AAOS
AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

Humeral Component Design During Primary Anatomic Total Shoulder Arthroplasty

Appropriate Use Criteria

Adapted by:
The American Academy of Orthopaedic Surgeons Board of Directors
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Endorsed by:

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Disclaimer

Volunteer physicians from multiple medical specialties created and categorized these Appropriate Use Criteria. These Appropriate Use Criteria are not intended to be comprehensive or a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. These Appropriate Use Criteria represent patients and situations that clinicians treating or diagnosing musculoskeletal conditions are most likely to encounter. The clinician's independent medical judgment, given the individual patient's clinical circumstances, should always determine patient care and treatment.

Disclosure Requirement

In accordance with American Academy of Orthopaedic Surgeons (AAOS) policy, all individuals whose names appear as authors or contributors to this document filed a disclosure statement as part of the submission process. All authors provided full disclosure of potential conflicts of interest prior to participation in the development of these Appropriate Use Criteria. Disclosure information for all panel members can be found in Appendix B.

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FDA Clearance

Some drugs or medical devices referenced or described in this document may not have been cleared by the Food and Drug Administration (FDA) or may have been cleared for a specific use only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or device he or she wishes to use in clinical practice.

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INTRODUCTION

OVERVIEW

AAOS has developed this Appropriate Use Criteria (AUC) to determine appropriateness of various humeral component designs during primary anatomic total shoulder arthroplasty.

An "appropriate" healthcare service is one for which the expected health benefits exceed the expected negative consequences by a sufficiently wide margin.[1] Evidence-based information, in conjunction with the clinical expertise of physicians from multiple medical specialties, was used to develop the criteria in order to improve patient care and obtain the best outcomes while considering the subtleties and distinctions necessary in making clinical decisions. To provide the evidence foundation for this AUC, the AAOS Department of Clinical Quality and Value provided the writing panel and rating panel with the AAOS Clinical Practice Guideline on Management of Glenohumeral Joint OA, which can be accessed via the following link:
https://www.orthoguidelines.org/topic?id=1031
The purpose of this AUC is to help determine the appropriateness of clinical practice guideline recommendations for the heterogeneous patient population routinely seen in practice. The best available scientific evidence is synthesized with collective expert opinion on topics where gold standard randomized clinical trials are not available or are inadequately detailed for identifying distinct patient types. When there is evidence corroborated by consensus that expected benefits substantially outweigh potential risks, exclusive of cost, a procedure is determined to be appropriate. The AAOS uses the RAND/UCLA Appropriateness Method (RAM)[1] to assess the appropriateness of a particular treatment. This process includes reviewing the results of the evidence analysis, compiling a list of clinical vignettes, and having an expert panel comprised of representatives from multiple medical specialties to determine the appropriateness of each of the clinical indications for treatment as "Appropriate," "May be Appropriate," or "Rarely Appropriate." To access a more user-friendly version of the appropriate use criteria for this topic online, please visit our AUC web-based application at www.orthoguidelines.org/auc or download the OrthoGuidelines app from Google Play or Apple Store.

These criteria should not be construed as including all indications or excluding indications reasonably directed to obtaining the same results. The criteria intend to address the most common clinical scenarios facing qualified physicians managing osteoarthritis of the shoulder. The ultimate judgment regarding any specific criteria should address all circumstances presented by the patient and the needs and resources particular to the locality or institution. It is also important to state that these criteria and are not meant to supersede clinician expertise and experience or patient preference.

INTERPRETING THE APPROPRIATENESS RATING

To prevent misuse of these criteria, it is extremely important that the user of this document understands how to interpret the appropriateness ratings. The appropriateness rating scale ranges from one to nine and there are three main range categories that determine how the median rating is defined (i.e., 1-3 = "Rarely Appropriate", 4-6 = "May Be Appropriate", and 7-9 = "Appropriate"). Before these AUCs are consulted, the user should read through and understand all contents of this document.

INCIDENCE AND PREVALENCE

Glenohumeral joint osteoarthritis is more common in women and increases with age. Primary glenohumeral joint osteoarthritis can occur over a broad age range, it is most commonly seen in patients >60 years of age. Radiographic data has found a prevalence rate of 94% in women and 85% in men over the age of 80 years. (Hashemi et al) Furthermore, Kerr et al (AJR 1985) reported a 20% incidence of idiopathic glenohumeral joint osteoarthritis in patients over the age of 60 who presented for shoulder symptoms. While the true incidence and prevalence of glenohumeral joint osteoarthritis cannot be estimated currently, it is important to recognize it is common.

ETIOLOGY

Glenohumeral joint osteoarthritis is characterized by progressive humeral head cartilage loss, adaptive changes to the subchondral bone, development of inferior humeral head osteophytes. These changes result in subsequent biomechanical change of the glenohumeral joint, joint space narrowing, posterior humeral head subluxation followed by progressive posterior glenoid bone loss. Although it has been hypothesized that there may be a genetic predisposition to disease progression, primary glenohumeral joint osteoarthritis has no specific causative factor that explains the etiology of the disease process other than the degenerative process that naturally occurs as a result of aging.

POTENTIAL BENEFITS, HARMS, AND CONTRAINDICATIONS

There are risks associated with both surgical and non-operative treatment of glenohumeral joint osteoarthritis. These risk factors increase based on the invasiveness of the treatment modality. Risks include but are not limited to infection, functional limitations, stiffness, neurovascular injury, deep venous thrombosis, pulmonary embolism, anesthesia complications, etc. The risks of complications are influenced by the providers' choice of treatment as well as patients underlying medical comorbidities. Contraindications are based on the specific treatment as well as patient related factors.

METHODS

This Appropriate Use Criteria (AUC) for management of glenohumeral joint osteoarthritis (GJO) is based on a review of the available literature and a list of clinical scenarios (i.e., criteria) constructed and rated by experts in orthopaedic surgery and other relevant medical fields. This section describes the methods adapted from RAM[1]. This section also includes the activities and compositions of the various panels that developed, defined, reviewed, and rated the criteria.

