Hip Pain and Mobility Deficits – Hip Osteoarthritis: Clinical Practice Guidelines linked to the International Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association


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Reviewers: Anthony Delitto PT, PhD, John Dewitt DPT, Amanda Ferland PT, Helene Fearon PT, Joy MacDermid PT, PhD, James W. Matheson DPT, Kathleen K. Mangione PT, PhD, Philip McClure PT, PhD, Marian A. Minor PT, PhD, Paul Shekelle MD, PhD, A. Russell Smith, Jr. PT, EdD, Leslie Torburn DPT

For author, coordinator, and reviewer affiliations, see end of text. ©2009 Orthopaedic Section American Physical Therapy Association (APTA), Inc, and the Journal of Orthopaedic & Sports Physical Therapy. The Orthopaedic Section, APTA, Inc., and the Journal of Orthopaedic & Sports Physical Therapy consent to the photocopying of this guideline for educational purposes. Address correspondence to: Joseph J. Godges DPT, ICF Practice Guidelines Coordinator, Orthopaedic Section, APTA Inc., 2920 East Avenue South, Suite 200; La Crosse, WI 54601. Email: icf@orthopt.org
Pathoanatomical Features: Physical therapists should assess for impairments in the hip joint and surrounding muscles, especially the gluteus medius, when a patient presents with hip pain. (Recommendation based on moderate evidence.)

Risk Factors: Physical therapists should consider age, hip development disorders, dysplasia, and previous hip joint injury as risk factors for the developing hip osteoarthritis. (Recommendation based on strong evidence.)

Diagnosis/Classification: Moderate hip pain in the lateral or anterior region mainly during weight bearing, in adults over the age of 50 years, with limited hip range of motion in 2 directions by more than 15 degrees when comparing the painful to the non painful side are useful clinical findings for classifying a patient with hip pain into the International Statistical Classification of Diseases and Related Health Problems (ICD) category of unilateral coxarthrosis and the associated International Classification of Functioning, Disability, and Health (ICF) impairment-based category of hip pain (b2816 Pain in joints) and mobility deficits (b7100 Mobility of a single joint). (Recommendation based on strong evidence.)

Differential Diagnosis: Physical therapists should consider diagnostic classifications other than osteoarthritis of the hip when the patient’s history and examination findings are not consistent with those presented in the diagnosis/classification section of this guideline – or – when the patient’s symptoms are not diminishing in a timely manner with interventions aimed at normalization of the patient’s impairments of body function. (Recommendation based on expert opinion.)

Examination – Outcome Measures: Clinicians should use validated self-report questionnaires, such as the Western Ontario McMaster Assessment (WOMAC), Lower Extremity Functional Scale (LEFS), or the Harris Hip Score for patients with hip osteoarthritis. These tools are useful for identifying a patient’s baseline status relative to pain, function, and disability and for monitoring a change in a patient’s status throughout the course of treatment. (Recommendation based on strong evidence.)

Examination – Activity Limitation and Participation Restriction Measures: Physical therapists should utilize easily reproducible physical performance measures, such as the 6 Minute Walk, Self-Paced Walk, Stair Measure, Timed Up and Go, and Functional Squat tests, to assess activity limitation and participation restrictions associated with their patient’s hip pain and to assess the changes in the patient’s level of function over the episode of care. (Recommendation based on strong evidence.)

Interventions – Patient Education: Clinicians should consider the use of patient education to teach activity modification, exercise, weight reduction and methods of unloading the arthritic joints. (Recommendation based on moderate evidence.)

Interventions – Functional, Gait, and Balance Training: Functional, gait and balance training, including the use of assistive devices such as canes, crutches and walkers, can be used in patients with hip osteoarthritis to reduce impairments associated with weight bearing activities. (Recommendation based on weak evidence.)
**Interventions – Manual Therapy:** Clinicians should consider the use of manual therapy procedures to provide short-term pain relief, and improved hip mobility and function in patients with mild hip osteoarthritis. (Recommendation based on moderate evidence.)

**Interventions – Flexibility, Strengthening and Endurance Exercises:** Clinicians should consider the use of flexibility, strengthening and endurance exercises, including aquatic exercises, in patients with hip osteoarthritis. (Recommendation based on moderate evidence.)

*These recommendations and clinical practice guidelines are based on the scientific literature published prior to August 2008.*
Introduction

AIM OF THE GUIDELINE

The Orthopaedic Section of the American Physical Therapy Association (APTA) 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).68

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 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
- Provide a description to policy makers, using internationally accepted terminology, of the practice of orthopaedic physical therapists
- Provide information for payors and claims reviewers regarding the practice of orthopaedic 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 physical therapy

STATEMENT OF INTENT

This guideline is 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 the rationale for significant departures from accepted guidelines be documented in the patient’s medical records at the time the relevant clinical decision is made.
Methods

Content experts were appointed by the Orthopaedic Section, APTA as developers and authors of clinical practice guidelines for musculoskeletal conditions of the hip that are commonly treated by physical therapists. These content experts were given the task to identify impairments of body function and structure, activity limitations, and participation restrictions, described using ICF terminology, that could 1) categorize patients into mutually exclusive impairment patterns upon which to base intervention strategies, and 2) serve as measures of changes in function over the course of an episode of care. The second task given to the content experts was to describe interventions and supporting evidence for specific subsets of patients based upon the previously chosen patient categories. It was also acknowledged by the Orthopaedic Section, APTA that a systematic search and review of the evidence related to diagnostic categories based on International Statistical Classification of Diseases and Health Related Problems (ICD) terminology would not be useful for these ICF-based clinical practice guidelines as most of the evidence associated with changes in levels of impairment or function in homogeneous populations is not readily searchable using the current terminology. For this reason, the content experts were directed to also search the scientific literature related to classification, outcome measures, and intervention strategies for musculoskeletal conditions commonly treated by physical therapists. Thus, the authors of this clinical practice guideline systematically searched MEDLINE, CINAHL, and the Cochrane Database of Systematic Reviews (1966 through August 2008) for any relevant articles related to classification, outcome measures, and intervention strategies for osteoarthritis of the hip. Additionally, when relevant articles were identified their reference lists were hand-searched in an attempt to identify other articles that might have contributed to the outcome of these clinical practice guidelines.

This guideline was issued in 2009 based upon publications in the scientific literature prior to August 2008. This guideline will be considered for review in 2013, or sooner if new evidence becomes available. Any updates to the guideline in the interim period will be noted on the Orthopaedic Section of the APTA website: www.orthopt.org

Levels of Evidence

Individual clinical research articles will be graded according to criteria described by the Center for Evidence-Based Medicine, Oxford, United Kingdom. (Table 1)

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<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tr>
<td>I</td>
<td>Evidence obtained from high quality randomized controlled trials, prospective studies, or diagnostic studies</td>
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<tr>
<td>II</td>
<td>Evidence obtained from less equality randomized controlled trials, prospective studies or diagnostic studies (e.g., improper randomization, no blinding, &lt; 80% follow-up)</td>
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<td>III</td>
<td>Case controlled studies or retrospective studies</td>
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<td>IV</td>
<td>Case series</td>
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<td>V</td>
<td>Expert opinion</td>
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Grades of Evidence

The overall strength of the evidence supporting recommendations made in this guideline will be graded according to guidelines described by Guyatt as modified by MacDermid and adopted by the coordinator and reviewers of this project. In this modified system, the typical A, B, C and D
grades of evidence have been modified to include the role of consensus expert opinion and basic science research to demonstrate biological or biomechanical plausibility. (Table 2)

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

The Orthopaedic Section, APTA also selected consultants from the following areas to serve as reviewers of the early drafts of this clinical practice guideline:
- Arthritis Foundation
- Claims review
- Coding
- Epidemiology
- Geriatrics Section of the APTA, Inc
- Medical practice guidelines
- Orthopaedic physical therapy residency education
- Physical therapy academic education
- Sports physical therapy residency education

Comments from these reviewers were utilized by the authors to edit this clinical practice guideline prior to submitting it for publication to the Journal of Orthopaedic & Sports Physical Therapy.

