OSTEOARTHRITIS

CHI Formulary Indication Review

مجلس الضمان الصحي
Council of Health Insurance

INDICATION UPDATE

January 2024

ADDENDUM to the CHI Original Osteoarthritis Clinical Guidance - Issued December 2019

Table of Contents

Related Documents

Related SOPs

- IDF-FR-P-02-01-IndicationsReview&IDFUpdates
- IDF-FR-P-05-01-UpdatedIndicationReview&IDFUpdates

Related WI:

- IDF-FR-WI-01-01SearchMethodologyGuideForNewIndications

List of Tables

List of Figures

Abbreviations

AAHKS	American Association of Hip and Knee Surgeons
AAOS	American Academy of Orthopedic Surgeons
ACR	American College of Rheumatology
Anti-NGF	Anti-Nerve Growth Factor
APTA	American Physical Therapy Association
ASU	Avocado/Soybean Unsaponifiables
BMI	Body Mass Index
CBT	Cognitive-Behavioral Therapy
CHI	Council of Health Insurance
EMA	European Medicines Agency
EULAR	European League Against Rheumatism
FDA	(U.S.) Food and Drug Administration
GDG	Guideline Development Group
GHOA	Global Health Osteoarthritis
GRADE	Grading of Recommendations Assessment, Development, and Evaluation
HA	Hyaluronic Acid
HAS	Haute Autorite de Sante
HTA	Health Technology Assessment
IA GC	Intra-Articular Glucocorticoid
IAT	Intra-Articular Therapy
KOA	Knee Osteoarthritis
MSM	Methylsulfonylmethane
MTA	Multimodal Treatment Approach
NICE	National Institute for Health and Care Excellence
NMES	Neuromuscular Electrical Stimulation
NSAID	Nonsteroidal Anti-Inflammatory Drug
OA	Osteoarthritis

OARSI	Osteoarthritis Research Society International
PA	Prior Authorization
PE	Prescribing Edit
PRAC	Pharmacovigilance Risk Assessment Committee
PRP	Platelet-Rich Plasma
RCT	Randomized Controlled Trial
ROM	Range of Motion
SFDA	Saudi Food and Drug Authority
ST	Step Therapy
SYSADOA	Symptomatic Slow-Acting Drugs for Osteoarthritis
TENS	Transcutaneous Electrical Nerve Stimulation
TJA	Total Joint Arthroplasty
TKA	Total Knee Arthroplasty
TSA	Total Shoulder Arthroplasty
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index

Executive Summary

Osteoarthritis is a degenerative joint disease that primarily affects the articular cartilage in synovial joints. It is characterized by the progressive deterioration of the cartilage, which can lead to joint pain, stiffness, and reduced range of motion. Osteoarthritis often involves changes in the underlying bone, such as the formation of bone spurs (osteophytes), and it may also affect the synovium and other joint structures. The most commonly affected joints include the hands (ends of the fingers and at the base and ends of the thumbs), knees, hips, neck and lower back[1].

The symptoms of osteoarthritis often begin slowly and usually begin with one or a few joints. The common symptoms of osteoarthritis include:

- Pain when using the joint, which may improve with rest. For some people, in the later stages of the disease, the pain may be worse at night. Pain can be localized or widespread.
- Joint stiffness, usually lasting less than 30 minutes, in the morning or after resting for a period of time.
- Joint changes that can limit joint movement.
- Swelling in and around the joint, especially after a lot of activity or use of that area.
- Changes in the ability to move the joint.
- Feeling that the joint is loose or unstable[1].

Osteoarthritis can be categorized into two main types: primary osteoarthritis and secondary osteoarthritis. These distinctions are based on the underlying causes and risk factors that contribute to the development of the condition.

- **Primary osteoarthritis,** also known as idiopathic or degenerative osteoarthritis, is the most common form of OA and typically occurs without a specific underlying cause. It is often associated with the natural aging process and gradual wear and tear on the joints over time. Key features of primary osteoarthritis include an age-related disease, a gradual onset, and a typical occurrence in weight-bearing joints.
- **Secondary osteoarthritis** is the result of an underlying condition, injury, or external factor that accelerates or triggers the development of OA. Key features of secondary osteoarthritis include having an underlying cause, occurs at any age, progress more rapidly than primary OA due to contributing factors and affects joints depending on underlying cause[2].

Osteoarthritis is a complex condition influenced by a combination of genetic, mechanical, and environmental factors. Several risk factors can increase an individual's likelihood of developing osteoarthritis. These risk factors include increasing age, female gender, genetics, joint overuse and misalignment, joint injuries, obesity, inflammatory joint diseases, metabolic disorders, smoking and sedentary lifestyle, joint stress due to high impact sports and low bone density[2].

Some of the complications and related problems associated with osteoarthritis include:

- **Joint Pain:** It can be persistent and affect the quality of life, leading to discomfort and reduced mobility.
- **Joint Stiffness:** Stiffness in the affected joint is common, making it challenging to move the joint through its full range of motion. Morning stiffness is a typical complaint.
- **Reduced Range of Motion:** Osteoarthritis can limit joint mobility, making it difficult to perform everyday activities and reducing the ability to perform physical tasks.
- **Muscle Weakness:** Over time, the disuse of a joint due to pain and stiffness can lead to muscle weakness and atrophy around the affected joint.
- **Joint Deformities:** In severe cases, osteoarthritis can lead to joint deformities, such as bow-leggedness or joint contractures. These deformities can further impair joint function.
- **Decreased Quality of Life:** Chronic pain, disability, and limitations in mobility can negatively impact an individual's overall quality of life, including their ability to work, perform daily tasks, and participate in recreational activities.
- **Psychological Impact:** Living with chronic pain and disability can lead to depression, anxiety, and a decreased sense of well-being. Managing the psychological impact of osteoarthritis is an important aspect of care.
- **Joint Inflammation:** While OA is primarily a non-inflammatory condition, low-level inflammation can occur in the affected joint, contributing to pain and further joint damage.
- **Joint Infections:** In some cases, advanced OA or joint surgeries may increase the risk of joint infections, which can be severe and require treatment[3].

Osteoarthritis affects approximately 3.3% to 3.6% of the global population, resulting in moderate to severe disability for 43 million individuals, ranking it as the 11th most debilitating disease worldwide. In the United States, it's estimated that 80% of the population aged 65 and older exhibit radiographic signs of OA, although only 60% of

this subgroup experience associated symptoms. This discrepancy arises because radiographic evidence of OA is at least twice as prevalent as symptomatic OA, meaning that the presence of radiographic changes doesn't necessarily indicate that OA is the root cause of a patient's joint pain. Notably, in 2011, there were nearly 1 million hospitalizations for OA, incurring a collective cost of nearly $15 billion, rendering it the second most financially burdensome disease in the United States[2].

Moreover, in 2019, about 528 million people worldwide were living with osteoarthritis, an increase of 113% since 1990. About 73% of people living with osteoarthritis are older than 55 years, and 60% are female. With a prevalence of 365 million, the knee is the most frequently affected joint, followed by the hip and the hand. 344 million people living with osteoarthritis experience severity levels (moderate or severe) that could benefit from rehabilitation. With ageing populations and increasing rates of obesity and injury, the prevalence of osteoarthritis is expected to continue to increase globally.

Osteoarthritis is not an evitable consequence of ageing[4].

In Saudi Arabia, osteoarthritis stands out as one of the most common and steadily growing health concerns. To gauge the disease's impact on society, it becomes imperative to assess its prevalence. Recent research conducted in Saudi Arabia has unveiled a noticeable trend in knee OA, where the prevalence increases with age, peaking at 60.6% among individuals aged 66 to 75 years, as compared to 30.8% among those aged 46 to 55 years [8]. Furthermore, other studies have reported that 39.75% of the population, encompassing 53.3% of males and 60.9% of females, grapple with knee OA[5].

Drug therapy is an integral component for the management of Osteoarthritis. The goals of treating Osteoarthritis depend on its underlying cause and the individual's specific needs and health condition. However, common goals of Osteoarthritis treatment include pain management, improving joint function, slowing disease progression, preventing disability, and enhancing quality of life[2].

Treatment for osteoarthritis typically involves a combination of approaches, including non-pharmacological interventions, pharmacological interventions, and, in some cases, surgical procedures. Management and treatment of osteoarthritis may vary depending on whether it is primary or secondary, as addressing the underlying cause or risk factors is crucial in the management of secondary osteoarthritis. Primary osteoarthritis is often managed with lifestyle modifications, physical therapy, pain management, and, in some cases, surgical interventions to alleviate symptoms and improve joint function. It's essential for individuals with OA to work with a healthcare provider to develop a personalized treatment plan based on their specific type and circumstances.

Common treatment options for OA include:

- **Lifestyle Modifications:** weight management, exercise, physical therapy.
- **Medications:** analgesics (acetaminophen), NSAIDs, topical creams/gels.
- **Injections:** corticosteroid injections, hyaluronic acid injections.
- **Surgery:** joint replacement, in some cases arthroscopy.
- **Nutrition and Dietary Supplements:** Some dietary supplements like fish oil may have anti-inflammatory properties and be considered for OA management[2].

CHI issued Osteoarthritis clinical guidance after thorough review of renowned international and national clinical guidelines in December 2019. Updating clinical practice guidelines (CPGs) is a crucial process for maintaining the validity of recommendations.

This report functions as an addendum to the prior CHI Osteoarthritis clinical guidance and seeks to offer guidance for the effective management of Osteoarthritis. It provides an **update on the Osteoarthritis Guidelines** for CHI Formulary with the ultimate objective of updating the IDF (CHI Drug Formulary) while addressing **the most updated best available clinical and economic evidence related to drug therapies.**

Main triggers for the update are summarized, being **new guidelines added to the report** such as:

- The American Academy of Orthopedic Surgeons (AAOS) Clinical Practice Guideline Summary: Management of Osteoarthritis of the Knee (Nonarthroplasty), Third Edition **(2022)**
- The AAOS Surgical Management of Osteoarthritis of the Knee **(2022)**
- The AAOS Management of Glenohumeral Joint Osteoarthritis **(2020)**
- The American College of Rheumatology (ACR)/American Association of Hip and Knee Surgeons (AAHKS) Clinical Practice Guideline for the Optimal Timing of Elective Hip or Knee Arthroplasty for Patients with Symptomatic Moderate-to-Severe Osteoarthritis or Advanced Symptomatic Osteonecrosis with Secondary Arthritis for Whom Nonoperative Therapy Is Ineffective **(2023)**
- National Institute for Health and Care Excellence (NICE) Guideline for the Diagnosis and Management of Osteoarthritis in Over 16s (**2022**)
- The European Alliance of Associations for Rheumatology (EULAR) updated recommendations for the management of hand osteoarthritis **(2018)**

- The Royal Australian college of General Practitioners guideline for the management of knee and hip osteoarthritis **(2018)**
- Guidelines for the diagnosis and treatment of osteoarthritis in China **(2019 edition)**
- The American Physical Therapy Association (APTA) Physical Therapist Management of Total Knee Arthroplasty **(2020)**
- The APTA Physical Therapist Management of Glenohumeral Joint Osteoarthritis: A Clinical Practice Guideline from the American Physical Therapy Association **(2023)**
- The EULAR recommendations for intra-articular therapies **(2021)**
- Journal of Evidence-Based Medicine, Acupuncture for treatment of knee osteoarthritis: A clinical practice guideline **(2023)**
- The Italian Society for Rheumatology clinical practice guidelines for the diagnosis and management of knee, hip, and hand osteoarthritis **(2019)**

After carefully examining clinical guidelines and reviewing the SFDA drug list, it is important to note that there has been **withdrawal** of the following drug:

- Acemetacin

Moreover, there has been **one EMA-approved drug,** diacerein (Cartimov®) for the treatment of osteoarthritis that was recently registered by the SFDA. Additional information is detailed in section 2.1.

Main recommendations issued by different Health Technology Assessment (HTA) bodies on the use of the current medications in Osteoarthritis were reviewed and summarized. These include the National Institute for Health and Care Excellence (NICE), the Canadian Agency for Drugs and Technologies in Health (CADTH), Haute Autorité de Santé (HAS), the Institute for Quality and Efficiency in Healthcare (IQWIG), and the Pharmaceutical Benefits Advisory Committee (PBAC).

The use of Diacerein is not backed by HTA bodies as the French Haute Autorite de Sante (**HAS**)[6] provided a **negative recommendation**. Moreover, the U.K. National Institute for Health and Care Excellence (**NICE**)[7] discontinued in January 2023 their appraisal of diacerein after having initially suspended it in 2018. Finally, after reexamining diacerein-containing medicines, the **European Medicines Agency (EMA) Pharmacovigilance Risk Assessment Committee (PRAC)**[8] has recommended in March 2014 that this product remains available, but with restrictions to manage the risks for severe diarrhea and liver damage. **We therefore recommend against listing diacerein among drugs to be used for the treatment of osteoarthritis.**

Finally, there have been **updates** regarding previously mentioned drugs in terms of drug information and prescribing edits since December 2019.

Table 1. Prescribing Edits (PE) Modifications for Osteoarthritis Medications

DRUGS	PE MODIFICATIONS
Aceclofenac	Add AGE: not recommended for use in children/adolescents < 18 years old except in specific situations determined by healthcare providers
Betamethasone dipropionate, betamethasone sodium phosphate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen).
Capsaicin	Add QL: should not be used for more than 5 consecutive days.
Dexamethasone sodium phosphate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen).
Dexketoprofen	Add AGE: not recommended for use in children/adolescents < 18 years old except in specific situations determined by healthcare providers
Diclofenac diethylamine	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Diclofenac epolamine	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Diclofenac potassium	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Diclofenac sodium	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.

Diclofenac sodium, lidocaine hydrochloride	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Duloxetine	Remove PA. Add ST and MD: should be prescribed by specialist if pain associated with depression and after confirming that the patient had tried the following to control pain of OA but failed: 1) topical and oral NSAIDS 2) paracetamol (acetaminophen). Add AGE: not usually indicated for children<18yo because have been shown to increase risk of suicidal ideations in infants and young children.
Etoricoxib	Add AGE: typically not recommended for use in children and adolescents, particularly those under the age of 18.
Flurbiprofen	Add AGE: typically not recommended for use in children and adolescents, particularly those under the age of 18.
Hyaluronic acid	Remove PA. Add ST and keep MD: to be only prescribed and administered by physician specialized in OA management. The prescriber must make sure that symptoms remain despite the patient having tried the following medication: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen), 4. intraarticular glucocorticoids. Add AGE: typically not recommended for use in children and adolescents, particularly those under the age of 18.
Hydrocortisone sodium succinate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)
Ibuprofen	Add AGE: ibuprofen not recommended for children weighing less than 7 kg
Indometacin	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 14.

Ketoprofen	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 12.
Mefenamic acid	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 18.
Meloxicam	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 18.
Methylprednisolone	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)
Methylprednisolone sodium succinate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)
Naproxen	Add AGE: naproxen not to be used for this indication below 12 years old
Oxycodone hydrochloride	Remove PA. Add MD: due to the safety concern of these agents, they should be prescribed in the lowest dose and for the shortest possible duration only in the following cases: 1. patient has contraindication to NSAIDS, 2. paracetamol failed, 3. patient has no available surgical option, 4.non-pharmacological options are not effective.
Oxycodone hydrochloride, naloxone hydrochloride	Remove PA. Add MD: due to the safety concern of these agents, they should be prescribed in the lowest dose and for the shortest possible duration only in the following cases: 1. patient has contraindication to NSAIDS, 2. paracetamol failed, 3. patient has no available surgical option, 4. non-pharmacological options are not effective.

Piroxicam	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 16.
Sodium hyaluronate	Remove PA. Add ST and keep MD: to be only prescribed and administered by physician specialized in OA management. The prescriber must make sure that symptoms remain despite the patient having tried the following medication: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen), 4. intraarticular glucocorticoids
Tramadol hydrochloride	Remove PA. Add MD, ST: due to the safety concern of these agents, they should be prescribed in the lowest dose and for the shortest possible duration only in the following cases: 1. patient has contraindication to NSAIDS, 2. paracetamol failed, 3. patient has no available surgical option, 4.non-pharmacological options are not effective.
Triamcinolone acetonide	Remove PA. Add MD, ST: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)

All recommendations are well supported by reference guidelines, Grade of Recommendation (GoR), Level of Evidence (LoE) and Strength of Agreement (SoA) in all tables reflecting specific drug classes' role in the Osteoarthritis therapeutic management.

Below is a table summarizing the major changes based on the different Osteoarthritis guidelines used to issue this report:

Table 2. General Recommendations for the Management of Osteoarthritis

Management of Osteoarthritis		
General Recommendations	**Level of Evidence/Grade of Recommendation**	**Reference**
Lateral wedge insoles are not recommended for patients with knee osteoarthritis	Strong recommendation[9]	AAOS[9]
Canes could be used to improve pain and function in patients with knee osteoarthritis. Brace treatment could be used to improve function, pain, and quality of life in patients with knee osteoarthritis	Moderate recommendation[9]	AAOS[9]
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: Turmeric, Ginger extract, Glucosamine, Chondroitin and Vitamin D	Limited recommendation[9]	AAOS[9]
Topical treatments are the preferred choice over systemic treatments. Among topical pharmacological options, topical nonsteroidal anti-inflammatory drugs (NSAIDs) are the primary recommendation. Topical NSAIDs should be used to improve function and quality of life for the treatment of osteoarthritis of the knee, when not contraindicated.	Strong recommendation[9] Grade A, level of evidence 1b[10] Grade 1B[11] Level of evidence 1-2[12]	AAOS[9] EULAR[10] Chinese Guidelines[11] Italian Society for Rheumatology[12]

Oral NSAIDs and acetaminophen are recommended to improve pain and function in the treatment of knee osteoarthritis when not contraindicated.	Strong recommendation[9] Grade A, level of evidence 1a[10] Grade 1B[11] Level of evidence 1[12]	AAOS[9] EULAR[10] Chinese Guidelines[11] Italian Society for Rheumatology[12]
Oral narcotics, including tramadol, result in a notable increase of adverse events and are not effective at improving pain or function for the treatment of osteoarthritis of the knee	Strong recommendation[9]	AAOS[9]
Chondroitin sulfate may be employed for patients with hand osteoarthritis to alleviate pain and enhance functionality.	Grade A, level of evidence 1b[10]	EULAR[10]
In patients with symptomatic knee OA, glucosamine sulphate and chondroitin sulphate may have a beneficial effect on symptoms. Structural effects, patients suitable for treatment and the cost to benefit ratio of the therapy remain to be defined.	Level of evidence 1-2[12]	Italian Society for Rheumatology[12]
Hyaluronic acid intra-articular injection(s) is not recommended for routine use in the treatment of symptomatic osteoarthritis of the knee	Moderate recommendation[9]	AAOS[9]
Intra-articular corticosteroids could provide short-term relief for patients with symptomatic osteoarthritis of the knee/hip	Moderate recommendation[9] Conditional recommendation, very low quality of evidence[13]	AAOS[9] Royal Australian College of General Practitioners[13]
While intra-articular glucocorticoid injections should generally not be employed for patients with hand	Grade A, level of evidence 1a-b[10]	EULAR[10]

osteoarthritis, they may be contemplated for individuals with painful interphalangeal joints		
Suggest not offering diacerein for people with knee and/or hip OA	Conditional recommendation, very low quality of evidence[13]	Royal Australian College of General Practitioners[13]
For patients of knee OA with persistent or moderate to severe pain, intra-articular injection of glucocorticoids is recommended for rapid relief of pain in patients with OA, the injection interval should not be shorter than 4 to 6 months. Intra-articular injection of HA can also be considered to improve the patient's symptoms in the long term and delay the time required for joint replacement	Grade 1B[11] Grade 2C[11]	Chinese Guidelines[11]
IAT may be performed at least 3 months prior to joint replacement surgery and may be performed after joint replacement following consultation with the surgical team. IAT is not a contraindication in people with clotting/bleeding disorders or taking antithrombotic medications unless bleeding risk is high.	Grade 3, level of evidence C[14]	EULAR[14]
Diabetic patients, especially those with suboptimal control, should be informed about the risk of transient increased glycaemia following IA GC and advised about the need to monitor glucose levels.	Grade 1B, level of evidence A[14]	EULAR[14]

For OA patients with NSAIDs contraindications or ineffective pain treatment, it is suggested to take opioids or duloxetine for analgesia (2C), or to combine diacerein, inflammatory skin extract of cowpox vaccine to inoculate of rabbits, tanezumab, technetium-99m methylene diphosphonate or bulleyaconitine A	Grade 2D[11]	Chinese Guidelines[11]
Patients with hand osteoarthritis should not be subjected to conventional or biological disease-modifying antirheumatic drugs.	Grade A, level of evidence 1a[10]	EULAR[10]
Hand orthoses are strongly recommended for patients with first CMC joint OA	Strong recommendation[15]	American College of Rheumatology/Arthritis Foundation[15]
Hand orthoses are conditionally recommended for patients with OA in other joints of the hand	Conditional recommendation[15]	American College of Rheumatology/Arthritis Foundation[15]
Drains should not be used with total knee arthroplasty because there is no significant difference in complications or outcomes. Cemented femoral and tibial components or cementless femoral and tibial components in knee arthroplasty show similar rates of functional outcomes, complications, and reoperations, and conflicting evidence in comparative	Moderate recommendation, high quality of evidence[16]	AAOS[16]
The practitioner can use unicompartmental arthroplasty vs total knee arthroplasty for patients with predominantly medial compartment osteoarthritis, as evidence reports improved patient	Moderate recommendation, high quality of evidence[16]	AAOS[16]

reported and functional outcomes in the short term; however, long-term rates of revision in unicompartmental knee arthroplasty may be higher than total knee arthroplasty		
Peripheral nerve blockades and periarticular injections for total knee arthroplasty lead to decreased postoperative pain and opioid requirements with no difference in complications or outcomes	Strong recommendation, high quality of evidence[16]	AAOS[16]
In patients with no known contraindications, tranexamic acid (TXA) should be used because its use decreases postoperative blood loss, postoperative drain collection, and reduces the necessity of postoperative transfusions following total knee arthroplasty (TKA)	Strong recommendation, high quality of evidence[16]	AAOS[16]
There is no benefit to the use of hyaluronic acid in the treatment of glenohumeral joint osteoarthritis	Strong recommendation[17]	AAOS[17]
Anatomic total shoulder arthroplasty demonstrates more favorable function and pain relief in the short- to mid-term follow-up when compared with hemiarthroplasty for the treatment of glenohumeral osteoarthritis	Strong recommendation[17]	AAOS[17]
For patients* with osteoarthritis or the hip/knee, recommend proceeding to TJA without delay: • over delaying arthroplasty 3 months • over delaying arthroplasty for a trial of physical therapy	Conditional recommendation, very low certainty of evidence[18]	ACR/AAHKS[18]

• over delaying surgical treatment for a trial of NSAIDs • over delaying surgical treatment for a trial of braces and/or ambulatory aids • over delaying surgical treatment for a trial of intraarticular glucocorticoid injections *Patient population include: ➔ Radiographically moderate-to-severe OA or advanced symptomatic ON with secondary arthritis of the hip or knee, using standard radiographic grading such as K/L or Tonnis ➔ moderate-to-severe pain or loss of function who have been indicated for elective TJA through a shared decision-making process with their physician and have completed and ➔ did not improve with ≥1 trials of appropriate nonoperative therapy such as physical therapy, NSAIDs, and/or intraarticular injections (e.g., glucocorticoids or viscosupplementation).		
For every patient, it is advisable to consider incorporating exercises that enhance function, bolster muscle strength, and alleviate pain	Grade A, level of evidence 1a[10]	EULAR[10]
TENS: transcutaneous electrical nerve stimulation (TENS) may help	Level of evidence 1-4[12]	Italian Society for Rheumatology[12]

with short-term pain control in some patients with hip or knee OA. Acupuncture: the usefulness in patients with symptomatic OA of the knee and hip remains to be defined. Balneotherapy and exercises in water are effective for relieving symptoms in hip and knee (and hand) OA. Manual therapy/Taping: it is unclear if manual therapy can be useful in patients with symptomatic osteoarthritis of the knee. The use of bandage tape may help to reduce pain in patients with joint instability knee OA.	Conditional recommendation, low quality of evidence[13]	Royal Australian College of General Practitioners[13]
Thermal interventions (locally applied heat or cold) are conditionally recommended for patients with knee, hip, and/ or hand OA.	Conditional recommendation[15]	American College of Rheumatology/Arthritis Foundation[15]
Paraffin, an additional method of heat therapy for the hands, is conditionally recommended for patients with hand OA.	Conditional recommendation[15]	American College of Rheumatology/Arthritis Foundation[15]
It's recommended that OA patients should control their weight, and those who are overweight or obese should lose weight. This can alleviate joint pressure, alleviate pain, prevent additional injury, and enhance joint mobility	Moderate recommendation[9] Grade 1A[11] Level of evidence 1-3[12] Strong recommendation, very low quality of evidence[13]	AAOS[9] Chinese Guidelines[11] Italian Society for Rheumatology[12] Royal Australian College of General Practitioners[13]
Engaging in regular exercise can diminish joint pain, reduce	Strong recommendation[9]	AAOS[9]

stiffness, and enhance flexibility and muscle strength. The mode of delivery of exercise education should be selected according both to the preference of the person with hip or knee OA and local availability. Patients with knee OA should participate in aerobic and/or resistance land-based and/or aquatic exercise.	Level of evidence 1-3[12]	Italian Society for Rheumatology[12]
Acupuncture is recommended for a duration of 4 to 8 weeks, depending on the severity of knee osteoarthritis (KOA) and the patient's response to treatment. It is recommended to consider combining non-steroidal anti-inflammatory drugs (NSAIDs) with acupuncture, rather than opting for acupuncture as a standalone treatment, particularly when dealing with severe knee osteoarthritis (KOA) symptoms	Limited recommendation[9] Weak recommendation, moderate certainty evidence[19]	AAOS[9] Journal of Evidence-Based Medicine[19]
Physical therapists should develop an early mobility plan and teach patients who have undergone TKA regarding the importance of early mobility and appropriate progression of physical activity, based on safety, functional tolerance, and physiological response.	◆◆◆◆[20]	APTA[20]
Physical therapists should design, implement, teach, and progress patients who have undergone TKA in high-intensity strength training and exercise programs during the early postacute period (ie, within 7	◆◆◆◆[20]	APTA[20]

days after surgery) to improve function, strength, and ROM.		
Physical therapists should implement the use of a sling and progressive exercises for ROM and strengthening to improve patient-reported outcomes, and ROM in patients with GHOA who have undergone total shoulder arthroplasty (TSA). They should also implement the use of a sling with the shoulder in a neutral rotation position for pain management.	◆◆◆◆, high quality of evidence[21]	APTA[21]
Strongly recommend offering land-based exercise for all people with knee, hip OA to improve pain and function, regardless of their age, structural disease severity, functional status, or pain levels	Strong recommendation, low quality of evidence[13]	Royal Australian College of General Practitioners[13]

At the end of the report, a **key recommendation synthesis section** is added highlighting the latest updates in **Osteoarthritis clinical and therapeutic management.**

Section 1.0 Summary of Reviewed Clinical Guidelines & Evidence

This section is divided into two parts: the first includes recommendations from **updated versions of guidelines** mentioned in the previous CHI Osteoarthritis report, and the second includes **newly added guidelines** that have helped generate this report.