Two panels participated in the development of the GJO Humeral Component Design AUC, a writing panel and a rating panel. Members of the writing panel developed a list of patient scenarios and relevant treatment options. Additional detail on how the writing panel developed the patient scenarios and treatments is below. The rating panel participated in two rounds of rating. During the first round, the rating panel was given approximately one month to independently rate the appropriateness of each the provided treatments for each of the relevant patient scenarios as 'Appropriate', 'May Be Appropriate', or 'Rarely Appropriate' via an electronic ballot. How the rating panel rates for appropriateness is described in more detailed below. After the first round of appropriateness ratings were submitted, AAOS staff calculated the median ratings for each patient scenario and specific treatment. A virtual rating panel meeting was held on Sunday December 11th, 2022. During this meeting rating panel members addressed the scenarios/treatments which resulted in disagreement from round one rating. The rating panel members discussed the list of assumptions, patient indications, and treatments to identify areas that needed to be clarified/edited. After the discussion and subsequent changes, the group was asked to rerate their first-round ratings during the rating panel meeting, only if they were persuaded to do so by the discussion and available evidence. There was no attempt to obtain consensus about appropriateness.

The AAOS Committee on Evidence Based Quality and Value, the AAOS Research and Quality Council, and the AAOS Board of Directors sequentially approve all AAOS AUC.

DEVELOPING CRITERIA

Panel members of the GJO AUC developed patient scenarios using the following guiding principles:

1. **Comprehensive** – Covers a wide range of patients.
2. **Mutually Exclusive** - There should be no overlap between patient scenarios/indications.
3. **Homogenous** –The final ratings should result in equal application within each of the patient scenarios.
4. **Manageable** – Number of total rating items (i.e., # of patient scenarios x # of treatments) should be practical for the rating panel. Target number of total rating items > 1500. This means that not all patient indications and treatments can be assessed within one AUC.

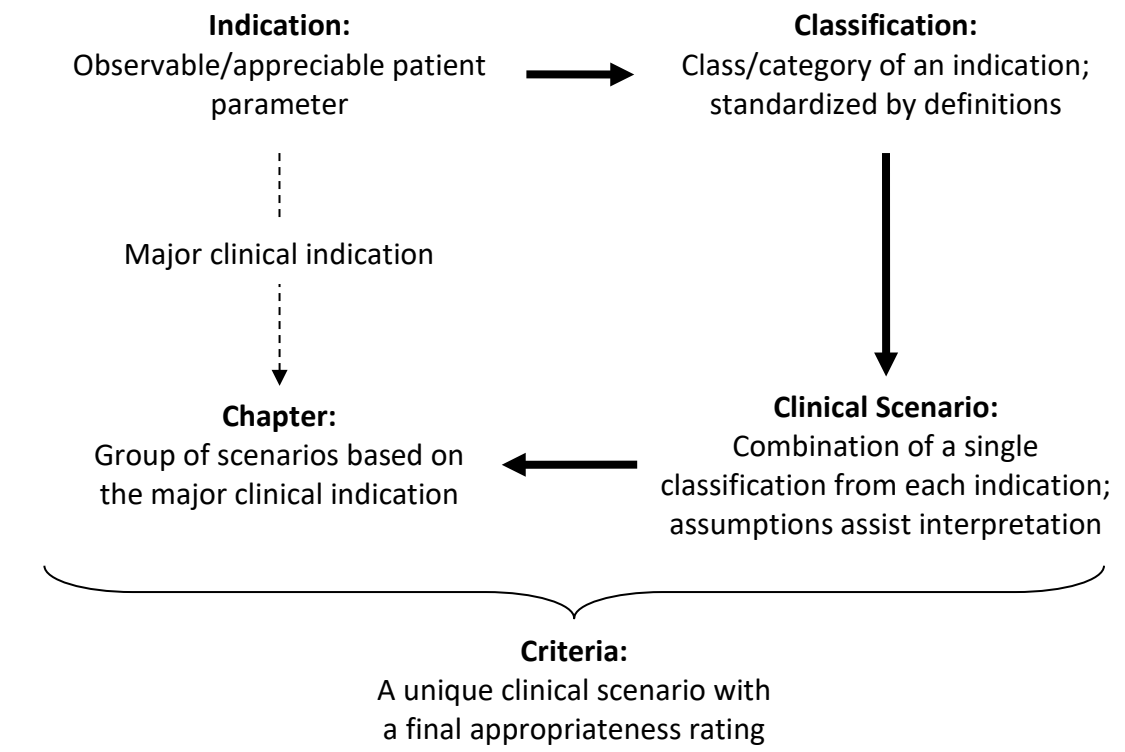
The writing panel developed the scenarios by categorizing patients in terms of indications evident during the clinical decision-making process. These scenarios relied upon definitions and general assumptions, mutually agreed upon by the writing panel during the development of the scenarios. These definitions and assumptions were necessary to provide consistency in the interpretation of the clinical scenarios among experts rating the scenarios, and readers using the final criteria.

FORMULATING INDICATIONS AND SCENARIOS

The AUC writing panel began the development of the scenarios by identifying clinical indications typical of patients in need of management of glenohumeral joint osteoarthritis. Indications are most often parameters observable by the clinician, including symptoms or results of diagnostic tests.

Additionally, "human factor" (e.g., activity level) or demographic variables can be considered.

FIGURE 1. DEVELOPING CRITERIA



Indications identified in clinical trials, derived from patient selection criteria, included in AAOS Clinical Practice Guidelines (https://www.orthoguidelines.org/topic?id=1031) served as a starting point for the writing panel, as well as ensured that these AUCs referenced the evidence base for this topic. The writing panel considered this initial list and other indications based on their clinical expertise and selected the most clinically relevant indications. The writing panel then defined distinct classes for each indication to stratify/categorize the indication.

The writing panel organized these indications into a matrix of clinical scenarios that addressed all combinations of the classifications. The writing panel was given the opportunity to remove any scenarios that rarely occur in clinical practice but agreed that all scenarios were clinically relevant. The major clinical decision-making indications chosen by the

writing panel divided the matrix of clinical scenarios into chapters, as follows: Osteoporosis/Osteopenia, Avascular Necrosis of the Humeral Head, Distal Humeral Hardware That Could Interfere with Placement of Standard Stem, Proximal Humerus Deformity, Subscapularis Management.

