AAOS – Osteoarthritis Guidelines

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OA incidence

- Approximately 33 million Americans (>40 millions Europeans) are affected by osteoarthritis (OA)
- More common in people >50 yrs of age
- Lifetime risk
  - 45% for the knee
  - 25% for the hip
  - 1.68-2.77% for the shoulder

Treatment guidelines for OA

- Uniformly recommend a range of pharmacological and non-pharmacological therapies
- Therapies are restricted by considerable side effects and limited efficacy, as well as country-specific restrictions (e.g. on opioid use), and patients' compliance on how they use their medication

The strength of recommendation

INTERPRETING THE STRENGTH OF EVIDENCE

Table 1. Strength of Recommendation Descriptions

Strength	Overall Strength of Evidence	Description of Evidence Quality	Strength Visual
Strong	Strong	Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention.	
Moderate	Moderate	Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.	
Limited	Low or Conflicting Evidence	Evidence from two or more "Low" quality studies with consistent findings **or** evidence from a single "Moderate" quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.	
Consensus	No Evidence	There is no supporting evidence. In the absence of reliable evidence, the systematic literature review development group is making a recommendation based on their clinical opinion.	

AAOS

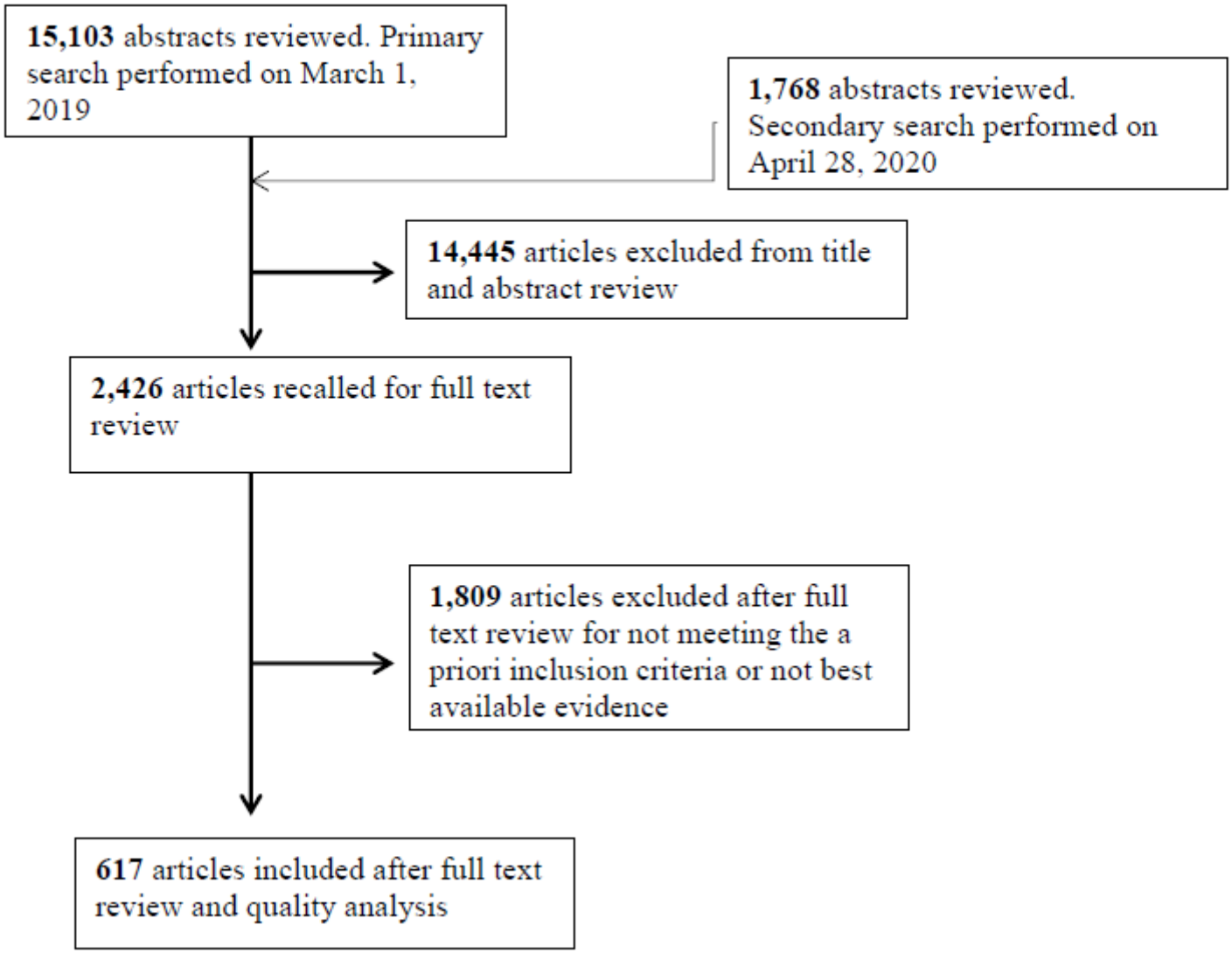
American Academy of Orthopaedic Surgeons

Management of Osteoarthritis of the Knee (Non-Arthroplasty)

Evidence-Based Clinical Practice Guideline

Adopted by:
The American Academy of Orthopaedic Surgeons Board of Directors
August 31, 2021

Study Attrition Flowchart



Lateral Wedge Insoles

Lateral wedge insoles are not recommended for patients with knee osteoarthritis.

Strength of Recommendation: Strong ★★★★

Cost Effectiveness/Resource Utilization

A standard insole or conventional walking shoe provided equivalent improvement in pain compared to lateral wedge arch support. Although the lateral wedge modifications are more expensive, the increased cost is not prohibitive and a patient attempting self-treatment could discontinue at any time with little loss of time effort or out of pocket cost.

Canes

Canes could be used to improve pain and function in patients with knee osteoarthritis.

Strength of Recommendation: Moderate ★★★☆

Feasibility

Canes have been used since antiquity although comparison studies are only being produced in the last generation. There is little downside to extended use of the cane as patients appear to adapt to the increased oxygen consumption demands.

Braces

Brace treatment could be used to improve function, pain and quality of life in patients with knee osteoarthritis.

Strength of Recommendation: Moderate ★★★☆

Future Research

Future high-quality studies that are well powered are required to assess the real efficacy of unloader braces vs knee sleeves in a population with similar mechanical axis with a similar degree of OA.

Weight Loss Intervention

Sustained weight loss is recommended to improve pain and function in overweight and obese patients with knee osteoarthritis.

Strength of Recommendation: Moderate ★★★☆ (downgrade)

Cost Effectiveness/Resource Utilization

Weight loss presents a potentially high level of cost effectiveness compared to other surgical and nonsurgical approaches; however, the cost-effectiveness of different weight loss approaches is still to be determined.

Oral/Dietary Supplements

The following supplements may be helpful in reducing pain and improving function for patients with mild to moderate knee osteoarthritis; however, the evidence is inconsistent/limited and additional research clarifying the efficacy of each supplement is needed.

a) **Turmeric**
b) **Ginger extract**
c) **Glucosamine**
d) **Chondroitin**
e) **Vitamin D**

Strength of Recommendation: Limited ★★☆☆ (downgrade)

Oral NSAIDs

Oral NSAIDs are recommended to improve pain and function in the treatment of knee osteoarthritis when not contraindicated.

Strength of Recommendation: Strong ★★★★

Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework.

Oral Acetaminophen

Oral Acetaminophen is recommended to improve pain and function in the treatment of knee osteoarthritis when not contraindicated.

Strength of Recommendation: Strong ★★★★

Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework.

Oral Narcotics

Oral narcotics, including tramadol, result in a significant increase of adverse events and are not effective at improving pain or function for treatment of osteoarthritis of the knee.

Strength of Recommendation: Strong ★★★★

Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework.

Future Research

Most important future research will provide high quality investigation through either prospective randomized trials or prospective cohort studies to establish efficacy within specific subgroups and populations to tailor systemic medications increasing efficacy and decreasing risk of adverse effects.

Topical Treatments

Topical NSAIDs should be used to improve function and quality of life for treatment of osteoarthritis of the knee, when not contraindicated.

Strength of Recommendation: Strong ★★★★

Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. Also requires no reasons to downgrade from the EtD framework.

Feasibility

Topical NSAIDs will be available at pharmacies over the counter. The main barrier will be cost and having to apply the gel multiple times a day.

Future Research

Future research might be directed at determining if continued topical NSAID use is required to sustain benefits or if benefits continue after usage for a defined period of time.

Supervised Exercise

Supervised exercise, unsupervised exercise, and/or aquatic exercise are recommended over no exercise to improve pain and function for treatment of knee osteoarthritis.

Strength of Recommendation: Strong ★★★★

Feasibility

Most exercise programs would be considered feasible. However, some patients may have difficulty with access to supervised exercise due to travel or co-pay concerns. Aquatic programs would not be feasible for patients who do not have access to a pool or walking tank.

Neuromuscular Training

Neuromuscular training (i.e. balance, agility, coordination) programs in combination with traditional exercise could be used to improve performance-based function and walking speed for treatment of knee osteoarthritis.

Strength of Recommendation: Moderate ★★★☆ (downgrade)

Feasibility

Neuromuscular exercise programs would be considered feasible. However, some patients may have difficulty with access to supervised exercise due to travel or co-pay concerns.

Self-Management

Self-management programs are recommended to improve pain and function for patients with knee osteoarthritis.

Strength of Recommendation: Strong ★★★★

Patient Education

Patient education programs are recommended to improve pain in patients with knee osteoarthritis.

Strength of Recommendation: Strong ★★★★

Feasibility

Self-management programs are feasible for patients provided they have appropriate access. Some patients may have limited access for participation, making the programs less feasible.

Future Research

Further research is needed to determine the best practice of education for reducing pain and other PROM for knee OA and the delivery method. Since many studies use different components and delivery methods and multiple interventions, it is impossible to recommend one particular educational module or particular component.

Manual Therapy

Manual therapy in addition to an exercise program may be used to improve pain and function in patients with knee osteoarthritis.

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Massage

Massage may be used in addition to usual care to improve pain and function in patients with knee osteoarthritis.

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Laser Treatment

FDA-approved laser treatment may be used to improve pain and function in patients with knee osteoarthritis

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be

Acupuncture

Acupuncture may improve pain and function in patients with knee osteoarthritis.

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Percutaneous Electrical Nerve Stimulation

Modalities that may be used to improve pain and/or function in patients with knee osteoarthritis include:

a) **Percutaneous Electrical Nerve Stimulation (pain and function)**
b) **Pulsed Electromagnetic Field Therapy (pain)**

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Extracorporeal Shockwave Therapy

Extracorporeal shockwave therapy may be used to improve pain and function for treatment of osteoarthritis of the knee.

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Transcutaneous Electrical Nerve Stimulation

Modalities that may be used to improve pain and/or function in patients with knee osteoarthritis include:

a) **Transcutaneous Electrical Nerve Stimulation (pain)**

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Dry Needling

In the absence of reliable evidence, it is the opinion of the workgroup that the utility/efficacy of dry needling is unclear and requires additional evidence.

Strength of Recommendation: Consensus ★☆☆☆

Feasibility

The intervention is feasible provided there is access to a trained practitioner. Not all clinics can provide such access.

Hyaluronic Acid

Hyaluronic acid intra-articular injection(s) is not recommended for routine use in the treatment of symptomatic osteoarthritis of the knee.

Strength of Recommendation: Moderate ★★★☆ (downgrade)
Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.

Intra-articular Corticosteroids

Intra-articular (IA) corticosteroids could provide short-term relief for patients with symptomatic osteoarthritis of the knee.

Strength of Recommendation: Moderate ★★★☆ (downgrade)
Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.

Platelet-rich Plasma

Platelet-rich plasma (PRP) may reduce pain and improve function in patients with symptomatic osteoarthritis of the knee.

Strength of Recommendation: Limited ★★☆☆ (downgrade)
Description: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.

Cost Effectiveness/Resource Utilization

The cost-effectiveness of different intra-articular therapies is still to be determined, in comparison to other treatment strategies and among different intra-articular alternatives.

Lavage/Debridement

Arthroscopy with lavage and/or debridement in patients with a primary diagnosis of knee osteoarthritis is not recommended.

Strength of Recommendation: Moderate ★★★☆

Partial Meniscectomy

Arthroscopic partial meniscectomy can be used for the treatment of meniscal tears in patients with concomitant mild to moderate osteoarthritis who have failed physical therapy or other nonsurgical treatments.

Strength of Recommendation: Moderate ★★★☆

Benefits/Harms of Implementation

Given the risks associated with surgical intervention, only appropriately indicated patients should be considered for partial meniscectomy in the setting of mild to moderate knee osteoarthritis.

Denervation Therapy

Denervation therapy may reduce pain and improve function in patients with symptomatic osteoarthritis of the knee.

Strength of Recommendation: Limited ★★☆☆ (downgrade)

Tibial Osteotomy

High tibial osteotomy may be considered to improve pain and function in properly indicated patients with unicompartmental knee osteoarthritis.

Strength of Recommendation: Limited ★★☆☆ (downgrade)

Free Floating Interpositional Devices

In the absence of reliable or new evidence, it is the opinion of the work group not to use free-floating (un-fixed) interpositional devices in patients with symptomatic medial compartment osteoarthritis of the knee.

Strength of Recommendation: Consensus ★☆☆☆

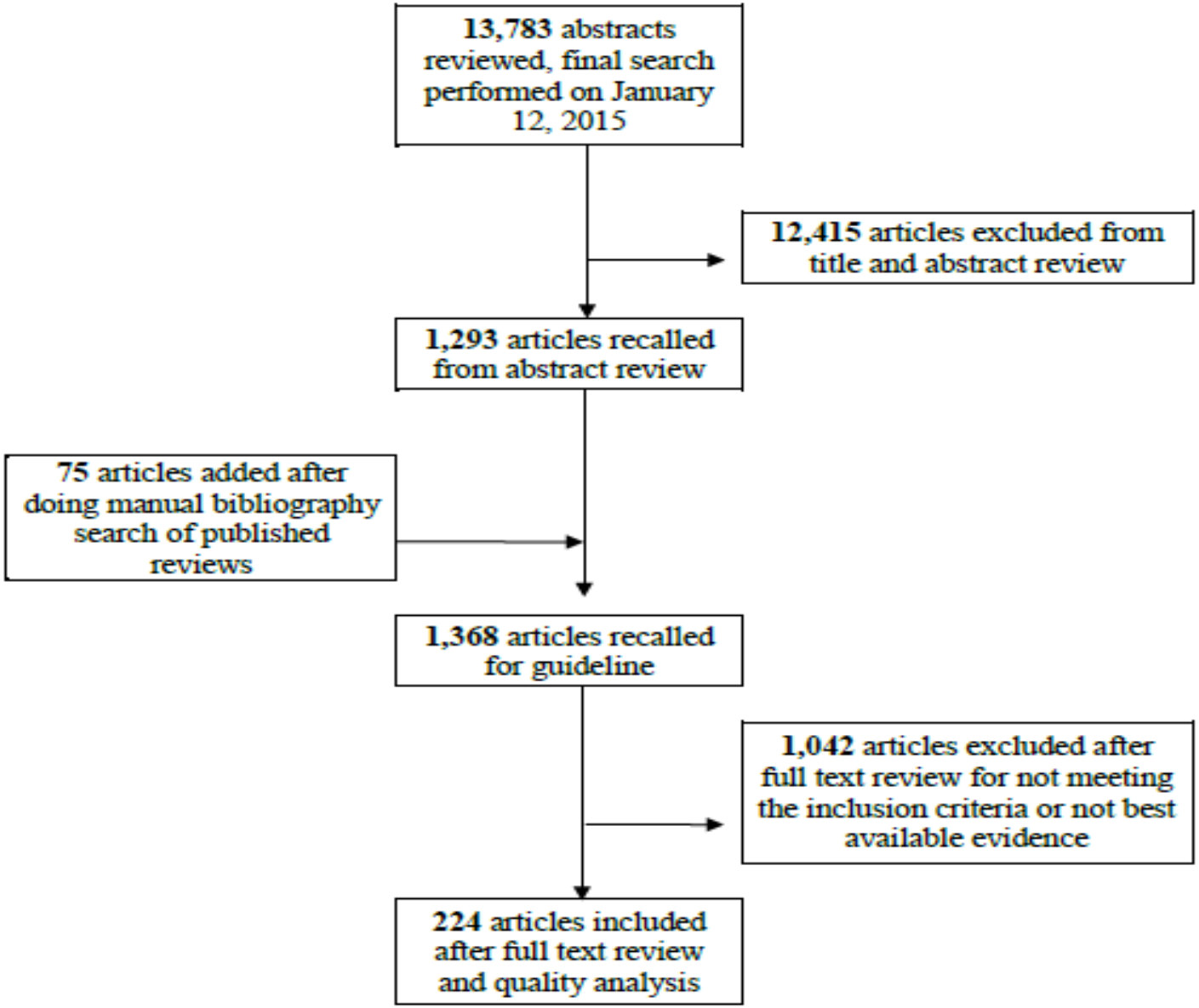
AAOS
American Academy of Orthopaedic Surgeons

Surgical Management of Osteoarthritis of the Knee

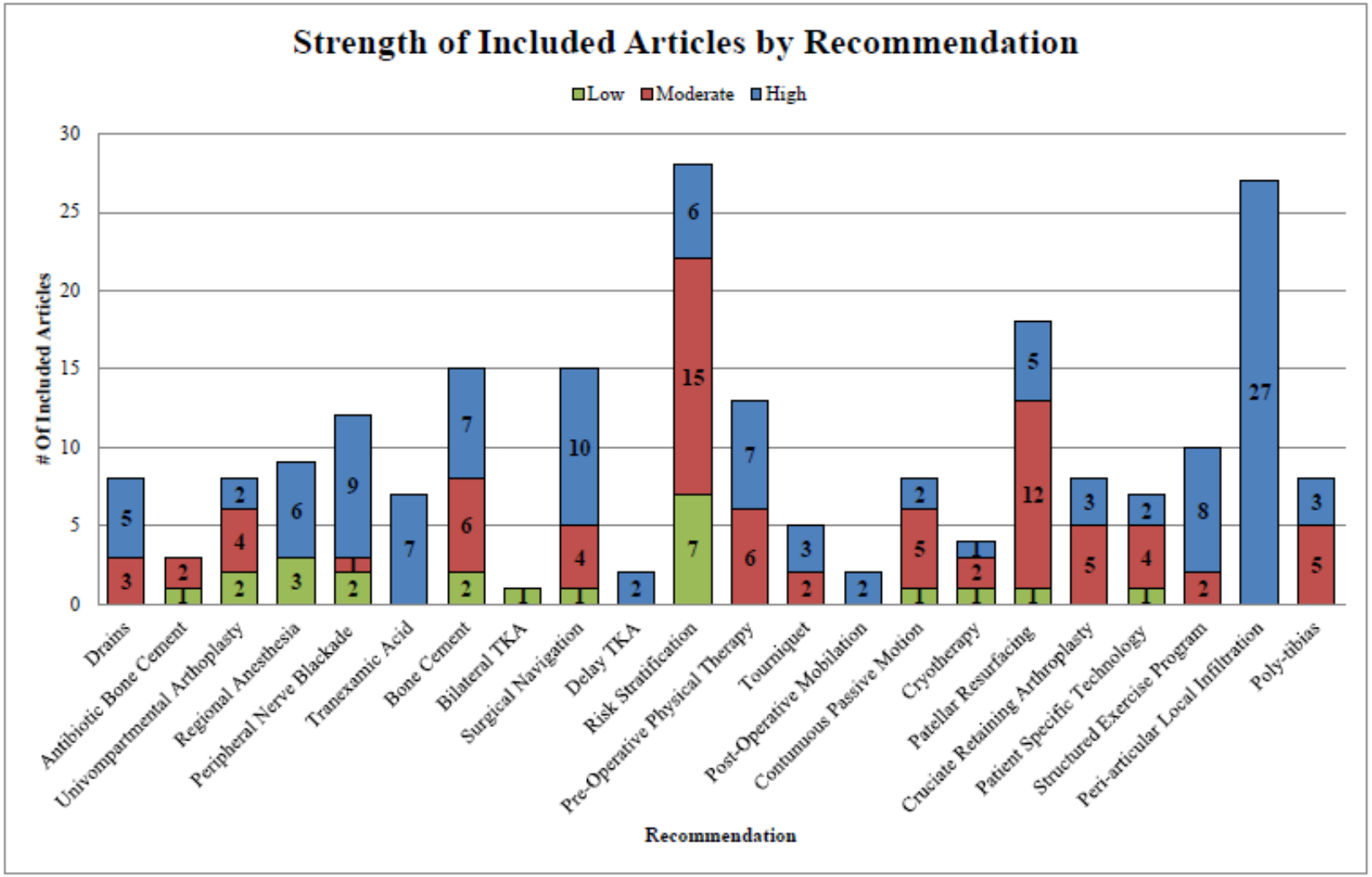
Evidence-Based Clinical Practice Guideline

Adopted by:
The American Academy of Orthopaedic Surgeons Board of Directors
September 4, 2015

APPENDIX IV
STUDY ATTRITION FLOWCHART



OVERVIEW OF ARTICLES BY RECOMMENDATION



BMI AS A RISK FACTOR

Strong evidence supports that obese patients have less improvement in outcomes with total knee arthroplasty (TKA).

Strength of Recommendation: Strong Evidence ★★★★

Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.

DIABETES AS A RISK FACTOR

Moderate evidence supports that patients with diabetes are at higher risk for complications with total knee arthroplasty (TKA).

Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

CHRONIC PAIN AS A RISK FACTOR

Moderate evidence supports that patients with select chronic pain conditions have less improvement in patient reported outcomes with TKA.

Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

DEPRESSION/ANXIETY AS A RISK FACTOR

Limited evidence supports that patients with depression and/or anxiety symptoms have less improvement in patient reported outcomes with total knee arthroplasty (TKA).

Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from two or more "Low" strength studies with consistent findings or evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

CIRRHOSIS/HEPATITIS C AS A RISK FACTOR

Limited evidence supports that patients with cirrhosis or hepatitis C are at higher risk for complications with total knee arthroplasty (TKA).

Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from two or more "Low" strength studies with consistent findings or evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

PREOPERATIVE PHYSICAL THERAPY

Limited evidence supports that supervised exercise before total knee arthroplasty (TKA) might improve pain and physical function after surgery.

Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from two or more "Low" strength studies with consistent findings or evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

DELAY TKA

Moderate evidence supports that an eight month delay to total knee arthroplasty (TKA) does not worsen outcomes.

Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

PERIPHERAL NERVE BLOCKADE

Strong evidence supports that peripheral nerve blockade for total knee arthroplasty (TKA) decreases postoperative pain and opioid requirements.

Strength of Recommendation: Strong Evidence ★★★★

Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.

NEURAXIAL ANESTHESIA

Moderate evidence supports that neuraxial anesthesia could be used in total knee arthroplasty (TKA) to improve select perioperative outcomes and complication rates compared to general anesthesia.

Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

PERIARTICULAR LOCAL ANESTHETIC INFILTRATION

Strong evidence supports the use of peri-articular local anesthetic infiltration compared to placebo in total knee arthroplasty (TKA) to decrease pain and opioid use.

Strength of Recommendation: Strong Evidence ★★★★

Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.

TOURNIQUET: BLOOD LOSS REDUCTION

Moderate evidence supports that the use of a tourniquet in total knee arthroplasty (TKA) decreases intraoperative blood loss.

Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

TOURNIQUET: POSTOPERATIVE PAIN REDUCTION

Strong evidence supports that tourniquet use in total knee arthroplasty (TKA) increases short term post-operative pain.

Strength of Recommendation: Strong Evidence ★★★★

Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.

TOURNIQUET: POSTOPERATIVE FUNCTION

Limited evidence supports that tourniquet use in total knee arthroplasty (TKA) decreases short term post-operative function.

Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from two or more "Low" strength studies with consistent findings or evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

TRANEXAMIC ACID

Strong evidence supports that, in patients with no known contraindications, treatment with tranexamic acid decreases postoperative blood loss and reduces the necessity of postoperative transfusions following total knee arthroplasty (TKA).

Strength of Recommendation: Strong Evidence ★★★★

Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.

ANTIBIOTIC BONE CEMENT

Limited evidence does not support the routine use of antibiotics in the cement for primary total knee arthroplasty (TKA).

Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from two or more "Low" strength studies with consistent findings or evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

CRUCIATE RETAINING ARTHROPLASTY

Strong evidence supports no difference in outcomes or complications between posterior stabilized and posterior cruciate retaining arthroplasty designs.

Strength of Recommendation: Strong Evidence ★★★★

POLYETHYLENE TIBIAL COMPONENT

Strong evidence supports use of either all-polyethylene or modular tibial components in knee arthroplasty (KA) because of no difference in outcomes.

Strength of Recommendation: Strong Evidence ★★★★

Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.

PATELLAR RESURFACING: PAIN AND FUNCTION

Strong evidence supports no difference in pain or function with or without patellar resurfacing in total knee arthroplasty.

Strength of Recommendation: Strong Evidence ★★★★

Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.

PATELLAR RESURFACING: REOPERATIONS

Moderate evidence supports that patellar resurfacing in total knee arthroplasty (TKA) could decrease cumulative reoperations after 5 years when compared to no patellar resurfacing in total knee arthroplasty (TKA).

Strength of Recommendation: Moderate Evidence ★★★☆

CEMENTED TIBIAL COMPONENTS VERSUS CEMENTLESS TIBIAL COMPONENTS

Strong evidence supports the use of tibial component fixation that is cemented or cementless in total knee arthroplasty due to similar functional outcomes and rates of complications and reoperations.

Strength of Recommendation: Strong Evidence ★★★★

CEMENTED FEMORAL & TIBIAL COMPONENTS VERSUS CEMENTLESS FEMORAL & TIBIAL COMPONENTS

Moderate evidence supports the use of either cemented femoral and tibial components or cementless femoral and tibial components in knee arthroplasty due to similar rates of complications and reoperations.

Strength of Recommendation: Moderate Evidence ★★★☆

ALL CEMENTED COMPONENTS VERSUS HYBRID FIXATION (CEMENTLESS FEMORAL COMPONENT)

Moderate evidence supports the use of either cementing all components or hybrid fixation (cementless femur) in total knee arthroplasty due to similar functional outcomes and rates of complications and reoperations.

Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

ALL CEMENTLESS COMPONENTS VERSUS HYBRID FIXATION (CEMENTLESS FEMORAL COMPONENT)

Limited evidence supports the use of either all cementless components or hybrid fixation (cementless femur) in total knee arthroplasty due to similar rates of complications and reoperations.

Strength of Recommendation: Limited Evidence ★★☆☆

BILATERAL TKA

Limited evidence supports simultaneous bilateral total knee arthroplasty (TKA) for patients aged 70 or younger or ASA status 1-2, because there are no increased complications.

Strength of Recommendation: Limited Evidence ★★☆☆

UKA: REVISIONS

Moderate evidence supports that total knee arthroplasty (TKA) could be used to decrease revision surgery risk compared to unicompartmental knee arthroplasty (UKA) for medial compartment osteoarthritis.

Strength of Recommendation: Moderate Evidence ★★★☆

UKA: DVT & MANIPULATION UNDER ANESTHESIA

Limited evidence supports that unicompartmental knee arthroplasty might be used to decrease the risk of deep vein thrombosis (DVT) and manipulation under anesthesia compared to total knee arthroplasty (TKA) for medial compartment osteoarthritis.

Strength of Recommendation: Limited Evidence ★★☆☆

UKA VERSUS OSTEOTOMY

Moderate evidence supports no difference between unicompartmental knee arthroplasty (UKA) or valgus-producing proximal tibial osteotomy in outcomes and complications in patients with medial compartment knee osteoarthritis.

Strength of Recommendation: Moderate Evidence ★★★☆

SURGICAL NAVIGATION

Strong evidence supports not using intraoperative navigation in total knee arthroplasty (TKA) because there is no difference in outcomes or complications.

Strength of Recommendation: Strong Evidence ★★★★

PATIENT SPECIFIC INSTRUMENTATION: PAIN AND FUNCTION

Strong evidence supports not using patient specific instrumentation compared to conventional instrumentation for total knee arthroplasty (TKA) because there is no difference in pain or functional outcomes.

Strength of Recommendation: Strong Evidence ★★★★

PATIENT SPECIFIC INSTRUMENTATION: TRANSFUSIONS AND COMPLICATIONS

Moderate evidence supports not using patient specific instrumentation compared to conventional instrumentation for total knee arthroplasty (TKA) because there is no difference in transfusions or complications.

Strength of Recommendation: Moderate Evidence ★★★☆

DRAINS

Strong evidence supports not using a drain with total knee arthroplasty (TKA) because there is no difference in complications or outcomes.

Strength of Recommendation: Strong Evidence ★★★★

CRYOTHERAPY DEVICES

Moderate evidence supports that cryotherapy devices after knee arthroplasty (KA) do not improve outcomes.

Strength of Recommendation: Moderate Evidence ★★★☆

CONTINUOUS PASSIVE MOTION

Strong evidence supports that CPM after knee arthroplasty (KA) does not improve outcomes.

Strength of Recommendation: Strong Evidence ★★★★

POSTOPERATIVE MOBILIZATION: LENGTH OF STAY

Strong evidence supports that rehabilitation started on the day of the total knee arthroplasty (TKA) reduces length of hospital stay.

Strength of Recommendation: Strong Evidence ★★★★

POSTOPERATIVE MOBILIZATION: PAIN AND FUNCTION

Moderate evidence supports that rehabilitation started on day of total knee arthroplasty (TKA) compared to rehabilitation started on postop day 1 reduces pain and improves function.

Strength of Recommendation: Moderate Evidence ★★★☆

EARLY STAGE SUPERVISED EXERCISE PROGRAM: FUNCTION

Moderate evidence supports that a supervised exercise program during the first two months after total knee arthroplasty (TKA) improves physical function.

Strength of Recommendation: Moderate Evidence ★★★☆

EARLY STAGE SUPERVISED EXERCISE PROGRAM: PAIN

Limited evidence supports that a supervised exercise program during the first two months after total knee arthroplasty (TKA) decreases pain.

Strength of Recommendation: Limited Evidence ★★☆☆

LATE STAGE POSTOPERATIVE SUPERVISED EXERCISE PROGRAM: FUNCTION

Limited evidence supports that selected patients might be referred to an intensive supervised exercise program during late stage post total knee arthroplasty (TKA) to improve physical function.

Strength of Recommendation: Limited Evidence ★★☆☆

AAOS

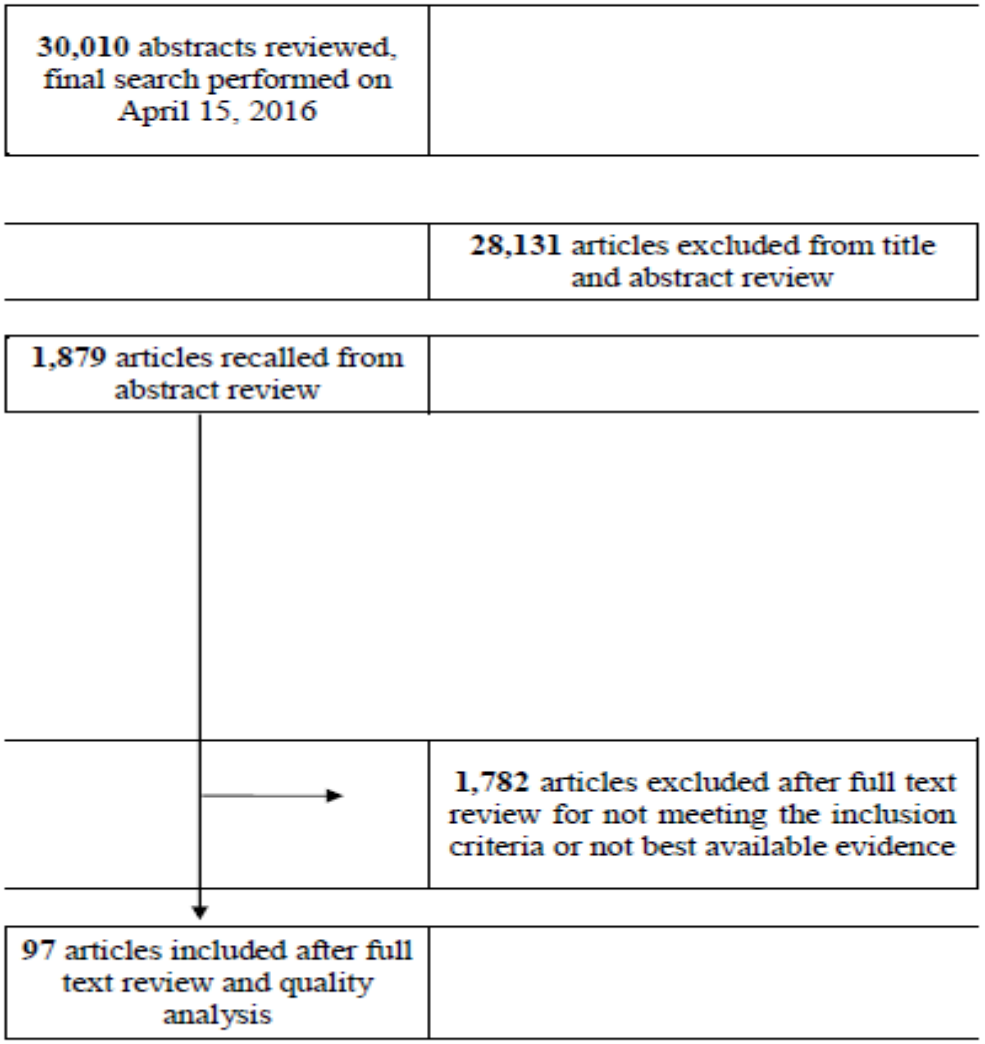
American Academy of Orthopaedic Surgeons

Management of Osteoarthritis of the Hip

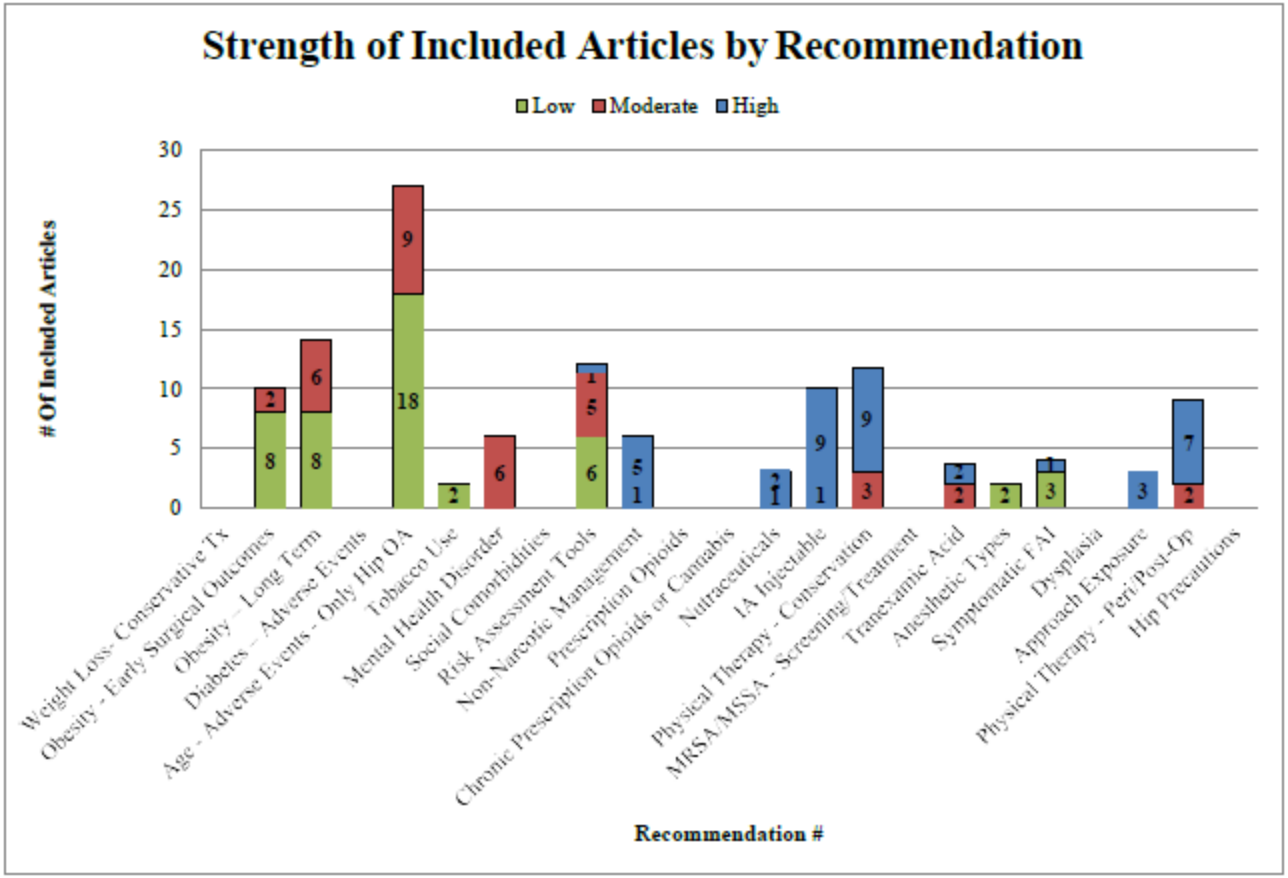
Evidence-Based Clinical Practice Guideline

Adopted by:
The American Academy of Orthopaedic Surgeons Board of Directors
March 13, 2017

APPENDIX IV
STUDY ATTRITION FLOWCHART



OVERVIEW OF ARTICLES BY RECOMMENDATION



No evidence was discovered to answer the following priori PICO questions: diabetes, social comorbidities, prescription opioids, cannibus, MRSA screening, and dysplasia. no evidence was discovered to answer these a priori PICO questions

RISK ASSESSMENT TOOLS

Moderate strength evidence supports that the practitioner could use risk assessment tools to assist in predicting adverse events, assessing surgical risks and educating patients with symptomatic osteoarthritis of the hip undergoing total hip arthroplasty.

Strength of Recommendation: Moderate Evidence ★★★☆

OBESITY AS A RISK FACTOR

a) **Moderate strength evidence supports that obese patients with symptomatic osteoarthritis of the hip, when compared to non-obese patients, may achieve lower absolute outcome scores but a similar level of patient satisfaction and relative improvement in pain and function after total hip arthroplasty.**

Strength of Recommendation: Moderate Evidence ★★★☆

b) **Limited strength evidence supports that obese patients with symptomatic osteoarthritis of the hip, when compared to non-obese patients, have increased incidence of postoperative dislocation, superficial wound infection, and blood loss after total hip arthroplasty.**

Strength of Recommendation: Limited Evidence ★★☆☆

AGE AS A RISK FACTOR

a) **Moderate strength evidence supports that increased age is associated with lower functional and quality of life outcomes in patients with symptomatic osteoarthritis of the hip undergoing total hip arthroplasty.**

Strength of Recommendation: Moderate Evidence ★★★☆

b) **Limited strength evidence supports that increased age may be associated with a higher risk of mortality in patients with symptomatic osteoarthritis of the hip undergoing total hip arthroplasty.**

Strength of Recommendation: Limited Evidence ★★☆☆

c) **Limited strength evidence supports that younger age may be associated with a higher risk of revision in patients with symptomatic osteoarthritis of the hip undergoing total hip arthroplasty.**

Strength of Recommendation: Limited Evidence ★★☆☆

MENTAL HEALTH DISORDER AS A RISK FACTOR

Moderate strength evidence supports that mental health disorders, such as depression, anxiety, and psychosis, are associated with decreased function, pain relief, and quality of life outcomes in patients with symptomatic osteoarthritis of the hip who undergo total hip arthroplasty (THA).

Strength of Recommendation: Moderate Evidence ★★★☆

TOBACCO USE

Limited strength evidence supports that patients who use tobacco products are at an increased risk for complications after total hip arthroplasty.

Strength of Recommendation: Limited Evidence ★★☆☆

NON-NARCOTIC MANAGEMENT

Strong evidence supports that NSAIDs improve short-term pain, function, or both in patients with symptomatic osteoarthritis of the hip.

Strength of Recommendation: Strong Evidence ★★★★

GLUCOSAMINE SULFATE

Moderate strength evidence does not support the use of glucosamine sulfate because it did not perform better than placebo for improving function, reducing stiffness and decreasing pain for patients with symptomatic osteoarthritis of the hip.

Strength of Recommendation: Moderate Evidence ★★★☆

INTRAARTICULAR INJECTABLES

a) **Strong evidence supports the use of intraarticular corticosteroids to improve function and reduce pain in the short-term for patients with symptomatic osteoarthritis of the hip.**

Strength of Recommendation: Strong Evidence ★★★★

b) **Strong evidence does not support the use of intraarticular hyaluronic acid because it does not perform better than placebo for function, stiffness, and pain in patients with symptomatic osteoarthritis of the hip.**

Strength of Recommendation: Strong Evidence ★★★★

PHYSICAL THERAPY AS A CONSERVATIVE TREATMENT

Strong evidence supports the use of physical therapy as a treatment to improve function and reduce pain for patients with osteoarthritis of the hip and mild to moderate symptoms.

Strength of Recommendation: Strong Evidence ★★★★

PREOPERATIVE PHYSICAL THERAPY

Limited evidence supports the use of pre-operative physical therapy to improve early function in patients with symptomatic osteoarthritis of the hip following total hip arthroplasty.

Strength of Recommendation: Limited Evidence ★★☆☆

POSTOPERATIVE PHYSICAL THERAPY

Moderate evidence supports the use of post-operative physical therapy because it could improve early function to a greater extent than no physical therapy management for patients with symptomatic osteoarthritis of the hip who have undergone total hip arthroplasty.

Strength of Recommendation: Moderate Evidence ★★★☆

ANESTHETIC TYPES

Limited evidence supports the use of neuraxial anesthesia compared to general anesthesia to reduce complications in patients with symptomatic osteoarthritis of the hip undergoing total hip arthroplasty.

Strength of Recommendation: Limited Evidence ★★☆☆

TRANEXAMIC ACID

Moderate strength evidence supports that the practitioner could use intravenous or topical tranexamic acid for patients with symptomatic osteoarthritis of the hip who are undergoing total hip arthroplasty (THA) as a part of the effort to reduce blood loss.

Strength of Recommendation: Moderate Evidence ★★★☆

APPROACH EXPOSURE

Moderate strength evidence supports that there were no clinically significant differences in patient oriented outcomes related to the surgical approach for patients with symptomatic osteoarthritis of the hip undergoing total hip arthroplasty.

Strength of Recommendation: Moderate Evidence ★★★☆

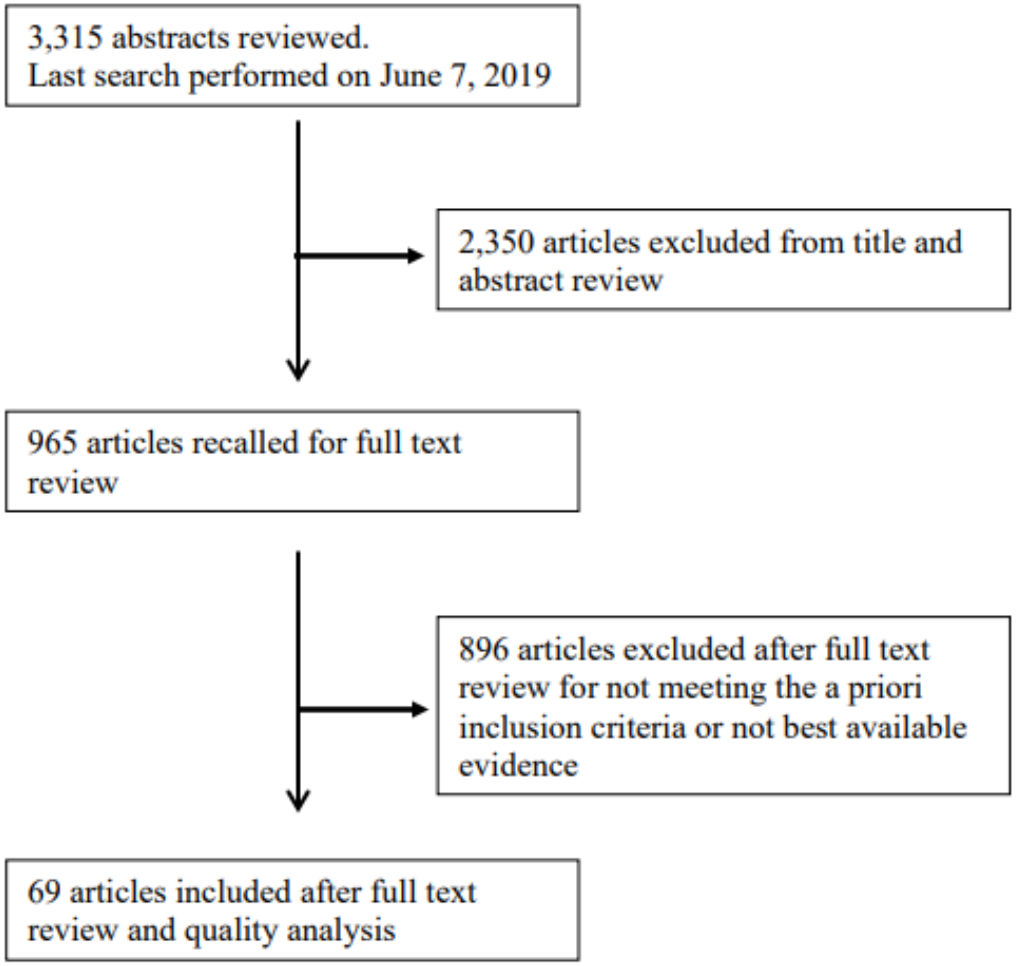
AAOS
American Academy of Orthopaedic Surgeons

Management of Glenohumeral Joint Osteoarthritis

Evidence-Based Clinical Practice Guideline

Adopted by:
The American Academy of Orthopaedic Surgeons Board of Directors
March 23, 2020

STUDY ATTRITION FLOWCHART



HYALURONIC ACID

Strong evidence supports that there is no benefit to the use of hyaluronic acid in the treatment of glenohumeral joint osteoarthritis.

Strength of Recommendation: Strong ★★★★

INJECTABLE BIOLOGICS

In the absence of reliable evidence, it is the opinion of the work group that injectable biologics, such as stem cells or platelet-rich plasma, cannot be recommended in the treatment of glenohumeral osteoarthritis.

Strength of Recommendation: Consensus ★☆☆☆

Benefits & Harms:

Currently there is no evidence supporting the benefit of these interventions and the potential harm is that seen with all unregulated injectables.

Cost Effectiveness/Resource Utilization

The marketing of injecting biologics has and continues to outpace the science. There is a significant cost to patients without any current scientific evidence proving efficacy in glenohumeral arthritis. .

Future Research:

High-quality studies are needed in the use of biologics for the treatment of glenohumeral osteoarthritis.

PROGNOSTIC FACTORS (BMI)

Strong evidence suggests that obese patients with glenohumeral osteoarthritis do not experience an increase in the rate of early post-operative complications.

Strength of Recommendation: Strong ★★★★

PROGNOSTIC FACTORS (GENDER/SEX)

Strong evidence supports that gender/sex is not associated with better or worse post-operative outcomes.

Strength of Recommendation: Strong ★★★★

PROGNOSTIC FACTORS (AGE)

Moderate evidence supports that older age at the time of surgery is associated with lower revision rates.

Strength of Recommendation: Moderate ★★★☆

PROGNOSTIC FACTORS (COMORBIDITIES)

Strong evidence suggests that patients with glenohumeral joint osteoarthritis who have more comorbidities experience higher rates of early post-arthroplasty complications.

Strength of Recommendation: Strong ★★★★

PROGNOSTIC FACTORS (SMOKING)

Moderate evidence suggests that smoking is associated with inferior post-operative outcomes.

Strength of Recommendation: Moderate ★★★☆

PROGNOSTIC FACTORS (PRE-OPERATIVE FUNCTION)

Moderate quality evidence suggests that, while both higher and lower pre-operative functioning patients with glenohumeral joint osteoarthritis will likely experience improvement following arthroplasty, patients with higher pre-operative function may experience less functional improvement.

Strength of Recommendation: Moderate ★★★☆

PROGNOSTIC FACTORS (DEPRESSION)

Moderate evidence suggests that depression is associated with inferior post-operative outcomes in patients with glenohumeral joint osteoarthritis undergoing arthroplasty.

Strength of Recommendation: Moderate ★★★☆

TOTAL SHOULDER ARTHROPLASTY

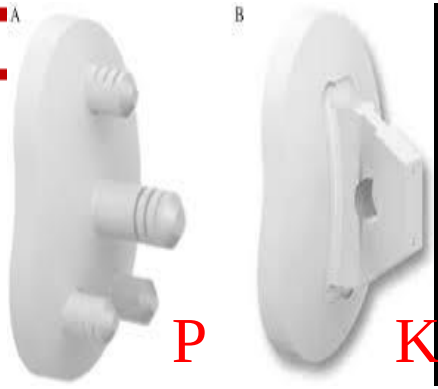
Strong evidence supports that anatomic total shoulder arthroplasty demonstrates more favorable function and pain relief in the short- to mid-term follow-up when compared to hemiarthroplasty for the treatment of glenohumeral osteoarthritis.

Strength of Recommendation: Strong ★★★★

GLENOID COMPONENT – PEGGED OR KEELED

Strong evidence supports that the clinician may utilize pegged or keeled glenoid components in patients with glenohumeral joint osteoarthritis and a well-functioning rotator cuff. Pegged components demonstrate less radiolucent lines, but the effect on clinical outcomes and survivorship are unclear.

Strength of Recommendation: Strong ★★★★



GLENOID COMPONENT – METAL BACKED CEMENTLESS

Moderate evidence supports that surgeons not use metal-backed cementless glenoid components.

Strength of Recommendation: Moderate (upgraded) ★★★☆

TOTAL SHOULDER ARTHROPLASTY – SUBSCAPULARIS PEEL, LESSER TUBEROSITY OSTEOTOMY, TENOTOMY

Moderate quality evidence supports that surgeons can utilize subscapularis peel, lesser tuberosity osteotomy, or tenotomy when performing shoulder arthroplasty.

Strength of Recommendation: Moderate ★★★☆

HEMIARTHROPLASTY - STEMS

Limited evidence supports that clinicians may utilize stemmed, stemless or resurfacing prosthesis for patients with glenohumeral joint osteoarthritis undergoing total or hemi-arthroplasty.

Strength of Recommendation: Limited ★★☆☆

CEMENTED STEMS

In the absence of reliable evidence, it is the opinion of the work group that either cemented or cementless stems can be utilized in the treatment of patients with glenohumeral joint osteoarthritis and a well-functioning rotator cuff.

Strength of Recommendation: Consensus ★☆☆☆

ANATOMIC OR REVERSE TOTAL SHOULDER ARTHROPLASTY

In the absence of reliable evidence, it is the opinion of the workgroup that clinicians may use either anatomic total shoulder arthroplasty (TSA) or reverse TSA for the treatment of glenohumeral joint osteoarthritis in select patients with excessive glenoid bone loss and/or rotator cuff dysfunction.

Strength of Recommendation: Consensus ★☆☆☆

GLENOID COMPONENTS – POLYETHYLENE-METAL OR ALL POLYETHYLENE

In the absence of reliable evidence, it is the opinion of the workgroup that clinicians may use either polyethylene-metal hybrid glenoid components or all-polyethylene components during total shoulder arthroplasty for treatment of glenohumeral joint osteoarthritis.

Strength of Recommendation: Consensus ★☆☆☆

BICEP TENODESIS AND TENOTOMY

In the absence of reliable evidence, it is the opinion of the workgroup that clinicians may consider concomitant biceps tenodesis or tenotomy during shoulder arthroplasty.

Strength of Recommendation: Consensus ★☆☆☆

SUPRASPINATUS TEARS

In the absence of reliable evidence, it is the opinion of the workgroup that for patients with small isolated, repairable supraspinatus tears, clinicians can perform anatomic total shoulder arthroplasty (TSA).

Strength of Recommendation: Consensus ★☆☆☆

TRANEXAMIC ACID

In the absence of reliable evidence, it is the opinion of the workgroup that utilization of tranexamic acid during shoulder arthroplasty may result in reduced blood loss and reduced risk of blood transfusion.

Strength of Recommendation: Consensus ★☆☆☆

PRE-OPERATIVE PHYSICAL THERAPY

In the absence of reliable evidence, it is the opinion of the work group that physical therapy may benefit select patients with glenohumeral joint osteoarthritis.

Strength of Recommendation: Consensus ★☆☆☆

POST-OPERATIVE PHYSICAL THERAPY

In the absence of reliable evidence, it is the opinion of the work group that clinicians may prescribe physical therapy in patients following shoulder arthroplasty.

Strength of Recommendation: Consensus ★☆☆☆

CRYOTHERAPY

In the absence of reliable evidence, it is the opinion of the workgroup that either continuous cryotherapy or cold packs can be used following shoulder arthroplasty.

Strength of Recommendation: Consensus ★☆☆☆

MULTIMODAL PAIN MANAGEMENT

In the absence of reliable evidence, it is the opinion of the workgroup that multimodal pain management strategies or non-opioid individual modalities can provide added benefit for postoperative pain management following shoulder arthroplasty.

Strength of Recommendation: Consensus ★☆☆☆

OPIOID PAIN MEDICATION

In the absence of reliable evidence, it is the opinion of the work group that opioids not be prescribed as routine and long-term pain management of glenohumeral osteoarthritis.

Strength of Recommendation: Consensus ★☆☆☆

ALTERNATIVE NON-SURGICAL TREATMENTS

In the absence of reliable evidence, the work group cannot recommend for or against the use of the following:

Acupuncture
Dry needling
Cannabis
Cannabodiol (CBD) Oil
Capsaicin
Shark Cartilage
Glucosamine and Chondroitin
Cupping
Transcutaneous Electrical Nerve Stimulation (TENS)

Strength of Recommendation: Consensus ★☆☆☆

NON-PROSTHETIC SURGICAL OPTIONS

In the absence of reliable evidence, it is the opinion of the work group that non-prosthetic surgical options may or may not provide short-term benefit for patients with glenohumeral joint osteoarthritis.

Strength of Recommendation: Consensus ★☆☆☆

RADIOGRAPHS

In the absence of reliable evidence, it is the opinion of the work group that patients with glenohumeral osteoarthritis undergoing arthroplasty should be imaged with axillary and true AP (Grashey view) radiographs, with advanced imaging performed at the discretion of the clinician.

Strength of Recommendation: Consensus ★☆☆☆

DISCHARGE

In the absence of reliable evidence, it is the opinion of the workgroup that same-day discharge is an option after shoulder arthroplasty in select patients.

Strength of Recommendation: Consensus ★☆☆☆