1.1 Revised Guidelines

The following segment contains the updated versions of the guidelines mentioned in the December 2019 CHI Osteoarthritis Report and the corresponding recommendations:

Table 3. Guidelines Requiring Revision

Guidelines Requiring Revision	
Old Versions	**Updated versions**
1.1 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee **(2019)**	N/A*
1.2 OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis **(2019)**	N/A*
1.3 Royal Australian College of General Practitioners: Guideline for the management of knee and hip osteoarthritis **(2018)**	N/A*

**: not available (no new updates for those guidelines)*

1.2 Additional Guidelines

This part includes the added guidelines to the previous CHI Osteoarthritis report, along with their recommendations.

Table 4. List of Additional Guidelines

Additional Guidelines
AAOS Clinical Practice Guideline Summary: Management of Osteoarthritis of the Knee (Nonarthroplasty), Third Edition **(2022)**
AAOS Surgical Management of Osteoarthritis of the Knee **(2022)**
AAOS Management of Glenohumeral Joint Osteoarthritis **(2020)**
ACR/AAHKS American College of Rheumatology and American Association of Hip and Knee Surgeons Clinical Practice Guideline for the Optimal Timing of Elective Hip or Knee Arthroplasty for Patients with Symptomatic Moderate-to-Severe Osteoarthritis or Advanced Symptomatic Osteonecrosis with Secondary Arthritis for Whom Nonoperative Therapy Is Ineffective **(2023)**
National Institute for Health and Care Excellence (NICE) Guideline for the Diagnosis and Management of Osteoarthritis in Over 16s (**2022**)
Update of the **EULAR** recommendations for the management of hand osteoarthritis **(2018)**
Royal Australian College of General Practitioners, Guideline for the management of knee and hip osteoarthritis **(2018)**
Guidelines for the diagnosis and treatment of osteoarthritis in China **(2019 edition)**
APTA Physical Therapist Management of Total Knee Arthroplasty **(2020)**
APTA Physical Therapist Management of Glenohumeral Joint Osteoarthritis: A Clinical Practice Guideline from the American Physical Therapy Association **(2023)**
EULAR recommendations for intra-articular therapies **(2021)**
Journal of Evidence-Based Medicine, Acupuncture for treatment of knee osteoarthritis: A clinical practice guideline **(2023)**
The **Italian Society for Rheumatology** clinical practice guidelines for the diagnosis and management of knee, hip, and hand osteoarthritis **(2019)**

1.2.1 American Academy of Orthopedic Surgeons (AAOS) Clinical Practice Guideline Summary: Management of Osteoarthritis of the Knee (Nonarthroplasty), Third Edition (2022)

The American Academy of Orthopedic Surgeons (AAOS), with input from representatives from the American Orthopedic Society for Sports Medicine, the American Association for Hip and Knee Surgeons, The Knee Society, the American Academy of Family Physicians, the American Physical Therapy Association, the Arthroscopic Association of North America, the International Cartilage Repair

Society, the American Medical Society for Sports Medicine, and the American Society of Regional Anesthesia and Pain, recently published their clinical practice guideline (CPG), Management of Osteoarthritis of the Knee (nonarthroplasty), third edition in May 2022[9]. The aim is to aid practitioners in the treatment of patients with symptomatic osteoarthritis of the knee. Each recommendation is based on a systematic review of the research related topic, which resulted in eight recommendations classified as high, eight recommendations classified as moderate, and 11 as limited. The strength of recommendation is assigned based on the quality of the supporting evidence (table 5).

Table 5. Certainty of Evidence and Strength of Recommendations of the AAOS Clinical Practice Guidelines

Strength of Recommendation	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. Also requires no reasons to downgradefrom the evidence-to-decision (EtD) framework	
Moderate	Moderate or Strong	Evidence from two or more "Moderate" quality studies with consistent findings or evidence froma single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.	

Limited	Limited, Moderate, or Strong	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. In addition, higher strength evidence can be downgraded to limited because of major concerns addressed in the EtD framework.	
Consensus	No reliable evidence	There is no supporting evidence, orhigher quality evidence was downgraded because of major concerns addressed in the EtD framework. In the absence of reliableevidence, the guideline work group is making a recommendation basedon their clinical opinion.	

The main recommendations by the AAOS are summarized below:

Lateral wedge insoles

- Lateral wedge insoles are not recommended for patients with knee osteoarthritis. (Strong recommendation, ★★★★).

Canes

- Canes could be used to improve pain and function in patients with knee osteoarthritis. (Moderate recommendation, ★★★☆).

Braces

- Brace treatment could be used to improve function, pain, and quality of life in patients with knee osteoarthritis. (Moderate recommendation, ★★★☆).

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: Turmeric, Ginger extract, Glucosamine, Chondroitin and Vitamin D (Limited recommendation, ★★☆☆).

Topical treatments

- Topical NSAIDs should be used to improve function and quality of life for the treatment of osteoarthritis of the knee, when not contraindicated. (Strong recommendation, ★★★★).

Supervised exercise

- Supervised exercise, unsupervised exercise, and/or aquatic exercise are recommended over no exercise to improve pain and function for the treatment of knee osteoarthritis. (Strong recommendation, ★★★★).

Neuromuscular training

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

Patient education programs

- Patient education programs are recommended to improve pain in patients with knee osteoarthritis. (Strong recommendation, ★★★★).

Weight loss intervention

- Sustained weight loss is recommended to improve pain and function in overweight and obese patients with knee osteoarthritis. (Moderate recommendation, ★★★☆).

Manual therapy

- Manual therapy in addition to an exercise program may be used to improve pain and function in patients with knee osteoarthritis. (Limited recommendation, ★★☆☆).

Massage

- Massage may be used in addition to usual care to improve pain and function in patients with knee osteoarthritis (Limited recommendation, ★★☆☆).

Laser treatment

- FDA-approved laser treatment may be used to improve pain and function in patients with knee osteoarthritis (Limited recommendation, ★★☆☆).

Acupuncture

- Acupuncture may improve pain and function in patients with knee osteoarthritis (Limited recommendation, ★★☆☆).

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) (Limited recommendation, ★★☆☆).

Percutaneous electrical nerve stimulation/pulsed electromagnetic field therapy

- 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 (pain) (Limited recommendation, ★★☆☆).

Extracorporeal shockwave therapy

- Extracorporeal shockwave therapy may be used to improve pain and function for the treatment of osteoarthritis of the knee (Limited recommendation, ★★☆☆).

Pharmacologic therapy

- Oral NSAIDs are recommended to improve pain and function in the treatment of knee osteoarthritis when not contraindicated (Strong recommendation, ★★★★).
- Oral acetaminophen is recommended to improve pain and functions (Strong recommendation, ★★★★).

- Oral narcotics, including tramadol, result in a notable increase of adverse events and are not effective at improving pain or function for the treatment of osteoarthritis of the knee (Strong recommendation, ★★★★).
- Hyaluronic acid intra-articular injection(s) is not recommended for routine use in the treatment of symptomatic osteoarthritis of the knee (Moderate recommendation, ★★★☆).
- Intra-articular corticosteroids could provide short-term relief for patients with symptomatic osteoarthritis of the knee (Moderate recommendation, ★★★☆).

Platelet-rich plasma

- Platelet-rich plasma may reduce pain and improve function in patients with symptomatic osteoarthritis of the knee (Limited recommendation, ★★☆☆).

Denervation therapy

- Denervation therapy may reduce pain and improve function in patients with symptomatic osteoarthritis of the knee (Limited recommendation, ★★☆☆).

Lavage/debridement

- Arthroscopy with lavage and/or debridement in patients with a primary diagnosis of knee osteoarthritis is not recommended (Moderate recommendation, ★★★☆).

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 (Moderate recommendation, ★★★☆).

Tibial osteotomy

- High tibial osteotomy may be considered to improve pain and function in properly indicated patients with uni-compartmental knee osteoarthritis (Limited recommendation, ★★☆☆).

Dry needling

- In the absence of reliable evidence, it is the opinion of the work group that the utility/efficacy of dry needling is unclear and requires additional evidence (Consensus, ★☆☆☆).

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 (unfixed) interpositional devices in patients with symptomatic medial compartment osteoarthritis of the knee (Consensus, ★☆☆☆).

1.2.2 American Academy of Orthopedic Surgeons (AAOS) Surgical Management of Osteoarthritis of the Knee (2022)

The evidence-based clinical practice guideline on the surgical management of osteoarthritis of the knee was developed by the AAOS with the intent to be used by surgeons and clinicians who incorporate surgical management of OA of the knee into their practice[16]. The strength of recommendation is assigned based on the quality of the supporting evidence (table 5) above.

- Drains should not be used with total knee arthroplasty (TKA) because there is no significant difference in complications or outcomes (Moderate recommendation, high quality of evidence ★★★☆).
- Cemented femoral and tibial components or cementless femoral and tibial components in knee arthroplasty show similar rates of functional outcomes, complications, and reoperations, and conflicting evidence in comparative studies (Moderate recommendation, high quality of evidence ★★★☆).
- Cemented femoral and tibial components or hybrid fixation (cementless femur) in total knee arthroplasty show similar functional outcomes and rates of complications and reoperations (Moderate recommendation, high quality of evidence ★★★☆).
- The practitioner can use unicompartmental arthroplasty vs total knee arthroplasty for patients with predominantly medial compartment osteoarthritis, as evidence reports improved patient reported and functional outcomes in the short term; however, long-term rates of revision in unicompartmental knee arthroplasty may be higher than total knee arthroplasty (Moderate recommendation, high quality of evidence ★★★☆).

- Peripheral nerve blockades for TKA lead to decreased postoperative pain and opioid requirements with no difference in complications or outcomes (Strong recommendation, high quality of evidence ★★★★).
- Periarticular injections used in TKA lead to decreased postoperative pain (Strong recommendation, high quality of evidence ★★★★).
- In patients with no known contraindications, tranexamic acid (TXA) should be used because its use decreases postoperative blood loss, postoperative drain collection, and reduces the necessity of postoperative transfusions following TKA (Strong recommendation, high quality of evidence ★★★★).
- There is no difference in outcomes, function, or pain between navigation and conventional techniques (Moderate recommendation, high quality of evidence ★★★☆).
- There is no difference in postoperative functional scores between patients with a BMI < 30 and obese patients (BMI 30-39.9); however, there may be increased risk of complications in morbidly obese patients (≥ 40), in particular, surgical site infections (Strong recommendation, high quality of evidence ★★★★).
- Optimization of perioperative glucose control (< 126mg/dl) after total knee arthroplasty should be attempted in diabetic and non-diabetic patients with HgbA1C < 6.5, as hyperglycemia can lead to less favorable postoperative outcomes and higher complication rates (Strong recommendation, high quality of evidence ★★★★).
- Evidence reports that there is no difference in outcomes, function, pain, or blood transfusions between the use of tourniquets and nonuse of tourniquets (Strong recommendation, high quality of evidence ★★★★).
- Evidence reports that there is no difference between patellar surfacing or non-patellar resurfacing in total knee arthroplasty (Strong recommendation, high quality of evidence ★★★★).
- Cruciate retaining (CR) and posterior stabilized (PS) TKA designs have similarly efficacious/favorable postoperative outcomes (Strong recommendation, high quality of evidence ★★★★).
- The practitioner should not use patient specific technology (e.g., guides, cutting blocks) because there is no significant difference in patient outcomes, function, or pain as compared to conventional TKA. Additionally, it does not reduce operating time, blood loss, length of stay, and/or complications (Strong recommendation, high quality of evidence ★★★★).

- There is no difference in composite/functional outcomes or complications between kinematic or mechanical alignment principles in total knee arthroplasty (Strong recommendation, high quality of evidence ★★★★).
- Cessation of preoperative opioids should be attempted for TKA, as preoperative opioid use demonstrates decreased postoperative functional scores and increased pain scores and complications (Moderate recommendation, low quality of evidence ★★★☆).
- All cementless components or hybrid fixation (cementless femur) in TKA show similar functional outcomes and rates of complications and reoperations (Limited recommendation, moderate quality of evidence ★★☆☆).
- The practitioner could use unicompartmental knee arthroplasty or tibial osteotomy for the treatment of knee osteoarthritis (Limited recommendation, moderate quality of evidence ★★☆☆).
- In the absence of reliable evidence, it is the opinion of the workgroup that simultaneous bilateral TKA could be performed vs. staged (> 90 days) bilateral TKA in appropriately selected patients but should be performed with caution and should be avoided with patients who are at high risk of cardiopulmonary complications (Consensus recommendation, low grade of evidence ★☆☆☆).
- Smoking cessation should be attempted before total knee arthroplasty, as a history of smoking may result in higher complications, lower functional scores, higher pain scores, and SSIs (Consensus recommendation, low grade of evidence ★☆☆☆).
- Discharge to home, with or without home services, is associated with fewer adverse events compared to discharge to acute rehabilitation facility or skilled nursing facility (Limited recommendation, moderate quality of evidence ★★☆☆).
- Evidence suggests no significant difference in function, outcomes, or complications in the short term between robotic assisted and conventional TKA (Limited recommendation, high quality of evidence ★★☆☆).
- Evidence suggests no significant difference in function, outcomes, or complications in the short term between robotic assisted and conventional unicompartmental knee arthroplasty (Limited recommendation, high quality of evidence ★★☆☆).

1.2.3 American Academy of Orthopedic Surgeons (AAOS) Management of Glenohumeral Joint Osteoarthritis (2020)

This guideline was created as a tool to assist physicians, surgeons and other health care professionals that care for patients with glenohumeral joint osteoarthritis in developing an understanding of levels of evidence that exist for a range of common diagnostic and treatment practices[17]. The strength of recommendation is assigned based on the quality of the supporting evidence (table 5) above.

- Strong evidence supports that there is **no benefit to the use of hyaluronic acid** in the treatment of glenohumeral joint osteoarthritis (Strong recommendation, ★★★★).
- Strong evidence suggests that obese patients with glenohumeral osteoarthritis do not experience an increase in the rate of early postoperative complications (Strong recommendation, ★★★★).
- Strong evidence supports that gender/sex is not associated with better or worse postoperative outcomes (Strong recommendation, ★★★★).
- Strong evidence suggests that patients with glenohumeral joint osteoarthritis who have more comorbidities experience higher rates of early post arthroplasty complications (Strong recommendation, ★★★★).
- 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 with hemiarthroplasty for the treatment of glenohumeral osteoarthritis (Strong recommendation, ★★★★).
- Strong evidence supports that the clinician may use pegged or keeled glenoid implants in patients with glenohumeral joint osteoarthritis and a well-functioning rotator cuff. Pegged implants demonstrate less radiolucent lines, but the effect on clinical outcomes and survivorship are unclear (Strong recommendation, ★★★★).
- Moderate evidence supports that older age at the time of surgery is associated with lower revision rates (Moderate recommendation, ★★★☆).
- Moderate evidence suggests that smoking is associated with inferior postoperative outcomes. (Moderate recommendation, ★★★☆).
- Moderate quality evidence suggests that although both higher and lower preoperative functioning patients with glenohumeral joint osteoarthritis will likely experience improvement after arthroplasty, patients with higher

preoperative function may experience less functional improvement (Moderate recommendation, ★★★☆).

- Moderate evidence suggests that depression is associated with inferior postoperative outcomes in patients with glenohumeral joint osteoarthritis undergoing arthroplasty (Moderate recommendation, ★★★☆).
- Moderate evidence supports that surgeons not use metal-backed non-cemented glenoid implants (Moderate recommendation, ★★★☆).
- Moderate quality evidence supports that surgeons can use subscapularis peel, lesser tuberosity osteotomy, or tenotomy when performing shoulder arthroplasty (Moderate recommendation, ★★★☆).
- Limited evidence supports that clinicians may use stemmed, stemless, or resurfacing prosthesis for patients with glenohumeral joint osteoarthritis undergoing total arthroplasty or hemiarthroplasty (Limited recommendation, ★★☆☆).
- 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 (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that clinicians may prescribe physical therapy in patients after shoulder arthroplasty (Consensus recommendation, ★☆☆☆).
- 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 (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, the work group cannot recommend for or against the use of the following: (1) Acupuncture, (2) Dry needling, (3) Cannabis, (4) Cannabidiol (CBD) oil, (5) Capsaicin, (6) Shark cartilage, (7) Glucosamine and chondroitin, (8) Cupping, and (9) Transcutaneous Electrical Nerve Stimulation (TENS) (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that opioids not be prescribed because routine and long-term pain management of glenohumeral osteoarthritis (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group nonprosthetic surgical options may or may not provide short-term benefit for

patients with glenohumeral joint osteoarthritis (Consensus recommendation, ★☆☆☆).

- 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 imaging performed at the discretion of the clinician (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that either cemented or noncemented stems can be used in the treatment of patients with glenohumeral joint osteoarthritis and a well-functioning rotator cuff (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that clinicians may use either anatomic TSA or reverse TSA for the treatment of glenohumeral joint osteoarthritis in select patients with excessive glenoid bone loss and/or rotator cuff dysfunction (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that clinicians may use polyethylene-metal hybrid glenoid implants or all polyethylene implants during TSA for the treatment of glenohumeral joint osteoarthritis (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that clinicians may consider concomitant biceps tenodesis or tenotomy during shoulder arthroplasty (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that utilization of tranexamic acid during shoulder arthroplasty may result in reduced blood loss and reduced risk of blood transfusion (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that for patients with small isolated, repairable supraspinatus tears, clinicians can perform anatomic TSA (Consensus recommendation, ★☆☆☆).
- In the absence of reliable evidence, it is the opinion of the work group that same day discharge is an option after shoulder arthroplasty in selected patients (Consensus recommendation, ★☆☆☆).

- In the absence of reliable evidence, it is the opinion of the work group that either continuous cryotherapy or cold packs can be used after shoulder arthroplasty (Consensus recommendation, ).
- In the absence of reliable evidence, it is the opinion of the work group that multimodal pain management strategies or nonopioid individual modalities can provide added benefit for postoperative pain management after shoulder arthroplasty (Consensus recommendation, ).

1.2.4 American College of Rheumatology/American Association of Hip and Knee Surgeons (ACR/AAHKS) Clinical Practice Guideline for the Optimal Timing of Elective Hip or Knee Arthroplasty for Patients with Symptomatic Moderate-to-Severe Osteoarthritis or Advanced Symptomatic Osteonecrosis with Secondary Arthritis for Whom Nonoperative Therapy Is Ineffective (2023)

The purpose of this clinical practice guideline was to develop consensus on evidence-based recommendations for the optimal timing of total joint arthroplasty (TJA) in patients with symptomatic moderate-to-severe OA or advanced symptomatic osteonecrosis with secondary arthritis for whom nonoperative therapy has been ineffective and who elected to undergo TJA, and to evaluate benefits of delays of surgery for additional nonoperative arthritis treatments or to achieve specific targets for medical optimization[18]. The ACR/AAHKS have opted for the GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) system:

Table 6. Certainty of Evidence and Strength of Recommendations of the ACR/AAHKS Clinical Guidelines Using the GRADE Approach

Strength of recommendation	
Strong	Benefits clearly outweigh risks and burden or vice versa. Usually stated as: **"we recommend"**
Conditional	Benefits probably outweigh risks and burden, or vice versa, but there is appreciable uncertainty.
Weak	Benefits closely balanced with risks and burden. Usually stated as: **"we suggest"**
Evidence level (quality of evidence)	
High	One or more well-designed and well-executed randomized controlled trials (RCTs) that yield consistent and directly applicable results.

	This level also means that further research is very unlikely to change our confidence in the estimate of effect.
Medium	RCTs with important limitations (i.e., biased assessment of the treatment effect, large loss to follow-up, lack of blinding, unexplained heterogeneity), indirect evidence originating from similar (but not identical) populations of interest, and RCTs with a very small number of participants or observed events. In addition, evidence from well-designed controlled trials without randomization, from well-designed cohort or case-control analytic studies, and from multiple time series with or without intervention is in this category. This level also means that further research will probably have an important impact on our confidence in the estimate of effect and may change the estimate.
Low	Observational studies would typically be rated as low quality because of the risk for bias. This level also means that further research is very likely to have an important impact on our confidence in the estimate of effect and will probably change the estimate.
Very low	Evidence is conflicting, of poor quality, or lacking, and hence the balance of benefits and harms cannot be determined. Any estimate of effect is very uncertain as evidence is either unavailable or does not permit a conclusion.

The recommendations listed below apply to a specific defined population. The defined population is patients with radiographically moderate-to-severe osteoarthritis or osteonecrosis of the hip or knee using standard radiographic grading such as Kellgren/Lawrence or Tonnis, and for patients with moderate-to-severe pain or loss of function who have been indicated for elective TJA through a shared decision-making process with their physician and have completed trials of ≥1 appropriate nonoperative therapy.

- Conditionally recommend proceeding to TJA without delay over delaying arthroplasty 3 months (Conditional recommendation, very low certainty of evidence).
- Conditionally recommend proceeding to TJA without delay over delaying arthroplasty for a trial of physical therapy (Conditional recommendation, low certainty of evidence).

- Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of NSAIDs (Conditional recommendation, very low certainty of evidence).
- Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of braces and/or ambulatory aids (Conditional recommendation, very low certainty of evidence).
- Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of intraarticular glucocorticoid injections (Conditional recommendation, very low certainty of evidence).
- Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of viscosupplementation injections (Conditional recommendation, very low certainty of evidence).
- In the defined population with a BMI of ≥50, we conditionally recommend proceeding to TJA without delaying to achieve weight reduction to a BMI of <50 (Conditional recommendation, very low certainty of evidence).
- In the defined population with a BMI of 40–49, we conditionally recommend proceeding to TJA without delaying to achieve weight reduction to a BMI of <40 (Conditional recommendation, very low certainty of evidence).
- In the defined population with a BMI of 35–39, we conditionally recommend proceeding to TJA without delaying achieving weight reduction to a BMI of <35 (Conditional recommendation, very low certainty of evidence).
- In the defined population with poorly controlled diabetes mellitus, we conditionally recommend delaying TJA to improve glycemic control (Conditional recommendation, very low certainty of evidence).
- In the defined population with nicotine dependence, we conditionally recommend delaying TJA for nicotine use reduction/cessation (Conditional recommendation, low certainty of evidence).
- In the defined population with bone loss with deformity or severe ligamentous instability, we conditionally recommend proceeding to TJA without delay over delaying TJA for optimization of non–life-threatening conditions (not graded)
- In the defined population with a neuropathic joint, we conditionally recommend proceeding to TJA without delay over delaying for optimization of non–life threatening conditions (not graded)

1.2.5 National Institute for Health and Care Excellence (NICE) Guideline for the Diagnosis and Management of Osteoarthritis in Over 16s (2022)

This guideline published by NICE in October 2022 covers the diagnosis, assessment, and non-surgical management of osteoarthritis. It aims to improve management of osteoarthritis and the quality of life for people with osteoarthritis[22]. The main recommendations are summarized below.

