outcome measure"[tw] OR "patient-reported outcome measures"[tw] OR "Patient-Reported Outcomes Measurement Information System"[tw] OR PROMIS[tiab] OR "Hip outcome score"[tw] OR "Hip outcome scores"[tw] OR "Modified Harris Hip score"[tw] OR "Modified Harris Hip scores"[tw] OR mHHS[tiab] OR "Copenhagen Hip and Groin Outcome Score"[tw] OR "Copenhagen Hip and Groin Outcome Scores"[tw] OR HAGOS[tiab] OR "Hip Disability and Osteoarthritis Outcome Score"[tw] OR "Hip Disability and Osteoarthritis Outcome Scores"[tw] OR HOOS[tiab])	Physical impairment and patient-reported outcome measures
8	("Physical Examination"[Mesh:NoExp] OR "physical examination"[tw] OR "physical exam"[tw] OR "clinical examination"[tw] OR "physical test"[tw] OR "physical tests"[tw] OR "Flexion Abduction External Rotation"[tw] OR FABER[tw] OR "Patrick test"[tw] OR "Flexion Adduction Internal Rotation"[tw] OR FADIR[tiab] OR FADDIR[tiab] OR "Resisted Straight Leg Raise"[tw] OR "Log Roll Test"[tw] OR "McCarthy Test"[tw] OR "Quadrant Test"[tw] OR "Scour Test"[tw] OR "Fitzgerald test"[tw] OR "Ligamentum teres test"[tw] OR "Internal rotation with pressure"[tw] OR "Internal rotation over pressure"[tw] OR IROP[tiab] OR "Impingement Provocation Test"[tw])	Physical exam
9	#5 AND #6 AND (#7 OR #8)	
10	#9 AND English[language] AND ("2013"[Date - Publication] : "3000"[Date - Publication]) NOT (animals[mesh] NOT humans[mesh]) NOT ("comment"[Publication Type] OR "editorial"[Publication Type] OR "letter"[Publication Type] OR "news"[Publication Type] OR "retracted publication"[Publication Type] OR "retraction of publication"[Publication Type] OR "Case Reports"[Publication Type])	Search results: 3500

Embase Search Strategy

No.	Search Terms	Concept
1	('Acetabulum'/exp OR 'Pelvic Bones'/de OR 'Hip'/exp OR 'Ligament Of Head Of Femur'/exp OR 'Round Ligament'/de OR Acetabulum:ti,ab,de OR Acetabulums:ti,ab,de OR 'Cotyloid Cavity':ti,ab,de OR 'Cotyloid Cavities':ti,ab,de OR Acetabula:ti,ab,de OR Acetabulas:ti,ab,de OR Hip:ti,ab,de OR Hips:ti,ab,de OR Coxa:ti,ab,de OR Coxas:ti,ab,de OR 'Acetabulofemoral Joint':ti,ab,de OR 'Acetabulofemoral Joints':ti,ab,de OR 'Femur Round Ligament':ti,ab,de OR 'Femur Round Ligaments':ti,ab,de OR 'Ligamentum Capitis Femoris':ti,ab,de OR 'Ligamentum Capitis Femori':ti,ab,de OR 'Ligamentum Teres Femoris':ti,ab,de OR 'Ligamentum Teres Femori':ti,ab,de OR 'Round Ligament of Femur':ti,ab,de) AND [embase]/lim NOT ('Round Ligament of Liver'/exp OR Liver:ti)	Hip
2	('Periarthritis'/exp OR 'Chronic Pain'/exp OR 'Musculoskeletal Pain'/de OR 'Arthralgia'/de OR 'Arthropathy'/de OR 'Contracture'/exp OR Periarthritis:ti,ab,de OR Periarthritides:ti,ab,de OR Pain:ti,ab:ti,ab,de OR Pains:ti,ab,de OR Painful:ti,ab,de OR Ache:ti,ab,de OR Aches:ti,ab,de OR Arthralgia:ti,ab,de OR Arthralgias:ti,ab,de OR Polyarthralgia:ti,ab,de OR Polyarthralgias:ti,ab,de OR 'Joint Disease':ti,ab,de OR 'Joint Diseases':ti,ab,de OR Arthropathies:ti,ab,de OR Arthropathy:ti,ab,de OR Contracture:ti,ab,de OR Contractures:ti,ab,de OR 'Adhesive Capsulitis':ti,ab,de OR 'Labrochondral Tear':ti,ab,de OR 'Labrochondral Tears':ti,ab,de OR 'Labrochondral Pathology':ti,ab,de) AND [embase]/lim NOT ('hip osteoarthritis'/mj OR osteoarthritis:ti)	Pain/injury
3	1 AND 2	Hip + pain/injury

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Terms	Concept
4	('Femoroacetabular Impingement'/exp OR 'Hip Injury'/exp OR 'Femoracetabular Impingement':ti,ab,de OR 'Femoracetabular Impingements':ti,ab,de OR 'Femoroacetabular Impingement':ti,ab,de OR 'Femoroacetabular Impingements':ti,ab,de OR 'Femoro-Acetabular Impingement':ti,ab,de OR 'Femoro Acetabular Impingement':ti,ab,de OR 'Femoro-Acetabular Impingements':ti,ab,de OR 'Femoral Acetabular Impingement':ti,ab,de OR 'Femoral Acetabular Impingements':ti,ab,de OR 'Hip Injuries':ti,ab,de OR 'Hip Injury':ti,ab,de OR 'Hip Joint Injury':ti,ab,de OR 'Hip Joint Injuries':ti,ab,de OR 'Hip Dislocation':ti,ab,de OR 'Hip Dislocations':ti,ab,de OR 'Hip Displacement':ti,ab,de OR 'Hip Displacements':ti,ab,de OR 'Hip Dysplasia':ti,ab,de OR 'Hip Impingement':ti,ab,de OR 'Hip Impingements':ti,ab,de OR 'Hip Instability':ti,ab,de OR 'Hip Instabilities':ti,ab,de OR 'Hip Microinstability':ti,ab,de OR 'Hip Microinstabilities':ti,ab,de OR 'Hip Micro-instability':ti,ab,de OR 'Hip Micro-instabilities':ti,ab,de OR 'Acetabular Labral Tear':ti,ab,de OR 'Acetabular Labral Tears':ti,ab,de OR 'Hip Labral Tear':ti,ab,de OR 'Hip Labral Tears':ti,ab,de OR 'Intra-Articular Hip Disorder':ti,ab,de OR 'Intra-Articular Hip Disorders':ti,ab,de OR 'Intraarticular Hip Disorder':ti,ab,de OR 'Intraarticular Hip Disorders':ti,ab,de OR 'Intra-Articular Hip Disease':ti,ab,de OR 'Intra-Articular Hip Diseases':ti,ab,de OR 'Intraarticular Hip Disease':ti,ab,de OR 'Intraarticular Hip Diseases':ti,ab,de OR 'Ligamentum Teres Injury':ti,ab,de OR 'Ligamentum Teres Injuries':ti,ab,de OR 'Ligamentum Teres Tear':ti,ab,de OR 'Ligamentum Teres Tears':ti,ab,de OR 'Ligamentum Capitis Injury':ti,ab,de OR 'Ligamentum Capitis Injuries':ti,ab,de OR 'Ligamentum Capitis Tear':ti,ab,de OR 'Ligamentum Capitis Tears':ti,ab,de OR 'Non-Arthritic Hip Pain':ti,ab,de OR 'Pre-Arthritic Hip Pain':ti,ab,de OR 'Non-Arthritic Hip Joint Pain':ti,ab,de OR 'Pre-Arthritic Hip Joint Pain':ti,ab,de OR 'Hip Arthroscopy':ti,ab) AND [embase]/lim NOT ('hip osteoarthritis'/mj OR osteoarthritis:ti)	Phrases for hip pain/injury
5	3 OR 4	Either set
6	('sensitivity'/exp OR 'specificity'/exp OR 'validation study'/exp OR 'reproducibility'/exp OR 'statistical analysis'/exp/mj OR 'psychometry'/exp OR 'predictive value'/exp OR 'prognosis'/exp OR sensitivity:ti,ab,de OR specificity:ti,ab,de OR reproducibility:ti,ab,de OR reproducible:ti,ab,de OR validity:ti,ab,de OR validation:ti,ab,de OR reliability:ti,ab,de OR reliable:ti,ab,de OR responsiveness:ti,ab,de OR consistency:ti,ab,de OR consistencies:ti,ab,de OR consistent:ti,ab,de OR 'log-likelihood ratio':ti,ab,de OR likelihood-ratio:ti,ab,de OR 'likelihood ratio':ti,ab,de OR 'LR test':ti,ab,de OR 'exploratory research':ti,ab,de OR 'comparative study':ti,ab,de OR 'cross-sectional study':ti,ab,de OR 'matched controls':ti,ab,de OR 'pain-free controls':ti,ab,de OR 'asymptomatic controls':ti,ab,de OR 'disease-free controls':ti,ab,de OR psychometrics:ti,ab,de OR 'predictive value of test*':ti,ab,de OR 'predictive value of results':ti,ab,de OR 'negative predictive value':ti,ab,de OR 'positive predictive value':ti,ab,de OR 'negative predictive values':ti,ab,de OR 'positive predictive values':ti,ab,de OR 'diagnostic accuracy':ti,ab,de OR 'diagnosis accuracy':ti,ab,de OR 'diagnostic utility':ti,ab,de OR prognosis:ti,ab,de OR 'prognostic factor':ti,ab,de OR 'prognostic factors':ti,ab,de OR 'internal consistency':ti,ab,de OR 'coefficient of variation':ti,ab,de) AND [embase]/lim	Measurement properties
7	('gait'/de OR 'rehabilitation'/de OR 'dynamometer'/exp OR 'return to sport'/exp OR 'one-leg hip test':ti,ab,de OR 'single-leg stance':ti,ab,de OR 'one-leg stance':ti,ab,de OR 'one-legged stance test':ti,ab,de OR 'step-down test':ti,ab,de OR 'step down test':ti,ab,de OR 'single leg squat test':ti,ab,de OR gait:ti,ab,de OR 'range of motion':ti,ab,de OR 'joint flexibility':ti,ab,de OR 'full movement':ti,ab,de OR 'movement pattern':ti,ab,de OR 'movement patterns':ti,ab,de OR rehabilitation:ti,ab,de OR 'internal rotation':ti,ab,de OR 'external rotation':ti,ab,de OR dynamometry:ti,ab,de OR dynameter:ti,ab,de OR 'muscle weakness':ti,ab,de OR 'muscle strength':ti,ab,de OR 'hip weakness':ti,ab,de OR 'hip strength':ti,ab,de OR 'muscle function':ti,ab,de OR gluteal:ti,ab,de OR gluteals:ti,ab,de OR gluteus:ti,ab,de OR adductor:ti,ab,de OR abductor:ti,ab,de OR 'hip extensor':ti,ab,de OR 'hip extensors':ti,ab,de OR 'biceps femoris':ti,ab,de OR semitendinosus:ti,ab,de OR semimembranosus:ti,ab,de OR 'internal rotator':ti,ab,de OR 'internal rotators':ti,ab,de OR 'external rotator':ti,ab,de OR 'external rotators':ti,ab,de OR 'lateral rotator':ti,ab,de OR 'lateral rotators':ti,ab,de OR 'hip flexion':ti,ab,de OR back-to-sport:ti,ab,de OR return-to-sport:ti,ab,de OR 'back to sport':ti,ab,de OR 'return to sport':ti,ab,de OR back-to-sports:ti,ab,de OR return-to-sports:ti,ab,de OR 'back to sports':ti,ab,de OR 'return to sports':ti,ab,de OR 'sporting activity resumption':ti,ab,de OR 'recreational activities resumption':ti,ab,de OR 'return to recreation':ti,ab,de OR 'return to recreational':ti,ab,de OR 'return to play':ti,ab,de) OR (Pain/exp/mj OR 'International Hip Outcome Tool':ti,ab,de OR i-HOT:ti,ab OR IHOT:ti,ab OR 'pain rating':ti,ab,de OR 'pain scale':ti,ab,de OR 'visual analogue scale':ti,ab,de OR 'visual analog scale':ti,ab,de OR 'numerical rating scale':ti,ab,de OR 'non-arthritic hip score':ti,ab,de OR NAHS:ti,ab OR 'lower extremity functional scale':ti,ab,de OR LEFS:ti,ab OR 'tegner activity level scale':ti,ab,de OR 'hip sports activity scale':ti,ab,de OR HSAS:ti,ab OR 'patient-reported outcome measure':ti,ab,de OR 'patient-reported outcome measures':ti,ab,de OR 'Patient-Reported Outcomes Measurement Information System':ti,ab,de OR PROMIS:ti,ab OR 'Hip outcome score':ti,ab,de OR 'Hip outcome scores':ti,ab,de OR 'Modified Harris Hip score':ti,ab,de OR 'Modified Harris Hip scores':ti,ab,de OR mHHS:ti,ab OR 'Copenhagen Hip and Groin Outcome Score':ti,ab,de OR 'Copenhagen Hip and Groin Outcome Scores':ti,ab,de OR HAGOS:ti,ab OR 'Hip Disability and Osteoarthritis Outcome Score':ti,ab,de OR 'Hip Disability and Osteoarthritis Outcome Scores':ti,ab,de OR HOOS:ti,ab) AND [embase]/lim	Physical impairment and patient-reported outcome measures
8	('physical examination'/de OR 'physical examination':ti,ab,de OR 'physical exam':ti,ab,de OR 'clinical examination':ti,ab,de OR 'physical test':ti,ab,de OR 'physical tests':ti,ab,de OR 'Flexion Abduction External Rotation':ti,ab,de OR FABER:ti,ab OR 'Patrick test':ti,ab OR 'Flexion Adduction Internal Rotation':ti,ab,de OR FADIR:ti,ab OR FADDIR:ti,ab OR 'Resisted Straight Leg Raise':ti,ab,de OR 'Log Roll Test':ti,ab,de OR 'McCarthy Test':ti,ab OR 'Quadrant Test':ti,ab OR 'Scour Test':ti,ab OR 'Fitzgerald test':ti,ab OR 'Ligamentum teres test':ti,ab,de OR 'Internal rotation with pressure':ti,ab,de OR 'Internal rotation over pressure':ti,ab,de OR IROP:ti,ab OR 'Impingement Provocation Test':ti,ab,de) AND [embase]/lim	Physical exam
9	#5 AND #6 AND (#7 OR #8)	
10	#9 AND [english]/lim AND [2013-2022]/py NOT ([animals]/lim NOT [humans]/lim) NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	Search results: 2853

Table continues on next page.

APPENDIX A (CONTINUED)

CINAHL Plus Search Strategy

No.	Search Terms	Concept
1	((MH "Acetabulum") OR (MH "Pelvic Bones") OR (MH "Hip") OR (MH "Hip Joint") OR Acetabulum OR Acetabulums OR "Cotyloid Cavity" OR "Cotyloid Cavities" OR Acetabula OR Acetabulas OR (MH Hip+) OR Hip OR Hips OR Coxa OR Coxas OR "Acetabulofemoral Joint" OR "Acetabulofemoral Joints" OR "Femur Round Ligament" OR "Femur Round Ligaments" OR "Ligamentum Capitis Femoris" OR "Ligamentum Capitis Femori" OR "Ligamentum Teres Femoris" OR "Ligamentum Teres Femori" OR "Round Ligament of Femur") NOT (TI Liver)	Hip
2	((MH "Periarthritis") OR (MH "Pain") OR (MH "Chronic Pain") OR (MH "Arthralgia") OR (MH "Joint Diseases") OR Periarthritis OR Periarthritides OR (TI Pain OR AB Pain) OR Pains OR Painful OR Ache OR Aches OR Arthralgia OR Arthralgias OR Polyarthralgia OR Polyarthralgias OR "Joint Disease" OR "Joint Diseases" OR Arthropathies OR Arthropathy OR Contracture OR Contractures OR "Adhesive Capsulitis" OR "Labrochondral Tear" OR "Labrochondral Tears" OR "Labrochondral Pathology") NOT (TI Osteoarthritis)	Pain/injury
3	S1 AND S2	Hip + pain/injury
4	((MH "Femoracetabular Impingement") OR (MH "Hip Injuries+") OR OR "Femoracetabular Impingement" OR "Femoracetabular Impingements" OR "Femoroacetabular Impingement" OR "Femoroacetabular Impingements" OR "Femoro-Acetabular Impingement" OR "Femoro Acetabular Impingement" OR "Femoro-Acetabular Impingements" OR "Femoral Acetabular Impingement" OR "Femoral Acetabular Impingements" OR "Hip Injuries" OR "Hip Injury" OR "Hip Joint Injury" OR "Hip Joint Injuries" OR "Hip Dislocation" OR "Hip Dislocations" OR "Hip Displacement" OR "Hip Displacements" OR "Hip Dysplasia" OR "Hip Impingement" OR "Hip Impingements" OR "Hip Instability" OR "Hip Instabilities" OR "Hip Microinstability" OR "Hip Microinstabilities" OR "Hip Micro-instability" OR "Hip Micro-instabilities" OR "Acetabular Labral Tear" OR "Acetabular Labral Tears" OR "Hip Labral Tear" OR "Hip Labral Tears" OR "Intra-Articular Hip Disorder" OR "Intra-Articular Hip Disorders" OR "Intraarticular Hip Disorder" OR "Intraarticular Hip Disorders" OR "Intra-Articular Hip Disease" OR "Intra-Articular Hip Diseases" OR "Intraarticular Hip Disease" OR "Intraarticular Hip Diseases" OR "Ligamentum Teres Injury" OR "Ligamentum Teres Injuries" OR "Ligamentum Teres Tear" OR "Ligamentum Teres Tears" OR "Ligamentum Capitis Injury" OR "Ligamentum Capitis Injuries" OR "Ligamentum Capitis Tear" OR "Ligamentum Capitis Tears" OR "Non-Arthritic Hip Pain" OR "Pre-Arthritic Hip Pain" OR "Non-Arthritic Hip Joint Pain" OR "Pre-Arthritic Hip Joint Pain" OR (TI "Hip Arthroscopy" OR AB "Hip Arthroscopy")	Phrases for hip pain/injury
5	S3 OR S4	Either set
6	(sensitivity OR specificity OR reproducibility OR reproducible OR validity OR validation OR reliability OR reliable OR responsiveness OR consistency OR consistencies OR consistent OR "log-likelihood ratio" OR likelihood-ratio OR "likelihood ratio" OR "LR test" OR "exploratory research" OR "comparative study" OR "cross-sectional study" OR "matched controls" OR "pain-free controls" OR "asymptomatic controls" OR "disease-free controls" OR psychometrics OR "predictive value of test*" OR "predictive value of results" OR "negative predictive value" OR "positive predictive value" OR "negative predictive values" OR "positive predictive values" OR "diagnostic accuracy" OR "diagnosis accuracy" OR "diagnostic utility" OR prognosis OR "prognostic factor" OR "prognostic factors" OR "internal consistency" OR "coefficient of variation")	Measurement properties
7	"One-leg hip test" OR "single-leg stance" OR "one-leg stance" OR "one-legged stance test" OR "step-down test" OR "step down test" OR "single leg squat test" OR gait OR "range of motion" OR "joint flexibility" OR "full movement" OR "movement pattern" OR "movement patterns" OR rehabilitation OR "internal rotation" OR "external rotation" OR dynamometry OR dynameter OR "muscle weakness" OR "muscle strength" OR "hip weakness" OR "hip strength" OR "muscle function" OR gluteal OR gluteals OR gluteus OR adductor OR abductor OR "hip extensor" OR "hip extensorsOR "biceps femoris"" OR semitendinosus OR semimembranosus OR "internal rotator" OR "internal rotators" OR "external rotator" OR "external rotators" OR "lateral rotator" OR "lateral rotators" OR "hip flexion" OR back-to-sport OR return-to-sport OR "back to sport" OR "return to sport" OR back-to-sports OR return-to-sports OR "back to sports" OR "return to sports" OR "sporting activity resumption" OR "recreational activities resumption" OR "return to recreation" OR "return to recreational" OR "return to play") OR ((MM Pain+) OR "International Hip Outcome Tool" OR (TI i-HOT OR AB i-HOT) OR (TI IHOT OR AB IHOT) OR "pain rating" OR "pain scale" OR "visual analogue scale" OR "visual analog scale" OR "numerical rating scale" OR "non-arthritic hip score" OR (TI NAHS OR AB NAHS) OR "lower extremity functional scale" OR (TI LEFS OR AB LEFS) OR "tegner activity level scale" OR "hip sports activity scale" OR (TI HSAS OR AB HSAS) OR "patient-reported outcome measure" OR "patient-reported outcome measures" OR "Patient-Reported Outcomes Measurement Information System" OR (TI PROMIS OR AB PROMIS) OR "Hip outcome score" OR "Hip outcome scores" OR "Modified Harris Hip score" OR "Modified Harris Hip scores" OR (TI mHHS OR AB mHHS) OR "Copenhagen Hip and Groin Outcome Score" OR "Copenhagen Hip and Groin Outcome Scores" OR (TI HAGOS OR AB HAGOS) OR "Hip Disability and Osteoarthritis Outcome Score" OR "Hip Disability and Osteoarthritis Outcome Scores" OR (TI HOOS OR AB HOOS)	Physical impairment and patient-reported outcome measures
8	"physical examination" OR "physical exam" OR "clinical examination" OR "physical test" OR "physical tests" OR "Flexion Abduction External Rotation" OR FABER OR "Patrick test" OR "Flexion Adduction Internal Rotation" OR (TI FADIR OR AB FADIR) OR (TI FADDIR OR AB FADDIR) OR "Resisted Straight Leg Raise" OR "Log Roll Test" OR "McCarthy Test" OR "Quadrant Test" OR "Scour Test" OR "Fitzgerald test" OR "Ligamentum teres test" OR "Internal rotation with pressure" OR "Internal rotation over pressure" OR (TI IROP OR AB IROP) OR "Impingement Provocation Test"	Physical exam
9	S5 AND S6 AND (S7 OR S8) AND Language:English AND Source Type: Academic Journals AND Publication Date:2013-2021	Search results: 1532

APPENDIX A (CONTINUED)

Cochrane Library Search Strategy

No.	Search Terms	Concept
1	([mh Acetabulum] OR [mh "Hip Joint"] OR [mh "Round Ligament of Femur"] OR Acetabulum:ti,ab,kw OR Acetabulums:ti,ab,kw OR "Cotyloid Cavity":ti,ab,kw OR "Cotyloid Cavities":ti,ab,kw OR Acetabula:ti,ab,kw OR Acetabulas:ti,ab,kw OR [mh Hip] OR Hip:ti,ab,kw OR Hips:ti,ab,kw OR Coxa:ti,ab,kw OR Coxas:ti,ab,kw OR "Acetabulofemoral Joint":ti,ab,kw OR "Acetabulofemoral Joints":ti,ab,kw OR "Femur Round Ligament":ti,ab,kw OR "Femur Round Ligaments":ti,ab,kw OR "Ligamentum Capitis Femoris":ti,ab,kw OR "Ligamentum Capitis Femori":ti,ab,kw OR "Ligamentum Teres Femoris":ti,ab,kw OR "Ligamentum Teres Femori":ti,ab,kw OR "Round Ligament of Femur":ti,ab,kw) NOT ([mh "Round Ligament of Liver"] OR Liver:ti)	Hip
2	([mh Periarthritis] OR [mh ^Pain] OR [mh "Acute Pain"] OR [mh "Chronic Pain"] OR [mh ^"Musculoskeletal Pain"] OR [mh ^Arthralgia] OR [mh ^"Joint Diseases"] OR Periarthritis:ti,ab,kw OR Periarthritides:ti,ab,kw OR Pain:ti,ab OR Pains:ti,ab,kw OR Painful:ti,ab,kw OR Ache:ti,ab,kw OR Aches:ti,ab,kw OR Arthralgia:ti,ab,kw OR Arthralgias:ti,ab,kw OR Polyarthralgia:ti,ab,kw OR Polyarthralgias:ti,ab,kw OR "Joint Disease":ti,ab,kw OR "Joint Diseases":ti,ab,kw OR Arthropathies:ti,ab,kw OR Arthropathy:ti,ab,kw OR Contracture:ti,ab,kw OR Contractures:ti,ab,kw OR "Adhesive Capsulitis":ti,ab,kw OR "Labrochondral Tear":ti,ab,kw OR "Labrochondral Tears":ti,ab,kw OR "Labrochondral Pathology":ti,ab,kw) NOT ([mh "Osteoarthritis, Hip"] OR Osteoarthritis:ti)	Pain/injury
3	1 AND 2	Hip + pain/injury
4	([mh "Femoracetabular Impingement"] OR [mh "Hip Injuries"] OR "Femoracetabular Impingement":ti,ab,kw OR "Femoracetabular Impingements":ti,ab,kw OR "Femoroacetabular Impingement":ti,ab,kw OR "Femoroacetabular Impingements":ti,ab,kw OR "Femoro-Acetabular Impingement":ti,ab,kw OR "Femoro Acetabular Impingement":ti,ab,kw OR "Femoro-Acetabular Impingements":ti,ab,kw OR "Femoral Acetabular Impingement":ti,ab,kw OR "Femoral Acetabular Impingements":ti,ab,kw OR "Hip Injuries":ti,ab,kw OR "Hip Injury":ti,ab,kw OR "Hip Joint Injury":ti,ab,kw OR "Hip Joint Injuries":ti,ab,kw OR "Hip Dislocation":ti,ab,kw OR "Hip Dislocations":ti,ab,kw OR "Hip Displacement":ti,ab,kw OR "Hip Displacements":ti,ab,kw OR "Hip Dysplasia":ti,ab,kw OR "Hip Impingement":ti,ab,kw OR "Hip Impingements":ti,ab,kw OR "Hip Instability":ti,ab,kw OR "Hip Instabilities":ti,ab,kw OR "Hip Microinstability":ti,ab,kw OR "Hip Microinstabilities":ti,ab,kw OR "Hip Micro-instability":ti,ab,kw OR "Hip Micro-instabilities":ti,ab,kw OR "Acetabular Labral Tear":ti,ab,kw OR "Acetabular Labral Tears":ti,ab,kw OR "Hip Labral Tear":ti,ab,kw OR "Hip Labral Tears":ti,ab,kw OR "Intra-Articular Hip Disorder":ti,ab,kw OR "Intra-Articular Hip Disorders":ti,ab,kw OR "Intraarticular Hip Disorder":ti,ab,kw OR "Intraarticular Hip Disorders":ti,ab,kw OR "Intra-Articular Hip Disease":ti,ab,kw OR "Intra-Articular Hip Diseases":ti,ab,kw OR "Intraarticular Hip Disease":ti,ab,kw OR "Intraarticular Hip Diseases":ti,ab,kw OR "Ligamentum Teres Injury":ti,ab,kw OR "Ligamentum Teres Injuries":ti,ab,kw OR "Ligamentum Teres Tear":ti,ab,kw OR "Ligamentum Teres Tears":ti,ab,kw OR "Ligamentum Capitis Injury":ti,ab,kw OR "Ligamentum Capitis Injuries":ti,ab,kw OR "Ligamentum Capitis Tear":ti,ab,kw OR "Ligamentum Capitis Tears":ti,ab,kw OR "Non-Arthritic Hip Pain":ti,ab,kw OR "Pre-Arthritic Hip Pain":ti,ab,kw OR "Non-Arthritic Hip Joint Pain":ti,ab,kw OR "Pre-Arthritic Hip Joint Pain":ti,ab,kw OR "Hip Arthroscopy":ti,ab)	Phrases for hip pain/injury
5	3 OR 4	Either set
6	([mh "Sensitivity and Specificity"] OR [mh "Validation Studies as Topic"] OR [mh "Reproducibility of Results"] OR [mh "Matched-Pair Analysis"] OR [mh Psychometrics] OR [mh "Predictive Value of Tests"] OR [mh Prognosis] OR sensitivity:ti,ab,kw OR specificity:ti,ab,kw OR reproducibility:ti,ab,kw OR reproducible:ti,ab,kw OR validity:ti,ab,kw OR validation:ti,ab,kw OR reliability:ti,ab,kw OR reliable:ti,ab,kw OR responsiveness:ti,ab,kw OR consistency:ti,ab,kw OR consistencies:ti,ab,kw OR consistent:ti,ab,kw OR "log-likelihood ratio":ti,ab,kw OR likelihood-ratio:ti,ab,kw OR "likelihood ratio":ti,ab,kw OR "LR test":ti,ab,kw OR "exploratory research":ti,ab,kw OR "comparative study":ti,ab,kw OR "cross-sectional study":ti,ab,kw OR "matched controls":ti,ab,kw OR "pain-free controls":ti,ab,kw OR "asymptomatic controls":ti,ab,kw OR "disease-free controls":ti,ab,kw OR psychometrics:ti,ab,kw OR "predictive value of test*":ti,ab,kw OR "predictive value of results":ti,ab,kw OR "negative predictive value":ti,ab,kw OR "positive predictive value":ti,ab,kw OR "negative predictive values":ti,ab,kw OR "positive predictive values":ti,ab,kw OR "diagnostic accuracy":ti,ab,kw OR "diagnosis accuracy":ti,ab,kw OR "diagnostic utility":ti,ab,kw OR prognosis:ti,ab,kw OR "prognostic factor":ti,ab,kw OR "prognostic factors":ti,ab,kw OR "internal consistency":ti,ab,kw OR "coefficient of variation":ti,ab,kw)	Measurement properties