CREATING DEFINITIONS AND ASSUMPTIONS

The GJO Humeral Component Design AUC writing panel constructed concise and explicit definitions for the indications and classifications. This standardization helps ensure that the way the writing panel defined the patient indications is consistent among those reading the clinical scenario matrix or the final criteria. Definitions create explicit boundaries when possible and are based on standard medical practice or existing literature.

Additionally, the writing panel formulated a list of general assumptions in order to provide more consistent interpretations of a scenario. These assumptions differed from definitions in that they identified circumstances that exist outside of the control of the clinical decision-making process. Assumptions also address the use of existing published literature regarding the effectiveness of treatment and/or the procedural skill level of physicians. Assumptions also highlight intrinsic methods described in this document such as the role of cost considerations in rating appropriateness, or the validity of the definition of appropriateness. The main goal of assumptions is to focus scenarios so that they apply to the average patient presenting to an average physician at an average facility.

The definitions and assumptions should provide all readers with a common starting point in interpreting the clinical scenarios. The list of definitions and assumptions accompanied the matrix of clinical scenarios in all stages of AUC development and appears in the Writing Panel section of this document.

LITERATURE REVIEW

The Clinical Practice Guideline on the Management of Glenohumeral Joint Osteoarthritis was used as the evidence base for this AUC (see here: https://www.orthoguidelines.org/topic?id=1031). This guideline helped to inform the decisions of the writing panel and rating panel where available and necessary.

RATING PANEL MODIFICATIONS TO WRITING PANEL DOCUMENT

At the start of the rating panel meeting, the rating panel was reminded that they could amend the original writing panel materials if the amendments resulted in more clinically relevant and practical criteria. To amend the original materials, instructed rating panel member must make a motion to amend and another member must “second” that motion, after which a vote is conducted. If the majority of rating panel members voted “yes” to amend the original materials, the amendments were accepted.

DETERMINING APPROPRIATENESS

RATING PANEL

As mentioned above, a multidisciplinary panel of clinicians was assembled to determine the appropriateness of treatments for the GJO Humeral Component Design AUC. One non-rating moderator, who is also an orthopaedic surgeon, moderated the rating panel. The moderator was familiar with the methods and procedures of AAOS Appropriate Use Criteria and led the panel (as a non-rater) in discussions. Additionally, no member of the rating panel was involved in the development, i.e., writing panel, of the scenarios.

The rating panel used a modified Delphi procedure to determine appropriateness ratings. The rating panel participated in two rounds of rating while considering evidence-based information provided in the literature review.

RATING APPROPRIATENESS

When rating the appropriateness of a scenario, the rating panel considered the following definition:

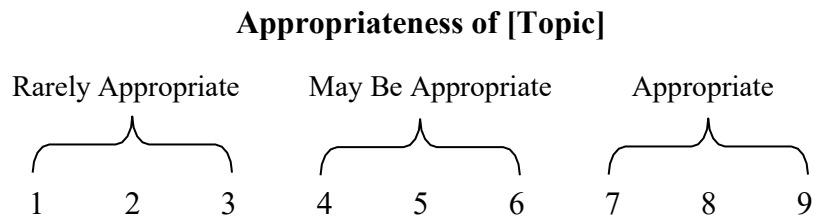
"An appropriate procedural step for a patient with glenohumeral joint osteoarthritis is one for which the procedure **is** generally acceptable, **is** a reasonable approach for the indication, and **is** likely to improve the patient's health outcomes or survival."

The rating panel rated each scenario using their best clinical judgment, taking into consideration the available evidence, for an average patient presenting to an average physician at an average facility as follows:

FIGURE 2. INTERPRETING THE 9-POINT APPROPRIATENESS SCALE

Rating	Explanation
7-9	**Appropriate**: Appropriate for the indication provided, meaning treatment **is** generally acceptable and **is** a reasonable approach for the indication and **is** likely to improve the patient's health outcomes or survival.
4-6	**May Be Appropriate**: Uncertain for the indication provided, meaning treatment **may** be acceptable and **may** be a reasonable approach for the indication, but with uncertainty implying that more research and/or patient information is needed to further classify the indication.
1-3	**Rarely Appropriate**: **Rarely** an appropriate option for management of patients in this population due to the lack of a clear benefit/risk advantage; **rarely** an effective option for individual care plans; exceptions should have documentation of the clinical reasons for proceeding with this care option (i.e., procedure is not generally acceptable and is not generally reasonable for the indication).

Each panelist uses the scale below to record their response for each scenario:



ROUND ONE RATING

The first round of rating occurred after approval of the final indications, scenarios, and assumptions by the writing panel. The rating panel rated the scenarios electronically using the AAOS AUC Electronic Ballot Tool, a personalized ballot created by AAOS staff. There was no interaction between rating panel members while completing the first round of rating. Panelists considered the following materials:

- The instructions for rating appropriateness
- The completed literature review, that is appropriately referenced when evidence is available for a scenario
- The list of indications, definitions, and assumptions, to ensure consistency in the interpretation of the clinical scenarios

ROUND TWO RATING

The second round of rating occurred after the virtual rating panel meeting on December 11th, 2022. Prior to the meeting, each rating panelist received a personalized document that included his/her first-round ratings along with summarized results of the first-round ratings that resulted in disagreement. These results indicated the frequency of ratings for a scenario for all panelists. The document contained no identifying information for other panelists' ratings. The moderator also used a document that summarized the results of the panelists' first round rating. These personalized documents served as the basis for discussions of scenarios which resulted in disagreement.

During the discussion, the rating panel members were allowed to add or edit the assumptions list, patient indications, and/or treatments if clarification was needed. Rating panel members were also able to record a new rating for any scenarios/treatments, if they were persuaded to do so by the discussion and/or the evidence. There was no attempt to obtain consensus among the panel members. After the final ratings were submitted, AAOS staff used the AAOS AUC Electronic Ballot Tool to export the median values and level of agreement for all rating items.