Diagnosis

The diagnosis of OA should be done clinically, without imaging, in people who:

- Are 45 and over **and**
- Have activity-related joint pain **and**
- Have either no morning joint-related stiffness or morning stiffness that lasts no longer than 30 minutes.

Imaging is used to diagnose OA in the presence of atypical features that suggest an alternative or additional diagnosis.

Non-pharmacological management

Therapeutic exercise

- Supervised therapeutic exercise tailored to the patient's need, such as local muscle strengthening, general aerobic fitness, are recommended in patients with OA.
- Patients should be advised that joint pain may increase when they start therapeutic exercise; however, long-term adherence to an exercise plan increases its benefits by reducing pain and increasing functioning and quality of life.

Weight management

- Weight loss will improve their quality of life and physical function as well as reduce pain in people with OA who are living with overweight and obesity.

Manual therapy

- Only consider manual therapy (such as manipulation, mobilization, or soft tissue techniques):
    - For people with hip or knee OA and
    - Alongside therapeutic exercise.

- There is not enough evidence to support the use of manual therapy alone for managing osteoarthritis.

Acupuncture

- Acupuncture or dry needling are not recommended to manage OA.

Electrotherapy

- There is insufficient evidence to recommend any of the following electrotherapy treatments because there is insufficient evidence:
    - Transcutaneous electrical nerve stimulation (TENS)
    - Ultrasound therapy
    - Interferential therapy
    - Laser therapy
    - Pulsed short-wave therapy
    - Neuromuscular electrical stimulation (NMES)

Devices

- Walking aids, such as walking sticks, may be recommended for people with lower limb OA.
- Insoles, braces, tape, splints or supports to people with OA should not be routinely used unless:
    - There is joint instability or abnormal biomechanical loading **and**
    - Therapeutic exercise is ineffective or unsuitable without the addition of an aid or device **and**
    - The addition of an aid or device is likely to improve movement and function.

Pharmacological management

Topical, oral, and transdermal medicines

Pharmacological treatments should be used at the lowest effective dose for the shortest possible time alongside non-pharmacological treatments and to support therapeutic exercise.

- In patients with knee OA, topical NSAIDs are recommended.
- In patients with OA that affects other joints, topical NSAIDs may be considered.

- If topical medicines are ineffective or unsuitable, consider an oral NSAID for people with osteoarthritis and take account of:
    - Potential gastrointestinal, renal, liver, and cardiovascular toxicity
    - Any risk factors the person may have, including age, pregnancy, current medication, and comorbidities.
    - Offer a gastroprotective treatment (such as a proton pump inhibitor) for people with osteoarthritis while they are taking an NSAID.
- Paracetamol or weak opioids should not be routinely used unless:
    - They are used only infrequently for short-term pain relief **and**
    - All other pharmacological treatments are contraindicated, not tolerated or ineffective.
- Glucosamine or strong opioids should not be used for the treatment of OA.

Intra-articular injections

- Intra-articular hyaluronan injections are not recommended to manage OA.
- Intra-articular corticosteroid injections can be considered when other pharmacological treatments are ineffective or unsuitable, or to support therapeutic exercise. They only provide short-term relief (2 to 10 weeks).

1.2.6 European League Against Rheumatism (EULAR) Recommendations for the Management of Hand Osteoarthritis (2018 Update)

In recent years, new data on the management of hand OA has become available on several pharmacological and non-pharmacological treatments, including but not limited to self-management, application of thumb base orthoses, topical non-steroidal anti-inflammatory drugs (NSAIDs), oral corticosteroids, various intra-articular therapies and treatment with conventional synthetic and biological disease-modifying antirheumatic drugs, and tumor necrosis factor (TNF) inhibitors. EULAR have therefore updated their 2007 guidelines and published new recommendations in 2018[10]. The main recommendations are summarized below.

Table 7. Certainty of Evidence and Strength of Recommendations of the EULAR Guidelines

Level of evidence	
1a	Systematic review of randomized controlled trials (RCTs)
1b	Individual RCTs

2a	Systematic review of cohort studies
2b	Individual cohort study (including low quality RCT)
3a	Systematic review of case-control studies
3b	Individual case-control study
4	Case series (and poor-quality cohort and case-control studies)
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or “first principles”
Grade of recommendation	
A	Consistent with level 1 studies
B	Consistent with level 2 or 3 studies or extrapolations from level 1 studies
C	Level 4 studies or extrapolations from level 2 or 3 studies
D	Level 5 evidence or troublingly inconsistent or inconclusive studies of any level

- Education and training on ergonomic principles, activity pacing, and the use of assistive devices should be provided to all patients (Level of evidence 1b, Grade or recommendation A).
- For every patient, it is advisable to consider incorporating exercises that enhance function, bolster muscle strength, and alleviate pain (Level of evidence 1a, Grade or recommendation A).
- Orthotic devices should be contemplated as a means of alleviating symptoms in patients with thumb base osteoarthritis, with a focus on their long-term use (Level of evidence 1b, Grade or recommendation A).
- In light of safety concerns, **topical treatments are the preferred choice over systemic treatments**. Among topical pharmacological options, **topical nonsteroidal anti-inflammatory drugs (NSAIDs) are the primary recommendation** (Level of evidence 1b, Grade or recommendation A).
- Oral analgesics, especially NSAIDs, should be deliberated for **short-term** use to alleviate symptoms (Level of evidence 1a, Grade or recommendation A).
- Chondroitin sulfate may be employed for patients with hand osteoarthritis to alleviate pain and enhance functionality (Level of evidence 1b, Grade or recommendation A).
- While intra-articular glucocorticoid injections should generally not be employed for patients with hand osteoarthritis, they may be contemplated for

individuals with painful interphalangeal joints (Level of evidence 1a-b, Grade or recommendation A).

- Patients with hand osteoarthritis should not be subjected to conventional or biological disease-modifying antirheumatic drugs (Level of evidence 1a, Grade or recommendation A).
- Surgical intervention should be examined for patients with structural abnormalities when other treatment options have not provided sufficient relief from pain. Trapeziectomy may be considered for those with thumb base osteoarthritis, and arthrodesis or arthroplasty for those with interphalangeal osteoarthritis (Level of evidence 5, Grade or recommendation D).
- Long-term monitoring of patients with hand osteoarthritis should be tailored to each patient's individual requirements (Level of evidence 5, Grade or recommendation D).

1.2.7 Royal Australian College of General Practitioners (RACGP) Guideline for the Management of Knee and Hip Osteoarthritis – Second Edition (2018)

The Royal Australian College of General Practitioners (RACGP) first developed Guidelines for the non-surgical management of hip and knee osteoarthritis in 2009. Since then, there has been substantial progress in evaluating the effectiveness and safety of commonly used and new therapies for osteoarthritis (OA). The objective of this new guideline is to present the best available, current scientific evidence for OA interventions, covering all interventions other than joint replacement for the hip and knee[13]. The main recommendations are summarized in table 9 below.

Table 8. Certainty of Evidence and Strength of Recommendations of the RACGP Guidelines

Recommendation	Description
Strong recommendation for the intervention	The working group is very confident that the benefits of an intervention clearly outweigh the harms (or vice versa)
Strong recommendation against the intervention	The working group is very confident that the harms of an intervention clearly outweigh the benefits
Conditional recommendation for the intervention	Denotes uncertainty over the balance of benefits, such as when the evidence quality is low or very low, or when personal preferences or costs are expected to

	impact the decision, and as such refer to decisions where consideration of personal preferences is essential for decision making
Conditional recommendation against the intervention	Denotes uncertainty over the balance of harms, such as when the evidence quality is low or very low, or when personal preferences or costs are expected to impact the decision, and as such refer to decisions where consideration of personal preferences is essential for decision making
Conditional (neutral) recommendation	The working group cannot determine the direction of the recommendation
Quality of evidence	
Very low	Evidence is conflicting, of poor quality, or lacking, and hence the balance of benefits and harms cannot be determined. Any estimate of effect is very uncertain as evidence is either unavailable or does not permit a conclusion.
Low	Observational studies would typically be rated as low quality because of the risk for bias. This level also means that further research is very likely to have an important impact on our confidence in the estimate of effect and will probably change the estimate.
Moderate	RCTs with important limitations (i.e., biased assessment of the treatment effect, large loss to follow-up, lack of blinding, unexplained heterogeneity), indirect evidence originating from similar (but not identical) populations of interest, and RCTs with a very small number of participants or observed events. In addition, evidence from well-designed controlled trials without randomization, from well-designed cohort or case-control analytic studies, and from multiple time series with or without intervention is in this category. This level also means that further research will probably have an important impact on our confidence in the estimate of effect and may change the estimate.

High	One or more well-designed and well-executed randomized controlled trials (RCTs) that yield consistent and directly applicable results. This level also means that further research is very unlikely to change our confidence in the estimate of effect.

Table 9. Summary of Recommendations on the Management of Knee and Hip Osteoarthritis (RACGP 2018 Guidelines)

Intervention	Recommendation	Recommendation strength	Evidence
Land-based exercise – Knee	○ Strongly recommend offering land-based exercise for all people with knee OA to improve pain and function, regardless of their age, structural disease severity, functional status, or pain levels ○ Exercise has also been found to be beneficial for other comorbidities and overall health. ○ Strongly recommend walking, muscle-strengthening exercise, and specifically, Tai Chi ○ Clinicians should prescribe an individualized exercise program, considering the person's preference, capability, and the availability of resources and local facilities. Realistic goals should be set. Dosage should be progressed with full consideration given to the frequency, duration and intensity of exercise sessions, number of sessions, and the period over which	**Strong for recommendation** (All land-based exercise, walking, muscle-strengthening exercise, Tai Chi)	**Low** (all land-based, Tai Chi) **Very low** (walking, muscle-strengthening exercise)

	sessions should occur. ○ Attention should be paid to strategies to optimize adherence. ○ Referral to an exercise professional to assist with exercise prescription and provide supervision either in person or remotely may be appropriate for some people		
Land-based exercise – Hip	○ Strongly recommend offering land-based exercise for all people with hip OA to improve pain and function, regardless of their age, structural disease severity, functional status, or pain levels ○ Exercise has also been found to be beneficial for other comorbidities and overall health. ○ The type of exercise that is most beneficial is not yet known. ○ Clinicians should prescribe an individualized progressive exercise program, considering the person's preference, capability, and the availability of local facilities. Realistic goals should be set. Dosage should be progressed with full consideration given to the frequency, duration and	**Strong for recommendation** (When combining all studies of land-based exercise)	**Moderate** (land-based)

	intensity of exercise sessions, number of sessions, and the period over which sessions should occur. ○ The clinician should monitor the person's response to the exercise program and could try a different form of land-based exercise if improvements are not evident. ○ Attention should be paid to strategies to optimize adherence. Referral to an exercise professional to assist with exercise prescription and provide supervision either in person or remotely may be useful for some people		
Weight management – Knee and/ or hip	○ Strongly recommend weight management for people with knee and/or hip OA. For those who are overweight (BMI ≥25 kg/m^2) or obese (BMI ≥30 kg/m^2), a minimum weight loss target of 5–7.5% of body weight is recommended. ○ It is beneficial to achieve a greater amount of weight loss given that a relationship exists between weight loss and symptomatic benefits. Weight loss should be combined with exercise for greater benefits. For people of healthy	**Strong for recommendation**	**Very low**

	body weight, education about the importance of maintaining healthy body weight is essential		
Oral opioids – Knee and/or hip	Do not recommend offering oral opioids for people with knee and/or hip OA	**Strong against recommendation**	**Low** (knee) **Very low** (hip)
Transdermal opioids – Knee and/or hip	Do not recommend offering transdermal opioids for people with knee and/or hip OA	**Strong against recommendation**	**Low**
Doxycycline – Knee and/or hip	Do not recommend offering doxycycline for people with knee and/or hip OA	**Strong against recommendation**	**Low (knee)** **Very low (hip)**
Strontium ranelate – Knee and/or hip	Do not recommend offering strontium ranelate for people with knee and/or hip OA	**Strong against recommendation**	**Moderate**
IL-1 inhibitors – Knee and/or hip	Do not recommend offering IL-1 inhibitors for people with knee and/or hip OA	**Strong against recommendation**	**Low**
FGF – Knee and/or hip	Do not recommend offering FGF for people with knee and/or hip OA	**Strong against recommendation**	**Very low**
Viscosupplementation injection – Hip	Do not recommend offering viscosupplementation injection for people with hip OA	**Strong against recommendation**	**Low**
Stem cell therapy – Knee and/or hip	Do not recommend offering stem cell therapy for people with knee and/or hip OA	**Strong against recommendation**	**Very low**
Arthroscopic, lavage and debridement, meniscectomy and	Do not recommend offering arthroscopic, lavage and debridement, meniscectomy and cartilage repair for people with knee	**Strong against recommendation**	**Very low (Lavage and debridement)**

cartilage repair – Knee	OA unless the person also has mechanical symptoms of a clinically locked knee as per Australian Knee Society's 'Arthroscopy position statement'		**Low (meniscectomy)** **Very low (cartilage repair)**
Cognitive behavioral therapy (CBT) – Knee and/or hip	It may be appropriate to offer CBT for some people with knee and/or hip OA. Clinicians should consider whether CBT is appropriate, considering psychological comorbidities and personal preference. They should be cognizant of issues related to cost and access. It is recommended that CBT is combined with exercise to improve outcomes. CBT may be offered face-to-face or via online programs	**Conditional for recommendation**	**Low (knee)** **Very low (hip)**
Stationary cycling and Hatha yoga – Knee	It may be appropriate to offer stationary cycling and/or Hatha yoga for some people with knee OA. Exercise has also been found to be beneficial for other comorbidities and overall health. Clinicians should prescribe an individualized exercise program, considering the person's preference, capability and the availability of resources and local facilities. Realistic goals should be set. Dosage should be progressed with full	**Conditional for recommendation**	**Very low**

	consideration given to the frequency, duration and intensity of exercise sessions, number of sessions, and the period over which sessions should occur. Attention should be paid to strategies to optimize adherence. Referral to an exercise professional to assist with exercise prescription and to provide supervision either in person or remotely may be appropriate for some people		
Aquatic exercise/ hydrotherapy – Knee and/or hip	It may be appropriate to offer aquatic exercise/hydrotherapy for some people with knee and/or hip OA. This will depend upon personal preference and the availability of local facilities	**Conditional for recommendation**	**Low**
Massage therapy – Knee and/or hip	It may be appropriate to offer a short course of massage therapy for some people with knee and/or hip OA. This should be considered only as an adjunctive treatment to enable engagement with active management strategies, and only for short term, cognizant of issues related to cost and access	**Conditional for recommendation**	**Low**
Manual therapy (stretching, soft tissue and/or joint mobilisation and/or	It may be appropriate to offer a short course of manual therapy (stretching, soft tissue and/or joint mobilization and/or manipulation) for some people with knee	**Conditional for recommendation**	**Very low**

manipulation) – Knee and/or hip	and/or hip OA. This should be considered only as an adjunctive treatment to enable engagement with active management strategies and only for short term, cognizant of issues related to cost and access		
Weight management plus exercise – Knee and/or hip	It may be appropriate to offer a combination of weight management plus exercise for some people with knee and/or hip OA. For those who are overweight (BMI ≥25 kg/m^2) or obese (BMI ≥30 kg/m^2), a minimum weight loss target of 5–7.5% of body weight is recommended. It is beneficial to achieve a greater amount of weight loss given that a relationship exists between the amount of weight loss and symptomatic benefits. Weight loss should be combined with exercise for greater benefits. For people of healthy body weight, education about the importance of maintaining healthy body weight is essential	**Conditional for recommendation** (combination weight management plus exercise)	**Low** (knee) **Very low** (hip)
Heat therapy – Knee and/or hip	It may be appropriate to offer local heat therapy (e.g., hot packs) as a self-management home strategy for some people with knee and/or hip OA. This should be considered only as an adjunctive treatment	**Conditional for recommendation**	**Very low**

Assistive walking device – Knee and/or hip **TENS – Knee and/or hip**	It may be appropriate to offer an assistive walking device (e.g., cane) for some people with knee and/or hip OA, depending on a person's preference and capability. It may be appropriate to offer TENS that can be used at home for some people with knee and/or hip OA. Clinicians need to provide sufficient instructions on self-use, and consider individual accessibility and affordability	**Conditional for recommendation** **Conditional for recommendation**	**Low** (knee) **Very low** (hip) **Very low**
Oral NSAIDs including COX-2 inhibitors – Knee and/or hip	It may be appropriate to offer oral NSAIDs for some people with knee and/or hip OA. It might be reasonable to trial oral NSAIDs at the lowest effective dose for a short period, then discontinue use if not effective. Clinicians also need to inform people, monitor, and capture adverse events, especially gastrointestinal, renal, and cardiovascular, which may be associated with use of NSAIDs	**Conditional for recommendation**	**Moderate**
Duloxetine – Knee and/or hip	It may be appropriate to offer duloxetine for some people with knee and/or hip OA. Duloxetine currently does not have an indication via the TGA for OA and should be considered as an investigational medication only. It could be considered for some people with knee and/or hip OA	**Conditional for recommendation**	**Moderate** (knee) **Low** (hip)

	when other forms of pain relief are inadequate		
Corticosteroid injection – Knee and/or hip	It may be appropriate to offer an intra-articular corticosteroid injection for some people with knee and/or hip OA for short-term pain relief. Clinicians need to be cautious of the potential harms of repeated use	**Conditional for recommendation**	**Very low**
Self-management education programs – Knee and/or hip	Unable to recommend either for or against formal face-to-face self-management education programs for people with knee and/or hip OA**.** However, clinicians should provide information to enhance understanding about OA, its prognosis, and its optimal management	**Conditional (neutral) recommendation**	**Very low**
Specific forms of land-based exercise – Hip	Exercise has been found to be beneficial for other comorbidities and overall health. However, we are unable to specifically recommend either for or against one type of land-based exercise for hip OA over another at this stage. Clinicians should prescribe an individualized progressive exercise program, considering the person's preference, capability, and the availability of local facilities. Realistic goals should be set. Dosage	**Conditional (neutral) recommendation** for recommending one type of land-based exercise over another (e.g., walking, muscle strengthening, stationary cycling, Tai Chi, Hatha yoga)	**Very low** (Walking, muscle strengthening, stationary cycling, Tai Chi, Hatha yoga)

	should be progressed, with full consideration given to the frequency, duration and intensity of exercise sessions, number of sessions, and the period over which sessions should occur. The clinician should monitor the person's response to the exercise program and could try a different form of land- based exercise if improvements are not evident. Attention should be paid to strategies to optimize adherence. Referral to an exercise professional to assist with exercise prescription and provide supervision either in person or remotely may be useful for some people		
Varus unloading knee braces for lateral tibiofemoral compartment knee OA **Shoe orthotics (medial wedge insoles – Knee; shock-absorbing insoles and arch supports – knee and/or hip)**	Unable to recommend either for or against the use of varus unloading/realignment braces for people with lateral tibiofemoral compartment knee OA. Unable to recommend either for or against the use of medial wedged insoles for people with lateral tibiofemoral OA and valgus deformity. Unable to recommend either for or against the use of shock-absorbing insoles or arch supports for knee and/or hip OA.	**Conditional (neutral) recommendation** (varus unloading/ realignment braces) **Conditional (neutral) recommendation** (medial wedged insoles) **Conditional (neutral) recommendation** (shock-absorbing	**Very low** (varus unloading/ realignment – no RCT data) **Very low** (medial wedged insoles) **Very low** (shock-absorbing insoles, arch support – no RCT data)

		insoles, arch support)	**Very low** (all hip orthotics – no RCT data)
Patellar taping – Knee	Unable to recommend either for or against the use of patellar taping for people with knee OA	**Conditional (neutral) recommendation**	**Very low**
Pulsed electromagnetic/ shortwave therapy – Knee and/or hip	Unable to recommend either for or against electromagnetic/shortwave therapy for people with knee and/or hip OA	**Conditional (neutral) recommendation**	**Low** (knee) **Very low** (hip)
Paracetamol – Knee and/or hip	Unable to recommend either for or against the use of paracetamol for people with knee and/or hip OA. However, it might be reasonable to trial paracetamol for a short period and then discontinue use if it is not effective. Clinicians also need to monitor and capture adverse events that may be associated with its use	**Conditional (neutral) recommendation**	**Very low**
Topical NSAIDs – Knee and/or hip	Unable to recommend either for or against the use of topical NSAIDs for people with knee and/or hip OA. It might be reasonable to trial topical NSAIDs for a short period and then discontinue use if not effective. Clinicians also need to monitor and capture the	**Conditional (neutral) recommendation**	**Moderate**

	adverse effects along with its use		
Topical capsaicin – Hip	Unable to recommend either for or against the use of topical capsaicin for people with hip OA	**Conditional (neutral) recommendation**	**Very low**
PRP injection – Knee and/or hip	Unable to recommend either for or against the use of PRP injection for people with knee and/or OA	**Conditional (neutral) recommendation**	**Very low**
ASU – Knee and/or hip	Unable to recommend for or against the use of avocado/soybean unsaponifiables(ASU) for people with knee and/or hip OA	**Conditional (neutral) recommendation**	**Very low**
***Boswellia serrata* extract – Knee and/or hip**	Unable to recommend for or against the use of *Boswellia serrata* for people with knee and/or hip OA	**Conditional (neutral) recommendation**	**Very low**
Curcuma/curcuminoid – Knee and/or hip	Unable to recommend for or against the use of curcuma/curcuminoid for people with knee and/or hip OA	**Conditional (neutral) recommendation**	**Low**
Pine bark extract – Knee and/or hip	Unable to recommend either for or against the use of pine bark extract for people with knee and/or hip OA	**Conditional (neutral) recommendation**	**Low** (knee) **Very low** (hip)
Collagen – Knee and/or hip	Unable to recommend either for or against the use of collagen for people with knee and/or hip OA	**Conditional (neutral) recommendation**	**Low (knee)** **Very low (hip)**
MSM – Knee and/or hip	Unable to recommend either for or against the use of MSM for people with knee and/or hip OA	**Conditional (neutral) recommendation**	**Very low**

Cold therapy – Knee and/or hip	Suggest not offering local cold application (e.g., ice packs) for people with knee and/or hip OA.	**Conditional against recommendation**	**Very low**
Valgus unloading/ realignment knee braces for medial tibiofemoral compartment and realigning patellofemoral braces for patellofemoral OA	Suggest not offering valgus unloading/realignment braces for people with medial tibiofemoral compartment knee OA. Suggest not offering realigning patellofemoral braces for patellofemoral OA	**Conditional against recommendation**	**Low** **Very low**
Shoe orthotics (lateral wedge insoles) – Knee	Suggest not offering lateral wedge insoles for people with medial tibiofemoral knee OA	**Conditional against recommendation**	**Very low**
Footwear – Knee	Suggest not offering unloading shoes, minimalist footwear, or rocker-sole shoes for people with symptomatic knee OA. However, clinicians may consider advising people with OA to wear footwear with shock-absorbing properties and avoid high-heeled shoes.	**Conditional against recommendation**	**Very low** (unloading shoes, minimalist footwear) **Low** (rocker-sole shoes
Kinesio taping – Knee and hip	Suggest not offering kinesio taping for people with knee and/or hip OA.	**Conditional against recommendation**	**Very low**
Other electrotherapy – Knee and/or hip (eg shockwave,	Suggest not offering electrotherapy modalities of shockwave, interferential or laser for people with knee and/or hip OA.	**Conditional against recommendation**	**Low** (laser) **Very low** (shockwave,

interferential, laser)			interferential, laser-hip)
Therapeutic ultrasound – Knee and/or hip	Suggest not offering therapeutic ultrasound for people with knee and/or hip OA.	**Conditional against recommendation**	**Moderate** (knee) **Low** (hip)
Acupuncture – Knee and/or hip	Suggest not offering acupuncture (i.e., traditional, laser, electrical) for people with knee and/or hip OA	**Conditional against recommendation**	**Low** (knee) **Very low** (hip)
Topical capsaicin – Knee	Suggest not offering topical capsaicin for people with knee OA	**Conditional against recommendation**	**Low**
Bisphosphonates – Knee and/or hip	Suggest not offering bisphosphonates for people with knee and/or hip OA	**Conditional against recommendation**	**Very low**
Calcitonin – Knee and/or hip	Suggest not offering calcitonin for people with knee and/or hip OA	**Conditional against recommendation**	**Very low**
Anti-NGF – Knee and/or hip	Suggest not offering NGF for people with knee and/or hip OA	**Conditional against recommendation**	**Moderate**
Colchicine – Knee and/or hip	Suggest not offering colchicine for people with knee and/or hip OA	**Conditional against recommendation**	**Very low**
Methotrexate – Knee and/or hip	Suggest not offering methotrexate for people with knee and/or hip OA	**Conditional against recommendation**	**Low**
Viscosupplementation – Knee	Suggest not offering viscosupplementation injection for people with knee OA	**Conditional against recommendation**	**Low**
Dextrose prolotherapy	Suggest not offering dextrose prolotherapy	**Conditional against**	**Low**

– Knee and/or hip	for people with knee and/or hip OA	**recommendation**	
Glucosamine – Knee and/or hip	Suggest not offering glucosamine for people with knee and/or hip OA	**Conditional against recommendation**	**Very low** (knee) **Low** (hip)
Chondroitin – Knee and/or hip	Suggest not offering chondroitin for people with knee and/or hip OA	**Conditional against recommendation**	**Very low**
Glucosamine and chondroitin in compound form – Knee and/or hip	Suggest not offering glucosamine and chondroitin in compound form for people with knee and/or hip OA	**Conditional against recommendation**	**Very low**
Vitamin D – Knee and/or hip	Suggest not offering vitamin D for people with knee and/or hip OA	**Conditional against recommendation**	**Low** (knee) **Very low** (hip)
Omega-3 fatty acids – Knee and/or hip	Suggest not offering omega-3 fatty acids for people with knee and/or hip OA	**Conditional against recommendation**	**Very low**
Diacerein – Knee and/or hip	We suggest not offering diacerein for people with knee and/or hip OA	**Conditional against recommendation**	**Very low**

1.2.8 Guidelines for the Diagnosis and Treatment of Osteoarthritis in China (2019)

The guideline provides recommendations for the OA diagnosis, disease risks monitoring and evaluation, treatment purpose and physical, medical, and surgical interventions. The grading of recommendations assessment, development, and evaluation (GRADE) approach was used to rate the quality of evidence and the strength of recommendations (table 10)[11].

