

PROPOSED TITLE

MULTIMODAL MANAGEMENT OF OSTEOARTHRITIS OF THE KNEE

GOAL

The goal of the proposed educational activity is to enhance practitioners' multimodal management of osteoarthritis (OA) of the knee in appropriate patients to provide long-term pain relief.

EDUCATIONAL AND PRACTICE BARRIERS

Barriers that emphasize a need for clinical education on this topic include:

- Lack of knowledge regarding the usefulness of nonpharmacological treatments and multimodal management of knee OA.
- Reliance on imaging and inappropriate referral to orthopedic surgeons

STATEMENT OF NEED

Based on needs assessment, the following practice gaps have been identified:

- Knee OA typically involves pain, disability, and reduced quality of life, and therapies to reduce pain levels while improving function are important for treatment outcomes.
- There is no universally effective and safe pharmacologic therapy for OA, and each option has potential side effects. Patients need more options for pain relief that are safe and effective when used over a long period of time.
- More attention is needed on multimodal approaches to the management of OA pain, including non-pharmacologic and pharmacologic treatment components based on patient need. Lifestyle modifications and exercise have been shown to lessen joint pain and disability, and assistive devices and braces should also be considered.
- Education and training programs for clinicians are needed regarding the consequences of inadequate pain relief for knee OA patients and the potential benefits of multimodal treatment plans.

LEARNING OBJECTIVES

At the completion of this activity, participants should be better prepared to:

- Demonstrate an understanding of the potential consequences of inadequate pain relief for patients with osteoarthritis (OA) of the knee, including effects on activities of daily living, functional abilities, and quality of life.
- Describe of the principles of multimodal management of OA of the knee, including pharmacologic and nonpharmacologic modalities aimed at reducing pain, inflammation, cartilage degradation, disability, and drug toxicity.

- Identify patients appropriate for multimodal management early in the trajectory of OA of the knee.

INTENDED AUDIENCE

The intended audience for this activity comprises the following groups:

- Primary care physicians
- Nonoperative sports medicine providers
- Physical medicine and rehabilitation specialists
- Physician extenders

LITERATURE REVIEW

Introduction

Osteoarthritis (OA), also known as degenerative joint disease, is caused by degeneration of joint cartilage and is the most common form of arthritis.¹ OA is estimated to affect 26.9 million adults in the United States; 13.9% of adults aged 25 years and older and 33.6% of adults aged 65 year and older.² Average annual prevalence of OA in the ambulatory health care system in the United States was estimated to be 3.5% (7.7 million people) from 2001–2005.³ Incidence rates of OA increase with age and level off around age 80.⁴ OA affects more women than men, especially after age 50.⁴⁻⁵ OA is associated with increased all-cause and disease-specific mortality.⁶

OA most commonly affects the knee, with devastating functional and behavioral outcomes.¹ Approximately 40% of adults with knee OA reported their health as “poor” or “fair.”¹ In 1999, adults with knee OA reported more than 13 days of lost work due to health problems, and OA of the knee is one of the top causes of disability among non-institutionalized adults.^{1,7} Knee OA typically involves pain, limitations of daily living activities, and overall reduction in quality of life.⁸

OA treatments need to reduce the levels of pain and inflammation, slow cartilage degradation, improve function and reduce disability, and avoid drug toxicity.⁸ Inadequate pain relief is a significant problem for both patients and their healthcare providers, and there is no universally effective pharmacological approach for OA treatment⁸. There is a gap in clinician knowledge regarding the usefulness of conservative and non-pharmacological management modalities, and unnecessary imaging and inappropriate referral to orthopedic surgeons are common problems.^{9,10}

Pharmacologic therapies

There is currently no universally effective pharmacologic therapy for OA, and the benefit to risk ratio varies with each option.⁸ Although new options are emerging, there are obstacles in the translation of treatment from preclinical models.¹¹

“To improve quality of life and minimize disability, these patients will need effective pain control. However, it is not necessarily clear which therapies work best for OA pain.”

