



INSTITUTE FOR CLINICAL  
SYSTEMS IMPROVEMENT

---

# Health Care Guideline

---

The information contained in this *ICSI Health Care Guideline* is intended primarily for health professionals and the following expert audiences:

- physicians, nurses, and other health care professional and provider organizations;
- health plans, health systems, health care organizations, hospitals and integrated health care delivery systems;
- medical specialty and professional societies;
- researchers;
- federal, state and local government health care policy makers and specialists; and
- employee benefit managers.

This *ICSI Health Care Guideline* should not be construed as medical advice or medical opinion related to any specific facts or circumstances. If you are not one of the expert audiences listed above you are urged to consult a health care professional regarding your own situation and any specific medical questions you may have. In addition, you should seek assistance from a health care professional in interpreting this *ICSI Health Care Guideline* and applying it in your individual case.

This *ICSI Health Care Guideline* is designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and is not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. An *ICSI Health Care Guideline* rarely will establish the only approach to a problem.

Copies of this *ICSI Health Care Guideline* may be distributed by any organization to the organization's employees but, except as provided below, may not be distributed outside of the organization without the prior written consent of the Institute for Clinical Systems Improvement, Inc. If the organization is a legally constituted medical group, the *ICSI Health Care Guideline* may be used by the medical group in any of the following ways:

- copies may be provided to anyone involved in the medical group's process for developing and implementing clinical guidelines;
- the *ICSI Health Care Guideline* may be adopted or adapted for use within the medical group only, provided that ICSI receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care, if the *ICSI Health Care Guideline* is incorporated into the medical group's clinical guideline program.

All other copyright rights in this *ICSI Health Care Guideline* are reserved by the Institute for Clinical Systems Improvement. The Institute for Clinical Systems Improvement assumes no liability for any adaptations or revisions or modifications made to this *ICSI Health Care Guideline*.

### Diagnosis and Treatment Algorithm

**Ninth Edition**  
**March 2007**

**Work Group Leader**

James Lee, MD, MPH  
*Family Practice,*  
*HealthPartners Medical*  
*Group/RiverWay Clinics*

**Work Group Members**

**Family Medicine**  
David Thorson, MD  
*Family HealthServices*  
*Minnesota*

**Physical Medicine and Rehabilitation**

Mary Jurisson, MD  
*Mayo Clinic*

**Orthopedic Surgery**

Allan Hunt, MD  
*Park Nicollet Health Services*  
Nicolas Yokan, MD  
*Sioux Valley Hospitals and*  
*Health System*

**Pharmacy**

Shauna Ackerman, PharmD  
*Olmsted Medical Center*  
Sarah Merbach, RPh  
*Olmsted Medical Center*

**Rheumatology**

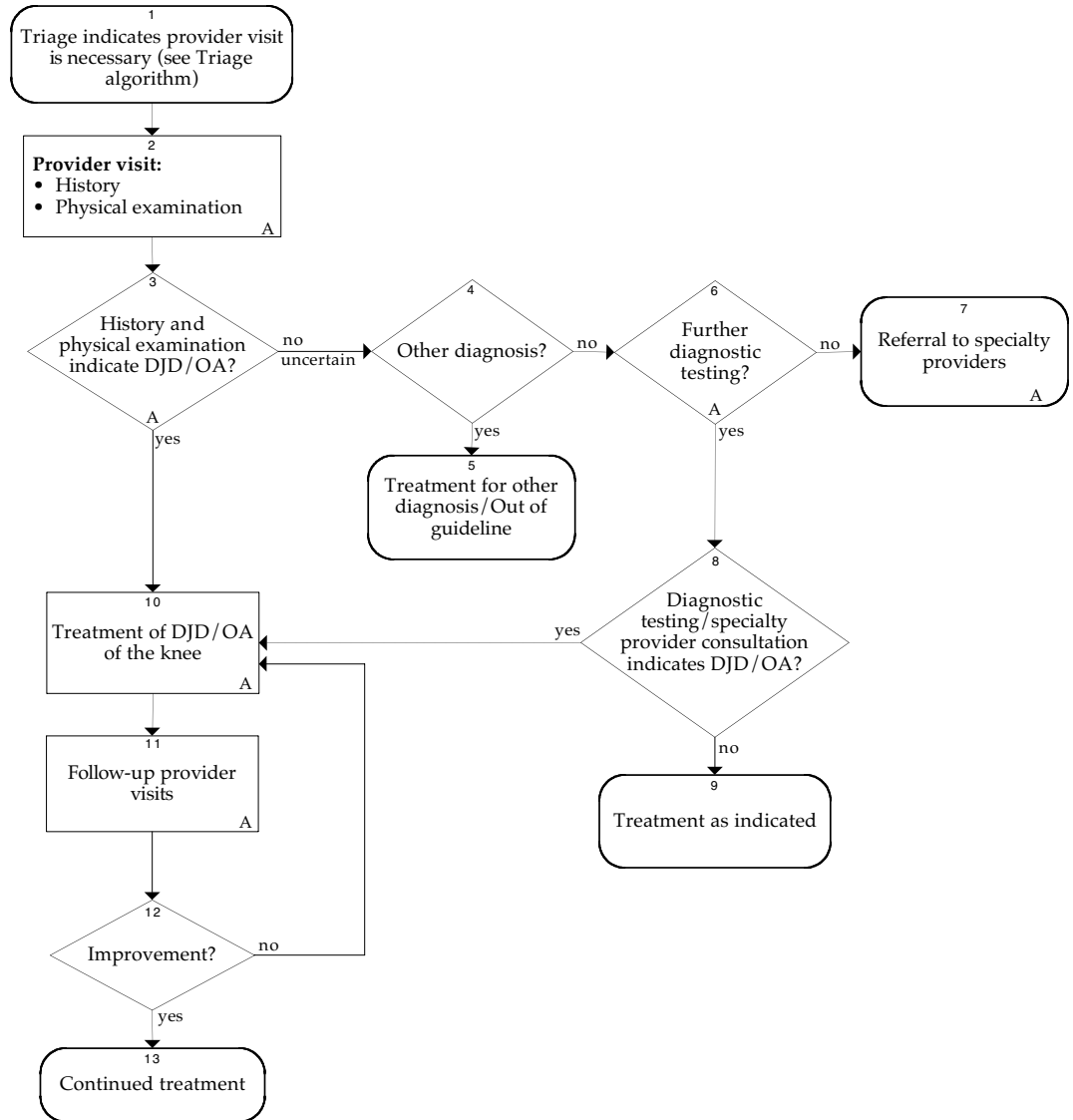
Thomas Harkcom, MD  
*HealthPartners Medical*  
*Group*

**Measurement Advisor**

Janet Jorgenson-Rathke, PT  
*ICSI*

**Facilitator**

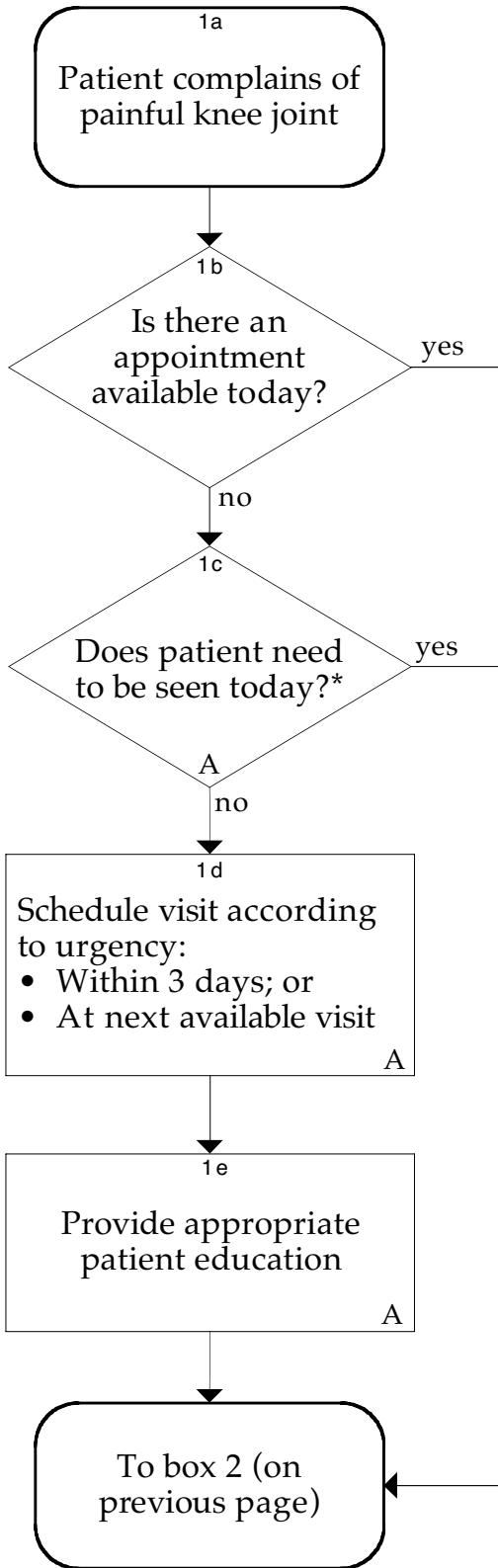
Melissa Marshall, MBA  
*ICSI*



A = Annotation

These clinical guidelines are designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and are not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. A guideline will rarely establish the only approach to a problem.

## Triage Algorithm



A = Annotation

### 1c\* Phone Triage Screening Criteria

#### Same-Day Provider Visit

- Hot, swollen joint, with or without fever and/or feeling ill
- Cannot bear weight on leg
- Leg or foot is cool and/or blue
- Deformity
- Severe pain
- Locked knee – unable to bend or extend
- Patient demands to be seen today

#### Phone Evaluation with Provider Review

- On chemotherapy for cancer
- On immunosuppressive drugs (i.e., transplant)
- History of diabetes
- Sickle cell anemia
- Taking prednisone

#### Appointment within 3 Days

- Unable to go to work or school due to pain
- Swelling

#### Routine Visit

Schedule patient for routine visit if any other complaints

## Diagnosis and Treatment Quick Reference Sheet

2

### Provider Visit History Components

- Age at first sign of painful symptoms. Have you had this pain before? Is it continuous or episodic?
- How did the pain present (Sudden onset or slow worsening over time)?
- How would you classify the pain (Sharp, dull, pinching, episodic, tight)?
- How would you rate your average pain over the last month (0-10)?
- What activity reproduces the pain? What makes it go away?
- Where is the pain?
- Are there any associated symptoms (Locking, swelling, giving way, stiffness)?
- Activity history: What are you doing for exercise? What have you changed about your exercise regimen? What kind of work do you do?
- Previous treatments/surgery/diagnostic studies
- Do you have any chronic medical illnesses? Any allergies?
- Ask differentiating questions, e.g., does the patient have a history of blood clots, psoriasis, gout, liver disease or a recent deer tick bite?

