CE

1.5 ANCC Contact Hours

Review of Nonsurgical Treatment Guidelines for Lower Extremity Osteoarthritis

Jessica Gourdine

Osteoarthritis (OA) is a chronic debilitating disease affecting over 30 million Americans. Many health providers fall prey to believing it is a normal part of aging, leading to inadequate management. Recommendations from the American Academy of Orthopaedic Surgeons (AAOS), American College of Rheumatology (ACR) and Osteoarthritis Research Society International (OARSI) guidelines provide the nurse practitioner options for treating those with OA who are not undergoing surgical management. These interventions include weight loss, exercise, and the use of nonsteroidal anti-inflammatory drugs. Although supported by evidence, these interventions are oftentimes not practiced in primary care. This article presents evidence-based interventions for the nonsurgical treatment of hip and knee OA from the AAOS, ACR, and OARSI guidelines.

Osteoarthritis (OA) is a chronic degenerative disease of the joint. Affecting over 30 million adults in the United States and diagnosed from age 55 to 64, its debilitations are a common complaint in primary care visits (Vincent & Watt, 2014). Many clinicians remain apathetic and continue to increase their risk for undertreating a patient with symptoms suggestive of OA (Veronese et al., 2016). Unfortunately, as the population continues to age, many providers associate it as a normal process of aging. Individuals could live decades with OA, increasing the United States economic health burden. Appropriate management will increasingly become a priority in primary healthcare, as newer longitudinal research suggests links between OA and comorbidities such as cardiovascular disease (Vincent & Watt, 2014). With a growing population of elderly patients, it is incumbent for providers to consider varying treatment options (Veronese et al., 2016).

The American College of Rheumatology (ACR), the Osteoarthritis Research Society International (OARSI) and the American Academy of Orthopaedic Surgeons (AAOS) have proposed treatment guidelines to aid practitioners in clinical management (Nelson, Allen, Golightly, Goode, & Jordan, 2014). The purpose of this article is to provide a summary for nurse practitioners on the treatment recommendations for the management of OA of the hip and knee.

Diagnosis and Pathophysiology

Pathophysiology

Age is a significant risk factor and current research has implicated genetics, weight, overuse, and previous joint injury in the development of OA (Nair, Ting, Keen, & Conaghan, 2017). It is a debilitating disease because of perceived pain and impaired mobility of the joint, making it necessary to briefly describe the pathophysiology of the bone and pain mechanisms.

Osteoarthritis consists of intra-articular and periarticular changes. The articular cartilage is composed of chondrocytes and extracellular matrix. The disruption of bone growth homeostasis leads to articular cartilage degeneration from effects of inflammation (Perrot, 2015). Chondrocytes in the growth plate, which under normal circumstances repairs damage to the matrix, in the OA pathologic process actively produces proinflammatory cytokines and matrix degrading enzymes that are both involved in the destruction of articular cartilage (Perrot, 2015). Cartilage becomes weaker, as collagen breaks down and the subchondral bone underneath is exposed (McCance, Huether, Brashers, & Rote, 2014). Cysts develop inside the subchondral bone due in part to dysfunctional proteoglycans, which regulate the passage of synovial fluid and water through cartilage. As a consequence, further pressure and damage are placed on subchondral bone, which eventually becomes sclerotic (McCance et al., 2014). The bones of the joint are reshaped and outgrow along the joint line, creating bone spurs through the mechanisms of osteophytes covered in cartilage. Proteoglycan production is decreased in aging and osteoarthritis further exacerbates joint pathology in aging (McCance et al., 2014).

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The articular cartilage, devoid of nerves, blood vessels, and lymph nodes, has a significant impact in the development of OA but has an unclear link with pain perception (McCance et al., 2014). Some research suggests that the capsule, ligaments, meniscus, periosteum, synovium, and subchondral bone that do contain sensory fibers are responsible for pain perception (Perrot, 2015). The complexity is evidenced by the poor correlation between severity of pain and the degree of joint degeneration. The genetic heterogeneity involved in the development of OA also plays a factor in pain perception and response to analgesics. Stimulants from various forces of the joint activate the neurofibers of mechanical, thermal, and chemical receptors providing nociceptive and neuropathic pain sensation (Perrot, 2015). Although further research is needed, essentially it is believed that the pathophysiology of pain in OA exhibits characteristics of central and peripheral mechanisms (Fu, Robbins & McDougall, 2018).