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Terms	Concept
7	([mh Gait] OR [mh "Gait Analysis"] OR [mh "Range of Motion, Articular"] OR [mh Rehabilitation] OR [mh "Muscle Strength Dynamometer"] OR [mh "Return to Sport"] OR "One-leg hip test":ti,ab,kw OR "single-leg stance":ti,ab,kw OR "one-leg stance":ti,ab,kw OR "one-legged stance test":ti,ab,kw OR "step-down test":ti,ab,kw OR "step down test":ti,ab,kw OR "single leg squat test":ti,ab,kw OR gait:ti,ab,kw OR "range of motion":ti,ab,kw OR "joint flexibility":ti,ab,kw OR "full movement":ti,ab,kw OR "movement pattern":ti,ab,kw OR "movement patterns":ti,ab,kw OR rehabilitation:ti,ab,kw OR "internal rotation":ti,ab,kw OR "external rotation":ti,ab,kw OR dynamometry:ti,ab,kw OR dynameter:ti,ab,kw OR "muscle weakness" OR "muscle strength":ti,ab,kw OR "hip weakness":ti,ab,kw OR "hip strength":ti,ab,kw OR "muscle function":ti,ab,kw OR gluteal:ti,ab,kw OR gluteals:ti,ab,kw OR gluteus:ti,ab,kw OR adductor:ti,ab,kw OR abductor:ti,ab,kw OR "hip extensor":ti,ab,kw OR "hip extensors":ti,ab,kw OR "biceps femoris":ti,ab,kw OR semitendinosus:ti,ab,kw OR semimembranosus:ti,ab,kw OR "internal rotator":ti,ab,kw OR "internal rotators":ti,ab,kw OR "external rotator":ti,ab,kw OR "external rotators":ti,ab,kw OR "lateral rotator":ti,ab,kw OR "lateral rotators":ti,ab,kw OR "hip flexion":ti,ab,kw OR back-to-sport:ti,ab,kw OR return-to-sport:ti,ab,kw OR "back to sport":ti,ab,kw OR "return to sport":ti,ab,kw OR back-to-sports:ti,ab,kw OR return-to-sports:ti,ab,kw OR "back to sports":ti,ab,kw OR "return to sports":ti,ab,kw OR "sporting activity resumption":ti,ab,kw OR "recreational activities resumption":ti,ab,kw OR "return to recreation":ti,ab,kw OR "return to recreational":ti,ab,kw OR "return to play":ti,ab,kw) OR ([mh Pain] OR "International Hip Outcome Tool":ti,ab,kw OR i-HOT:ti,ab OR IHOT:ti,ab OR "pain rating":ti,ab,kw OR "pain scale":ti,ab,kw OR "visual analogue scale":ti,ab,kw OR "visual analog scale":ti,ab,kw OR "numerical rating scale":ti,ab,kw OR "non-arthritic hip score":ti,ab,kw OR NAHS:ti,ab OR "lower extremity functional scale":ti,ab,kw OR LEFS:ti,ab OR "tegner activity level scale":ti,ab,kw OR "hip sports activity scale":ti,ab,kw OR HSAS:ti,ab OR "patient-reported outcome measure":ti,ab,kw OR "patient-reported outcome measures":ti,ab,kw OR "Patient-Reported Outcomes Measurement Information System":ti,ab,kw OR PROMIS:ti,ab OR "Hip outcome score":ti,ab,kw OR "Hip outcome scores":ti,ab,kw OR "Modified Harris Hip score":ti,ab,kw OR "Modified Harris Hip scores":ti,ab,kw OR mHHS:ti,ab OR "Copenhagen Hip and Groin Outcome Score":ti,ab,kw OR "Copenhagen Hip and Groin Outcome Scores":ti,ab,kw OR HAGOS:ti,ab OR "Hip Disability and Osteoarthritis Outcome Score":ti,ab,kw OR "Hip Disability and Osteoarthritis Outcome Scores":ti,ab,kw OR HOOS:ti,ab)	Physical impairment and patient-reported outcome measures
8	([mh ^"Physical Examination"] OR "physical examination":ti,ab,kw OR "physical exam":ti,ab,kw OR "clinical examination":ti,ab,kw OR "physical test":ti,ab,kw OR "physical tests":ti,ab,kw OR "Flexion Abduction External Rotation":ti,ab,kw OR FABER:ti,ab,kw OR "Patrick test":ti,ab,kw OR "Flexion Adduction Internal Rotation":ti,ab,kw OR FADIR:ti,ab OR FADDIR:ti,ab OR "Resisted Straight Leg Raise":ti,ab,kw OR "Log Roll Test":ti,ab,kw OR "McCarthy Test":ti,ab,kw OR "Quadrant Test":ti,ab,kw OR "Scour Test":ti,ab,kw OR "Fitzgerald test":ti,ab,kw OR "Ligamentum teres test":ti,ab,kw OR "Internal rotation with pressure":ti,ab,kw OR "Internal rotation over pressure":ti,ab,kw OR IROP:ti,ab OR "Impingement Provocation Test":ti,ab,kw)	Physical exam
9	#5 AND #6 AND (#7 OR #8) AND Publication Date: 2013-Present	Search results: 600

Nonarthritic Hip Pain Outcomes
Search Strategies: Run on September 5, 2022
Total Number of Search Results: 9360
Number of Unique Results: 918 (6992 Counting 2021 Search)

PubMed Search Strategy

No.	Search Terms	Concept
1	(Acetabulum[mesh] OR "Hip Joint"[mesh] OR "Round Ligament of Femur"[mesh] OR Acetabulum[tw] OR Acetabulums[tw] OR Cotyloid Cavity[tw] OR Cotyloid Cavities[tw] OR Acetabula[tw] OR Acetabulas[tw] OR Hip[mesh] OR Hip[tw] OR Hips[tw] OR Coxa[tw] OR Coxas[tw] OR "Acetabulofemoral Joint"[tw] OR "Acetabulofemoral Joints"[tw] OR "Femur Round Ligament"[tw] OR "Femur Round Ligaments"[tw] OR "Ligamentum Capitis Femoris"[tw] OR "Ligamentum Capitis Femori"[tw] OR "Ligamentum Teres Femoris"[tw] OR "Ligamentum Teres Femori"[tw] OR "Round Ligament of Femur"[tw]) NOT ("Round Ligament of Liver"[Mesh] OR Liver[ti])	Hip
2	(Periarthritis[mesh] OR Pain[mesh:noexp] OR "Acute Pain"[mesh] OR "Chronic Pain"[mesh] OR "Musculoskeletal Pain"[mesh:noexp] OR Arthralgia[Mesh:NoExp] OR "Joint Diseases"[mesh:noexp] OR Periarthritis[tw] OR Periarthritides[tw] OR Pain[tiab] OR Pains[tw] OR Painful[tw] OR Ache[tw] OR Aches[tw] OR Arthralgia[tw] OR Arthralgias[tw] OR Polyarthralgia[tw] OR Polyarthralgias[tw] OR "Joint Disease"[tw] OR "Joint Diseases"[tw] OR Arthropathies[tw] OR Arthropathy[tw] OR Contracture[tw] OR Contractures[tw] OR "Adhesive Capsulitis"[tw] OR "Labrochondral Tear"[tw] OR "Labrochondral Tears"[tw] OR "Labrochondral Pathology"[tw]) NOT ("Osteoarthritis, Hip"[Majr] OR Osteoarthritis[ti])	Pain/injury
3	#1 AND #2	Hip + pain/injury

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Terms	Concept
4	("Femoracetabular Impingement"[mesh] OR "Hip Injuries"[mesh] OR "Hip Joint/injuries"[Mesh] OR "Femoracetabular Impingement"[tw] OR "Femoracetabular Impingements"[tw] OR "Femoroacetabular Impingement"[tw] OR "Femoroacetabular Impingements"[tw] OR "Femoro-Acetabular Impingement"[tw] OR "Femoro Acetabular Impingement"[tw] OR "Femoro-Acetabular Impingements"[tw] OR "Femoral Acetabular Impingement"[tw] OR "Femoral Acetabular Impingements"[tw] OR "Hip Injuries"[tw] OR "Hip Injury"[tw] OR "Hip Joint Injury"[tw] OR "Hip Joint Injuries"[tw] OR "Hip Dislocation"[tw] OR "Hip Dislocations"[tw] OR "Hip Displacement"[tw] OR "Hip Displacements"[tw] OR "Hip Dysplasia"[tw] OR "Hip Impingement"[tw] OR "Hip Impingements"[tw] OR "Hip Instability"[tw] OR "Hip Instabilities"[tw] OR "Hip Microinstability"[tw] OR "Hip Microinstabilities"[tw] OR "Hip Micro-instability"[tw] OR "Hip Micro-instabilities"[tw] OR "Acetabular Labral Tear"[tw] OR "Acetabular Labral Tears"[tw] OR "Hip Labral Tear"[tw] OR "Hip Labral Tears"[tw] OR "Intra-Articular Hip Disorder"[tw] OR "Intra-Articular Hip Disorders"[tw] OR "Intraarticular Hip Disorder"[tw] OR "Intraarticular Hip Disorders"[tw] OR "Intra-Articular Hip Disease"[tw] OR "Intra-Articular Hip Diseases"[tw] OR "Intraarticular Hip Disease"[tw] OR "Intraarticular Hip Diseases"[tw] OR "Ligamentum Teres Injury"[tw] OR "Ligamentum Teres Injuries"[tw] OR "Ligamentum Teres Tear"[tw] OR "Ligamentum Teres Tears"[tw] OR "Ligamentum Capitis Injury"[tw] OR "Ligamentum Capitis Injuries"[tw] OR "Ligamentum Capitis Tear"[tw] OR "Ligamentum Capitis Tears"[tw] OR "Non-Arthritic Hip Pain"[tw] OR "Pre-Arthritic Hip Pain"[tw] OR "Non-Arthritic Hip Joint Pain"[tw] OR "Pre-Arthritic Hip Joint Pain"[tw] OR "Hip Arthroscopy"[tiab])	Phrases for hip pain/injury
5	#3 OR #4	Either set
6	("Sensitivity and Specificity"[Mesh] OR "Validation Studies as Topic"[Mesh] OR "Reproducibility of Results"[Mesh] OR "Matched-Pair Analysis"[mesh] OR "Psychometrics"[Mesh] OR "Predictive Value of Tests"[Mesh] OR "Prognosis"[Mesh] OR sensitivity[tw] OR specificity[tw] OR reproducibility[tw] OR reproducible[tw] OR validity[tw] OR validation[tw] OR reliability[tw] OR reliable[tw] OR responsiveness[tw] OR consistency[tw] OR consistencies[tw] OR consistent[tw] OR "log-likelihood ratio"[tw] OR "likelihood-ratio"[tw] OR "likelihood ratio"[tw] OR "LR test"[tw] OR "exploratory research"[tw] OR "comparative study"[tw] OR "cross-sectional study"[tw] OR "matched controls"[tw] OR "pain-free controls"[tw] OR "asymptomatic controls"[tw] OR "disease-free controls"[tw] OR psychometrics[tw] OR "predictive value of test*"[tw] OR "predictive value of results"[tw] OR "negative predictive value"[tw] OR "positive predictive value"[tw] OR "negative predictive values"[tw] OR "positive predictive values"[tw] OR "diagnostic accuracy"[tw] OR "diagnosis accuracy"[tw] OR "diagnostic utility"[tw] OR prognosis[tw] OR "prognostic factor"[tw] OR "prognostic factors"[tw] OR "internal consistency"[tw] OR "coefficient of variation"[tw])	Measurement properties
7	("Gait"[Mesh] OR "Gait Analysis"[Mesh] OR "Range of Motion, Articular"[Mesh] OR "Rehabilitation"[Mesh] OR "Muscle Strength Dynamometer"[Mesh] OR "Return to Sport"[Mesh] OR "One-leg hip test"[tw] OR "single-leg stance"[tw] OR "one-leg stance"[tw] OR "one-legged stance test"[tw] OR "step-down test"[tw] OR "step down test"[tw] OR "single leg squat test"[tw] OR gait[tw] OR "range of motion"[tw] OR "joint flexibility"[tw] OR "full movement"[tw] OR "movement pattern"[tw] OR "movement patterns"[tw] OR rehabilitation[tw] OR "internal rotation"[tw] OR "external rotation"[tw] OR dynamometry[tw] OR dynameter[tw] OR "muscle weakness" OR "muscle strength"[tw] OR "hip weakness"[tw] OR "hip strength"[tw] OR "muscle function"[tw] OR gluteal[tw] OR gluteals[tw] OR gluteus[tw] OR adductor[tw] OR abductor[tw] OR "hip extensor"[tw] OR "hip extensors"[tw] OR "biceps femoris"[tw] OR semitendinosus[tw] OR semimembranosus[tw] OR "internal rotator"[tw] OR "internal rotators"[tw] OR "external rotator"[tw] OR "external rotators"[tw] OR "lateral rotator"[tw] OR "lateral rotators"[tw] OR "hip flexion"[tw] OR "back-to-sport"[tw] OR "return-to-sport"[tw] OR "back to sport"[tw] OR "return to sport"[tw] OR "back-to-sports"[tw] OR "return-to-sports"[tw] OR "back to sports"[tw] OR "return to sports"[tw] OR "sporting activity resumption"[tw] OR "recreational activities resumption"[tw] OR "return to recreation"[tw] OR "return to recreational"[tw] OR "return to play"[tw]) OR ("Pain"[Majr] OR "International Hip Outcome Tool"[tw] OR i-HOT[tiab] OR IHOT[tiab] OR "pain rating"[tw] OR "pain scale"[tw] OR "visual analogue scale"[tw] OR "visual analog scale"[tw] OR "numerical rating scale"[tw] OR "non-arthritic hip score"[tw] OR NAHS[tiab] OR "lower extremity functional scale"[tw] OR LEFS[tiab] OR "tegner activity level scale"[tw] OR "hip sports activity scale"[tw] OR HSAS[tiab] OR "patient-reported outcome measure"[tw] OR "patient-reported outcome measures"[tw] OR "Patient-Reported Outcomes Measurement Information System"[tw] OR PROMIS[tiab] OR "Hip outcome score"[tw] OR "Hip outcome scores"[tw] OR "Modified Harris Hip score"[tw] OR "Modified Harris Hip scores"[tw] OR mHHS[tiab] OR "Copenhagen Hip and Groin Outcome Score"[tw] OR "Copenhagen Hip and Groin Outcome Scores"[tw] OR HAGOS[tiab] OR "Hip Disability and Osteoarthritis Outcome Score"[tw] OR "Hip Disability and Osteoarthritis Outcome Scores"[tw] OR HOOS[tiab])	Physical impairment and patient-reported outcome measures
8	("Physical Examination"[Mesh:NoExp] OR "physical examination"[tw] OR "physical exam"[tw] OR "clinical examination"[tw] OR "physical test"[tw] OR "physical tests"[tw] OR "Flexion Abduction External Rotation"[tw] OR FABER[tw] OR "Patrick test"[tw] OR "Flexion Adduction Internal Rotation"[tw] OR FADIR[tiab] OR FADDIR[tiab] OR "Resisted Straight Leg Raise"[tw] OR "Log Roll Test"[tw] OR "McCarthy Test"[tw] OR "Quadrant Test"[tw] OR "Scour Test"[tw] OR "Fitzgerald test"[tw] OR "Ligamentum teres test"[tw] OR "Internal rotation with pressure"[tw] OR "Internal rotation over pressure"[tw] OR IROP[tiab] OR "Impingement Provocation Test"[tw])	Physical exam
9	#5 AND #6 AND (#7 OR #8)	
10	#9 AND English[language] AND ("2013"[Date - Publication] : "3000"[Date - Publication]) NOT (animals[mesh] NOT humans[mesh]) NOT ("comment"[Publication Type] OR "editorial"[Publication Type] OR "letter"[Publication Type] OR "news"[Publication Type] OR "retracted publication"[Publication Type] OR "retraction of publication"[Publication Type] OR "Case Reports"[Publication Type])	Search results: 3966

APPENDIX A (CONTINUED)

Embase Search Strategy

No.	Search Terms	Concept
1	('Acetabulum'/exp OR 'Pelvic Bones'/de OR 'Hip'/exp OR 'Ligament Of Head Of Femur'/exp OR 'Round Ligament'/de OR Acetabulum:ti,ab,de OR Acetabulums:ti,ab,de OR 'Cotyloid Cavity':ti,ab,de OR 'Cotyloid Cavities':ti,ab,de OR Acetabula:ti,ab,de OR Acetabulas:ti,ab,de OR Hip:ti,ab,de OR Hips:ti,ab,de OR Coxa:ti,ab,de OR Coxas:ti,ab,de OR 'Acetabulofemoral Joint':ti,ab,de OR 'Acetabulofemoral Joints':ti,ab,de OR 'Femur Round Ligament':ti,ab,de OR 'Femur Round Ligaments':ti,ab,de OR 'Ligamentum Capitis Femoris':ti,ab,de OR 'Ligamentum Capitis Femori':ti,ab,de OR 'Ligamentum Teres Femoris':ti,ab,de OR 'Ligamentum Teres Femori':ti,ab,de OR 'Round Ligament of Femur':ti,ab,de) AND [embase]/lim NOT ('Round Ligament of Liver'/exp OR Liver:ti)	Hip
2	('Periarthritis'/exp OR 'Chronic Pain'/exp OR 'Musculoskeletal Pain'/de OR 'Arthralgia'/de OR 'Arthropathy'/de OR 'Contracture'/exp OR Periarthritis:ti,ab,de OR Periarthritides:ti,ab,de OR Pain:ti,ab:ti,ab,de OR Pains:ti,ab,de OR Painful:ti,ab,de OR Ache:ti,ab,de OR Aches:ti,ab,de OR Arthralgia:ti,ab,de OR Arthralgias:ti,ab,de OR Polyarthralgia:ti,ab,de OR Polyarthralgias:ti,ab,de OR 'Joint Disease':ti,ab,de OR 'Joint Diseases':ti,ab,de OR Arthropathies:ti,ab,de OR Arthropathy:ti,ab,de OR Contracture:ti,ab,de OR Contractures:ti,ab,de OR 'Adhesive Capsulitis':ti,ab,de OR 'Labrochondral Tear':ti,ab,de OR 'Labrochondral Tears':ti,ab,de OR 'Labrochondral Pathology':ti,ab,de) AND [embase]/lim NOT ('hip osteoarthritis'/mj OR osteoarthritis:ti)	Pain/injury
3	1 AND 2	Hip + pain/injury
4	('Femoroacetabular Impingement'/exp OR 'Hip Injury'/exp OR 'Femoracetabular Impingement':ti,ab,de OR 'Femoracetabular Impingements':ti,ab,de OR 'Femoroacetabular Impingement':ti,ab,de OR 'Femoroacetabular Impingements':ti,ab,de OR 'Femoro-Acetabular Impingement':ti,ab,de OR 'Femoro Acetabular Impingement':ti,ab,de OR 'Femoro-Acetabular Impingements':ti,ab,de OR 'Femoral Acetabular Impingement':ti,ab,de OR 'Femoral Acetabular Impingements':ti,ab,de OR 'Hip Injuries':ti,ab,de OR 'Hip Injury':ti,ab,de OR 'Hip Joint Injury':ti,ab,de OR 'Hip Joint Injuries':ti,ab,de OR 'Hip Dislocation':ti,ab,de OR 'Hip Dislocations':ti,ab,de OR 'Hip Displacement':ti,ab,de OR 'Hip Displacements':ti,ab,de OR 'Hip Dysplasia':ti,ab,de OR 'Hip Impingement':ti,ab,de OR 'Hip Impingements':ti,ab,de OR 'Hip Instability':ti,ab,de OR 'Hip Instabilities':ti,ab,de OR 'Hip Microinstability':ti,ab,de OR 'Hip Microinstabilities':ti,ab,de OR 'Hip Micro-instability':ti,ab,de OR 'Hip Micro-instabilities':ti,ab,de OR 'Acetabular Labral Tear':ti,ab,de OR 'Acetabular Labral Tears':ti,ab,de OR 'Hip Labral Tear':ti,ab,de OR 'Hip Labral Tears':ti,ab,de OR 'Intra-Articular Hip Disorder':ti,ab,de OR 'Intra-Articular Hip Disorders':ti,ab,de OR 'Intraarticular Hip Disorder':ti,ab,de OR 'Intraarticular Hip Disorders':ti,ab,de OR 'Intra-Articular Hip Disease':ti,ab,de OR 'Intra-Articular Hip Diseases':ti,ab,de OR 'Intraarticular Hip Disease':ti,ab,de OR 'Intraarticular Hip Diseases':ti,ab,de OR 'Ligamentum Teres Injury':ti,ab,de OR 'Ligamentum Teres Injuries':ti,ab,de OR 'Ligamentum Teres Tear':ti,ab,de OR 'Ligamentum Teres Tears':ti,ab,de OR 'Ligamentum Capitis Injury':ti,ab,de OR 'Ligamentum Capitis Injuries':ti,ab,de OR 'Ligamentum Capitis Tear':ti,ab,de OR 'Ligamentum Capitis Tears':ti,ab,de OR 'Non-Arthritic Hip Pain':ti,ab,de OR 'Pre-Arthritic Hip Pain':ti,ab,de OR 'Non-Arthritic Hip Joint Pain':ti,ab,de OR 'Pre-Arthritic Hip Joint Pain':ti,ab,de OR 'Hip Arthroscopy':ti,ab) AND [embase]/lim NOT ('hip osteoarthritis'/mj OR osteoarthritis:ti)	Phrases for hip pain/injury
5	3 OR 4	Either set
6	('sensitivity'/exp OR 'specificity'/exp OR 'validation study'/exp OR 'reproducibility'/exp OR 'statistical analysis'/exp/mj OR 'psychometry'/exp OR 'predictive value'/exp OR 'prognosis'/exp OR sensitivity:ti,ab,de OR specificity:ti,ab,de OR reproducibility:ti,ab,de OR reproducible:ti,ab,de OR validity:ti,ab,de OR validation:ti,ab,de OR reliability:ti,ab,de OR reliable:ti,ab,de OR responsiveness:ti,ab,de OR consistency:ti,ab,de OR consistencies:ti,ab,de OR consistent:ti,ab,de OR 'log-likelihood ratio':ti,ab,de OR likelihood-ratio:ti,ab,de OR 'likelihood ratio':ti,ab,de OR 'LR test':ti,ab,de OR 'exploratory research':ti,ab,de OR 'comparative study':ti,ab,de OR 'cross-sectional study':ti,ab,de OR 'matched controls':ti,ab,de OR 'pain-free controls':ti,ab,de OR 'asymptomatic controls':ti,ab,de OR 'disease-free controls':ti,ab,de OR psychometrics:ti,ab,de OR 'predictive value of test*':ti,ab,de OR 'predictive value of results':ti,ab,de OR 'negative predictive value':ti,ab,de OR 'positive predictive value':ti,ab,de OR 'negative predictive values':ti,ab,de OR 'positive predictive values':ti,ab,de OR 'diagnostic accuracy':ti,ab,de OR 'diagnosis accuracy':ti,ab,de OR 'diagnostic utility':ti,ab,de OR prognosis:ti,ab,de OR 'prognostic factor':ti,ab,de OR 'prognostic factors':ti,ab,de OR 'internal consistency':ti,ab,de OR 'coefficient of variation':ti,ab,de) AND [embase]/lim	Measurement properties

