

# Knee osteoarthritis: Therapeutic alternatives in primary care

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## Abstract

### AIM

To discuss pharmacological and non-pharmacological therapeutic alternatives for managing knee osteoarthritis in primary care by primary health care nurse practitioners.

### METHODS

A case example is presented, the evidence-based guideline recommendations of the Osteoarthritis Research Society International and the American Academy of Orthopaedic Surgeons are reviewed, and a plan of care is developed.

### RESULTS

Osteoarthritis is the most common form of arthritis seen in primary care, and it is a major public health issue because the aging population and widespread obesity have drastically increased incidence. Osteoarthritis is clinically associated with escalating chronic pain, physical disability, and decreased quality of life. Early diagnosis of mild osteoarthritis in relatively young patients presents an opportunity for primary health care providers to manage pain, increase quality of life, and decrease risk of disability.

### CONCLUSION

Primary health care providers can implement these recommendations in their own practices to provide care to patients with knee osteoarthritis based on current best evidence.

**Key words:** Osteoarthritis; Knee; Primary care; Nurse practitioner; Guidelines

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**Core tip:** Osteoarthritis is the most common form of arthritis seen in primary care, and it is a major public health issue because the aging population and widespread obesity have drastically increased incidence. Osteoarthritis is clinically associated with escalating chronic pain, physical disability, and decreased quality of life. Early diagnosis of mild osteoarthritis in relatively young patients presents an opportunity for primary health care providers to manage pain, increase quality of life, and decrease risk of disability. This manuscript presents and discusses pharmacological and non-pharmacological therapeutic alternatives for managing knee osteoarthritis in primary care by primary health care nurse practitioners. A case

example is presented, the evidence-based guideline recommendations of the Osteoarthritis Research Society International and the American Academy of Orthopaedic Surgeons are reviewed, and a plan of care is developed. Primary health care providers can implement these recommendations in their own practices to provide care to patients with knee osteoarthritis based on current best evidence.

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## INTRODUCTION

An active 56-year-old man presented to his primary health care nurse practitioners (PHCNP) and reported increasing left knee pain. He described the pain as a constant ache that increased with prolonged periods of sitting and after playing sports, and noted that it seemed to have started gradually over the preceding six months. On physical exam, he was noted to be 5'10" and weigh 190 lbs, with a body mass index (BMI) of 27. His vital signs were within normal range. He had a mild amount of swelling to the anterior medial aspect of his left knee; no redness, heat or gross deformities; full extension but limited flexion to 95 degrees; no instability; and a negative McMurray's circumduction test. His strength was grossly normal and equal in both legs and his gait was unremarkable.

This patient's past medical history included gastroesophageal reflux (GERD), irritable bowel syndrome, and previous right hamstring strain. He is an avid recreational athlete player, non-smoker, social drinker, and he denies any drug use. Current medication includes, pantoprazole 40 mg by mouth once daily for GERD, and over the counter ibuprofen and acetaminophen for intermittent knee pain. He has an anaphylactic medication allergy to penicillin, and is also allergic cats and dogs. He attends his family physician's office for an annual physical once per year, and his prostate, colon cancer screening, and immunizations are up to date.

This patient's PHCNP ordered a left knee ultrasound and left knee X-ray, and instructed him to try over the counter acetaminophen and/or ibuprofen for pain relief. This patient returned to clinic two weeks later to review the results. His X-rays revealed early osteoarthritic changes in his medial compartment and his ultrasound showed a small joint effusion with no abnormalities in the surrounding structures. The patient described that he experienced only limited pain relief with ibuprofen and acetaminophen, and his physical examination was unchanged.

## MATERIALS AND METHODS

Osteoarthritis is the most common form of arthritis seen

in primary care<sup>[1]</sup>. Risk factors for osteoarthritis include obesity, family history, female sex, trauma, and older age<sup>[2]</sup>, and approximately 25% of patients over 40 years of age and 85% of patients over 65 have radiographic evidence of osteoarthritis<sup>[3]</sup>. According to Uphold and Graham, osteoarthritis is the "progressive structural breakdown of articular cartilage that lines the joint surfaces"<sup>[3]</sup>. Osteoarthritis is a major public health issue because the aging population and widespread obesity have drastically increased incidence<sup>[4]</sup>. Osteoarthritis is clinically associated with escalating chronic pain, physical disability, and decreased quality of life.

Early diagnosis of mild osteoarthritis in relatively young patients presents an opportunity for PHCNPs to manage pain, increase quality of life, and decrease risk of disability<sup>[5]</sup>. Some patients and health care providers may accept chronic pain as a symptom of osteoarthritis without extensive trialing of non-pharmacological or pharmacological treatments, but inadequate pain management may lead to disability and sedentary activity, subsequently increasing risks for obesity, hypertension, dyslipidemia, coronary artery disease, and diabetes<sup>[5]</sup>.