In addition, several physical therapists practicing in orthopaedic and sports physical therapy settings were sent initial drafts of this clinical practice guideline along with feedback forms to determine its usefulness, validity, and impact.
CLASSIFICATION

The primary ICD-10 code and condition associated with hip pain and mobility deficits is M16.1 Primary coxarthrosis, unilateral. In the ICD, the term osteoarthritis (OA) is used as a synonym for arthrosis or osteoarthrosis. Other, secondary codes associated with hip OA are M16.0 primary coxarthrosis, bilateral; M16.2 Coxarthrosis resulting from dysplasia, bilateral; M16.3 Dysplastic coxarthrosis, unilateral; M16.4 Post-traumatic coxarthrosis, bilateral; M16.5 Post-traumatic coxarthrosis, unilateral; M16.7 Secondary coxarthrosis, not otherwise specified. The corresponding ICD-9 CM codes and conditions, which are used in the USA, are 715.15 Osteoarthritis of the pelvic region and thigh, localized, primary; 715.25 Osteoarthritis of the pelvic region and thigh, localized, secondary; 715.85 Osteoarthritis of the pelvic region and thigh involving more than one site but not specified as generalized.

The primary ICF body function codes associated with the above noted primary ICD-10 condition are the sensory functions related to pain and the movement-related functions related to joint mobility. These body function codes are b2816 Pain in joints and b7100 Mobility of a single joint.

The primary ICF body structure codes associated with hip pain and mobility deficits are s75001 Hip joint, s75002 Muscles of thigh, and s75003 Ligaments and fascia of thigh.

The primary ICF activities and participation codes associated with hip pain and mobility deficits are d4154 Maintaining a standing position, d4500 Walking short distances, and d4501 Walking long distances.

The ICD-10 and primary and secondary ICF codes associated with hip pain and mobility deficits are provided in Table 3 (below).
ICD-10 and ICF Codes Associated with Hip Pain and Mobility Deficits

International Statistical Classification of Diseases and Related Health Problems

Primary ICD-10: M16.1 Primary coxarthrosis, unilateral

Secondary ICD-10:
- M16.0 Primary coxarthrosis, bilateral
- M16.2 Coxarthrosis resulting from dysplasia, bilateral
- M16.3 Dysplastic coxarthrosis, unilateral
- M16.4 Post-traumatic coxarthrosis, bilateral
- M16.5 Post-traumatic coxarthrosis, unilateral
- M16.7 Secondary coxarthrosis, not otherwise specified

International Classification of Functioning, Disability and Health

Primary ICF Body Functions codes:
- b28016 Pain in joints
- b7100 Mobility of a single joint

Primary ICF Body Structure codes:
- s75001 Hip joint
- s75002 Muscles of thigh
- s75003 Ligaments and fascia of thigh

Primary ICF Activities and Participation codes:
- d4154 Maintaining a standing position
- d4500 Walking short distances
- d4501 Walking long distances

Secondary ICF Body Functions codes:
- b7101 Mobility of a several joint (increase or decrease in mobility)
- b7201 Mobility of the pelvis
- b7300 Power of isolated muscles and muscle groups
- b7401 Endurance of muscle groups
- b770 Gait pattern functions
- b7800 Sensation of muscle stiffness

Secondary ICF Body Structure codes:
- s7401 Joints of pelvic region

Secondary ICF Activities and Participation codes:
- d4101 Squatting
- d4103 Sitting
- d4106 Shifting the body’s center of gravity
- d4350 Pushing with lower extremities
- d4351 Kicking
- d4502 Walking on different slopes
- d4503 Walking around objects
- d4551 Climbing
- d4552 Running
- d4553 Jumping
- d4600 Moving around within the home
- d4601 Moving around within buildings other than home
- d4602 Moving around outside the home or other building
CLINICAL GUIDELINES

Impairment/Function-based Diagnosis

PREVALENCE

Hip pain associated with OA is the most common cause of hip pain in adults.\(^5\) Prevalence studies have shown the rates for adult hip OA range from 0.4% to 12%.\(^6, 54, 66, 102, 168\) Hoaglund reports the prevalence of hip OA in Caucasians to be 3-6%.\(^60\)

PATHOANATOMICAL FEATURES

The proximal femur articulates with the acetabulum to form the hip joint. The femoral head is two thirds of a sphere covered with hyaline cartilage and enclosed in a fibrous capsule.\(^35, 131\) The femoral head is connected to the femoral shaft via the femoral neck. In the frontal plane the femoral neck lies at an angle to the shaft of the femur. This “angle of inclination” is normally 120-125 degrees in the adult population.\(^35\) In the transverse plane the proximal femur is oriented anterior to the distal femoral condyles as a result of a medial torsion of the femur with a normal range between 14-18 degrees of anteversion.\(^20\) The hip joint is a “ball and socket” synovial joint with articular cartilage and a fully developed joint capsule allowing movement in all 3 body planes.\(^131\) The joint capsule attaches around the acetabular rim proximally and distally at the intertrochanteric line. Three strong ligaments reinforce the joint capsule, the iliofemoral and pubo-femoral anteriorly and ischial-femoral posteriorly.\(^35\)

In osteoarthritis of the hip the entire joint structure and function is affected with joint capsular changes (shortening and lengthening) along with subsequent articular cartilage degeneration.\(^96\) Later in the disease process osteophytes or spurs may develop from excessive tensile force on the hip joint capsule or from abnormal pressure on the articular cartilage.\(^4, 96\) Other changes also develop including sclerosis of the subchondral bone from increased focal pressure, and sometimes the formation of cysts.\(^77\) Muscle weakness often develops around a joint with osteoarthritis,\(^134\) specifically the abductor muscles in the hip.\(^122\) The hip abductor weakness progressively weakens in the later stages of hip OA, which may create a Trendelenburg gait pattern over time.\(^8\) Physical therapists should assess for impairments in the hip joint and surrounding muscles when a patient presents with anterior or lateral hip pain, especially the abductor muscles. Also, physical therapists must not overlook that the function of the hip muscles change from prone to the sitting position.\(^105\)

Physical therapists should assess for impairments in the hip joint and surrounding muscles, especially the gluteus medius, when a patient presents with hip pain.
RISK FACTORS