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Terms	Concept
7	('gait'/de OR 'rehabilitation'/de OR 'dynamometer'/exp OR 'return to sport'/exp OR 'one-leg hip test':ti,ab,de OR 'single-leg stance':ti,ab,de OR 'one-leg stance':ti,ab,de OR 'one-legged stance test':ti,ab,de OR 'step-down test':ti,ab,de OR 'step down test':ti,ab,de OR 'single leg squat test':ti,ab,de OR gait:ti,ab,de OR 'range of motion':ti,ab,de OR 'joint flexibility':ti,ab,de OR 'full movement':ti,ab,de OR 'movement pattern':ti,ab,de OR 'movement patterns':ti,ab,de OR rehabilitation:ti,ab,de OR 'internal rotation':ti,ab,de OR 'external rotation':ti,ab,de OR dynamometry:ti,ab,de OR dynameter:ti,ab,de OR 'muscle weakness':ti,ab,de OR 'muscle strength':ti,ab,de OR 'hip weakness':ti,ab,de OR 'hip strength':ti,ab,de OR 'muscle function':ti,ab,de OR gluteal:ti,ab,de OR gluteals:ti,ab,de OR gluteus:ti,ab,de OR adductor:ti,ab,de OR abductor:ti,ab,de OR 'hip extensor':ti,ab,de OR 'hip extensors':ti,ab,de OR 'biceps femoris':ti,ab,de OR semitendinosus:ti,ab,de OR semimembranosus:ti,ab,de OR 'internal rotator':ti,ab,de OR 'internal rotators':ti,ab,de OR 'external rotator':ti,ab,de OR 'external rotators':ti,ab,de OR 'lateral rotator':ti,ab,de OR 'lateral rotators':ti,ab,de OR 'hip flexion':ti,ab,de OR back-to-sport:ti,ab,de OR return-to-sport:ti,ab,de OR 'back to sport':ti,ab,de OR 'return to sport':ti,ab,de OR back-to-sports:ti,ab,de OR return-to-sports:ti,ab,de OR 'back to sports':ti,ab,de OR 'return to sports':ti,ab,de OR 'sporting activity resumption':ti,ab,de OR 'recreational activities resumption':ti,ab,de OR 'return to recreation':ti,ab,de OR 'return to recreational':ti,ab,de OR 'return to play':ti,ab,de) OR (Pain/exp/mj OR 'International Hip Outcome Tool':ti,ab,de OR i-HOT:ti,ab OR IHOT:ti,ab OR 'pain rating':ti,ab,de OR 'pain scale':ti,ab,de OR 'visual analogue scale':ti,ab,de OR 'visual analog scale':ti,ab,de OR 'numerical rating scale':ti,ab,de OR 'non-arthritic hip score':ti,ab,de OR NAHS:ti,ab OR 'lower extremity functional scale':ti,ab,de OR LEFS:ti,ab OR 'tegner activity level scale':ti,ab,de OR 'hip sports activity scale':ti,ab,de OR HSAS:ti,ab OR 'patient-reported outcome measure':ti,ab,de OR 'patient-reported outcome measures':ti,ab,de OR 'Patient-Reported Outcomes Measurement Information System':ti,ab,de OR PROMIS:ti,ab OR 'Hip outcome score':ti,ab,de OR 'Hip outcome scores':ti,ab,de OR 'Modified Harris Hip score':ti,ab,de OR 'Modified Harris Hip scores':ti,ab,de OR mHHS:ti,ab OR 'Copenhagen Hip and Groin Outcome Score':ti,ab,de OR 'Copenhagen Hip and Groin Outcome Scores':ti,ab,de OR HAGOS:ti,ab OR 'Hip Disability and Osteoarthritis Outcome Score':ti,ab,de OR 'Hip Disability and Osteoarthritis Outcome Scores':ti,ab,de OR HOOS:ti,ab) AND [embase]/lim	Physical impairment and patient-reported outcome measures
8	('physical examination'/de OR 'physical examination':ti,ab,de OR 'physical exam':ti,ab,de OR 'clinical examination':ti,ab,de OR 'physical test':ti,ab,de OR 'physical tests':ti,ab,de OR 'Flexion Abduction External Rotation':ti,ab,de OR FABER:ti,ab OR 'Patrick test':ti,ab OR 'Flexion Adduction Internal Rotation':ti,ab,de OR FADIR:ti,ab OR FADDIR:ti,ab OR 'Resisted Straight Leg Raise':ti,ab,de OR 'Log Roll Test':ti,ab,de OR 'McCarthy Test':ti,ab OR 'Quadrant Test':ti,ab OR 'Scour Test':ti,ab OR 'Fitzgerald test':ti,ab OR 'Ligamentum teres test':ti,ab,de OR 'Internal rotation with pressure':ti,ab,de OR 'Internal rotation over pressure':ti,ab,de OR IROP:ti,ab OR 'Impingement Provocation Test':ti,ab,de) AND [embase]/lim	Physical exam
9	#5 AND #6 AND (#7 OR #8)	
10	#9 AND [english]/lim AND [2013-2022]/py NOT ([animals]/lim NOT [humans]/lim) NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	Search results: 2962

CINAHL Plus Search Strategy

No.	Search Terms	Concept
1	((MH "Acetabulum") OR (MH "Pelvic Bones") OR (MH "Hip") OR (MH "Hip Joint") OR Acetabulum OR Acetabulums OR "Cotyloid Cavity" OR "Cotyloid Cavities" OR Acetabula OR Acetabulas OR (MH Hip+) OR Hip OR Hips OR Coxa OR Coxas OR "Acetabulofemoral Joint" OR "Acetabulofemoral Joints" OR "Femur Round Ligament" OR "Femur Round Ligaments" OR "Ligamentum Capitis Femoris" OR "Ligamentum Capitis Femori" OR "Ligamentum Teres Femoris" OR "Ligamentum Teres Femori" OR "Round Ligament of Femur") NOT (TI Liver)	Hip
2	((MH "Periarthritis") OR (MH "Pain") OR (MH "Chronic Pain") OR (MH "Arthralgia") OR (MH "Joint Diseases") OR Periarthritis OR Periarthritides OR (TI Pain OR AB Pain) OR Pains OR Painful OR Ache OR Aches OR Arthralgia OR Arthralgias OR Polyarthralgia OR Polyarthralgias OR "Joint Disease" OR "Joint Diseases" OR Arthropathies OR Arthropathy OR Contracture OR Contractures OR "Adhesive Capsulitis" OR "Labrochondral Tear" OR "Labrochondral Tears" OR "Labrochondral Pathology") NOT (TI Osteoarthritis)	Pain/injury
3	S1 AND S2	Hip + pain/injury
4	((MH "Femoracetabular Impingement") OR (MH "Hip Injuries+") OR OR "Femoracetabular Impingement" OR "Femoracetabular Impingements" OR "Femoroacetabular Impingement" OR "Femoroacetabular Impingements" OR "Femoro-Acetabular Impingement" OR "Femoro Acetabular Impingement" OR "Femoro-Acetabular Impingements" OR "Femoral Acetabular Impingement" OR "Femoral Acetabular Impingements" OR "Hip Injuries" OR "Hip Injury" OR "Hip Joint Injury" OR "Hip Joint Injuries" OR "Hip Dislocation" OR "Hip Dislocations" OR "Hip Displacement" OR "Hip Displacements" OR "Hip Dysplasia" OR "Hip Impingement" OR "Hip Impingements" OR "Hip Instability" OR "Hip Instabilities" OR "Hip Microinstability" OR "Hip Microinstabilities" OR "Hip Micro-instability" OR "Hip Micro-instabilities" OR "Acetabular Labral Tear" OR "Acetabular Labral Tears" OR "Hip Labral Tear" OR "Hip Labral Tears" OR "Intra-Articular Hip Disorder" OR "Intra-Articular Hip Disorders" OR "Intraarticular Hip Disorder" OR "Intraarticular Hip Disorders" OR "Intra-Articular Hip Disease" OR "Intra-Articular Hip Diseases" OR "Intraarticular Hip Disease" OR "Intraarticular Hip Diseases" OR "Ligamentum Teres Injury" OR "Ligamentum Teres Injuries" OR "Ligamentum Teres Tear" OR "Ligamentum Teres Tears" OR "Ligamentum Capitis Injury" OR "Ligamentum Capitis Injuries" OR "Ligamentum Capitis Tear" OR "Ligamentum Capitis Tears" OR "Non-Arthritic Hip Pain" OR "Pre-Arthritic Hip Pain" OR "Non-Arthritic Hip Joint Pain" OR "Pre-Arthritic Hip Joint Pain" OR (TI "Hip Arthroscopy" OR AB "Hip Arthroscopy")	Phrases for hip pain/injury
5	S3 OR S4	Either set

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Terms	Concept
6	(sensitivity OR specificity OR reproducibility OR reproducible OR validity OR validation OR reliability OR reliable OR responsiveness OR consistency OR consistencies OR consistent OR "log-likelihood ratio" OR likelihood-ratio OR "likelihood ratio" OR "LR test" OR "exploratory research" OR "comparative study" OR "cross-sectional study" OR "matched controls" OR "pain-free controls" OR "asymptomatic controls" OR "disease-free controls" OR psychometrics OR "predictive value of test*" OR "predictive value of results" OR "negative predictive value" OR "positive predictive value" OR "negative predictive values" OR "positive predictive values" OR "diagnostic accuracy" OR "diagnosis accuracy" OR "diagnostic utility" OR prognosis OR "prognostic factor" OR "prognostic factors" OR "internal consistency" OR "coefficient of variation")	Measurement properties
7	"One-leg hip test" OR "single-leg stance" OR "one-leg stance" OR "one-legged stance test" OR "step-down test" OR "step down test" OR "single leg squat test" OR gait OR "range of motion" OR "joint flexibility" OR "full movement" OR "movement pattern" OR "movement patterns" OR rehabilitation OR "internal rotation" OR "external rotation" OR dynamometry OR dynameter OR "muscle weakness" OR "muscle strength" OR "hip weakness" OR "hip strength" OR "muscle function" OR gluteal OR gluteals OR gluteus OR adductor OR abductor OR "hip extensor" OR "hip extensorsOR "biceps femoris"" OR semitendinosus OR semimembranosus OR "internal rotator" OR "internal rotators" OR "external rotator" OR "external rotators" OR "lateral rotator" OR "lateral rotators" OR "hip flexion" OR back-to-sport OR return-to-sport OR "back to sport" OR "return to sport" OR back-to-sports OR return-to-sports OR "back to sports" OR "return to sports" OR "sporting activity resumption" OR "recreational activities resumption" OR "return to recreation" OR "return to recreational" OR "return to play") OR ((MM Pain+) OR "International Hip Outcome Tool" OR (TI i-HOT OR AB i-HOT) OR (TI IHOT OR AB IHOT) OR "pain rating" OR "pain scale" OR "visual analogue scale" OR "visual analog scale" OR "numerical rating scale" OR "non-arthritic hip score" OR (TI NAHS OR AB NAHS) OR "lower extremity functional scale" OR (TI LEFS OR AB LEFS) OR "tegner activity level scale" OR "hip sports activity scale" OR (TI HSAS OR AB HSAS) OR "patient-reported outcome measure" OR "patient-reported outcome measures" OR "Patient-Reported Outcomes Measurement Information System" OR (TI PROMIS OR AB PROMIS) OR "Hip outcome score" OR "Hip outcome scores" OR "Modified Harris Hip score" OR "Modified Harris Hip scores" OR (TI mHHS OR AB mHHS) OR "Copenhagen Hip and Groin Outcome Score" OR "Copenhagen Hip and Groin Outcome Scores" OR (TI HAGOS OR AB HAGOS) OR "Hip Disability and Osteoarthritis Outcome Score" OR "Hip Disability and Osteoarthritis Outcome Scores" OR (TI HOOS OR AB HOOS)	Physical impairment and patient-reported outcome measures
8	"physical examination" OR "physical exam" OR "clinical examination" OR "physical test" OR "physical tests" OR "Flexion Abduction External Rotation" OR FABER OR "Patrick test" OR "Flexion Adduction Internal Rotation" OR (TI FADIR OR AB FADIR) OR (TI FADDIR OR AB FADDIR) OR "Resisted Straight Leg Raise" OR "Log Roll Test" OR "McCarthy Test" OR "Quadrant Test" OR "Scour Test" OR "Fitzgerald test" OR "Ligamentum teres test" OR "Internal rotation with pressure" OR "Internal rotation over pressure" OR (TI IROP OR AB IROP) OR "Impingement Provocation Test"	Physical exam
9	S5 AND S6 AND (S7 OR S8) AND Language:English AND Source Type: Academic Journals AND Publication Date:2013-2022	Search results: 1671

Cochrane Library Search Strategy

No.	Search Terms	Concept
1	([mh Acetabulum] OR [mh "Hip Joint"] OR [mh "Round Ligament of Femur"] OR Acetabulum:ti,ab,kw OR Acetabulums:ti,ab,kw OR "Cotyloid Cavity":ti,ab,kw OR "Cotyloid Cavities":ti,ab,kw OR Acetabula:ti,ab,kw OR Acetabulas:ti,ab,kw OR [mh Hip] OR Hip:ti,ab,kw OR Hips:ti,ab,kw OR Coxa:ti,ab,kw OR Coxas:ti,ab,kw OR "Acetabulofemoral Joint":ti,ab,kw OR "Acetabulofemoral Joints":ti,ab,kw OR "Femur Round Ligament":ti,ab,kw OR "Femur Round Ligaments":ti,ab,kw OR "Ligamentum Capitis Femoris":ti,ab,kw OR "Ligamentum Capitis Femori":ti,ab,kw OR "Ligamentum Teres Femoris":ti,ab,kw OR "Ligamentum Teres Femori":ti,ab,kw OR "Round Ligament of Femur":ti,ab,kw) NOT ([mh "Round Ligament of Liver"] OR Liver:ti)	Hip
2	([mh Periarthritis] OR [mh ^Pain] OR [mh "Acute Pain"] OR [mh "Chronic Pain"] OR [mh ^"Musculoskeletal Pain"] OR [mh ^Arthralgia] OR [mh ^"Joint Diseases"] OR Periarthritis:ti,ab,kw OR Periarthritides:ti,ab,kw OR Pain:ti,ab OR Pains:ti,ab,kw OR Painful:ti,ab,kw OR Ache:ti,ab,kw OR Aches:ti,ab,kw OR Arthralgia:ti,ab,kw OR Arthralgias:ti,ab,kw OR Polyarthralgia:ti,ab,kw OR Polyarthralgias:ti,ab,kw OR "Joint Disease":ti,ab,kw OR "Joint Diseases":ti,ab,kw OR Arthropathies:ti,ab,kw OR Arthropathy:ti,ab,kw OR Contracture:ti,ab,kw OR Contractures:ti,ab,kw OR "Adhesive Capsulitis":ti,ab,kw OR "Labrochondral Tear":ti,ab,kw OR "Labrochondral Tears":ti,ab,kw OR "Labrochondral Pathology":ti,ab,kw) NOT ([mh "Osteoarthritis, Hip"] OR Osteoarthritis:ti)	Pain/injury
3	1 AND 2	Hip + Pain/injury

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Terms	Concept
4	([mh "Femoracetabular Impingement"] OR [mh "Hip Injuries"] OR "Femoracetabular Impingement":ti,ab,kw OR "Femoracetabular Impingements":ti,ab,kw OR "Femoracetabular Impingement":ti,ab,kw OR "Femoracetabular Impingements":ti,ab,kw OR "Femoro-Acetabular Impingement":ti,ab,kw OR "Femoro Acetabular Impingement":ti,ab,kw OR "Femoro-Acetabular Impingements":ti,ab,kw OR "Femoral Acetabular Impingement":ti,ab,kw OR "Femoral Acetabular Impingements":ti,ab,kw OR "Hip Injuries":ti,ab,kw OR "Hip Injury":ti,ab,kw OR "Hip Joint Injury":ti,ab,kw OR "Hip Joint Injuries":ti,ab,kw OR "Hip Dislocation":ti,ab,kw OR "Hip Dislocations":ti,ab,kw OR "Hip Displacement":ti,ab,kw OR "Hip Displacements":ti,ab,kw OR "Hip Dysplasia":ti,ab,kw OR "Hip Impingement":ti,ab,kw OR "Hip Impingements":ti,ab,kw OR "Hip Instability":ti,ab,kw OR "Hip Instabilities":ti,ab,kw OR "Hip Microinstability":ti,ab,kw OR "Hip Microinstabilities":ti,ab,kw OR "Hip Micro-instability":ti,ab,kw OR "Hip Micro-instabilities":ti,ab,kw OR "Acetabular Labral Tear":ti,ab,kw OR "Acetabular Labral Tears":ti,ab,kw OR "Hip Labral Tear":ti,ab,kw OR "Hip Labral Tears":ti,ab,kw OR "Intra-Articular Hip Disorder":ti,ab,kw OR "Intra-Articular Hip Disorders":ti,ab,kw OR "Intraarticular Hip Disorder":ti,ab,kw OR "Intraarticular Hip Disorders":ti,ab,kw OR "Intra-Articular Hip Disease":ti,ab,kw OR "Intra-Articular Hip Diseases":ti,ab,kw OR "Intraarticular Hip Disease":ti,ab,kw OR "Intraarticular Hip Diseases":ti,ab,kw OR "Ligamentum Teres Injury":ti,ab,kw OR "Ligamentum Teres Injuries":ti,ab,kw OR "Ligamentum Teres Tear":ti,ab,kw OR "Ligamentum Teres Tears":ti,ab,kw OR "Ligamentum Capitis Injury":ti,ab,kw OR "Ligamentum Capitis Injuries":ti,ab,kw OR "Ligamentum Capitis Tear":ti,ab,kw OR "Ligamentum Capitis Tears":ti,ab,kw OR "Non-Arthritic Hip Pain":ti,ab,kw OR "Pre-Arthritic Hip Pain":ti,ab,kw OR "Non-Arthritic Hip Joint Pain":ti,ab,kw OR "Pre-Arthritic Hip Joint Pain":ti,ab,kw OR "Hip Arthroscopy":ti,ab)	Phrases for hip pain/injury
5	3 OR 4	Either set
6	([mh "Sensitivity and Specificity"] OR [mh "Validation Studies as Topic"] OR [mh "Reproducibility of Results"] OR [mh "Matched-Pair Analysis"] OR [mh Psychometrics] OR [mh "Predictive Value of Tests"] OR [mh Prognosis] OR sensitivity:ti,ab,kw OR specificity:ti,ab,kw OR reproducibility:ti,ab,kw OR reproducible:ti,ab,kw OR validity:ti,ab,kw OR validation:ti,ab,kw OR reliability:ti,ab,kw OR reliable:ti,ab,kw OR responsiveness:ti,ab,kw OR consistency:ti,ab,kw OR consistencies:ti,ab,kw OR consistent:ti,ab,kw OR "log-likelihood ratio":ti,ab,kw OR likelihood-ratio:ti,ab,kw OR "likelihood ratio":ti,ab,kw OR "LR test":ti,ab,kw OR "exploratory research":ti,ab,kw OR "comparative study":ti,ab,kw OR "cross-sectional study":ti,ab,kw OR "matched controls":ti,ab,kw OR "pain-free controls":ti,ab,kw OR "asymptomatic controls":ti,ab,kw OR "disease-free controls":ti,ab,kw OR psychometrics:ti,ab,kw OR "predictive value of test*":ti,ab,kw OR "predictive value of results":ti,ab,kw OR "negative predictive value":ti,ab,kw OR "positive predictive value":ti,ab,kw OR "negative predictive values":ti,ab,kw OR "positive predictive values":ti,ab,kw OR "diagnostic accuracy":ti,ab,kw OR "diagnosis accuracy":ti,ab,kw OR "diagnostic utility":ti,ab,kw OR prognosis:ti,ab,kw OR "prognostic factor":ti,ab,kw OR "prognostic factors":ti,ab,kw OR "internal consistency":ti,ab,kw OR "coefficient of variation":ti,ab,kw)	Measurement properties
7	([mh Gait] OR [mh "Gait Analysis"] OR [mh "Range of Motion, Articular"] OR [mh Rehabilitation] OR [mh "Muscle Strength Dynamometer"] OR [mh "Return to Sport"] OR "One-leg hip test":ti,ab,kw OR "single-leg stance":ti,ab,kw OR "one-leg stance":ti,ab,kw OR "one-legged stance test":ti,ab,kw OR "step-down test":ti,ab,kw OR "step down test":ti,ab,kw OR "single leg squat test":ti,ab,kw OR gait:ti,ab,kw OR "range of motion":ti,ab,kw OR "joint flexibility":ti,ab,kw OR "full movement":ti,ab,kw OR "movement pattern":ti,ab,kw OR "movement patterns":ti,ab,kw OR rehabilitation:ti,ab,kw OR "internal rotation":ti,ab,kw OR "external rotation":ti,ab,kw OR dynamometry:ti,ab,kw OR dynameter:ti,ab,kw OR "muscle weakness" OR "muscle strength":ti,ab,kw OR "hip weakness":ti,ab,kw OR "hip strength":ti,ab,kw OR "muscle function":ti,ab,kw OR gluteal:ti,ab,kw OR gluteals:ti,ab,kw OR gluteus:ti,ab,kw OR adductor:ti,ab,kw OR abductor:ti,ab,kw OR "hip extensor":ti,ab,kw OR "hip extensors":ti,ab,kw OR "biceps femoris":ti,ab,kw OR semitendinosus:ti,ab,kw OR semimembranosus:ti,ab,kw OR "internal rotator":ti,ab,kw OR "internal rotators":ti,ab,kw OR "external rotator":ti,ab,kw OR "external rotators":ti,ab,kw OR "lateral rotator":ti,ab,kw OR "lateral rotators":ti,ab,kw OR "hip flexion":ti,ab,kw OR back-to-sport:ti,ab,kw OR return-to-sport:ti,ab,kw OR "back to sport":ti,ab,kw OR "return to sport":ti,ab,kw OR back-to-sports:ti,ab,kw OR return-to-sports:ti,ab,kw OR "back to sports":ti,ab,kw OR "return to sports":ti,ab,kw OR "sporting activity resumption":ti,ab,kw OR "recreational activities resumption":ti,ab,kw OR "return to recreation":ti,ab,kw OR "return to recreational":ti,ab,kw OR "return to play":ti,ab,kw) OR ([mh Pain] OR "International Hip Outcome Tool":ti,ab,kw OR i-HOT:ti,ab OR IHOT:ti,ab OR "pain rating":ti,ab,kw OR "pain scale":ti,ab,kw OR "visual analogue scale":ti,ab,kw OR "visual analog scale":ti,ab,kw OR "numerical rating scale":ti,ab,kw OR "non-arthritic hip score":ti,ab,kw OR NAHS:ti,ab OR "lower extremity functional scale":ti,ab,kw OR LEFS:ti,ab OR "tegner activity level scale":ti,ab,kw OR "hip sports activity scale":ti,ab,kw OR HSAS:ti,ab OR "patient-reported outcome measure":ti,ab,kw OR "patient-reported outcome measures":ti,ab,kw OR "Patient-Reported Outcomes Measurement Information System":ti,ab,kw OR PROMIS:ti,ab OR "Hip outcome score":ti,ab,kw OR "Hip outcome scores":ti,ab,kw OR "Modified Harris Hip score":ti,ab,kw OR "Modified Harris Hip scores":ti,ab,kw OR mHHS:ti,ab OR "Copenhagen Hip and Groin Outcome Score":ti,ab,kw OR "Copenhagen Hip and Groin Outcome Scores":ti,ab,kw OR HAGOS:ti,ab OR "Hip Disability and Osteoarthritis Outcome Score":ti,ab,kw OR "Hip Disability and Osteoarthritis Outcome Scores":ti,ab,kw OR HOOS:ti,ab)	Physical impairment and patient-reported outcome measures
8	([mh ^"Physical Examination"] OR "physical examination":ti,ab,kw OR "physical exam":ti,ab,kw OR "clinical examination":ti,ab,kw OR "physical test":ti,ab,kw OR "physical tests":ti,ab,kw OR "Flexion Abduction External Rotation":ti,ab,kw OR FABER:ti,ab,kw OR "Patrick test":ti,ab,kw OR "Flexion Adduction Internal Rotation":ti,ab,kw OR FADIR:ti,ab OR FADDIR:ti,ab OR "Resisted Straight Leg Raise":ti,ab,kw OR "Log Roll Test":ti,ab,kw OR "McCarthy Test":ti,ab,kw OR "Quadrant Test":ti,ab,kw OR "Scour Test":ti,ab,kw OR "Fitzgerald test":ti,ab,kw OR "Ligamentum teres test":ti,ab,kw OR "Internal rotation with pressure":ti,ab,kw OR "Internal rotation over pressure":ti,ab,kw OR IROP:ti,ab OR "Impingement Provocation Test":ti,ab,kw)	Physical exam
9	#5 AND #6 AND (#7 OR #8) AND Publication Date: 2013-Present	Search results: 761

APPENDIX A (CONTINUED)

Nonarthritic Hip Pain Interventions
January 2013 to June 2019
PubMed Search Strategy
Run on June 20, 2019