Table 10. Certainty of Evidence and Strength of Recommendations of the Chinese Guidelines Using the GRADE Approach

Grade	Quality of evidence
A	A body of evidence of high-quality meta-analyses, systematic reviews of and RCTs directly applicable to the target population
B	As above but relating to high quality case control or cohort studies with low risk of bias or confounding and high probability that a relationship is causal
C	As B but trials may have some flaws
D	Non-analytic evidence e.g., case reports or series or expert opinion
Level	**Strength of recommendation**
1	Strong
2	Weak

The main recommendations are summarized below:

- The purpose of OA treatment is to relieve pain, prevent deformity, improve function and life quality (1B)
- It is recommended that OA patients should control their weight, and those who are overweight or obese should lose weight (1A)
- It is recommended to carry out health education for OA patients, mainly to educate them about the causes, prevention, progress, and treatment of the disease, reduce the burden of patients' thoughts, and improve their self-management efficiency (1B).
- OA patients should reduce long-term standing, kneeling and squatting positions, ascending stairs activity, as well as bad posture, etc. (2B).

- It is recommended for OA patients to take reasonable joint muscle training and moderate aerobic exercise (1B).
- It is recommended for OA patients to choose different activities according to the location of the disease, such as grasping and holding activities of hand joints, flexion, and extension activities of knee joints under the condition of non-load, and gentle activities in different directions of cervical and lumbar joints (1B)
- For patients with mild pain, topical application of non-steroidal anti-inflammatory drugs (NSAIDs) is recommended to reduce local pain (1B), and external application of Chinese medicine may also be considered (2B)
- Physical therapy such as manipulation therapy, massage, and acupuncture is recommended for OA patients to relieve pain and improve physical function (2B)
- For some patients, treatment with glucosamine or chondroitin sulfate can be selected. It should be stopped if no symptom improved after 3 to 6 months (2C)
- For OA patients with persistent pain or moderate or severe pain, it is recommended to choose oral NSAIDs after risk assessment and use the lowest effective dose for a short period (1–3 months) alone (1B). The combination of COX-2 inhibitor and proton pump inhibitor is recommended for patients with high risk of gastrointestinal adverse reactions (1B)
- For patients with OA treated with oral drugs, some oral Chinese medicine can be considered in combination (2C)
- For patients of knee OA with persistent or moderate to severe pain, intra-articular injection of glucocorticoids is recommended for rapid relief of pain in patients with OA, the injection interval should not be shorter than 4 to 6 months (1B)
- For patients of knee OA with persistent or moderate to severe pain, intra-articular injection of HA can be considered to improve the patient's symptoms in the long term and delay the time required for joint replacement (2C)
- For OA patients with NSAIDs contraindications or ineffective pain treatment, it is suggested to take opioids or duloxetine for analgesia (2C), or to combine diacerein, inflammatory skin extract of cowpox vaccine to inoculate of rabbits, tanezumab, technetium-99m methylene diphosphonate or bulleyaconitine A (2D)

- For patients with knee OA who have poor responses with intra-articular injection of HA, stem cell injection may be considered (2D)
- For knee OA patients with poor pain treatment response and mechanical symptoms, we recommend arthroscopy to reduce symptoms after assessing the risk of surgery (2C)
- For patients with hip or knee OA who have poor response to conservative treatment and whose quality of life is significantly affected, we recommend performing joint replacement after assessing the risk of surgery, which can relieve pain, increase the range of joint movement, and improve quality of life (1B)

1.2.9 American Physical Therapy Association (APTA) Physical Therapist Management of Total Knee Arthroplasty (2020)

This guideline addresses the management of adult patients with knee osteoarthritis undergoing primary TKA. It is not intended to address management of revision or partial knee arthroplasty, pediatric patients, or patients with rheumatoid arthritis. In addition, this guideline is not intended to address nonoperative management of patients with osteoarthritis[20]. The main recommendations are summarized in table 12 below.

Table 11. Certainty of Evidence and Strength of Recommendations of the APTA Guidelines

Strength	Strength Visual	Definition
Strong	◆◆◆◆	A high level of certainty of moderate-to-substantial benefit, harm, or cost, or a moderate level of certainty for substantial benefit, harm, or cost (based on a preponderance of Level 1 or 2 evidence with at least 1 Level 1 study).
Moderate	◆◆◆♦	A high level of certainty of slight-to-moderate benefit, harm, or cost, or a moderate level of certainty for a moderate level of benefit, harm, or cost (based on a preponderance of Level 2 evidence, or a single high-quality RCT).
Weak	◆◆♦♦	A moderate level of certainty of slight benefit, harm, or cost, or a low level of certainty for moderate-to-substantial benefit, harm, or cost (based on Level 2 through 5 evidence).

Theoretical/ foundational	◆◆◆◆	A preponderance of evidence from animal or cadaver studies, from conceptual/theoretical models/principles, or from basic science/bench research; or published expert opinion in peer-reviewed journals that supports the recommendation.
Best Practice	◆◆◆◆	Recommended practice based on current clinical practice norms; exceptional situations in which validating studies have not or cannot be performed yet there is a clear benefit, harm, or cost; or expert opinion.

Quality of evidence	**Definition**
High	Preponderance of Level 1 or 2 evidence with at least 1 Level I study. Indicates a high level of certainty that further research is not likely to change outcomes of the combined evidence.
Moderate	Preponderance of Level 2 evidence. Indicates a moderate level of certainty that further research is not likely to change the outcomes direction of the combined evidence; however, further evidence may impact the magnitude of the outcome.
Low	A moderate level of certainty of slight benefit, harm, or cost, or a low level of certainty for moderate-to-substantial benefit, harm, or cost. Based on Level II through V evidence. Indicates that there is some but not enough evidence to be confident of the true outcomes of the study and that future research may change the direction of the outcome and/or impact magnitude of the outcome.
Insufficient	Based on Level II through V evidence. Indicates minimal or conflicting evidence to support the true direction and/or magnitude of the outcome. Future research may inform the recommendation.

Table 12. Summary of Recommendations for Total Knee Arthroplasty (APTA 2020 Guidelines)

Interventions	Rating	Practice Recommendations
Preoperative exercise program	◆◆◆♦	Physical therapists should design preoperative exercise programs and teach patients undergoing total knee arthroplasty (TKA) to implement strengthening and flexibility exercises.
Preoperative education	◆◆♦♦	It is the consensus of the work group that physical therapists or other team members should provide preoperative education for patients undergoing TKA, including, at a minimum: patient expectations during hospitalization and factors influencing discharge planning and disposition, the postoperative rehabilitation program, safe transferring techniques, use of assistive devices, and fall prevention.
Continuous passive motion (CPM) device use for mobilization	◆◆◆♦	Physical therapists should NOT use CPMs for patients who have undergone primary, uncomplicated TKA.
Cryotherapy	◆◆◆♦	Physical therapists should teach patients and other care givers use of cryotherapy and encourage its use for early postoperative pain management for patients who have undergone TKA.
Physical activity	◆◆♦♦	It is the consensus of the work group that physical therapists should develop an early mobility plan and teach patients who have undergone TKA regarding the importance of early mobility and appropriate progression of physical activity, based on safety, functional tolerance, and physiological response.
Motor function training (balance, walking, movement,	◆◆◆◆	Physical therapists should include motor function training (eg, balance, walking, movement symmetry) for patients who have undergone TKA.

symmetry)		
Postoperative knee range-of-motion (ROM) exercise	◆◆◆◆	It is the consensus of the work group that physical therapists should teach and encourage patients to implement passive, active assistive, and active ROM exercises for the involved knee following TKA.
Immediate postoperative knee flexion during rest for blood loss and swelling	◆◆◆◆	To reduce immediate postoperative blood loss and swelling in the first 7 days after surgery, physical therapists or other team members may teach patients to position the operated knee in some degree of flexion (30°-90°) while resting.
Neuromuscular electrical stimulation (NMES)	◆◆◆◆	Physical therapists should use NMES for patients who have undergone TKA to improve quadriceps muscle strength, gait performance, performance-based outcomes, and patient-reported outcomes.
Resistance and intensity of strengthening exercise	◆◆◆◆	Physical therapists should design, implement, teach, and progress patients who have undergone TKA in high-intensity strength training and exercise programs during the early post-acute period (i.e., within 7 days after surgery) to improve function, strength, and ROM.
Prognostic factors: body mass index (BMI), depression, preoperative ROM, physical function and strength, age, diabetes, number of comorbidities, and sex	◆◆◆◆	Physical therapist management should take into consideration the following factors when determining prognosis, providing treatment, and engaging in informed decision making and expectation setting with patients undergoing TKA:
		Higher BMI is associated with more postoperative complications and worse postoperative outcomes.
		Depression is associated with worse postoperative outcomes.
		Preoperative ROM is positively associated with postoperative ROM but has minimal, if any, effect on physical function and quality of life.

		Preoperative physical function is positively associated with postoperative physical function.
		Preoperative strength is positively associated with postoperative physical function.
		Age is associated with mixed patient-reported, performance-based, and impairment-based outcomes.
		Diabetes is not associated with worse functional outcomes.
		A greater degree of comorbidity is associated with worse patient-reported outcomes.
		Sex is associated with both positive and negative effects on postoperative outcomes.
Prognostic factors: tobacco and patient support	◆◆◆◆	It is the consensus of the work group that active tobacco use and lack of patient support (eg, environmental factors including, but not limited to, support and relationships) should be considered as prognostic/risk factors associated with less than optimal functional outcomes.
Postoperative physical therapy supervision	◆◆◆◆	Supervised physical therapist management should be provided for patients who have undergone TKA. The optimal setting should be determined by patient safety, mobility, and environmental and personal factors.
Group-based vs individual-based therapy	◆◆◆◆	Physical therapists may use group-based or individual-based physical therapy sessions for patients who have undergone TKA.
Physical therapy postoperative timing	◆◆◆◆	Physical therapist management should start within 24 hours of surgery and prior to discharge for patients who have undergone TKA.
Physical therapy discharge planning	◆◆◆◆	It is the consensus of the work group that physical therapists should provide guidance to the care team and to the patient on safe and objective discharge

		planning, patient functional status, assistance equipment, and services needed to support a safe discharge from the acute care setting.
Outcomes assessment	◆◆◆◆	It is the consensus of the work group that physical therapists should collect data using the Knee Injury Osteoarthritis Outcomes Survey Joint Replacement (KOOS JR) as a patient-reported outcome measure and both the 30-Second Sit-to-Stand and Timed “Up and Go” (TUG) tests as performance-based outcomes to demonstrate the effectiveness of care provided. At a minimum, these measures should be collected at the first visit and upon conclusion of care from each setting.

1.2.10 American Physical Therapy Association (APTA) Physical Therapist Management of Glenohumeral Joint Osteoarthritis: A Clinical Practice Guideline from the American Physical Therapy Association (2023)

This clinical practice guideline (CPG) is based on a systematic review of published studies involving the physical therapist management of patients with glenohumeral joint osteoarthritis (GHOA) and those undergoing total shoulder arthroplasty (TSA). Recommendations are summarized in table 13 (grading based on table 11 above)[21].

Table 13. Summary of Recommendations for the Management of Management of Glenohumeral Joint Osteoarthritis (APTA 2023 Guidelines)

Intervention	Quality of Evidence	Strength of Recommendation	Recommendation
Postoperative management: sling and exercise	High	◆◆◆◆	Physical therapists should implement the use of a sling and progressive exercises for ROM and strengthening to improve patient-reported outcomes, and ROM in patients with GHOA who have undergone total shoulder arthroplasty (TSA).
Postoperative physical therapist–directed pain management	Moderate	◆◆◆♦	Physical therapists should implement the use of a sling with the shoulder in a neutral rotation position for pain management in patients with GHOA who have undergone TSA.
Postoperative physical therapy timing	Moderate	◆◆◆♦	The timing of the introduction of shoulder ROM exercises by physical therapists may be delayed up to 4 weeks without negatively impacting patient-reported outcomes in patients with GHOA who have undergone TSA.
Preoperative physical therapy for patients scheduled for TSA	Insufficient	◆♦♦♦	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services delivered preoperatively may benefit postoperative outcomes in patients with GHOA who are undergoing TSA.

Nonoperative physical therapy comparison to other management strategies	Insufficient	◆◆◆◆	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services may benefit patients with GHOA who have not undergone TSA.
Nonoperative physical therapist intervention options	Insufficient	◆◆◆◆	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that no one specific intervention performed by a physical therapist is superior to another for patients with GHOA.
Postoperative physical therapy outcomes	Insufficient	◆◆◆◆	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services delivered postoperatively may benefit patient-rated functional outcomes in the management of patients who have undergone TSA for GHOA.
Postoperative physical therapy edema management	Insufficient	◆◆◆◆	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist interventions for edema in patients with GHOA who have undergone TSA should be based on best available evidence, clinical expertise, and patient values.

1.2.11 European Alliance of Associations for Rheumatology (EULAR) Recommendations for Intra-Articular Therapies (2021)

The objective of this guideline is to establish evidence-based recommendations to guide health professionals using intra-articular therapies (IAT) in adult patients with peripheral arthropathies[14]. Recommendations are summarized in table 15 below.

Table 14. Certainty of Evidence and Strength of Recommendations of the EULAR Guidelines

CATEGORY OF EVIDENCE		STRENGTH OF RECOMMENDATION	
1A	Meta-analysis of RCTs	A	Category I evidence
1B	RCT		
2A	Controlled study without randomization	B	Category II evidence or extrapolated from category I evidence
2B	Quasi-experimental study		
3	Non-experimental descriptive studies, such as comparative, correlation, and case-control studies	C	Category III evidence or extrapolated from categories I or II evidence
4	Expert committee reports or opinion or clinical experience of respected authorities, or both	D	Category IV evidence or extrapolated from categories II or III evidence

Table 15: Summary of Recommendations for the Use of Intra-Articular Therapies (EULAR 2021 Guideline)

OVERARCHING PRINCIPLES		
I. IAT are recommended and widely used in the management of joint diseases.		
II. The aim of IAT is to improve patient-centered outcomes.		
III. Contextual factors are important and contribute to the effect of IAT.		
IV. IAT should be offered in the frame of full individualized information and a shared decision-making process.		
V. A variety of health professionals perform these procedures routinely.		
RECOMMENDATIONS	**Level of Evidence**	**Grade of recommendation**
The patient must be fully informed of the nature of the procedure, the injectable, and potential benefits, and risks; informed consent should be obtained and documented according to local habits.	4	D
► An optimal setting for IAT includes a professional, clean, quiet, private, well-lightened room. ► Patient in an appropriate position, ideally on a couch/examination table, easy to lie flat. ► Equipment for aseptic procedures. ► Aid from another HP. ► Resuscitation equipment close-by.	4	D
Accuracy depends on the joint, route of entry, and health professional expertise; if available, imaging guidance, for example, ultrasound, may be used to improve accuracy.	1B-2A	B
During pregnancy when injecting a joint one must take into account whether the compound is safe for mother and baby.	4	D

Aseptic technique should always be undertaken when performing IAT.	3	C
Patients should be offered local anesthetic explaining pros and cons.	3–4	D
Diabetic patients, especially those with suboptimal control, should be informed about the risk of transient increased glycaemia following IA GC and advised about the need to monitor glucose levels particularly from first to third day.	1B	A
IAT is not a contraindication in people with clotting/bleeding disorders or taking antithrombotic medications unless bleeding risk is high.	3	C
IAT may be performed at least 3 months prior to joint replacement surgery and may be performed after joint replacement following consultation with the surgical team.	3	C
The shared decision to reinject a joint should take into consideration benefits from previous injections and other individualized factors (e.g., treatment options, compound used, systemic treatment, comorbidities…).	2	B
Avoid overuse of injected joints for 24 hours following IAT; however, immobilization is discouraged.	1B	A

1.2.12 Acupuncture for Treatment of Knee Osteoarthritis: A Clinical Practice Guideline (2023)

Although increasingly used in the clinical setting, acupuncture is not mentioned or weakly recommended in guidelines for the treatment of knee OA (KOA). This guideline published in the Journal of Evidence-Based Medicine in 2023 aimed to look at the efficacy of acupuncture in treating KOA. An independent evidence synthesis group performed a systematic review to summarize available evidence and evaluate the evidence using the GRADE approach (table 6 above)[19]. The main recommendations are summarized below:

- Acupuncture is recommended over no treatment for adult knee osteoarthritis (KOA) (weak recommendation, moderate certainty evidence).
- After a treatment duration of approximately 4 weeks, acupuncture has demonstrated improvements in KOA health status (moderate certainty evidence), pain (very low certainty evidence), stiffness (low certainty evidence), and physical function (low certainty evidence). However, there was no significant impact on mental health (low certainty evidence) or physical health (moderate certainty evidence) in comparison to no treatment.
- Notably, acupuncture has shown a particular improvement in stiffness (moderate certainty evidence) and was not less effective in terms of KOA health status (low certainty evidence), pain (moderate certainty evidence), and physical function (low certainty evidence) when compared to usual care after the 4-week treatment period. The incidence of adverse reactions in the acupuncture group was 6.2%, while it was 3.3% in the no treatment group (moderate certainty evidence). Acupuncture's adverse reactions were deemed acceptable, rendering it a relatively safe therapy.
- Acupuncture is recommended for a duration of 4 to 8 weeks, depending on the severity of knee osteoarthritis (KOA) and the patient's response to treatment (weak recommendation, moderate certainty evidence. This approach is particularly relevant for KOA patients aged 55 to 75 with moderate-to-severe symptoms. Shared decision-making with patients is encouraged in determining the appropriate treatment duration. For individuals with severe WOMAC total scores or moderate knee pain, undergoing acupuncture sessions 2-4 times a week for a cumulative period of 4-8 weeks has shown potential for enhancing health status.
- It is recommended to consider combining non-steroidal anti-inflammatory drugs (NSAIDs) with acupuncture, rather than opting for acupuncture as a

standalone treatment, particularly when dealing with severe knee osteoarthritis (KOA) symptoms (weak recommendation, moderate certainty evidence).

1.2.13 The Italian Society for Rheumatology (SIR) Clinical Practice Guidelines for the Diagnosis and Management of Knee, Hip, and Hand Osteoarthritis (2019)

The Italian Society for Rheumatology Clinical Practice Guidelines[12] have opted for the following Grading Scheme/Level of Evidence, and the main recommendations are summarized in table 17 below.

Table 16. Certainty of Evidence and Strength of Recommendations of the SIR Guidelines

CATEGORY	EVIDENCE
1	From meta-analysis of randomized controlled trials or from at least one randomized controlled trial
2	From at least one controlled study without randomization or from at least one cohort study
3	From at least one case-control study
4	From case-series or poor-quality cohort and case-control studies
5	From expert committee reports or opinions and/or clinical experience of respected authorities

Table 17. Summary of Recommendations for the Management of Knee, Hip, and Hand Osteoarthritis (SIR 2019 Guideline)

RECOMMENDATION	LEVEL OF EVIDENCE
Optimal management of OA requires a combination of non-pharmacological and pharmacological treatment modalities individualized to the patient's needs.	5
Treatment of hand, hip and knee OA should be individualized according to: 1) the wishes and expectations of the individual 2) localization, severity of structural change and type of OA 3) risk factors (such as age, sex, obesity, and adverse mechanical	1-4

factors) 4) presence of inflammation 5) comorbidity and co-medication 6) OA in other sites.	
Blood, urine, or synovial fluid tests are not required for diagnosis of OA but may be required for differential diagnosis. In OA patients with marked inflammatory symptoms and/or signs, especially involving atypical sites, laboratory tests should be undertaken.	1-2
Paracetamol (acetaminophen) (up to 3 g/day) is an effective initial oral analgesic for treatment of mild to moderate pain. In elderly patients it should be preferred because of its relative safety in comparison with NSAIDs. The use of weak opioids in case of severe pain or no response, intolerance, or contraindication to NSAIDs, is recommended. Stronger opioids should only be used for the management of severe pain in exceptional circumstances. Duloxetine may be helpful for knee (and maybe hip) OA accompanied by chronic pain.	1-4
Oral NSAIDs are recommended at the lowest effective dose and for the shortest duration in patients who respond inadequately to paracetamol. NSAIDs (such as ibuprofen, diclofenac, and naproxen) and selective COX- 2 inhibitors (including celecoxib and etoricoxib) are indicated in moderate pain. Higher doses of oral NSAIDs may be indicated in more severe pain. In patients with increased gastrointestinal risk, non-selective NSAIDs plus a proton-pump inhibitor, or a selective COX-2 inhibitor, should be used. In patients with increased cardiovascular risk, naproxen can be used; COX-2 inhibitors are contraindicated and other non-selective NSAIDs should be used with caution. In nephropathic patients the use of NSAID and COX-2 inhibitors should be avoided.	1
Topical pharmacological treatments are preferred over systemic treatments, especially for mild to moderate pain and when only a few joints are affected. Topical NSAIDs and capsaicin gel are effective and safe treatments. Patients with age >75 years should use topical rather than oral NSAIDs even though the analgesic response decreases after 1 year of use.	1-2

The accuracy of intra-articular injection depends on the joint and on the skills of the practitioner. Ultrasound- guidance may improve accuracy and it is particularly recommended for joints that are difficult to access due to the site itself, degree of deformity or obesity. *Hyaluronic Acid:* intra-articular injection of hyaluronic acid of different molecular weights may give symptomatic benefit with low toxicity and could help to reduce the NSAID use. Steroids: intra-articular corticosteroid injection may be beneficial, providing fast pain relief in patients who suffer painful relapses and who do not respond or have a contraindication to analgesics and NSAIDs. *Mesenchymal stem cells and/or platelet rich plasma:* it is unclear if intra-articular injection of mesenchymal stem cells or platelet-rich plasma can help to relieve pain associated with knee OA.	1-5
In patients with symptomatic knee OA, glucosamine sulphate and chondroitin sulphate may have a beneficial effect on symptoms. Structural effects, patients suitable for treatment and the cost to benefit ratio of the therapy remain to be defined.	1-2
Concerning patient education, lifestyle changes and therapeutic exercise: ***Patients' education*** Information, education, and an individually tailored program, including long-term and short-term goals, intervention or action plans to reduce the degenerative damage of the OA should be provided. People with hip and/or knee OA should be taught a regular individualized (daily) exercise regimen and participate in self-management programs, strengthening, low-impact aerobic exercises, and neuromuscular education. ***Lifestyles*** Patients with hip and knee OA, who are overweight, should be encouraged to lose weight and maintain their weight at a lower level. People with hip or knee OA at risk of work disability should have access to vocational rehabilitation, including counselling on modifiable work-related factors. ***Exercise*** The mode of delivery of exercise education should be selected according both to the preference of the person with hip or knee	1-3

OA and local availability. Patients with knee OA should participate in aerobic and/or resistance land-based and/or aquatic exercise.	
Orthoses prevent the progression of degenerative changes and improve function. In hip and knee OA, the use of assistive devices such as a walking-stick or crutches is suggested as a preventive measure. The use of appropriate and comfortable shoes is recommended. The combination of splints for thumb base OA, orthoses and exercise regimen reduce pain and improve functionality in the short and long term and prevent/correct lateral angulation and flexion deformity.	1-2
Concerning TENS, acupuncture, balneotherapy and exercises in water, manual therapy, and patellar taping: *TENS:* transcutaneous electrical nerve stimulation (TENS) may help with short-term pain control in some patients with hip or knee OA. Acupuncture: the usefulness in patients with symptomatic OA of the knee and hip remains to be defined. *Balneotherapy and exercises in water are effective for relieving symptoms in hip and knee (and hand) OA*. *Manual therapy/Taping:* it is unclear if manual therapy can be useful in patients with symptomatic osteoarthritis of the knee. The use of bandage tape may help to reduce pain in patients with joint instability knee OA.	1-4
Orthopedic surgery should be considered in patients with radiographic evidence of OA, who have marked disability, reduced quality of life and pain refractory to other treatments.	5

Section 2.0 Drug Therapy in Osteoarthritis

This section comprises four subsections: the first contains the newly recommended drugs, the second covers drug modifications, the third outlines the drugs to delist due to withdrawal from the market among others, and the fourth tackles other drugs approved by FDA/EMA but not yet registered by the SFDA.