Age: The most common predisposing factor for OA of the hip is age. Osteoarthritis of the hip affects primarily middle-aged and elderly people.², ¹⁴⁰ Hip OA is found more often in adults over 60 years of age.¹², ⁹⁵ Karlson found that age was positively associated with having a subsequent hip replacement because of primary hip OA, with age > 70 more likely than age < 55.⁷⁸

Development Disorders: Many studies have demonstrated the link between development disorders, such as Legg-Calve-Perthes disease, congenital hip dislocation, or slipped capital femoral epiphysis, and premature OA of the hip.¹, ⁴⁵, ⁴⁶, ⁷⁰, ⁷¹, ¹¹¹, ¹⁷⁰ Dysplasia of the femur and the acetabulum has also been shown to be related to hip OA.³⁴, ³⁶, ⁷¹, ⁷³, ¹²⁵, ¹⁴¹, ¹⁴⁷-¹⁵⁰ Dysplasia is defined as any change in orientation of the acetabulum or the proximal femur. Dysplasia creates a change in how the femur and the acetabulum articulate with each other.⁷² Types of dysplasia include coxa vara, coxa valga, femoral anteversion and femoral retroversion, acetabular anteversion, acetabular retroversion, coxa plana, and coxa profunda.¹⁵, ⁷¹, ⁷² A few studies show limited association between hip dysplasia and osteoarthritis of the hip.⁶⁷, ⁸⁷, ¹⁶⁵ However, the majority of the evidence appears to show that developmental disorders and hip dysplasia are related to hip OA.³⁴, ³⁶, ⁷¹, ⁷³, ¹²⁵, ¹⁴¹, ¹⁴⁷-¹⁵⁰

Ethnicity: It is unknown at this time what specific role ethnicity contributes in the development of hip OA; however, studies suggest that non Caucasian populations, including Asian, black, and East Indian populations have a very low prevalence of primary hip OA when compared to that of Caucasians of European ancestry.⁶⁰, ¹⁶⁸

Gender: Few studies have been performed that examine gender and hip OA.⁷⁶, ¹⁴⁰ Most epidemiological data show that females have a slight increase over males (7.5% to 6.5%).¹⁴⁰ Although little if any difference exists between genders, different patterns of hip OA exist between men and women. Women have more superiomedial femoral migration while men have more superiolateral migration.³⁰, ⁸⁹ Thus, although there is conflicting evidence for an association between gender and prevalence of hip OA, men and women may have different types of hip OA.

Genetics: Siblings show a high association of hip OA, suggesting a possible genetic role.⁸⁸ While the nature of the genetic influence is still speculative, it has been postulated that hip OA involves either a structural defect (i.e., collagen) or alterations in cartilage or bone metabolism.⁸⁵, ⁹⁷, ⁹⁸ Genetics is often linked to hip OA because of the low prevalence of hip OA in Asian and black populations in their native countries and the familial association of hip OA in Caucasians.⁶⁰ MacGregor and Lane showed that genetic factors may play a role in the development of hip OA,⁸⁵, ¹⁰⁰ or in reducing the risk of hip OA in women.⁹⁰ Although, there has been much interest and speculation in looking for a genetic link to hip OA, currently there is insufficient evidence to explain how genetics is related to the development of hip OA.
**Occupation:** Numerous studies in Europe and the United States have found a higher prevalence of hip OA in male workers whose occupation involves the prolonged lifting of very heavy loads.\textsuperscript{101, 160, 162, 163} Farming, in particular, has been identified as a high risk occupation for the development of hip. However, a specific aspect of farming that leads to the development of hip OA has not been identified. Suspected risk factors have been suggested, including regular heavy lifting, tractor driving (vibration), and walking on uneven ground.\textsuperscript{26, 62, 101, 142-145, 166} Vibration was specifically studied and reported to not be associated with the development of hip OA.\textsuperscript{75} In summary, although there some weak evidence linking the development of hip OA to some occupations,\textsuperscript{91} the role occupation plays in developing hip OA remains unclear.

**Sports Exposure:** Epidemiological studies have demonstrated that participation in certain competitive sports increases the risk for osteoarthritis.\textsuperscript{18, 92} Running has low risk for osteoarthritis,\textsuperscript{86} but high-intensity, direct impact activities appear to increase the risk of OA.\textsuperscript{17, 18}

**Previous injury:** A proximal hip fracture which results in changes to the articular surfaces of the hip joint creates abnormal load bearing of the hip and has been shown to be related to the development of hip OA.\textsuperscript{44} Tepper found that previous hip injury is associated with hip osteoarthritis,\textsuperscript{140} while Cooper found that previous injury was associated with hip osteoarthritis.\textsuperscript{25} Previous hip injury may be important risk factor for the future development of hip osteoarthritis. In addition, patients with OA of one hip are at increased risk of developing OA in the opposite hip.\textsuperscript{164}

**Body mass index:** A number of studies have shown that body mass index is related to hip OA.\textsuperscript{25, 93, 159} Other studies, however, have shown little correlation between hip OA and body mass index.\textsuperscript{43, 71, 74, 94, 124} The current evidence is contradictory on whether BMI is related to hip OA or not. What seems apparent is that obesity is probably associated with the progression of hip OA rather than onset,\textsuperscript{103} and that the preventive value of weight loss is important.\textsuperscript{36, 161}

**Leg length disparity:** Several studies have suggested that a difference in leg lengths may be an important factor in the development of hip OA.\textsuperscript{47-49, 51, 112} Gofton, in a series of papers, demonstrated the biomechanical and clinical problem of leg length disparity and its relationship to hip osteoarthritis.\textsuperscript{47-49} Nahoda reported on the importance of correcting leg length disparity in the prevention of hip OA.\textsuperscript{113} Golightly noted an association between radiographic hip OA and leg length disparity.\textsuperscript{51} The few papers on leg length disparity suggest a relationship with hip OA, however more research is needed before leg length disparity can be considered an important risk factor in the development of hip OA.

Physical therapists should consider age, hip development disorders, dysplasia, and previous hip joint injury as risk factors for the developing hip osteoarthritis.
CLINICAL COURSE

The clinical course of hip OA depends upon the condition of the articular cartilage and other joint structures within the hip joint. In those with hip OA, the disease progresses with superior migration of the femoral head, increasing age, limited hip range of motion, muscle weakness, and the presence of generalized osteoarthritis. In individuals with hip OA; the amount of joint space narrowing, the presence of multiple osteophytes, the migration of the femoral head, and the presence of subchondral sclerosis are associated with OA progression.

Total hip arthroplasty (THA) is the most common surgical procedure for end-stage hip osteoarthritis. The timing of THA is primarily dictated by pain particularly as pain interferes with ambulation and function. Preoperative function appears to be associated with postoperative function. In a small cohort Fortin found high functioning individuals who undergo THA continued to function at a high level 2 years out. Low functioning individuals who underwent THA continued to function at a low level 2 years out.
The diagnosis of hip OA can be made with a reasonable level of certainty on the basis of the history and physical examination. However, joint space narrowing along with other radiographic features including osteophytes and subchondral sclerosis on plain film radiographs is considered the definitive diagnosis. The following clinical criteria are typically present in individuals who have radiographic findings consistent with hip OA:

- Reports of moderate lateral or anterior/groin hip pain with weight bearing. This pain may progress to anterior thigh or knee pain.
- Limited passive hip joint range of motion in at least 2 of its 6 directions (flexion, extension, abduction, adduction, internal and external rotation).
- Reports of frequent morning stiffness during the first hour after waking.