No.	Search Hedge	Results
1	(Acetabulum[mesh] OR Acetabulum[tw] OR Acetabulums[tw] OR Cotyloid Cavity[tw] OR Cotyloid Cavities[tw] OR Acetabula[tw] OR Acetabulas[tw] OR Pelvic Bones[mesh:noexp] OR Pelvic Bones[tw] OR Pelvis Bones[tw] OR Innominate Bones[tw] OR Innominate Bone[tw] OR Hip[mesh] OR Hip[tw] OR Hips[tw] OR Coxa[tw] OR Coxas[tw] OR Acetabulofemoral Joint[tw] OR Acetabulofemoral Joints[tw] OR Hip Joint[mesh] OR "Round Ligament of Femur"[mesh] OR Femur Round Ligament[tw] OR Femur Round Ligaments[tw] OR Ligamentum Capitis Femoris[tw] OR Ligamentum Capitis Femori[tw] OR Ligamentum Teres Femoris[tw] OR Ligamentum Teres Femori[tw] OR "Round Ligament of Femur"[tw] OR "Ligament Of Head Of Femur"[tw] OR Round Ligaments[mesh:noexp])	164 572
2	(Synovitis, Pigmented Villonodular[mesh] OR Pigmented Villonodular Synovitis[tw] OR Pigmented Villonodular Synovitides[tw] OR Diffuse Tenosynovial Giant Cell Tumor[tw] OR Periarthritis[mesh] OR Periarthritis[tw] OR Periarthritides[tw] OR Pain[mesh:noexp] OR Acute Pain[mesh] OR Chronic Pain[mesh] OR Musculoskeletal Pain[mesh:noexp] OR Pain[tiab] OR Pains[tw] OR Painful[tw] OR Ache[tw] OR Aches[tw] OR Arthralgia[Mesh:NoExp] OR Arthralgia[tw] OR Arthralgias[tw] OR Polyarthralgia[tw] OR Polyarthralgias[tw] OR Joint Diseases[mesh:noexp] OR Joint Disease[tw] OR Joint Diseases[tw] OR Arthrosis[tw] OR Arthroses[tw] OR Arthropathies[tw] OR Arthropathy[tw] OR Contracture[mesh] OR Contracture[tw] OR Contractures[tw] OR Adhesive Capsulitis[tw] OR Adhesive Capsulitides[tw] OR Bursitis[tw] OR Bursitides[tw] OR Labrochondral Tear[tw] OR Labrochondral Tears[tw] OR Labrochondral Pathology[tw])	736 519
3	1 AND 2	27 056
4	(Hip Contracture[mesh] OR Hip Contracture[tw] OR Hip Contractures[tw] OR Femoracetabular Impingement[mesh] OR Femoracetabular Impingement[tw] OR Femoracetabular Impingements[tw] OR Femoroacetabular Impingement[tw] OR Femoroacetabular Impingements[tw] OR Femoro-Acetabular Impingement[tw] OR Femoro Acetabular Impingement[tw] OR Femoro-Acetabular Impingements[tw] OR Femoral Acetabular Impingement[tw] OR Femoral Acetabular Impingements[tw] OR Hip Injuries[mesh] OR Hip Injuries[tw] OR Hip Injury[tw] OR "Hip Joint/injuries"[Mesh] OR Hip Joint Injury[tw] OR Hip Joint Injuries[tw] OR Hip Dislocation[tw] OR Hip Dislocations[tw] OR Hip Displacement[tw] OR Hip Displacements[tw] OR Hip Dysplasia[tw] OR Hip Impingement[tw] OR Hip Impingements[tw] OR Hip Instability[tw] OR Hip Instabilities[tw] OR Hip Microinstability[tw] OR Hip Microinstabilities[tw] OR Hip Micro-instability[tw] OR Hip Micro-instabilities[tw] OR Acetabular Labral Tear[tw] OR Acetabular Labral Tears[tw] OR Hip Labral Tear[tw] OR Hip Labral Tears[tw] OR Intra-Articular Hip Disorder[tw] OR Intra-Articular Hip Disorders[tw] OR Intraarticular Hip Disorder[tw] OR Intraarticular Hip Disorders[tw] OR Intra-Articular Hip Disease[tw] OR Intra-Articular Hip Diseases[tw] OR Intraarticular Hip Disease[tw] OR Intraarticular Hip Diseases[tw] OR Ligamentum Teres Injury[tw] OR Ligamentum Teres Injuries[tw] OR Ligamentum Teres Tear[tw] OR Ligamentum Teres Tears[tw] OR Ligamentum Capitis Injury[tw] OR Ligamentum Capitis Injuries[tw] OR Ligamentum Capitis Tear[tw] OR Ligamentum Capitis Tears[tw] OR "Non-Arthritic Hip Pain"[tw] OR "Pre-Arthritic Hip Pain"[tw] OR "Non-Arthritic Hip Joint Pain"[tw] OR "Pre-Arthritic Hip Joint Pain"[tw])	40 857
5	3 OR 4	62 420

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
6	("Musculoskeletal Manipulations"[Mesh:NoExp] OR Musculoskeletal Manipulations[tw] OR Musculoskeletal Manipulation[tw] OR Manual Therapies[tw] OR Manual Therapy[tw] OR Manipulation Therapy[tw] OR Manipulation Therapies[tw] OR Manipulative Therapies[tw] OR Manipulative Therapy[tw] OR Joint Manipulation[tw] OR Joint Mobilization[tw] OR "Manipulation, Chiropractic"[Mesh] OR Chiropractic Manipulation[tw] OR Chiropractic Manipulations[tw] OR Chiropractic Adjustment[tw] OR Chiropractic Adjustments[tw] OR Chiropractics[tw] OR "Combined Modality Therapy"[Mesh:NoExp] OR Multimodal Treatment[tw] OR Multimodal Treatments[tw] OR Combined Modality Therapies[tw] OR Combined Modality Therapy[tw] OR "Conservative Treatment"[Mesh] OR Conservative Treatments[tw] OR Conservative Treatment[tw] OR Conservative Management[tw] OR Conservative Therapy[tw] OR Conservative Therapies[tw] OR Conservative Care[tw] OR Non-Operative Management[tw] OR Non-Operative Treatment[tw] OR Non-Operative Treatments[tw] OR Non-Operative Therapy[tw] OR Non-Operative Therapies[tw] OR Non-Operative Approach[tw] OR Non-Surgical Management[tw] OR Non-Surgical Treatment[tw] OR Non-Surgical Treatments[tw] OR Non-Surgical Therapy[tw] OR Non-Surgical Therapies[tw] OR Non-Surgical Approach[tw] OR "Iontophoresis"[Mesh] OR Iontophoresis[tw] OR Iontophoreses[tw] OR Analgesia[tw] OR Analgesic[tw]OR Analgesics[tw] OR "Pain Management"[Mesh] OR Pain Management[tw] OR Pain Managements[tw] OR "Pain Measurement"[Mesh] OR Pain Measurements[tw] OR Pain Measurement[tw] OR "Patient Education as Topic"[Mesh] OR Patient Education[tiab] OR "Education of Patients"[tw] OR "Patient Counseling"[tw] OR "Counseling of Patients"[tw] OR "Physical Therapy Modalities"[Mesh] OR Physical Therapy[tw] OR Physical Therapies[tw] OR Physiotherapy[tw] OR Physiotherapies[tw] OR Neurophysiotherapy[tw] OR Physical Therapist[tw] OR Physical Therapists[tw] OR "Telerehabilitation"[Mesh] OR Telerehabilitation[tw] OR Telerehabilitations[tw] OR Tele-rehabilitation[tw] OR Rehabilitation[tw] OR Tele-rehabilitations[tw] OR Rehabilitations[tw] OR Therapeutic Modality[tw] OR Therapeutic Modalities[tw] OR "Ultrasonic Therapy"[Mesh:NoExp] OR Ultrasonic Therapy[tw] OR Ultrasonic Therapies[tw] OR Shockwave Therapy[tw] OR Shockwave Therapies[tw] OR Shock Wave Therapy[tw] OR Shock Wave Therapies[tw] OR Ultrasound Therapy[tw] OR Ultrasound Therapies[tw] OR Therapeutic Ultrasound[tw] OR HIFU Therapy[tw] OR HIFU Therapies[tw] OR Continuous Ultrasound[tw] OR Pulsed Ultrasound[tw] OR Kinesiotherapy[tw] OR "Exercise Therapy"[Mesh] OR Exercise Therapy[tw] OR Therapeutic Exercise[tw] OR Therapeutic Exercises[tw] OR Exercise Movement[tw] OR "Resistance Training"[Mesh] OR Resistance Training[tw] OR Strength Training[tw] OR Resistance Methods[tw] OR Strengthening[tw] OR "Electric Stimulation"[Mesh] OR "Electric Stimulation Therapy"[Mesh] OR "Transcutaneous Electric Nerve Stimulation"[Mesh] OR Electrostimulation[tw] OR Electric Stimulation[tw] OR Nerve Stimulation[tw] OR Electro Stimulation[tw] OR Electro Therapy[tw] OR Electrotherapy[tw] OR Electro Therapies[tw] OR Electrotherapies[tw] OR Electrical Therapy[tw] OR Electrical Therapies[tw] OR Muscle Stimulation[tw] OR Muscular Stimulation[tw] OR Neuromuscular Stimulation[tw] OR Taping[tw] OR Tape[tw] OR Bracing[tw] OR Brace[tw] OR Immobilization[tw] OR Immobilize[tw] OR Activity Modification[tw] OR Activity Modifications[tw] OR Movement Modification[tw] OR Movement Modifications[tw] OR Dry Needling[tw] OR Dry Needle[tw] OR "Endurance Training"[Mesh] OR Endurance Training[tw] OR Endurance Therapy[tw] OR Endurance Therapies[tw] OR "Muscle Stretching Exercises"[Mesh] OR Stretching[tw] OR Stretches[tw] OR Flexibility Training[tw] OR Flexibility Exercise[tw] OR Flexibility Exercises[tw] OR Mobilization[tw] OR Mobilizations[tw] OR Joint Exercise[tw] OR Joint Exercises[tw] OR Neuromuscular Re-Education[tw] OR Neuromuscular Reeducation[tw] OR Neuromuscular Training[tw] OR Proprioceptive Training[tw] OR Perturbation Training[tw] OR Movement Training[tw] OR "Cryotherapy"[Mesh] OR Cryotherapy[tw] OR Cryotherapies[tw] OR Cold Therapy[tw] OR Cold Therapies[tw] OR Therapeutic Cold[tw] OR Cryo-Cuff[tw] OR "Cryo Cuff"[tw] OR Thermotherapy[tw] OR Thermotherapies[tw] OR Thermo Therapy[tw] OR Thermo Therapies[tw] OR Thermal Modality[tw] OR Thermal Modalities[tw] OR Thermal Therapy[tw] OR Thermal Therapies[tw] OR Thermal Agent[tw] OR Thermal Agents[tw] OR Moist Heat[tw] OR Moist Heating[tw] OR Heat Therapy[tw] OR Heat Therapies[tw] OR Therapeutic Heat[tw] OR Ice Therapy[tw] OR Ice Therapies[tw] OR Therapeutic Ice[tw] OR Therapeutic Icing[tw] OR "Game Ready"[tw] OR Compression Therapy[tw] OR Compression Therapies[tw] OR Diathermy[tw] OR Short Wave Therapy[tw] OR Cardiorespiratory Training[tw] OR Cardiorespiratory Exercise[tw] OR Cardiorespiratory Conditioning[tw] OR Aerobic Conditioning[tw] OR Aerobic Training[tw] OR Aerobic Exercise[tw] OR "Laser Therapy"[Mesh:NoExp] OR Laser Therapy[tw] OR Laser Therapies[tw] OR Laser Treatment[tw] OR Laser Treatments[tw] OR Thermomagnetic[tw] OR Electromagnetic[tw])	1 466 874
7	("Anti-Inflammatory Agents, Non-Steroidal"[Mesh] OR NSAIDs[tiab] OR NSAID[tiab] OR "Non-Steroidal Anti-Inflammatory Agents"[tw] OR "Non Steroidal Anti Inflammatory Agents"[tw] OR "Nonsteroidal Anti-Inflammatory Agents"[tw] OR "Nonsteroidal Anti Inflammatory Agents"[tw] OR "Nonsteroidal Antiinflammatory Agents"[tw] OR "Anti-Inflammatory Analgesics"[tw] OR "Aspirin-Like Agents"[tw] OR "Aspirin Like Agents"[tw] OR "Non-Steroidal Anti-Inflammatory Agent"[tw] OR "Non Steroidal Anti Inflammatory Agent"[tw] OR "Nonsteroidal Anti-Inflammatory Agent"[tw] OR "Nonsteroidal Anti Inflammatory Agent"[tw] OR "Nonsteroidal Antiinflammatory Agent"[tw] OR "Anti-Inflammatory Analgesic"[tw] OR "Aspirin-Like Agent"[tw] OR "Aspirin Like Agent"[tw] OR "Non-Steroid Anti-Inflammatory Agents"[tw] OR "Non Steroid Anti Inflammatory Agents"[tw] OR "Nonsteroid Anti-Inflammatory Agents"[tw] OR "Nonsteroid Anti Inflammatory Agents"[tw] OR "Nonsteroid Antiinflammatory Agents"[tw] OR "Non-Steroid Anti-Inflammatory Agent"[tw] OR "Non Steroid Anti Inflammatory Agent"[tw] OR "Nonsteroid Anti-Inflammatory Agent"[tw] OR "Nonsteroid Anti Inflammatory Agent"[tw] OR "Nonsteroid Antiinflammatory Agent"[tw] OR "Anti-Inflammatory Agents, Non-Steroidal"[Pharmacological Action] OR Aspirin[tw] OR Ibuprofen[tw] OR Naproxen[tw] OR Celecoxib[tw] OR Meloxicam[tw] OR Indomethacin[tw] OR "Viscosupplementation"[Mesh] OR Viscosupplementation[tw] OR Viscosupplementations[tw] OR "Regenerative Cellular Therapy"[tw] OR "Regenerative Cellular Therapies"[tw] OR "Regenerative Stem Cell Therapy"[tw] OR "Regenerative Stem Cell Therapies"[tw] OR "Stem Cell Regeneration"[tw] OR Cellular Regeneration[tw] OR "Platelet-Rich Plasma"[Mesh] OR Platelet Rich Plasma[tw] OR Platelet-Rich Plasma[tw] OR RPP Injection[tw] OR RPP Injections[tw] OR "Cortisone/therapeutic use"[Mesh] OR Cortisone Injection[tw] OR Cortisone Injections[tw] OR Therapeutic Cortisone[tw] OR Cortisone Therapy[tw] OR Hip Procedure[tw] OR Hip Procedures[tw])	284 744
8	6 OR 7	1 718 531
9	5 AND 8	12 470
10	9 AND "English"[Language] AND ("2013"[Date - Publication] : "3000"[Date - Publication]) NOT ("case reports"[Publication Type] OR "news"[Publication Type]) NOT (Animals[Mesh] NOT Humans[Mesh])	3690

APPENDIX A (CONTINUED)

Embase

No.	Search Hedge	Results
1	('Acetabulum'/exp OR Acetabulum:ti,ab,de,tn OR Acetabulums:ti,ab,de,tn OR "Cotyloid Cavity":ti,ab,de,tn OR "Cotyloid Cavities":ti,ab,de,tn OR Acetabula:ti,ab,de,tn OR Acetabulas:ti,ab,de,tn OR 'Pelvic Bones'/de OR "Pelvic Bones":ti,ab,de,tn OR "Pelvis Bones":ti,ab,de,tn OR "Innominate Bones":ti,ab,de,tn OR "Innominate Bone":ti,ab,de,tn OR 'Hip'/exp OR Hip:ti,ab,de,tn OR Hips:ti,ab,de,tn OR Coxa:ti,ab,de,tn OR Coxas:ti,ab,de,tn OR "Acetabulofemoral Joint":ti,ab,de,tn OR "Acetabulofemoral Joints":ti,ab,de,tn OR 'Ligament Of Head Of Femur'/exp OR "Femur Round Ligament":ti,ab,de,tn OR "Femur Round Ligaments":ti,ab,de,tn OR "Ligamentum Capitis Femoris":ti,ab,de,tn OR "Ligamentum Capitis Femori":ti,ab,de,tn OR "Ligamentum Teres Femoris":ti,ab,de,tn OR "Ligamentum Teres Femori":ti,ab,de,tn OR "Round Ligament of Femur":ti,ab,de,tn OR "Ligament Of Head Of Femur":ti,ab,de,tn OR 'Round Ligament'/de) AND [embase]/lim	204 622
2	('Pigmented Villonodular Synovitis'/exp OR "Pigmented Villonodular Synovitis":ti,ab,de,tn OR "Pigmented Villonodular Synovitides":ti,ab,de,tn OR "Diffuse Tenosynovial Giant Cell Tumor":ti,ab,de,tn OR 'Periarthritis'/exp OR Periarthritis:ti,ab,de,tn OR Periarthritides:ti,ab,de,tn OR 'Pain'/de OR 'Chronic Pain'/exp OR 'Musculoskeletal Pain'/de OR Pain:ti,ab OR Pains:ti,ab,de,tn OR Painful:ti,ab,de,tn OR Ache:ti,ab,de,tn OR Aches:ti,ab,de,tn OR 'Arthralgia'/de OR Arthralgia:ti,ab,de,tn OR Arthralgias:ti,ab,de,tn OR Polyarthralgia:ti,ab,de,tn OR Polyarthralgias:ti,ab,de,tn OR 'Arthropathy'/de OR "Joint Disease":ti,ab,de,tn OR "Joint Diseases":ti,ab,de,tn OR Arthrosis:ti,ab,de,tn OR Arthroses:ti,ab,de,tn OR Arthropathies:ti,ab,de,tn OR Arthropathy:ti,ab,de,tn OR 'Contracture'/exp OR Contracture:ti,ab,de,tn OR Contractures:ti,ab,de,tn OR "Adhesive Capsulitis":ti,ab,de,tn OR "Adhesive Capsulitides":ti,ab,de,tn OR Bursitis:ti,ab,de,tn OR Bursitides:ti,ab,de,tn OR "Labrochondral Tear":ti,ab,de,tn OR "Labrochondral Tears":ti,ab,de,tn OR "Labrochondral Pathology":ti,ab,de,tn) AND [embase]/lim	935 477
3	1 AND 2	38 458
4	('Hip Contracture'/exp OR "Hip Contracture":ti,ab,de,tn OR "Hip Contractures":ti,ab,de,tn OR 'Femoroacetabular Impingement'/exp OR "Femoracetabular Impingement":ti,ab,de,tn OR "Femoracetabular Impingements":ti,ab,de,tn OR "Femoroacetabular Impingement":ti,ab,de,tn OR "Femoroacetabular Impingements":ti,ab,de,tn OR "Femoro-Acetabular Impingement":ti,ab,de,tn OR "Femoro Acetabular Impingement":ti,ab,de,tn OR "Femoro-Acetabular Impingements":ti,ab,de,tn OR "Femoral Acetabular Impingement":ti,ab,de,tn OR "Femoral Acetabular Impingements":ti,ab,de,tn OR 'Hip Injury'/exp OR "Hip Injuries":ti,ab,de,tn OR "Hip Injury":ti,ab,de,tn OR "Hip Joint Injury":ti,ab,de,tn OR "Hip Joint Injuries":ti,ab,de,tn OR "Hip Dislocation":ti,ab,de,tn OR "Hip Dislocations":ti,ab,de,tn OR "Hip Displacement":ti,ab,de,tn OR "Hip Displacements":ti,ab,de,tn OR "Hip Dysplasia":ti,ab,de,tn OR "Hip Impingement":ti,ab,de,tn OR "Hip Impingements":ti,ab,de,tn OR "Hip Instability":ti,ab,de,tn OR "Hip Instabilities":ti,ab,de,tn OR "Hip Microinstability":ti,ab,de,tn OR "Hip Microinstabilities":ti,ab,de,tn OR "Hip Micro-instability":ti,ab,de,tn OR "Hip Micro-instabilities":ti,ab,de,tn OR "Acetabular Labral Tear":ti,ab,de,tn OR "Acetabular Labral Tears":ti,ab,de,tn OR "Hip Labral Tear":ti,ab,de,tn OR "Hip Labral Tears":ti,ab,de,tn OR "Intra-Articular Hip Disorder":ti,ab,de,tn OR "Intra-Articular Hip Disorders":ti,ab,de,tn OR "Intraarticular Hip Disorder":ti,ab,de,tn OR "Intraarticular Hip Disorders":ti,ab,de,tn OR "Intra-Articular Hip Disease":ti,ab,de,tn OR "Intra-Articular Hip Diseases":ti,ab,de,tn OR "Intraarticular Hip Disease":ti,ab,de,tn OR "Intraarticular Hip Diseases":ti,ab,de,tn OR "Ligamentum Teres Injury":ti,ab,de,tn OR "Ligamentum Teres Injuries":ti,ab,de,tn OR "Ligamentum Teres Tear":ti,ab,de,tn OR "Ligamentum Teres Tears":ti,ab,de,tn OR "Ligamentum Capitis Injury":ti,ab,de,tn OR "Ligamentum Capitis Injuries":ti,ab,de,tn OR "Ligamentum Capitis Tear":ti,ab,de,tn OR "Ligamentum Capitis Tears":ti,ab,de,tn OR "Non-Arthritic Hip Pain":ti,ab,de,tn OR "Pre-Arthritic Hip Pain":ti,ab,de,tn OR "Non-Arthritic Hip Joint Pain":ti,ab,de,tn OR "Pre-Arthritic Hip Joint Pain":ti,ab,de,tn) AND [embase]/lim	51 498
5	3 OR 4	82 623

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
6	('Musculoskeletal Manipulation'/de OR "Musculoskeletal Manipulations":ti,ab,de,tn OR "Musculoskeletal Manipulation":ti,ab,de,tn OR "Manual Therapies":ti,ab,de,tn OR "Manual Therapy":ti,ab,de,tn OR "Manipulation Therapy":ti,ab,de,tn OR "Manipulation Therapies":ti,ab,de,tn OR "Manipulative Therapies":ti,ab,de,tn OR "Manipulative Therapy":ti,ab,de,tn OR "Joint Manipulation":ti,ab,de,tn OR "Joint Mobilization":ti,ab,de,tn OR ' Chiropractic Manipulation'/exp OR "Chiropractic Manipulation":ti,ab,de,tn OR "Chiropractic Manipulations":ti,ab,de,tn OR "Chiropractic Adjustment":ti,ab,de,tn OR "Chiropractic Adjustments":ti,ab,de,tn OR Chiropractics:ti,ab,de,tn OR "Multimodality Therapy":ti,ab,de,tn OR "Multimodality Therapies":ti,ab,de,tn OR "Multimodal Treatment":ti,ab,de,tn OR "Multimodal Treatments":ti,ab,de,tn OR "Combined Modality Therapies":ti,ab,de,tn OR "Combined Modality Therapy":ti,ab,de,tn OR 'Conservative Treatment'/exp OR "Conservative Treatments":ti,ab,de,tn OR "Conservative Treatment":ti,ab,de,tn OR "Conservative Management":ti,ab,de,tn OR "Conservative Therapy":ti,ab,de,tn OR "Conservative Therapies":ti,ab,de,tn OR "Conservative Care":ti,ab,de,tn OR "Non-Operative Management":ti,ab,de,tn OR "Non-Operative Treatment":ti,ab,de,tn OR "Non-Operative Treatments":ti,ab,de,tn OR "Non-Operative Therapy":ti,ab,de,tn OR "Non-Operative Therapies":ti,ab,de,tn OR "Non-Operative Approach":ti,ab,de,tn OR "Non-Surgical Management":ti,ab,de,tn OR "Non-Surgical Treatment":ti,ab,de,tn OR "Non-Surgical Treatments":ti,ab,de,tn OR "Non-Surgical Therapy":ti,ab,de,tn OR "Non-Surgical Therapies":ti,ab,de,tn OR "Non-Surgical Approach":ti,ab,de,tn OR 'Iontophoresis'/exp OR Iontophoresis:ti,ab,de,tn OR Iontophoreses:ti,ab,de,tn OR 'Analgesia'/exp OR "Analgesia":ti,ab,de,tn OR "Analgesic":ti,ab,de,tn OR "Analgesics":ti,ab,de,tn OR "Pain Management":ti,ab,de,tn OR "Pain Managements":ti,ab,de,tn OR 'Pain Measurement'/exp OR "Pain Measurements":ti,ab,de,tn OR "Pain Measurement":ti,ab,de,tn OR 'Patient Education'/exp OR "Patient Education":ti,ab OR "Education of Patients":ti,ab,de,tn OR "Patient Counseling":ti,ab,de,tn OR "Counseling of Patients":ti,ab,de,tn OR 'Physiotherapy'/exp OR "Physical Therapy":ti,ab,de,tn OR "Physical Therapies":ti,ab,de,tn OR Physiotherapy:ti,ab,de,tn OR Physiotherapies:ti,ab,de,tn OR Neurophysiotherapy:ti,ab,de,tn OR "Physical Therapist":ti,ab,de,tn OR "Physical Therapists":ti,ab,de,tn OR 'Telerehabilitation'/exp OR Telerehabilitation:ti,ab,de,tn OR Telerehabilitations:ti,ab,de,tn OR Tele-rehabilitation:ti,ab,de,tn OR Rehabilitation:ti,ab,de,tn OR Tele-rehabilitations:ti,ab,de,tn OR Rehabilitations:ti,ab,de,tn OR "Therapeutic Modality":ti,ab,de,tn OR "Therapeutic Modalities":ti,ab,de,tn OR 'Ultrasound Therapy'/de OR "Ultrasonic Therapy":ti,ab,de,tn OR "Ultrasonic Therapies":ti,ab,de,tn OR "Shockwave Therapy":ti,ab,de,tn OR "Shockwave Therapies":ti,ab,de,tn OR "Shock Wave Therapy":ti,ab,de,tn OR "Shock Wave Therapies":ti,ab,de,tn OR "Ultrasound Therapy":ti,ab,de,tn OR "Ultrasound Therapies":ti,ab,de,tn OR "Therapeutic Ultrasound":ti,ab,de,tn OR "HIFU Therapy":ti,ab,de,tn OR "HIFU Therapies":ti,ab,de,tn OR "Continuous Ultrasound":ti,ab,de,tn OR "Pulsed Ultrasound":ti,ab,de,tn OR 'Kinesiotherapy'/exp OR "Kinesiotherapy":ti,ab,de,tn OR "Exercise Therapy":ti,ab,de,tn OR "Therapeutic Exercise":ti,ab,de,tn OR "Therapeutic Exercises":ti,ab,de,tn OR "Exercise Movement":ti,ab,de,tn OR 'Resistance Training'/exp OR "Resistance Training":ti,ab,de,tn OR "Strength Training":ti,ab,de,tn OR "Resistance Methods":ti,ab,de,tn OR Strengthening:ti,ab,de,tn OR 'Electrostimulation'/exp OR 'Electrotherapy'/exp OR "Electrostimulation":ti,ab,de,tn OR "Electric Stimulation":ti,ab,de,tn OR "Nerve Stimulation":ti,ab,de,tn OR "Electro Stimulation":ti,ab,de,tn OR "Electro Therapy":ti,ab,de,tn OR Electrotherapy:ti,ab,de,tn OR "Electro Therapies":ti,ab,de,tn OR Electrotherapies:ti,ab,de,tn OR "Electrical Therapy":ti,ab,de,tn OR "Electrical Therapies":ti,ab,de,tn OR "Muscle Stimulation":ti,ab,de,tn OR "Muscular Stimulation":ti,ab,de,tn OR "Neuromuscular Stimulation":ti,ab,de,tn OR Taping:ti,ab,de,tn OR Tape:ti,ab,de,tn OR Bracing:ti,ab,de,tn OR Brace:ti,ab,de,tn OR Immobilization:ti,ab,de,tn OR Immobilize:ti,ab,de,tn OR "Activity Modification":ti,ab,de,tn OR "Activity Modifications":ti,ab,de,tn OR "Movement Modification":ti,ab,de,tn OR "Movement Modifications":ti,ab,de,tn OR "Dry Needling":ti,ab,de,tn OR "Dry Needle":ti,ab,de,tn OR 'Endurance Training'/exp OR "Endurance Training":ti,ab,de,tn OR "Endurance Therapy":ti,ab,de,tn OR "Endurance Therapies":ti,ab,de,tn OR 'Stretching Exercise'/exp OR Stretching:ti,ab,de,tn OR Stretches:ti,ab,de,tn OR "Flexibility Training":ti,ab,de,tn OR "Flexibility Exercise":ti,ab,de,tn OR "Flexibility Exercises":ti,ab,de,tn OR Mobilization:ti,ab,de,tn OR Mobilizations:ti,ab,de,tn OR "Joint Exercise":ti,ab,de,tn OR "Joint Exercises":ti,ab,de,tn OR "Neuromuscular Re-Education":ti,ab,de,tn OR "Neuromuscular Reeducation":ti,ab,de,tn OR "Neuromuscular Training":ti,ab,de,tn OR "Proprioceptive Training":ti,ab,de,tn OR "Perturbation Training":ti,ab,de,tn OR "Movement Training":ti,ab,de,tn OR 'Cryotherapy'/de OR Cryotherapy:ti,ab,de,tn OR Cryotherapies:ti,ab,de,tn OR "Cold Therapy":ti,ab,de,tn OR "Cold Therapies":ti,ab,de,tn OR "Therapeutic Cold":ti,ab,de,tn OR "Cryo-Cuff":ti,ab,de,tn OR "Cryo Cuff":ti,ab,de,tn OR Thermotherapy:ti,ab,de,tn OR Thermotherapies:ti,ab,de,tn OR "Thermo Therapy":ti,ab,de,tn OR "Thermo Therapies":ti,ab,de,tn OR "Thermal Modality":ti,ab,de,tn OR "Thermal Modalities":ti,ab,de,tn OR "Thermal Therapy":ti,ab,de,tn OR "Thermal Therapies":ti,ab,de,tn OR "Thermal Agent":ti,ab,de,tn OR "Thermal Agents":ti,ab,de,tn OR "Moist Heat":ti,ab,de,tn OR "Moist Heating":ti,ab,de,tn OR "Heat Therapy":ti,ab,de,tn OR "Heat Therapies":ti,ab,de,tn OR "Therapeutic Heat":ti,ab,de,tn OR "Ice Therapy":ti,ab,de,tn OR "Ice Therapies":ti,ab,de,tn OR "Therapeutic Ice":ti,ab,de,tn OR "Therapeutic Icing":ti,ab,de,tn OR "Game Ready":ti,ab,de,tn OR "Compression Therapy":ti,ab,de,tn OR "Compression Therapies":ti,ab,de,tn OR Diathermy:ti,ab,de,tn OR "Short Wave Therapy":ti,ab,de,tn OR "Cardiorespiratory Training":ti,ab,de,tn OR "Cardiorespiratory Exercise":ti,ab,de,tn OR "Cardiorespiratory Conditioning":ti,ab,de,tn OR "Aerobic Conditioning":ti,ab,de,tn OR "Aerobic Training":ti,ab,de,tn OR "Aerobic Exercise":ti,ab,de,tn OR 'Laser Thermotherapy'/de OR "Laser Therapy":ti,ab,de,tn OR "Laser Therapies":ti,ab,de,tn OR "Laser Treatment":ti,ab,de,tn OR "Laser Treatments":ti,ab,de,tn OR Thermomagnetic:ti,ab,de,tn OR Electromagnetic:ti,ab,de,tn) AND [embase]/lim	1 664 884