Diagnosis

The diagnosis of OA is primarily based on clinical presentation aided by the use of radiographic imaging (e.g., magnetic resonant imaging and radiographs, which adds to the specificity of OA diagnosis). The ACR provides a succinct list of criteria in diagnosing knee and hip OA in later stages (Gelber, 2014). See Table 1 for an example of a traditional clinical and radiographic ACR classification system developed in 1991 for hip OA, which provides 91% sensitivity and 89% specificity (Altman et al., 1991).

The classic presentation of OA is unilateral or symmetric joint pain/aching with stiffness. Pain is exacerbated by activity and relieved with rest. Patients may be asymptomatic initially, but develop worsening signs over several years. Fundamentally, common radiologic features found in patients with OA include osteophytes, bone deformity, and joint space narrowing (Taruc-Uy & Lynch, 2013).

Guideline Appraisal

Guidelines use evidence provided by quality studies to provide recommendations for health conditions (Hochberg et al., 2012). The following sections briefly describe two methods to appraise evidence and develop guidelines used by the AAOS, ACR and OARSI.

The GRADE Approach

Grading of Recommendations Assessment, Development, and Evaluation (GRADE) is a system that has been praised for its transparency and has been adopted by several organizations around the world (Neumann et al., 2016). "Strong recommendations reflect a clear preference for one alternative and should apply to all or almost all patients, obviating the need for a careful review of the evidence with each patient" (Neumann et al., 2016, p. 45). While *weak recommendations* are individualized according the patient's preference, it should be applied under shared decision-making between the patient and his/her provider (Neumann et al., 2016).

The GRADE approach takes information from studies (including systematic reviews) and scrutinizes potential benefits and harms to available resources, patient preferences, and other relevant factors to provide recommendations (Neumann et al., 2016). Where there is a strong contrast between risk and harm in *strong recommendations*, *weak recommendations* have less strength to recommend one intervention over an alternative therefore advising a more individualized approach. The four levels of evidence (high, moderate, low, and very low) are based on the quality of the study being appraised (Neumann et al., 2016). Therefore, guidelines are only as good as the most current systematic reviews and sometimes *strong recommendations* are based on low or very low quality of evidence making it inappropriately graded (Neumann et al., 2016). Each recommendation presented in a GRADE guideline includes the applicable patient characteristic, "the recommended action, under what circumstances it should be performed, and the alternative to which the intervention was compared" (Neumann et al., 2016, p. 50).

Table 1. Clinical and Radiographic Criteria for the Diagnosis of Hip OA in the Presence of Hip Pain

ACR Classification System	
Hip pain	Femoral and/or osteophytes on radiograph
Hip pain	ESR <20 mm/hr Axial joint space narrowing on radiograph

Note. ACR = American College of Rheumatology; ESR = erythrocyte sedimentation rate; OA = osteoarthritis.

RAND/UCLA Appropriateness Method

Many clinical recommendations are evaluated using the RAND/UCLA Appropriateness Method. Guidelines using this method are formed through the work of two groups: core panel and expert panel (Nair, Aggarwal, & Khanna, 2011). The core panel presents relevant information to the expert panel by conducting systematic reviews of current literature forming clinical scenarios. The expert panel is given this research and instructed to rate the appropriateness of an intervention on a detailed clinical scenario (Nair et al., 2011). Interventions are deemed *appropriate*, *inappropriate*, or *uncertain* during round one which is the Likert scale and round two which requires a face-to-face meeting of 7–15 expert panelists of various disciplines. The Likert scale is used to judge appropriateness (Nair et al., 2011). During the meeting Likert results are reviewed and the appropriateness of the interventions debated. The scenarios are rerated and results categorized as *appropriate*, *inappropriate*, or *uncertain*. An intervention is deemed uncertain when there is disagreement or when there is a score between 4 and 6 (Nair et al., 2011).