Clinical criteria for the classification of patients with hip pain associated with OA were developed through a multicenter study by the American College of Rheumatology. One hundred fourteen patients with a mean age 64 and 87 controls with a mean age 57 were included in the study. Patients were classified as having hip OA if pain was present in combination with either 1) hip internal rotation > 15 degrees, pain present on internal rotation of the hip, morning stiffness of the hip ≤ 60 minutes, and > 50 years, or 2) hip internal rotation < 15 degrees and hip flexion < 115 degrees and age > 50 years. The patient group was assessed radiologically for joint space narrowing and osteophytes and sensitivity and specificity of the clinical criteria, which included hip joint range of motion (internal rotation and flexion), presence of morning stiffness, and age in years. Sensitivity was 86 % and specificity was 75 % with a positive likelihood ratio (LR+) of 3.44 and with a negative likelihood ratio (LR-) of 0.19.

Birrell et al also used a standard clinical and radiographic examination to assess the predictability of hip OA from hip range of motion (ROM). 195 patients with recent onset of hip pain with radiographic OA had restricted movement at the hip compared with those without radiographic change. Restriction in internal rotation was the most predictive and flexion the least predictive of radiographic OA. When comparing sides, a range of motion difference of more than 15° between the painful and non-painful side was considered a limitation of joint mobility. Restriction in hip ROM was predictive of the presence of OA. The diagnostic accuracy for restriction in a single plane of hip motion for patients with severe hip OA was: Sensitivity 100%, specificity 54%, LR+ 2.17, LR- 0.01. The diagnostic accuracy for restriction in a single plane of hip motion for patients with moderate hip OA was: Sensitivity 86%, specificity 42%, LR+ 1.48, LR- 0.33. The diagnostic accuracy for restriction in a 3 planes of hip motion for patients with moderate hip OA was: Sensitivity 33%, specificity 98%, LR+ 16.5, LR- 0.67.
Hip OA is classified as primary, in the absence of any obvious underlying joint abnormality, or secondary if degeneration occurs as a result of a pre-existing abnormal joint problem. Some suggest that all hip OA is secondary as some pre-existing problem (e.g. dysplasia) must be present for hip OA to develop. This criteria presented above is usually sufficient to diagnose a patient with osteoarthritis of the hip and the associated ICF impairment-based category of hip pain (b28015 Pain in lower limb; b2816 Pain in joints). In addition, the following physical examination measures may be helpful in the diagnostic process when differentiating hip pain from other sources of pain:

- Limited hip passive range of motion (especially hip internal and external rotation and hip flexion) with bony end feel or crepitus
- The scour test
- Faber’s (Patrick’s) test

A recent preliminary study of patients with hip OA identified 5 possible predictors: pain aggravated with squatting, groin or lateral hip pain with scour test, active hip flexion causing lateral hip pain, pain with active hip extension, and passive range of motion less than 25°. One limitation of this study was the small sample of subjects (21 of 79) who had hip OA by radiograph. This could have resulted in spurious findings. Future studies are needed to cross-validate these results prior to widespread clinical use.

Moderate hip pain in the lateral or anterior region mainly during weight bearing, in adults over the age of 50 years, with limited hip range of motion in 2 directions by more than 15 degrees when comparing the painful to the non painful side are useful clinical findings for classifying a patient with hip pain into the International Statistical Classification of Diseases and Related Health Problems (ICD) category of unilateral coxarthrosis and the associated International Classification of Functioning, Disability, and Health (ICF) impairment-based category of hip pain (b2816 Pain in joints) and mobility deficits (b7100 Mobility of a single joint).
DIFFERENTIAL DIAGNOSIS

The following differential diagnoses should be considered in an individual with hip pain:

- Labral tear
- Bursitis
- Hip or pelvis muscle strain
- Gout
- Psoriatic arthritis
- Piriformis syndrome
- Paget disease of bone
- Metastatic cancer
- Femoral neck or pelvic ramus stress fracture
- Sacroiliac joint dysfunction
- Referred pain as a result of an L2-3 radiculopathy

Physical therapists should consider diagnostic classifications other than osteoarthritis of the hip when the patient’s history and examination findings are not consistent with those presented in the diagnosis/classification section of this guideline – or – when the patient’s symptoms are not diminishing in a timely manner with interventions aimed at normalization of the patient’s impairments of body function.

IMAGING STUDIES

Imaging studies, specifically plain film radiographs, are confirmatory for moderate to advanced hip joint osteoarthritis. Plain radiographs are less useful in demonstrating early osteoarthritic joint changes.\(^{37, 77}\) Joint space narrowing detected on radiographs may be a relatively late stage phenomenon of OA.\(^{16}\) JSN has been advocated as the best indicator and best predictor of arthritic change in patients with hip osteoarthritis.\(^{27, 29, 31}\) A reduction of greater than or equal to 0.5 mm of joint space represents a clinically relevant and significant reduction in joint space width.\(^{3}\) The development of newer imaging techniques, such as using gadolinium enhanced magnetic resonance imaging, has been suggested as a method to detect deficiencies in cartilage structure that may represent early arthritic changes in young patients.\(^{82}\)

In addition to JSN, other criteria including osteophytic spurs, and subchondral sclerosis also are used to identify patients with hip OA.\(^{4, 14}\) The Kellgren/Lawrence scale has been used to classify degenerative findings associated with hip OA. It is divided into different 4 grades: Grade 1: no radiographic evidence of osteoarthritis, Grade 2: doubtful narrowing of joint space and possible (minute) osteophytes; Grade 3 moderate definite osteophytes, definite moderate narrowing of joints space; Grade 4: large osteophytes, severe joint space narrowing subchondral sclerosis and definite deformity of bone contour.\(^{79, 80}\) A potential caveat when using the Kellgren/Lawrence scales is that spurs or osteophytes are emphasized,\(^{110, 116}\) and not all patients with hip OA have osteophytes which suggests to some that osteophytes are a part of the normal aging process.\(^{116}\)
Examination

OUTCOME MEASURES

The most commonly used outcome measure for hip OA is the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC).\textsuperscript{11} The WOMAC has been validated and its reliability been shown in many different studies and in many different countries.\textsuperscript{9, 132, 146, 157, 169} The index consists of 24 questions (5 pain, 2 stiffness and 17 physical function) that are assigned a score of between 0 (extreme) and 4 (none). Individual question scores are then summed to form a raw score ranging from 0 (worst) to 96 (best). Finally, raw scores are normalized by multiplying each score by 100/96 creating a score of between 0% (worst) to 100% (best). Test-retest reliability of the WOMAC as measured by the intraclass correlation coefficient has been shown to be good with ICC’s ranging between 0.74-.89.\textsuperscript{128 129} The minimally clinically important differences for WOMAC score is a 12% change from the baseline score.\textsuperscript{7}