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
7	('Nonsteroid Antiinflammatory Agent'/exp OR NSAIDs:ti,ab OR NSAID:ti,ab OR "Non-Steroidal Anti-Inflammatory Agents":ti,ab,de,tn OR "Non Steroidal Anti Inflammatory Agents":ti,ab,de,tn OR "Nonsteroidal Anti-Inflammatory Agents":ti,ab,de,tn OR "Nonsteroidal Anti Inflammatory Agents":ti,ab,de,tn OR "Nonsteroidal Antiinflammatory Agents":ti,ab,de,tn OR "Anti-Inflammatory Analgesics":ti,ab,de,tn OR "Aspirin-Like Agents":ti,ab,de,tn OR "Aspirin Like Agents":ti,ab,de,tn OR "Non-Steroidal Anti-Inflammatory Agent":ti,ab,de,tn OR "Non Steroidal Anti Inflammatory Agent":ti,ab,de,tn OR "Nonsteroidal Anti-Inflammatory Agent":ti,ab,de,tn OR "Nonsteroidal Anti Inflammatory Agent":ti,ab,de,tn OR "Nonsteroidal Antiinflammatory Agent":ti,ab,de,tn OR "Anti-Inflammatory Analgesic":ti,ab,de,tn OR "Aspirin-Like Agent":ti,ab,de,tn OR "Aspirin Like Agent":ti,ab,de,tn OR "Non-Steroid Anti-Inflammatory Agents":ti,ab,de,tn OR "Non Steroid Anti Inflammatory Agents":ti,ab,de,tn OR "Nonsteroid Anti-Inflammatory Agents":ti,ab,de,tn OR "Nonsteroid Anti Inflammatory Agents":ti,ab,de,tn OR "Nonsteroid Antiinflammatory Agents":ti,ab,de,tn OR "Non-Steroid Anti-Inflammatory Agent":ti,ab,de,tn OR "Non Steroid Anti Inflammatory Agent":ti,ab,de,tn OR "Nonsteroid Anti-Inflammatory Agent":ti,ab,de,tn OR "Nonsteroid Anti Inflammatory Agent":ti,ab,de,tn OR "Nonsteroid Antiinflammatory Agent":ti,ab,de,tn OR Aspirin:ti,ab,de,tn OR Ibuprofen:ti,ab,de,tn OR Naproxen:ti,ab,de,tn OR Celecoxib:ti,ab,de,tn OR Meloxicam:ti,ab,de,tn OR Indomethacin:ti,ab,de,tn OR 'Viscosupplementation'/exp OR Viscosupplementation:ti,ab,de,tn OR Viscosupplementations:ti,ab,de,tn OR "Regenerative Cellular Therapy":ti,ab,de,tn OR "Regenerative Cellular Therapies":ti,ab,de,tn OR "Regenerative Stem Cell Therapy":ti,ab,de,tn OR "Regenerative Stem Cell Therapies":ti,ab,de,tn OR "Stem Cell Regeneration":ti,ab,de,tn OR "Cellular Regeneration":ti,ab,de,tn OR 'Thrombocyte Rich Plasma'/exp OR "Thrombocyte Rich Plasma":ti,ab,de,tn OR "Platelet Rich Plasma":ti,ab,de,tn OR "Platelet-Rich Plasma":ti,ab,de,tn OR "RPP Injection":ti,ab,de,tn OR "RPP Injections":ti,ab,de,tn OR "Cortisone Injection":ti,ab,de,tn OR "Cortisone Injections":ti,ab,de,tn OR "Therapeutic Cortisone":ti,ab,de,tn OR "Cortisone Therapy":ti,ab,de,tn OR "Hip Procedure":ti,ab,de,tn OR "Hip Procedures":ti,ab,de,tn) AND [embase]/lim	690 265
8	6 OR 7	2 251 691
9	5 AND 8	22 897
10	9 AND [english]/lim AND (2013:py OR 2014:py OR 2015:py OR 2016:py OR 2017:py OR 2018:py OR 2019:py) NOT ('conference abstract'/it OR 'conference review'/it OR 'note'/it) NOT ('Animals'/exp NOT 'Humans'/exp)	6047

Cochrane

No.	Search Hedge	Results
1	(Acetabulum OR Acetabulums OR "Cotyloid Cavity" OR "Cotyloid Cavities" OR Acetabula OR Acetabulas OR "Pelvic Bones" OR "Pelvis Bones" OR "Innominate Bones" OR "Innominate Bone" OR Hip OR Hips OR Coxa OR Coxas OR "Acetabulofemoral Joint" OR "Acetabulofemoral Joints" OR "Femur Round Ligament" OR "Femur Round Ligaments" OR "Ligamentum Capitis Femoris" OR "Ligamentum Capitis Femori" OR "Ligamentum Teres Femoris" OR "Ligamentum Teres Femori" OR "Round Ligament of Femur" OR "Ligament Of Head Of Femur")	20 195
2	("Pigmented Villonodular Synovitis" OR "Pigmented Villonodular Synovitides" OR "Diffuse Tenosynovial Giant Cell Tumor" OR Periarthritis OR Periarthritides OR Pain:ti,ab OR Pains OR Painful OR Ache OR Aches OR Arthralgia OR Arthralgias OR Polyarthralgia OR Polyarthralgias OR "Joint Disease" OR "Joint Diseases" OR Arthrosis OR Arthroses OR Arthropathies OR Arthropathy OR Contracture OR Contractures OR "Adhesive Capsulitis" OR "Adhesive Capsulitides" OR Bursitis OR Bursitides OR "Labrochondral Tear" OR "Labrochondral Tears" OR "Labrochondral Pathology")	146 345
3	1 AND 2	4854
4	("Hip Contracture" OR "Hip Contractures" OR "Femoracetabular Impingement" OR "Femoracetabular Impingements" OR "Femoroacetabular Impingement" OR "Femoroacetabular Impingements" OR "Femoro-Acetabular Impingement" OR "Femoro Acetabular Impingement" OR "Femoro-Acetabular Impingements" OR "Femoral Acetabular Impingement" OR "Femoral Acetabular Impingements" OR "Hip Injuries" OR "Hip Injury" OR "Hip Joint Injury" OR "Hip Joint Injuries" OR "Hip Dislocation" OR "Hip Dislocations" OR "Hip Displacement" OR "Hip Displacements" OR "Hip Dysplasia" OR "Hip Impingement" OR "Hip Impingements" OR "Hip Instability" OR "Hip Instabilities" OR "Hip Microinstability" OR "Hip Microinstabilities" OR "Hip Micro-instability" OR "Hip Micro-instabilities" OR "Acetabular Labral Tear" OR "Acetabular Labral Tears" OR "Hip Labral Tear" OR "Hip Labral Tears" OR "Intra-Articular Hip Disorder" OR "Intra-Articular Hip Disorders" OR "Intraarticular Hip Disorder" OR "Intraarticular Hip Disorders" OR "Intra-Articular Hip Disease" OR "Intra-Articular Hip Diseases" OR "Intraarticular Hip Disease" OR "Intraarticular Hip Diseases" OR "Ligamentum Teres Injury" OR "Ligamentum Teres Injuries" OR "Ligamentum Teres Tear" OR "Ligamentum Teres Tears" OR "Ligamentum Capitis Injury" OR "Ligamentum Capitis Injuries" OR "Ligamentum Capitis Tear" OR "Ligamentum Capitis Tears" OR "Non-Arthritic Hip Pain" OR "Pre-Arthritic Hip Pain" OR "Non-Arthritic Hip Joint Pain" OR "Pre-Arthritic Hip Joint Pain")	542
5	3 AND 4	183

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
6	("Musculoskeletal Manipulations" OR "Musculoskeletal Manipulation" OR "Manual Therapies" OR "Manual Therapy" OR "Manipulation Therapy" OR "Manipulation Therapies" OR "Manipulative Therapies" OR "Manipulative Therapy" OR "Joint Manipulation" OR "Joint Mobilization" OR "Chiropractic Manipulation" OR "Chiropractic Manipulations" OR "Chiropractic Adjustment" OR "Chiropractic Adjustments" OR Chiropractics OR "Multimodal Treatment" OR "Multimodal Treatments" OR "Combined Modality Therapies" OR "Combined Modality Therapy" OR "Conservative Treatments" OR "Conservative Treatment" OR "Conservative Management" OR "Conservative Therapy" OR "Conservative Therapies" OR "Conservative Care" OR "Non-Operative Management" OR "Non-Operative Treatment" OR "Non-Operative Treatments" OR "Non-Operative Therapy" OR "Non-Operative Therapies" OR "Non-Operative Approach" OR "Non-Surgical Management" OR "Non-Surgical Treatment" OR "Non-Surgical Treatments" OR "Non-Surgical Therapy" OR "Non-Surgical Therapies" OR "Non-Surgical Approach" OR Iontophoresis OR Iontophoreses OR Analgesia OR Analgesic OR Analgesics OR "Pain Management" OR "Pain Managements" OR "Pain Measurements" OR "Pain Measurement" OR "Patient Education" OR "Education of Patients" OR "Patient Counseling" OR "Counseling of Patients" OR "Physical Therapy" OR "Physical Therapies" OR Physiotherapy OR Physiotherapies OR Neurophysiotherapy OR "Physical Therapist" OR "Physical Therapists" OR Telerehabilitation OR Telerehabilitations OR Tele-rehabilitation OR Rehabilitation OR Tele-rehabilitations OR Rehabilitations OR "Therapeutic Modality" OR "Therapeutic Modalities" OR "Ultrasonic Therapy" OR "Ultrasonic Therapies" OR "Shockwave Therapy" OR "Shockwave Therapies" OR "Shock Wave Therapy" OR "Shock Wave Therapies" OR "Ultrasound Therapy" OR "Ultrasound Therapies" OR "Therapeutic Ultrasound" OR "HIFU Therapy" OR "HIFU Therapies" OR "Continuous Ultrasound" OR "Pulsed Ultrasound" OR Kinesiotherapy OR "Exercise Therapy" OR "Therapeutic Exercise" OR "Therapeutic Exercises" OR "Exercise Movement" OR "Resistance Training" OR "Strength Training" OR "Resistance Methods" OR Strengthening OR Electrostimulation OR "Electric Stimulation" OR "Nerve Stimulation" OR "Electro Stimulation" OR "Electro Therapy" OR Electrotherapy OR "Electro Therapies" OR Electrotherapies OR "Electrical Therapy" OR "Electrical Therapies" OR "Muscle Stimulation" OR "Muscular Stimulation" OR "Neuromuscular Stimulation" OR Taping OR Tape OR Bracing OR Brace OR Immobilization OR Immobilize OR "Activity Modification" OR "Activity Modifications" OR "Movement Modification" OR "Movement Modifications" OR "Dry Needling" OR "Dry Needle" OR "Endurance Training" OR "Endurance Therapy" OR "Endurance Therapies" OR Stretching OR Stretches OR "Flexibility Training" OR "Flexibility Exercise" OR "Flexibility Exercises" OR Mobilization OR Mobilizations OR "Joint Exercise" OR "Joint Exercises" OR "Neuromuscular Re-Education" OR "Neuromuscular Reeducation" OR "Neuromuscular Training" OR "Proprioceptive Training" OR "Perturbation Training" OR "Movement Training" OR Cryotherapy OR Cryotherapies OR "Cold Therapy" OR "Cold Therapies" OR "Therapeutic Cold" OR Cryo-Cuff OR "Cryo Cuff" OR Thermotherapy OR Thermotherapies OR "Thermo Therapy" OR "Thermo Therapies" OR "Thermal Modality" OR "Thermal Modalities" OR "Thermal Therapy" OR "Thermal Therapies" OR "Thermal Agent" OR "Thermal Agents" OR "Moist Heat" OR "Moist Heating" OR "Heat Therapy" OR "Heat Therapies" OR "Therapeutic Heat" OR "Ice Therapy" OR "Ice Therapies" OR "Therapeutic Ice" OR "Therapeutic Icing" OR "Game Ready" OR "Compression Therapy" OR "Compression Therapies" OR Diathermy OR "Short Wave Therapy" OR "Cardiorespiratory Training" OR "Cardiorespiratory Exercise" OR "Cardiorespiratory Conditioning" OR "Aerobic Conditioning" OR "Aerobic Training" OR "Aerobic Exercise" OR "Laser Therapy" OR "Laser Therapies" OR "Laser Treatment" OR "Laser Treatments" OR Thermomagnetic OR Electromagnetic)	208 932
7	("Non-Steroidal Anti-Inflammatory Agents" OR "Non Steroidal Anti Inflammatory Agents" OR "Nonsteroidal Anti-Inflammatory Agents" OR "Nonsteroidal Anti Inflammatory Agents" OR "Nonsteroidal Antiinflammatory Agents" OR "Anti-Inflammatory Analgesics" OR "Aspirin-Like Agents" OR "Aspirin Like Agents" OR "Non-Steroidal Anti-Inflammatory Agent" OR "Non Steroidal Anti Inflammatory Agent" OR "Nonsteroidal Anti-Inflammatory Agent" OR "Nonsteroidal Anti Inflammatory Agent" OR "Nonsteroidal Antiinflammatory Agent" OR "Anti-Inflammatory Analgesic" OR "Aspirin-Like Agent" OR "Aspirin Like Agent" OR "Non-Steroid Anti-Inflammatory Agents" OR "Non Steroid Anti Inflammatory Agents" OR "Nonsteroid Anti-Inflammatory Agents" OR "Nonsteroid Anti Inflammatory Agents" OR "Nonsteroid Antiinflammatory Agents" OR "Non-Steroid Anti-Inflammatory Agent" OR "Non Steroid Anti Inflammatory Agent" OR "Nonsteroid Anti-Inflammatory Agent" OR "Nonsteroid Anti Inflammatory Agent" OR "Nonsteroid Antiinflammatory Agent" OR Aspirin OR Ibuprofen OR Naproxen OR Celecoxib OR Meloxicam OR Indomethacin OR Viscosupplementation OR Viscosupplementations OR "Regenerative Cellular Therapy" OR "Regenerative Cellular Therapies" OR "Regenerative Stem Cell Therapy" OR "Regenerative Stem Cell Therapies" OR "Stem Cell Regeneration" OR "Cellular Regeneration" OR "Platelet Rich Plasma" OR "Platelet-Rich Plasma" OR "RPP Injection" OR "RPP Injections" OR "Cortisone Injection" OR "Cortisone Injections" OR "Therapeutic Cortisone" OR "Cortisone Therapy" OR "Hip Procedure" OR "Hip Procedures")	27 170
8	6 OR 7	229 658
9	5 AND 8	0

CINAHL

No.	Search Hedge	Results
1	((MH "Acetabulum") OR Acetabulum OR Acetabulums OR "Cotyloid Cavity" OR "Cotyloid Cavities" OR Acetabula OR Acetabulas OR (MH "Pelvic Bones") OR "Pelvic Bones" OR "Pelvis Bones" OR "Innominate Bones" OR "Innominate Bone" OR (MH "Hip") OR Hip OR Hips OR Coxa OR Coxas OR "Acetabulofemoral Joint" OR "Acetabulofemoral Joints" OR (MH "Hip Joint") OR "Femur Round Ligament" OR "Femur Round Ligaments" OR "Ligamentum Capitis Femoris" OR "Ligamentum Capitis Femori" OR "Ligamentum Teres Femoris" OR "Ligamentum Teres Femori" OR "Round Ligament of Femur" OR "Ligament Of Head Of Femur")	58 663
2	((MH "Synovitis, Pigmented Villonodular") OR "Pigmented Villonodular Synovitis" OR "Pigmented Villonodular Synovitides" OR "Diffuse Tenosynovial Giant Cell Tumor" OR (MH "Periarthritis") OR Periarthritis OR Periarthritides OR (MH "Pain") OR (MH "Chronic Pain") OR TI Pain OR AB Pain OR Pains OR Painful OR Ache OR Aches OR (MH "Arthralgia") OR Arthralgia OR Arthralgias OR Polyarthralgia OR Polyarthralgias OR (MH "Joint Diseases") OR "Joint Disease" OR "Joint Diseases" OR Arthrosis OR Arthroses OR Arthropathies OR Arthropathy OR (MH "Contracture+") OR Contracture OR Contractures OR "Adhesive Capsulitis" OR "Adhesive Capsulitides" OR Bursitis OR Bursitides OR "Labrochondral Tear" OR "Labrochondral Tears" OR "Labrochondral Pathology")	285 049
3	1 AND 2	11 375

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APPENDIX A (CONTINUED)

No.	Search Hedge	Results
4	("Hip Contracture" OR "Hip Contractures" OR (MH "Femoracetabular Impingement") OR "Femoracetabular Impingement" OR "Femoracetabular Impingements" OR "Femoroacetabular Impingement" OR "Femoroacetabular Impingements" OR "Femoro-Acetabular Impingement" OR "Femoro Acetabular Impingement" OR "Femoro-Acetabular Impingements" OR "Femoral Acetabular Impingement" OR "Femoral Acetabular Impingements" OR (MH "Hip Injuries+") OR "Hip Injuries" OR "Hip Injury" OR "Hip Joint Injury" OR "Hip Joint Injuries" OR "Hip Dislocation" OR "Hip Dislocations" OR "Hip Displacement" OR "Hip Displacements" OR "Hip Dysplasia" OR "Hip Impingement" OR "Hip Impingements" OR "Hip Instability" OR "Hip Instabilities" OR "Hip Microinstability" OR "Hip Microinstabilities" OR "Hip Micro-instability" OR "Hip Micro-instabilities" OR "Acetabular Labral Tear" OR "Acetabular Labral Tears" OR "Hip Labral Tear" OR "Hip Labral Tears" OR "Intra-Articular Hip Disorder" OR "Intra-Articular Hip Disorders" OR "Intraarticular Hip Disorder" OR "Intraarticular Hip Disorders" OR "Intra-Articular Hip Disease" OR "Intra-Articular Hip Diseases" OR "Intraarticular Hip Disease" OR "Intraarticular Hip Diseases" OR "Ligamentum Teres Injury" OR "Ligamentum Teres Injuries" OR "Ligamentum Teres Tear" OR "Ligamentum Teres Tears" OR "Ligamentum Capitis Injury" OR "Ligamentum Capitis Injuries" OR "Ligamentum Capitis Tear" OR "Ligamentum Capitis Tears" OR "Non-Arthritic Hip Pain" OR "Pre-Arthritic Hip Pain" OR "Non-Arthritic Hip Joint Pain" OR "Pre-Arthritic Hip Joint Pain")	14 499
5	3 OR 4	23 286
6	("Musculoskeletal Manipulations" OR "Musculoskeletal Manipulation" OR "Manual Therapies" OR "Manual Therapy" OR "Manipulation Therapy" OR "Manipulation Therapies" OR "Manipulative Therapies" OR "Manipulative Therapy" OR "Joint Manipulation" OR "Joint Mobilization" OR (MH "Manipulation, Chiropractic+") OR "Chiropractic Manipulation" OR "Chiropractic Manipulations" OR "Chiropractic Adjustment" OR "Chiropractic Adjustments" OR Chiropractics OR (MH "Combined Modality Therapy") OR "Multimodal Treatment" OR "Multimodal Treatments" OR "Combined Modality Therapies" OR "Combined Modality Therapy" OR "Conservative Treatments" OR "Conservative Treatment" OR "Conservative Management" OR "Conservative Therapy" OR "Conservative Therapies" OR "Conservative Care" OR "Non-Operative Management" OR "Non-Operative Treatment" OR "Non-Operative Treatments" OR "Non-Operative Therapy" OR "Non-Operative Therapies" OR "Non-Operative Approach" OR "Non-Surgical Management" OR "Non-Surgical Treatment" OR "Non-Surgical Treatments" OR "Non-Surgical Therapy" OR "Non-Surgical Therapies" OR "Non-Surgical Approach" OR (MH "Iontophoresis") OR Iontophoresis OR Iontophoreses OR Analgesia OR Analgesic OR Analgesics OR (MH "Pain Management+") OR "Pain Management" OR "Pain Managements" OR (MH "Pain Measurement+") OR "Pain Measurements" OR "Pain Measurement" OR (MH "Patient Education+") OR TI "Patient Education" OR AB "Patient Education" OR "Education of Patients" OR "Patient Counseling" OR "Counseling of Patients" OR (MH "Physical Therapy Practice+") OR (MH "Physical Therapy+") OR "Physical Therapy" OR "Physical Therapies" OR Physiotherapy OR Physiotherapies OR Neurophysiotherapy OR "Physical Therapist" OR "Physical Therapists" OR (MH "Telerehabilitation") OR Telerehabilitation OR Telerehabilitations OR Tele-rehabilitation OR Rehabilitation OR Tele-rehabilitations OR Rehabilitations OR "Therapeutic Modality" OR "Therapeutic Modalities" OR (MH "Ultrasonic Therapy") OR "Ultrasonic Therapy" OR "Ultrasonic Therapies" OR "Shockwave Therapy" OR "Shockwave Therapies" OR "Shock Wave Therapy" OR "Shock Wave Therapies" OR "Ultrasound Therapy" OR "Ultrasound Therapies" OR "Therapeutic Ultrasound" OR "HIFU Therapy" OR "HIFU Therapies" OR "Continuous Ultrasound" OR "Pulsed Ultrasound" OR Kinesiotherapy OR (MH "Therapeutic Exercise+") OR "Exercise Therapy" OR "Therapeutic Exercise" OR "Therapeutic Exercises" OR "Exercise Movement" OR (MH "Resistance Training+") OR "Resistance Training" OR "Strength Training" OR "Resistance Methods" OR Strengthening OR (MH "Electric Stimulation+") OR (MH "Transcutaneous Electric Nerve Stimulation+") OR Electrostimulation OR "Electric Stimulation" OR "Nerve Stimulation" OR "Electro Stimulation" OR "Electro Therapy" OR Electrotherapy OR "Electro Therapies" OR Electrotherapies OR "Electrical Therapy" OR "Electrical Therapies" OR "Muscle Stimulation" OR "Muscular Stimulation" OR "Neuromuscular Stimulation" OR Taping OR Tape OR Bracing OR Brace OR Immobilization OR Immobilize OR "Activity Modification" OR "Activity Modifications" OR "Movement Modification" OR "Movement Modifications" OR "Dry Needling" OR "Dry Needle" OR "Endurance Training" OR "Endurance Therapy" OR "Endurance Therapies" OR (MH "Stretching") OR Stretching OR Stretches OR "Flexibility Training" OR "Flexibility Exercise" OR "Flexibility Exercises" OR Mobilization OR Mobilizations OR "Joint Exercise" OR "Joint Exercises" OR "Neuromuscular Re-Education" OR "Neuromuscular Reeducation" OR "Neuromuscular Training" OR "Proprioceptive Training" OR "Perturbation Training" OR "Movement Training" OR (MH "Cryotherapy+") OR (MH "Heat-Cold Application+") OR Cryotherapy OR Cryotherapies OR "Cold Therapy" OR "Cold Therapies" OR "Therapeutic Cold" OR Cryo-Cuff OR "Cryo Cuff" OR Thermotherapy OR Thermotherapies OR "Thermo Therapy" OR "Thermo Therapies" OR "Thermal Modality" OR "Thermal Modalities" OR "Thermal Therapy" OR "Thermal Therapies" OR "Thermal Agent" OR "Thermal Agents" OR "Moist Heat" OR "Moist Heating" OR "Heat Therapy" OR "Heat Therapies" OR "Therapeutic Heat" OR "Ice Therapy" OR "Ice Therapies" OR "Therapeutic Ice" OR "Therapeutic Icing" OR "Game Ready" OR "Compression Therapy" OR "Compression Therapies" OR Diathermy OR "Short Wave Therapy" OR "Cardiorespiratory Training" OR "Cardiorespiratory Exercise" OR "Cardiorespiratory Conditioning" OR "Aerobic Conditioning" OR "Aerobic Training" OR "Aerobic Exercise" OR (MH "Laser Therapy") OR "Laser Therapy" OR "Laser Therapies" OR "Laser Treatment" OR "Laser Treatments" OR Thermomagnetic OR Electromagnetic)	539 192
7	((MH "Antiinflammatory Agents, Non-Steroidal+") OR TI NSAIDs OR AB NSAIDs OR TI NSAID OR AB NSAID OR "Non-Steroidal Anti-Inflammatory Agents" OR "Non Steroidal Anti Inflammatory Agents" OR "Nonsteroidal Anti-Inflammatory Agents" OR "Nonsteroidal Anti Inflammatory Agents" OR "Nonsteroidal Antiinflammatory Agents" OR "Anti-Inflammatory Analgesics" OR "Aspirin-Like Agents" OR "Aspirin Like Agents" OR "Non-Steroidal Anti-Inflammatory Agent" OR "Non Steroidal Anti Inflammatory Agent" OR "Nonsteroidal Anti-Inflammatory Agent" OR "Nonsteroidal Anti Inflammatory Agent" OR "Nonsteroidal Antiinflammatory Agent" OR "Anti-Inflammatory Analgesic" OR "Aspirin-Like Agent" OR "Aspirin Like Agent" OR "Non-Steroid Anti-Inflammatory Agents" OR "Non Steroid Anti Inflammatory Agents" OR "Nonsteroid Anti-Inflammatory Agents" OR "Nonsteroid Anti Inflammatory Agents" OR "Nonsteroid Antiinflammatory Agents" OR "Non-Steroid Anti-Inflammatory Agent" OR "Non Steroid Anti Inflammatory Agent" OR "Nonsteroid Anti-Inflammatory Agent" OR "Nonsteroid Anti Inflammatory Agent" OR "Nonsteroid Antiinflammatory Agent" OR Aspirin OR Ibuprofen OR Naproxen OR Celecoxib OR Meloxicam OR Indomethacin OR Viscosupplementation OR Viscosupplementations OR "Regenerative Cellular Therapy" OR "Regenerative Cellular Therapies" OR "Regenerative Stem Cell Therapy" OR "Regenerative Stem Cell Therapies" OR "Stem Cell Regeneration" OR "Cellular Regeneration" OR (MH "Platelet-Rich Plasma+") OR "Platelet Rich Plasma" OR "Platelet-Rich Plasma" OR "RPP Injection" OR "RPP Injections" OR "Cortisone Injection" OR "Cortisone Injections" OR "Therapeutic Cortisone" OR "Cortisone Therapy" OR "Hip Procedure" OR "Hip Procedures")	37 148
8	6 OR 7	568 203
9	5 AND 8	6696
10	9 AND Language: English AND Publication Date: 2013-2019 NOT Source Type: Magazines	1747