### Therapeutic goals

The therapeutic goals for patients such as the one in this case example are to alleviate or eliminate knee pain, restore joint mobility, decrease inflammation, improve surrounding muscle strength to protect structures of the knee, minimize complications, and maintain independence and quality of life. This patient expressed the importance of playing sports, as it is his primary form of exercise and an important social activity. He also expressed apprehension about taking oral medications long-term and a preference for non-pharmacological treatment.

### Therapeutic alternatives: Pharmacological

According to several clinical practice guidelines, the use of pharmacological therapy to treat pain associated with osteoarthritis should be initiated in a step-wise approach in combination with non-pharmacological therapy<sup>[2,3,6-8]</sup>. The Osteoarthritis Research Society International (OARSI) recommends beginning with acetaminophen in patients who report mild to moderate pain from osteoarthritis, but health care providers may consider alternative therapy in the presence of severe pain or inflammation<sup>[8]</sup>. The American Academy of Orthopaedic Surgeons (AAOS) reported inconclusive evidence to support the use of acetaminophen, with one cited study concluding no clinical or significant difference in comparison to a placebo<sup>[7]</sup>. Others recommend beginning with acetaminophen because it has a relatively low risk profile, in comparison to other analgesic medications<sup>[2]</sup>.

Nutritional supplements such as glucosamine and chondroitin are available over the counter and are proposed to maintain joint cartilage<sup>[6]</sup>. According the AAOS "at this time, both glucosamine and chondroitin sulphate have been extensively studied. Despite the availability of the literature, there is essentially no evidence

that minimum clinically important outcomes have been achieved compared to placebo, whether evaluated alone or in combination<sup>[7]</sup>. The OARSI stated that glucosamine and/or chondroitin may provide symptomatic relief in patients with osteoarthritis, but should be discontinued if no apparent benefit within 6 mo of treatment, although continuation is not likely harmful<sup>[8]</sup>.

Topical analgesics and capsaicin have also been used in the initial treatment of mild osteoarthritis<sup>[6]</sup>. Topical analgesics, such as topical diclofenac, are recommended by the AAOS and OARSI as a potential treatment for patients who have contraindications to oral analgesics<sup>[8,9]</sup>. According to the OARSI, efficient pain relief from topical analgesics can take up to two weeks and the patient may experience local irritation. There is no high quality to support routine treatment of osteoarthritis with topical capsaicin, and the burning sensation of the cream is often tolerated poorly by patients<sup>[6]</sup>.

Non-steroidal anti-inflammatory drugs (NSAIDs) are highly effective in the treatment of osteoarthritis pain and inflammation<sup>[6,8,9]</sup>, but their use in many patients with osteoarthritis requires caution due to increased risk of gastrointestinal bleeding, renal dysfunction, blood pressure elevation, and adverse cardiac events<sup>[2,3]</sup>. The OARSI recommends starting NSAIDs at the lowest dose possible and avoiding long-term use. Patients at risk of gastrointestinal bleeding may be prescribed a proton pump inhibitor for gastroprotection. Cyclooxygenase-2 inhibitors are a form of NSAIDs that have decreased gastrointestinal complications, but are more expensive and carry a higher risk of cardiovascular events<sup>[2,6]</sup>.

Opioids have the potential to manage pain in advanced osteoarthritis that has not responded to other pharmacological therapies<sup>[2]</sup>, but their use requires close monitoring for signs of abuse or adverse effects such as drowsiness, constipation, and dizziness<sup>[6,8]</sup>. Stronger opioids should only be prescribed in exceptional circumstances or in patients for whom surgical intervention is planned. According to the College of Nurses of Ontario<sup>[10-15]</sup>, nurse practitioners are not authorized to prescribe opioids; therefore, patients requiring opioids for osteoarthritis pain management should be referred to a physician.

Intra-articular injections with either corticosteroids or hyaluronic acid may be considered in patients who fail to experience pain relief with pharmacological and non-pharmacological therapies<sup>[6]</sup>. Intra-articular corticosteroid injections may provide the patient short-term relief for 4-8 wk and one joint should only be injected 3-5 times per year<sup>[3]</sup>. The AAOS reported inconclusive evidence supporting intra-articular corticosteroid injections.

Intra-articular hyaluronic acid is controversial in the literature, with significant variation in recommendations. The AAOS does not recommend the use of hyaluronic acid for patients with osteoarthritis due to conflicting evidence and high variability<sup>[7]</sup>. A recent systematic review and network meta-analysis suggested that intra-articular treatments were superior to NSAIDs in the treatment of osteoarthritis, but these effects may

be primarily as a result of large intra-articular placebo effects<sup>[16]</sup>.