FINAL RATINGS

Using the median value of the second-round ratings, AAOS staff determined the final levels of appropriateness. Disagreement among raters can affect the final rating. Agreement and disagreement were determined using the BIOMED definitions of Agreement and Disagreement, as reported in the RAND/UCLA Appropriate Method User's Manual[1], for a panel of 8-10 rating members (see Figure 3 below). The 8-10 panel member disagreement cutoff was used for this rating panel. For this panel size, disagreement is defined as when ≥ 3 members' appropriateness ratings fell within the appropriate (7-9) and rarely appropriate (1-3) ranges for any scenario (i.e., ≥ 3 members' ratings fell between 1-3 and ≥ 3 members' ratings fell between 7-9 on any given scenario and its treatment). If there is still disagreement in the rating panel ratings after the last round of rating, that rating item is labeled as "5" regardless of median score. Agreement is defined as ≤ 2 panelists rated outside of the 3-point range containing the median.

FIGURE 3. DEFINING AGREEMENT AND DISAGREEMENT FOR APPROPRIATENESS RATINGS

	Disagreement	**Agreement**
Panel Size	Number of panelists rating in each extreme (1-3 and 7-9)	Number of panelists rating outside the 3-point region containing the median (1-3, 4-6, 7-9)
8,9,10	*≥ 3*	*≤ 2*
11,12,13	≥ 4	≤ 3
14,15,16	≥ 5	≤ 4
17,18,19	≥ 6	≤ 5

Adapted from RAM [1]

The classifications in the table below determined final levels of appropriateness.

FIGURE 4. INTERPRETING FINAL RATINGS OF CRITERIA

Level of Appropriateness	**Description**
Appropriate	• Median panel rating between 7-9 and no disagreement
May Be Appropriate	• Median panel rating between 4-6 or • Median panel rating 1-9 with disagreement
Rarely Appropriate	• Median panel rating between 1-3 and no disagreement

REVISION PLANS

These criteria represent a cross-sectional view of current methods for management of glenohumeral joint osteoarthritis and may become outdated as new evidence becomes available or clinical decision-making indicators are improved. In accordance with guideline and appropriate use criteria standards, AAOS will update or withdraw these criteria in five years. AAOS will issue updates in accordance with new evidence, changing practice, rapidly emerging treatment options, and new technology.

DISSEMINATING APPROPRIATE USE CRITERIA

All AAOS AUCs can be accessed via a user-friendly app that is available via the OrthoGuidelines website (www.orthoguidelines.org/auc) or as a native app via the Apple and Google Play stores.

Publication of the AUC document is on the AAOS website at [https://www.aaos.org/quality/quality-programs/. This document provides interested readers with full documentation about the development of Appropriate Use Criteria and further details of the criteria ratings.

AUCs are first announced by an Academy press release and then published on the AAOS website. AUC summaries are published in *AAOS Now* and the Journal of the American Academy of Orthopaedic Surgeons (JAAOS). AUCs may also be promoted via JAAOS' Unplugged podcast. In addition, most appropriate use criteria are promoted at the AAOS Annual Meeting in the Resource Center.

The dissemination efforts of AUCs may include the AAOS Learning Management Systems (LMS), AAOS' Education by Specialty Area pages, webinars, and media briefings. In addition, AUCs are also promoted in relevant Continuing Medical Education (CME) courses. Specialty Societies that participated in the development of the AUC are invited to endorse the AUC and share the links to the online tool and full AUC pdf to their membership via their websites.

Other dissemination efforts outside of the AAOS include submitting AUCs to the Guidelines International Network and to other medical specialty societies' meetings.

ASSUMPTIONS AND DISCLAIMER

Before these appropriate use criteria are consulted, it is assumed that:

- Non-surgical treatment options have been attempted as necessary/applicable
- Patient has intact rotator cuff
- Patient does not have a neuromuscular condition that limits their ability to undergo arthroplasty
- Ability of patient to comply with post-op prescriptions and restriction (post op care and rehab)
- General medical condition of the patient does not preclude surgery/general management (eg diabetes, late stage renal disease)
- AUC does not apply to revision procedures

Conditions Not Covered in This AUC

- Inflammatory Arthropathies
- Post-Infectious Process
- Post-capsulorrhaphy arthropathy

PATIENT POPULATION

This AUC is intended for use as part of the management of patients with glenohumeral joint osteoarthritis.

SCOPE

The scope of these appropriate use criteria is humeral component design during primary anatomic TSA.

DISCLAIMER

Volunteer physicians from multiple medical specialties created and categorized these Appropriate Use Criteria. These Appropriate Use Criteria are not intended to be comprehensive or a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. These Appropriate Use Criteria represent patients and situations that clinicians treating or diagnosing musculoskeletal conditions are most likely to encounter. The clinician's independent medical judgment, given the individual patient's clinical circumstances, should always determine patient care and treatment. Practitioners are advised to consider management options in the context of their own training and background and institutional capabilities when selecting recommended treatment options.

INDICATIONS

PATIENT INDICATIONS AND CLASSIFICATIONS

Osteoporosis/Osteopenia
- Yes
- No

Avascular Necrosis of the Humeral Head
- Yes
- No

Distal Humeral Hardware That Could Interfere with Placement of Standard Stem
- Yes
- No