APPENDIX A (CONTINUED)

PEDro

No.	Search Hedge	Results
1	Abstract and Title: Hip Joint Pain AND Published Since: 2013	32
2	Abstract and Title: Hip Joint Disease AND Published Since: 2013	6
3	Abstract and Title: Hip Contracture AND Published Since: 2013	2
4	Abstract and Title: Hip Joint Injury AND Published Since: 2013	7
5	Abstract and Title: Hip Dislocation AND Published Since: 2013	3
6	Abstract and Title: Hip Dysplasia AND Published Since: 2013	4
7	Abstract and Title: Hip Impingement AND Published Since: 2013	12
8	Abstract and Title: Hip Instability AND Published Since: 2013	8
9	Abstract and Title: Femoracetabular Impingement AND Published Since: 2013	1
10	Abstract and Title: Femoroacetabular Impingement AND Published Since: 2013	10
11	Abstract and Title: Non-Arthritic Hip Pain AND Published Since: 2013	1
12	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11	86

Nonarthritic Hip Pain CPG: Interventions Search Strategies Update
Run on June 30, 2022
All Search Results (Before Removing Duplicate Citations): 9816
Original Results (After Removing Duplicate Citations): 5336

PubMed via NLM Search Strategy

No.	Search Hedge	Results
1	(Acetabulum[mesh] OR Acetabulum[tw] OR Acetabulums[tw] OR Cotyloid Cavity[tw] OR Cotyloid Cavities[tw] OR Acetabula[tw] OR Acetabulas[tw] OR Pelvic Bones[mesh:noexp] OR Pelvic Bones[tw] OR Pelvis Bones[tw] OR Innominate Bones[tw] OR Innominate Bone[tw] OR Hip[mesh] OR Hip[tw] OR Hips[tw] OR Coxa[tw] OR Coxas[tw] OR Acetabulofemoral Joint[tw] OR Acetabulofemoral Joints[tw] OR Hip Joint[mesh] OR "Round Ligament of Femur"[mesh] OR Femur Round Ligament[tw] OR Femur Round Ligaments[tw] OR Ligamentum Capitis Femoris[tw] OR Ligamentum Capitis Femori[tw] OR Ligamentum Teres Femoris[tw] OR Ligamentum Teres Femori[tw] OR "Round Ligament of Femur"[tw] OR "Ligament Of Head Of Femur"[tw] OR Round Ligaments[mesh:noexp])	195 381
2	(Synovitis, Pigmented Villonodular[mesh] OR Pigmented Villonodular Synovitis[tw] OR Pigmented Villonodular Synovitides[tw] OR Diffuse Tenosynovial Giant Cell Tumor[tw] OR Periarthritis[mesh] OR Periarthritis[tw] OR Periarthritides[tw] OR Pain[mesh:noexp] OR Acute Pain[mesh] OR Chronic Pain[mesh] OR Musculoskeletal Pain[mesh:noexp] OR Pain[tiab] OR Pains[tw] OR Painful[tw] OR Ache[tw] OR Aches[tw] OR Arthralgia[Mesh:NoExp] OR Arthralgia[tw] OR Arthralgias[tw] OR Polyarthralgia[tw] OR Polyarthralgias[tw] OR Joint Diseases[mesh:noexp] OR Joint Disease[tw] OR Joint Diseases[tw] OR Arthrosis[tw] OR Arthroses[tw] OR Arthropathies[tw] OR Arthropathy[tw] OR Contracture[mesh] OR Contracture[tw] OR Contractures[tw] OR Adhesive Capsulitis[tw] OR Adhesive Capsulitides[tw] OR Bursitis[tw] OR Bursitides[tw] OR Labrochondral Tear[tw] OR Labrochondral Tears[tw] OR Labrochondral Pathology[tw])	892 778
3	#1 AND #2	33 140
4	(Hip Contracture[mesh] OR Hip Contracture[tw] OR Hip Contractures[tw] OR Femoracetabular Impingement[mesh] OR Femoracetabular Impingement[tw] OR Femoracetabular Impingements[tw] OR Femoroacetabular Impingement[tw] OR Femoroacetabular Impingements[tw] OR Femoro-Acetabular Impingement[tw] OR Femoro Acetabular Impingement[tw] OR Femoro-Acetabular Impingements[tw] OR Femoral Acetabular Impingement[tw] OR Femoral Acetabular Impingements[tw] OR Hip Injuries[mesh] OR Hip Injuries[tw] OR Hip Injury[tw] OR "Hip Joint/injuries"[Mesh] OR Hip Joint Injury[tw] OR Hip Joint Injuries[tw] OR Hip Dislocation[tw] OR Hip Dislocations[tw] OR Hip Displacement[tw] OR Hip Displacements[tw] OR Hip Dysplasia[tw] OR Hip Impingement[tw] OR Hip Impingements[tw] OR Hip Instability[tw] OR Hip Instabilities[tw] OR Hip Microinstability[tw] OR Hip Microinstabilities[tw] OR Hip Micro-instability[tw] OR Hip Micro-instabilities[tw] OR Acetabular Labral Tear[tw] OR Acetabular Labral Tears[tw] OR Hip Labral Tear[tw] OR Hip Labral Tears[tw] OR Intra-Articular Hip Disorder[tw] OR Intra-Articular Hip Disorders[tw] OR Intraarticular Hip Disorder[tw] OR Intraarticular Hip Disorders[tw] OR Intra-Articular Hip Disease[tw] OR Intra-Articular Hip Diseases[tw] OR Intraarticular Hip Disease[tw] OR Intraarticular Hip Diseases[tw] OR Ligamentum Teres Injury[tw] OR Ligamentum Teres Injuries[tw] OR Ligamentum Teres Tear[tw] OR Ligamentum Teres Tears[tw] OR Ligamentum Capitis Injury[tw] OR Ligamentum Capitis Injuries[tw] OR Ligamentum Capitis Tear[tw] OR Ligamentum Capitis Tears[tw] OR "Non-Arthritic Hip Pain"[tw] OR "Pre-Arthritic Hip Pain"[tw] OR "Non-Arthritic Hip Joint Pain"[tw] OR "Pre-Arthritic Hip Joint Pain"[tw])	48 727
5	#3 OR #4	75 010

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
6	("Musculoskeletal Manipulations"[Mesh:NoExp] OR Musculoskeletal Manipulations[tw] OR Musculoskeletal Manipulation[tw] OR Manual Therapies[tw] OR Manual Therapy[tw] OR Manipulation Therapy[tw] OR Manipulation Therapies[tw] OR Manipulative Therapies[tw] OR Manipulative Therapy[tw] OR Joint Manipulation[tw] OR Joint Mobilization[tw] OR "Manipulation, Chiropractic"[Mesh] OR Chiropractic Manipulation[tw] OR Chiropractic Manipulations[tw] OR Chiropractic Adjustment[tw] OR Chiropractic Adjustments[tw] OR Chiropractics[tw] OR "Combined Modality Therapy"[Mesh:NoExp] OR Multimodal Treatment[tw] OR Multimodal Treatments[tw] OR Combined Modality Therapies[tw] OR Combined Modality Therapy[tw] OR "Conservative Treatment"[Mesh] OR Conservative Treatments[tw] OR Conservative Treatment[tw] OR Conservative Management[tw] OR Conservative Therapy[tw] OR Conservative Therapies[tw] OR Conservative Care[tw] OR Non-Operative Management[tw] OR Non-Operative Treatment[tw] OR Non-Operative Treatments[tw] OR Non-Operative Therapy[tw] OR Non-Operative Therapies[tw] OR Non-Operative Approach[tw] OR Non-Surgical Management[tw] OR Non-Surgical Treatment[tw] OR Non-Surgical Treatments[tw] OR Non-Surgical Therapy[tw] OR Non-Surgical Therapies[tw] OR Non-Surgical Approach[tw] OR "Iontophoresis"[Mesh] OR Iontophoresis[tw] OR Iontophoreses[tw] OR Analgesia[tw] OR Analgesic[tw]OR Analgesics[tw] OR "Pain Management"[Mesh] OR Pain Management[tw] OR Pain Managements[tw] OR "Pain Measurement"[Mesh] OR Pain Measurements[tw] OR Pain Measurement[tw] OR "Patient Education as Topic"[Mesh] OR Patient Education[tiab] OR "Education of Patients"[tw] OR "Patient Counseling"[tw] OR "Counseling of Patients"[tw] OR "Physical Therapy Modalities"[Mesh] OR Physical Therapy[tw] OR Physical Therapies[tw] OR Physiotherapy[tw] OR Physiotherapies[tw] OR Neurophysiotherapy[tw] OR Physical Therapist[tw] OR Physical Therapists[tw] OR "Telerehabilitation"[Mesh] OR Telerehabilitation[tw] OR Telerehabilitations[tw] OR Tele-rehabilitation[tw] OR Rehabilitation[tw] OR Tele-rehabilitations[tw] OR Rehabilitations[tw] OR Therapeutic Modality[tw] OR Therapeutic Modalities[tw] OR "Ultrasonic Therapy"[Mesh:NoExp] OR Ultrasonic Therapy[tw] OR Ultrasonic Therapies[tw] OR Shockwave Therapy[tw] OR Shockwave Therapies[tw] OR Shock Wave Therapy[tw] OR Shock Wave Therapies[tw] OR Ultrasound Therapy[tw] OR Ultrasound Therapies[tw] OR Therapeutic Ultrasound[tw] OR HIFU Therapy[tw] OR HIFU Therapies[tw] OR Continuous Ultrasound[tw] OR Pulsed Ultrasound[tw] OR Kinesiotherapy[tw] OR "Exercise Therapy"[Mesh] OR Exercise Therapy[tw] OR Therapeutic Exercise[tw] OR Therapeutic Exercises[tw] OR Exercise Movement[tw] OR "Resistance Training"[Mesh] OR Resistance Training[tw] OR Strength Training[tw] OR Resistance Methods[tw] OR Strengthening[tw] OR "Electric Stimulation"[Mesh] OR "Electric Stimulation Therapy"[Mesh] OR "Transcutaneous Electric Nerve Stimulation"[Mesh] OR Electrostimulation[tw] OR Electric Stimulation[tw] OR Nerve Stimulation[tw] OR Electro Stimulation[tw] OR Electro Therapy[tw] OR Electrotherapy[tw] OR Electro Therapies[tw] OR Electrotherapies[tw] OR Electrical Therapy[tw] OR Electrical Therapies[tw] OR Muscle Stimulation[tw] OR Muscular Stimulation[tw] OR Neuromuscular Stimulation[tw] OR Taping[tw] OR Tape[tw] OR Bracing[tw] OR Brace[tw] OR Immobilization[tw] OR Immobilize[tw] OR Activity Modification[tw] OR Activity Modifications[tw] OR Movement Modification[tw] OR Movement Modifications[tw] OR Dry Needling[tw] OR Dry Needle[tw] OR "Endurance Training"[Mesh] OR Endurance Training[tw] OR Endurance Therapy[tw] OR Endurance Therapies[tw] OR "Muscle Stretching Exercises"[Mesh] OR Stretching[tw] OR Stretches[tw] OR Flexibility Training[tw] OR Flexibility Exercise[tw] OR Flexibility Exercises[tw] OR Mobilization[tw] OR Mobilizations[tw] OR Joint Exercise[tw] OR Joint Exercises[tw] OR Neuromuscular Re-Education[tw] OR Neuromuscular Reeducation[tw] OR Neuromuscular Training[tw] OR Proprioceptive Training[tw] OR Perturbation Training[tw] OR Movement Training[tw] OR "Cryotherapy"[Mesh] OR Cryotherapy[tw] OR Cryotherapies[tw] OR Cold Therapy[tw] OR Cold Therapies[tw] OR Therapeutic Cold[tw] OR Cryo-Cuff[tw] OR "Cryo Cuff"[tw] OR Thermotherapy[tw] OR Thermotherapies[tw] OR Thermo Therapy[tw] OR Thermo Therapies[tw] OR Thermal Modality[tw] OR Thermal Modalities[tw] OR Thermal Therapy[tw] OR Thermal Therapies[tw] OR Thermal Agent[tw] OR Thermal Agents[tw] OR Moist Heat[tw] OR Moist Heating[tw] OR Heat Therapy[tw] OR Heat Therapies[tw] OR Therapeutic Heat[tw] OR Ice Therapy[tw] OR Ice Therapies[tw] OR Therapeutic Ice[tw] OR Therapeutic Icing[tw] OR "Game Ready"[tw] OR Compression Therapy[tw] OR Compression Therapies[tw] OR Diathermy[tw] OR Short Wave Therapy[tw] OR Cardiorespiratory Training[tw] OR Cardiorespiratory Exercise[tw] OR Cardiorespiratory Conditioning[tw] OR Aerobic Conditioning[tw] OR Aerobic Training[tw] OR Aerobic Exercise[tw] OR "Laser Therapy"[Mesh:NoExp] OR Laser Therapy[tw] OR Laser Therapies[tw] OR Laser Treatment[tw] OR Laser Treatments[tw] OR Thermomagnetic[tw] OR Electromagnetic[tw])	1 700 816
7	("Anti-Inflammatory Agents, Non-Steroidal"[Mesh] OR NSAIDs[tiab] OR NSAID[tiab] OR "Non-Steroidal Anti-Inflammatory Agents"[tw] OR "Non Steroidal Anti Inflammatory Agents"[tw] OR "Nonsteroidal Anti-Inflammatory Agents"[tw] OR "Nonsteroidal Anti Inflammatory Agents"[tw] OR "Nonsteroidal Antiinflammatory Agents"[tw] OR "Anti-Inflammatory Analgesics"[tw] OR "Aspirin-Like Agents"[tw] OR "Aspirin Like Agents"[tw] OR "Non-Steroidal Anti-Inflammatory Agent"[tw] OR "Non Steroidal Anti Inflammatory Agent"[tw] OR "Nonsteroidal Anti-Inflammatory Agent"[tw] OR "Nonsteroidal Anti Inflammatory Agent"[tw] OR "Nonsteroidal Antiinflammatory Agent"[tw] OR "Anti-Inflammatory Analgesic"[tw] OR "Aspirin-Like Agent"[tw] OR "Aspirin Like Agent"[tw] OR "Non-Steroid Anti-Inflammatory Agents"[tw] OR "Non Steroid Anti Inflammatory Agents"[tw] OR "Nonsteroid Anti-Inflammatory Agents"[tw] OR "Nonsteroid Anti Inflammatory Agents"[tw] OR "Nonsteroid Antiinflammatory Agents"[tw] OR "Non-Steroid Anti-Inflammatory Agent"[tw] OR "Non Steroid Anti Inflammatory Agent"[tw] OR "Nonsteroid Anti-Inflammatory Agent"[tw] OR "Nonsteroid Anti Inflammatory Agent"[tw] OR "Nonsteroid Antiinflammatory Agent"[tw] OR "Anti-Inflammatory Agents, Non-Steroidal"[Pharmacological Action] OR Aspirin[tw] OR Ibuprofen[tw] OR Naproxen[tw] OR Celecoxib[tw] OR Meloxicam[tw] OR Indomethacin[tw] OR "Viscosupplementation"[Mesh] OR Viscosupplementation[tw] OR Viscosupplementations[tw] OR "Regenerative Cellular Therapy"[tw] OR "Regenerative Cellular Therapies"[tw] OR "Regenerative Stem Cell Therapy"[tw] OR "Regenerative Stem Cell Therapies"[tw] OR "Stem Cell Regeneration"[tw] OR Cellular Regeneration[tw] OR "Platelet-Rich Plasma"[Mesh] OR Platelet Rich Plasma[tw] OR Platelet-Rich Plasma[tw] OR RPP Injection[tw] OR RPP Injections[tw] OR "Cortisone/therapeutic use"[Mesh] OR Cortisone Injection[tw] OR Cortisone Injections[tw] OR Therapeutic Cortisone[tw] OR Cortisone Therapy[tw] OR Hip Procedure[tw] OR Hip Procedures[tw])	312 008
8	#6 OR #7	1 974 832
9	#5 AND #8	15 508
10	#9 AND "English"[Language] AND ("2019"[Date - Publication] : "3000"[Date - Publication]) NOT ("case reports"[Publication Type] OR "news"[Publication Type]) NOT (Animals[Mesh] NOT Humans[Mesh])	2829

APPENDIX A (CONTINUED)

Embase via Elsevier

No.	Search Hedge	Results
1	('Acetabulum'/exp OR Acetabulum:ti,ab,de OR Acetabulums:ti,ab,de OR "Cotyloid Cavity":ti,ab,de OR "Cotyloid Cavities":ti,ab,de OR Acetabula:ti,ab,de OR Acetabulas:ti,ab,de OR 'Pelvic Bones'/de OR "Pelvic Bones":ti,ab,de OR "Pelvis Bones":ti,ab,de OR "Innominate Bones":ti,ab,de OR "Innominate Bone":ti,ab,de OR 'Hip'/exp OR Hip:ti,ab,de OR Hips:ti,ab,de OR Coxa:ti,ab,de OR Coxas:ti,ab,de OR "Acetabulofemoral Joint":ti,ab,de OR "Acetabulofemoral Joints":ti,ab,de OR 'Ligament Of Head Of Femur'/exp OR "Femur Round Ligament":ti,ab,de OR "Femur Round Ligaments":ti,ab,de OR "Ligamentum Capitis Femoris":ti,ab,de OR "Ligamentum Capitis Femori":ti,ab,de OR "Ligamentum Teres Femoris":ti,ab,de OR "Ligamentum Teres Femori":ti,ab,de OR "Round Ligament of Femur":ti,ab,de OR "Ligament Of Head Of Femur":ti,ab,de OR 'Round Ligament'/de)	315 478
2	('Pigmented Villonodular Synovitis'/exp OR "Pigmented Villonodular Synovitis":ti,ab,de OR "Pigmented Villonodular Synovitides":ti,ab,de OR "Diffuse Tenosynovial Giant Cell Tumor":ti,ab,de OR 'Periarthritis'/exp OR Periarthritis:ti,ab,de OR Periarthritides:ti,ab,de OR 'Pain'/de OR 'Chronic Pain'/exp OR 'Musculoskeletal Pain'/de OR Pain:ti,ab OR Pains:ti,ab,de OR Painful:ti,ab,de OR Ache:ti,ab,de OR Aches:ti,ab,de OR 'Arthralgia'/de OR Arthralgia:ti,ab,de OR Arthralgias:ti,ab,de OR Polyarthralgia:ti,ab,de OR Polyarthralgias:ti,ab,de OR 'Arthropathy'/de OR "Joint Disease":ti,ab,de OR "Joint Diseases":ti,ab,de OR Arthrosis:ti,ab,de OR Arthroses:ti,ab,de OR Arthropathies:ti,ab,de OR Arthropathy:ti,ab,de OR 'Contracture'/exp OR Contracture:ti,ab,de OR Contractures:ti,ab,de OR "Adhesive Capsulitis":ti,ab,de OR "Adhesive Capsulitides":ti,ab,de OR Bursitis:ti,ab,de OR Bursitides:ti,ab,de OR "Labrochondral Tear":ti,ab,de OR "Labrochondral Tears":ti,ab,de OR "Labrochondral Pathology":ti,ab,de)	1 387 031
3	#1 AND #2	57 913
4	('Hip Contracture'/exp OR "Hip Contracture":ti,ab,de OR "Hip Contractures":ti,ab,de OR 'Femoroacetabular Impingement'/exp OR "Femoracetabular Impingement":ti,ab,de OR "Femoracetabular Impingements":ti,ab,de OR "Femoroacetabular Impingement":ti,ab,de OR "Femoroacetabular Impingements":ti,ab,de OR "Femoro-Acetabular Impingement":ti,ab,de OR "Femoro Acetabular Impingement":ti,ab,de OR "Femoro-Acetabular Impingements":ti,ab,de OR "Femoral Acetabular Impingement":ti,ab,de OR "Femoral Acetabular Impingements":ti,ab,de OR 'Hip Injury'/exp OR "Hip Injuries":ti,ab,de OR "Hip Injury":ti,ab,de OR "Hip Joint Injury":ti,ab,de OR "Hip Joint Injuries":ti,ab,de OR "Hip Dislocation":ti,ab,de OR "Hip Dislocations":ti,ab,de OR "Hip Displacement":ti,ab,de OR "Hip Displacements":ti,ab,de OR "Hip Dysplasia":ti,ab,de OR "Hip Impingement":ti,ab,de OR "Hip Impingements":ti,ab,de OR "Hip Instability":ti,ab,de OR "Hip Instabilities":ti,ab,de OR "Hip Microinstability":ti,ab,de OR "Hip Microinstabilities":ti,ab,de OR "Hip Micro-instability":ti,ab,de OR "Hip Micro-instabilities":ti,ab,de OR "Acetabular Labral Tear":ti,ab,de OR "Acetabular Labral Tears":ti,ab,de OR "Hip Labral Tear":ti,ab,de OR "Hip Labral Tears":ti,ab,de OR "Intra-Articular Hip Disorder":ti,ab,de OR "Intra-Articular Hip Disorders":ti,ab,de OR "Intraarticular Hip Disorder":ti,ab,de OR "Intraarticular Hip Disorders":ti,ab,de OR "Intra-Articular Hip Disease":ti,ab,de OR "Intra-Articular Hip Diseases":ti,ab,de OR "Intraarticular Hip Disease":ti,ab,de OR "Intraarticular Hip Diseases":ti,ab,de OR "Ligamentum Teres Injury":ti,ab,de OR "Ligamentum Teres Injuries":ti,ab,de OR "Ligamentum Teres Tear":ti,ab,de OR "Ligamentum Teres Tears":ti,ab,de OR "Ligamentum Capitis Injury":ti,ab,de OR "Ligamentum Capitis Injuries":ti,ab,de OR "Ligamentum Capitis Tear":ti,ab,de OR "Ligamentum Capitis Tears":ti,ab,de OR "Non-Arthritic Hip Pain":ti,ab,de OR "Pre-Arthritic Hip Pain":ti,ab,de OR "Non-Arthritic Hip Joint Pain":ti,ab,de OR "Pre-Arthritic Hip Joint Pain":ti,ab,de)	81 556
5	#3 OR #4	127 954