The Lower Extremity Functional Scale (LEFS) is another useful outcome measure that is often administered to patients with hip OA.\textsuperscript{13} The LEFS uses a rank scale from 0-4 that asks patients if they do or would have difficulty at all with 20 different activities for example: getting into or out of the bath tub, sitting for 1 hour, squatting and rolling over in bed. The Scores range from 0-80 with 80 “no difficulty” and 0 “extreme difficulty or unable to perform the activity.” The reliability and validity have both been shown to be good for the LEFS. The minimal detectable change and minimal clinical important difference is “9” scale points.\textsuperscript{13}

Another often used functional outcome measures is the Harris Hip Score.\textsuperscript{57} The Harris hip score is a measure of 10 different variables including pain, function, activities of daily living, and physical impairment. Scores range from 0-100 (0 worst to 100 best).\textsuperscript{57} Shields et al found the weighted Kappa statistic supported good intratester (K = .79-.90) and moderate inter-tester (K = .48-.78) reliability for the Harris hip score.\textsuperscript{130}

Clinicians should use validated self-report questionnaires, such as the Western Ontario McMaster Assessment (WOMAC), Lower Extremity Functional Scale (LEFS), or the Harris Hip Score for patients with hip osteoarthritis. These tools are useful for identifying a patient’s baseline status relative to pain, function, and disability and for monitoring a change in a patient’s status throughout the course of treatment.
ACTIVITY LIMITATION AND PARTICIPATION RESTRICTION MEASURES

6-MINUTE WALK TEST

ICF category: Measurement of activity limitation – walking long distances

Description: A physical performance measure that assesses how far a person can walk in 6 minutes.33

Measurement Method: During the performance of the 6 Minute Walk (6MWT), patients are instructed to cover as much distance as possible during the 6-minute time frame with the opportunity to stop and rest if required. The test is conducted on an unobstructed level surface. The course is marked off in meters and the distance traveled by each subject is measured to the nearest meter. Standardized verbal encouragement, "You are doing well, keep up the good work" is provided at 60-second intervals. Patients are permitted to use their regular walking aids if needed.81

Nature of variable: Continuous

Units of measurement: Meters

Measurement properties: The 6MWT showed high test-retest reliability (ICC (2,1) of .95-.97).133 Kennedy et al also showed high retest reliability for the 6MWT with ICC (2,1) of 0.94 [CI=0.88-0.98]. The Minimal Detectable Change (MDC) for the 6MWT is 72.8 meters.81

SELF-PACED WALK TEST

ICF category: Measurement of activity limitation – walking short distances

Description: A physical performance measure that assesses how fast a person can walk 40 meters

Measurement Method: During the performance of the Self-Paced Walk Test, (SPWT) patients are instructed to "walk as quickly as you can without overexerting yourself" and are timed with a stopwatch while they walked two lengths (turn excluded) of a 20 meter indoor course81

Nature of variable: Continuous

Units of measurement: Seconds

Measurement properties: The test-retest reliability of the SPWT has been examined by Kennedy et al.81 They found ICC of 0.91 (CI=0.81-0.97). Kennedy et al81 also showed that the SPWT was responsive in detecting deterioration and improvement in the early postoperative time period following arthroplasty. The MDC for the SPWT is 4.04 seconds.81
STAIR MEASURE

ICF category: Measurement of activity limitation – climbing

Description: A physical performance measure that assesses how well a person can ascend and descend a flight of stairs.

Measurement Method: During the performance of the Stair Measure (ST) patients are instructed to ascend and descend 9 stairs (step height, 20 cm) in their usual manner, and at a safe and comfortable pace.\textsuperscript{81}

Nature of variable: Continuous

Units of measurement: Seconds

Measurement properties: The test-retest reliability of the ST has been examined by Kennedy et al.\textsuperscript{81} They found ICC’s of 0.90 (CI=0.79-0.90).\textsuperscript{81} Kennedy et al also showed that the ST was responsive in detecting deterioration and improvement in the early postoperative time period following arthroplasty.\textsuperscript{81} The MDC for the ST is 6.5 seconds.\textsuperscript{81}

TIMED UP AND GO TEST

ICF category: Measurement of activity limitation – sitting

Description: A physical performance measure that assesses how well a person can get up from a chair, walk a short distance (3 meters), turn around, return, and then sit down again.\textsuperscript{104}

Measurement Method: During the performance of the Timed Up and Go Test (TUG) the patient sits in a chair with arms rests and is asked to stand up from the chair and walk as quickly and safely as possible to the cone, turn, walk back to the chair and sit down again (the total distance is 3 meters). This is performed timed.

Nature of variable: Continuous

Units of measurement: Seconds

Measurement properties: There was good agreement among observers on the subjective scoring of the TUG, and good correlation with laboratory tests.\textsuperscript{119} Podsiadlo showed that the TUG had good inter and intratester reliability.\textsuperscript{119} Steffen showed that the TUG had high test-retest reliability (ICC [2, 1] = .95-.97).\textsuperscript{133} Steffen et al also demonstrated that the TUG has high\textsuperscript{133} test-retest reliability (ICC [2,1]=.95-.97).\textsuperscript{133} Podsiadlo showed that the criterion-
related validity of the TUG by showing that it correlates well with other functional scales. Kennedy et al showed that the TUG was responsive in detecting deterioration and improvement in postoperative time period following arthroplasty. The MDC for the TUG is 2.9 seconds.

FUNCTIONAL SQUAT TEST

ICF category: Measurement of activity limitation – squatting

Description: A physical performance measure that assesses person’s ability to squat

Measurement Method

The patient is asked to stand with their feet pointed forward at a comfortable distance apart. An inclinometer is placed on the tibia of the lower extremity to be tested just distal to the tibial tuberosity and zeroed. The subjects were then asked to bend the knees and bring the buttocks straight toward the heels without bending forward or lifting their heels off the ground. The patient was asked to rate the pain they experienced during the movement on a 0-10 numeric pain rating scale and the inclinometer measurement taken at the greatest range of motion at which the subject was able to maintain the proper form, or at the point where the subject stopped the test secondary to pain.

Nature of variable: Ordinal and Continuous

Units of measurement: 0-10 numeric pain rating scale and angular degrees

Measurement properties: The intraclass correlation coefficients for the Functional Squat Test was 0.92 showing excellent reliability. The MDC for the Functional Squat Test for pain is 1.3 on the numeric pain rating scale and a change of more than 5 degrees of tibial displacement.
PHYSICAL IMPAIRMENT MEASURES

PASSIVE HIP INTERNAL AND EXTERNAL ROTATION AND HIP FLEXION

| ICF category: | Measurement of impairment of body function – mobility of a single joint |
| Description: | The amount of passive hip rotation and passive hip flexion measured prone and supine respectively. Although assessing the range in all 6 directions (3 planes) of hip motion is important in patients with hip OA, for brevity we included the 3 most commonly limited hip motions. |
| Measurement method: | **Hip External and Internal Rotation**<br>The patient is positioned prone with feet over the edge of the treatment table. The hip measured is placed in 0 degree of abduction, and the contralateral hip is placed in about 30 degrees of abduction. The reference knee is flexed to 90 degrees, and the leg is passively moved to produce hip rotation. Manual stabilization is applied to the pelvis to prevent pelvic movement and also at the tibio-femoral joint to prevent motion (rotation or abduction/adduction), which could be construed as hip rotation. The motion is stopped when the extremity achieves its end of passive joint ROM or when pelvic movement is necessary for additional movement of the leg. The inclinometer is aligned vertically and along the shaft of the tibia, just proximal to the medial malleolus for both medial and lateral rotation ROM measurements.