Proximal Humerus Deformity
- Yes
- No

Subscapularis Management
- Osteotomy
- Peel
- Tenotomy

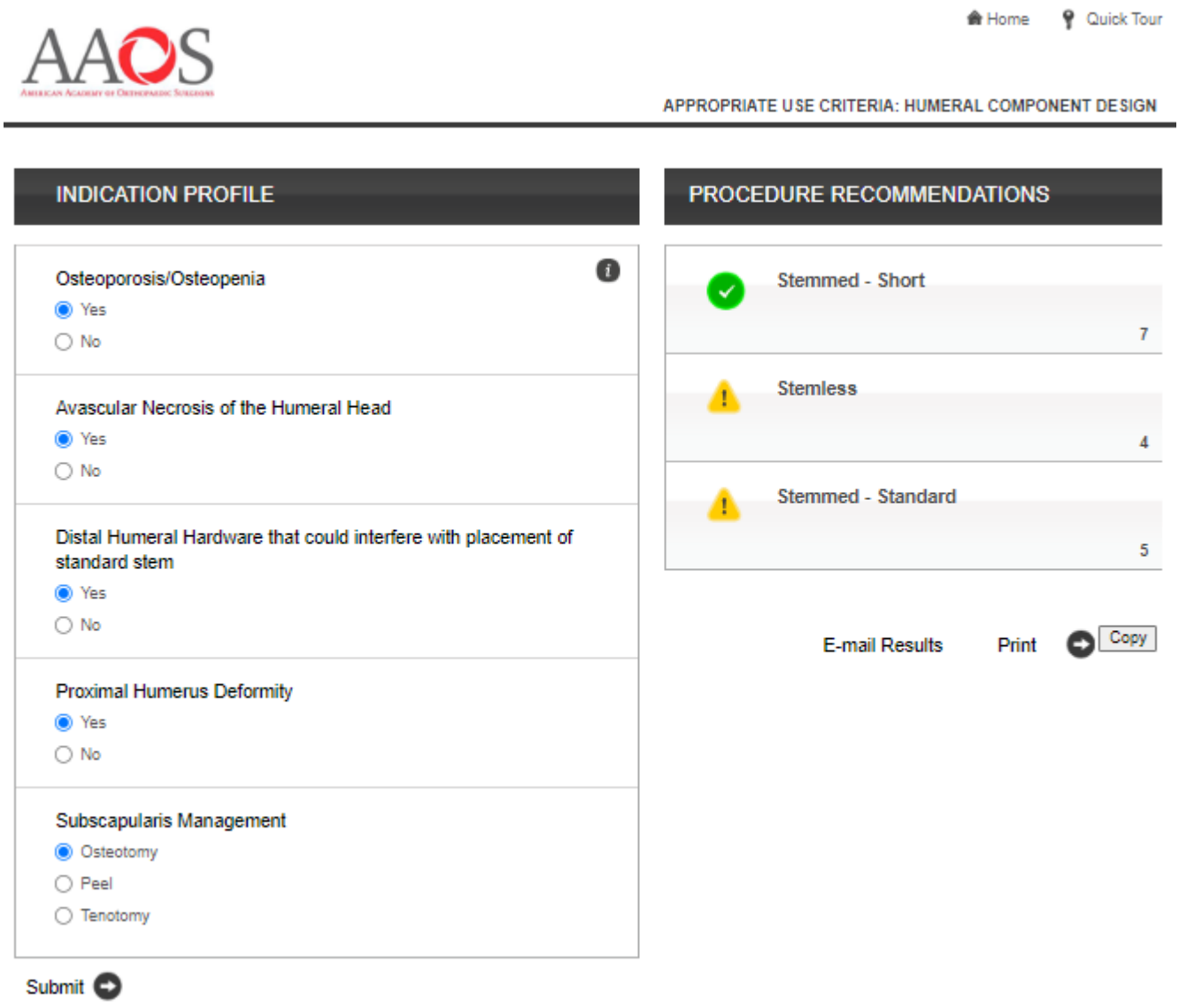
TREATMENTS

- Stemless
- Stemmed – Short
- Stemmed – Standard

RESULTS OF APPROPRIATENESS RATINGS

For a user-friendly version of these appropriate use criteria, please access our AUC web-based application at www.orthoguidelines.org/auc. The OrthoGuidelines native app can also be downloaded via the Apple or Google Play stores.

Web-Based AUC Application Screenshot



RESULTS

The following Appropriate Use Criteria tables contain the final appropriateness ratings assigned by the members of the rating panel. Patient characteristics are found under the column titled “Scenario”. The Appropriate Use Criteria for each patient scenario can be found within each of the treatment rows. These criteria are formatted by appropriateness, median rating, and + or - indicating agreement or disagreement amongst the rating panel, respectively.

Out of 144 total rating items, 81 (56%) rating items were rated as “Appropriate”, 63 (44%) rating items were rated as “May Be Appropriate”, and 0 (0%) rating items were rated as “Rarely Appropriate” (Figure 5). Additionally, the rating panel members were in statistical agreement on 61 (42%) rating items and statistical disagreement on 0 (0%) rating items (Figure 6).