### Physical Examination Components

- Inspection for deformity or abnormalities
- Check foot pulses
- Tenderness
- Presence and location of warmth or erythema
- Presence and location of swelling or effusion
- Range of motion, active and passive
- Assess stability, varus, valgus, posterior drawer, Lachman
- Meniscal compression (McMurray's test)
- Crepitance
- Assessment of patellar function
- Evaluation of gait

3

### Symptoms/Signs Consistent with Degenerative Joint Disease of the Knee

- Less than 30 minutes of morning stiffness
- Long-standing pain that increases with weight bearing or stairs and lessens with rest
- Visible, palpable or radiographic osteophytes
- Contracture
- Crepitation on movement
- Effusions, that are not warm as in inflammatory arthritis
- Insidious Onset

### Symptoms/Signs Inconsistent with Degenerative Joint Disease of the Knee

- Fever or Chills
- Erythema
- Warmth
- Large effusions
- Locking or giving way

10

### Treatment of Degenerative Joint Disease/Osteoarthritis of the Knee

- Patient education for self-management: MD, nurse, physical therapy, occupational therapy, arthritis self-help course, written material, others
- Pain management: joint protection, cold or heat, analgesic medications (acetaminophen, NSAIDs), restorative sleep
- Exercise: conditioning/aerobic for endurance and weight loss, strengthening knee muscles, range of motion exercises
- Improve function at work, home, avocation: use adaptive equipment (canes, reachers, raised toilet seats, etc.) refer to physical medicine and rehabilitation, physical therapy, occupational therapy, others when necessary
- Injection with glucocorticosteroid or hyaluronan preparation
- Follow-up

6

### X-Ray Views

If the physician chooses to obtain an x-ray, standing AP (weight bearing), lateral (possibly weight bearing) and patellar (tangential) are recommended.

7

### Indications for Referral

Referral to rheumatologist, orthopedic surgeon, physical medicine and rehabilitation specialist, or another musculoskeletal specialist may be recommended for patients with a systematic rheumatic disease, functional deterioration, septic arthritis or osteomyelitis, trauma, malignancy, laboratory abnormality, or misalignment that might benefit from orthotics, or patients who respond poorly to treatment, are unable to work, or carry on with other interests are at risk for falling.

## Table of Contents

<b>Algorithms and Annotations</b> .....	1-22
Algorithm (Diagnosis and Treatment) .....	1
Algorithm (Triage).....	2
Diagnosis and Treatment Quick Reference Sheet.....	3
Foreword	
Scope and Target Population .....	5
Clinical Highlights and Recommendations .....	5
Priority Aims .....	5
Related ICSI Scientific Documents .....	5
Brief Description of Evidence Grading.....	6
Disclosure of Potential Conflict of Interest .....	6
Annotations .....	7-22
Definition of Degenerative Joint Disease/Osteoarthritis .....	7
Annotations (Triage) .....	7-10
Annotations (Diagnosis and Treatment).....	11-22
<b>Supporting Evidence</b> .....	23-32
Evidence Grading System.....	24-25
References.....	26-28
Conclusion Grading Worksheets.....	29-32
Conclusion Grading Worksheet A – Annotation #10 (Exercise Recommended) .....	29-30
Conclusion Grading Worksheet B – Annotation #11 (Synthetic Hyaluronates) .....	31-32
<b>Support for Implementation</b> .....	33-41
Priority Aims and Suggested Measures .....	34
Measurement Specifications.....	35-38
Optional Data Collection Tool .....	39
Key Implementation Recommendations.....	40
Knowledge Products and Resources.....	40
Other Resources Available .....	41

## Foreword

### Scope and Target Population

This guideline is intended for use with established patients who complain of a painful knee that may be due to degenerative joint disease/osteoarthritis. An established patient is one who has been seen at his or her primary clinic or medical group at least once. This guideline includes criteria for referral to a rheumatologist or orthopedic specialist.

### Clinical Highlights and Recommendations

- Schedule a same-day appointment if a patient reports the following: hot, swollen joint with or without fever and/or feeling ill, cannot bear weight on leg, leg or foot is cool or blue, deformity, severe pain, locked knee, and/or patient demands to be seen the same day. (*Annotation #1c*)
- For patients who are not scheduled for a same-day visit, provide advice on basic techniques to reduce pain and inflammation in the knee. These include rest, ice, compression, elevation, and the use of appropriate over-the-counter analgesics. (*Annotation #1e*)
- When a patient is diagnosed with degenerative joint disease of the knee, avoid obtaining an x-ray on the first visit unless specifically indicated. (*Annotation #6*)
- Educate the patient regarding overall goals of treatment. These include education regarding the disease and self-management, pain reduction, exercise that promotes joint health, and improvement in patient functioning and safety. Consider referral to physical therapy. (*Annotation #10*)

### Priority Aims

1. Improve the efficacy of diagnostic imaging for evaluating degenerative joint disease.
2. Increase the use of recommended conservative approach as first-line treatment for degenerative joint disease.
3. Increase patient education for patients with degenerative joint disease.

### Related ICSI Scientific Documents

#### Related Guidelines

- Anticoagulation Therapy Supplement
- Assessment and Management of Chronic Pain
- Venous Thromboembolism
- Venous Thromboembolism Prophylaxis

#### Technology Assessment Reports

- Acupuncture for Chronic Osteoarthritis Pain, Headache, and Low Back Pain (#36, 2000)

#### Patient and Family Guidelines

- Assessment and Management of Chronic Pain for Patients and Families

## **Evidence Grading**

Individual research reports are assigned a letter indicating the class of report based on design type: A, B, C, D, M, R, X.

Key conclusions are assigned a conclusion grade: I, II, III, or Grade Not Assignable.

A full explanation of these designators is found in the Supporting Evidence section of the guideline.

## **Disclosure of Potential Conflict of Interest**

In the interest of full disclosure, ICSI has adopted the policy of revealing relationships work group members have with companies that sell products or services that are relevant to this guideline topic. The reader should not assume that these financial interests will have an adverse impact on the content of the guideline, but they are noted here to fully inform readers. Readers of the guideline may assume that only work group members listed below have potential conflicts of interest to disclose.

Alan Hunt, MD has received consulting or speaker fees in the past 12 months from Arthrex.

No other work group members have potential conflicts of interest to disclose.

ICSI's conflict of interest policy and procedures are available for review on ICSI's Web site at <http://www.icsi.org>.

## Algorithm Annotations

### Definition of Degenerative Joint Disease/Osteoarthritis

Degenerative joint disease is a heterogeneous class of joint disorders characterized by degeneration and loss of cartilage, alteration of subchondral bone, and associated soft tissue changes that may be due to a variety of causes. These changes, which are the result of cartilage injury exceeding the rate of cartilage repair, occur gradually over time. Clinical criteria for the definitive diagnosis of degenerative joint disease of the knee are based on history, physical examination, and roentgenologic findings that may occur late after the onset of pathologic findings. Degenerative joint disease, for the purposes of this guideline, includes patients in whom cartilage injury may exceed the rate of repair, resulting in the potential for progressive joint destruction.

Though hard to define, osteoarthritis is a frequent and costly condition. The American College of Rheumatology reports that more than 21 million Americans are affected by osteoarthritis. It is the most common type of arthritis, which is the leading cause of disability in the United States. Total costs associated with arthritis are estimated by the Centers for Disease Prevention and Control to be almost \$65 billion annually. The Centers for Disease Prevention and Control estimates that by the year 2020, sixty million Americans, or almost 20% of the population, will be affected by some form of arthritis, and nearly 12 million will experience activity limitation.

### Triage Algorithm Annotations

#### 1c. Does Patient Need to Be Seen Today?

The time frame in which a patient may be seen can be determined by asking a series of triage questions. The questions are intended to determine which symptoms require more urgent treatment by a physician and which ones can be managed through phone advice.

Phone follow-up is one way to ensure that patients keep appointments. These follow-ups can provide additional slots for patient appointments for capitated products. They increase revenue generation for fee-for-service products. Some clinics, however, may not have the staff to support this activity.

The patient should receive an immediate urgent care, emergency department, clinic, provider visit if he or she meets any of the following criteria:

- Hot, swollen joint, with or without fever and/or feeling ill
  - This criterion captures the patient with a possibility of an acute bacterial joint or periarticular infection, either of which would require immediate attention.
- Cannot bear weight on leg
  - This criterion captures the patient with:
    - atypical bacterial infection,
    - atraumatic fracture, or
    - traumatic fracture or derangement.
- Leg or foot is cool and/or blue
  - This criterion captures the patient with an acute vascular occlusive event.



- Deformity
  - This criterion captures the patient with a fracture.
- Severe pain
  - This criterion captures the patient with an acute vascular occlusive event.  
Please refer to the ICSI Venous Thromboembolism guideline.
- Locked knee (unable to bend or extend)
  - This criterion suggests torn cartilage or a loose body.
- Patient demands to be seen today
  - This criterion captures the patient with other conditions for which immediate attention may be required.

If the patient meets any of the following criteria, a provider should review the triage decision and determine when the patient should be scheduled for a visit:

- Now taking chemotherapy for cancer
  - This criterion requires review of the patient who may be on immunosuppressant medications (and who therefore may not demonstrate typical manifestations of infection).
- Now taking immunosuppressive drugs
  - This criterion requires review of the patient who may be on immunosuppressant medications (and who therefore may not demonstrate typical manifestations of infection).
- History of diabetes
  - This criterion requires review of the patient who may have poor sensation (diabetic neuropathy) and who therefore may not be able to accurately report symptoms of conditions that may require immediate attention.
- Sickle cell anemia
  - This criterion requires review of the patient who may have a sickle cell crisis or acute vascular occlusive event.
- On prednisone
  - This criterion requires review of the patient who may not demonstrate typical manifestations of infection.

## **1d. Schedule Visit According to Urgency**

The patient should receive an appointment within the next three days if he or she meets any of the following criteria:

- Unable to go to work or school due to pain
  - The provider will need to appropriately assess disability status.
- Swelling
  - Swelling suggests conditions for which medical care positively affects morbidity (i.e., sprain, strain).

Patients with other types of knee pain should be scheduled for the next available routine visit.

## 1e. Provide Appropriate Patient Education

### Key Points:

- Patient education should include advice on basic techniques such as rest, ice, compression, elevation and the use of appropriate over-the-counter analgesics.
- Recommending the use of over-the-counter analgesics or NSAIDs prior to the first visit is controversial.

When a patient is scheduled for an appointment within three days or several weeks, recommendations for home self-care should be given by the medical information nurse or other appropriate personnel. This pre-appointment education does not take the place of a provider visit, but is only interim advice.