**Hip Flexion**<br>With the subject in the supine position, the therapist passively flexes the femur with the movement arm of the goniometer along the long axis of the femur and the stationary arm of the goniometer along the long axis of the trunk, while also monitoring the lumbar spine to avoid any posterior pelvic tilt. The patient was also asked to rate the pain experienced during the movement on a 0-10 numeric pain rating scale (NPRS). |
| Nature of variable | Continuous and Ordinal |
| Units of measurement | Degrees and 0-10 numeric pain rating scale |
| Measurement properties | Limited range of motion is associated with high levels of disability in patients with hip OA. There is strong evidence to support the intrarater reliability of hip rotation (medial and lateral) range of motion measurements (reported intraclass correlation coefficient (ICC) for hip medial and lateral rotation ranged from 0.96 to 0.99. The reliability for hip flexion has been shown to be excellent ICC 0.94 [CI= 0.89-0.97]. Croft showed good agreement among 6 testers when assessing for hip rotation and hip flexion in patients with hip OA. Steultjens et al also showed good reliability when assessing the hip joint in patients with OA. The MDC, determined using previously published data, for hip flexion is 5°, meaning any change more than 5° is considered an important clinical change. The MDC for pain for hip flexion is a change of 1.2 on the 0-10 NPRS. |
**THE FABER (PATRICK’S) TEST**

<table>
<thead>
<tr>
<th>ICF category</th>
<th>Measurement of impairment of body function – pain in joints.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>A test to determine the irritability of the hip joint.</td>
</tr>
<tr>
<td>Measurement method</td>
<td>The FABER test is administered with the subject in supine, the heel of the lower extremity to be tested placed over the opposite knee. The hip joint was passively externally rotated and abducted by placing pressure over the ipsilateral knee, while stabilizing the contralateral innominate. After being zeroed against a wall, the inclinometer was placed on the medial tibia of the lower extremity to be tested, just distal to the medial tibial condyle. The range of motion measurement was taken at the point of maximal passive resistance or at the point where the subject stopped the test secondary to pain.(^{23}) The patient was also asked to rate the location of the pain as well as the amount of pain experienced during the movement on a 0-10 NPRS.</td>
</tr>
<tr>
<td>Nature of variable</td>
<td>Nominal and Continuous</td>
</tr>
<tr>
<td>Units of measurement</td>
<td>Binary: Yes/No for same or similar hip pain; Degrees</td>
</tr>
<tr>
<td>Measurement properties</td>
<td>Reliability of ROM measurements was excellent for the functional FABER test (ICC, 0.87) ([CI= 0.78-0.94]). and good intrarater reliability was demonstrated with ratings of pain using the FABER test (ICC, 0.96) ([CI=0.92-0.98]).(^{23}) Cibulka et al found that the FABER test was responsive in detecting improvement in patients with hip pain.(^{21}) The MDC for the Faber test for range of motion is 8° difference in motion, while the MDC for pain is a change of more than 1.6 points of the NPRS.(^{23})</td>
</tr>
</tbody>
</table>
THE SCOUR TEST

ICF category: Measurement of impairment of body function – pain in joints.

Description: A test to determine the irritability of the hip joint.

Measurement method
The hip scour test is performed with the patient lying in the supine position while the therapist flexes and adducts the hip until resistance to movement is detected. The therapist then maintains flexion into resistance and gently moves the hip into abduction, then bringing the hip through 2 full arcs of motion. If the patient reports no pain, then the examiner repeats the test while applying long-axis compression through the femur. This test must be administered with some caution so as to not irritate the hip joint. The patient is asked to rate the pain experienced during the movement on a 0-10 numeric pain rating scale (NPRS).23

Nature of variable
Nominal

Units of measurement
Binary: Yes/No for same or similar hip pain

Measurement properties
The reliability of the Scour test is good (ICC 0.87(ICC, 0.96) (ICC, 0.96) for rating of hip pain.23 The MDC for the Scour test for pain is a change of more than 1.5 points on the 0-10 NPRS.23

PROGNOSIS

The prognosis of hip OA depends on a number of factors; the most apparent is the existing radiographic degree of hip OA. Two different studies on patients with hip OA have shown that baseline radiographic grade is an important predictive factor for having a total hip arthroplasty.50,158 Gossec et al found that a Kellgren-Lawrence grade of III had an odd's ratio of 3.3 and a grade IV had an odd's ratio of 5.3 that patients would likely have a total hip replacement.52 Other indicators for performing a total hip arthroplasty include previous use of non steroidal anti-inflammatory drugs (NSAID’s) and pain of at least 47 mm on a100 mm pain scale for over 6 months.52
CLINICAL GUIDELINES

Interventions

A variety of interventions have been described for the treatment of hip OA and there is fair evidence from randomized, controlled trials and systematic reviews to support the benefits of physical therapy intervention in these patients.

ANTI-INFLAMMATORY AGENTS

Both over-the-counter and prescribed anti-inflammatory agents including non-steroidal anti-inflammatory drugs (NSAID’s), Cox-2 inhibitors, and steroid injections are recommended as part of a multidisciplinary treatment approach to hip OA. Randomized clinical trials evaluating the use of NSAID’s have shown that NSAID’s can be effective for the temporary relief of symptoms and improvement in function in patients with hip OA. However, it should be noted that this class of drugs is not without risk for serious adverse events.

There is limited evidence to support the use of steroid injection to provide short-term pain relief. A recent placebo-controlled trial confirmed that corticosteroid injection can be an effective treatment of pain in hip OA, with benefits lasting up to 3 months.

GLUCOSAMINE

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PATIENT EDUCATION

Studies have shown the benefit of patient education in the self-management of patients with arthritis in decreasing pain, improving function, reducing stiffness and fatigue, and reducing medical usage. An approach, called Hip School, that includes primarily patient education as an intervention has been shown to be effective in preliminary study for patients with hip OA signs and symptoms. A meta-analysis has shown that patient education can provide on average 20% more pain relief when compared to non-steroidal anti-inflammatory drugs alone in patients with hip osteoarthritis and rheumatoid arthritis.

Clinicians should consider the use of patient education to teach activity modification, exercise, weight reduction and methods of unloading the arthritic joints.
FUNCTIONAL, GAIT AND BALANCE TRAINING

Patients with hip osteoarthritis often have gait abnormalities such as asymmetry in weight bearing and asymmetry of step length. Physical therapists often use an assistive device to decrease joint loading on a hip joint in patients with osteoarthritis. A cane in the contra-lateral hand and carrying loads in the ipsilateral hand have been shown in EMG and in vivo hip pressure studies to be effective in reducing hip abductor muscle activity and acetabular contact pressures. One study has shown that a cane in the opposite hand can reduce hip load, reduce hip pain, and improve function in patients with hip OA. Assistive devices are often used in patients with hip OA because of higher pain intensity, increased disability, and increased morning stiffness. Further work needs to be done to determine whether such joint protection principles result in reduction of symptoms, improvement in function, and prevention or retardation of progression of hip OA.