Lisa A. Mandl MD et al.¹²

Hospital for Special Surgery
Weill Cornell Medical School
New York, NY

Oral nonsteroidal anti-inflammatory drugs (NSAIDs) are often used as first-line medications for joint pain.¹³ However, NSAIDs have limited pain relief and have potential for serious complications, such as peptic ulcers, perforations, and bleeding.¹³ Cardiovascular risk is another concern, especially in patients with a history of heart disease or stroke, and renal toxicity can occur in patients with kidney problems.¹³⁻¹⁴

Opioids are another common choice for treatment of OA pain.¹³ Opioids appear to have efficacy and acceptable safety in short-term trials.¹⁴ However, only strong doses may provide significant benefits versus acetaminophen or NSAIDs.¹⁴ Opioids also have frequent side effects such as nausea, constipation, dizziness, somnolence, and vomiting.¹⁴ Furthermore, opioid use includes risk of addiction.¹³

Topical treatments, such as topical NSAIDs and topical capsaicin, have shown moderate efficacy in pain relief, although the placebo effect may be significant with topical therapies.¹³⁻¹⁴ Side effects such as burning, itching, and rashes are associated with these treatments, but they can be useful alternatives to oral medication.¹³⁻¹⁴

Intra-articular injection of the knee joint with hyaluronic acid (HA) or corticosteroids is also commonly used for OA treatment. HA injection generally shows positive effects, although these effects may be moderate, and actual clinical significance remains unclear.¹³⁻¹⁴ Corticosteroid injection does seem effective for short term (1-2 week) pain relief, but less useful in the long term.¹⁵ It is unclear if the pain-relief mechanism is related to inflammation.¹³

Non-pharmacologic therapies

Patient education and self-management are increasingly recognized as effective methods to achieve small to moderate pain benefits. Programs that specifically focus on goal-orientated education and treatment management concerning weight loss and exercise have led to adherence improvements.¹⁶⁻¹⁷ Weight loss, aerobic exercise and

strengthening exercise have been shown to be helpful in reducing pain, disability and comorbidities.¹⁸

“When patients ask their physicians how they can prevent OA of the knees, weight control is paramount.”

Rhonda Shuckett MD et al.¹⁹

University of British Columbia
Vancouver, Canada

With the average body weight of the US and world populations increasing significantly, weight loss is an important factor in the management of knee OA.²⁰ For example, women with an approximately 5 kg weight loss had a 50% reduction in the risk of symptomatic knee OA.²¹ Disability can be significantly improved by weight loss >5.1% over a 20-week period.²² However, in practice, weight management is not frequently implemented.⁹

“Exercise is a primary intervention in the management of OA.”

Tiziano Marovino PT, DPT, MPH, DAAPM²³

ATI Physical Therapy
Ypsilanti, Michigan

Although the relationship between high levels of exercise and development of OA is still unclear, several studies and systematic reviews have suggested that exercise has a positive effect for patients that already have OA.²⁰ Two meta-analysis studies showed that exercise was effective in managing knee OA, although the most beneficial regime is still debatable.²⁴ Patients should be educated about the benefits of exercise, and an exercise program that minimizes pain and discomfort should be used.²⁵ Although exercise is beneficial, sports that involve twisting and high impact activities such as running should be avoided.²⁵

The IDEA Randomized Clinical Trial included 3 groups in which participants either were involved with intensive weight loss, exercise, or both. Pain scores were reduced to no or little pain in 20% of the weight-loss-only group, 22% in the exercise-only group, and 40% in the weight loss and exercise group.²⁶ This supports the notion that both weight loss and exercise are important in managing knee OA, as they are more effective in

combination than either one alone. Similarly, the Arthritis, Diet, and Activity Promotion Trial showed that weight loss combined with exercise, but not either weight loss or exercise alone, was effective in decreasing pain and improving function in obese patients with symptomatic knee OA.¹⁸