Education should include advice on basic techniques to reduce pain and inflammation in the affected joint. Such techniques include rest, ice, compression, elevation and the use of appropriate over-the-counter analgesics as follows:

- Rest:** Reduce or avoid activities that aggravate the pain. Alternate work with rest throughout your day.
- Ice:** Ice pack applied to the affected joint for 10-15 minutes several times a day. Protect the skin with clothing or a towel.
- Compression:** If swelling is present, a compression such as an Ace™ wrap dressing or sleeve may be used. It should be unwrapped and rewrapped three to four times per day.
- Elevation:** Elevate the affected extremity above the level of your heart to help reduce swelling.
- Analgesics:** Recommend acetaminophen in standard over-the-counter doses for pain if the patient has no signs of liver disease or excessive intake of alcohol. Over-the-counter anti-inflammatories (NSAIDs) such as ibuprofen, naproxen sodium or acetylsalicylic acid may be used if the patient has no history of ulcer disease, diabetes, renal disease, liver disease, coronary artery disease or bleeding diathesis; is not currently using anticoagulants such as warfarin or heparin, has no sensitivity to these medications; and is not pregnant. Caution should be exercised in recommending chronic NSAID use in persons over age 65 due to the high risk of gastrointestinal hemorrhage in this population over time.

The following over-the-counter medications may be recommended by the triage person at the clinic. These medications and dosages will provide analgesic and/or anti-inflammatory effects.

- Acetaminophen 500 mg extra strength tablets, one to two tablets up to four times per day, but do not exceed eight tablets per day
- Ibuprofen 200 mg tablets, one to two tablets every four to six hours as needed, up to six tablets per day
- Aspirin 325 mg one or two tablets every four hours as needed, not to exceed 4,000 mg/day
- Naproxen sodium 220 mg one to two tablets every 8-12 hours, up to three tablets in 24 hours, for those over age 65, one tablet every 12 hours, up to two tablets per 24 hours

Source: Handbook of Non-Prescription Drugs. Published by American Pharmaceutical Association.

These medications need to be taken on a full stomach and on an as-needed basis. Should a patient choose to take the highest dosage, he or she may achieve an anti-inflammatory effect from ibuprofen, aspirin or naproxen sodium. Acetaminophen has only analgesic effects.

Recommending the use of over-the-counter analgesics or NSAIDs prior to the first visit is controversial. Standard textbooks of medicine and osteoarthritis recommend establishing the diagnosis before prescribing medications. However, these medications are readily available, and patients use them. Of some concern is the fact that over-the-counter NSAIDs such as ibuprofen, acetylsalicylic acid, and naproxen are very effective treatments for inflammatory joint manifestations of infections, malignancies, and inflammatory arthritis and may have the potential to obscure the diagnosis if taken prior to the first visit. This potential has not been extensively studied; however, at least one study has failed to show that NSAIDs delay or obscure the diagnosis in traumatic conditions. The American College of Rheumatology recommends establishing the diagnosis prior to recommending treatment.

Another concern is the possible toxic effects in the elderly, including gastrointestinal bleeding, renal toxic effects, and central nervous system effects. Risk factors for these complications include prior history of gastrointestinal pathology, renal disease, hypertension, reduced cardiac output, hypovolemia and central nervous system pathology.

NSAIDs are contraindicated in patients on anticoagulants or with a bleeding diathesis. The dose of NSAID recommended in the guideline is analgesic and can be anti-inflammatory, but is suboptimal for inflammation.

Concerns have been raised about the effects of the chronic use of acetaminophen on renal function and hepatic function (particularly in patients who consume alcohol). Patients should be cautioned about chronic use and advised not to use alcohol concurrently. The dose should not exceed 4,000 mg per day. The American College of Rheumatology recommends using nonpharmacologic modalities first, then acetaminophen, then NSAIDs.

Doses of 400-1,200 mg/day of ibuprofen are analgesic and have fewer side effects. Doses of 2,400-3,600 mg/day also suppress inflammation and have more frequent adverse effects. Doses of 1,800 mg/day are usually effective in osteoarthritis.

*(Bradley, 1991; Gurwitz, 1990; Jones, 1992; Williams, 1993)*

Since there is no data that one NSAID is more efficacious than another, the use of ibuprofen or naproxen sodium would be most cost effective. It is suggested that NSAID use should be prioritized on the basis of cost.

The College of Rheumatology recommends patients who have comorbidities and are taking chronic medication may require liver and renal functioning tests.

A patient education brochure or other written information to reinforce home self-care instruction may be offered to the patient. This information may be given over the phone, or the patient may be able to pick it up at the clinic if the clinic has the information available in a handout or brochure. Recommended patient education resources are listed in the Support for Implementation section of this guideline.

In certain systems, telephone follow-up may be used to confirm appointments or to allow patients to cancel appointments if home self-care has resolved the initial problem.

*Supporting evidence is of classes: A, C, D*

## Diagnosis and Treatment Algorithm Annotations

### 2. Provider Visit

The appropriate treatment of knee pain is dependent upon an accurate history and physical examination. The success of treatment is dependent upon the dedication of the patient and the application of correct rehabilitative principles (*Krause, 1990; Yates, 1986*). The provider visit should focus on diagnosis of degenerative joint disease/osteoarthritis of the knee rather than the differential diagnosis of knee pain.

#### History

- Age at first sign of painful symptoms. Have you had this pain before? Is it continuous or episodic?
- How did the pain present (sudden onset or slow worsening over time)?
- How would you classify the pain (sharp, dull, pinching, episodic, tight)?
- How would you rate your average pain over the last month (0-10)?
- What activity reproduces the pain? What makes it go away?
- Where is the pain?
- Are there any associated symptoms (locking, swelling, giving way, stiffness)?
- Activity history: What are you doing for exercise? What have you changed about your exercise regimen? What kind of work do you do?
- Previous treatments/surgery/diagnostic studies
- Do you have any chronic medical illnesses? Any allergies?
- Ask differentiating questions, e.g., does patient have a history of blood clots, psoriasis, gout, liver disease or a recent deer tick bite?

Rationale for obtaining an accurate history:

- Enables the provider to be thorough
- Enables the provider to make the appropriate diagnosis
  - 70 percent of accurate diagnoses are done by obtaining a thorough and accurate history

#### Physical Examination

Typical physical examination findings in degenerative arthritis of the knee include:

- Swelling due to effusion with little synovial thickening, usually with little warmth
- Atrophy of the surrounding muscles
- Active and passive range of motion may both be restricted
- Crepitus
- Pain and muscle spasm at the extremes of existing range of motion
- Joint deformity

The physical examination may include some or all of the following components as appropriate:

- Inspection for deformity or abnormalities
- Check foot pulses
- Tenderness
- Presence and location of warmth or erythema
- Presence and location of swelling or effusion
- Range of motion, active and passive
- Assess stability, varus, valgus, posterior drawer, Lachman
- Meniscal compression (McMurray's test)
- Crepitance
- Assessment of patellar function
- Evaluation of gait

The patient must have complaints such as swelling, catching, locking. Discomfort should be localized over the joint line, either medial or lateral. The most sensitive compression test is palpation of the joint line with the knee over the edge of the examining table bent at 30 degrees. In this position gentle varus/valgus stress will produce pain, but also palpable crepitation over the joint line.

The next most useful compression test is the McMurray's. It is most useful for big, unstable tears. The examiner should be able to feel a "pop" as the unstable meniscal fragment gets caught. It should also elicit the same type of pain the patient experiences if they have catching and locking symptoms.

The Apley is the other compression test that is commonly described in the textbooks. However, it is not particularly useful or sensitive; therefore, generally not recommended.

*Supporting evidence is of class: D*

### **3. History and Physical Examination Indicate Degenerative Joint Disease/Osteoarthritis?**

A history and physical examination may produce a nonspecific result. The practitioner may wish to get laboratory tests, x-rays, or other tests to help diagnose the patient's condition. It is possible that a patient has both degenerative joint disease/osteoarthritis and another diagnosis.

In general, the following are consistent with the diagnosis of degenerative joint disease of the knee:

- Less than 30 minutes of morning stiffness
- Long-standing pain that increases with weight bearing or stairs and lessens with rest
- Insidious onset
- Bony deformity (osteophyte)
- Contracture
- Crepitation on movement
- Effusions that are not warm as in inflammatory arthritis

The following are inconsistent with degenerative joint disease of the knee:

- Fever or chills
- Erythema
- Warmth
- Large effusions
- Locking or giving way

(Hochberg, 1995)

Supporting evidence is of class: R

## 6. Further Diagnostic Testing

If history and physical examination are not conclusive for degenerative joint disease alone, further diagnostic testing is indicated. For the purposes of this guideline, diagnostic testing includes x-rays, joint taps, magnetic resonance imaging, bone scan, computed tomography, and laboratory tests.

### X-Rays

With a diagnosis of degenerative joint disease of the knee, avoid obtaining an x-ray on the first visit unless it is specifically indicated. Indications for x-rays in the evaluation of joint pain may include (Brandt, 1989; Messieh, 1990):

- History of trauma to rule out fracture
- Presence of significant effusion – especially monarticular arthritis
- After physical examination, the pain cannot be explained by ligamentous strain or bursitis, and the patient has not had a prior x-ray of that joint done
- Loss of joint range of motion without an established pre-existing condition
- Severe joint pain – even with known pre-existing diagnosis at that joint
- Prereferral to an orthopedist – if surgery is contemplated
- Persistent significant knee pain, especially in a young patient
- Conservative treatment failed

The major indication for follow-up x-rays for degenerative joint disease of the knee is to identify new pathology, not simply to log disease progression.

Degenerative changes in weight-bearing joints have been described in up to 90 percent of persons younger than 40 years old studied at autopsy. There is a noticeable lack of related clinical symptoms. Only about 30 percent of persons with x-ray evidence of osteoarthritis complain of pain at the relevant site.

If the physician chooses to obtain an x-ray, standing anteroposterior (weight bearing), lateral (possibly weight bearing) and patellar (tangential) are recommended. Standing anteroposterior more reliably show joint space narrowing than other views. The American College of Radiology Appropriateness criteria was reviewed and supports an x-ray, knee anteroposterior standing or supine (ACR Appropriateness criteria) (Pavlov, 2005).

One cohort study of osteoarthritis showed very little correlation in the x-rays over an eight-year period.

When a diagnosis of degenerative joint disease of the knee is made, computed tomography, bone scans and magnetic resonance imaging are not recommended.

### Indications for laboratory testing in degenerative joint disease

- Non-traumatic monarticular effusions with swelling generally require aspiration with the following tests performed on the fluid (if the fluid is not straw colored and clear):
  - Gram stain and bacterial culture
  - Crystal analysis
  - Cell count and differential
  - Not recommended: glucose, protein

The synovial fluid in osteoarthritis should be non-inflammatory, i.e., less than 200 wbc/mm<sup>3</sup> but in a flare could rise to 1,000-2,000 wbc/mm<sup>3</sup>. Fluid should be clear to only faintly turbid. Synovial fluid glucose levels can be low in very inflammatory rheumatoid arthritis, or crystalline arthritis in the presence of sepsis and are not recommended.

Consider a Lyme test in the presence of monarticular arthritis with joint swelling if the patient gives a history of deer tick bite, erythema chronicum migrans rash or possible exposure to ticks.