Functional, gait and balance training is recommended to address impairments of proprioception, balance, and strength all are commonly found in individuals with lower extremity arthritis. Functional training of a small cohort of elderly individuals with lower extremity impairment demonstrated improved functional performance. In one study older individuals with lower extremity arthritis were found to have impairments in lower extremity strength, proprioception and balance which contributed to higher fall risk scores.

Functional, gait and balance training, including the use of assistive devices such as canes, crutches and walkers, can be used in patients with hip osteoarthritis to reduce pain and impairments associated with weight bearing activities.

MANUAL THERAPY

One study has recommended mobilization/manipulation as a component of the management program for patients with hip OA. This randomized controlled trial compared the use of manual therapy and therapeutic exercises in patients with hip OA defined on the basis of hip function, range of joint motion, pain and radiological deterioration. The manual therapy session started with stretching techniques of shortened muscles surrounding the hip joint. Second, traction of the hip joint was performed, followed by traction manipulation in each limited position (a high velocity thrust technique). All manipulations were repeated during each session until the manual therapist concluded optimal results of the session. After five weeks of intervention they found that 81% of participants treated with manual therapy had positive outcomes (95% CI, 1.30, 2.60). Fifty percent of participants receiving therapeutic exercise had positive outcomes (95% CI, 1.30, 2.60). The outcomes for hip function (Harris hip score), range of joint motion (ROM) and pain (VAS) were compared for specific subgroups of hip OA depending on limited function, ROM or level of pain. Manual therapy was found to be superior to exercise therapy in some patients with hip OA. Manual therapy was not shown to be any more effective than exercise in patients with highly limited function, ROM, or high levels of pain.
MacDonald et al\textsuperscript{99} published a case series describing the outcomes of individual patients with hip osteoarthritis treated with manual physical therapy and exercise. The series included seven patients referred to physical therapy with hip OA or hip pain. All patients were treated with manual physical therapy followed by exercises to increase hip strength and range of motion. Six of 7 patients completed a Harris Hip Score at initial examination and discharge from physical therapy. Patients exhibited reductions in pain and increases in passive range of motion, as well as a clinically meaningful improvement in function.\textsuperscript{99}

Harding et al\textsuperscript{56} in a study using cadaveric models showed that a posterior-anterior (P/A) mobilization of the hip produced about 1 mm of movement in the hip joint when using a force of 356N. Distal distraction of the hip, however, created motion ranging from 2-7 mm of displacement when using forces between 89 to 356N.\textsuperscript{56} This cadaveric study suggests that when attempting to mobilize the hip joint, the amount of movement produced at the hip most likely depends on the direction the joint is mobilized.

Risks of adverse events associated with manual therapy of the hip typically include self-limiting soreness of the hip region. There are no studies documenting an increased risk for serious adverse events associated with manual therapy of the hip.

In summary, some evidence exists for using manual therapy to increase hip joint range of motion and short term reduction pain in patients with hip OA, especially in patients that do not have signs of severe hip OA (e.g., osteophytes and significant joint space narrowing).

Clinicians should consider the use of manual therapy procedures to provide short-term pain relief, and improved hip mobility and function in patients with mild hip osteoarthritis.
There are three categories of exercise therapy employed for osteoarthritis: range of motion / flexibility exercises, muscle strengthening exercises, and cardiovascular conditioning / endurance exercises. Often all three types of exercise are utilized for patients with hip OA. Adequate joint motion and elasticity of periarticular tissues are necessary for cartilage nutrition and health, protection of joint structures from damaging impact loads, function and comfort in daily activities. Exercise to regain or maintain motion and flexibility is achieved by routines of low-intensity, controlled movements that do not cause increased pain. Muscle weakness around an osteoarthritic joint is a common finding. Progressive resistive / strengthening exercises progressively load muscles and muscle groups in a graduated manner to allow for muscle strengthening while limiting tissue injury. Cardiovascular conditioning / endurance exercises are low to moderate-intensity exercises designed to provide a workload to the cardiovascular and pulmonary system that is 60% to 80% above baseline and sustained for an extended period of time (e.g., 15 – 30 minutes).

Range of motion and strengthening exercises have been advocated by many authors as a component of the management for patients with OA of the hip. Van Baar et al showed that exercise is effective in patients with OA of the hip using an exercise program previously reported by Oostendorp et al. Oostendorp’s program consisted of flexibility, hip muscle strengthening, and an aerobic exercise program. The emphasis of the stretching utilized in this program was aimed at stretching 2-joint hip muscles including the iliopsoas, rectus femoris, and hip adductor muscles. Before stretching it was advised to heat the specific muscle and then stretch gently without excessive force for 15-30 seconds performed 5 to 10 times preferably daily but at least 3 times a week. Van Baar et al reported that the effects of exercise diminish over time. Consequently, when patients quit exercising after 10 weeks, the beneficial effect of reduced pain, less use of medication and improved function would decline. A confounding factor with the trial was Van Baar et al pooled patients with hip OA with those of knee OA so determining specific treatment effect in patients with hip OA was not possible.

Many of the published articles on exercise report findings of subjects with combined hip OA with knee OA. However, in a recent meta-analysis, Hernandez-Molina et al was able to contact authors of several studies and obtain data that only pertained to hip OA. They found 9 articles where hip strengthening exercises showed a beneficial effect in reducing pain and improving function in patients with hip OA. In another study moderate evidence was found for long-term effectiveness on reduced pain, self-reported physical function, and observed physical function with exercise for patients with hip OA. Studies have also shown aerobic exercise may offer additional improvement in function when combined with stretching and strengthening.
Minor et al. randomly assigned 120 patients with well-defined rheumatoid arthritis (n = 40) or osteoarthritis (n = 80) of the hip, knee, or ankle to receive one of three interventions: a stretching and strengthening exercise program alone, or the same program combined with one of two aerobic exercises: pool activities or walking. All patients participated in a 12-week program, which met 3 times each week for 1 hour, and all performed supervised range-of-motion and isometric exercises. The two aerobic exercise groups also did up to 30 minutes of exercises to increase their heart rates to 60% to 80% of each person's baseline maximum by walking or pool activity. At 12 weeks, 80% of study participants were assessed for aerobic capacity, flexibility (trunk bending), function tests (exercise endurance on a treadmill test, time to walk 50 feet, and reported daily activity), and self-reported health status using the Arthritis Impact Measurement Scale (AIMS), an arthritis-specific functional status instrument that reliably measures psychological health, physical health, and pain. The pool and walking programs increased aerobic capacity. The AIMS scores based on physical activity anxiety and depression subscales improved from 5% to 12% in both aerobic groups, significantly more than for the control group. There were no significant differences between the groups for the pain subscale. Both aerobic groups decreased their times to walk 50 feet by 12%, compared with a 2% change for control participants. Additional studies are needed to address; patient compliance with treatment, the optimal type and frequency of exercises, and the treatment of painful exacerbations of the patients hip conditions (apparently an unusual occurrence during exercise programs).