2.1 Additions

The following drug has been approved for Osteoarthritis but not SFDA registered yet. This section below tackles the SFDA registered new molecules along with their HTA analysis and the "Other Drugs" section includes non-SFDA registered new molecules.

2.1.1 Diacerein (Cartimov®)

The following table describes the characteristics of Diacerein (Cartimov®)

Table 18. Diacerein (Cartimov®) Drug Information

SCIENTIFIC NAME DIACEREIN	
SFDA Classification	Prescription
SFDA Approval	Yes
US FDA	No
EMA	Yes; After reexamining diacerein-containing medicines, the European Medicines Agency (EMA) Pharmacovigilance Risk Assessment Committee (PRAC) has recommended in March 2014 that these products remain available, but with restrictions to manage the risks for severe diarrhea and liver damage[8].
MHRA	No
PMDA	No
Indication (ICD-10)	M15, M16, M17, M18, M19
Drug Class	Analgesic
Drug Sub-class	Nonopioid; Anti-inflammatory Agent

ATC Code	M01AX21
Pharmacological Class (ASHP)	Anti-inflammatory Agent
DRUG INFORMATION	
Dosage Form	Capsule
Route of Administration	Oral
Dose (Adult) [DDD]*	50 to 100 mg/day in 1 to 2 divided doses.
Maximum Daily Dose Adults*	N/A
Dose (pediatrics)	N/A
Maximum Daily Dose Pediatrics*	N/A
Adjustment	No dosage adjustment is necessary
Prescribing edits*	**AGE, MD, ST**
AGE (Age Edit)	Not recommended in patients aged 65 years and above. Not suitable for children under 15 years of age.
CU (Concurrent Use Edit)	N/A
G (Gender Edit)	N/A
MD (Physician Specialty Edit)	PRAC also recommends that diacerein only be started by physicians experienced in treating osteoarthritis. "Doctors should note that, based on available data, the use of diacerein is to be limited to treating symptoms of osteoarthritis affecting the hip or knee," the committee said.
PA (Prior Authorization)	N/A
QL (Quantity Limit)	N/A
ST (Step Therapy)	Diacerein is considered a symptomatic slow-acting drugs for OA (SYSADOA) and is typically prescribed when other treatments have not provided sufficient relief or when there is a need for a disease-modifying effect. it is thought to have potential disease-modifying properties by helping to protect cartilage from further degeneration
EU (Emergency Use Only)	N/A
PE (Protocol Edit)	N/A

SAFETY	
Main Adverse Drug Reactions (most common and most serious)	**Most common:** gastrointestinal distress (diarrhea, abdominal pain, nausea, soft stools), rash or itching, liver enzyme abnormalities (elevation). **Most serious**: hepatotoxicity, severe skin, and allergic reactions
Drug Interactions*	- Antacids (aluminum, calcium, and magnesium salts, oxides, or hydroxides): Decreased digestive absorption of diacerein. - Diuretic and/or cardiac glycosides: Intake of diacerein can lead to diarrhea and hypokalemia. Caution must be exercised in the concomitant administration of diuretics (high-ceiling loop and thiazides) and/or cardiac glycosides (digitoxin, digoxin), as the risk of arrhythmia is increased.
Special Population	Not recommended in patients aged 65 years and above
Pregnancy	Clinically, there is currently no adequate data to assess a potential teratogenic or fetotoxic effect of diacerein when administered during pregnancy. Therefore, it is not recommended to administer the product to women during pregnancy.
Lactation	There is no available data on the presence of diacerein in milk or the effects on the breastfed child. Therefore, due to the potential for adverse events in breastfeeding infants, advise lactating women not to breastfeed during treatment with this drug.
Contraindications	• Inflammatory organic bowel disease (ulcerative colitis, Crohn's disease). • Intestinal obstruction or partial obstruction.

	• Abdominal pain syndromes of indeterminate etiology. • Known allergy to rhein (substance in the anthraquinone group) and substances with similar activity. • Known hypersensitivity to any excipient. • Current and/or history of liver disease.
Monitoring Requirements	Monitoring parameters for the safety and efficacy of diacerein are essential to ensure that the medication is working as intended and to detect any potential adverse effects. • Pain and Joint Function: Assess and record changes in pain levels, joint stiffness, and overall joint function. Monitoring these parameters will help evaluate the effectiveness of diacerein in managing osteoarthritis symptoms. • Radiographic Imaging: X-rays and other imaging studies can provide objective evidence of changes in joint structure and disease progression. These may be used periodically to assess the efficacy of diacerein treatment. • Adverse Effects: Keep a record of any adverse effects or side effects you experience while taking diacerein. Common side effects may include gastrointestinal symptoms (abdominal pain, diarrhea, nausea), which should be reported to your healthcare provider. • Liver Function Tests: Diacerein has been associated with potential liver enzyme elevations. Your healthcare provider may recommend regular

	liver function tests to monitor for any signs of liver dysfunction. • Kidney Function Tests: While diacerein is generally not associated with kidney problems, it's a good practice to monitor kidney function through periodic blood tests, particularly if you have a history of kidney disease. • Blood Clotting Parameters: If you are taking diacerein along with anticoagulants (e.g., Warfarin), it's essential to monitor blood clotting parameters such as the International Normalized Ratio (INR) more frequently to prevent bleeding complications.
Precautions	• **Diarrhea:** Diacerein often causes diarrhea, which can lead to dehydration and low potassium levels (hypokalemia). If diarrhea occurs, patients should discontinue diacerein and consult their doctor for alternative treatment options. Caution is needed in patients taking diuretics, which can exacerbate dehydration and hypokalemia. Exercise caution in patients on cardiac glycosides (e.g., digoxin) and avoid concomitant use of laxatives. • **Hepatotoxicity:** Diacerein has been associated with elevated liver enzyme levels and symptomatic acute liver injury in post-marketing reports. Before starting diacerein, the patient's medical history and current liver health should be assessed. The presence of liver disease is a contraindication for diacerein use. Monitor for signs of liver injury and

	exercise caution when diacerein is used alongside other drugs known to cause liver damage. Patients should limit alcohol intake, and diacerein treatment should be discontinued if liver enzyme elevation or symptoms of liver damage are observed. Patients should be educated about the signs of hepatotoxicity and advised to promptly contact their physician if they experience such symptoms. • **Elderly Patients:** Caution should be exercised when using diacerein in patients older than 65 years. Close supervision and monitoring of adverse reactions are recommended. • **Age Restriction:** Diacerein capsules are not suitable for children under 15 years of age. • **Pregnancy and Lactation:** Diacerein is not recommended during pregnancy and breastfeeding. • **Lactose Content:** Diacerein contains lactose, and it should not be administered to individuals with congenital galactosemia, glucose or galactose malabsorption syndrome, or lactase deficiency.
Black Box Warning	N/A
REMS*	N/A

HEALTH TECHNOLOGY ASSESSMENT (HTA)

The table below lists the HTA reviews and recommendations of Osteoarthritis treatment options by the following agencies/institutes/authorities: National Institute for Health and Care Excellence (NICE), Canadian Agency for Drugs and Technologies in Health (CADTH), Haute Autorité de Santé (HAS), Institute for Quality and Efficiency in Health Care (IQWIG), and Pharmaceutical Benefits Advisory Committee (PBAC) as applicable. The recommendations below are for Diacerein:

Table 19. Diacerein HTA Analysis

MEDICATION	AGENCY	DATE – HTA RECOMMENDATION
Diacerein	NICE[7]	19 January 2023 Discontinued on February 11, 2023 following an update from the manufacturer on their regulatory timings the timelines for this MTA are to be confirmed.
	CADTH	N/A
	HAS[6]	21 September 2011 **Negative recommendation:** Unfavorable opinion for maintaining the listing on the reimbursable specialties list for social security beneficiaries.
	IQWIG	N/A
	PBAC	N/A

CONCLUSION STATEMENT

Diacerein is a medication used to treat osteoarthritis, a common joint condition characterized by the degeneration of joint cartilage and associated pain and inflammation. It is typically prescribed when other treatments have not provided sufficient relief or when there is a need for a disease-modifying effect. Diacerein has anti-inflammatory and disease-modifying properties that can help alleviate osteoarthritis symptoms and potentially slow down the progression of the disease. The use of Diacerein is not backed up by HTA bodies and has **negative recommendations** such as by HAS. Moreover, it is not FDA approved and its use by EMA is restricted to specific patient population due to increased liver enzyme levels that could lead to potential hepatotoxicity, diarrhea, and severe skin/allergic reactions. Finally, NICE discontinued the medication on February 11, 2023 following an update from the manufacturer. **We therefore recommend against listing diacerein among drugs to be used for the treatment of osteoarthritis.**

2.2 Modifications

The following modifications and adjustments have been implemented since the 2019 report:

Table 20. Prescribing Edits (PE) Modifications for Osteoarthritis Medications

DRUGS	PE MODIFICATIONS
Aceclofenac	Add AGE: not recommended for use in children/adolescents < 18 years old except in specific situations determined by healthcare providers
Betamethasone dipropionate, betamethasone sodium phosphate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen).
Capsaicin	Add QL: should not be used for more than 5 consecutive days.
Dexamethasone sodium phosphate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen).
Dexketoprofen	Add AGE: not recommended for use in children/adolescents < 18 years old except in specific situations determined by healthcare providers
Diclofenac diethylamine	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Diclofenac epolamine	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Diclofenac potassium	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.

Diclofenac sodium	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Diclofenac sodium, lidocaine hydrochloride	Add AGE: diclofenac not recommended to be used for this indication below 18 years old, should be determined by healthcare provider.
Duloxetine	Remove PA. Add ST and MD: should be prescribed by specialist if pain associated with depression and after confirming that the patient had tried the following to control pain of OA but failed: 1) topical and oral NSAIDS 2) paracetamol (acetaminophen). Add AGE: not usually indicated for children<18yo because have been shown to increase risk of suicidal ideations in infants and young children.
Etoricoxib	Add AGE: typically not recommended for use in children and adolescents, particularly those under the age of 18.
Flurbiprofen	Add AGE: typically not recommended for use in children and adolescents, particularly those under the age of 18.
Hyaluronic acid	Remove PA. Add ST and keep MD: to be only prescribed and administered by physician specialized in OA management. The prescriber must make sure that symptoms remain despite the patient having tried the following medication: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen), 4. intraarticular glucocorticoids. Add AGE: typically not recommended for use in children and adolescents, particularly those under the age of 18.
Hydrocortisone sodium succinate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)
Ibuprofen	Add AGE: ibuprofen not recommended for children weighing less than 7 kg

Indometacin	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 14.
Ketoprofen	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 12.
Mefenamic acid	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 18.
Meloxicam	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 18.
Methylprednisolone	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)
Methylprednisolone sodium succinate	Remove PA. Add ST and MD: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)
Naproxen	Add AGE: naproxen not to be used for this indication below 12 years old
Oxycodone hydrochloride	Remove PA. Add MD: due to the safety concern of these agents, they should be prescribed in the lowest dose and for the shortest possible duration only in the following cases: 1. patient has contraindication to NSAIDS, 2. paracetamol failed, 3. patient has no available surgical option, 4.non-pharmacological options are not effective.
Oxycodone hydrochloride, naloxone hydrochloride	Remove PA. Add MD: due to the safety concern of these agents, they should be prescribed in the lowest dose and for the shortest possible duration only in the following cases: 1.

	patient has contraindication to NSAIDS, 2. paracetamol failed, 3. patient has no available surgical option, 4. non-pharmacological options are not effective.
Piroxicam	Add AGE: as per Canadian labeling, typically not recommended for use in children and adolescents, particularly those under the age of 16.
Sodium hyaluronate	Remove PA. Add ST and keep MD: to be only prescribed and administered by physician specialized in OA management. The prescriber must make sure that symptoms remain despite the patient having tried the following medication: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen), 4. intraarticular glucocorticoids
Tramadol hydrochloride	Remove PA. Add MD, ST: due to the safety concern of these agents, they should be prescribed in the lowest dose and for the shortest possible duration only in the following cases: 1. patient has contraindication to NSAIDS, 2. paracetamol failed, 3. patient has no available surgical option, 4.non-pharmacological options are not effective.
Triamcinolone acetonide	Remove PA. Add MD, ST: should be prescribed by specialist for management of OA in case of acute flare or after checking that the patient has received the following without improvement of pain: 1. topical NSAIDS, 2. oral NSAIDS, 3. paracetamol (acetaminophen)

2.3 Delisting

The medication below is not SFDA registered[23], therefore, it is recommended to delist the following drug from CHI formulary:

- Acemetacin

2.4 Other drugs

The drug detailed in this section is a supplement commonly used for osteoarthritis, however, it is **not approved** by the FDA and/or the EMA and **not registered by the SFDA**.

2.4.1 Piascledine®

Piascledine**®** is a brand name for a medication containing a combination of two active ingredients: avocado soybean unsaponifiables (ASU) and soybean oil. It is commonly used as a dietary supplement for the management of osteoarthritis. Piascledine is often taken as a pill of 300mg once daily to alleviate joint pain, improve joint function, and slow down the progression of osteoarthritis.

Section 3.0 Key Recommendations Synthesis

Diagnosis of osteoarthritis

- Clinically diagnose osteoarthritis in individuals who are aged 45 or above, experiencing joint pain related to activity, and either have no morning stiffness in the joints or stiffness lasting no more than 30 minutes[22].
- Avoid routine use of imaging for osteoarthritis diagnosis unless there are unusual features or indications of an alternative or additional condition[22].

Management of knee osteoarthritis

- Lateral wedge insoles are not recommended for patients with knee osteoarthritis[9].
- Canes could be used to improve pain and function in patients with knee osteoarthritis[9].
- Brace treatment could be used to improve function, pain, and quality of life in patients with knee osteoarthritis[9].
- 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: turmeric, ginger extract, glucosamine, chondroitin, and vitamin D[9].
- In patients with symptomatic knee OA, glucosamine sulphate and chondroitin sulphate may have a beneficial effect on symptoms. Structural effects, patients suitable for treatment and the cost to benefit ratio of the therapy remain to be defined[12].
- Other guidelines recommend against the use of supplements such as glucosamine[13,22].
- Topical treatments are the preferred choice over systemic treatments. Among topical pharmacological options, topical nonsteroidal anti-inflammatory drugs (NSAIDs) are the primary recommendation. Topical NSAIDs should be used to improve function and quality of life for the treatment of osteoarthritis of the knee, when not contraindicated[9-12].
- Oral NSAIDs and acetaminophen are recommended to improve pain and function in the treatment of knee osteoarthritis when not contraindicated[9-12].

- Oral narcotics, including tramadol, result in a notable increase of adverse events and are not effective at improving pain or function for the treatment of osteoarthritis of the knee[9].
- Hyaluronic acid intra-articular injection(s) is not recommended for routine use in the treatment of symptomatic osteoarthritis of the knee[9].
- Intra-articular corticosteroids could provide short-term relief for patients with symptomatic osteoarthritis of the knee/hip[9].
- Suggest not offering diacerein for people with knee and/or hip OA[13].
- For patients of knee OA with persistent or moderate to severe pain, intra-articular injection of glucocorticoids is recommended for rapid relief of pain in patients with OA, the injection interval should not be shorter than 4 to 6 months[11].
- Intra-articular injection of HA can also be considered to improve the patient's symptoms in the long term and delay the time required for joint replacement[11].
- Drains should not be used with total knee arthroplasty because there is no significant difference in complications or outcomes. Cemented femoral and tibial components or cementless femoral and tibial components in knee arthroplasty show similar rates of functional outcomes, complications, and reoperations, and conflicting evidence in comparative[16].
- The practitioner can use unicompartmental arthroplasty vs total knee arthroplasty for patients with predominantly medial compartment osteoarthritis, as evidence reports improved patient reported and functional outcomes in the short term; however, long-term rates of revision in unicompartmental knee arthroplasty may be higher than total knee arthroplasty[16].
- In patients with no known contraindications, tranexamic acid (TXA) should be used because its use decreases postoperative blood loss, postoperative drain collection, and reduces the necessity of postoperative transfusions following total knee arthroplasty (TKA)[16].
- For the following patients with osteoarthritis or the hip/knee:
    - With radiographically moderate-to-severe OA or advanced symptomatic ON with secondary arthritis of the hip or knee, using standard radiographic grading such as K/L or Tonnis

- With moderate-to-severe pain or loss of function who have been indicated for elective total joint arthroplasty (TJA) through a shared decision-making process with their physician

  and

- Did not improve with ≥ 1 trials of appropriate nonoperative therapy such as physical therapy, NSAIDs, and/or intraarticular injections (e.g., glucocorticoids or viscosupplementation).

Recommend proceeding to TJA without delay:

- over delaying arthroplasty 3 months
- over delaying arthroplasty for a trial of physical therapy
- over delaying surgical treatment for a trial of NSAIDs
- over delaying surgical treatment for a trial of braces and/or ambulatory aids
- over delaying surgical treatment for a trial of intraarticular glucocorticoid injections[18].

- While some guidelines recommend platelet-rich plasma as an option to reduce pain and improve function in patients with symptomatic osteoarthritis of the knee (limited recommendation)[9], others strongly recommend against it in patients with knee and/or hip OA[15].

Management of hand osteoarthritis

- Patients with hand osteoarthritis should not be subjected to conventional or biological disease-modifying antirheumatic drugs[10].
- Chondroitin sulfate may be employed for patients with hand osteoarthritis to alleviate pain and enhance functionality[10].
- While intra-articular glucocorticoid injections should generally not be employed for patients with hand osteoarthritis, they may be contemplated for individuals with painful interphalangeal joints[10].
- Hand orthoses are strongly recommended for patients with first carpometacarpal (CMC) joint OA[15].
- Hand orthoses are conditionally recommended for patients with OA in other joints of the hand[15].

Management of hip osteoarthritis

- Exercise is strongly recommended for patients with hip OA[15].
- Weight loss is strongly recommended[15].
- NSAIDs are recommended[15].
- Tramadol are acetaminophen are conditionally recommended for patients with hip OA[15].
- Supplement material is not recommended to be used in hip OA[15].
- Ultrasound-guided intraarticular glucocorticoid injections are strongly recommended for patients with hip OA[15].
- Intraarticular hyaluronic acid injections are strongly recommended against in patients with hip OA[15].
- Platelet-rich plasma treatment is strongly recommended against in patients with hip OA[15].
- Stem cell injections are strongly recommended against in patients with hip OA[15].

General management for osteoarthritis

- IAT may be performed at least 3 months prior to joint replacement surgery and may be performed after joint replacement following consultation with the surgical team. IAT is not a contraindication in people with clotting/bleeding disorders or taking antithrombotic medications, unless bleeding risk is high[14].
- Diabetic patients, especially those with suboptimal control, should be informed about the risk of transient increased glycaemia following IA GC and advised about the need to monitor glucose levels particularly from first to third day[14].
- For OA patients with NSAIDs contraindications or ineffective pain treatment, it is suggested to take opioids or duloxetine for analgesia (2C), or to combine diacerein, inflammatory skin extract of cowpox vaccine to inoculate of rabbits, tanezumab, technetium-99m methylene diphosphonate or bulleyaconitine A[11].
- There is no benefit to the use of hyaluronic acid in the treatment of glenohumeral joint osteoarthritis[17].

- Anatomic total shoulder arthroplasty demonstrates more favorable function and pain relief in the short- to mid-term follow-up when compared with hemiarthroplasty for the treatment of glenohumeral osteoarthritis[17].
- For every patient, it is advisable to consider incorporating exercises that enhance function, bolster muscle strength, and alleviate pain[10].
- Concerning TENS, acupuncture, balneotherapy and exercises in water, manual therapy, and patellar taping:
    - ➔ TENS: transcutaneous electrical nerve stimulation (TENS) may help with short-term pain control in some patients with hip or knee OA.
    - ➔ Acupuncture: the usefulness in patients with symptomatic OA of the knee and hip remains to be defined.
    - ➔ Balneotherapy and exercises in water are effective for relieving symptoms in hip and knee (and hand) OA.
    - ➔ Manual therapy/Taping: it is unclear if manual therapy can be useful in patients with symptomatic osteoarthritis of the knee. The use of bandage tape may help to reduce pain in patients with joint instability knee OA[12].
- Thermal interventions (locally applied heat or cold) are conditionally recommended for patients with knee, hip, and/ or hand OA[15].
- Paraffin, an additional method of heat therapy for the hands, is conditionally recommended for patients with hand OA[15].
- It's recommended that OA patients should control their weight, and those who are overweight or obese should lose weight. This can alleviate joint pressure, alleviate pain, prevent additional injury, and enhance joint mobility[9, 11, 12, 13].
- Engaging in regular exercise can diminish joint pain, reduce stiffness, and enhance flexibility and muscle strength. The mode of delivery of exercise education should be selected according both to the preference of the person with hip or knee OA and local availability. Patients with knee OA should participate in aerobic and/or resistance land-based and/or aquatic exercise[9].
- Acupuncture is recommended for a duration of 4 to 8 weeks, depending on the severity of knee osteoarthritis (KOA) and the patient's response to treatment. It is recommended to consider combining non-steroidal anti-inflammatory drugs (NSAIDs) with acupuncture, rather than opting for acupuncture as a standalone treatment, particularly when dealing with severe knee osteoarthritis (KOA) symptoms[6,19].

- Physical therapists should develop an early mobility plan and teach patients who have undergone TKA regarding the importance of early mobility and appropriate progression of physical activity, based on safety, functional tolerance, and physiological response[20].
- Physical therapists should design, implement, teach, and progress patients who have undergone TKA in high-intensity strength training and exercise programs during the early postacute period (ie, within 7 days after surgery) to improve function, strength, and ROM[20].
- Physical therapists should implement the use of a sling and progressive exercises for ROM and strengthening to improve patient-reported outcomes, and ROM in patients with GHOA who have undergone total shoulder arthroplasty (TSA). They should also implement the use of a sling with the shoulder in a neutral rotation position for pain management[21].
- Strongly recommend offering land-based exercise for all people with knee, hip OA to improve pain and function, regardless of their age, structural disease severity, functional status, or pain levels[13].

Referral for joint replacement

- Patients with hip, knee, or shoulder OA can be referred for joint replacement if their joint symptoms (such as pain, stiffness, reduced function, or progressive joint deformity) are substantially impacting their quality of life and non-surgical management (for example, therapeutic exercise, weight loss, pain relief) is ineffective or unsuitable[22].
- Patients should not be excluded from referral to joint replacement because of age, sex or gender, smoking, comorbidities, overweight or obesity, based on measurements such as body mass index (BMI)[22].

Section 4.0 Conclusion

This report serves as **an annex to the previous CHI Osteoarthritis report** and aims to provide recommendations to aid in the management of Osteoarthritis. It is important to note that these recommendations should be utilized to support clinical decision-making and not replace it in the management of individual patients with Osteoarthritis. Health professionals are expected to consider this guidance alongside the specific needs, preferences, and values of their patients when exercising their judgment.

Section 5.0 References

1. NIAMS. What Causes Osteoarthritis, Symptoms & More. Published 2023. Accessed October 31, 2023. https://www.niams.nih.gov/health-topics/osteoarthritis
2. Sen R, Hurley JA. Osteoarthritis. *StatPearls*. Published online February 20, 2023. Accessed October 31, 2023. https://www.ncbi.nlm.nih.gov/books/NBK482326/
3. Healthline. Osteoarthritis Complications: Weight Gain, Anxiety, and More. Published 2023. Accessed October 31, 2023. https://www.healthline.com/health/osteoarthritis/complications-and-dangers#complications
4. WHO. Osteoarthritis. Published 2023. Accessed October 31, 2023. https://www.who.int/news-room/fact-sheets/detail/osteoarthritis
5. Althomali OW, Amin J, Acar T, et al. Prevalence of Symptomatic Knee Osteoarthritis in Saudi Arabia and Associated Modifiable and Non-Modifiable Risk Factors: A Population-Based Cross-Sectional Study. *Healthcare*. 2023;11(5). doi:10.3390/HEALTHCARE11050728
6. Haute Autorité de Santé. Haute Autorité de Santé - ART 50 (diacéréine). Published 2013. Accessed November 7, 2023. https://www.has-sante.fr/jcms/c_1356138/fr/art-50-diacereine
7. NICE. Project information | Osteoarthritis - diacerein [ID332] | Guidance | NICE. Published online 2023.
8. European Medicines Agency. Diacerein-containing medicines for oral administration. Published 2014. Accessed November 7, 2023. https://www.ema.europa.eu/en/medicines/human/referrals/diacerein-containing-medicines-oral-administration
9. Brophy RH, Fillingham YA. AAOS Clinical Practice Guideline Summary: Management of Osteoarthritis of the Knee (Nonarthroplasty), Third Edition. *Journal of the American Academy of Orthopaedic Surgeons*. 2022;30(9):E721-E729. doi:10.5435/JAAOS-D-21-01233
10. Kloppenburg M, Kroon FPB, Blanco FJ, et al. 2018 update of the EULAR recommendations for the management of hand osteoarthritis. *Ann Rheum Dis*. 2019;78(1):16-24. doi:10.1136/annrheumdis-2018-213826

11. Zhang Z, Huang C, Jiang Q, et al. Guidelines for the diagnosis and treatment of osteoarthritis in China (2019 edition). *Ann Transl Med*. 2020;8(19):1213-1213. doi:10.21037/atm-20-4665

12. A. Ariani1 2, M. Manara1,3, A. Fioravanti4 , F. Iannone5 , F. Salaffi6 , N. Ughi1,3, I. Prevete1,7, A. Bortoluzzi1,8, S. Parisi1,9, C.A. Scirè1,8. The Italian Society for Rheumatology clinical practice guidelines for the diagnosis and management of knee, hip and hand osteoarthritis. Published online 2019.