It should be noted that the recommendations presented in this article are limited to those explored in the guidelines of the OARSI, AAOS, and ACR. Many guidelines exist addressing OA and should not be substituted for clinical judgment (Nelson et al., 2014).

Recommendations by Clinical Guidelines

OARSI Recommendations

The OARSI guidelines categorize interventions for patients with knee-only OA without significant comorbidities; knee-only OA with comorbidities (i.e., hypertension, diabetes, cardiovascular disease, renal failure, gastrointestinal [GI] bleeding, depression, or limited physical activity); and multiple-joint OA with and without comorbidities (McAlindon et al., 2014).

The OARSI strongly encourages physical activity in the treatment of knee osteoarthritis. They distinguish between land, aquatic based and strength training, recommending land-based exercise for short-term pain relief and improved physical function of the knee (McAlindon et al., 2014). Although specific land-based therapies were not detailed in recommendations, it did specify tai chi, strength training, aerobic exercise, and active range-of-motion exercises to manage pain and preserve physical function. Physical activity has an added benefit of promoting weight reduction in patients with body mass index more than 25%. Weight management should focus on moderate weight reduction for a goal of 5% weight loss within a 20-week period for best results (McAlindon et al., 2014). Self-management also cannot be underemphasized in the treatment of knee OA. Self-management inspires individuals to overcome their negative perceptions of disability and manage their symptoms through self-efficacy (Brand, Nyland, Henzman, & McGinnis, 2013). Supported by good evidence quality, the OARSI recommends self-management be implemented in primary care through group and telephone sessions for patients with knee-only OA and multijoint OA (McAlindon et al., 2014).

The strongest recommendations for individuals with knee-only OA without comorbidities were biomechanical interventions (knee braces and foot orthoses), intra-articular corticosteroids, topical nonsteroidal anti-inflammatory drug (NSAIDs), walking cane, selective and nonselective oral NSAIDs, capsaicin, duloxetine, and Tylenol. Intra-articular corticosteroids are believed to have greater short-term relief of pain than hyaluronic acid injections, which is still used in some clinics (McAlindon et al., 2014).

Patients with knee-only OA *with* comorbidities were recommended biomechanical interventions, walking cane, intra-articular corticosteroids, and topical NSAIDs. The recommendations with the weakest evidence were cane use and duloxetine for pharmacologic management. Because of limited studies it is uncertain whether knee OA patients with multiple comorbidities should use walking canes. Individuals typically need at least 1–2 months to adjust to the energy needed for proficient contralateral cane use (Jones et al., 2012). Also, the few studies have raised concerns that using canes in these patients will increase the weight-bearing load on the unaffected leg (McAlindon et al., 2014).

In patients with multijoint OA *without* comorbidities selective NSAIDs, intra-articular corticosteroids, oral nonselective NSAIDs, duloxetine, biomechanical interventions, and acetaminophen (Tylenol) were recommended. Patients with multijoint OA *with* comorbidities are recommended to participate in balneotherapy (bathing in thermal mineral waters; Matsumoto et al., 2017), biomechanical interventions, intra-articular corticosteroids, selective NSAIDs, and duloxetine. The use of duloxetine for chronic pain was also considered appropriate for patients with multiple joint OA and relevant comorbidities and knee OA *without* comorbidities. However, the quality of the evidence supporting its use in both groups was fair (McAlindon et al., 2014).

OARSI guidelines also noted interventions that were explicitly discouraged. The use of electrotherapy/neuromuscular electrical stimulation was not recommended in all patients with knee OA. Transcutaneous electric nerve stimulation (TENS) was also not recommended, however only in patient *with* multiple comorbidities. For disease modification, chondroitin, glucosamine, and risedronate were not recommended in both categories of OA. However, the use of chondroitin and glucosamine for symptoms relief was still to be determined. Nonsteroidal anti-inflammatory drugs should also be used with extreme caution in patients with high-risk comorbidities. High-risk comorbidities include, but are not limited to previous GI bleed, myocardial infarction, and chronic renal failure (McAlindon et al., 2014).

ACR 2012 Knee Recommendations

The 2012 ACR guidelines were developed using the GRADE approach. Their guidelines strongly recommend the use of exercise management and weight reduction (for overweight and obese patients). The program should be tailored to the patient's physical capacity. The ACR, similar to OARSI guidelines, did not have a preference between land and aquatic-based exercise programs, although land-based exercises should include either aerobic or resistance-based exercises (Hochberg et al., 2012).

Conditional recommendations of the ACR were self-management programs, tai chi, psychosocial interventions, and medially directed patellar taping. Conditional recommendations are labeled thus due to a lack of strong quality evidence and/or studies that result in only small benefits over risks, or if there were mixed opinions of expert panelists. However, patient preferences and values are also considered when a recommendation is labeled conditional (Hochberg et al., 2012). The ACR also addressed foot insoles by conditionally recommending medially wedged insoles for those with lateral compartment OA and laterally wedged subtalar strapped insoles for those with medial compartment OA (Hochberg et al., 2012). Also, patients with knee OA who have chronic moderate to severe pain and may or may not be a candidate for surgery are conditionally recommended to participate in traditional acupuncture and TENS (Hochberg et al., 2012).

Unfortunately, the ACR does not have any strong recommendations for pharmacologic interventions. Their guidelines address the use of acetaminophen, topical and oral NSAIDs, tramadol, and intra-articular corticosteroid injection on a conditional basis. Patients older than 75 years are strongly recommended to use topical NSAIDs over orals. Although a conditional

recommendation, they do not recommend the use of glucosamine, chondroitin, and topical capsaicin (Hochberg et al., 2012).

When indicated the following approach to NSAID use is strongly recommended. Cyclooxygenase-2 (COX-2) selective inhibitor or nonselective NSAID should be used with a proton pump inhibitor (PPI) in patients with a history of symptomatic or complicated GI ulcer without GI bleed in the last year. For similar patients who have had an upper GI bleed within the last year, practitioners can consider COX-2 selective inhibitor with a PPI. Patients on low-dose aspirin (<325 mg/day) could receive nonselective NSAIDs (not including ibuprofen) with a PPI, not COX-2 inhibitors (Hochberg et al., 2012).

Opioid and duloxetine therapy is only recommended for patients who are not candidates or refuse surgical arthroplasty (Hochberg et al., 2012). It should be mentioned that patients who undergo surgical treatment have moderate to severe disease, although not all patients with this condition choose or are candidates for surgical interventions. If opioids are to be considered, guidelines formulated by the American Pain Society/Academy of Pain Medicine should be used (Hochberg et al., 2012).

ACR Hip OA Recommendations

Pharmacologic interventions presented in ACR guidelines for the treatment of hip OA are very similar to the knee. The differences are based on available studies. The subject of intra-articular hyaluronic acid, topical NSAIDs, topical capsaicin, and duloxetine was not addressed because of scientific studies. Chondroitin and glucosamine were conditionally not recommended. The same guidelines for opioid use in knee OA should be applied to hip OA (Hochberg et al., 2012).

Strongly recommended nonpharmacologic interventions for hip OA were aerobic and/or resistance-based land exercise—weight reduction and aquatic exercise. Conditionally recommended intervention included thermal agents, manual therapy with supervised exercise, self-management programs, and walking aids. They also addressed foot insoles by conditionally recommending medially wedged insoles for those with lateral compartment OA and laterally wedged subtalar strapped insoles for those with medial compartment OA (Hochberg et al., 2012). Interventions where there were no data in its use with hip OA were tai chi, manual therapy alone, and balance exercises with or without strengthening exercises (Hochberg et al., 2012).

AAOS Knee OA

The AAOS appraisal method dubbed the *AAOS system* is similar to the GRADE method with distinguishable differences to include their consideration of statistical power and the inclusion of prospective case series studies (Jevsevar et al., 2013).

The AAOS strongly recommends patients with symptomatic OA of the knee "participate in self-management programs, strengthening, low-impact aerobic exercises, and neuromuscular education; and engage in physical activity consistent with national guidelines" (Jevsevar et al., 2013, p.1885). Based on high-strength studies, acupuncture is strongly not recommended for symptomatic knee OA. Neither is glucosamine and chondroitin recommended (Jevsevar et al., 2013).

For pharmacologic therapy, the AAOS strongly recommends NSAIDs and tramadol for diagnosed patients. Hyaluronic acid was strongly not recommended. The use of growth factor injections and/or platelet-rich plasma, intra-articular corticosteroids, acetaminophen, opioids, or pain patches for symptomatic knee OA had inconclusive recommendations (Jevsevar et al., 2013). Other interventions, which were inconclusive because of low quality or conflicting studies, were the use of manual therapy, physical agents and electrotherapeutic modalities (TENS, therapeutic application of a musically modulated electromagnetic field, and ultrasound), and valgus-directing force brace. Clinicians should implement inconclusive evidence using strong judgment and stay alert to new data illustrating benefits versus harm (Jevsevar et al., 2013).

Moderate recommendations for the symptomatic treatment of knee OA include the use of lateral wedge insoles for medial compartment OA, weight loss, and needle lavage. The AAOS specifically recommends clinicians follow moderate recommendations unless a patient's characteristics deem otherwise or if more up-to-date data become available (Jevsevar et al., 2013).

AAOS Hip Recommendations

The AAOS also used the GRADE method to evaluate quality of evidence and also considered cost-effectiveness in their decisions for hip OA management (AAOS, 2017).

Interventions strongly supported by the AAOS with support from two high-strength studies were the use of intra-articular corticosteroids for short-term symptom relief and physical therapy for mild to moderate relief and improved function for up to 9 months. Nonsteroidal anti-inflammatory drugs were also supported for short-term relief of pain and improvement of function (AAOS, 2017).

The AAOS is strongly against intra-articular hyaluronic acid. Interventions such as platelet-rich therapy, stem cell, or prolotherapy, which are attracting increased attention, did not have high-quality randomized control trials to include in recommendations. Moderate evidence did not support the use of glucosamine as preferred over placebo in improving function, decreasing pain and stiffness (AAOS, 2017).

It should also be noted that among the surgical interventions (total hip arthroplasty), the AAOS noticed moderate evidence of mental health disorders and its decreased effect on surgical outcomes. It can be assumed that if these conditions are not controlled, the optimal benefit of surgical interventions cannot be achieved (AAOS, 2017). However, it is difficult to assume how close to surgery interventions should occur. Considering that medical or behavioral therapy is implemented over weeks until therapeutic effect is considered, these issues should be addressed well before surgery. Therefore, mental health disorders should

also be addressed for the effective management of hip OA (AAOS, 2017).

Opportunities for Future Research

Opportunities for future research include the long-term use of NSAIDs and specific exercise therapies. Exercise therapy is recommended by each organization. However, studies are lacking addressing specific types or duration of physical therapy recommended for hip and knee OA and the long-term effects (Jevsevar et al., 2013). The genetic heterogeneity of osteoarthritis also provides opportunity for researchers to provide patient-specific interventions for the management in the elderly.

Studies used to develop guidelines or influence clinical practice usually have a proportionally smaller number of participants older than 70 years; however, a large portion of patients seen in clinic with OA are part of this underrepresented group causing the implementation of interventions (specifically pharmacologic) to be contentious. Furthermore, implementing guidelines has proven difficult over the years because many adults of this age have multiple comorbidities and have lived with OA for some time (Peat et al., 2011).