### **Therapeutic alternatives: Non-pharmacological**

PHCNPs should begin the treatment of osteoarthritis with a patient education session about the condition and expand on plans of care incorporating best available evidence<sup>[6]</sup>. Non-pharmacological treatment frequently involves life-style modification and should be tailored to fit with patient preferences. For example, strong guideline recommendations highlight the importance of weight-loss in patients with BMIs greater than 25<sup>[3,6,8,9]</sup>. Murphy and Helmick described that "strong epidemiological evidence links obesity to an increased risk of symptomatic knee osteoarthritis and knee replacement"<sup>[10]</sup>. Sinusas<sup>[2]</sup> reported that a 5%-10% weight loss from baseline was sufficient for reducing disability in patients with osteoarthritis, and pain significantly decreased if patients lost more than 6 kg. For optimal care, weight management may involve encouraging patients to participate in exercise programs and referring patients to dieticians for counselling.

The AAOS strongly recommends that patients participate in exercise programs that encourage physical activity according to national guidelines and involve components of strengthening and low-impact aerobic exercise<sup>[7]</sup>. Strengthening exercises should be individualized to improve muscular support of the affected joint and aerobic exercises should be encouraged for long-term functional outcomes<sup>[11]</sup>. It is important for patients to minimize movements that aggravate their osteoarthritis and balance physical activity with periods of rest to minimize pain<sup>[3]</sup>. A recently published Cochrane review reported high-quality evidence demonstrating that individuals with osteoarthritis who engaged in exercise experienced reduced pain and improved quality of life<sup>[4]</sup>. The OARSI recommends aquatic exercise for patients with symptomatic osteoarthritis, but another Cochrane review reported further research is required on the long-term benefit of aquatic exercise in patients with osteoarthritis<sup>[12]</sup>.

Acupuncture and physiotherapy modalities are also cited as possible non-pharmacological interventions for patients with symptomatic osteoarthritis<sup>[6,8,9]</sup>. The AAOS does not support the use of acupuncture for the relief of pain secondary to osteoarthritis due to inconclusive evidence<sup>[7]</sup>, but the OARSI reported that acupuncture might provide some symptomatic relief according to a single randomized control trial<sup>[8,13]</sup>. The AAOS cited inconclusive evidence to support the use of physiotherapy modalities such as transcutaneous electrical nerve conduction for pain relief<sup>[7]</sup>, but the OARSI indicated that heat or cryotherapy might be effective for relieving symptoms in hip or knee osteoarthritis<sup>[8]</sup>.

External supports such as knee braces and footwear insoles are also discussed in the literature as possible non-pharmacological therapy for patients with knee osteoarthritis. Knee braces are recommended for patients who have associated mild to moderate valgus or varus instability and want to maintain active lifestyles,

but they are often costly and cumbersome for patients to wear<sup>[6,8,11]</sup>. Lateral wedged insoles for patients with medial tibio-femoral compartment osteoarthritis may mildly decrease pain and improve instability<sup>[3,8]</sup>. The AAOS does not support the use of lateral wedge insoles based on four studies that found no significant benefit for pain and physical function<sup>[7]</sup>.

## RESULTS

In this case example, the PHCNP should arrange another clinic appointment with this patient to discuss his treatment options regarding pharmacological and non-pharmacological care. Reaching therapeutic goals through a plan of care should involve equal input from both the PHCNP and the patient, also known as shared decision-making<sup>[14]</sup>. Although PHCNPs provide medical evidence and clinical experience, patients provide important information about their values, beliefs, and lifestyle. When developing plans of care with patients, it is important for PHCNPs to recognize when clinical presentations or treatments are outside their scope of practice or beyond their expertise, in order to provide appropriate referrals according to nurse practitioner practice guidelines<sup>[15]</sup>. For example, patients with severe osteoarthritis should be referred if they require opioid prescriptions, intra-articular injections outside of the training or scope of the nurse practitioner, or surgical intervention.

Treatment for this patient's left knee osteoarthritis will focus on managing his pain and inflammation, improving mobility and function, and maintaining his independence. This patient has expressed the importance of continuing to play sports and personal preference for minimal duration of oral medications. Over the counter acetaminophen and/or ibuprofen for approximately three weeks has provided minimal pain relief. According to the step-wise approach outlined in the evidence, the next step is to prescribe an oral NSAID in combination with non-pharmacological therapy<sup>[3,6]</sup>. Due to his preference to not take oral medications, the PHCNP should first recommend a topical analgesic prior to moving up to oral NSAIDs as indicated by the treatment guidelines<sup>[6]</sup>.

Therefore, the first step in this patient's pharmacological plan of care is to try topical analgesics as directed for one week to the left knee. A topical analgesic was selected based on his personal preferences, risk of adverse gastrointestinal effects from oral NSAIDs, high safety rating, low cost, and simplicity of use. The PHCNP should discuss the potential of low adherence due to ongoing application, possibility of adverse topical irritation, and the duration of treatment required.

The second step in this patient's pharmacological plan of care would be to start a low dose of oral NSAIDs, if topical analgesics did not meet therapeutic goals or patient preferences. The PHCNP should ensure that he continues pantoprazole while taking oral NSAIDs and is aware of the risk of gastrointestinal bleeding<sup>[6]</sup>. Combination pills that consist of NSAIDs and proton

pump inhibitors are available for patients at increased risk of adverse gastrointestinal effects, but are much more costly than taking the medications separately and no more effective<sup>[6]</sup>. The PHCNP should present the options of paying more or taking an extra medication.

Non-pharmacological treatment of this patient's left knee osteoarthritis will focus on improving surrounding muscle strength to protect structures of the knee, reducing complications, and restoring mobility and function. The PHCNP may begin by suggesting six to eight weeks off from sports. Health education should include explaining the importance of maintaining a healthy body weight and recommending at least thirty minutes of moderate low-impact physical activity on most days of the week<sup>[3]</sup>. If significant dietary changes are required to achieve weight loss, the PHCNP may refer this patient to a dietician for guidance.

Referral to a physiotherapist could assist this patient in developing a structured low-impact aerobic exercise routine and strengthening program. If this patient does not have coverage or cannot afford physiotherapy, the PHCNP may want to recommend local community programs and resources through the arthritis society<sup>[17]</sup>. This patient may also want to try treating his knee with ice for fifteen to twenty minutes three times per day for treatment of acute inflammation<sup>[8,17]</sup>.

## DISCUSSION

The PHCNP should follow up with this patient in one week to assess the effectiveness of the topical analgesic and non-pharmacological treatment. At this time, his pain, mobility, independence, level of activity, and adherence to therapy will be assessed. The PHCNP should also continue to provide health education as required to address health care needs and therapeutic goals. If therapeutic goals were not met by the topical analgesic, the PHCNP and this patient could consider the second step of the pharmacological care plan; which is to discuss trialing a low dose oral NSAID for a short period of time. The PHCNP and this patient should continue regular follow up appointments until therapeutic goals are reached, at which point this patient could consider slowly returning to athletic and recreational activities.

## COMMENTS

### Background

Osteoarthritis is the most common form of arthritis seen in primary care, and it is a major public health issue because the aging population and widespread obesity have drastically increased incidence. Osteoarthritis is clinically associated with escalating chronic pain, physical disability, and decreased quality of life. Early diagnosis of mild osteoarthritis in relatively young patients presents an opportunity for primary health care providers to manage pain, increase quality of life, and decrease risk of disability.

### Research frontiers

This manuscript presents and discusses pharmacological and non-pharmacological therapeutic alternatives for managing knee osteoarthritis in primary care by primary health care nurse practitioners. A case example is presented, the evidence-based guideline recommendations of the Osteoarthritis Research



Society International and the American Academy of Orthopaedic Surgeons are reviewed, and a plan of care is developed.

### Innovations and breakthroughs

According to several clinical practice guidelines, the use of pharmacological therapy to treat pain associated with osteoarthritis should be initiated in a step-wise approach in combination with non-pharmacological therapy. Nutritional supplements such as glucosamine and chondroitin are available over the counter and are proposed to maintain joint cartilage. Topical analgesics and capsaicin have also been used in the initial treatment of mild osteoarthritis. Non-steroidal anti-inflammatory drugs are highly effective, but their use in many patients requires caution due to increased risk of gastrointestinal bleeding, renal dysfunction, blood pressure elevation, and adverse cardiac events. Intra-articular hyaluronic acid is controversial in the literature, with significant variation in recommendations. Non-pharmacological treatment frequently involves lifestyle modification and should be tailored to fit with patient preferences.

### Applications

The therapeutic goals for patients with osteoarthritis are to alleviate or eliminate knee pain, restore joint mobility, decrease inflammation, improve surrounding muscle strength to protect structures of the knee, minimize complications, and maintain independence and quality of life. Reaching therapeutic goals through a plan of care should involve equal input from both the primary health care providers and the patient, also known as shared decision-making.

### Terminology

According to Uphold and Graham, osteoarthritis is the "progressive structural breakdown of articular cartilage that lines the joint surfaces". Osteoarthritis is a major public health issue because the aging population and widespread obesity have drastically increased incidence. Osteoarthritis is clinically associated with escalating chronic pain, physical disability, and decreased quality of life.

### Peer-review

In this Evidence-Based Medicine article, the authors present and discuss pharmacological and non-pharmacological therapeutic alternatives for managing knee osteoarthritis in primary care by primary health care nurse practitioners. Primary health care providers can implement these recommendations in their own practices to provide care to patients with knee osteoarthritis based on current best evidence.

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