13. Royal Australian College of General Practitioners. *Guideline for the Management of Knee and Hip Osteoarthritis - Second Edition*.; 2018. www.racgp.org.au

14. Uson J, Rodriguez-Garciá SC, Castellanos-Moreira R, et al. EULAR recommendations for intra-articular therapies. *Ann Rheum Dis*. 2021;80(10):1299-1305. doi:10.1136/annrheumdis-2021-220266

15. Kolasinski SL, Neogi T, Hochberg MC, et al. 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee. *Arthritis Care Res (Hoboken)*. 2020;72(2):149-162. doi:10.1002/ACR.24131/ABSTRACT

16. AAOS. *Surgical Management of Osteoarthritis Of the Knee*.; 2022.

17. Khazzam M, Gee AO, Pearl M. Management of Glenohumeral Joint Osteoarthritis. *Journal of the American Academy of Orthopaedic Surgeons*. 2020;28(19):781-789. doi:10.5435/JAAOS-D-20-00404

18. Hannon CP, Goodman SM, Austin MS, et al. American College of Rheumatology and American Association of Hip and Knee Surgeons Clinical Practice Guideline for the Optimal Timing of Elective Hip or Knee Arthroplasty for Patients With Symptomatic Moderate-to-Severe Osteoarthritis or Advanced Symptomatic Osteonecrosis With Secondary Arthritis for Whom Nonoperative Therapy Is Ineffective. *Arthritis Care Res (Hoboken)*. Published online 2023. doi:10.1002/acr.25175

19. Luo X, Liu J, Li Q, et al. Acupuncture for treatment of knee osteoarthritis: A clinical practice guideline. *J Evid Based Med*. 2023;16(2):237-245. doi:10.1111/jebm.12526

20. Logerstedt AD, Radach L, Scalzitti D, Stevens-Lapsley J, Zeni Jr J. *Physical Therapist Management of Total Knee Arthroplasty*. Vol 100.; 2020. https://academic.oup.com/ptj

21. Michener LA, Heitzman J, Abbruzzese LD, et al. APTA Physical Therapist Management of Glenohumeral Joint Osteoarthritis: A Clinical Practice

Guideline from the American Physical Therapy Association. *Phys Ther*. 2023;103(6). doi:10.1093/ptj/pzad041

22. NICE. Recommendations | Osteoarthritis in over 16s: diagnosis and management | Guidance | NICE. Published online 2022.
23. SFDA. SFDA Drug List . Published 2023. Accessed August 10, 2023. https://www.sfda.gov.sa/en/drugs-list

Section 6.0 Appendices

Appendix A. Prescribing Edits Definition

Some covered drugs may have additional requirements, rules, or limits on coverage. These requirements and limits may include:

Prescribing edits Tools	Description
AGE (Age):	Coverage may depend on patient age
CU (Concurrent Use):	Coverage may depend upon concurrent use of another drug
G (Gender):	Coverage may depend on patient gender
MD (Physician Specialty):	Coverage may depend on prescribing physician's specialty or board certification
PA (Prior Authorization):	Requires specific physician request process
QL (Quantity Limits):	Coverage may be limited to specific quantities per prescription and/or time period
ST (Step Therapy):	Coverage may depend on previous use of another drug
EU (Emergency Use only):	This drug status on Formulary is only for emergency use
PE (Protocol Edit):	Use of drug is dependent on protocol combination, doses and sequence of therapy

Appendix B. Osteoarthritis Scope

Section	Rationale/Updates
Addition of a new section: AAOS Clinical Practice Guideline Summary: Management of Osteoarthritis of the Knee (Nonarthroplasty), Third Edition (2022)[9]	• Lateral wedge insoles are not recommended for patients with knee osteoarthritis. (Strong recommendation, ★★★★). • Canes could be used to improve pain and function in patients with knee osteoarthritis. (Moderate recommendation, ★★★☆). • Brace treatment could be used to improve function, pain, and quality of life in patients with knee osteoarthritis. (Moderate recommendation, ★★★☆). • 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: Turmeric, Ginger extract, Glucosamine, Chondroitin and Vitamin D (Limited recommendation, ★★☆☆). • Topical NSAIDs should be used to improve function and quality of life for the treatment of osteoarthritis of the knee, when not contraindicated. (Strong recommendation, ★★★★). • Supervised exercise, unsupervised exercise, and/or aquatic exercise are recommended over no exercise to improve pain and function for the treatment of knee osteoarthritis. (Strong recommendation, ★★★★). • Neuromuscular training (ie, balance, agility, and coordination) programs in combination with exercise could be used to improve performance-based function and walking speed for the treatment of knee osteoarthritis. (Moderate recommendation, ★★★☆). • Patient education programs are recommended to improve pain in patients with knee osteoarthritis. (Strong recommendation, ★★★★). • Patient education programs are recommended to improve pain in patients with knee osteoarthritis. (Strong recommendation, ★★★★). • Sustained weight loss is recommended to improve pain and function in overweight and obese patients with knee osteoarthritis. (Moderate recommendation, ★★★☆). • Manual therapy in addition to an exercise program may be used to improve pain and function in patients with knee osteoarthritis. (Limited recommendation, ★★☆☆).

	• Massage may be used in addition to usual care to improve pain and function in patients with knee osteoarthritis (Limited recommendation, ★★☆☆). • FDA-approved laser treatment may be used to improve pain and function in patients with knee osteoarthritis (Limited recommendation, ★★☆☆). • Acupuncture may improve pain and function in patients with knee osteoarthritis (Limited recommendation, ★★☆☆). • Modalities that may be used to improve pain and/or function in patients with knee osteoarthritis include a. Transcutaneous electrical nerve stimulation (pain) (Limited recommendation, ★★☆☆). • 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 (pain) (Limited recommendation, ★★☆☆). • Extracorporeal shockwave therapy may be used to improve pain and function for the treatment of osteoarthritis of the knee (Limited recommendation, ★★☆☆). • Oral NSAIDs are recommended to improve pain and function in the treatment of knee osteoarthritis when not contraindicated (Strong recommendation, ★★★★). • Oral acetaminophen is recommended to improve pain and functions (Strong recommendation, ★★★★). • Oral narcotics, including tramadol, result in a notable increase of adverse events and are not effective at improving pain or function for the treatment of osteoarthritis of the knee (Strong recommendation, ★★★★). • Hyaluronic acid intra-articular injection(s) is not recommended for routine use in the treatment of symptomatic osteoarthritis of the knee (Moderate recommendation, ★★★☆). • Intra-articular corticosteroids could provide short-term relief for patients with symptomatic osteoarthritis of the knee (Moderate recommendation, ★★★☆). • Platelet-rich plasma may reduce pain and improve function in patients with symptomatic osteoarthritis of the knee (Limited recommendation, ★★☆☆). • Denervation therapy may reduce pain and improve function in patients with symptomatic osteoarthritis of the knee (Limited recommendation, ★★☆☆). • Arthroscopy with lavage and/or debridement in patients with a primary diagnosis of knee

	osteoarthritis is not recommended (Moderate recommendation, ★★★☆). • 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 (Moderate recommendation, ★★★☆). • High tibial osteotomy may be considered to improve pain and function in properly indicated patients with uni-compartmental knee osteoarthritis (Limited recommendation, ★★☆☆). • In the absence of reliable evidence, it is the opinion of the work group that the utility/efficacy of dry needling is unclear and requires additional evidence (Consensus, ★☆☆☆). • In the absence of reliable or new evidence, it is the opinion of the work group not to use free-floating (unfixed) interpositional devices in patients with symptomatic medial compartment osteoarthritis of the knee (Consensus, ★☆☆☆).
Addition of a new section: AAOS Surgical Management of Osteoarthritis of the Knee (2022)[16]	• Drains should not be used with total knee arthroplasty because there is no significant difference in complications or outcomes (Moderate recommendation, high quality of evidence ★★★☆). • Cemented femoral and tibial components or cementless femoral and tibial components in knee arthroplasty show similar rates of functional outcomes, complications, and reoperations, and conflicting evidence in comparative studies (Moderate recommendation, high quality of evidence ★★★☆). • Cemented femoral and tibial components or hybrid fixation (cementless femur) in total knee arthroplasty show similar functional outcomes and rates of complications and reoperations (Moderate recommendation, high quality of evidence ★★★☆). • The practitioner can use unicompartmental arthroplasty vs total knee arthroplasty for patients with predominantly medial compartment osteoarthritis, as evidence reports improved patient reported and functional outcomes in the short term; however, long-term rates of revision in unicompartmental knee arthroplasty may be higher than total knee arthroplasty (Moderate recommendation, high quality of evidence ★★★☆). • Peripheral nerve blockades for total knee arthroplasty lead to decreased postoperative pain and opioid requirements with no difference in complications or outcomes (Strong recommendation, high quality of evidence ★★★★).

	• Periarticular injections used in total knee arthroplasty lead to decreased postoperative pain (Strong recommendation, high quality of evidence ★★★★). • In patients with no known contraindications, tranexamic acid (TXA) should be used because its use decreases postoperative blood loss, postoperative drain collection, and reduces the necessity of postoperative transfusions following total knee arthroplasty (TKA) (Strong recommendation, high quality of evidence ★★★★). • There is no difference in outcomes, function, or pain between navigation and conventional techniques (Moderate recommendation, high quality of evidence ★★★☆). • There is no difference in postoperative functional scores between patients with a BMI < 30 and obese patients (BMI 30-39.9); however, there may be increased risk of complications in morbidly obese patients (≥40), in particular, surgical site infections (Strong recommendation, high quality of evidence ★★★★). • Optimization of perioperative glucose control (<126mg/dl) after total knee arthroplasty should be attempted in diabetic and non-diabetic patients with HgbA1C < 6.5, as hyperglycemia can lead to less favorable postoperative oucomes and higher complication rates (Strong recommendation, high quality of evidence ★★★★). • Evidence reports that there is no difference in outcomes, function, pain, or blood transfusions between the use of tourniquets and nonuse of tourniquets (Strong recommendation, high quality of evidence ★★★★). • Evidence reports that there is no difference between patellar surfacing or non-patellar resurfacing in total knee arthroplasty (Strong recommendation, high quality of evidence ★★★★). • Cruciate retaining (CR) and posterior stabilized (PS) total knee arthroplasty (TKA) designs have similarly efficacious/favorable postoperative outcomes (Strong recommendation, high quality of evidence ★★★★). • The practitioner should not use patient specific technology (e.g., guides, cutting blocks) because there is no significant difference in patient outcomes, function, or pain as compared to conventional total knee arthroplasty (TKA). Additionally, it does not reduce operating time, blood loss, length of stay, and/or complications (Strong recommendation, high quality of evidence ★★★★). • There is no difference in composite/functional outcomes or complications between kinematic or mechanical alignment principles in total knee arthroplasty (Strong

	recommendation, high quality of evidence ★★★★). • Cessation of preoperative opioids should be attempted for total knee arthroplasty (TKA), as preoperative opioid use demonstrates decreased postoperative functional scores and increased pain scores and complications (Moderate recommendation, low quality of evidence ★★★☆). • All cementless components or hybrid fixation (cementless femur) in total knee arthroplasty show similar functional outcomes and rates of complications and reoperations (Limited recommendation, moderate quality of evidence ★★☆☆). • The practitioner could use uni-compartmental knee arthroplasty or tibial osteotomy for the treatment of knee osteoarthritis (Limited recommendation, moderate quality of evidence ★★☆☆). • In the absence of reliable evidence, it is the opinion of the workgroup that simultaneous bilateral total knee arthroplasty (TKA) could be performed vs. staged (>90 days) bilateral TKA in appropriately selected patients but should be performed with caution and should be avoided with patients who are at high risk of cardiopulmonary complications (Consensus recommendation, low grade of evidence ★☆☆☆). • Smoking cessation should be attempted before total knee arthroplasty, as a history of smoking may result in higher complications, lower functional scores, higher pain scores, and SSIs (Consensus recommendation, low grade of evidence ★☆☆☆). • Discharge to home, with or without home services, is associated with fewer adverse events compared to discharge to acute rehabilitation facility or skilled nursing facility (Limited recommendation, moderate quality of evidence ★★☆☆). • Evidence suggests no significant difference in function, outcomes, or complications in the short term between robotic assisted and conventional total knee arthroplasty (TKA) (Limited recommendation, high quality of evidence ★★☆☆). • Evidence suggests no significant difference in function, outcomes, or complications in the short term between robotic assisted and conventional unicompartmental knee arthroplasty (Limited recommendation, high quality of evidence ★★☆☆).
Addition of a new section: AAOS Management of	• Strong evidence supports that there is no benefit to the use of hyaluronic acid in the treatment of glenohumeral joint osteoarthritis (Strong recommendation, ★★★★). • Strong evidence suggests that obese patients with glenohumeral osteoarthritis do not experience an increase in the rate of early postoperative complications (Strong

Glenohumeral Joint Osteoarthritis (2020)[17]	recommendation, ★★★★). • Strong evidence supports that gender/ sex is not associated with better or worse postoperative outcomes (Strong recommendation, ★★★★). • Strong evidence suggests that patients with glenohumeral joint osteoarthritis who have more comorbidities experience higher rates of early post arthroplasty complications (Strong recommendation, ★★★★). • Strong evidence supports that anatomic total should arthroplasty demonstrates more favorable function and pain relief in the short- to mid-term follow-up when compared with hemiarthroplasty for the treatment of glenohumeral osteoarthritis (Strong recommendation, ★★★★). • Strong evidence supports that the clinician may use pegged or keeled glenoid implants in patients with glenohumeral joint osteoarthritis and a well-functioning rotator cuff. Pegged implants demonstrate less radiolucent lines, but the effect on clinical outcomes and survivorship are unclear (Strong recommendation, ★★★★). • Moderate evidence supports that older age at the time of surgery is associated with lower revision rates (Moderate recommendation, ★★★☆). • Moderate evidence suggests that smoking is associated with inferior postoperative outcomes. (Moderate recommendation, ★★★☆). • Moderate quality evidence suggests that although both higher and lower preoperative functioning patients with glenohumeral joint osteoarthritis will likely experience improvement after arthroplasty, patients with higher preoperative function may experience less functional improvement (Moderate recommendation, ★★★☆). • Moderate evidence suggests that depression is associated with inferior postoperative outcomes in patients with glenohumeral joint osteoarthritis undergoing arthroplasty (Moderate recommendation, ★★★☆). • Moderate evidence supports that surgeons not use metal-backed non-cemented glenoid implants (Moderate recommendation, ★★★☆). • Moderate quality evidence supports that surgeons can use subscapularis peel, lesser tuberosity osteotomy, or tenotomy when performing shoulder arthroplasty (Moderate recommendation, ★★★☆). • Limited evidence supports that clinicians may use stemmed, stemless, or resurfacing prosthesis for patients with glenohumeral joint osteoarthritis undergoing total arthroplasty

	or hemiarthroplasty (Limited recommendation, ★★☆☆). • 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 (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that clinicians may prescribe physical therapy in patients after shoulder arthroplasty (Consensus recommendation, ★☆☆☆). • 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 (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, the work group cannot recommend for or against the use of the following: (1) Acupuncture, (2) Dry needling, (3) Cannabis, (4) Cannabidiol (CBD) oil, (5) Capsaicin, (6) Shark cartilage, (7) Glucosamine and chondroitin, (8) Cupping, and (9) Transcutaneous Electrical Nerve Stimulation (TENS) (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that opioids not be prescribed because routine and long-term pain management of glenohumeral osteoarthritis (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group nonprosthetic surgical options may or may not provide short-term benefit for patients with glenohumeral joint osteoarthritis (Consensus recommendation, ★☆☆☆). • 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 imaging performed at the discretion of the clinician (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that either cemented or noncemented stems can be used in the treatment of patients with glenohumeral joint osteoarthritis and a well-functioning rotator cuff (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that clinicians may use either anatomic TSA or reverse TSA for the treatment of glenohumeral joint

	osteoarthritis in select patients with excessive glenoid bone loss and/or rotator cuff dysfunction (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that clinicians may use polyethylene-metal hybrid glenoid implants or all polyethylene implants during TSA for the treatment of glenohumeral joint osteoarthritis (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that clinicians may consider concomitant biceps tenodesis or tenotomy during shoulder arthroplasty (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that utilization of tranexamic acid during shoulder arthroplasty may result in reduced blood loss and reduced risk of blood transfusion (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that for patients with small isolated, repairable supraspinatus tears, clinicians can perform anatomic TSA (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that same day discharge is an option after shoulder arthroplasty in selected patients (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that either continuous cryotherapy or cold packs can be used after shoulder arthroplasty (Consensus recommendation, ★☆☆☆). • In the absence of reliable evidence, it is the opinion of the work group that multimodal pain management strategies or nonopioid individual modalities can provide added benefit for postoperative pain management after shoulder arthroplasty (Consensus recommendation, ★☆☆☆).
Addition of a new section: ACR/AAHKS American College of Rheumatology and American Association of Hip	The recommendations listed below apply to a specific defined population. The defined population is patients with radiographically moderate-to-severe osteoarthritis or osteonecrosis of the hip or knee using standard radiographic grading such as Kellgren/Lawrence or Tonnis, and for patients with moderate-to-severe pain or loss of function who have been indicated for elective total joint arthroplasty (TJA) through a shared decision-making process with their physician and have completed trials of ≥1 appropriate nonoperative therapy.

and Knee Surgeons Clinical Practice Guideline for the Optimal Timing of Elective Hip or Knee Arthroplasty for Patients With Symptomatic Moderate-to-Severe Osteoarthritis or Advanced Symptomatic Osteonecrosis With Secondary Arthritis for Whom Nonoperative Therapy Is Ineffective (2023)[18]	• Conditionally recommend proceeding to TJA without delay over delaying arthroplasty 3 months (Conditional recommendation, very low certainty of evidence). • Conditionally recommend proceeding to TJA without delay over delaying arthroplasty for a trial of physical therapy (Conditional recommendation, low certainty of evidence). • Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of NSAIDs (Conditional recommendation, very low certainty of evidence). • Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of braces and/or ambulatory aids (Conditional recommendation, very low certainty of evidence). • Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of intraarticular glucocorticoid injections (Conditional recommendation, very low certainty of evidence). • Conditionally recommend proceeding to TJA without delay over delaying surgical treatment for a trial of viscosupplementation injections (Conditional recommendation, very low certainty of evidence). • In the defined population with a BMI of ≥50, we conditionally recommend proceeding to TJA without delaying to achieve weight reduction to a BMI of <50 (Conditional recommendation, very low certainty of evidence). • In the defined population with a BMI of 40–49, we conditionally recommend proceeding to TJA without delaying to achieve weight reduction to a BMI of <40 (Conditional recommendation, very low certainty of evidence). • In the defined population with a BMI of 35–39, we conditionally recommend proceeding to TJA without delaying to achieve weight reduction to a BMI of <35 (Conditional recommendation, very low certainty of evidence). • In the defined population with poorly controlled diabetes mellitus, we conditionally recommend delaying TJA to improve glycemic control (Conditional recommendation, very low certainty of evidence). • In the defined population with nicotine dependence, we conditionally recommend delaying TJA for nicotine use reduction/cessation (Conditional recommendation, low certainty of evidence). • In the defined population with bone loss with deformity or severe ligamentous instability,

	we conditionally recommend proceeding to TJA without delay over delaying TJA for optimization of non–life-threatening conditions (not graded) • In the defined population with a neuropathic joint, we conditionally recommend proceeding to TJA without delay over delaying for optimization of non–life threatening conditions (not graded)
Addition of a new section: Update of the EULAR recommendations for the management of hand osteoarthritis (2018)[10]	• Education and training on ergonomic principles, activity pacing, and the use of assistive devices should be provided to all patients (Level of evidence 1b, Grade or recommendation A). • For every patient, it is advisable to consider incorporating exercises that enhance function, bolster muscle strength, and alleviate pain (Level of evidence 1a, Grade or recommendation A). • Orthotic devices should be contemplated as a means of alleviating symptoms in patients with thumb base osteoarthritis, with a focus on their long-term use (Level of evidence 1b, Grade or recommendation A). • In light of safety concerns, topical treatments are the preferred choice over systemic treatments. Among topical pharmacological options, topical nonsteroidal anti-inflammatory drugs (NSAIDs) are the primary recommendation (Level of evidence 1b, Grade or recommendation A). • Oral analgesics, especially NSAIDs, should be deliberated for short-term use to alleviate symptoms (Level of evidence 1a, Grade or recommendation A). • Chondroitin sulfate may be employed for patients with hand osteoarthritis to alleviate pain and enhance functionality (Level of evidence 1b, Grade or recommendation A). • While intra-articular glucocorticoid injections should generally not be employed for patients with hand osteoarthritis, they may be contemplated for individuals with painful interphalangeal joints (Level of evidence 1a-b, Grade or recommendation A). • Patients with hand osteoarthritis should not be subjected to conventional or biological disease-modifying antirheumatic drugs (Level of evidence 1a, Grade or recommendation A). • Surgical intervention should be examined for patients with structural abnormalities when other treatment options have not provided sufficient relief from pain. Trapeziectomy may be considered for those with thumb base osteoarthritis, and arthrodesis or arthroplasty for those with interphalangeal osteoarthritis (Level of evidence 5, Grade or recommendation D).

<table>
<tr><td></td><td>

- Long-term monitoring of patients with hand osteoarthritis should be tailored to each patient's individual requirements (Level of evidence 5, Grade or recommendation D).