The use of aquatic exercise (hydrotherapy) in the treatment of patients with osteoarthritis of the hip has been assessed. Foley pooled patients with hip and knee osteoarthritis so treatment effect could not be established in patients. Aquatic exercise appears to have some beneficial short-term effects for patients with hip and/or knee OA while no long-term effects have been documented. Hinman in a randomized controlled trial compared a 6-week program of aquatic physical therapy to no intervention. The aquatic physical therapy group demonstrated a significantly less pain and improved physical function, strength, and quality of life. It was unclear to the authors whether the benefits were attributable to intervention effects or a placebo response. Individuals who have an intolerance to land based exercise may better tolerate aquatic based exercise. Other articles have also shown the benefit of aquatic therapy including Fransen et al from the Cochrane Systematic Review database. These studies showed that aquatic therapy could reduce pain in patients with hip OA using lower extremity strengthening, flexibility, and general cardiovascular training.

Clinicians should consider the use of flexibility, strengthening and endurance exercises, including aquatic exercises, in patients with hip osteoarthritis.
SUMMARY OF RECOMMENDATIONS

Pathoanatomical Features
Physical therapists should assess for impairments in the hip joint and surrounding muscles, especially the gluteus medius, when a patient presents with hip pain.

Risk Factors
Physical therapists should consider age, hip development disorders, dysplasia, and previous hip joint injury as risk factors for the developing hip osteoarthritis.

Diagnosis/Classification
Moderate hip pain in the lateral or anterior region mainly during weight bearing, in adults over the age of 50 years, with limited hip range of motion in 2 directions by more than 15 degrees when comparing the painful to the non painful side are useful clinical findings for classifying a patient with hip pain into the International Statistical Classification of Diseases and Related Health Problems (ICD) category of unilateral coxarthrosis and the associated International Classification of Functioning, Disability, and Health (ICF) impairment-based category of hip pain (b2816 Pain in joints) and mobility deficits (b7100 Mobility of a single joint).

Differential Diagnosis
Physical therapists should consider diagnostic classifications other than osteoarthritis of the hip when the patient’s history and examination findings are not consistent with those presented in the diagnosis/classification section of this guideline – or – when the patient’s symptoms are not diminishing in a timely manner with interventions aimed at normalization of the patient’s impairments of body function.

Examination – Outcome Measures
Clinicians should use validated self-report questionnaires, such as the Western Ontario McMaster Assessment (WOMAC), Lower Extremity Functional Scale (LEFS), or the Harris Hip Score for patients with hip osteoarthritis. These tools are useful for identifying a patient’s baseline status relative to pain, function, and disability and for monitoring a change in a patient’s status throughout the course of treatment.

Examination – Activity Limitation Measures
Physical therapists should utilize easily reproducible physical performance measures, such as the 6 Minute Walk, Self-Paced Walk, Stair Measure, Timed Up and Go, and Functional Squat tests, to assess activity limitation and participation restrictions associated with their patient’s hip pain and to assess the changes in the patient’s level of function over the episode of care.

Interventions – Patient Education
Clinicians should consider the use of manual therapy procedures to provide short-term pain relief, and improved hip mobility and function in patients with mild hip osteoarthritis.

Interventions – Functional, Gait, and Balance Training
Functional, gait and balance training, including the use of assistive devices such as canes, crutches and walkers, can be used in patients with hip osteoarthritis to reduce pain and impairments associated with weight bearing activities.

Interventions – Manual Therapy
Clinicians should consider the use of manual therapy procedures to provide short-term pain relief, and improved hip mobility and function in patients with mild hip osteoarthritis.

Interventions – Flexibility, Strengthening and Endurance Exercises
Clinicians should consider the use of flexibility, strengthening and endurance exercises, including aquatic exercises, in patients with hip osteoarthritis
AFFILIATIONS & CONTACTS

Authors:

Michael T. Cibulka, DPT, MHS
Assistant Professor
Physical Therapy Program
Maryville University
St. Louis, MO 63141
mcibulka@maryville.edu

Douglas M. White, DPT
Principal & Consultant
Milton Orthopaedic & Sports Physical Therapy, PC
101 Blue Hills Parkway
Milton, MA 02186
dr.white@miltonortho.com

Judith Woehrle, PT, PhD
Director, Physical Therapy Program
Maryville University
650 Maryville University Dr
St Louis, MO 63141
woehrle@maryville.edu

Marcie Harris-Hayes, DPT
Assistant Professor of Physical Therapy and Orthopaedic Surgery
Washington University School of Medicine
St. Louis, MO 63108
harrisma@wustl.edu

Keelan Enseki, PT, MS
Centers for Rehab Services
University of Pittsburgh Medical Center
Center for Sports Medicine
3200 South Water Street
Pittsburgh, PA 15203
ensekikr@upmc.edu

Timothy L. Fagerson, DPT MS
Director, Spine Orthopaedic Sport Physical Therapy
148 Linden St., Suite B-8
Wellesley, MA 02482
fagerson@verizon.net

Reviewers

Anthony Delitto, PT, PhD
Professor and Chair
School of Health & Rehabilitation Sciences
University of Pittsburgh
Pittsburgh, Pennsylvania
delittoa@upmc.edu

John Dewitt DPT
Director of Physical Therapy Sports Medicine Residency
The Ohio State University
Columbus, Ohio
john.dewitt@osumc.edu

Amanda Ferland, PT
Clinic Director
MVP Physical Therapy
Federal Way, Washington
aferland@mvppt.com

Helene Fearon, PT
Principal and Consultant
Rehabilitation Consulting & Resource Institute
Phoenix, Arizona
helenefearon@myrehabconsultants.com

Katherine Mangione, PT, PhD
Professor of Physical Therapy
Arcadia University
450 S Easton Rd
Glenside, PA 19038
mangionek@arcadia.edu

Marian A. Minor, PT, PhD
Professor, Department Chair
Physical Therapy
School of Health Professions
University of Missouri-Columbia
106A Lewis Hall
Columbia, MO 65211
minorm@health.missouri.edu
James Slover, MD, MS
301 East 17th St. Suite 1616
New York, NY 10003
james.slover@nyumc.org

Joseph J. Godges, DPT
ICF Practice Guidelines Coordinator
Orthopaedic Section APTA, Inc.
La Crosse, Wisconsin
icf@orthopt.org

Joy MacDermid, PT, PhD
Associate Professor
School of Rehabilitation Science
McMaster University
Hamilton, Ontario, Canada
macderj@mcmaster.ca

James W. Matheson, DPT
Minnesota Sport and Spine Rehabilitation
Burnsville, Minnesota
jw@eipconsulting.com

Philip McClure, PT, PhD
Professor
Department of Physical Therapy
Arcadia University
Glenside, Pennsylvania
mcclure@arcadia.edu

Paul Shekelle, MD, PhD
Director
Southern California Evidenced-Based Practice Center
Rand Corporation
Santa Monica, California
shekelle@rand.org

A. Russell Smith, Jr., PT, EdD
Chair
Athletic Training & Physical Therapy
University of North Florida
Jacksonville, Florida
arsmith@unf.edu

Leslie Torburn, DPT
Principal and Consultant
Silhouette Consulting, Inc.
San Carlos, California
torburn@yahoo.com
References:


