



## Review Article

### Care of the Older Adult with Knee Pain

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#### Abstract

Knee pain in older adults is common. Osteoarthritis (OA), a common cause of knee pain, is increasing and many older adults will seek initial care from their primary care providers. Although there are numerous guidelines for OA management, there are challenges to implementing these in primary care settings, partly because this condition is often not recognized. This paper seeks to provide practical suggestions for evaluation of knee pain in older adults in primary care and a brief review of the implications for treatment options if OA is present. A thoughtful history, focused physical examination, basic lab testing, early use of standard, weight-bearing radiographs, are key elements in evaluation, and the use of magnetic resonance imaging, even in the setting of an acute injury, is generally not appropriate if OA is found. Unless patients wish to pursue a palliative approach, management is directed towards improvement of life by improvement of function. A patient-centered treatment plan, with elements drawn from multiple disciplines emphasizes education, weight management, and sustaining physical activity, with appropriate medications, used adjunctively. Opioid analgesics are not recommended. Total knee arthroplasty, the only definitive treatment for OA, is appropriate for many older adults who envision an active lifestyle, are

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healthy enough for the procedure, and are committed to the post-operative rehabilitation regimen that is a critical element in achieving a good result.

**Keywords:** Clinical decision-making; Knee pain; Musculoskeletal

#### Introduction

In the most recent decade, Musculoskeletal (MSK) conditions were the most frequently identified diagnoses in primary care visits in the United States [1]. Prevalence of Osteoarthritis (OA), a common cause of knee pain, increases with age; median age for initial diagnosis of symptomatic knee OA is 55 years [2]. In 2007-2008, 13.7 million people in the US (6.9% of the total population of 199 million over age 25) were estimated to have symptomatic knee OA; in 2011-12 this had risen to 15.1 million (7.3% of 208 million) - a relative increase of over 225% in only 4 years [3]. OA is of particular concern to older adults, as it is most frequently first recognized between 55 and 64 years of age [2].

This paper is intended to assist clinicians caring for older adults with knee pain. The discussion is framed within the context of knee OA because this common condition typically drives management, even when other problems are superimposed. Although many clinical organizations and expert panels have produced suggestions for OA management, a recent systematic review of these guidelines has found them to be inadequately disseminated and implemented, and recommends that greater effort be made to integrate these concepts in primary care [4]. We have written this paper in contribution to this effort and anticipate that it will be of value to those who provide primary care for older adults.

#### New Constructs in Osteoarthritis

The recent "Bone and Joint Decade" focused attention on MSK diseases, promoting world-wide efforts to advance understanding and improve care. In this context, new paradigms of knee OA have emerged, summarized in several recent reviews [5-7]. We propose four principles to guide care of older adults with knee pain. First, treatments should aim to improve quality of life by improving function. Second, treatments should be individualized, multifaceted, responsive to changing conditions and needs, and implemented by a single team of providers to preserve continuity. Third, discussions of risks and benefits should consider the reversibility of treatments which prove ineffective or problematic. Finally, clinicians should recognize that responses of individual patients often differ from results observed in well-conducted clinical trials. This is particularly true in OA, as substantial placebo responses lead some authorities to believe that even placebo should be considered active treatment [8].

#### Differential Diagnosis

In addition to OA, other conditions should be considered as possible causes of knee pain in older adults. Crystal diseases, including

gout and calcium pyrophosphate deposition disease-commonly referred to as pseudogout- are increasingly prevalent with age and may be unrecognized if patients are evaluated during an intercritical period when acute inflammation is not seen. Systemic conditions, particularly rheumatoid arthritis and, less commonly, systemic lupus erythematosus can also present later in life. Although these conditions are often painful, chief complaints in patients with chronic inflammatory arthritis are more often swelling or stiffness-both of which are often accompanied by significant fatigue-rather than pain. Finally, it is important to consider the possibility of tibial plateau fracture, which can certainly occur with trauma, but in older adults, can be caused by insufficiency of subchondral bone [9].

## Evaluation

### History

A biopsychosocial approach to clinical interviews can have therapeutic, in addition to diagnostic, value. Initial conversations between patients and providers are crucial to establishing common goals, and a shared understanding of whether an aggressive approach prioritizing function over mere analgesia is appropriate, or whether a more palliative strategy emphasizing pain relief and comfort care is preferred. Understanding what activities the patient stopped because of knee pain can be helpful in constructing a physical therapy regimen that allows recovery of enjoyable activity. Questions and concerns about Total Knee Arthroplasty (TKA), even early in treatment, can lay a foundation for future practical discussions. Finally, interviews should lead to an understanding of the impact on patients and family members, as well as what coping strategies are used.

It is also important for providers to be aware that not all knee pain originates from problems in the knee; arthropathies of the spine, pelvis, or hip can refer pain to the knee which may exceed symptoms elsewhere. A clear understanding of the impact of symptoms on Activities of Daily Living (ADLs) can be helpful in identifying some important clues. If there is great difficulty putting on socks and shoes, the hip should be carefully evaluated; if pain is worsened when transitioning from lying supine to sitting, the lumbar spine should be examined as a possible source of incomplete sciatica. In patients who experience chronic pain, these symptoms may be further complicated by “brain smudging”, a recent construct describing a dysregulated system of neurologic signal processing that may inhibit the ability to localize pain [10].

### Physical examination

Physical examination should include measurements of height and weight, and calculation of Body Mass Index (BMI). Observation of gait-in combination with the “timed up and go” test-yields information about other elements of functional status, such as strength and balance. With the exception of orthopedic and sports medicine specialties, most health care providers are not well-trained to correctly perform many of the maneuvers used to exam the knee and surrounding structures [11]. To address this concern, we have developed a systematic approach that has been used effectively across a range of educational activities for over 5 years [12-15]. However, because OA usually determines management options even when meniscal injuries occur, the value of provocative testing of the meniscus (e.g., McMurray’s, Apley’s, or Thesaly’s maneuvers) in patients known to have OA is limited. In this case, meniscal disease is anticipated as a

feature of OA and positive exam findings-which are expected-should not change diagnostic impressions or management [6,7]. We believe that it is reasonable to prioritize the following exam elements:

- Range of motion
- Examination to determine the presence of an effusion
- Palpation to establish the area of maximum tenderness
- In cases of recent ground-level fall or similar trauma, evaluation of the medial and lateral collateral ligaments

### Laboratory

The laboratory evaluation is less important for establishing the diagnosis than for considering management options. Basic blood tests are recommended; complete blood counts, serum creatinine, liver transaminases and glycosylated hemoglobin if patients have diabetes. Elevation in blood glucose level is anticipated following intra-articular steroid injection, with greater increases seen in patients who have metabolic evidence of poorer diabetes control [16]. When a knee effusion is present, synovial fluid analysis may be helpful; in OA, joint fluid is expected to appear yellow and clear, with white blood cell counts generally less than 2,000/ $\mu$ L.

### Imaging

In patients older than 50 years with knee pain, presence of a single radiographic osteophyte is all that is required to establish the diagnosis of OA [17]. For this reason, we advocate obtaining a series of radiographs that includes:

- Frontal (antero-posterior (AP)), weight-bearing view to evaluate the medial and lateral tibio-femoral joint spaces
- Lateral flexion view to evaluate the patellofemoral joint
- “Sunrise” or similar view to evaluate the patellofemoral articulation and possibility of medial or lateral patellar osteophytes.

Weight-bearing technique is crucial because it shows the functional width of the tibio-femoral joint space. Some clinicians prefer a Postero-Anterior (PA) flexion view rather than the AP, because under these conditions the joint space is compressed by the posterior aspect of the femoral condyle. Although radiographs are helpful in establishing the diagnosis of OA, there is poor correlation between radiographic severity of disease and patient-reported symptoms. Functional assessments are more valuable than serial radiographs in following disease progression. Importantly, once OA is diagnosed, advanced modalities-such as Magnetic Resonance Imaging (MRI)-are generally not appropriate as these are expensive and results typically do not change management.

### Management

Older adults who are robust/fit and desire aggressive management should be treated similarly to younger adults. A functional and quality of life approach will take into account the likelihood that robust older adults have longer life expectancy than those who are frail, often with the hope of an active lifestyle. For example, a robust senior athlete interested in competing may consider TKA earlier than a frail or less active senior. It is important to recognize older adults who may be experiencing functional decline and progression of either a pre-frail or frail state which is a result of, or exacerbated by, knee pain.

For example, a senior who has stopped their regular daily walks and has become more sedentary may experience accelerated functional decline. Such seniors may actually benefit from TKA, with a reduction in risk of permanent frailty [18]. A recent study involving over 1600 older adults with lower extremity symptoms found that a minimum of 45 minutes/week of Moderate-Vigorous (MV) physical activity was associated with sustainment or improvement of high functional status [19]. These findings may be encouraging to older adults who would like to retain or recover a high level of function, yet who find federal guidelines (a minimum of 150 minutes/week of MV physical activity) too rigorous.

## Education

Low educational attainment is the most significant risk associated with symptomatic knee OA [20]. Although it has not been shown that participation in formal education improves existing OA, engagement in adult educational activities increases number and breadth of community connections, and may mitigate isolation and social withdrawal.

## Weight management

Guidelines from several organizations include statements recommending weight loss for people with knee OA who are overweight, and a recent study indicated that a minimum weight loss of 7.7% is required in order to produce a clinically meaningful result [21-23]. Dietary restriction is more effective than exercise in both initial weight loss and maintenance of lower body mass, and may be particularly effective when combined with other therapies such as cognitive-behavioral pain management [24].

## Physical therapy

Effectiveness of PT depends on the knowledge and skill of therapists, the effort and engagement of patients, and the appropriateness of prescribed regimens. There is strong evidence supporting a trial of PT in older adults with knee pain, with effects from land-based programs similar to Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) [25,26].

## Pharmacologic therapies

### Acetaminophen

Acetaminophen is first-line treatment of mild to moderate non-inflammatory pain in older adults because of its low cost and safety profile compared to other analgesics, particularly NSAIDs. In patients with intermittent symptoms, acetaminophen may be used episodically; for persistent symptoms, we recommend continuous use with doses up to 3 g/day in patients without contraindications. Acetaminophen can cause asymptomatic elevation of liver enzymes in healthy people, and although implications of this are unclear, it is recommended that acetaminophen use not exceed 2 g/day in patients with existing liver disease or increased risk of hepatotoxicity. Patients should be warned regarding use of other medications that include acetaminophen to avoid unintentional overdosing.

### Oral NSAIDs

Non-steroidal anti-inflammatory drugs may be considered for patients with inadequate relief with acetaminophen. Topical NSAIDs

are thought to be safer than oral preparations, because systemic drug concentrations are less. Without compelling evidence that one NSAID is more efficacious than another for knee OA, choices should be informed by risk factors and prescribed at the lowest dose and shortest possible duration. If one NSAID provides inadequate relief after two to four weeks, changing to a different NSAID is reasonable since individual responses vary. Some data suggest naproxen may pose a lesser cardiovascular risk than other NSAIDs, though risk can neither be entirely predicted nor eliminated [27]. Non-acetylated salicylates and selective COX-2 inhibitors may have more favorable gastrointestinal risk profiles than other NSAIDs, but cardiovascular risks may be greater [28]. Patients with increased risk of GI bleeding (aged 75, history of GI bleeding or peptic ulcer disease, anticoagulant use including aspirin and chronic glucocorticoid use) should have a gastroprotective agent prescribed (e.g., proton pump inhibitor or misoprostol) while taking a NSAID. Nonsteroidal anti-inflammatory drugs should be avoided or used with caution in patients with estimated glomerular filtration rate of <30 mL/min per 1.73 m<sup>2</sup> or on dialysis.

## Opioid analgesics

Opioid medications should not be routinely used in treating knee pain, even if discomfort is severe [29,30]. In addition to adverse effects associated with these medications—which are particularly hazardous in older adults—opioids may also impair the effectiveness of TKA. One retrospective study found that patients who had been treated with opioids prior to TKA were 3.5 times more likely to be dissatisfied with the results than those who were opioid-naïve [31].

## Intra-articular injections

Intra-Articular (IA) injections of Corticosteroids (CS)—most frequently methylprednisolone or triamcinolone acetonide—are often used for short-term relief of pain associated with OA and meniscal derangement [22,23]. Although individual patient responses to these injections may vary, a recent randomized controlled trial comparing repeated injections (every three months for two years) with triamcinolone to those with saline demonstrated no differences in patient-reported outcomes [32]. Short-term complications are rare, but may include infection (risk reported between 1/2600 and 1/15,000), bleeding (though is generally safe even in patients who are anticoagulated in therapeutic range), and hyperglycemia (transient increase lasting 3-5 days) [16,33,34]. Long-term local complications of repetitive CS injection may include hastening of progression of IA degeneration, though recent evidence has not produced consistent interpretations of risk [32,35].

Viscosupplementation with Hyaluronic Acid (HA) is an alternative option for patients who either have reason to avoid steroid injections or who have not responded to them, though specific recommendations and guidelines vary [22,23]. Many preparations of HA are available and no large comparison trials exist. For those who respond, benefits include less frequent injection rates (every 6 months), and avoidance of steroid side effects; risks of infection and bleeding are thought to be similar.

## Arthroplasty

When conservative measures fail to control symptoms and improve function, referral for consideration of TKA is warranted. Although optimal timing of surgery remains unknown, outcomes appear similar

when TKA is performed within 8 months of initial surgical evaluation [36]. Pre-operative PT may be beneficial as functional decline adversely affects post-operative outcomes [36,37]. Post-operative care emphasizes early mobilization and Venous Thromboembolism (VTE) prophylaxis. Initiation of PT on day of surgery leads to significant improvements in joint range of motion, leg strength, balance, reduced pain and shorter length of hospital stay compared to therapy delayed more than 24 hours [38]. Older adults are at increased risk of VTE and bleeding post-operatively. Pharmacologic VTE prophylaxis adjusted for renal impairment should be initiated 12-24 hours after surgery and continued at least 10-14 days. If bleeding-risk is high, mechanical prophylaxis (e.g., sequential compression devices) is substituted [39].

Finally, it is important to note that even after a technically successful procedure, a substantial number of patients-up to 20%-will have persistent knee pain [40]. Important efforts to identify predictive variables are underway, and patients considering TKA should be informed of this possibility.

### Newer therapies

Various novel cellular therapies, whose mechanisms of action are directed towards slowing down natural progression of structural disease in OA, are currently under investigation. Platelet-rich plasma, mesenchymal stem cells, and autologous chondrocyte transplantation are being explored though many challenges remain, including variability of technique and treatment protocols and limited data regarding outcomes and complications.

### Complementary/Alternative therapies

Use of Complementary and Alternative Medicines (CAM) and therapies is common, and it is important for clinicians to know that there have been no major CAM therapies shown to improve pain control, function, or swelling in patients with OA to the degree that they should be considered standard of care. Glucosamine and chondroitin continue to be widely used despite large studies showing use is no better than placebo in reducing pain caused by OA [41]. Tai chi, a traditional Chinese exercise involving low-impact, fluid movements, deep breathing and meditation has been compared with traditional PT for knee OA. Both groups showed similar benefits in symptom relief and improved function [42]. Massage therapy has been found to improve function and pain in patients with OA with once to twice-weekly sessions, and a follow up study revealed that once weekly 60 minute sessions were optimal and may be more feasible [43]. A recent meta-analysis of acupuncture in knee OA has shown improvements in short- and long-term physical function, though only short-term pain relief [44].

### Management of meniscus and ligament injuries

Meniscal disease is common in OA, though significance of a specific lesion is unclear, as incidence studies have shown meniscal tears exist in the majority of asymptomatic older adults [45]. Principles of management are similar regardless of age, and increasingly emphasize a conservative approach in light of observations which have raised questions about the value of Arthroscopic Partial Meniscectomy (APM) in adults. In one recent randomized, controlled and blinded study, no difference in outcomes-including “mechanical” symptoms (i.e., a sensation of locking or catching)-were found between those treated with sham arthroscopy and those who underwent APM,

even in the absence of OA [46,47]. Similar results have been found when comparing APM to PT [48,49].

These findings must prompt reconsideration of the value of MRI. The inappropriate use of this relatively high-cost imaging technique in older adults with knee pain is increasingly recognized, particularly in primary care [50,51]. For patients who are surgical candidates, we recommend referring to orthopedics in lieu of MRI. Limited data are available to guide recommendations regarding management of cruciate ligament injuries, though in OA an initial conservative approach is reasonable, even if there has been a complete rupture of either anterior or posterior ligaments. An immobilizing brace can be used following an acute injury, and if disabling instability persists despite PT, patients can be referred for orthopedic consultation regarding TKA. As with meniscal disease, MRI is not needed prior to referral, as findings would not change decisions to refer.

### Management of collateral ligament injury

Injuries to medial or lateral collateral ligaments are classified as strains, sprains, or tears, indicating progressive levels of damage and dysfunction. Physical therapy is the treatment, with possible use of a hinged knee brace to assist with ambulation. If injury is severe and instability persists, orthopedic referral is appropriate.

### Management of pes anserine and pre-patellar bursitis

In patients with OA, a careful examination for tenderness and swelling of the pes anserine and pre-patellar bursae is important because many therapies for OA will not have improve these conditions. In addition to minimizing activities causing direct pressure, local treatment with topical NSAID or even CS injection of the affected bursa can be helpful.

### Summary

Knee pain is common in older adults and in most cases occurs in the setting of OA. A comprehensive management plan, specific for each patient and driven by their individual goals considers education, weight management, PT, medications, injections and ultimately TKA for appropriate patients. Magnetic resonance imaging does not usually change management decisions, and is an unnecessary step prior to surgical referral; providers caring for older adults should substantially limit MRI in evaluating knee pain.

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### Authors' Contributions

MJB led the organization and framing of the scope of the paper, was the primary author on the majority of the manuscript, made subsection writing assignments to coauthors, and revised and edited all sections. AMB participated in organizing the paper, was the primary author of several subsections, constructed the Table, and reviewed and revised all sections. CKM was the primary author of several subsections, and reviewed and revised all sections. AK was the primary author of several subsections, and reviewed and revised all sections. SAJ was the primary author of several subsections, and reviewed and revised all sections. GPE conceived the idea for the paper, participated

in organizing and framing of its scope, identified and invited coauthors, was the primary author of one of the subsections, and reviewed and edited all sections.

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