</td></tr>
<tr><td>Addition of a new section:
Royal Australian college of General Practitioners, Guideline for the management of knee and hip osteoarthritis (2018)</td><td>
<table>
<tr><th>Intervention</th><th>Recommendation</th><th>Recommendation strength</th><th>Evidence</th></tr>
<tr><td>Land-based exercise – Knee</td><td>

- Strongly recommend offering land-based exercise for all people with knee OA to improve pain and function, regardless of their age, structural disease severity, functional status or pain levels
- Exercise has also been found to be beneficial for othercomorbidities and overall health
- Strongly recommend walking, muscle-strengthening exercise, and specifically, Tai Chi
- Clinicians should prescribe an individualised exercise program, taking into account the person’s preference, capability, and the availability of resources and local facilities. Realistic goals should be set. Dosage

</td><td>Strong for recommendation (all land-based exercise, walking, muscle-strengthening exercise, Tai Chi)</td><td>Low (all land-based, Tai Chi)
Very low (walking, muscle-strengthening exercise)</td></tr>
</table>
</td></tr>
</table>

			should be progressed with full consideration given to the frequency, duration and intensity of exercise sessions, number of sessions, and the period over which sessions should occur o Attention should be paid to strategies to optimize adherence. o Referral to an exercise professional to assist with exercise prescription and provide supervision either in person or remotely may be appropriate for some people		

	Land-based exercise – Hip	○ Strongly recommend offering land-based exercise for all people with hip OA to improve pain and function, regardless of their age, structural disease severity, functional status or pain levels ○ Exercise has also been found to be beneficial for othercomorbidities and overall health ○ The type of exercise that is most beneficial is not yet known. ○ Clinicians should prescribe an individualized progressive exercise program, taking into account the person's preference, capability and the availability of local facilities. Realistic goals should be set. Dosage should be progressed with full consideration given to the frequency, duration and intensity of exercise sessions,	Strong for recommendation (when combining all studies of land-basedexercise)	**Moderate (land-based)**

			number of sessions, and the period over which sessions should occur o The clinician should monitor the person's response to the exercise program, and could try a different form of land-based exercise if improvements are not evident. o Attention should be paid to strategies to optimize adherence. Referral to an exercise professional to assist with exercise prescription and provide supervision either in person or remotely may be useful for some people			

	Weight management – Knee and/ or hip	○ Strongly recommend weight management for people with knee and/or hip OA. For those who are overweight (BMI ≥25 kg/m^2) or obese (BMI ≥30 kg/m^2), a minimum weight loss target of 5–7.5% of body weight is recommended. ○ It is beneficial to achieve a greater amount of weight loss given that a relationship exists between weight loss and symptomatic benefits. Weight loss should be combined with exercise for greater benefits. For people of healthy body weight, education about the importance of maintaining healthy body weight is essential	Strong for recommendation	**Very low**
	Oral opioids – Knee and/or hip	Do not recommend offering oral opioids for people with knee and/or hip OA	Strong against recommendation	**Low (knee)** **Very low (hip)**

	Transdermal opioids – Knee and/or hip	Do not recommend offering transdermal opioids for people with knee and/or hip OA	Strong against recommendation	**Low**
	Doxycycline – Knee and/or hip	Do not recommend offering doxycycline for people with knee and/or hip OA	Strong against recommendation	**Low (knee)** **Very low (hip)**
	Strontium ranelate – Knee and/or hip	Do not recommend offering strontium ranelate for people with knee and/or hip OA	Strong against recommendation	**Moderate**
	IL-1 inhibitors – Knee and/or hip	Do not recommend offering IL-1 inhibitors for people with knee and/or hip OA	Strong against recommendation	**Low**
	FGF – Knee and/or hip	Do not recommend offering FGF for people with knee and/or hip OA	Strong against recommendation	**Very low**
	Viscosupplementation injection – Hip	Do not recommend offering viscosupplementation injection for people with hip OA	Strong against recommendation	**Low**

	Stem cell therapy – Knee and/or hip	Do not recommend offering stem cell therapy for people with knee and/or hip OA	Strong against recommendation	**Very low**
	Arthroscopic, lavage and debridement, meniscectomy and cartilage repair – Knee	Do not recommend offering arthroscopic, lavage and debridement, meniscectomy and cartilage repair for people with knee OA unless the person also has mechanical symptoms of a clinically locked knee as per Australian Knee Society's 'Arthroscopy position statement'	Strong against recommendation	**Very low (lavage and debridement)** **Low (meniscectomy)** **Very low (cartilage repair)**
	Cognitive behavioral therapy (CBT) – Knee and/or hip	It may be appropriate to offer CBT for some people with knee and/or hip OA. Clinicians should consider whether CBT is appropriate, considering psychological comorbidities and personal preference. They should be cognizant of issues related to cost and access. It is recommended that CBT is combined with exercise to improve	Conditional for recommendation	**Low (knee)** **Very low (hip)**

		outcomes. CBT may be offered face-to-face or via online programs		
	Stationary cycling and Hatha yoga – Knee	It may be appropriate to offer stationary cycling and/or Hatha yoga for some people with knee OA Exercise has also been found to be beneficial for other comorbidities and overall health Clinicians should prescribe an individualised exercise program, taking into account the person's preference, capability and the availability of resources and local facilities. Realistic goals should be set. Dosage should be progressed with full consideration given to the frequency, duration and intensity of exercise sessions, number of sessions, and the period over which sessions should occur. Attention should be paid to strategies to optimize adherence. Referral to an	Conditional for recommendation	**Very low**

		exercise professional to assist with exercise prescription and to provide supervision either in person or remotely may be appropriate for some people		
	Aquatic exercise/ hydrotherapy – Knee and/or hip	It may be appropriate to offer aquatic exercise/hydrotherapy for some people with knee and/or hip OA. This will depend upon personal preference and the availability of local facilities	Conditional for recommendation	**Low**
	Massage therapy – Knee and/or hip	It may be appropriate to offer a short course of massage therapy for some people with knee and/or hip OA. This should be considered only as an adjunctive treatment to enable engagement with active management strategies, and only for short term, cognizant of issues related to cost and access	Conditional for recommendation	**Low**
	Manual therapy (stretching, soft tissue and/or joint mobilisation and/or	It may be appropriate to offer a short course of manual therapy (stretching, soft tissue	Conditional for recommendation	**Very low**

	manipulation) – Knee and/or hip	and/or joint mobilization and/or manipulation) for some people with knee and/or hip OA. This should be considered only as an adjunctive treatment to enable engagement with active management strategies and only for short term, cognizant of issues related to cost and access		
	Weight management plus exercise – Knee and/or hip	It may be appropriate to offer a combination of weight management plus exercise for some people with knee and/or hip OA. For those who are overweight (BMI ≥25 kg/m^2) or obese (BMI ≥30 kg/m^2), a minimum weight loss target of 5–7.5% of body weight is recommended. It is beneficial to achieve a greater amount of weight loss given that a relationship exists between the amount of weight loss and symptomatic benefits. Weight loss should be combined with exercise for greater benefits. For people	Conditional for recommendation (combination weight management plus exercise)	**Low (knee)** **Very low (hip)**

		of healthy body weight, education about the importance of maintaining healthy body weight is essential		
	Heat therapy – Knee and/or hip	It may be appropriate to offer local heat therapy (eg hot packs) as a self-management home strategy for some people with knee and/or hip OA. This should be considered only as an adjunctive treatment	Conditional for recommendation	**Very low**
	Assistive walking device – Knee and/or hip **TENS – Knee and/or hip**	It may be appropriate to offer an assistive walking device (eg cane) for some people with knee and/or hip OA,depending on a person's preference and capability It may be appropriate to offer TENS that can be used at home for some people with knee and/or hip OA. Clinicians need to provide sufficient instructions on self-use, and consider individual accessibility and affordability	Conditional for recommendation Conditional for recommendation	**Low (knee)** **Very low (hip)** **Very low**

	Oral NSAIDs including COX-2 inhibitors – Knee and/or hip	It may be appropriate to offer oral NSAIDs for some people with knee and/or hip OA It might be reasonable to trial oral NSAIDs at the lowest effective dose for a short period, then discontinue use if not effective. Clinicians also need to inform people, monitor and capture adverse events, especially gastrointestinal, renal and cardiovascular, which may be associated with use of NSAIDs	Conditional for recommendation	**Moderate**
	Duloxetine – Knee and/or hip	It may be appropriate to offer duloxetine for some people with knee and/or hip OA Duloxetine currently does not have an indication via the TGA for OA, and should be considered as an investigational medication only. It could be considered for some people with knee and/or hip OA when other forms of pain relief are inadequate	Conditional for recommendation	**Moderate (knee)** **Low (hip)**

	Corticosteroid injection – Knee and/or hip	It may be appropriate to offer an intra-articular corticosteroid injection for some people with knee and/or hip OA for short-term pain relief Clinicians need to be cautious of the potential harms of repeated use	Conditional for recommendation	**Very low**
	Self-management education programs – Knee and/or hip	Unable to recommend either for or against formal face-to-face self-management education programs for people with knee and/or hip OA**.** However, clinicians should provide information to enhance understanding about OA, its prognosis and its optimal management	Conditional (neutral) recommendation	**Very low**
	Specific forms of land-based exercise – Hip	Exercise has been found to be beneficial for other comorbidities and overall health. However, we are unable to specifically recommend either for or against one type of land-based exercise for hip OA over another at this stage Clinicians should prescribe an individualized	Conditional (neutral) recommendation for recommending one type of land-based exercise over another (eg walking, muscle strengthening, stationary cycling, Tai Chi, Hatha yoga)	**Very low (walking, muscle strengthening, stationary cycling, Tai Chi, Hatha yoga)**

			progressiveexercise program, taking into account the person's preference, capability and the availability of local facilities. Realistic goals should be set. Dosage should be progressed, with full consideration given to the frequency, duration and intensity of exercise sessions, number of sessions, and the period over which sessions should occur The clinician should monitor the person's response to the exercise program and could try a different form of land-based exercise if improvements are not evident. Attention should be paid to strategies to optimize adherence. Referral to an exercise professional to assist with exercise prescription and provide supervision either in person or remotely may be useful for some people		

	Varus unloading knee braces for lateral tibiofemoral compartment knee OA **Shoe orthotics (medial wedge insoles – Knee;** **shock-absorbing insoles and arch supports – knee and/or hip)**	Unable to recommend either for or against the use of varus unloading/realignment braces for people with lateral tibiofemoral compartment knee OA Unable to recommend either for or against the use of medial wedged insoles for people with lateral tibiofemoral OA and valgus deformity Unable to recommend either for or against the use of shock-absorbing insoles or arch supports for knee and/or hip OA	Conditional (neutral) recommendation (varus unloading/ realignment braces) Conditional (neutral) recommendation (medial wedged insoles) Conditional (neutral) recommendation (shock-absorbing insoles, arch support)	**Very low (varus unloading/ realignment – no RCT data)** **Very low (medial wedged insoles)** **Very low (shock-absorbing insoles, arch support – no RCT data)** **Very low (all hip orthotics – no** **RCT data)**
	Patellar taping – Knee	Unable to recommend either for or against the use of patellar taping for people with knee OA	Conditional (neutral) recommendation	**Very low**
	Pulsed electromagnetic/ shortwave therapy – **Knee and/or hip**	Unable to recommend either for or against electromagnetic/shortwave therapy for people with knee and/or hip OA	Conditional (neutral) recommendation	**Low (knee)** **Very low (hip)**

	Paracetamol – Knee and/or hip	Unable to recommend either for or against the use of paracetamol for people with knee and/or hip OA However, it might be reasonable to trial paracetamol for a short period and then discontinue use if it is not effective. Clinicians also need to monitor and capture adverse events that may be associated with its use	Conditional (neutral) recommendation	**Very low**
	Topical NSAIDs –Knee and/or hip	Unable to recommend either for or against the useof topical NSAIDs for people with knee and/or hip OA It might be reasonable to trial topical NSAIDs for a short period and then discontinue use if not effective. Cliniciansalso need to monitor and capture the adverse effects along with its use	Conditional (neutral) recommendation	**Moderate**
	Topical capsaicin – Hip	Unable to recommend either for or against the use of topical capsaicin for	Conditional (neutral) recommendation	**Very low**

		people with hip OA		
	PRP injection –Knee and/or hip	Unable to recommend either for or against the use of PRP injection for people with knee and/or OA	Conditional (neutral) recommendation	**Very low**
	ASU – Knee and/or hip	Unable to recommend for or against the use ofASU for people with knee and/or hip OA	Conditional (neutral) recommendation	**Very low**
	***Boswellia serrata* extract – Knee and/or hip**	Unable to recommend for or against the use of *Boswellia serrata* for people with knee and/or hip OA	Conditional (neutral) recommendation	**Very low**
	Curcuma/curcuminoid – Knee and/or hip	Unable to recommend for or against the use of curcuma/curcuminoid for people with knee and/or hip OA	Conditional (neutral) recommendation	**Low**
	Pine bark extract – Knee and/or hip	Unable to recommend either for or against the use of pine bark extract for people with knee and/or hip OA	Conditional (neutral) recommendation	**Low (knee)** **Very low (hip)**

	Collagen – Knee and/or hip	Unable to recommend either for or against the use of collagen for people with knee and/or hip OA	Conditional (neutral) recommendation	**Low (knee)** **Very low (hip)**
	MSM – Kneeand/or hip	Unable to recommend either for or against the use of MSM for people with knee and/or hip OA	Conditional (neutral) recommendation	**Very low**
	Cold therapy – Knee and/or hip	Suggest not offering local cold application (eg ice packs) for people with knee and/or hip OA	Conditional against recommendation	**Very low**
	Valgus unloading/ realignment knee braces for medial tibiofemoral compartment and realigning patellofemoral braces for patellofemoral OA	Suggest not offering valgus unloading/realignment braces for people with medial tibiofemoral compartmentknee OA Suggest not offering realigning patellofemoral braces for patellofemoral OA	Conditional against recommendation Conditional against recommendation	**Low** **Very low**
	Shoe orthotics (lateral wedge insoles) – Knee	Suggest not offering lateral wedge insoles for people with medial tibiofemoral knee OA	Conditional against recommendation	**Very low**

	Footwear – Knee	Suggest not offering unloading shoes, minimalist footwear or rocker-sole shoes for people with symptomatic knee OA However, clinicians may consider advising people with OA to wear footwear with shock-absorbing properties and avoid high-heeled shoes	Conditional against recommendation	**Very low (unloading shoes, minimalist footwear) Low (rocker-sole shoes**
	Kinesio taping – Knee and hip	Suggest not offering kinesio taping for people with knee and/or hip OA	Conditional against recommendation	**Very low**
	Other electrotherapy – Knee and/or hip (eg shockwave, interferential, laser)	Suggest not offering electrotherapy modalities of shockwave, interferential or laser for people with knee and/or hip OA	Conditional against recommendation	**Low (laser) Very low (shockwave, interferential, laser-hip)**
	Therapeutic ultrasound – Knee and/or hip	Suggest not offering therapeutic ultrasound for people with knee and/or hip OA	Conditional against recommendation	**Moderate (knee) Low (hip)**

	Acupuncture – Knee and/or hip	Suggest not offering acupuncture (ie traditional, laser, electrical) for people with knee and/or hip OA	Conditional against recommendation	**Low (knee) Very low (hip)**
	Topical capsaicin – Knee	Suggest not offering topical capsaicin for people with knee OA	Conditional against recommendation	**Low**
	Bisphosphonates – Knee and/or hip	Suggest not offering bisphosphonates for people with knee and/or hip OA	Conditional against recommendation	**Very low**
	Calcitonin – Knee and/or hip	Suggest not offering calcitonin for people with knee and/or hip OA	Conditional against recommendation	**Very low**
	Anti-NGF – Knee and/or hip	Suggest not offering NGF for people with knee and/or hip OA	Conditional against recommendation	**Moderate**
	Colchicine – Knee and/or hip	Suggest not offering colchicine for people with knee and/or hip OA	Conditional against recommendation	**Very low**
	Methotrexate – Knee and/or hip	Suggest not offering methotrexate for people with knee and/or hip OA	Conditional against recommendation	**Low**

	Viscosupplementation – Knee	Suggest not offering viscosupplementation injection for people with knee OA	Conditional against recommendation	**Low**
	Dextrose prolotherapy – Knee and/or hip	Suggest not offering dextrose prolotherapy for people with knee and/or hip OA	Conditional against recommendation	**Low**
	Glucosamine – Knee and/or hip	Suggest not offering glucosamine for people with knee and/or hip OA	Conditional against recommendation	**Very low (knee)** **Low (hip)**
	Chondroitin – Knee and/or hip	Suggest not offering chondroitin for people with kneeand/or hip OA	Conditional against recommendation	**Very low**
	Glucosamine and chondroitin in compound form – Knee and/or hip	Suggest not offering glucosamine and chondroitin incompound form for people with knee and/or hip OA	Conditional against recommendation	**Very low**
	Vitamin D – Knee and/or hip	Suggest not offering vitamin D for people with knee and/or hip OA	Conditional against recommendation	**Low (knee)** **Very low (hip)**
	Omega-3 fatty acids – Knee and/or hip	Suggest not offering omega-3 fatty acids for peoplewith knee and/or hip OA	Conditional against recommendation	**Very low**

	Diacerein – Knee and/or hip	We suggest not offering diacerein for people with kneeand/or hip OA	Conditional against recommendation	**Very low**
Addition of a new section: Guidelines for the diagnosis and treatment of osteoarthritis in China (2019 edition)[11]	• The purpose of OA treatment is to relieve pain, prevent deformity, improve function and life quality (1B) • It is recommended that OA patients should control their weight, and those who are overweight or obese should lose weight (1A) • It is recommended to carry out health education for OA patients, mainly to educate them about the causes, prevention, progress and treatment of the disease, reduce the burden of patients' thoughts, and improve their self-management efficiency (1B). • OA patients should reduce long-term standing, kneeling and squatting positions, ascending stairs activity, as well as bad posture, etc. (2B). • It is recommended for OA patients to take reasonable joint muscle training and moderate aerobic exercise (1B). • It is recommended for OA patients to choose different activities according to the location of the disease, such as grasping and holding activities of hand joints, flexion and extension activities of knee joints under the condition of non-load, and gentle activities in different directions of cervical and lumbar joints (1B) • For patients with mild pain, topical application of non-steroidal anti-inflammatory drugs (NSAIDs) is recommended to reduce local pain (1B), and external application of Chinese medicine may also be considered (2B) • Physical therapy such as manipulation therapy, massage, and acupuncture is recommended for OA patients to relieve pain and improve physical function (2B) • For some patients, treatment with glucosamine or chondroitin sulfate can be selected. It should be stopped if no symptom improved after 3 to 6 months (2C) • For OA patients with persistent pain or moderate or severe pain, it is recommended to choose oral NSAIDs after risk assessment and use the lowest effective dose for a short period (1–3 months) alone (1B). The combination of COX-2 inhibitor and proton pump inhibitor is recommended for patients with high risk of gastrointestinal adverse reactions (1B) • For patients with OA treated with oral drugs, some oral Chinese medicine can be		

<table>
<tr>
<td></td>
<td>considered in combination (2C)
• For patients of knee OA with persistent or moderate to severe pain, intra-articular injection of glucocorticoids is recommended for rapid relief of pain in patients with OA, the injection interval should not be shorter than 4 to 6 months (1B)
• For patients of knee OA with persistent or moderate to severe pain, intra-articular injection of HA can be considered to improve the patient's symptoms in the long term and delay the time required for joint replacement (2C)
• For OA patients with NSAIDs contraindications or ineffective pain treatment, it is suggested to take opioids or duloxetine for analgesia (2C), or to combine diacerein, inflammatory skin extract of cowpox vaccine to inoculate of rabbits, tanezumab, technetium-99m methylene diphosphonate or bulleyaconitine A (2D)
• For patients with knee OA who have poor responses with intra-articular injection of HA, stem cell injection may be considered (2D)
• For knee OA patients with poor pain treatment response and mechanical symptoms, we recommend arthroscopy to reduce symptoms after assessing the risk of surgery (2C)
• For patients with hip or knee OA who have poor response to conservative treatment and whose quality of life is significantly affected, we recommend to perform joint replacement after assessing the risk of surgery, which can relieve pain, increase the range of joint movement, and improve quality of life (1B)</td>
</tr>
<tr>
<td>Addition of a new section:
APTA Physical Therapist Management of Total Knee Arthroplasty (2020)[20]</td>
<td>
<table>
<tr><th>Interventions</th><th>Rating</th><th>Practice Recommendations</th></tr>
<tr><td>Preoperative exercise program</td><td>◆◆◆◆</td><td>Physical therapists should design preoperative exercise programs and teach patients undergoing total knee arthroplasty (TKA) to implement strengthening and flexibility exercises.</td></tr>
<tr><td>Preoperative education</td><td>◆◆◆◆</td><td>It is the consensus of the work group that physical therapists or other team members should provide preoperative education for patients undergoing TKA, including, at a minimum: patient expectations during hospitalization and factors influencing discharge planning and disposition, the postoperative rehabilitation program, safe transferring techniques, use of assistive devices, and fall prevention.</td></tr>
</table>
</td>
</tr>
</table>

	Continuous passive motion (CPM) device use for mobilization	◆◆◆◆	Physical therapists should NOT use CPMs for patients who have undergone primary, uncomplicated TKA.
	Cryotherapy	◆◆◆◆	Physical therapists should teach patients and other care givers use of cryotherapy and encourage its use for early postoperative pain management for patients who have undergone TKA.
	Physical activity	◆◆◆◆	It is the consensus of the work group that physical therapists should develop an early mobility plan and teach patients who have undergone TKA regarding the importance of early mobility and appropriate progression of physical activity, based on safety, functional tolerance, and physiological response.
	Motor function training (balance, walking, movement, symmetry)	◆◆◆◆	Physical therapists should include motor function training (eg, balance, walking, movement symmetry) for patients who have undergone TKA.
	Postoperative knee range-of-motion (ROM) exercise	◆◆◆◆	It is the consensus of the work group that physical therapists should teach and encourage patients to implement passive, active assistive, and active ROM exercises for the involved knee following TKA.
	Immediate postoperative knee flexion during rest for blood loss and	◆◆◆◆	To reduce immediate postoperative blood loss and swelling in the first 7 days after surgery, physical therapists or other team members may teach patients to position the operated knee in some degree of flexion (30°-90°) while resting.

	swelling		
	Neuromuscular electrical stimulation (NMES)	◆◆◆◆	Physical therapists should use NMES for patients who have undergone TKA to improve quadricepsmuscle strength, gait performance, performance-based outcomes, and patient-reported outcomes.
	Resistance and intensity of strengthening exercise	◆◆◆◆	Physical therapists should design, implement, teach, and progress patients who have undergone TKAin high-intensity strength training and exercise programs during the early postacute period (ie, within 7 days after surgery) to improve function, strength, and ROM.
	Prognostic factors: body massindex (BMI), depression, preoperative ROM, physical function and strength, age, diabetes, number of comorbidities, and sex	◆◆◆◆	Physical therapist management should take into consideration the following factors when determining prognosis, providing treatment, and engaging in informed decision making andexpectation setting with patients undergoing TKA:
			Higher BMI is associated with more postoperative complications and worse postoperative outcomes.
			Depression is associated with worse postoperative outcomes.
			Preoperative ROM is positively associated with postoperative ROM but has minimal, if any, effect onphysical function and quality of life.
			Preoperative physical function is positively associated with postoperative physical function.
			Preoperative strength is positively associated with postoperative physical function.
			Age is associated with mixed patient-reported, performance-based, and impairment-basedoutcomes.
			Diabetes is not associated with worse functional outcomes.
			A greater degree of comorbidity is associated with worse patient-reported outcomes.

			Sex is associated with both positive and negative effects on postoperative outcomes.
	Prognostic factors: tobacco and patient support	◆◆◆◆	It is the consensus of the work group that active tobacco use and lack of patient support (eg, environmental factors including, but not limited to, support and relationships) should be considered as prognostic/risk factors associated with less than optimal functional outcomes.
	Postoperative physical therapy supervision	◆◆◆◆	Supervised physical therapist management should be provided for patients who have undergone TKA. The optimal setting should be determined by patient safety, mobility, and environmental and personal factors.
	Group-based vs individual-based therapy	◆◆◆◆	Physical therapists may use group-based or individual-based physical therapy sessions for patients who have undergone TKA.
	Physical therapy postoperative timing	◆◆◆◆	Physical therapist management should start within 24 hours of surgery and prior to discharge for patients who have undergone TKA.
	Physical therapy discharge planning	◆◆◆◆	It is the consensus of the work group that physical therapists should provide guidance to the care team and to the patient on safe and objective discharge planning, patient functional status, assistance equipment, and services needed to support a safe discharge from the acute care setting.
	Outcomes assessment	◆◆◆◆	It is the consensus of the work group that physical therapists should collect data using the Knee Injury Osteoarthritis Outcomes Survey Joint Replacement (KOOS JR) as a patient-reported outcome measure and both the 30-Second Sit-to-Stand and Timed “Up and Go” (TUG) tests as performance-based outcomes to demonstrate the effectiveness of care provided. At a minimum, these measures should be collected at the first visit and upon

	conclusion of care from each setting.

Addition of a new section:
APTA Physical Therapist Management of Glenohumeral Joint Osteoarthritis: A Clinical Practice Guideline from the American Physical Therapy Association (2023)[21]

Intervention	Quality of Evidence	Strength of Recommendation	Recommendation
Diagnosis: history, physical exam, radiograph	Moderate	◆◆◆◆	History, physical examination, and radiographs can be useful to differentially diagnose GHOA. Critical shoulder angle on radiographs and age are specifically predictive of the diagnosis.
Diagnosis: MRI	High	◆◆◆◆	Advanced imaging using MRI is beneficial in the differential diagnosis of GHOA. MRI is helpful to confirm the diagnosis but is less useful to rule out the diagnosis.
Postoperative management: sling and exercise	High	◆◆◆◆	Physical therapists should implement the use of a sling and progressive exercises for ROM and strengthening to improve patient-reported outcomes, and ROM in patients with GHOA who have undergone total shoulder arthroplasty (TSA).
Postoperative physical therapist– directed pain management	Moderate	◆◆◆◆	Physical therapists should implement the use of a sling with the shoulder in a neutral rotation position for pain management in patients with GHOA who have undergone TSA.

	Postoperative physical therapy timing	Moderate	♦♦♦♦	The timing of the introduction of shoulder ROM exercises by physical therapists may be delayed up to 4 weeks without negatively impacting patient-reported outcomes in patients with GHOA who have undergone TSA.
	Preoperative physical therapy for patients scheduled for TSA	Insufficient	♦♦♦♦	**In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services** delivered preoperatively may benefit postoperative outcomes in patients with GHOA who are undergoing TSA.
	Nonoperative physical therapy comparison to other management strategies	Insufficient	♦♦♦♦	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services may benefit patients with GHOA who have not undergone TSA.
	Nonoperative physical therapist intervention options	Insufficient	♦♦♦♦	**In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that no one specific intervention** performed by a physical therapist is superior to another for patients with GHOA.

	Postoperative physical therapy outcomes	Insufficient	◆◆◆◆	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist services delivered postoperatively may benefit patient-rated functional outcomes in the management of patients who have undergone TSA for GHOA.
	Postoperative physical therapy edema management	Insufficient	◆◆◆◆	In the absence of high- or moderate-quality evidence, the opinion of the GDG based on clinical expertise is that physical therapist interventions for edema in patients with GHOA who have undergone TSA should be based on best available evidence, clinical expertise, and patient values.

Addition of a new section: EULAR recommendations for intra-articular therapies (2021)[14]

Overarching principles and recommendations, with agreement and level of evidence and grade of recommendation (if applicable)		
OVERARCHING PRINCIPLES		
I. IAT are recommended and widely used in the management of joint diseases.		
II.The aim of IAT is to improve patient-centred outcomes.		
III.Contextual factors are important and contribute to the effect of IAT.		
IV.IAT should be offered in the frame of full individualised information and a shared decision-making process.		
V. A variety of health professionals perform these procedures routinely.		
RECOMMENDATIONS	**LE**	**GR**
The patient must be fully informed of the nature of the procedure, the injectable, and potential benefits and risks; informedconsent should be obtained and documented according to local habits.	4	D

	► An optimal setting for IAT includes: Professional, clean, quiet, private, well-lightened room. ► Patient in an appropriate position, ideally on a couch/examination table, easy to lie flat. ► Equipment for aseptic procedures. ► Aid from another HP. ► Resuscitation equipment close-by.	4	D
	Accuracy depends on the joint, route of entry, and health professional expertise; if available, imaging guidance, forexample, ultrasound, may be used to improve accuracy.	1B-2A	B
	During pregnancy when injecting a joint one has to take into account whether the compound is safe for mother and baby.	4	D
	Aseptic technique should always be undertaken when performing IAT.	3	C
	Patients should be offered local anesthetic explaining pros and cons.	3–4	D
	Diabetic patients, especially those with suboptimal control, should be informed about the risk of transient increasedglycaemia following IA GC and advised about the need to monitor glucose levels particularly from first to third day.	1B	A
	IAT is not a contraindication in people with clotting/bleeding disorders or taking antithrombotic medications, unlessbleeding risk is high.	3	C
	IAT may be performed at least 3 months prior to joint replacement surgery and may be performed after joint replacementfollowing consultation with the surgical team.	3	C
	The shared decision to reinject a joint should take into consideration benefits from previous injections and otherindividualized factors (eg, treatment options, compound used, systemic treatment, comorbidities...).	2	B
	Avoid overuse of injected joints for 24 hours following IAT; however, immobilization is discouraged.	1B	A
Addition of a new section: Journal of Evidence-Based Medicine,	• Acupuncture is recommended over no treatment for adult knee osteoarthritis (KOA) (weak recommendation, moderate certainty evidence). • After a treatment duration of approximately 4 weeks, acupuncture has demonstrated improvements in KOA health status (moderate certainty evidence), pain (very low certainty evidence), stiffness (low certainty evidence), and physical function (low certainty evidence).		

<table>
<tr><td>Acupuncture for treatment of knee osteoarthritis: A clinical practice guideline (2023)[19]</td><td>However, there was no significant impact on mental health (low certainty evidence) or physical health (moderate certainty evidence) in comparison to no treatment.
• Notably, acupuncture has shown a particular improvement in stiffness (moderate certainty evidence) and was not less effective in terms of KOA health status (low certainty evidence), pain (moderate certainty evidence), and physical function (low certainty evidence) when compared to usual care after the 4-week treatment period. The incidence of adverse reactions in the acupuncture group was 6.2%, while it was 3.3% in the no treatment group (moderate certainty evidence). Acupuncture's adverse reactions were deemed acceptable, rendering it a relatively safe therapy.
• Acupuncture is recommended for a duration of 4 to 8 weeks, depending on the severity of knee osteoarthritis (KOA) and the patient's response to treatment (weak recommendation, moderate certainty evidence. This approach is particularly relevant for KOA patients aged 55 to 75 with moderate-to-severe symptoms. Shared decision-making with patients is encouraged in determining the appropriate treatment duration. For individuals with severe WOMAC total scores or moderate knee pain, undergoing acupuncture sessions 2-4 times a week for a cumulative period of 4-8 weeks has shown potential for enhancing health status.
• It is recommended to consider combining non-steroidal anti-inflammatory drugs (NSAIDs) with acupuncture, rather than opting for acupuncture as a standalone treatment, particularly when dealing with severe knee osteoarthritis (KOA) symptoms (weak recommendation, moderate certainty evidence).</td></tr>
<tr><td>Addition of a new section:
The Italian Society for Rheumatology clinical practice guidelines for the diagnosis and management of knee, hip and hand osteoarthritis (2019)[12]</td><td>
<table>
<tr><th>RECOMMENDATION</th><th>LEVEL OF EVIDENCE</th></tr>
<tr><td>Optimal management of OA requires a combination of non-pharmacological and pharmacological treatment modalities individualized to the patient’s needs.</td><td>5</td></tr>
<tr><td>Treatment of hand, hip and knee OA should be individualized according to: 1) the wishes and expectations of the individual, 2) localization, severity of structural change and type of OA, 3) risk factors (such as age, sex, obesity and adverse mechanical factors), 4) presence of inflammation, 5) comorbidity and co-medication, 6) OA in other sites.</td><td>1-4</td></tr>
</table>
</td></tr>
</table>

	Blood, urine or synovial fluid tests are not required for diagnosis of OA but may be required for differential diagnosis. In OA patients with marked inflammatory symptoms and/or signs, especially involving atypical sites, laboratory tests should be undertaken.	1-2
	Paracetamol (acetaminophen) (up to 3 g/day) is an effective initial oral analgesic for treatment of mild to moderate pain. In elderly patients it should be preferred because of its relative safety in comparison with NSAIDs. The use of weak opioids in case of severe pain or no response, intolerance or contraindication to NSAIDs, is recommended. Stronger opioids should only be used for the management of severe pain in exceptional circumstances. Duloxetine may be helpful for knee (and maybe hip) OA accompanied by chronic pain.	1-4
	Oral NSAIDs are recommended at the lowest effective dose and for the shortest duration in patients who respond inadequately to paracetamol. NSAIDs (such as ibuprofen, diclofenac and naproxen) and selective COX- 2 inhibitors (including celecoxib and etoricoxib) are indicated in moderate pain. Higher doses of oral NSAIDs may be indicated in more severe pain. In patients with increased gastrointestinal risk, non-selective NSAIDs plus a proton-pump inhibitor, or a selective COX-2 inhibitor, should be used. In patients with increased cardiovascular risk, naproxen can be used; COX-2 inhibitors are contraindicated and other non-selective NSAIDs should be used with caution. In nephropathic patients the use of NSAID and COX-2 inhibitors should be avoided.	1

	Topical pharmacological treatments are preferred over systemic treatments, especially for mild to moderate pain and when only a few joints are affected. Topical NSAIDs and capsaicin gel are effective and safe treatments. Patients with age >75 years should use topical rather than oral NSAIDs even though the analgesic response decreases after 1 year of use.	1-2
	The accuracy of intra-articular injection depends on the joint and on the skills of the practitioner. Ultrasound- guidance may improve accuracy and it is particularly recommended for joints that are difficult to access due to the site itself, degree of deformity or obesity. *Hyaluronic Acid:* intra-articular injection of hyaluronic acid of different molecular weights may give symptomatic benefit with low toxicity and could help to reduce the NSAID use. Steroids: intra-articular corticosteroid injection may be beneficial, providing fast pain relief in patients who suffer painful relapses and who do not respond or have a contraindication to analgesics and NSAIDs. *Mesenchymal stem cells and/or platelet rich plasma:* it is unclear if intra-articular injection of mesenchymal stem cells or platelet-rich plasma can help to relieve pain associated with knee OA.	1-5
	In patients with symptomatic knee OA, glucosamine sulphate and chondroitin sulphate may have a beneficial effect on symptoms. Structural effects, patients suitable for treatment and the cost to benefit ratio of the therapy remain to be defined.	1-2
	Concerning patient education, lifestyle changes and therapeutic exercise: *Patients' education* Information, education and an individually tailored program, including long-term and short-term goals, intervention or action plans to reduce the degenerative damage of the OA should be provided. People with	

	hip and/or knee OA should be taught a regular individualized (daily) exercise regimen and participate in self-management programs, strengthening, low-impact aerobic exercises, and neuromuscular education. *Life styles* Patients with hip and knee OA, who are overweight, should be encouraged to lose weight and maintain their weight at a lower level. People with hip or knee OA at risk of work disability should have access to vocational rehabilitation, including counselling on modifiable work-related factors. *Exercise* The mode of delivery of exercise education should be selected according both to the preference of the person with hip or knee OA and local availability. Patients with knee OA should participate in aerobic and/or resistance land-based and/or aquatic exercise.	1-3
	Orthoses prevent the progression of degenerative changes and improve function. In hip and knee OA, the use of assistive devices such as a walking-stick or crutches is suggested as a preventive measure. The use of appropriate and comfortable shoes is recommended. The combination of splints for thumb base OA, orthoses and exercise regimen reduce pain and improve functionality in the short and long term and prevent/correct lateral angulation and flexion deformity.	1-2
	Concerning TENS, acupuncture, balneotherapy and exercises in water, manual therapy and patellar taping: *TENS:* transcutaneous electrical nerve stimulation (TENS) may help with short-term pain control in some patients with hip or knee OA. Acupuncture: the usefulness in patients with symptomatic OA of the knee and hip remains to be defined. *Balneotherapy and exercises in water are effective for relieving symptoms in hip and knee (and hand) OA.*	1-4

	Manual therapy/Taping: it is unclear if manual therapy can be useful in patients with symptomatic osteoarthritis of the knee. The use of bandage tape may help to reduce pain in patients with joint instability knee OA.	
	Orthopedic surgery should be considered in patients with radiographic evidence of OA, who have marked disability, reduced quality of life and pain refractory to other treatments.	5

Appendix C. PubMed Search Methodology Terms

The following PubMed Search Methodology was opted:

Query	Filters	Search Details	Results
((((((((((Osteoarthritis[MeSH Terms]) OR (Osteoarthritides[Title/Abstract])) OR (Osteoarthrosis[Title/Abstract])) OR (Osteoarthroses[Title/Abstract])) OR (Arthritis, Degenerative[Title/Abstract])) OR (Arthritides, Degenerative[Title/Abstract])) OR (Degenerative Arthritides[Title/Abstract])) OR (Degenerative Arthritis[Title/Abstract])) OR (Arthrosis[Title/Abstract])) OR (Arthroses[Title/Abstract])) OR (Osteoarthrosis Deformans[Title/Abstract])	Guideline, in the last 5 years	("osteoarthritis"[MeSH Terms] OR "Osteoarthritides"[Title/Abstract] OR "Osteoarthrosis"[Title/Abstract] OR "Osteoarthroses"[Title/Abstract] OR "arthritis degenerative"[Title/Abstract] OR (("Arthritis"[MeSH Terms] OR "Arthritis"[All Fields] OR "Arthritides"[All Fields] OR "polyarthritides"[All Fields]) AND "Degenerative"[Title/Abstract]) OR "degenerative arthritides"[Title/Abstract] OR "degenerative arthritis"[Title/Abstract] OR "Arthrosis"[Title/Abstract] OR "Arthroses"[Title/Abstract] OR "osteoarthrosis deformans"[Title/Abstract]) AND ((y_5[Filter]) AND (guideline[Filter]))	17

Appendix D. Osteoarthritis Treatment Algorithm

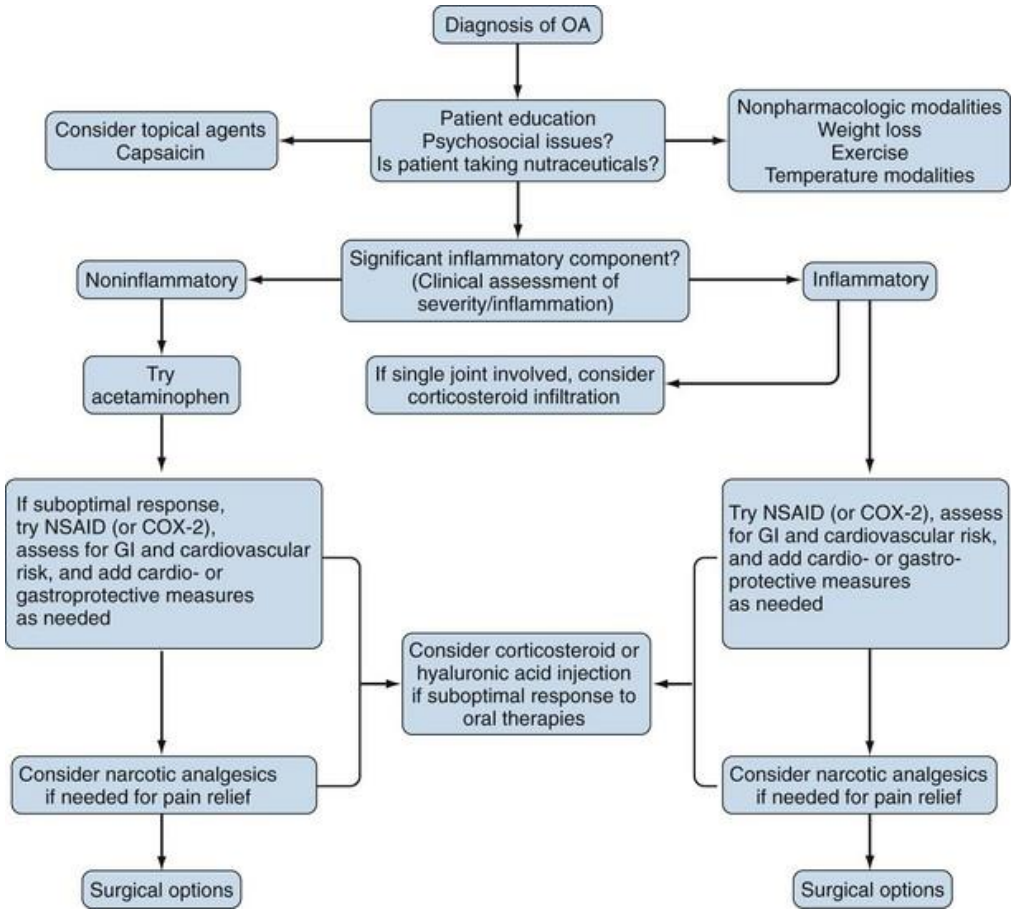

Figure 1. *Algorithm for the management of osteoarthritis (OA)*

COX, cyclooxygenase; GI, gastrointestinal; NSAID, nonsteroidal anti-inflammatory drug.

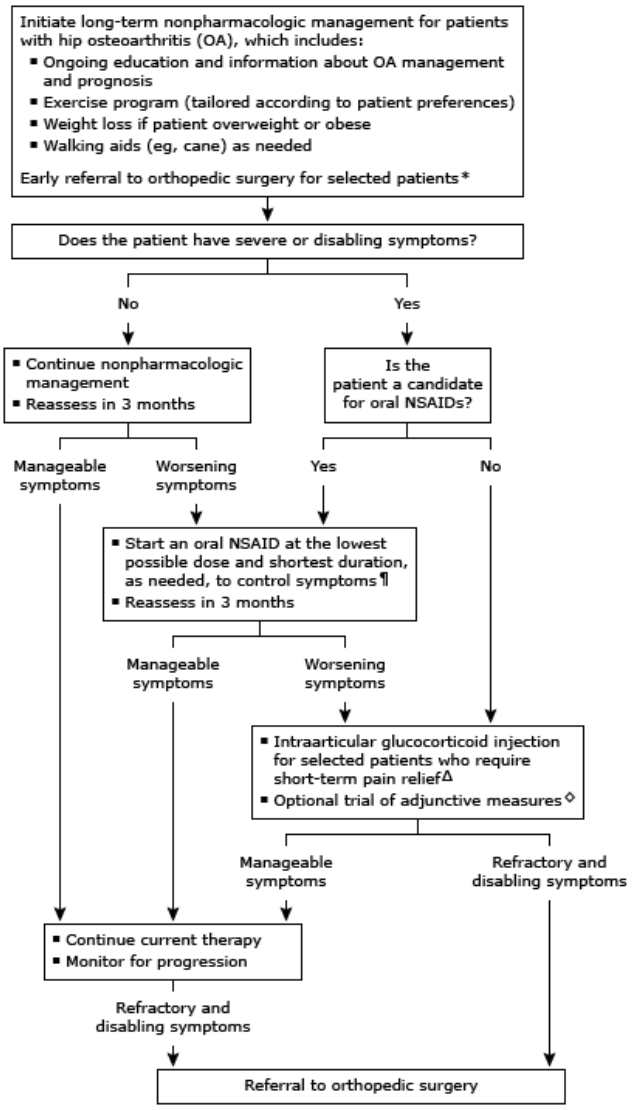

Figure 2. *Management of hip osteoarthritis*

NSAID: nonsteroidal antiinflammatory drug
* Some younger patients with milder symptoms may have disease secondary to alterations in hip joint morphology and may benefit from early intervention with activity modification, physical therapy, and referral to orthopedic surgery.
¶ Assess the need for a proton pump inhibitor if increased risk for gastrointestinal side effects.
Δ Intraarticular glucocorticoids are not routinely recommended because the pain relief is mild to moderate and is short-lived.

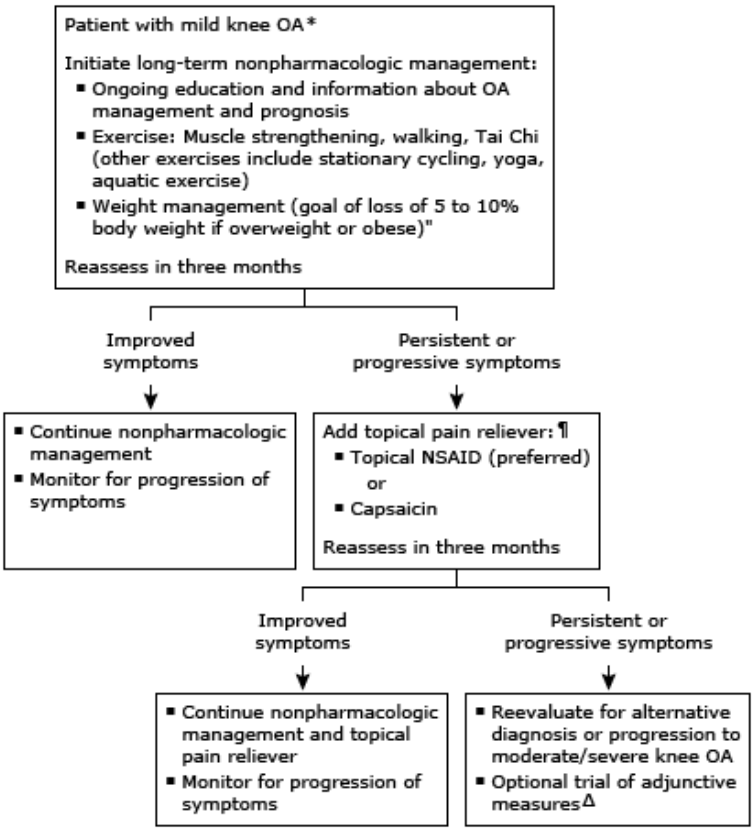

Figure 3. *Management of mild knee osteoarthritis*

OA: osteoarthritis; NSAID: nonsteroidal anti-inflammatory drug; TENS: transcutaneous electrical nerve stimulation.
* Patients with mild knee OA have low levels of intermittent knee pain with relatively well-preserved quality of life.
¶ If patient has concomitant OA in other joints, they may already be on systemic therapies.

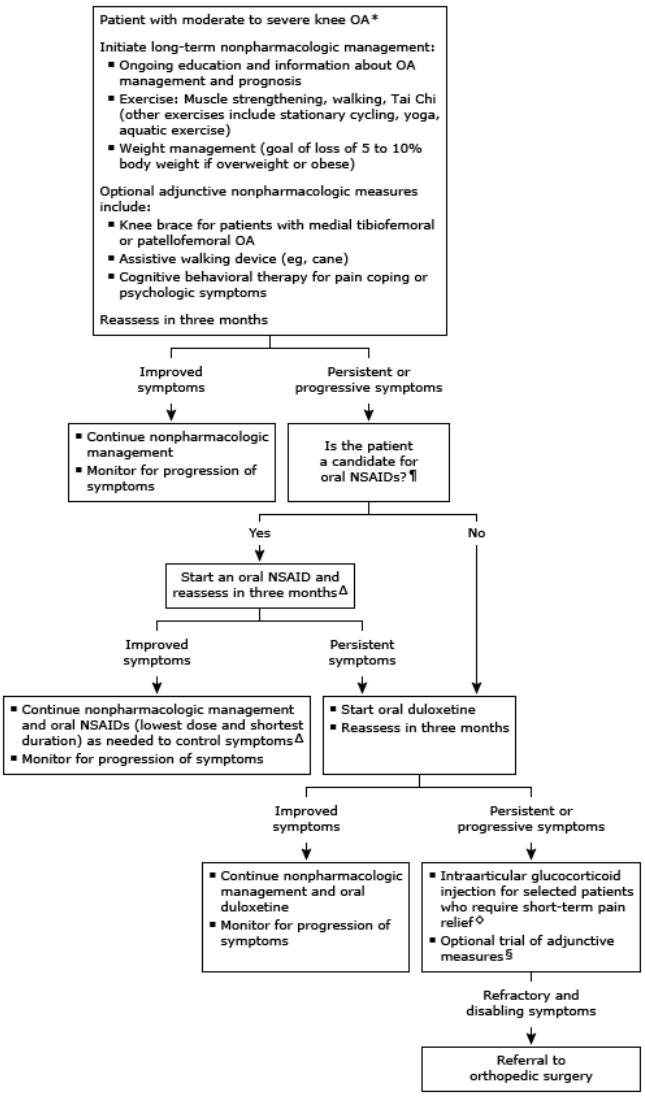

Figure 4. *Management of moderate to severe knee osteoarthritis*

OA: osteoarthritis; NSAID: nonsteroidal anti-inflammatory drug; TENS: transcutaneous electrical nerve stimulation.

* Patients with moderate to severe knee OA have persistent pain, which significantly impairs functionality, activity participation, and quality of life.

¶ If the patient has OA limited to the knees and hands, a trial of topical NSAIDs is reasonable before advancing to oral NSAIDs (if not otherwise contraindicated).

△ Assess the need for a proton pump inhibitor if increased risk for gastrointestinal side effects.

◊ Intraarticular glucocorticoid injections are not routinely recommended because the pain relief is mild to moderate and is short-lived.

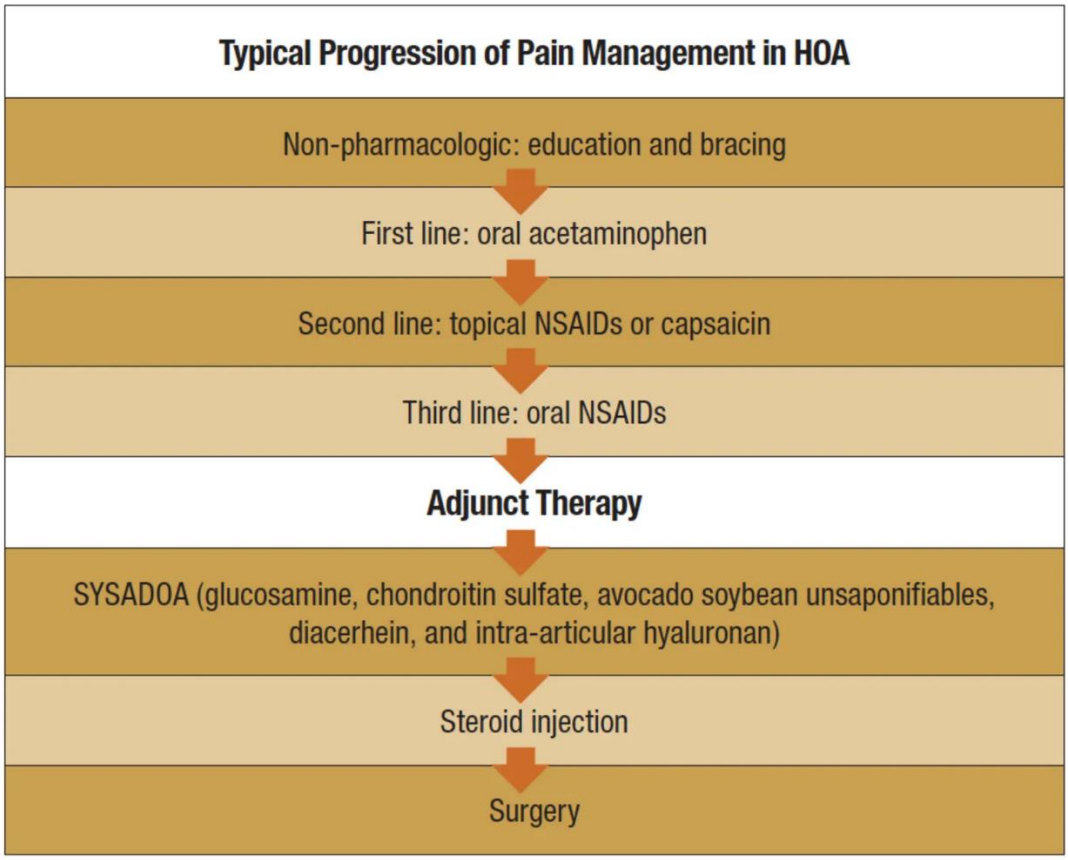

Figure 5. *Treatment algorithm for patients with osteoarthritis of the hand*