Conclusion

Osteoarthritis is a chronic disease, yet many patients only present to the primary care provider when they have significant pain. With the growing use of narcotics in an era of opioid epidemic, providers should learn to manage and treat this condition properly using evidence-based research (Kirschner, Ginsburg, & Sulmasy, 2014). Patients often seek pharmacologic interventions and neglect physical therapy/exercise management and weight control. Financial constraints and fear of exacerbating pain have discouraged patients from complying with these recommendations (Spitaels et al., 2017). Figure 1 summarizes recommended interventions from the aforementioned organizations. Although not specifically instructed, these guidelines can be applied to the elderly (65 years and older) with comorbidities considered.

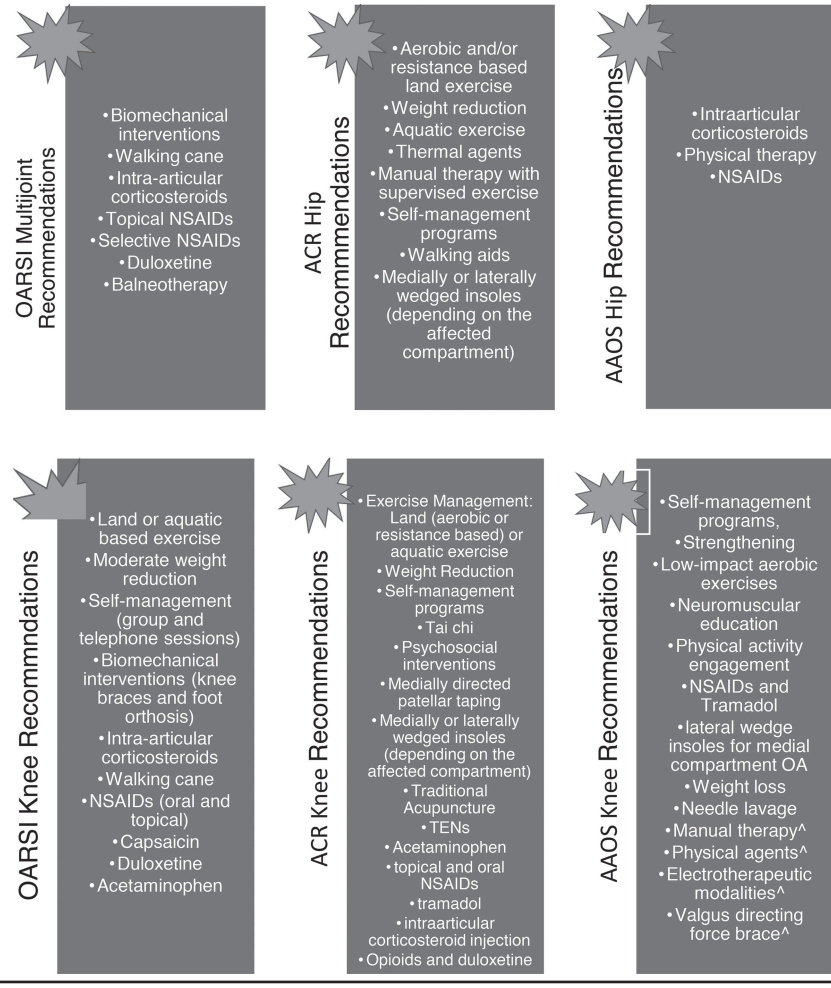

Figure 1. Summary of interventions recommended by the OARSI, ACR, and AAOS. These recommendations should be applied in context as the table includes strong, conditional, and some inconclusive recommendations for patients with and without comorbidities. AAOS = American Academy of Orthopaedic Surgeons; ACR = American College of Rheumatology; OARSI = Osteoarthritis Research Society International. *Only for patients who are not candidates or refuse surgical arthroplasty. ^Inconclusive recommendation that should be applied using strong discernment. Data from American Academy of Orthopaedic Surgeons (2017); Brand et al. (2013); Hochberg et al. (2012); Jevsevar et al. (2013); Jones et al. (2012); Matsumoto et al. (2017); McAlindon et al. (2014).

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