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
6	('Musculoskeletal Manipulation'/de OR "Musculoskeletal Manipulations":ti,ab,de OR "Musculoskeletal Manipulation":ti,ab,de OR "Manual Therapies":ti,ab,de OR "Manual Therapy":ti,ab,de OR "Manipulation Therapy":ti,ab,de OR "Manipulation Therapies":ti,ab,de OR "Manipulative Therapies":ti,ab,de OR "Manipulative Therapy":ti,ab,de OR "Joint Manipulation":ti,ab,de OR "Joint Mobilization":ti,ab,de OR ' Chiropractic Manipulation'/exp OR "Chiropractic Manipulation":ti,ab,de OR "Chiropractic Manipulations":ti,ab,de OR "Chiropractic Adjustment":ti,ab,de OR "Chiropractic Adjustments":ti,ab,de OR Chiropractics:ti,ab,de OR "Multimodality Therapy":ti,ab,de OR "Multimodality Therapies":ti,ab,de OR "Multimodal Treatment":ti,ab,de OR "Multimodal Treatments":ti,ab,de OR "Combined Modality Therapies":ti,ab,de OR "Combined Modality Therapy":ti,ab,de OR 'Conservative Treatment'/exp OR "Conservative Treatments":ti,ab,de OR "Conservative Treatment":ti,ab,de OR "Conservative Management":ti,ab,de OR "Conservative Therapy":ti,ab,de OR "Conservative Therapies":ti,ab,de OR "Conservative Care":ti,ab,de OR "Non-Operative Management":ti,ab,de OR "Non-Operative Treatment":ti,ab,de OR "Non-Operative Treatments":ti,ab,de OR "Non-Operative Therapy":ti,ab,de OR "Non-Operative Therapies":ti,ab,de OR "Non-Operative Approach":ti,ab,de OR "Non-Surgical Management":ti,ab,de OR "Non-Surgical Treatment":ti,ab,de OR "Non-Surgical Treatments":ti,ab,de OR "Non-Surgical Therapy-":ti,ab,de OR "Non-Surgical Therapies":ti,ab,de OR "Non-Surgical Approach":ti,ab,de OR 'Iontophoresis'/exp OR Iontophoresis:ti,ab,de OR Iontophoreses:ti,ab,de OR 'Analgesia'/exp OR "Analgesia":ti,ab,de OR "Analgesic":ti,ab,de OR "Analgesics":ti,ab,de OR "Pain Management":ti,ab,de OR "Pain Managements":ti,ab,de OR 'Pain Measurement'/exp OR "Pain Measurements":ti,ab,de OR "Pain Measurement":ti,ab,de OR 'Patient Education'/exp OR "Patient Education":ti,ab OR "Education of Patients":ti,ab,de OR "Patient Counseling":ti,ab,de OR "Counseling of Patients":ti,ab,de OR 'Physiotherapy'/exp OR "Physical Therapy":ti,ab,de OR "Physical Therapies":ti,ab,de OR Physiotherapy:ti,ab,de OR Physiotherapies:ti,ab,de OR Neurophysiotherapy:ti,ab,de OR "Physical Therapist":ti,ab,de OR "Physical Therapists":ti,ab,de OR 'Telerehabilitation'/exp OR Telerehabilitation:ti,ab,de OR Telerehabilitations:ti,ab,de OR Tele-rehabilitation:ti,ab,de OR Rehabilitation:ti,ab,de OR Tele-rehabilitations:ti,ab,de OR Rehabilitations:ti,ab,de OR "Therapeutic Modality":ti,ab,de OR "Therapeutic Modalities":ti,ab,de OR 'Ultrasound Therapy'/de OR "Ultrasonic Therapy":ti,ab,de OR "Ultrasonic Therapies":ti,ab,de OR "Shockwave Therapy":ti,ab,de OR "Shockwave Therapies":ti,ab,de OR "Shock Wave Therapy":ti,ab,de OR "Shock Wave Therapies":ti,ab,de OR "Ultrasound Therapy":ti,ab,de OR "Ultrasound Therapies":ti,ab,de OR "Therapeutic Ultrasound":ti,ab,de OR "HIFU Therapy":ti,ab,de OR "HIFU Therapies":ti,ab,de OR "Continuous Ultrasound":ti,ab,de OR "Pulsed Ultrasound":ti,ab,de OR 'Kinesiotherapy'/exp OR "Kinesiotherapy":ti,ab,de OR "Exercise Therapy":ti,ab,de OR "Therapeutic Exercise":ti,ab,de OR "Therapeutic Exercises":ti,ab,de OR "Exercise Movement":ti,ab,de OR 'Resistance Training'/exp OR "Resistance Training":ti,ab,de OR "Strength Training":ti,ab,de OR "Resistance Methods":ti,ab,de OR Strengthening:ti,ab,de OR 'Electrostimulation'/exp OR 'Electrotherapy'/exp OR "Electrostimulation":ti,ab,de OR "Electric Stimulation":ti,ab,de OR "Nerve Stimulation":ti,ab,de OR "Electro Stimulation":ti,ab,de OR "Electro Therapy":ti,ab,de OR Electrotherapy:ti,ab,de OR "Electro Therapies":ti,ab,de OR Electrotherapies:ti,ab,de OR "Electrical Therapy":ti,ab,de OR "Electrical Therapies":ti,ab,de OR "Muscle Stimulation":ti,ab,de OR "Muscular Stimulation":ti,ab,de OR "Neuromuscular Stimulation":ti,ab,de OR Taping:ti,ab,de OR Tape:ti,ab,de OR Bracing:ti,ab,de OR Brace:ti,ab,de OR Immobilization:ti,ab,de OR Immobilize:ti,ab,de OR "Activity Modification":ti,ab,de OR "Activity Modifications":ti,ab,de OR "Movement Modification":ti,ab,de OR "Movement Modifications":ti,ab,de OR "Dry Needling":ti,ab,de OR "Dry Needle":ti,ab,de OR 'Endurance Training'/exp OR "Endurance Training":ti,ab,de OR "Endurance Therapy":ti,ab,de OR "Endurance Therapies":ti,ab,de OR 'Stretching Exercise'/exp OR Stretching:ti,ab,de OR Stretches:ti,ab,de OR "Flexibility Training":ti,ab,de OR "Flexibility Exercise":ti,ab,de OR "Flexibility Exercises":ti,ab,de OR Mobilization:ti,ab,de OR Mobilizations:ti,ab,de OR "Joint Exercise":ti,ab,de OR "Joint Exercises":ti,ab,de OR "Neuromuscular Re-Education":ti,ab,de OR "Neuromuscular Reeducation":ti,ab,de OR "Neuromuscular Training":ti,ab,de OR "Proprioceptive Training":ti,ab,de OR "Perturbation Training":ti,ab,de OR "Movement Training":ti,ab,de OR 'Cryotherapy'/de OR Cryotherapy:ti,ab,de OR Cryotherapies:ti,ab,de OR "Cold Therapy":ti,ab,de OR "Cold Therapies":ti,ab,de OR "Therapeutic Cold":ti,ab,de OR "Cryo-Cuff":ti,ab,de OR "Cryo Cuff":ti,ab,de OR Thermotherapy:ti,ab,de OR Thermotherapies:ti,ab,de OR "Thermo Therapy":ti,ab,de OR "Thermo Therapies":ti,ab,de OR "Thermal Modality":ti,ab,de OR "Thermal Modalities":ti,ab,de OR "Thermal Therapy":ti,ab,de OR "Thermal Therapies":ti,ab,de OR "Thermal Agent":ti,ab,de OR "Thermal Agents":ti,ab,de OR "Moist Heat":ti,ab,de OR "Moist Heating":ti,ab,de OR "Heat Therapy":ti,ab,de OR "Heat Therapies":ti,ab,de OR "Therapeutic Heat":ti,ab,de OR "Ice Therapy":ti,ab,de OR "Ice Therapies":ti,ab,de OR "Therapeutic Ice":ti,ab,de OR "Therapeutic Icing":ti,ab,de OR "Game Ready":ti,ab,de OR "Compression Therapy":ti,ab,de OR "Compression Therapies":ti,ab,de OR Diathermy:ti,ab,de OR "Short Wave Therapy":ti,ab,de OR "Cardiorespiratory Training":ti,ab,de OR "Cardiorespiratory Exercise":ti,ab,de OR "Cardiorespiratory Conditioning":ti,ab,de OR "Aerobic Conditioning":ti,ab,de OR "Aerobic Training":ti,ab,de OR "Aerobic Exercise":ti,ab,de OR 'Laser Thermotherapy'/de OR "Laser Therapy":ti,ab,de OR "Laser Therapies":ti,ab,de OR "Laser Treatment":ti,ab,de OR "Laser Treatments":ti,ab,de OR Thermomagnetic:ti,ab,de OR Electromagnetic:ti,ab,de)	2 544 659
7	('Nonsteroid Antiinflammatory Agent'/exp OR NSAIDs:ti,ab OR NSAID:ti,ab OR "Non-Steroidal Anti-Inflammatory Agents":ti,ab,de OR "Non Steroidal Anti Inflammatory Agents":ti,ab,de OR "Nonsteroidal Anti-Inflammatory Agents":ti,ab,de OR "Nonsteroidal Anti Inflammatory Agents":ti,ab,de OR "Nonsteroidal Antiinflammatory Agents":ti,ab,de OR "Anti-Inflammatory Analgesics":ti,ab,de OR "Aspirin-Like Agents":ti,ab,de OR "Aspirin Like Agents":ti,ab,de OR "Non-Steroidal Anti-Inflammatory Agent":ti,ab,de OR "Non Steroidal Anti Inflammatory Agent":ti,ab,de OR "Nonsteroidal Anti-Inflammatory Agent":ti,ab,de OR "Nonsteroidal Anti Inflammatory Agent":ti,ab,de OR "Nonsteroidal Antiinflammatory Agent":ti,ab,de OR "Anti-Inflammatory Analgesic":ti,ab,de OR "Aspirin-Like Agent":ti,ab,de OR "Aspirin Like Agent":ti,ab,de OR "Non-Steroid Anti-Inflammatory Agents":ti,ab,de OR "Non Steroid Anti Inflammatory Agents":ti,ab,de OR "Nonsteroid Anti-Inflammatory Agents":ti,ab,de OR "Nonsteroid Anti Inflammatory Agents":ti,ab,de OR "Nonsteroid Antiinflammatory Agents":ti,ab,de OR "Non-Steroid Anti-Inflammatory Agent":ti,ab,de OR "Non Steroid Anti Inflammatory Agent":ti,ab,de OR "Nonsteroid Anti-Inflammatory Agent":ti,ab,de OR "Nonsteroid Anti Inflammatory Agent":ti,ab,de OR "Nonsteroid Antiinflammatory Agent":ti,ab,de OR Aspirin:ti,ab,de OR Ibuprofen:ti,ab,de OR Naproxen:ti,ab,de OR Celecoxib:ti,ab,de OR Meloxicam:ti,ab,de OR Indomethacin:ti,ab,de OR 'Viscosupplementation'/exp OR Viscosupplementation:ti,ab,de OR Viscosupplementations:ti,ab,de OR "Regenerative Cellular Therapy":ti,ab,de OR "Regenerative Cellular Therapies":ti,ab,de OR "Regenerative Stem Cell Therapy":ti,ab,de OR "Regenerative Stem Cell Therapies":ti,ab,de OR "Stem Cell Regeneration":ti,ab,de OR "Cellular Regeneration":ti,ab,de OR 'Thrombocyte Rich Plasma'/exp OR "Thrombocyte Rich Plasma":ti,ab,de OR "Platelet Rich Plasma":ti,ab,de OR "Platelet-Rich Plasma":ti,ab,de OR "RPP Injection":ti,ab,de OR "RPP Injections":ti,ab,de OR "Cortisone Injection":ti,ab,de OR "Cortisone Injections":ti,ab,de OR "Therapeutic Cortisone":ti,ab,de OR "Cortisone Therapy":ti,ab,de OR "Hip Procedure":ti,ab,de OR "Hip Procedures":ti,ab,de)	1 197 132
8	#6 OR #7	3 588 963
9	#5 AND #8	34 152
10	#9 AND [english]/lim AND (2019:py OR 2020:py OR 2021:py OR 2022:py OR 2023:py) NOT ('conference abstract'/it OR 'conference review'/it OR 'note'/it OR 'case report'/de) NOT ('Animals'/exp NOT 'Humans'/exp)	4610

APPENDIX A (CONTINUED)

Cochrane Library

No.	Search Hedge	Results
1	(Acetabulum OR Acetabulums OR "Cotyloid Cavity" OR "Cotyloid Cavities" OR Acetabula OR Acetabulas OR "Pelvic Bones" OR "Pelvis Bones" OR "Innominate Bones" OR "Innominate Bone" OR Hip OR Hips OR Coxa OR Coxas OR "Acetabulofemoral Joint" OR "Acetabulofemoral Joints" OR "Femur Round Ligament" OR "Femur Round Ligaments" OR "Ligamentum Capitis Femoris" OR "Ligamentum Capitis Femori" OR "Ligamentum Teres Femoris" OR "Ligamentum Teres Femori" OR "Round Ligament of Femur" OR "Ligament Of Head Of Femur")	27 393
2	("Pigmented Villonodular Synovitis" OR "Pigmented Villonodular Synovitides" OR "Diffuse Tenosynovial Giant Cell Tumor" OR Periarthritis OR Periarthritides OR Pain:ti,ab OR Pains OR Painful OR Ache OR Aches OR Arthralgia OR Arthralgias OR Polyarthralgia OR Polyarthralgias OR "Joint Disease" OR "Joint Diseases" OR Arthrosis OR Arthroses OR Arthropathies OR Arthropathy OR Contracture OR Contractures OR "Adhesive Capsulitis" OR "Adhesive Capsulitides" OR Bursitis OR Bursitides OR "Labrochondral Tear" OR "Labrochondral Tears" OR "Labrochondral Pathology")	192 693
3	#1 AND #2	7174
4	("Hip Contracture" OR "Hip Contractures" OR "Femoracetabular Impingement" OR "Femoracetabular Impingements" OR "Femoroacetabular Impingement" OR "Femoroacetabular Impingements" OR "Femoro-Acetabular Impingement" OR "Femoro Acetabular Impingement" OR "Femoro-Acetabular Impingements" OR "Femoral Acetabular Impingement" OR "Femoral Acetabular Impingements" OR "Hip Injuries" OR "Hip Injury" OR "Hip Joint Injury" OR "Hip Joint Injuries" OR "Hip Dislocation" OR "Hip Dislocations" OR "Hip Displacement" OR "Hip Displacements" OR "Hip Dysplasia" OR "Hip Impingement" OR "Hip Impingements" OR "Hip Instability" OR "Hip Instabilities" OR "Hip Microinstability" OR "Hip Microinstabilities" OR "Hip Micro-instability" OR "Hip Micro-instabilities" OR "Acetabular Labral Tear" OR "Acetabular Labral Tears" OR "Hip Labral Tear" OR "Hip Labral Tears" OR "Intra-Articular Hip Disorder" OR "Intra-Articular Hip Disorders" OR "Intraarticular Hip Disorder" OR "Intraarticular Hip Disorders" OR "Intra-Articular Hip Disease" OR "Intra-Articular Hip Diseases" OR "Intraarticular Hip Disease" OR "Intraarticular Hip Diseases" OR "Ligamentum Teres Injury" OR "Ligamentum Teres Injuries" OR "Ligamentum Teres Tear" OR "Ligamentum Teres Tears" OR "Ligamentum Capitis Injury" OR "Ligamentum Capitis Injuries" OR "Ligamentum Capitis Tear" OR "Ligamentum Capitis Tears" OR "Non-Arthritic Hip Pain" OR "Pre-Arthritic Hip Pain" OR "Non-Arthritic Hip Joint Pain" OR "Pre-Arthritic Hip Joint Pain")	675
5	#3 AND #4	279
6	("Musculoskeletal Manipulations" OR "Musculoskeletal Manipulation" OR "Manual Therapies" OR "Manual Therapy" OR "Manipulation Therapy" OR "Manipulation Therapies" OR "Manipulative Therapies" OR "Manipulative Therapy" OR "Joint Manipulation" OR "Joint Mobilization" OR "Chiropractic Manipulation" OR "Chiropractic Manipulations" OR "Chiropractic Adjustment" OR "Chiropractic Adjustments" OR Chiropractics OR "Multimodal Treatment" OR "Multimodal Treatments" OR "Combined Modality Therapies" OR "Combined Modality Therapy" OR "Conservative Treatments" OR "Conservative Treatment" OR "Conservative Management" OR "Conservative Therapy" OR "Conservative Therapies" OR "Conservative Care" OR "Non-Operative Management" OR "Non-Operative Treatment" OR "Non-Operative Treatments" OR "Non-Operative Therapy" OR "Non-Operative Therapies" OR "Non-Operative Approach" OR "Non-Surgical Management" OR "Non-Surgical Treatment" OR "Non-Surgical Treatments" OR "Non-Surgical Therapy" OR "Non-Surgical Therapies" OR "Non-Surgical Approach" OR Iontophoresis OR Iontophoreses OR Analgesia OR Analgesic OR Analgesics OR "Pain Management" OR "Pain Managements" OR "Pain Measurements" OR "Pain Measurement" OR "Patient Education" OR "Education of Patients" OR "Patient Counseling" OR "Counseling of Patients" OR "Physical Therapy" OR "Physical Therapies" OR Physiotherapy OR Physiotherapies OR Neurophysiotherapy OR "Physical Therapist" OR "Physical Therapists" OR Telerehabilitation OR Telerehabilitations OR Tele-rehabilitation OR Rehabilitation OR Tele-rehabilitations OR Rehabilitations OR "Therapeutic Modality" OR "Therapeutic Modalities" OR "Ultrasonic Therapy" OR "Ultrasonic Therapies" OR "Shockwave Therapy" OR "Shockwave Therapies" OR "Shock Wave Therapy" OR "Shock Wave Therapies" OR "Ultrasound Therapy" OR "Ultrasound Therapies" OR "Therapeutic Ultrasound" OR "HIFU Therapy" OR "HIFU Therapies" OR "Continuous Ultrasound" OR "Pulsed Ultrasound" OR Kinesiotherapy OR "Exercise Therapy" OR "Therapeutic Exercise" OR "Therapeutic Exercises" OR "Exercise Movement" OR "Resistance Training" OR "Strength Training" OR "Resistance Methods" OR Strengthening OR Electrostimulation OR "Electric Stimulation" OR "Nerve Stimulation" OR "Electro Stimulation" OR "Electro Therapy" OR Electrotherapy OR "Electro Therapies" OR Electrotherapies OR "Electrical Therapy" OR "Electrical Therapies" OR "Muscle Stimulation" OR "Muscular Stimulation" OR "Neuromuscular Stimulation" OR Taping OR Tape OR Bracing OR Brace OR Immobilization OR Immobilize OR "Activity Modification" OR "Activity Modifications" OR "Movement Modification" OR "Movement Modifications" OR "Dry Needling" OR "Dry Needle" OR "Endurance Training" OR "Endurance Therapy" OR "Endurance Therapies" OR Stretching OR Stretches OR "Flexibility Training" OR "Flexibility Exercise" OR "Flexibility Exercises" OR Mobilization OR Mobilizations OR "Joint Exercise" OR "Joint Exercises" OR "Neuromuscular Re-Education" OR "Neuromuscular Reeducation" OR "Neuromuscular Training" OR "Proprioceptive Training" OR "Perturbation Training" OR "Movement Training" OR Cryotherapy OR Cryotherapies OR "Cold Therapy" OR "Cold Therapies" OR "Therapeutic Cold" OR Cryo-Cuff OR "Cryo Cuff" OR Thermotherapy OR Thermotherapies OR "Thermo Therapy" OR "Thermo Therapies" OR "Thermal Modality" OR "Thermal Modalities" OR "Thermal Therapy" OR "Thermal Therapies" OR "Thermal Agent" OR "Thermal Agents" OR "Moist Heat" OR "Moist Heating" OR "Heat Therapy" OR "Heat Therapies" OR "Therapeutic Heat" OR "Ice Therapy" OR "Ice Therapies" OR "Therapeutic Ice" OR "Therapeutic Icing" OR "Game Ready" OR "Compression Therapy" OR "Compression Therapies" OR Diathermy OR "Short Wave Therapy" OR "Cardiorespiratory Training" OR "Cardiorespiratory Exercise" OR "Cardiorespiratory Conditioning" OR "Aerobic Conditioning" OR "Aerobic Training" OR "Aerobic Exercise" OR "Laser Therapy" OR "Laser Therapies" OR "Laser Treatment" OR "Laser Treatments" OR Thermomagnetic OR Electromagnetic)	266 855

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
7	("Non-Steroidal Anti-Inflammatory Agents" OR "Non Steroidal Anti Inflammatory Agents" OR "Nonsteroidal Anti-Inflammatory Agents" OR "Nonsteroidal Anti Inflammatory Agents" OR "Nonsteroidal Antiinflammatory Agents" OR "Anti-Inflammatory Analgesics" OR "Aspirin-Like Agents" OR "Aspirin Like Agents" OR "Non-Steroidal Anti-Inflammatory Agent" OR "Non Steroidal Anti Inflammatory Agent" OR "Nonsteroidal Anti-Inflammatory Agent" OR "Nonsteroidal Anti Inflammatory Agent" OR "Nonsteroidal Antiinflammatory Agent" OR "Anti-Inflammatory Analgesic" OR "Aspirin-Like Agent" OR "Aspirin Like Agent" OR "Non-Steroid Anti-Inflammatory Agents" OR "Non Steroid Anti Inflammatory Agents" OR "Nonsteroid Anti-Inflammatory Agents" OR "Nonsteroid Anti Inflammatory Agents" OR "Nonsteroid Antiinflammatory Agents" OR "Non-Steroid Anti-Inflammatory Agent" OR "Non Steroid Anti Inflammatory Agent" OR "Nonsteroid Anti-Inflammatory Agent" OR "Nonsteroid Anti Inflammatory Agent" OR "Nonsteroid Antiinflammatory Agent" OR Aspirin OR Ibuprofen OR Naproxen OR Celecoxib OR Meloxicam OR Indomethacin OR Viscosupplementation OR Viscosupplementations OR "Regenerative Cellular Therapy" OR "Regenerative Cellular Therapies" OR "Regenerative Stem Cell Therapy" OR "Regenerative Stem Cell Therapies" OR "Stem Cell Regeneration" OR "Cellular Regeneration" OR "Platelet Rich Plasma" OR "Platelet-Rich Plasma" OR "RPP Injection" OR "RPP Injections" OR "Cortisone Injection" OR "Cortisone Injections" OR "Therapeutic Cortisone" OR "Cortisone Therapy" OR "Hip Procedure" OR "Hip Procedures")	31 686
8	#6 OR #7	290 937
9	#5 AND #8 AND Limits: Publication Date: January 2019 - Present	95

CINAHL Plus via EBSCO

No.	Search Hedge	Results
1	((MH "Acetabulum") OR Acetabulum OR Acetabulums OR "Cotyloid Cavity" OR "Cotyloid Cavities" OR Acetabula OR Acetabulas OR (MH "Pelvic Bones") OR "Pelvic Bones" OR "Pelvis Bones" OR "Innominate Bones" OR "Innominate Bone" OR (MH "Hip") OR Hip OR Hips OR Coxa OR Coxas OR "Acetabulofemoral Joint" OR "Acetabulofemoral Joints" OR (MH "Hip Joint") OR "Femur Round Ligament" OR "Femur Round Ligaments" OR "Ligamentum Capitis Femoris" OR "Ligamentum Capitis Femori" OR "Ligamentum Teres Femoris" OR "Ligamentum Teres Femori" OR "Round Ligament of Femur" OR "Ligament Of Head Of Femur")	81 429
2	((MH "Synovitis, Pigmented Villonodular") OR "Pigmented Villonodular Synovitis" OR "Pigmented Villonodular Synovitides" OR "Diffuse Tenosynovial Giant Cell Tumor" OR (MH "Periarthritis") OR Periarthritis OR Periarthritides OR (MH "Pain") OR (MH "Chronic Pain") OR TI Pain OR AB Pain OR Pains OR Painful OR Ache OR Aches OR (MH "Arthralgia") OR Arthralgia OR Arthralgias OR Polyarthralgia OR Polyarthralgias OR (MH "Joint Diseases") OR "Joint Disease" OR "Joint Diseases" OR Arthrosis OR Arthroses OR Arthropathies OR Arthropathy OR (MH "Contracture+") OR Contracture OR Contractures OR "Adhesive Capsulitis" OR "Adhesive Capsulitides" OR Bursitis OR Bursitides OR "Labrochondral Tear" OR "Labrochondral Tears" OR "Labrochondral Pathology")	385 052
3	S1 AND S2	19 962
4	("Hip Contracture" OR "Hip Contractures" OR (MH "Femoracetabular Impingement") OR "Femoracetabular Impingement" OR "Femoracetabular Impingements" OR "Femoroacetabular Impingement" OR "Femoroacetabular Impingements" OR "Femoro-Acetabular Impingement" OR "Femoro Acetabular Impingement" OR "Femoro-Acetabular Impingements" OR "Femoral Acetabular Impingement" OR "Femoral Acetabular Impingements" OR (MH "Hip Injuries+") OR "Hip Injuries" OR "Hip Injury" OR "Hip Joint Injury" OR "Hip Joint Injuries" OR "Hip Dislocation" OR "Hip Dislocations" OR "Hip Displacement" OR "Hip Displacements" OR "Hip Dysplasia" OR "Hip Impingement" OR "Hip Impingements" OR "Hip Instability" OR "Hip Instabilities" OR "Hip Microinstability" OR "Hip Microinstabilities" OR "Hip Micro-instability" OR "Hip Micro-instabilities" OR "Acetabular Labral Tear" OR "Acetabular Labral Tears" OR "Hip Labral Tear" OR "Hip Labral Tears" OR "Intra-Articular Hip Disorder" OR "Intra-Articular Hip Disorders" OR "Intraarticular Hip Disorder" OR "Intraarticular Hip Disorders" OR "Intra-Articular Hip Disease" OR "Intra-Articular Hip Diseases" OR "Intraarticular Hip Disease" OR "Intraarticular Hip Diseases" OR "Ligamentum Teres Injury" OR "Ligamentum Teres Injuries" OR "Ligamentum Teres Tear" OR "Ligamentum Teres Tears" OR "Ligamentum Capitis Injury" OR "Ligamentum Capitis Injuries" OR "Ligamentum Capitis Tear" OR "Ligamentum Capitis Tears" OR "Non-Arthritic Hip Pain" OR "Pre-Arthritic Hip Pain" OR "Non-Arthritic Hip Joint Pain" OR "Pre-Arthritic Hip Joint Pain")	19 962
5	S3 OR S4	33 172

Table continues on next page.

APPENDIX A (CONTINUED)

No.	Search Hedge	Results
6	("Musculoskeletal Manipulations" OR "Musculoskeletal Manipulation" OR "Manual Therapies" OR "Manual Therapy" OR "Manipulation Therapy" OR "Manipulation Therapies" OR "Manipulative Therapies" OR "Manipulative Therapy" OR "Joint Manipulation" OR "Joint Mobilization" OR (MH "Manipulation, Chiropractic+") OR "Chiropractic Manipulation" OR "Chiropractic Manipulations" OR "Chiropractic Adjustment" OR "Chiropractic Adjustments" OR Chiropractics OR (MH "Combined Modality Therapy") OR "Multimodal Treatment" OR "Multimodal Treatments" OR "Combined Modality Therapies" OR "Combined Modality Therapy" OR "Conservative Treatments" OR "Conservative Treatment" OR "Conservative Management" OR "Conservative Therapy" OR "Conservative Therapies" OR "Conservative Care" OR "Non-Operative Management" OR "Non-Operative Treatment" OR "Non-Operative Treatments" OR "Non-Operative Therapy" OR "Non-Operative Therapies" OR "Non-Operative Approach" OR "Non-Surgical Management" OR "Non-Surgical Treatment" OR "Non-Surgical Treatments" OR "Non-Surgical Therapy" OR "Non-Surgical Therapies" OR "Non-Surgical Approach" OR (MH "Iontophoresis") OR Iontophoresis OR Iontophoreses OR Analgesia OR Analgesic OR Analgesics OR (MH "Pain Management+") OR "Pain Management" OR "Pain Managements" OR (MH "Pain Measurement+") OR "Pain Measurements" OR "Pain Measurement" OR (MH "Patient Education+") OR TI "Patient Education" OR AB "Patient Education" OR "Education of Patients" OR "Patient Counseling" OR "Counseling of Patients" OR (MH "Physical Therapy Practice+") OR (MH "Physical Therapy+") OR "Physical Therapy" OR "Physical Therapies" OR Physiotherapy OR Physiotherapies OR Neurophysiotherapy OR "Physical Therapist" OR "Physical Therapists" OR (MH "Telerehabilitation") OR Telerehabilitation OR Telerehabilitations OR Tele-rehabilitation OR Rehabilitation OR Tele-rehabilitations OR Rehabilitations OR "Therapeutic Modality" OR "Therapeutic Modalities" OR (MH "Ultrasonic Therapy") OR "Ultrasonic Therapy" OR "Ultrasonic Therapies" OR "Shockwave Therapy" OR "Shockwave Therapies" OR "Shock Wave Therapy" OR "Shock Wave Therapies" OR "Ultrasound Therapy" OR "Ultrasound Therapies" OR "Therapeutic Ultrasound" OR "HIFU Therapy" OR "HIFU Therapies" OR "Continuous Ultrasound" OR "Pulsed Ultrasound" OR Kinesiotherapy OR (MH "Therapeutic Exercise+") OR "Exercise Therapy" OR "Therapeutic Exercise" OR "Therapeutic Exercises" OR "Exercise Movement" OR (MH "Resistance Training+") OR "Resistance Training" OR "Strength Training" OR "Resistance Methods" OR Strengthening OR (MH "Electric Stimulation+") OR (MH "Transcutaneous Electric Nerve Stimulation+") OR Electrostimulation OR "Electric Stimulation" OR "Nerve Stimulation" OR "Electro Stimulation" OR "Electro Therapy" OR Electrotherapy OR "Electro Therapies" OR Electrotherapies OR "Electrical Therapy" OR "Electrical Therapies" OR "Muscle Stimulation" OR "Muscular Stimulation" OR "Neuromuscular Stimulation" OR Taping OR Tape OR Bracing OR Brace OR Immobilization OR Immobilize OR "Activity Modification" OR "Activity Modifications" OR "Movement Modification" OR "Movement Modifications" OR "Dry Needling" OR "Dry Needle" OR "Endurance Training" OR "Endurance Therapy" OR "Endurance Therapies" OR (MH "Stretching") OR Stretching OR Stretches OR "Flexibility Training" OR "Flexibility Exercise" OR "Flexibility Exercises" OR Mobilization OR Mobilizations OR "Joint Exercise" OR "Joint Exercises" OR "Neuromuscular Re-Education" OR "Neuromuscular Reeducation" OR "Neuromuscular Training" OR "Proprioceptive Training" OR "Perturbation Training" OR "Movement Training" OR (MH "Cryotherapy+") OR (MH "Heat-Cold Application+") OR Cryotherapy OR Cryotherapies OR "Cold Therapy" OR "Cold Therapies" OR "Therapeutic Cold" OR Cryo-Cuff OR "Cryo Cuff" OR Thermotherapy OR Thermotherapies OR "Thermo Therapy" OR "Thermo Therapies" OR "Thermal Modality" OR "Thermal Modalities" OR "Thermal Therapy" OR "Thermal Therapies" OR "Thermal Agent" OR "Thermal Agents" OR "Moist Heat" OR "Moist Heating" OR "Heat Therapy" OR "Heat Therapies" OR "Therapeutic Heat" OR "Ice Therapy" OR "Ice Therapies" OR "Therapeutic Ice" OR "Therapeutic Icing" OR "Game Ready" OR "Compression Therapy" OR "Compression Therapies" OR Diathermy OR "Short Wave Therapy" OR "Cardiorespiratory Training" OR "Cardiorespiratory Exercise" OR "Cardiorespiratory Conditioning" OR "Aerobic Conditioning" OR "Aerobic Training" OR "Aerobic Exercise" OR (MH "Laser Therapy") OR "Laser Therapy" OR "Laser Therapies" OR "Laser Treatment" OR "Laser Treatments" OR Thermomagnetic OR Electromagnetic)	686 062
7	((MH "Antiinflammatory Agents, Non-Steroidal+") OR TI NSAIDs OR AB NSAIDs OR TI NSAID OR AB NSAID OR "Non-Steroidal Anti-Inflammatory Agents" OR "Non Steroidal Anti Inflammatory Agents" OR "Nonsteroidal Anti-Inflammatory Agents" OR "Nonsteroidal Anti Inflammatory Agents" OR "Nonsteroidal Antiinflammatory Agents" OR "Anti-Inflammatory Analgesics" OR "Aspirin-Like Agents" OR "Aspirin Like Agents" OR "Non-Steroidal Anti-Inflammatory Agent" OR "Non Steroidal Anti Inflammatory Agent" OR "Nonsteroidal Anti-Inflammatory Agent" OR "Nonsteroidal Anti Inflammatory Agent" OR "Nonsteroidal Antiinflammatory Agent" OR "Anti-Inflammatory Analgesic" OR "Aspirin-Like Agent" OR "Aspirin Like Agent" OR "Non-Steroid Anti-Inflammatory Agents" OR "Non Steroid Anti Inflammatory Agents" OR "Nonsteroid Anti-Inflammatory Agents" OR "Nonsteroid Anti Inflammatory Agents" OR "Nonsteroid Antiinflammatory Agents" OR "Non-Steroid Anti-Inflammatory Agent" OR "Non Steroid Anti Inflammatory Agent" OR "Nonsteroid Anti-Inflammatory Agent" OR "Nonsteroid Anti Inflammatory Agent" OR "Nonsteroid Antiinflammatory Agent" OR Aspirin OR Ibuprofen OR Naproxen OR Celecoxib OR Meloxicam OR Indomethacin OR Viscosupplementation OR Viscosupplementations OR "Regenerative Cellular Therapy" OR "Regenerative Cellular Therapies" OR "Regenerative Stem Cell Therapy" OR "Regenerative Stem Cell Therapies" OR "Stem Cell Regeneration" OR "Cellular Regeneration" OR (MH "Platelet-Rich Plasma+") OR "Platelet Rich Plasma" OR "Platelet-Rich Plasma" OR "RPP Injection" OR "RPP Injections" OR "Cortisone Injection" OR "Cortisone Injections" OR "Therapeutic Cortisone" OR "Cortisone Therapy" OR "Hip Procedure" OR "Hip Procedures")	48 394
8	S6 OR S7	723 834
9	S5 AND S8	9595
10	S9 AND Language: English AND Publication Date: 2019-2022 NOT Source Type: Magazines	2213

APPENDIX A (CONTINUED)

Physiotherapy Evidence Database (PEDro)

No.	Search Hedge	Results
1	Abstract and Title: Hip Joint Pain AND Published Since: 2019	32
2	Abstract and Title: Hip Joint Disease AND Published Since: 2019	4
3	Abstract and Title: Hip Contracture AND Published Since: 2019	1
4	Abstract and Title: Hip Joint Injury AND Published Since: 2019	6
5	Abstract and Title: Hip Dislocation AND Published Since: 2019	2
6	Abstract and Title: Hip Dysplasia AND Published Since: 2019	3
7	Abstract and Title: Hip Impingement AND Published Since: 2019	11
8	Abstract and Title: Hip Instability AND Published Since: 2019	9
9	Abstract and Title: Femoracetabular Impingement AND Published Since: 2019	0
10	Abstract and Title: Non-Arthritic Hip Pain AND Published Since: 2019	1
11	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10	69

APPENDIX B

ARTICLE INCLUSION AND EXCLUSION CRITERIA

The purpose of this screening is to identify articles that will be included in the full-text review related to examination and treatment of individuals with nonarthritic hip pain. Nonarthritic hip pain is being defined as intra-articular hip pathologies to include labral tears, FAIS, microinstability, ligamentum teres tears, and cartilage lesions not classified as arthritis.

Articles published in peer-reviewed journals that include studies of the following types: systematic reviews, meta-analyses, experimental and quasi-experimental, cohort, case series, and cross-sectional studies will be included and have at least a sample size of 10 or greater.

The following articles or sources will be excluded: meeting abstracts, press releases, theses, nonsystematic review articles, case reports, and articles that cannot be retrieved in English.

Inclusion Criteria

We will include articles reporting on the following:

- Special tests and measures for diagnosis and/or differential diagnosis of nonarthritic hip joint pain within the scope of physical therapist practice, including but not limited to the flexion, abduction, external rotation (FABER) test; Scour; internal rotation with overpressure (IROP) test; resisted straight-leg raise; flexion, adduction, internal rotation (FADIR) test; Fitzgerald's test; McCarthy test; log roll test; and variations of joint apprehension tests for hip joint microinstability.

OR

- Physical impairment measures (ie, strength, range of motion, flexibility, balance)

OR

- Pain measures (NPRS: best, worst, now) and pain drawing

OR

- Functional tests used to measure activity/physical performance measures of patients with nonarthritic hip pain, including but not limited to the double-leg squat test, step-down test, single-leg squat test, Star Excursion Balance Test (SEBT), hopping, and jumping

OR

- Patient-reported outcome measures (PROMs) both specific and nonspecific to nonarthritic hip joint pain outcomes. Hip-specific instruments may include but are not limited to the Hip Outcome Score (HOS), Copenhagen Hip and Groin Outcome Score (HAGOS), International Hip Outcome Score (iHot-12 or iHot-33), and Nonarthritic Hip Score (NAHS). Non–hip-specific instruments may include but not limited to the Tegner Activity Scale, Lower Extremity Functional Scale (LEFS), and Patient-Reported Outcomes Measurement Information System (PROMIS).

OR

- Primarily adults (≥10 years old)
  - Studies reporting on persons less than 10 years old IF the proportion in the sample is small (<5%) OR that separate data are available for adults.

AND

Nonarthritic hip pain, including the following topics:

- Diagnostic characteristics of nonarthritic hip joint pain, including but not limited to pain location, duration, and quality, and related body system impairments and activity limitations
- Nonarthritic hip pain, including but not limited to morphological features, sports participation, and movement patterns
- Interventions within the scope of practice of physical therapists, to include modalities (including but not limited to strengthening, manual therapy, stretching exercises, neuromuscular re-education, taping, and bracing)
- We will include all outcomes.

Exclusion Criteria

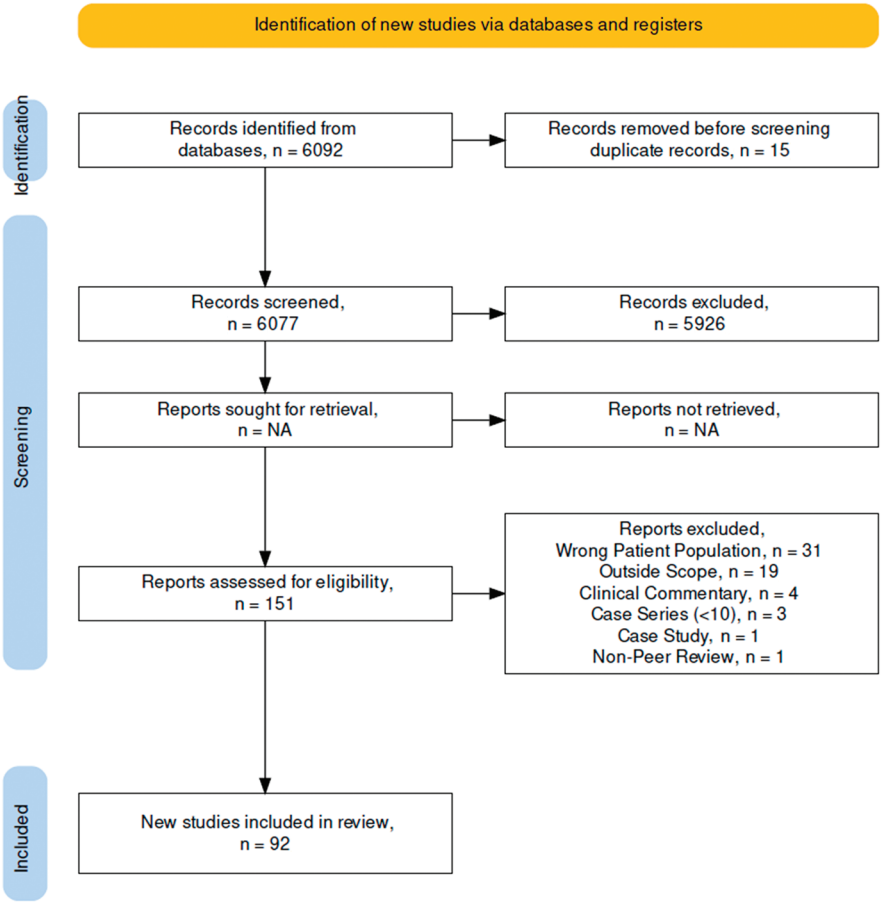
We will exclude articles reporting on the following:

- Animal studies
- Primarily infants and children (<10 years old)
- Nonarthritic intra-articular hip pain related primarily to the following:
  - Fractures (including stress fractures)
  - Osteochondral lesions
  - Athletic pubalgia
  - Myositis ossificans
  - Septic arthritis
  - Avascular necrosis (AVN) or other neurovascular injury or compromise
    - Legg-Calvé-Perthes disease
    - Adult onset AVN
  - Slipped capital femoral epiphysis (SCFE)
  - Tumors
  - Postoperative nonarthritic hip pain
  - Nonarthritic hip pain related to extra-articular pathology including tendinopathy (primary diagnoses of gluteal, adductor, hamstrings, or hip flexor tendinopathy, tendon-related coxa sultans/snapping hip)
  - Lumbosacral pain
  - Extra-articular posterior hip pain (ischiofemoral impingement [IFI], nerve entrapment)
  - Nonmusculoskeletal nonarthritic hip pain:
    - Diabetes
    - Primary peripheral nerve entrapment
  - Topics outside the scope of physical therapist practice

APPENDIX C

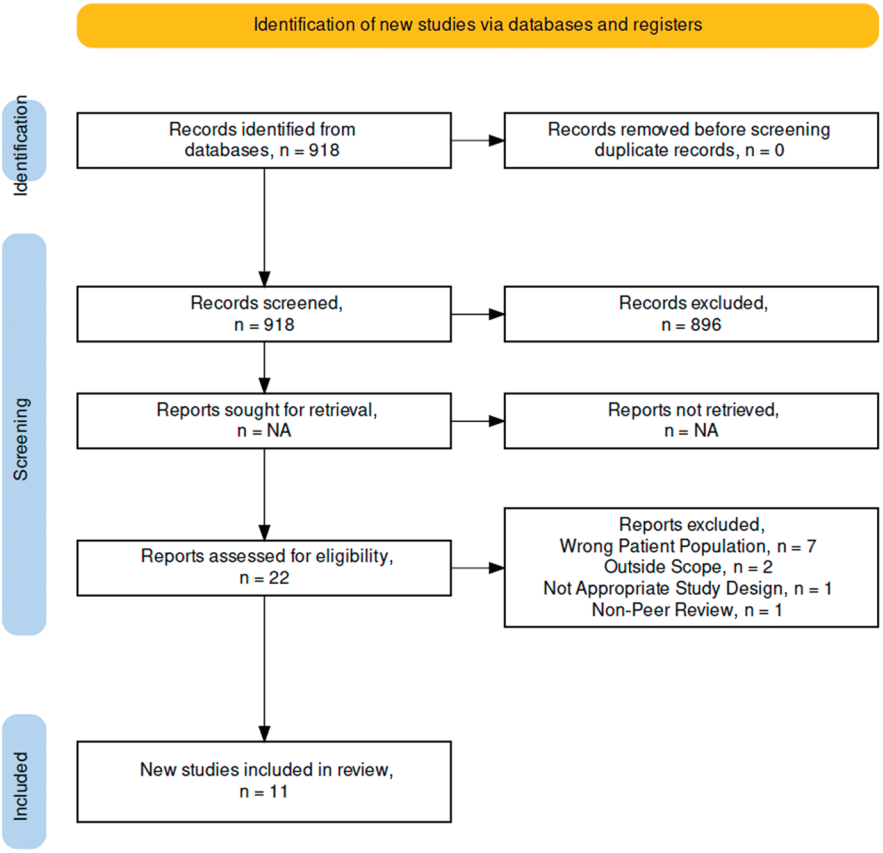
FLOW CHART OF ARTICLES

Hip Pain Nonarthritic – Examination, Outcomes, and Performance Measures: January 2013 to Sepember 2021



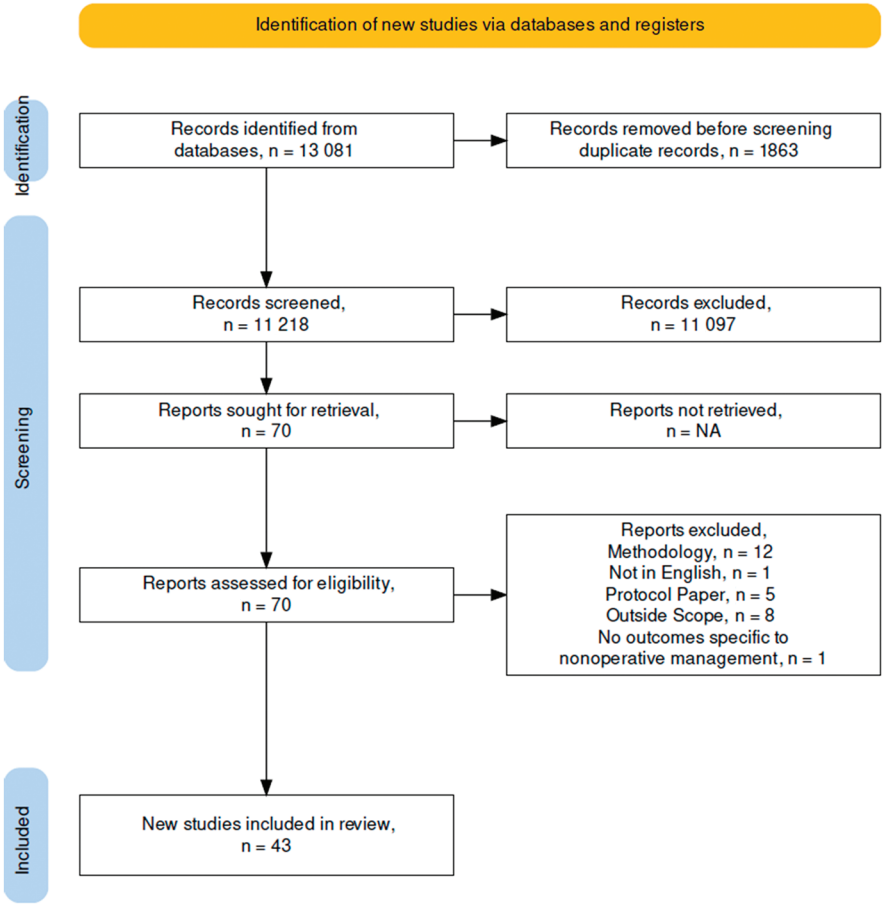
APPENDIX C (CONTINUED)

Hip Pain Nonarthritic – Examination, Outcomes, and Performance Measures: October 2021 to July 2022



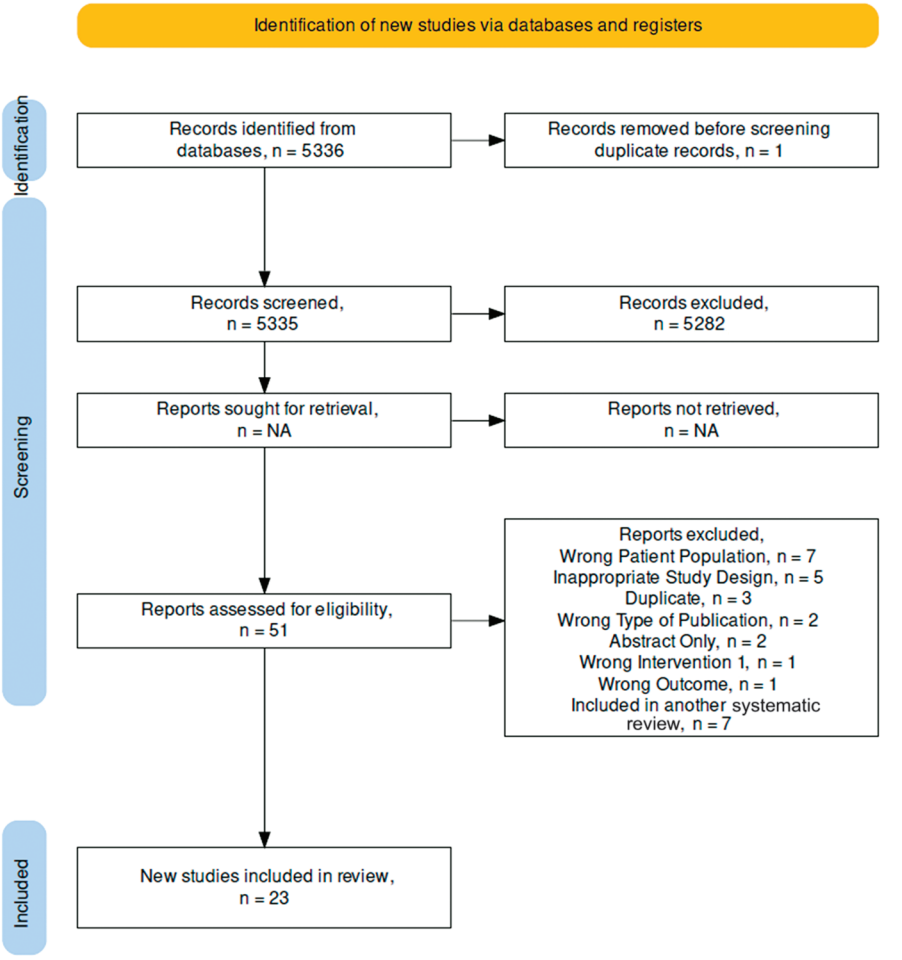
APPENDIX C (CONTINUED)

Nonarthritic Hip Pain Interventions: January 2013 to June 2019



APPENDIX C (CONTINUED)

Nonarthritic Hip Pain Interventions: July 2019 to July 2022



APPENDIX D

LEVELS OF EVIDENCE TABLE[a]

Level	Intervention/Prevention	Pathoanatomic/Risk/Clinical Course/Prognosis/Differential Diagnosis	Diagnosis/Diagnostic Accuracy	Prevalence of Condition/ Disorder	Exam/Outcomes
I	Systematic review of high-quality RCTs High-quality RCT[b]	Systematic review of prospective cohort studies High-quality prospective cohort study[‡]	Systematic review of high-quality diagnostic studies High-quality diagnostic study[d] with validation	Systematic review, high-quality cross-sectional studies High-quality cross-sectional study[e]	Systematic review of prospective cohort studies High-quality prospective cohort study
II	Systematic review of high-quality cohort studies High-quality cohort study[c] Outcomes study or ecological study Lower-quality RCT[f]	Systematic review of retrospective cohort study Lower-quality prospective cohort study High-quality retrospective cohort study Consecutive cohort Outcomes study or ecological study	Systematic review of exploratory diagnostic studies or consecutive cohort studies High-quality exploratory diagnostic studies Consecutive retrospective cohort	Systematic review of studies that allows relevant estimate Lower-quality cross-sectional study	Systematic review of lower-quality prospective cohort studies Lower-quality prospective cohort study
III	Systematic reviews of case-control studies High-quality case-control study Lower-quality cohort study	Lower-quality retrospective cohort study High-quality cross-sectional study Case-control study	Lower-quality exploratory diagnostic studies Nonconsecutive retrospective cohort	Local nonrandom study	High-quality cross-sectional study
IV	Case series	Case series	Case-control study		Lower-quality cross-sectional study
V	Expert opinion	Expert opinion	Expert opinion	Expert opinion	Expert opinion

Abbreviation: RCT, randomized clinical trial.

[a]*Adapted from the Center for Evidence-based Medicine 2009 levels of evidence.*[215] *See also* **APPENDIX E.**

[b]*High quality includes RCTs with greater than 80% follow-up, blinding, and appropriate randomization procedures.*

[c]*High-quality cohort study includes greater than 80% follow-up.*

[d]*High-quality diagnostic study includes consistently applied reference standard and blinding.*

[e]*High-quality prevalence study is a cross-sectional study that uses a local and current random sample or censuses.*

[f]*Weaker diagnostic criteria and reference standards, improper randomization, no blinding, and less than 80% follow-up may add bias and threats to validity.*

APPENDIX E

PROCEDURES FOR ASSIGNING LEVELS OF EVIDENCE

- Level of evidence is assigned based on the study design using the Levels of Evidence table (**APPENDIX D**), assuming high quality (eg, for intervention, randomized clinical trial starts at level I)
- Study quality is assessed using the critical appraisal tool, and the study is assigned 1 of 4 overall quality ratings based on the critical appraisal results
- Level of evidence assignment is adjusted based on the overall quality rating:
  - High quality (high confidence in the estimate/results): study remains at assigned level of evidence (eg, if the randomized clinical trial is rated high quality, its final assignment is level I). High quality should include:
    - Randomized clinical trial with greater than 80% follow-up, blinding, and appropriate randomization procedures
    - Cohort study includes greater than 80% follow-up
    - Diagnostic study includes consistently applied reference standard and blinding
    - Prevalence study is a cross-sectional study that uses a local and current random sample or censuses
  - Acceptable quality (the study does not meet requirements for high quality and weaknesses limit the confidence in the accuracy of the estimate): downgrade 1 level
    - Based on critical appraisal results
  - Low quality: the study has significant limitations that substantially limit confidence in the estimate: downgrade 2 levels
    - Based on critical appraisal results
  - Unacceptable quality: serious limitations–exclude from consideration in the guideline
    - Based on critical appraisal results