- Consider referral or further evaluation for infection, inflammation, neoplastic or toxic etiologies. Lyme serology and synovial fluid analysis are suggested in inflammatory disease. Lupus does not usually cause a monarticular arthritis, so the main reason to order an antinuclear antibody for joint pain is if there is a concern about polyarticular inflammatory arthritis.
- If a patient has osteoarthritis by x-ray that is not due to past trauma or known process and if the patient is younger than 50, the following may be considered:
  - Iron studies (Fe/TIBC) – less than 75 percent saturation and/or ferritin greater than 300 to rule out hemochromatosis
  - Calcium, phosphorus and alkaline phosphatase to evaluate for hyperparathyroidism
  - Features of acromegaly: check phosphorus, glucose, consider plasma growth hormone level
  - Dark urine on standing or black shards in synovial fluid: check serum and urine homogentisic acid
  - Abnormal liver function tests: consider Wilson's disease or hemochromatosis
  - Diabetes may accelerate the osteoarthritis process and elevated blood sugar should raise the question of hemochromatosis or acromegaly in the appropriate clinical setting.
  - An elevated serum uric acid does not make a diagnosis of gout.

*Supporting evidence is of classes: D, R*

## 7. Referral to Specialty Providers

When specialty referral is indicated, coordinated management by the primary care provider and a musculoskeletal specialty provider is desirable. On the initial visit, the provider may reach a diagnosis that requires further evaluation or treatment by a specialty provider. Referral to rheumatologist, orthopedic surgeon, physical medicine and rehabilitation specialist, or another musculoskeletal specialist may be recommended for patients:

- With a systemic rheumatic disease such as rheumatoid arthritis, systemic lupus erythematosus, scleroderma, vasculitis, inflammatory myopathy, and severe osteoporosis.

- With functional deterioration due to a rheumatic disease
- With septic arthritis or osteomyelitis
- With trauma such as a fracture or ligament injury that may require surgery or other treatment that the primary care physician is unable to provide
- With a primary or metastatic malignancy
- With a laboratory abnormality if uncertainty exists about its interpretation
- With chronic musculoskeletal problems who are responding poorly to treatment
- Whose function is impaired enough to significantly impact either vocational or avocational interests
- Who have fallen or are at risk of falling or who have other safety issues
- With a misalignment that might benefit from orthotics

A patient may not respond after standard therapy options. Consideration may then be given to referral to an arthritis specialist-rheumatologist, physical medicine and rehabilitation specialist, or orthopedic surgeon.

*(American College of Rheumatology, 1989; American College of Rheumatology Subcommittee on Osteoarthritis Guidelines, 2000)*

*Supporting evidence is of class: R*

## **10. Treatment of Degenerative Joint Disease/Osteoarthritis of the Knee**

### **Key Points:**

- The overall goals of treatment are to:
  - Provide the patient with an understanding of the disease and self management,
  - Reduce pain,
  - Instruct in exercises to promote joint health, and
  - Improve overall patient functioning and safety.
- Treatment should include the following components in a progressive fashion over time:
  - Patient education
  - Pain management
  - Exercise
  - Assistive devices
  - Physical therapy



- A follow-up visit should be scheduled three to six weeks after the initial visit.

### **Patient Education**

Treatment at the initial visit begins with education. A discussion of the disease and its natural history will allow realistic goals for treatment to be established. The patient should be instructed in methods of proper body mechanics and joint protection. Lifestyle or environment changes should be suggested to eliminate excessive and recurrent trauma. Weight reduction should be recommended for overweight individuals. Moderate exercise should be encouraged. Vigorous activities that produce prolonged pain and inflammation should be avoided. A healthy, balanced diet with adequate vitamin intake is also recommended.

Focus group sessions have shown that patients have many faulty beliefs and expectations. Many patients are dissatisfied with explanations or concerned that the physician does not fully understand their case. Most osteoarthritis treatment requires self-care, so patients need to be informed about the components and rationale of this "self-care." Group instruction may be more effective than individual instruction. A study by Lorig, et al. demonstrated cost saving in patients in an education program through decreased frequency of physician visits (*Lorig, 1993; Mazzuca, 1997; Mazzuca, 1999*).

The provider may wish to consider a referral to education classes for self-management of arthritis. There are some computer-based education programs and several self-help books that may be appropriate. If the patient seems to need more help in problem solving to implement self-care, consider referral to a nurse for medication instruction, physical therapy for exercise instruction, or an occupational therapist for joint protection instruction.

Patient education should, in general, be reinforced with further written or verbal instruction.

Patient education resources describing joint protection, exercise, pain relief and basic healthy living habits are included in the Support for Implementation section of this guideline.

*Supporting evidence is of class: C*

### **Pain Management**

- Joint protection

The patient should be instructed to avoid prolonged standing, kneeling, squatting and stair climbing.

If obese, the patient should lose weight through modification of diet and a consistent low-impact aerobic conditioning program such as walking 30-60 minutes a day. If a patient with degenerative joint disease of the knee is unable to walk, consider referral to a physiatrist or physical therapist to assist in identifying appropriate alternative aerobic conditioning exercises.

Impact loading, prolonged static loading, kneeling, squatting, stair climbing and obesity have been shown to have an impact on osteoarthritis in general, and on the knee in animal, biochemical and epidemiologic studies (*Cooper, 1994; Felson, 1992; Felson, 1997; Pronk, 1994*). Patients should be advised to lose weight and avoid these activities.

If work or home activities seem to aggravate the problem, consider an outside evaluation by an appropriate health care professional.

- Physical modalities

- Cold: ice packs, ice massage. These can be applied every three to four hours as needed for 15-20 minutes at a time.
- Heat: warm bath or shower for 15-20 minutes, heat lamp, heating pad, warm compresses.

Heat and/or ice: These modalities, while effective, have risks. Most commonly these risks include neurovascular compromise, frostbite and burns. When these modalities are recommended, the patient should be educated in how to avoid these complications. Instruction as to reasonable expectations is critical. Many patients equate these treatments with "curative rehabilitation" and discontinue using them when the condition persists, even though they experience pain relief. Many patients have tried these modalities, but not for a sufficient duration for analgesia to occur. Although rare, frostbite and burns can occur and are occasionally severe, so patients should be advised to avoid these complications. When multiple joints or muscles are to be treated, a 15-20 minute warm bath or shower at 100°-105°F may be most practical. Because this can produce significant vasodilation, the patient should be cautioned about orthostatic symptoms, and it may be contraindicated in patients with cardiovascular disease.

A single joint or area such as the knees may be treated with heat. Although there are no published supporting studies, in one practice, fewer burns have been seen with the heat lamp than with heating pads. Ice packs and ice massage are contraindicated in patients at risk of vasospasm or ischemia. Ice should be removed when the skin is numb.

The patient may choose the modality that provides the most pain relief.

*(Jurisson, 1995; Brosseau, 2004b)*

- Medications

The patient may be started on a course of acetaminophen or, if not effective, a nonsteroidal anti-inflammatory drug (NSAID) in appropriate analgesic doses if there are no contraindications to those medications. Since there is no proven efficacy of one NSAID over another, unless the patient has a history of peptic ulcer disease or is on anticoagulants, a less expensive one should be tried initially. A COX-2 inhibitor may be preferred for patients over age 65, those with a history of dyspepsia while taking COX-1-NSAIDs, or those with increased risk factors for gastrointestinal hemorrhage.

If an analgesic or NSAID was initiated prior to the visit, the patient should be questioned about dose, effectiveness and complications. Important considerations of effectiveness are changes in the patient's ability to sleep, work, perform household activities and activities of daily living as a result of the use of the medication. Equally important are adverse effects such as drowsiness, gastrointestinal upset (or bleeding) and fluid retention. Some authors advocate screening renal, hepatic and bone marrow function early after initiating a chronic course of NSAIDs, and periodically thereafter. If an analgesic dose has been inadequate, an anti-inflammatory dose may be more effective in some patients. Signs and symptoms of inflammation do not predict whether an NSAID at anti-inflammatory doses will be effective.

Although clinical trials of NSAIDs have not shown complications to be particularly frequent, the prevalence of painful musculoskeletal conditions results in prevalent use of NSAIDs with consequent large absolute numbers for patient mortality, hospitalization and morbidity and therefore, high cost to the health care system as a whole. COX-2 inhibitors may add some margin of safety for patients with a history of peptic ulcer disease, and can be used in patients taking anticoagulants. International Normalized Ratios (INRs) must be monitored closely at the initiation of these agents. There is no data suggesting that these offer added benefit as far as pain relief over acetaminophen or older NSAIDs in analgesic doses, and there is no good comparison data for these expensive and newer compounds. For this reason, use of acetaminophen has been advocated by some as a first-line pharmacologic agent and has been shown to be safer in the short term. The pathophysiology of degenerative joint disease is in part, and in some cases wholly, mechanical, the result of stress to the joint exceeding repair. Some authors advocate less reliance on pharmacologic and more reliance on mechanical measures such as joint protection by attention to joint congruence. In one study, nonpharmacologic management of pain resulted in discontinuation of NSAIDs without loss of effectiveness in two out of three patients chronically managed with NSAIDs for osteoarthritis.

The prudent approach may be to use nonpharmacologic methods as the first line and to use the least toxic but effective analgesic necessary to optimize function. In most patients, episodic use of medications when the joint has been overused or injured is all that is needed. The American College of Rheumatology advocates nonpharmacologic pain management as first-line therapy for osteoarthritis.

(American College of Rheumatology, 2000; American College of Rheumatology Subcommittee on Osteoarthritis Guidelines, 2000)

Elderly patients or those with increased blood pressure or risk factors for hypertension should be monitored for elevated blood pressure (Qiu, 1998; Smalley, 1995; Uebelhart, 1998).

The nutraceutical agents glucosamine (1500 mg daily) and chondroitin sulfate (1200 mg daily) are widely available and tried by patients.

A January 2001 Lancet article reported the long-term effects of glucosamine in a three-year randomized, double-blind placebo-controlled trial of 212 patients with degenerative joint disease of the knee (Reginster, 2001). On both objective measurement of disease progression (mean joint space width of the medial compartment of the tibiofemoral joint by digital image analysis) and a standardized and validated measure of symptoms (WOMAC index), statistically significant differences were noted, with the glucosamine group showing symptomatic improvement and slowing of disease progression. The authors concluded that glucosamine may have combined structure-modifying and symptom-modifying effects. There were no differences in safety between the treatment and placebo groups. This study did not appear to have the problems cited in the *Journal of American Medical Association* meta-analysis. Although additional studies confirming these results are needed, it seems appropriate at this point to discuss these findings with patients.

The Glucosamine/Chondroitin Arthritis Intervention Trial (GAIT) evaluated glucosamine and chondroitin sulfate as treatments for osteoarthritis. A combination of the two has shown to have benefits and may be reasonable to offer to patients (Clegg, 2006).

Based on the data we now have it seems reasonable for physicians to discuss the use of glucosamine sulfate, with or without chondroitin sulfate, pointing out that, although it appears that they may be beneficial both for symptoms and for slowing of disease progression, these agents do not fall under the FDA approval process, and unknowns remain regarding efficacy, tolerability and toxicity.

It is reasonable to recommend a 60-90 day trial of the combination of glucosamine and chondroitin sulfate, leaving the decision for ongoing (continuing) therapy to patients on an individual basis.

Narcotic medications are not advised as first-line treatment. Carefully monitored narcotic dosing may be considered for patients who are intolerant of NSAIDs and have not received sufficient benefit from physical therapy (PT), occupational therapy (OT) and other modalities. Dosing should begin in a progressive fashion. Systemic administration of adrenocorticosteroids is of no value. The American College of Rheumatology advocates the use of nonpharmacologic methods first and addition of medication only when additional analgesia is necessary.

Glucosamine should not be taken by those with allergy to shellfish. Other side effects may also occur.

- Miscellaneous pain relievers

Some patients may refuse the usual medical management, may not be candidates because of contraindications, or may request other treatments. When heat, cold or medications are contraindicated or ineffective, the following may also be considered:

- Electrical stimulation such as TENS – Electrical stimulation may require referral to a physical therapist and is expensive, but is helpful for pain relief in some patients (Osiri, 2004).

- Massage – Massage of various types can provide temporary pain relief, is relatively nontoxic and can be applied by the patient independently with instruction.

Other physical modalities may provide temporary pain relief and may be suggested by a physical therapist. If the provider is unfamiliar with the indications and contraindications for other physical modalities, consider referral to physical medicine and rehabilitation.

- Acupuncture – Acupuncture has been shown effective as an adjunct for pain relief in osteoarthritis of the knee (*Berman, 1995; Berman, 1999; National Institutes of Health, 1997*). A variety of specialists may have training in acupuncture, including physiatrists, anesthesiologists, osteopaths, chiropractors and others.
- Wedge insoles – While randomized controlled trials are few in number, there is a trend suggesting that wedge insoles to reduce the varus during stance in medial compartment OA can reduce the associated pain sufficiently to reduce the need for pain medications and is a reasonable adjunct to other treatments (*Marks, 2004; Pham, 2004; Toda, 2001; Toda, 2004*). Patients can be referred to a pedorthotist, podiatrist, orthotist, physical medicine & rehabilitation (PM&R) physician, or physical therapist (PT) to assist in fitting a patient with the appropriate wedge insole.
- Unloader braces and knee sleeves – Knee sleeves and unloader braces can reduce pain in patients with varus deformities (*Barnes, 2002; Finger, 2002; Kirkley, 1999; Matsuno, 1997*). They can be referred to an orthotist, PM&R physician, or PT to assist in fitting and independent use of the brace.

There is some thought that varus and valgus deformities can contribute to overloading the medial and lateral compartments, respectively, thus increasing pain and possibly accelerating the progression of the cartilage destruction. Strategies to reduce the deformity can include exercise, bracing of the foot, ankle or knee, or surgery. It has also been suggested with some clinical evidence that high heels can increase loads in the knees and therefore physicians should recommend that their patients not wear high heel shoes.

- Cognitive restructuring, stress management, relaxation

These are covered in pain management classes and support groups, the Arthritis Self-Help Course, and stress management classes. Consider referral to one of these classes if they are available. Some of these are covered in the Arthritis Foundation brochure "Managing Your Pain" referenced in the Support for Implementation section of this guideline.

- Ensure adequate restorative sleep

Provide instruction in basic sleep hygiene measures. Assess causes of non-restorative sleep (pain, nocturia, depression, psychosocial stress, poor sleep hygiene, sleep disorder, CHF, etc.) and treat appropriately (relaxation before bed, instruct in use of sleep hygiene, amitriptyline, etc.).

*Supporting evidence is of classes: A, B, C, D, M, R*

## Exercise

Exercise should be recommended for patients with degenerative joint disease of the knee. [*Conclusion Grade I: See Conclusion Grading A – Annotation #10 (Exercise Recommended)*]

Exercise should include the following:

- Active range of motion for the hip, knee and ankle for maintaining and regaining range of motion and for promoting joint health and nutrition. Maintenance of cartilage nutrition and differentiation

requires frequent congruent contact of opposing surfaces through their entire range with appropriate loading. Successful experimental cartilage repair in animals and humans requires range of motion exercises. It is therefore reasonable to recommend range of motion exercises to patients where joint health is at risk or where cartilage injury likely has occurred. Patients can perform these independently and safely.

- **Progressive walking.** Begin walking for a duration that is well tolerated as a baseline such that it does not produce accelerating knee pain over successive days. Gradually increase the walk duration to a goal of 30-60 minutes five to seven days per week for closed chain strengthening and endurance training of the legs and for management of obesity. It may also contribute to a sense of well-being and pain control. Patients with limited tolerance for walking may prefer to start by walking in a pool, pushing a shopping cart, or using an exercise bike or other exercise equipment. Many patients do not have access to a pool or exercise equipment, however. Patients with symptomatic osteoarthritis of the knee are often deconditioned. Aerobic conditioning in patients with osteoarthritis of the knee has been shown to improve endurance, pain and function.
- **Quad sets with vastus medialis obliques activation at 15° flexion to full knee extension in external hip rotation.** Evidence to date suggests that quadriceps weakness, deconditioning, altered proprioception, and altered gait biomechanics are common in osteoarthritis of the knee and may precede the onset of symptoms and disability, as well as contribute to disability. A number of studies have suggested that the quadriceps quickly becomes inactive and atrophied in patients with knee pathology. Quadriceps setting can at least partially reverse this and is easily and safely done on an independent basis. Other studies have shown that a physical therapist-supervised exercise program may be required for further gains in strength and function in some patients. Quadriceps strengthening exercises can improve strength, decrease pain, decrease rate of loading during heel strike, and improve function without worsening symptoms.

If the patient has difficulty walking, has contractures, has severe exercise intolerance, has fallen or has other reasons for being unable to carry out this exercise program, consider referral to a physiatrist or physical therapist for a supervised program two or three times a week until the patient can perform an independent exercise program. A physical therapist may focus on the use of other modalities and more specific exercises to regain range of motion, strengthen the lower extremities, and improve endurance. If there is severe loss of function, a physiatrist may be helpful in supervising treatment for complex loss of function.

Obesity is a well-established risk factor for development and/or progression of osteoarthritis of the knee, hip and hands. Aerobic conditioning is an important component of weight control. Knee injuries, knee instability, and repetitive impact loading are significant risk factors for knee osteoarthritis. Advice about exercise and sport participation should include instruction in prevention of knee injury. Sport-specific training has been shown to reduce the incidence of joint injury. Patients who wish to participate in sports that include activities involving impact loading, torsional forces to joints, or otherwise put the participant at risk of injury (football, basketball, volleyball, soccer, rugby, etc.) should be referred to a sports physician who can screen for factors predisposing to injury in those sports and recommend sport-specific remedial training prior to participation.

Patients should, in summary, be instructed in a regular exercise program that includes:

- **Physical Activity:** This is defined as physical activity accumulating to 30 minutes per day most days of the week.
- **Aerobic Conditioning:** 20-60 minutes, three to five days a week at a moderate level (Borg, relative perceived exertion, three to four out of 10 or 50 percent, maximal heart rate). This can be accomplished by walking, pool exercises or using exercise equipment such as treadmills, bicycles, elliptical trainers, and other cardiovascular fitness machines. Note: not all patients have access to these machines.

- **Strengthening of the Lower Extremities:** There are many ways to do this, and the specifics of strengthening in osteoarthritis in the knee have not definitely been established. Exercise regimes that produce more effective strengthening are more effective for pain and disability. Referral to a physical therapist preferably with special training of the knee, where available, is appropriate.
- **Range of Motion and Flexibility Exercises:** Patients can perform these independently and safely. They should include the hip, knee and ankle.

Some patients may be more compliant in the social milieu of an aquatic or land-based exercise class for patients with arthritis such as may be offered at the YMCA/YWCA. Patients with more severe symptoms may best be started in a pool or other exercise that unloads the knee.

Weight control is most effective when there is an exercise component, such as a walking program.

*(Brosseau, 2004a; Deyle, 2000; Ettinger, 1997; Fransen, 2001; Hopman-Rock, 2000; Petrella, 2000; van Baar, 1999)*

*Supporting evidence is of classes: A, M*

### **Assistive Devices**

In some cases an assistive device such as a splint, brace, cane, crutch or walker may be an appropriate component of initial treatment (*Salter, 1983*).

A cane in the hand opposite the affected knee has been shown in biomechanics labs to substantially reduce load to the affected knee and hip.

Although anyone with appropriate training may instruct in the use of assistive devices, it may be most efficient to refer to a physical therapist, occupational therapist, ergonomist or other professional who is trained to select and instruct in the use of these devices. A physical therapist can teach most patients to use a knee sleeve, cane or walker in one to two visits. Other assistive devices such as reachers, bath benches, raised toilet seats, grab bars, etc. may be suggested by an occupational therapist, sometimes in a visit to the home, where other safety issues may also be addressed. In the workplace, an occupational therapist, physical therapist or ergonomist may suggest modifications. Sport-specific trainers may provide the best advice regarding athletic activities.

*Supporting evidence is of class: R*

### **Physical Therapy**

Some patients may benefit from a supervised exercise program or from specific therapeutic modalities the therapist can provide.

## **11. Follow-Up Provider Visits**

The response to initial treatment should be assessed at follow-up visits. If the patient is responding well to initial treatment, key points of the treatment plan should be reviewed and reinforced and the following pain rating question should be repeated: How would you rate your average pain over the past month (0-10)? If the patient has had little improvement in symptoms or function or has had complications, the provider may consider progressive and/or escalated use of the approaches in Annotation #10, "Treatment of Degenerative Joint Disease/Osteoarthritis of the Knee."

### **Medication Change because of Lack of Effectiveness**

- Trial of a different anti-inflammatory medication. (Patient should be kept on medication for two to four weeks before trying a different one.)
- Injections
  - Local intra-articular corticosteroid injections may provide short-term or long-term relief of pain and may be appropriate at this point for some patients. A suggested dose is 40 mg triamcinolone.
  - A series of injections of hyaluronan preparation may also be appropriate to relieve pain at this point in some patients. Current data suggests that these injections are only moderately effective up to 10 weeks. Data suggests that patients with milder disease will get a better response to hyaluronan injections, and those with complete collapse of the joint space are less likely to respond.

*(Brandt, 2001; Evanich, 2001; Guidolin, 2001; Petrella, 2002; Modawal, 2005)*

While corticosteroids require a single injection, hyaluronan is given in a series of injections, generally three to five.

Synthetic hyaluronates may be effective treatment for pain in selected patients with mild to moderate Degenerative Joint Disease of the knee. [*Conclusion Grade II: See Conclusion Grading Worksheet B – Annotation #11 (Synthetic Hyaluronates)*]

### **Exercise**

The issue of exercise should be readdressed comprehensively at this time. Exercise may include a plan given through instruction at the clinic or a program supervised by a physical therapist, athletic trainer or other comparable professional.

### **Referral to Specialty Providers**

A patient may not respond after standard therapy options. Consideration may then be given to referral to an arthritis specialist – Rheumatology, Physical Medicine and Rehabilitation, or Orthopedic Surgery. (See Annotation #7, "Referral to Specialty Providers.")

*Supporting evidence is of classes: A, D, M*

Document Drafted Mar – Jul 1995
First Edition Jun 1996
Second Edition May 1997
Third Edition Jun 1998
Fourth Edition Dec 1999
Fifth Edition Dec 2000
Sixth Edition Jun 2002
Seventh Edition Dec 2003
Eighth Edition Dec 2004
Ninth Edition Begins April 2007

**Availability of references**

References cited are available to ICSI participating member groups on request from the ICSI office. Please fill out the reference request sheet included with your guideline and send it to ICSI.

Released in March 2007 for Ninth Edition.  
*The next scheduled revision will occur within 36 months.*

**Original Work Group Members**

Wendy Anderson  
*Buyers' Health Care Action Group*  
**General Mills**  
 Renee Bergstrom  
*Health Education*  
**Mayo Clinic**  
 Carolyn Bowles, MD  
*Rheumatology*  
**HealthPartners**  
 Mary Jurisson, MD  
*Physical Medicine and Rehabilitation*  
**Mayo Clinic**

Judy Kelloway, PharmD  
*Pharmacy*  
**Park Nicollet Clinic**  
 James Lee, MD, MPH  
*Family Practice, Work Group Leader*  
**Mork Clinic**  
 Julie Persoon, RN  
*Facilitator*  
**Allina Medical Group North**  
 Nico Pronk, PhD  
*Measurement Advisor*  
**HealthPartners**

Margaret Stein, MD  
*Internal Medicine*  
**HealthPartners**  
 Mark Thomas, MD  
*Orthopedic Surgery*  
**Park Nicollet Clinic**  
 Dave Thorson, MD  
*Family Practice*  
**MinnHealth Family Physicians**

**Contact ICSI at:**

8009 34th Avenue South, Suite 1200; Bloomington, MN 55425; (952) 814-7060; (952) 858-9675 (fax)  
 Online at <http://www.ICSI.org>



## Evidence Grading System

### I. CLASSES OF RESEARCH REPORTS

#### A. Primary Reports of New Data Collection:

- Class A: Randomized, controlled trial
- Class B: Cohort study
- Class C: Non-randomized trial with concurrent or historical controls  
Case-control study  
Study of sensitivity and specificity of a diagnostic test  
Population-based descriptive study
- Class D: Cross-sectional study  
Case series  
Case report

#### B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

- Class M: Meta-analysis  
Systematic review  
Decision analysis  
Cost-effectiveness analysis
- Class R: Consensus statement  
Consensus report  
Narrative review
- Class X: Medical opinion

### II. CONCLUSION GRADES

Key conclusions (as determined by the work group) are supported by a conclusion grading worksheet that summarizes the important studies pertaining to the conclusion. Individual studies are classed according to the system defined in Section I, above, and are assigned a designator of +, -, or  $\emptyset$  to reflect the study quality. Conclusion grades are determined by the work group based on the following definitions:

**Grade I:** The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

**Grade II:** The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

**Grade III:** The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results from different studies or because of serious doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

**Grade Not Assignable:** There is no evidence available that directly supports or refutes the conclusion.

The symbols **+**, **-**, **∅**, and **N/A** found on the conclusion grading worksheets are used to designate the quality of the primary research reports and systematic reviews:

**+** indicates that the report or review has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis;

**-** indicates that these issues have not been adequately addressed;

**∅** indicates that the report or review is neither exceptionally strong or exceptionally weak;

**N/A** indicates that the report is not a primary reference or a systematic review and therefore the quality has not been assessed.

## References

- American College of Rheumatology. Guidelines for obtaining a rheumatology consultation (position statement). November 11, 1989. (Class R)
- American College of Rheumatology. Recommendations for the medical management of osteoarthritis of the hip and knee. *Arthritis Rheum* 2000;43:1905-15. (Class R)
- American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. Recommendations for the medical management of osteoarthritis of the hip and knee. *Arthritis & Rheumatism* 2000;43:1905-15. (Class R)
- Barnes CL, Cawley PW, Hederman B. Effect of counterforce™ brace on symptomatic relief in a group of patients with symptomatic unicompartmental osteoarthritis: a prospective 2-year investigation. *Am J Orthop* 2002;31:396-401. (Class D)
- Berman BM, Lao L, Greene M, et al. Efficacy of traditional Chinese acupuncture in the treatment of symptomatic knee osteoarthritis: a pilot study. *Osteoarthritis Cartilage* 1995;3:139-42. (Class D)
- Berman BM, Singh BB, Lao L, et al. A randomized trial of acupuncture as an adjunctive therapy in osteoarthritis of the knee. *Br J Rheum* 1999;38:346-54. (Class A)
- Bradley JD, Brandt KD, Katz BP, et al. Comparison of an anti-inflammatory dose of ibuprofen, an analgesic dose of ibuprofen, and acetaminophen in the treatment of patients with osteoarthritis of the knee. *N Engl J Med* 1991;325:87-91. (Class A)
- Brandt KD. Pain, synovitis, and articular cartilage changes in osteoarthritis. *Semin Arthritis Rheum* 1989;18:77-80. (Class R)
- Brandt KD, Block JA, Michalski JP, et al. Efficacy and safety of intraarticular sodium hyaluronate in knee osteoarthritis. *Clin Orthop* 2001;385:130-43. (Class A)
- Brosseau L, MacLeay L, Robinson V, et al. Intensity of exercise for the treatment of osteoarthritis. (Cochrane Review) *In The Cochrane Library* 2004a;3. Chichester, UK: John Wiley & Sons, Ltd. (Class M)
- Brosseau L, Yonge KA, Robinson V, et al. Thermotherapy for treatment of osteoarthritis. (Cochrane Review) *In The Cochrane Library* 2004b;3. Chichester, UK: John Wiley & Sons, Ltd. (Class M)
- Clegg DO, Reda DJ, Harris CL, et al. Glucosamine, chondroitin sulfate, and the two in combination for painful knee osteoarthritis. *N Engl J Med* 2006;354:795-808. (Class A)
- Cooper C, McAlindon T, Snow S, et al. Mechanical and constitutional risk factors for symptomatic knee osteoarthritis: differences between medial tibiofemoral and patellofemoral disease. *J Rheumatol* 1994;21:307-13. (Class C)
- Deyle GD, Henderson NE, Matekel RL, et al. Effectiveness of manual physical therapy and exercise in osteoarthritis of the knee: a randomized, controlled trial. *Ann Intern Med* 2000;132:173-81. (Class A)
- Ettinger WH, Burns R, Messier SP, et al. A randomized trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis: the fitness arthritis and seniors trial (FAST). *JAMA* 1997;277:25-31. (Class A)
- Evanich JD, Evanich CJ, Wright MB, Rydelwicz JA. Efficacy of intraarticular hyaluronic acid injections in knee osteoarthritis. *Clin Orthop* 2001;390:173-81. (Class D)
- Felson DT, Zhang Y, Anthony JM, et al. Weight loss reduces the risk for symptomatic knee osteoarthritis in women. *Ann Intern Med* 1992;116:535-39. (Class C)

- Felson DT, Zhang Y, Hannan MT, et al. Risk factors for incident radiographic knee osteoarthritis in the elderly: the Framingham Study. *Arthritis Rheum* 1997;40:728-33. (Class B)
- Finger S, Paulos LE. Clinical and biomechanical evaluation of the unloading brace. *J Knee Surg* 2002;15:155-59. (Class D)
- Fransen M, Crosbie J, Edmonds J. Physical therapy is effective for patients with osteoarthritis of the knee: a randomized controlled clinical trial. *J Rheumatol* 2001;28:156-64. (Class A)
- Guidolin DD, Ronchetti IP, Lini E, et al. Morphological analysis of articular cartilage biopsies from a randomized, clinical study comparing the effects of 500–730 kDa sodium hyaluronate (Hyalgan®) and methylprednisolone acetate on primary osteoarthritis of the knee. *Osteoarthritis Cartilage* 2001;9:371-81. (Class A)
- Gurwitz JH, Avorn JH, Ross-Gegnan D, et al. Nonsteroidal anti-inflammatory drug-associated azotemia in the very old. *JAMA* 1990;264:471-75. (Class C)
- Hochberg MC, Altman RD, Brandt KD, et al. Guidelines for the medical management of osteoarthritis: part II. osteoarthritis of the knee. *Arthritis Rheum* 1995;38:1541-46. (Class R)
- Hopman-Rock M, Westhoff MH. The effects of a health educational and exercise program for older adults with osteoarthritis of the hip or knee. *J Rheumatol* 2000;27:1947-54. (Class A)
- Jones AC, Berman P, Doherty M. Nonsteroidal anti-inflammatory drug usage and requirement in elderly acute hospital admissions. *Br J Rheumatol* 1992;31:45-48. (Class D)
- Jurisson ML. Managing pain in rheumatic diseases. *Phys Med Rehabil Clin North Am* 1995;6:207-17. (Class R)
- Kirkley A, Webster-Bogaert S, Litchfield R, et al. The effect of bracing on varus gonarthrosis. *J Bone Joint Surg Am* 1999;81:539-48. (Class A)
- Krause BL, Williams JPR, Catterall A, et al. Natural history of Osgood-Schlatter disease. *J Pediatr Orthoped* 1990;10:65-68. (Class D)
- Lorig KR, Mazonson PD, Holman HR. Evidence suggesting that health education for self-management in patients with chronic arthritis has sustained health benefits while reducing health care costs. *Arthritis Rheum* 1993;36:439-46. (Class C)
- Marks R, Penton L. Are foot orthotics efficacious for treating painful medial compartment knee osteoarthritis? A review of the literature. *Int J Clin Pract* 2004;58:49-57. (Class R)
- Matsuno H, Kadowaki KM, Tsuji H. Generation II knee bracing for severe medial compartment osteoarthritis of the knee. *Arch Phys Med Rehabil* 1997;78:745-49. (Class D)
- Mazzuca SA, Brandt KD, Katz BP, et al. Effects of self-care education on the health status of inner-city patients with osteoarthritis of the knee. *Arthritis Rheum* 1997;40:1466-74. (Class C)
- Mazzuca SA, Brandt KD, Katz BP, et al. Reduced utilization and cost of primary care clinic visits resulting from self-care education for patients with osteoarthritis of the knee. *Arthritis Rheum* 1999;42:1267-73. (Class C)
- McAlindon TE, LaValley MP, Gulin JP, et al. Glucosamine and chondroitin for treatment of osteoarthritis: a systematic quality assessment and meta-analysis. *JAMA* 2000;283:1469-75. (Class M)
- Messieh SS, Fowler PJ, Munro T. Anteroposterior radiographs of the osteoarthritic knee. *J Bone Joint Surg (Br)* 1990;72-B:639-40. (Class D)
- Modawal A, Ferrer M, Choi HK, Castle JA. Hyaluronic acid injections relieve knee pain: this meta-analysis shows good therapeutic effect for between 5 and 12 weeks. *J Fam Prac* 2005;54:758-67. (Class M)

- National Institutes of Health. NIH consensus statement: acupuncture. 1997;15:1-34. (Class R)
- Osiri M, Welch V, Brosseau L, et al. Transcutaneous electrical nerve stimulation for knee osteoarthritis. (Cochrane Review) *In The Cochrane Library* 2004;3. Chichester, UK: John Wiley & Sons, Ltd. (Class M)
- Pavlov H, Dalinka MK, Alazraki NP, et al. Nontraumatic knee pain. *ACR Appropriateness Criteria* 2005. (Class R)
- Petrella RJ, Bartha C. Home based exercise therapy for older patients with knee osteoarthritis: a randomized clinical trial. *J Rheumatol* 2000;27:2215-21. (Class A)
- Petrella RJ, DiSilvestro MD, Hildebrand C. Effects of hyaluronate sodium on pain and physical functioning in osteoarthritis of the knee: a randomized, double-blind, placebo-controlled clinical trial. *Arch Intern Med* 2002;162:292-98. (Class A)
- Pham T, Maillefert J-F, Hudry C, et al. Laterally elevated wedged insoles in the treatment of medial knee osteoarthritis: a two-year prospective randomized controlled study. *OsteoArthritis and Cartilage* 2004;12:46-55. (Class A)
- Pronk NP, Wing RR. Physical activity and long-term maintenance of weight loss. *Obes Res* 1994;2:587-99. (Class R)
- Qiu GX, Gao SN, Giacobelli G, et al. Efficacy and safety of glucosamine sulfate versus ibuprofen in patients with knee osteoarthritis. *Arzneim-Forsch/Drug Res* 1998;48:469-74. (Class A)
- Reginster JY, Deroisy R, Rovati LC, et al. Long-term effects of glucosamine sulphate on osteoarthritis progression: a randomised, placebo-controlled clinical trial. *Lancet* 2001;357:251-56. (Class A)
- Salter RB. *In Textbook of Disorders and Injuries of the Musculoskeletal System*. Baltimore: Williams & Wilkins, 1983. (Class R)
- Smalley WE, Ray WA, Daugherty JR, et al. Nonsteroidal anti-inflammatory drugs and the incidence of hospitalizations for peptic ulcer disease in elderly persons. *Am J Epidemiol* 1995;144:539-45. (Class C)
- Toda Y, Segal N, Kato A, et al. Effect of a novel insole on the subtalar joint of patients with medial compartment osteoarthritis of the knee. *J Rheumatol* 2001;28:2705-10. (Class C)
- Toda Y, Tsukimura N, Kato A. The effects of different elevations of laterally wedged insoles with subtalar strapping on medial compartment osteoarthritis of the knee. *Arch Phys Med Rehabil* 2004;85:673-77. (Class C)
- Uebelhart D, Thonar EJ-MA, Delmas P, et al. Effects of oral chondroitin sulfate on the progression of knee osteoarthritis: a pilot study. *Osteoarthritis Cartilage* 1998;6(suppl A):39-46. (Class A)
- van Baar ME, Assendelft WJJ, Dekker J, et al. Effectiveness of exercise therapy in patients with osteoarthritis of the hip or knee: A systematic review of randomized clinical trials. *Arthritis Rheum* 1999;42:1361-69. (Class M)
- Welch V, Brosseau L, Peterson J, et al. Therapeutic ultrasound for osteoarthritis of the knee. (Cochrane Review) *In The Cochrane Library* 2004;3 Chichester, UK: John Wiley & Sons, Ltd. (Class M)
- Williams HJ, Ward JR, Egger MJ, et al. Comparison of naproxen and acetaminophen in a two-year study of treatment of osteoarthritis of the knee. *Arthritis Rheum* 1993;36:1196-1206. (Class A)
- Yates C, Grana WA. Patellofemoral pain—a prospective study. *Orthopedics* 1986;9:663-67. (Class D)

# Conclusion Grading Worksheet A – Annotation #10 (Exercise Recommended)

**Work Group's Conclusion:** Exercise should be recommended for patients with DJD of the knee.

**Conclusion Grade: I**

Author/Year	Design Type	Class	Quality +, -, 0	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ <i>Work Group's Comments (italicized)</i>
Etinger et al., 1997	RCT	A	0	-439 (70% female) community-dwelling adults with radiographically evident knee osteoarthritis (OA), pain and self-reported physical disability -144 received aerobic exercise, 146 resistance exercise, and 149 health education -mean age 69 years	-aerobic exercise group had 12% lower score on pain questionnaire (p=0.001), performed better on 6-minute walk test (1507ft vs 1349ft, p<0.001), time to climb/descend stairs (12.7 vs 13.9 seconds, p=0.05), time to lift/carry 10 lbs. (9.1 vs 10 seconds, p<0.001), and time to get in/out of a car (8.7 vs 10.6 seconds, p<0.001) than the health education group -resistance exercise group had 8% lower score on pain questionnaire (p=0.02), performed better on 6-minute walk test (1406ft vs 1349ft, p=0.02), time to lift/carry 10 lbs. (9.3 vs 10 seconds, p=0.001), and time to get in/out of a car (9 vs 10.6 seconds, p=0.003) than the health education group	-These data suggest that exercise should be prescribed as part of the treatment for knee osteoarthritis.  Work Group's Comments: <i>-Blinded studies are not practical in measuring benefits of exercise and some patients may elect to exercise outside of study protocol.</i>
Van Baar et al., 1999	Systematic Review	M	N/A	-computerized search of MEDLINE of clinical trials of OA of the hip or knee -weighting of trials was assessed based on validity and power -9 trials were included	-the evidence indicates a small to moderate beneficial effect of exercise therapy on pain in knee OA -the evidence indicates a small beneficial effect of exercise therapy on self-reported disability and walking in knee OA -the evidence indicates a moderate to great beneficial effect of exercise therapy on a patients global assessment of effect on knee OA	-There is evidence of beneficial effects of exercise therapy in patients with OA of the hip or knee. However, the small number of good studies restricts drawing firm conclusions.
Deyle et al., 2000	RCT	A	0	-42 treatment and 41 placebo patients (59% female) with OA of the knee referred by a physician for physical therapy (PT) -mean age 61 years	-at 8 week follow-up, average 6-minute walk distance had improved by 13.1% (p<0.05) and WOMAC (function, pain, stiffness) scores had improved by 55.8% (p<0.05) over baseline in the trx group -at 8 week follow-up, average 6-minute walk distance was 78m (p<0.05) better and average WOMAC scores were 472 mm (p<0.05) better in treatment patients as compared to controls -at 1-year, more placebo patients had received knee surgery than treatment patients (p=0.039), 20% of placebo and 5% of trx patients had received knee arthroplasty, and 15% treated and 5% control patients had received steroid injections	-A combination of manual physical therapy and supervised exercise yields functional benefits for patients with osteoarthritis of the knee and may delay or prevent the need for surgical intervention.

Author/Year	Design Type	Class	Quality +,-,Ø	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ <i>Work Group's Comments (italicized)</i>
Fransen et al., 2001	RCT	A	Ø	-126 patients (73% women) referred to PT for knee osteoarthritis -43 patients received individual treatments, 40 small group format, and 43 controls who were randomized to one of the treatment groups at 8-wk follow-up -mean age 67 years	-the treatment groups had significant improvements in WOMAC pain (10.6 vs -1.5, p<0.01) and physical function (7.7 vs -0.1, p<0.01), health related quality of life (SF-36 physical, p=0.05 and mental, p<0.01), knee extensors (p=0.01) and flexors (p=0.02), and fast speed (p<0.01), fast cadence (p=0.05) and fast stride length (p<0.01) as compared to controls -there were no significant differences between the two treatment groups	-Physical therapy, either as individually delivered treatment or in small group format, is an effective intervention for patients with knee OA.
Hopman-Rock et al., 2000	RCT	A	-	-105 patients (83% female) with clinically and radiographically diagnosed knee or hip osteoarthritis -56 treatment patients entered a self management program consisting of 6 weekly, 2-hour sessions of health education and physical exercise, 49 controls did not receive intervention -mean age 65.3 years	-treatment group had significant improvements in pain (symptoms p=0.045, tolerance p=0.011), strength of the left M. quadriceps (p=0.028), BMI (p=0.01) and visits to the physical therapist (p=0.01) as compared to the control group -no statistically significant differences between the two groups (both groups showed improvement) were found for extension, flexion, exhortation, or endorotation of the hip or knee -most effects were moderate at post-test and smaller at 6-month follow-up	-The program was reasonably effective but more attention should be paid to proactive follow-up interventions and to the selection of participants.  Work Group's Comments: <i>-Patients in this study were included for hip and/or knee OA.</i>
Petrella et al., 2000	RCT	A	Ø	-179 patients (60% female) with radiographic evidence of mild/moderate knee osteoarthritis -88 received a home based exercise program and 89 received a control program -All patients received 1200 mg of oxaprozin daily -mean age 74 years	-at 8 wks, treatment group had significant reductions in pain (WOMAC p=0.003, VAS p=0.02), improvement in self-paced walking and stepping times (SPW p=0.002, SPS p=0.009), and better passive range of motion (p=0.03) as compared to the control group -there was no significant difference in the Physical Activity Scale for Elderly scores between the two groups	-Addition of a progressive exercise program to nonsteroidal anti-inflammatory therapy in patients with knee OA can improve measures of activity and activity-related pain more than medication alone.

## Conclusion Grading Worksheet B – Annotation #11 (Synthetic Hyaluronates)

**Work Group's Conclusion:** Synthetic hyaluronates may be effective treatment for pain in selected patients with mild to moderate DJD of the knee.

**Conclusion Grade: II**

Author/Year	Design Type	Class	Quality +, -, 0	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ <i>Work Group's Comments (italicized)</i>
Brandt et al., 2001	RCT	A	0	-226 patients with knee osteoarthritis (OA) randomized to receive 3 weekly injections of 30 mg sodium hyaluronate (HA, 114 patients) or saline (112 controls) -25-week follow-up -mean age 66 years -63% women	-Of the 135 patients who completed 15 at least 15 weeks of the study and had an index pain score of at least 12 at baseline, 58% of HA patients achieved a 5 unit or greater improvement in pain scores compared to 40% of controls (p=0.04) and twice as many HA patients achieved a net improvement of at least 7 units (30% vs 17%, p>0.05) -no difference was seen in amount of side effects between the two groups (8% HA vs 10% controls)	-The results indicate that sodium hyaluronate treatment is well tolerated and produces statistically and clinically significant improvement in patients with mild to moderate knee OA in whom pain in the contralateral knee is relatively modest.
Evanich et al., 2001	Case series	D	-	-84 patients (100 knees) received 3 injections of 2 ml of Hylan G-F20 for 3 weeks -average follow-up 10 months -20% LTF -61% women -mean age 66 years	-66% of treated knees received 66% relief of pain -less than 50% of knees achieved satisfactory results and 35% reported increased activity -28% of knees underwent surgery within 7 months of the index injection -15% of patients experienced adverse reactions	-The authors recommend intraarticular hyaluronic acid only for patients with symptoms who have significant surgical risk factors and for patients with mild radiographic disease in whom conservative treatment has failed.
Guidolin et al., 2001	RCT	A	0	-24 patients with primary OA of the knee -11 patients treated with Hyaluronan (HA, 20mg/2ml) once/wk for 5 weeks -13 patients treated with methylprednisolone (MP, 40mg/1ml) once/wk for 3 weeks -19 control patients without OA were also analyzed	-root men square roughness (p=0.065) and superficial amorphous layer structural compactness (p=0.005) and thickness (p=0.002), were significantly improved in HA treated patients at 6-month follow-up but not in the MP group -the numerical density restoration of metabolically active chondrocytes was statistically significant for the HA group in both the tangential layer (p=0.004) and the intermediate layer (p=0.002) at 6-months -significantly more biopsies from the HA group showed improved territorial matrix as compared to the MP group at 6-months (80% vs 30%, p=0.02)	-These results cannot be explained by temporary restoration of the synovial fluid viscoelasticity, and provide further evidence that the specific fraction of hyaluronan used in this study is a useful tool in OA treatment, with a potential structure-modifying activity.



Author/Year	Design Type	Class	Quality +,-,0	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ <i>Work Group's Comments (italicized)</i>
Petrella et al., 2002	RCT	A	0	-120 patients (59% women) with grade 1-3 medial compartment knee OA were randomized to 4 tx groups -group 1-received 20mg hyaluronate sodium and placebo -group 2-NSAIDs and hyaluronate sodium -group 3-NSAIDs and placebo -group 4-placebo alone	-at week 4, significant improvement in WOMAC self-reported scores for pain and disability (p<0.05) and VAS resting pain scores (p<0.05) were shown in groups 1-3 as compared to baseline. -at 4 weeks, groups 1-2 showed significantly lower self-paced stepping pain (p<0.05) and no change was observed in group 4 -at week 12, groups 1-2 showed significantly less activity pain (p<0.05) and group 1 significantly faster self-paced walking and stepping (p<0.05)	-For resting pain relief, hyaluronate sodium seems to be as effective as NSAIDs. For pain with physical activity and functional performance, hyaluronate sodium may be superior to placebo alone or NSAIDs alone.

This section provides resources, strategies and measurement specifications for use in closing the gap between current clinical practice and the recommendations set forth in the guideline.

The subdivisions of this section are:

- Priority Aims and Suggested Measures
  - Measurement Specifications
- Key Implementation Recommendations
- Knowledge Products and Resources
- Other Resources Available

## Priority Aims and Suggested Measures

1. Improve the efficacy of diagnostic imaging for evaluating degenerative joint disease.

Possible measures for accomplishing this aim:

- a. Percent of patients diagnosed with degenerative joint disease with knee x-ray panels that include a standing view of the knee.
- b. Percent of patients diagnosed with degenerative joint disease who did not receive MRIs during the diagnostic process.

2. Increase the use of recommended conservative approach as first-line treatment for degenerative joint disease.

Possible measures for accomplishing this aim:

- a. Percent of patients diagnosed with degenerative joint disease receiving non-pharmacologic pain management as part of the first-line treatment.
- b. Percent of patients diagnosed with degenerative joint disease receiving acetaminophen or analgesic dose nonsteroidal medications as the first-line medication.
- c. Percent of patients diagnosed with degenerative joint disease with documentation that they have been advised to exercise regularly.

3. Increase patient education for patients with degenerative joint disease.

Possible measures for accomplishing this aim:

- a. Percent of patients with degenerative joint disease with documented education in four comprehensive areas: protecting the joint, exercise, pain relief, healthy living habits.
- b. Percent of patients with degenerative joint disease receiving patient education on medications and their uses.

## Measurement Specifications

### Possible Success Measure #1a

Percentage of patients diagnosed with degenerative joint disease with knee x-ray panels that include a standing view of the knee.

### Population Definition

All patients age 18 and older with a diagnosis of degenerative joint disease.

### Data of Interest

# of patients diagnosed with degenerative joint disease with a knee x-ray panel that includes a standing view

---

total # of patients diagnosed with degenerative joint disease who have a knee x-ray panel taken

### Numerator/Denominator Definitions

Numerator: X-ray panels that include a standing view might be identified by the following CPT codes:

73562	Includes anteroposterior, lateral and/or patellar views (this code is used as a 3 view code, i.e., code 73560 <b>plus</b> a standing view).
73565	Radiologic examination, both knees, standing, anteroposterior.

Degenerative joint disease of the knee might be identified using the following ICD-9 codes\*:

715.96	Osteoarthritis (degenerative) of the lower leg.
715.16	Osteoarthritis (degenerative) idiopathic, primary, lower leg.
715.26	Osteoarthritis (degenerative) secondary, lower leg.
715.36	Osteoarthritis (degenerative) localized, lower leg.

Denominator: Patient population identified through diagnosis specific for degenerative joint disease in the knee and any knee x-ray panel taken.

### Method/Source of Data Collection

The medical records of a random sample of patients who have a degenerative joint disease diagnosis specific to the knee may be reviewed monthly. From the claims (billing) data, all patients age 18 and older with degenerative joint disease of the knee may be identified. If possible, this list might be reduced to include only those who had knee x-rays at that visit. This patient pool may then be used to randomly select cases for review of the x-ray panels taken and determination of which of those panels included a standing view x-ray. Alternatively, the Degenerative Joint Disease Optional Data Collection Tool (provided as an example at the end of the measurement section) could be used for data collection as patients present with a painful knee.

### Time Frame Pertaining to Data Collection

Data may be collected monthly.

## **Notes**

The intent of the guideline is not to increase the number of x-rays taken, but to ensure that when an x-ray is obtained, it will be a standing one. This measurement assesses what proportion of knee x-rays taken are of the standing view type. The reported measure should increase toward 100%.

### **Possible Success Measure #3a**

Percentage of patients with degenerative joint disease with documented education in four comprehensive areas: protecting the joint, exercise, pain relief, healthy living habits.

### **Population Definition**

Patients 18 years of age and older diagnosed with degenerative joint disease.

### **Data of Interest**

$$\frac{\text{\# of records with documentation of patient education about degenerative joint disease}}{\text{total \# of patients with degenerative joint disease whose medical records are reviewed}}$$

### **Numerator/Denominator Definitions**

**Numerator:** Documented is defined as any evidence in the medical record that patient education materials were provided related to caring for degenerative joint disease as recommended in the guideline.

**Denominator:** Patients with a diagnosis code of 715.96, 715.16, 715.26, 715.36 who have not been seen in clinic with the same diagnosis code within the previous six months.

### **Method/Source of Data Collection**

Data may be collected electronically using the claims/encounter database or the enrollment database. Medical groups should identify patients with degenerative joint disease seen at the clinic. Each medical group can then generate a list of all eligible patients with degenerative joint disease seen during the target month/quarter. The eligible patients are those who are 18 years old and older who have been continuously enrolled in the clinic for the past six months. A random sample of 20 charts can be chosen from this list. The patient medical records will be reviewed for any evidence that a clinician provided patient education.

### **Time Frame Pertaining to Data Collection**

A minimum of 20 charts per month can be reviewed.

## **Probing Measures**

Some medical groups report difficulty in obtaining standing view x-rays due to limitations in the available technology, i.e., x-ray (radiologic) equipment. This probing measure is identified to aid medical groups in the process of making standing view x-rays possible using already available equipment.

### **Suggested Probing Measures:**

1. Why are standing view x-rays not obtained?
  - Can standing view x-rays be obtained using available radiologic equipment without technological modifications?
  - Is the technological limitation the reason that standing view x-rays are not obtained for the identified population in this guideline?
  - Can simple modifications be identified that make the standing view x-ray possible? [e.g., several wooden boxes of varied heights may be constructed for the patients to stand on in order to line up the x-ray equipment with the knee(s).]

These measures may all be collected at the same time in a short time frame. Following data collection, steps may be taken to create possible solutions and implement the procedures. Success may be reflected in increased number of standing view x-rays.

2. Are there differences in the rate of standing view x-ray panels obtained in this patient population between clinics in the same system?
3. What are the common characteristics of those people who do not receive standing view x-ray panels?
4. What are the common characteristics of those people who do not receive patient education?

## Optional Data Collection Tool

	Date	Member ID	Patient Name	Patient presenting with painful knee	Patient Diagnosed with DJD	X-ray taken	Standing x-ray taken	MRI taken	Exercise prescribed or recommended	Patient education provided
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										



## Key Implementation Recommendations

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline.

1. Have a system in place that assures the patient will be seen for a same-day appointment if a patient reports the following: hot, swollen joint with or without fever and/or feeling ill, cannot bear weight on leg, leg or foot is cool or blue, deformity, severe pain, locked knee, and/or patient demands to be seen the same day.
2. Develop a process that identifies a designated care provider who can provide advice on basic techniques to reduce pain and inflammation (e.g. ice, rest, compression) in the knee.
3. Have a system in place that guarantees that education will occur and/or educational materials are provided to the patient regarding overall goals of treatment. Education can include information regarding the disease and self-management, pain reduction, exercise that promotes joint health, and improvement in patient functioning and safety.
4. Develop a system that has pre-identified referral sources so as to remove barriers that will interfere with referrals to specialists.

## Knowledge Products and Resources

### Criteria for Selecting Resources

The preceding resources were selected by the Degenerative Joint Disease guideline work group as additional resources for providers and/or patients. The following criteria were considered in selecting these sites.

- The site contains information specific to the topic of the guideline.
- The content is supported by evidence-based research.
- The content includes the source/author, and contact information.
- The content clearly states revision dates or the date the information was published.
- The content is clear about potential biases, noting conflict of interest and/or disclaimers as appropriate.

### Resources Available to ICSI Members Only

The following materials are available to ICSI members only. Also available is a wide variety of other knowledge products including tool kits on CQI processes and Rapid Cycling that can be helpful. To obtain copies of these or other Knowledge Products, go to <http://www.icsi.org/knowledge>.

To access these materials on the Web site you must be logged in as an ICSI member.

## Other Resources Available

Title/Description	Audience	Author/Organization	Web sites/Order Information
ACR Web site provides information to specialists in arthritis care and fact sheets for patients on arthritis-related topics, including Degenerative Joint Disease.	Health Care Professionals; Patients and Families	American College of Rheumatology (ACR)	<a href="http://www.rheumatology.org/public">http://www.rheumatology.org/public</a>
Patient focused site. Includes advice on lifestyle modifications to improve management of arthritis, pain management and medications. Also provides directory of local chapters.	Patients and Families	Arthritis Foundation	<a href="http://www.arthritis.org">http://www.arthritis.org</a> toll free number: 1-800-283-7800
Mayo Clinic patient-oriented website. Type "osteoarthritis" in the search box for more information.	Patients and Families	Mayo Foundation for Medical Education and Research	<a href="http://www.mayoclinic.com">http://www.mayoclinic.com</a>
The health information page provides links to content from various institutions and centers that make up the NIH. Search "osteoarthritis" under the alphabetized list for more information.	Patients and Families	National Institutes of Health	<a href="http://www.health.nih.gov">http://www.health.nih.gov</a>