Other non-pharmacologic measures may include assistive devices and braces.²⁷ A systematic analysis suggested that knee braces and foot orthoses are an effective means of decreasing pain, joint stiffness, and use of pain medication with minimal adverse effects.²⁸ Despite potential benefits, there is a need for more high quality studies and more effective ways to determine which subset of knee OA patients are likely to benefit from these interventions.²⁰

Multimodal approaches

Several studies have now suggested that multimodal approaches involving pharmacological and non-pharmacological therapies as providing the best pain relief for patients. Such combinations are an important management strategy for knee OA pain, as high-cost and high-risk interventions may not justify their potential benefits^{14,25,29}.

“After reviewing the medical literature and empirical evidence available to the medical community, I am in strong support of the importance of exercise, nutrition, and occasional proper, well-informed treatments for these conditions.”²³

*Elmer G. Pinzon, MD, MPH
Knoxville, Tennessee*

Multiple studies have also demonstrated that psychosocial factors are important disease-specific factors in reports of pain intensity and disability in several conditions, including joint pain. Treatment of these symptoms in combination with pharmacological and non-pharmacological therapies can lessen pain and improve quality of life.³⁰⁻³¹

Holistic assessment of the patient’s medical, social, and psychological needs can enable a tailored approach to treatment formulated in partnership with the patient³². Thus, the patient’s level of pain and additional conditions, such as diabetes and hypertension, can guide the development of the treatment plan. The initial component of a multimodal approach is patient education that focuses on lifestyle modifications and exercise programs to lessen joint pain.³³ Periodic monitoring (every three months) for effects of treatment on pain, function, psychological status, and quality of life can maximize treatment adherence and enable treatment to be tailored to the patient’s changing needs.³²

Conclusion

OA of the knee is a common condition affecting millions of people. Pain is a major consequence of knee OA and leads to poor functional outcomes and reduced quality of life. Conservative, non-pharmacological approaches have been under-utilized by caregivers. A multimodal approach involving pharmacological and non-pharmacological therapies may provide the best chance at pain relief for patients.

TENTATIVE CONTENT OUTLINE

Although content development for the activities has not yet begun, Global and ACE have considered the following topics for potential inclusion. This tentative content outline will be used to form the basis for discussion with activity faculty.

- The prevalence of knee OA pain
 - Number of knee OA patients
 - Clinical outcomes of knee OA
- The consequences of knee OA pain
 - Disability
 - Difficulty in day-to-day tasks
 - Difficulty in reducing other modifiable risk factors
- Pharmacological treatments
 - Adverse events
 - Addiction concerns
 - Limited or short pain relief
- Non-pharmacological treatments
 - Can be used with pharmacological treatments in multimodal management
 - May include lifestyle changes, exercise programs, weight loss, and assistive devices and braces
- Multimodal approach to management of knee OA
 - Should be based on individual patient need, including level of pain and comorbidities
 - The initial step is patient education that focuses on lifestyle changes to lessen joint pain

EDUCATIONAL GAP ANALYSIS

Gap	Learning Objective	Anticipated Outcome	ABMS Core Competency	Sample Outcomes Question
Knee OA typically involves pain, disability, and	Demonstrate an understanding of the potential consequences of	Clinicians will understand the need for improved pain	Practice-based learning and improvement;	Patients with knee OE are likely to suffer which of the following?

reduced quality of life.	inadequate pain relief for patients with osteoarthritis (OA) of the knee, including effects on activities of daily living, functional abilities, and quality of life.	management of knee OA, and patient care will improve accordingly.	patient care and procedural skills; medical knowledge	A. Pain B. Disability C. Reduced quality of life D. All of the above
There is no universally effective and safe pharmacologic therapy for OA, and non-pharmacologic modalities such as lifestyle modifications, exercise and assistive devices have been shown to lessen joint pain and disability.	Describe of the principles of multimodal management of OA of the knee, including pharmacologic and nonpharmacologic modalities aimed at reducing pain, inflammation, cartilage degradation, disability, and drug toxicity.	Clinicians will be more likely to consider multimodal management and lessen reliance on imaging and inappropriate referral to orthopedic surgeons	Practice-based learning and improvement; patient care and procedural skills; medical knowledge	What is the initial step of multimodal treatment? A. Patient education B. Assistive devices C. Opioid treatment D. Radiological imaging
Multimodal management is often not initially considered as a treatment option, leading to unnecessary pain.	Identify patients appropriate for multimodal management early in the trajectory of OA of the knee.	Clinicians will consider multimodal management earlier in the treatment of knee OA	Practice-based learning and improvement; patient care and procedural skills; medical knowledge	Which of the following comorbidities should factor into patient selection for multimodal management? A. Hypertension B. Diabetes C. Obesity D. All of the above

REFERENCES

1. Centers for Disease Control and Prevention. Osteoarthritis fact sheet <http://www.cdc.gov/arthritis/basics/osteoarthritis.htm>. Accessed August 2015.
2. Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. *Arthritis Rheum.* 2008;58(1):26-35.
3. Sacks JJ, Luo Y-H, Helmick CG. Prevalence of specific types of arthritis and other rheumatic conditions in the ambulatory health care system in the United States, 2001–2005. *Arthritis Care & Research.* 2010;62 (4):460-464.
4. Buckwalter JA, Saltzman C, Brown T. The impact of osteoarthritis. *Clin Orthoped Rel Res.* 2004;427S: S6-S15.
5. Srikanth VK, Fryer JL, Zhai G, Winzenberg TM, Hosmer D, Jones G. A meta-analysis of sex difference prevalence, incidence and severity of osteoarthritis. *Osteoarthritis Cartilage.* 2005;13:769-781.
6. Nüesch E, Dieppe P, Reichenbach S, et al. All cause and disease specific mortality in patients with knee or hip osteoarthritis: population based cohort study. *BMJ.* 2011;342:d1165.
7. Guccione AA, Felson DT, Anderson JJ, et al. The effects of specific medical conditions on the functional limitations of elders in the Framingham Study. *Am J Pub Health.* 1994;84(3):351-358.
8. Conaghan PG, Peloso PM, Everett SV, et al. Inadequate pain relief and large functional loss among patients with knee osteoarthritis: evidence from a prospective multinational longitudinal study of osteoarthritis real-world therapies. *Rheumatology* 2015;54:270-277
9. Hunter DJ, Neogi T, Hochberg MC. Quality of osteoarthritis management and the need for reform in the US. *Arthritis Care Res (Hoboken).* 2011;63(1):31-38.
10. DeHaan MN, Guzman J, Boyley MT, et al. Knee osteoarthritis clinical practice guidelines – how are we doing? *J Rheumatol.* 2007;34(10):2099-2105
11. Yu SP, Hunter DJ. Emerging drugs for the treatment of knee osteoarthritis. *Expert Opin Emerg Drugs.* 2015 Sep;20(3):361-78.
12. Mandl LA, Losina E. Relative efficacy of knee osteoarthritis treatments: are all placebos created equal? *Ann Intern Med.* 2015 Jan 6;162(1):71-2.
13. Kennedy S, Moran M. Pharmacological treatment of osteoarthritis of the hip and knee. *BCMJ* 2010;52:404-409.
14. Zhang W, Moskowitz RW, Nuki G, et al. OARSI recommendations for the management of hip and knee osteoarthritis, part II: OARSI evidence-based, expert consensus guidelines. *Osteoarthritis Cartilage* 2008;16:137-162.
15. Hepper CT, Halvorson JJ, Duncan ST, et al. The efficacy and duration of intra-articular corticosteroid injection for knee osteoarthritis: A systematic review of level 1 studies. *J Am Acad Orthop Surg* 2009;17:638-646.

16. Du S, Yuan C, Xiao X, Chu J, Qiu Y, Qian H. Self-management programs for chronic musculoskeletal pain conditions: a systematic review and meta-analysis. *Patient Educ Couns*. 2011;85:e299–e310.
17. Ravaud P, Flipo RM, Boutron I, Roy C, Mahmoudi A, Giraudeau B, Pham T. ARTIST (osteoarthritis intervention standardized) study of standardised consultation versus usual care for patients with osteoarthritis of the knee in primary care in France: pragmatic randomised controlled trial. *BMJ*. 2009;338:b421.
18. Messier SP, Loeser RF, Miller GD, et al. Exercise and dietary weight loss in overweight and obese older adults with knee osteoarthritis: the Arthritis, Diet, and Activity Promotion Trial. *Arthritis Rheum* 2004;50:1501–10.
19. Hasan M and Shuckett R. Clinical features and pathogenetic mechanisms of osteoarthritis of the hip and knee. *BCMJ* 2010;52(8): 393-398.
20. Fibel KH, Hillstrom HJ, and Halpern BC. State-of-the-Art management of knee osteoarthritis *World J Clin Cases*. 2015;3(2): 89–101.
21. Felson DT, Zhang Y, Anthony JM, Naimark A, Anderson JJ. Weight loss reduces the risk for symptomatic knee osteoarthritis in women. The Framingham Study. *Ann Intern Med*. 1992;116:535–539.
22. Christensen R, Bartels EM, Astrup A, Bliddal H. Effect of weight reduction in obese patients diagnosed with knee osteoarthritis: a systematic review and meta-analysis. *Ann Rheum Dis*. 2007;66:433–439.
23. Pinzon, EG, Richeimer, SH, Ko G, et al. PPM Editorial Board: Tips for Treating Osteoarthritis. *Pract Pain Manage*. 2015;15(6):1-2.
24. Juhl C, Christensen R, Roos EM, Zhang W, Lund H. Impact of exercise type and dose on pain and disability in knee osteoarthritis: a systematic review and meta-regression analysis of randomized controlled trials. *Arthritis Rheumatol*. 2014;66:622–636.
25. Bennell KL, Hunter DJ, and Hinman, RS, Management of osteoarthritis of the knee. *BMJ* 2012;345:e4934
26. Messier SP, Mihalko SL, Legault C, Miller GD, et al. Effects of intensive diet and exercise on knee joint loads, inflammation, and clinical outcomes among overweight and obese adults with knee osteoarthritis: the IDEA randomized clinical trial. *JAMA*. 2013;310:1263–1273.
27. Langworthy MJ, Saad A, Langworthy NM. Conservative treatment modalities and outcomes for osteoarthritis: the concomitant pyramid of treatment. *Phys Sportsmed*. 2010;38:133–145.
28. Raja K, Dewan N. Efficacy of knee braces and foot orthoses in conservative management of knee osteoarthritis: a systematic review. *Am J Phys Med Rehabil*. 2011;90:247–262.

29. Cushnaghan J, McCarthy C, and Dieppe P. Taping the patella medially: a new treatment for osteoarthritis of the knee joint? *British Medical Journal* 1994; 308(6931):753–755.
30. Vranceanu AM, Barsky A, Ring D. Psychosocial aspects of disabling musculoskeletal pain. *J Bone Joint Surg Am* 2009;91:2014-2018.
31. Lin EH, Katon W, Von Korff M. Effect of improving depression care on pain and functional outcomes among older adults with arthritis: A randomized controlled trial. *JAMA* 2003;290:2428-2434.
32. Conaghan PG, Dickson J, Grant RL. Care and management of osteoarthritis in adults: summary of NICE guidance. *BMJ* 2008;336:502-3
33. Skou ST, Roos EM, Laursen MB, et al. Efficacy of multimodal, systematic non-surgical treatment of knee osteoarthritis for patients not eligible for a total knee replacement: a study protocol of a randomised controlled trial. *BMJ Open*. 2012 Nov 14;2(6)