FIGURE 5. BREAKDOWN OF APPROPRIATENESS RATINGS

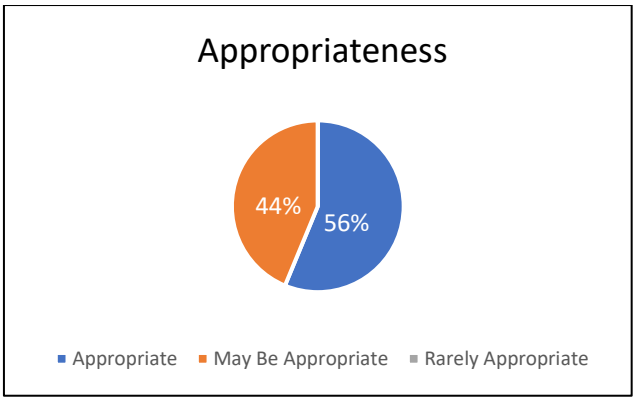


FIGURE 6. BREAKDOWN OF AGREEMENT AMONGST RATING PANEL

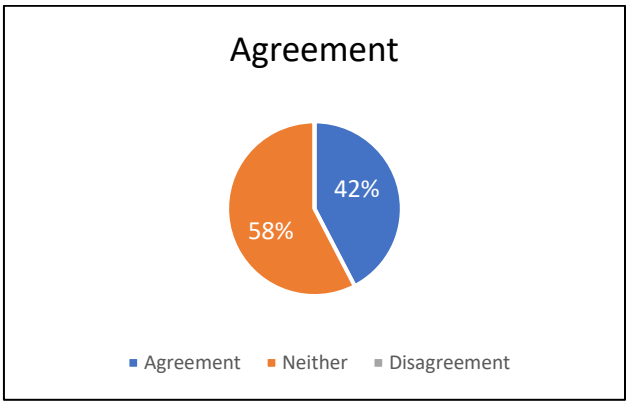
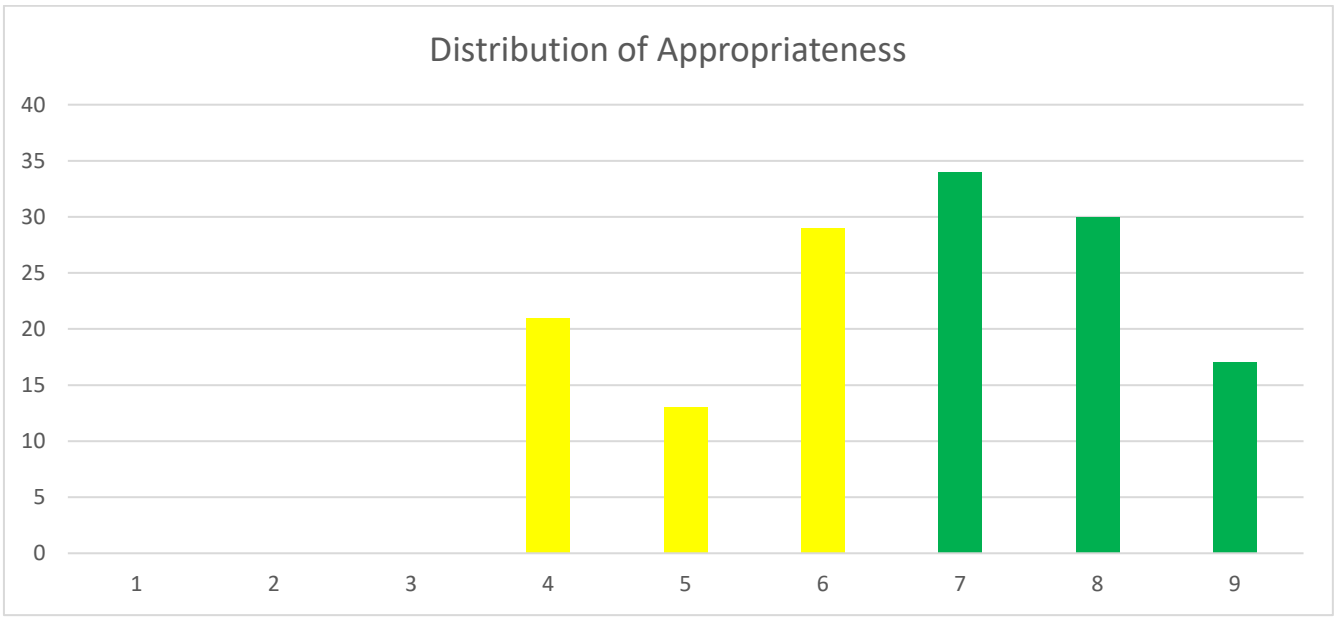


FIGURE 7. DISTRIBUTION OF APPROPRIATENESS ON 9-POINT RATING SCALE



APPROPRIATENESS RATINGS BY PATIENT SCENARIO

Interpreting the AUC tables:

- Each procedure contains the appropriateness (i.e., appropriate, may be appropriate, or rarely appropriate) for each patient scenario, followed by the median panel rating, and the panel's agreement represented by "+", or disagreement represented by "-", in parentheses.

Scenario 1:	Treatment	Appropriateness Rating
Yes, Yes, Yes, Yes, Osteotomy	Stemless	Maybe Appropriate (4)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (5)
Scenario 2:	Treatment	Appropriateness Rating
Yes, Yes, Yes, Yes, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (5)
Scenario 3:	Treatment	Appropriateness Rating
Yes, Yes, Yes, Yes, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 4:	Treatment	Appropriateness Rating
Yes, Yes, Yes, No, Osteotomy	Stemless	Maybe Appropriate (4)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (5)
Scenario 5:	Treatment	Appropriateness Rating
Yes, Yes, Yes, No, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 6:	Treatment	Appropriateness Rating
Yes, Yes, Yes, No, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 7:	Treatment	Appropriateness Rating
Yes, Yes, No, Yes, Osteotomy	Stemless	Maybe Appropriate (5, +)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Appropriate (7)
Scenario 8:	Treatment	Appropriateness Rating
Yes, Yes, No, Yes, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (6)
Scenario 9:	Treatment	Appropriateness Rating
Yes, Yes, No, Yes, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (6)
Scenario 10:	Treatment	Appropriateness Rating

Yes, Yes, No, No, Osteotomy	Stemless	Maybe Appropriate (4)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (8, +)
Scenario 11:	Treatment	Appropriateness Rating
Yes, Yes, No, No, Peel	Stemless	Maybe Appropriate (5)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (8, +)
Scenario 12:	Treatment	Appropriateness Rating
Yes, Yes, No, No, Tenotomy	Stemless	Maybe Appropriate (5)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (8, +)
Scenario 13:	Treatment	Appropriateness Rating
Yes, No, Yes, Yes, Osteotomy	Stemless	Maybe Appropriate (4)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (5)
Scenario 14:	Treatment	Appropriateness Rating
Yes, No, Yes, Yes, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 15:	Treatment	Appropriateness Rating
Yes, No, Yes, Yes, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (5)
Scenario 16:	Treatment	Appropriateness Rating
Yes, No, Yes, No, Osteotomy	Stemless	Maybe Appropriate (4)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (5)
Scenario 17:	Treatment	Appropriateness Rating
Yes, No, Yes, No, Peel	Stemless	Appropriate (7)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 18:	Treatment	Appropriateness Rating
Yes, No, Yes, No, Tenotomy	Stemless	Appropriate (7)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 19:	Treatment	Appropriateness Rating
Yes, No, No, Yes, Osteotomy	Stemless	Maybe Appropriate (4)
	Stemmed - Short	Appropriate (8)
	Stemmed - Standard	Appropriate (7)
Scenario 20:	Treatment	Appropriateness Rating
Yes, No, No, Yes, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8)
	Stemmed - Standard	Appropriate (7)
Scenario 21:	Treatment	Appropriateness Rating
Yes, No, No, Yes, Tenotomy	Stemless	Maybe Appropriate (6)

	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Appropriate (7)
Scenario 22:	Treatment	Appropriateness Rating
Yes, No, No, No, Osteotomy	Stemless	Maybe Appropriate (5, +)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 23:	Treatment	Appropriateness Rating
Yes, No, No, No, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 24:	Treatment	Appropriateness Rating
Yes, No, No, No, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 25:	Treatment	Appropriateness Rating
No, Yes, Yes, Yes, Osteotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (5, +)
Scenario 26:	Treatment	Appropriateness Rating
No, Yes, Yes, Yes, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 27:	Treatment	Appropriateness Rating
No, Yes, Yes, Yes, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 28:	Treatment	Appropriateness Rating
No, Yes, Yes, No, Osteotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 29:	Treatment	Appropriateness Rating
No, Yes, Yes, No, Peel	Stemless	Appropriate (7)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 30:	Treatment	Appropriateness Rating
No, Yes, Yes, No, Tenotomy	Stemless	Appropriate (7)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 31:	Treatment	Appropriateness Rating
No, Yes, No, Yes, Osteotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Appropriate (7)
Scenario 32:	Treatment	Appropriateness Rating
No, Yes, No, Yes, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)

	Stemmed - Standard	Maybe Appropriate (6)
Scenario 33:	Treatment	Appropriateness Rating
No, Yes, No, Yes, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (6)
Scenario 34:	Treatment	Appropriateness Rating
No, Yes, No, No, Osteotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 35:	Treatment	Appropriateness Rating
No, Yes, No, No, Peel	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 36:	Treatment	Appropriateness Rating
No, Yes, No, No, Tenotomy	Stemless	Maybe Appropriate (6)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 37:	Treatment	Appropriateness Rating
No, No, Yes, Yes, Osteotomy	Stemless	Appropriate (7)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (5, +)
Scenario 38:	Treatment	Appropriateness Rating
No, No, Yes, Yes, Peel	Stemless	Appropriate (7, +)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 39:	Treatment	Appropriateness Rating
No, No, Yes, Yes, Tenotomy	Stemless	Appropriate (8, +)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 40:	Treatment	Appropriateness Rating
No, No, Yes, No, Osteotomy	Stemless	Appropriate (7)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (5, +)
Scenario 41:	Treatment	Appropriateness Rating
No, No, Yes, No, Peel	Stemless	Appropriate (9, +)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 42:	Treatment	Appropriateness Rating
No, No, Yes, No, Tenotomy	Stemless	Appropriate (9, +)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Maybe Appropriate (4)
Scenario 43:	Treatment	Appropriateness Rating
No, No, No, Yes, Osteotomy	Stemless	Appropriate (7)
	Stemmed - Short	Appropriate (7, +)
	Stemmed - Standard	Maybe Appropriate (6, +)

Scenario 44:	Treatment	Appropriateness Rating
No, No, No, Yes, Peel	Stemless	Appropriate (9, +)
	Stemmed - Short	Appropriate (7)
	Stemmed - Standard	Maybe Appropriate (6, +)
Scenario 45:	Treatment	Appropriateness Rating
No, No, No, Yes, Tenotomy	Stemless	Appropriate (9, +)
	Stemmed - Short	Appropriate (8)
	Stemmed - Standard	Maybe Appropriate (6, +)
Scenario 46:	Treatment	Appropriateness Rating
No, No, No, No, Osteotomy	Stemless	Appropriate (8, +)
	Stemmed - Short	Appropriate (8, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 47:	Treatment	Appropriateness Rating
No, No, No, No, Peel	Stemless	Appropriate (9, +)
	Stemmed - Short	Appropriate (9, +)
	Stemmed - Standard	Appropriate (9, +)
Scenario 48:	Treatment	Appropriateness Rating
No, No, No, No, Tenotomy	Stemless	Appropriate (9, +)
	Stemmed - Short	Appropriate (9, +)
	Stemmed - Standard	Appropriate (9, +)

APPENDICES

APPENDIX A. DOCUMENTATION OF APPROVAL

AAOS BODIES THAT APPROVED THIS APPROPRIATE USE CRITERIA

Evidence-Based Quality and Value Committee: Approved on January 18, 2023
The AAOS Committee on Evidence Based Quality and Value consists of 19 AAOS members. The overall purpose of this committee is to plan, organize, direct, and evaluate initiatives related to Clinical Practice Guidelines, Appropriate Use Criteria, and Quality Measures.

Research and Quality Council: Approved on February 1, 2023
To enhance the mission of the AAOS, the Research and Quality Council promotes the most ethically and scientifically sound basic, clinical, and translational research possible to ensure the future care for patients with musculoskeletal disorders. The Council also serves as the primary resource to educate its members, the public, and public policy makers regarding evidenced-based medical practice, orthopaedic devices and biologics regulatory pathways and standards development, patient safety, and other related areas of importance.

Board of Directors: Approved on March 6, 2023
The 16 member AAOS Board of Directors manages the affairs of the AAOS, sets policy, and determines and continually reassesses the Strategic Plan.

APPENDIX B. DISCLOSURE INFORMATION

GJO AUC WRITING PANEL MEMBER DISCLOSURES

Jonathan Baker, MD
Alynylam Pharmaceuticals: Paid consultant ($5,100)
Radiology consultant (Self)

Aaron Chamberlain, MD, FAAOS
AAOS: Board or committee member ($0) Evidence-Based Quality and Value (Self)
American Shoulder and Elbow Surgeons: Board or committee member ($0) Fellowship Committee (Self)
Arthrex, Inc: Paid consultant ($0)
Johnson & Johnson: Paid consultant ($51,575) DePuy/Mitek (Self)
Zimmer: Research support ($0)

Michael Cusick, MD, FAAOS
Enovis: Shoulder/elbow arthroplasty implantation techniques related to the treatment of glenohumeral osteoarthritis ($5,000)
Exactech: Shoulder arthroplasty implantation techniques related to the treatment of glenohumeral osteoarthritis ($4,000)
Avuemed: Consultant for sports medicine implant design not related to glenohumeral osteoarthritis ($0.00)

Adam Dann, DO, FAAOS
Abbott: Paid consultant ($5,000) N/A (Family)
AIS: Paid consultant ($0) N/A(Family)
FH Ortho: Paid consultant ($10,000) N/A (Self)
Medtronic: Paid consultant ($70,000) N/A (Family)

June Kennedy, MS,
This individual reported nothing to disclose

Brian Leggin, DPT
This individual reported nothing to disclose

Matthew Putnam, MD, FAAOS
Cerner: Stock or stock Options Number of Shares: 855 NA (Family)
DePuy, A Johnson & Johnson Company: Research support ($10,000) Research materials
Johnson & Johnson: Employee ($480,000)
DePuy Synthes – Mitek (Self)
Johnson & Johnson: Stock or stock Options Number of Shares: 500 Stock (Self)
Medtronic Sofamor Danek: Stock or stock Options Number of Shares: 2,000 NA (Family)
Procter & Gamble: Stock or stock Options Number of Shares: 105 N/A (Family)
Zimmer: Stock or stock Options Number of Shares: 1,500 NA (Family)

Daniel Schwartz, MD, FAAOS
DJ Orthopaedics: Paid consultant ($36,000) Consultant (Self)
Johnson & Johnson: Paid consultant ($120,000) Consultant (Self)

Erik Severud, MD, FAAOS
This individual reported nothing to disclose

Matthew Zens, DPT, SCS, MS, ATC
This individual reported nothing to disclose

GJO AUC RATING PANEL MEMBER DISCLOSURES

Garret Bullock, PT, DPT, DPhil
This individual reported nothing to disclose.

Brian W. Hill, MD
DJ Orthopaedics: Paid presenter or speaker ($0) Number of Presentations: 0

Elizabeth McAllister Nolan, MD, FAAOS
American Orthopaedic Association: Board or committee member ($0)
American Shoulder and Elbow Surgeons: Board or committee member ($0)
Journal of Bone and Joint Surgery - American: Editorial or governing board ($0)
Journal of Shoulder and Elbow Surgery: Editorial or governing board ($0)

Noah Matthew Raizman, MD, FAAOS
This individual reported nothing to disclose.

Christopher James Roach, MD, FAAOS
AAOS: Board or committee member ($0)
American Orthopaedic Society for Sports Medicine: Board or committee member ($0)
Arthroscopy Association of North America: Board or committee member ($0)
Orthopaedic Journal of Sports Medicine, Electronic Media Editorial Board: Editorial or governing board ($0)

Matthew J Smith, MD, FAAOS
Arthrex, Inc: Research support ($0)
DePuy, A Johnson & Johnson Company: IP royalties ($0)
DePuy, A Johnson & Johnson Company: Paid presenter or speaker ($0) Number of Presentations: 0
Ignite Orthopedics: IP royalties ($0)
Ignite Orthopedics: Stock or stock Options Number of Shares: 0
Wright Medical Technology, Inc.: Research support ($0)

Melissa Wright, MD
American Shoulder and Elbow Surgeons: Board or committee member ($0)"

Edward Yian, MD, FAAOS
This individual reported nothing to disclose (Payments under $1k)

APPENDIX C. REFERENCES

1. Fitch K, Bernstein SJ, Aguilar MD et al. *The RAND/UCLA Appropriateness Method User's Manual*. Santa Monica, CA: RAND Corporation; 2001.
2. Kerr, R., Resnick, D., Pineda, C., Haghighi, P., Osteoarthritis of the glenohumeral joint: a radiologic-pathologic study Am J Roentgenology 1985;144(5): 967-972.
3. Day, J.S., Lau, E., Ong, K.L., Williams, G.R., Ramsey, M.L., Kurtz, S.M., Prevalence and projections of total shoulder and elbow arthroplasty in the United States to 2015. J Shoulder Elbow Surg 2010;19:1115-20.
4. Weinstein, S.I., Yelin, E.H., Watkins-Castillo, S.I., Burden of Musculoskeletal Diseases in the US (BMUS)- 4th edition: Prevalence of Select Musculoskeletal Conditions: pgs 1-8 Available at http://www.boneandjointburden.org.
5. American Academy of Orthopaedic Surgeons Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline (1st Edition). https://www.aaos.org/globalassets/quality-and-practice-resources/glenohumeral/gjo-cpg.pdf Published March 23, 2020.

AAOS Management of Glenohumeral Joint Osteoarthritis Clinical Practice Guideline

1. American Academy of Orthopaedic Surgeons. Systematic Literature Review on the Management of Glenohumeral Joint Osteoarthritis. http://www.orthoguidelines.org/topic?id=1031. Published 03/23/2020.

EXTERNAL ENDORSEMENTS

Krause, Barbara

From: Anna Quintanilla <aquintanilla@ases-assn.org>
Sent: Friday, March 17, 2023 12:13 PM
To: Krause, Barbara
Subject: RE: AAOS Appropriate Use Criteria on Humeral Component Design During Primary Anatomic Total Shoulder Arthroplasty Endorsement Request

Follow Up Flag: Follow up
Due By: Friday, March 24, 2023 2:00 PM
Flag Status: Flagged

Hi again,

ASES will endorse this AUC as well.

Have a good weekend,

Anna

Anna K. Quintanilla, MA, CAE
Executive Director

American Shoulder and Elbow Surgeons
1515 East Woodfield Rd., Suite 345
Schaumburg, IL 60173
Phone: 847- 957-1373| Fax: 847-268-9499
aquintanilla@ases-assn.org
www.ases-assn.org

From: Krause, Barbara <krause@aaos.org>
Sent: Wednesday, March 15, 2023 12:11 PM

To: Anna Quintanilla <aquintanilla@ases-assn.org>
Subject: AAOS Appropriate Use Criteria on Humeral Component Design During Primary Anatomic Total Shoulder Arthroplasty Endorsement Request

Good afternoon,

Attached, please find a letter from Kaitlyn Severino, MBA, CAE inviting the American Shoulder and Elbow Surgeons to endorse the newly published *AAOS Appropriate Use Criteria on Humeral Component Design During Primary Anatomic Total Shoulder Arthroplasty*

View the online tool here

Please feel free to contact me should you have any questions.

Kind regards,
Barb

AAOS
American Academy of Orthopaedic Surgeons
American Association of Orthopaedic Surgeons

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