AAOS
American Academy of Orthopaedic Surgeons

Review Period Report

Evidence-Based Clinical Practice Guideline on the Management of Glenohumeral Joint Osteoarthritis

Table of Contents

Overview of the Review Period

The reviews and comments related to this clinical practice guideline are reprinted in this document and posted on the AAOS website. All reviewers are required to disclose their conflict of interests.

Review

AAOS contacted 7 organizations with content expertise to review a draft of the clinical practice guideline during the three-week peer review period in January 2020.

Additionally, the draft was also provided to members of the AAOS Board of Directors (BOD), members of the Council on Research and Quality (CORQ), members of the Board of Councilors (BOC), members of the Board of Specialty Societies (BOS) and members of the Committee on Evidence-Based Quality and Value (EBQV) for review and comment.

- Seven (7) individuals provided comments via the electronic structured peer review form. No reviewers asked to remain anonymous.
- All seven reviews were on behalf of a society and/or committee.
- The work group considered all comments and made some modifications when they were consistent with the evidence.

Reviewer Key

Each reviewer was assigned a number (see below). All responses in this document are listed by the assigned peer reviewer's number.

Table 1. Reviewer Key

Reviewer Number	Name of Reviewer (Required)	What is the name of the society that you are representing?
1	Mathew Failla, PT, PhD	American Physical Therapy Association (APTA)
2	Karen Chen, MD	American College of Radiology (ACR)
3	Eric Steifel, MD	Arthroscopy Association of North America (AANA)
4	Joesph Kostuch, PT, SCS	American Society of Shoulder and Elbow Therapist (ASSET)
5	Saurabh Mehta, PT, MSc, PhD	American Physical Therapy Association (APTA)
6	Joaquin Sanchez-Sotelo, MD, PhD	American Shoulder and Elbow Surgeons (ASES)
7	Mark Ellen, MD, FABPMR, CAQ-SM	American Academy of Physical Medicine and Rehabilitation (AAPMR)

Reviewer Demographics

Reviewer #	Name of Reviewer (Required)	Primary Specialty	Work Setting	What is the name of the society that you are representing?
1	Mathew Failla, PT, PhD	Shoulder and Elbow		American Physical Therapy Association (APTA)
2	Karen Chen, MD			American College of Radiology (ACR)
3	Eric Stiefel, MD	Sports Medicine		Arthroscopy Association of North America (AANA)
4	Joesph Kostuch, PT, SCS	Shoulder and Elbow		American Society of Shoulder and Elbow Therapist (ASSET)
5	Saurabh Mehta, PT, MSc, PhD	Hand		American Physical Therapy Association (APTA)
6	Joaquin Sanchez-Sotelo, MD, PhD	Shoulder and Elbow		American Shoulder and Elbow Surgeons (ASES)
7	Mark Ellen, MD, FABPMR, CAQ-SM	Sports Medicine		American Academy of Physical Medicine and Rehabilitation (AAPMR)

Reviewers' Disclosure Information

All reviewers are required to disclose any possible conflicts that would bias their review via a series of 10 questions (see Table 2). For any positive responses to the questions (i.e. "Yes"), the reviewer was asked to provide details on their possible conflict.

Table 2. Disclosure Question Key

Disclosure Question	Disclosure Question Details
A	A) Do you or a member of your immediate family receive royalties for any pharmaceutical, biomaterial or orthopaedic product or device?
B	B) Within the past twelve months, have you or a member of your immediate family served on the speakers bureau or have you been paid an honorarium to present by any pharmaceutical, biomaterial or orthopaedic product or device company?
C	C) Are you or a member of your immediate family a PAID EMPLOYEE for any pharmaceutical, biomaterial or orthopaedic device or equipment company, or supplier?
D	D) Are you or a member of your immediate family a PAID CONSULTANT for any pharmaceutical, biomaterial or orthopaedic device or equipment company, or supplier?
E	E) Are you or a member of your immediate family an UNPAID CONSULTANT for any pharmaceutical, biomaterial or orthopaedic device or equipment company, or supplier?
F	F) Do you or a member of your immediate family own stock or stock options in any pharmaceutical, biomaterial or orthopaedic device or equipment company, or supplier (excluding mutual funds)
G	G) Do you or a member of your immediate family receive research or institutional support as a principal investigator from any pharmaceutical, biomaterial or orthopaedic device or equipment company, or supplier?
H	H) Do you or a member of your immediate family receive any other financial or material support from any pharmaceutical, biomaterial or orthopaedic device and equipment company or supplier?
I	I) Do you or a member of your immediate family receive any royalties, financial or material support from any medical and/or orthopaedic publishers?
J	J) Do you or a member of your immediate family serve on the editorial or governing board of any medical and/or orthopaedic publication?

Table 3. Reviewer's Disclosure Information

Reviewer #	Name of Reviewer (Required)	Disclosure Available via AAOS Disclosure System	A	B	C	D	E	F	G	H	I	J
1	Matthew Failla, PT, PhD	No	No	No	No	No	No	No	No	No	No	No
2	Karen Chen, MD	No	No	No	No	No	No	No	No	No	No	No
3	Eric Stiefel, MD	No										
4	Joseph Kostuch, PT, SCS	No	No	No	No	No	No	No	No	No	No	No
5	Saurabh Mehta, PT, MSc, PhD	No	No	No	No	No	No	No	No	No	No	No
6	Joaquin Sanchez- Sotelo, MD, PhD	Yes										
7	Mark Ellen, MD, FABPMR, CAQ-SM	No	No	No	No	No	No	No	No	No	No	No

Reviewer Responses to Structured Review Form Questions

All reviewers are asked 16 structured review questions which have been adapted from the Appraisal of Guidelines for Research and Evaluation (AGREE) II Criteria*. Their responses to these questions are listed on the next few pages.

Table 5. Reviewer Responses to Structured Review Questions 1-4

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	1. The overall objective(s) of the guideline is (are) specifically described.	2. The health question(s) covered by the guideline is (are) specifically described.	3. The guideline's target audience is clearly described.	4. There is an explicit link between the recommendations and the supporting evidence.
1	Mathew Failla, PT, PhD	American Physical Therapy Association (APTA)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
2	Karen Chen, MD	American College of Radiology (ACR)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
3	Eric Steifel, MD	Arthroscopy Association of North America (AANA)	Agree	Strongly Agree	Strongly Agree	Neutral
4	Joesph Kostuch, PT, SCS	American Society of Shoulder and Elbow Therapist (ASSET)	Strongly Agree	Strongly Agree	Strongly Agree	Agree
5	Saurabh Mehta, PT, MSc, PhD	American Physical Therapy Association (APTA)	Strongly Agree	Strongly Agree	Strongly Agree	Neutral
6	Joaquin Sanchez- Sotelo, MD, PhD	American Shoulder and Elbow Surgeons (ASES)	Agree	Agree	Agree	Agree
7	Mark Ellen, MD, FABPMR, CAQ-SM	American Academy of Physical Medicine and Rehabilitation (AAPMR)	Strongly Agree	Strongly Agree	Disagree	Strongly Agree

Table 6. Reviewer Responses to Structured Review Questions 5-8

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	5. Given the nature of the topic and the data, all clinically important outcomes are considered.	6. The patients to whom this guideline is meant to apply are specifically described.	7. The criteria used to select articles for inclusion are appropriate.	8. The reasons why some studies were excluded are clearly described.
1	Mathew Failla, PT, PhD	American Physical Therapy Association (APTA)	Strongly Agree	Strongly Agree	Agree	Agree
2	Karen Chen, MD	American College of Radiology (ACR)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
3	Eric Steifel, MD	Arthroscopy Association of North America (AANA)	Strongly Agree	Strongly Agree	Agree	Agree
4	Joesph Kostuch, PT, SCS	American Society of Shoulder and Elbow Therapist (ASSET)	Agree	Strongly Agree	Strongly Agree	Strongly Agree
5	Saurabh Mehta, PT, MSc, PhD	American Physical Therapy Association (APTA)	Agree	Strongly Agree	Neutral	Strongly Agree
6	Joaquin Sanchez-Sotelo, MD, PhD	American Shoulder and Elbow Surgeons (ASES)	Agree	Agree	Agree	Agree
7	Mark Ellen, MD, FABPMR, CAQ-SM	American Academy of Physical Medicine and Rehabilitation (AAPMR)	Strongly Agree	Agree	Strongly Agree	Strongly Agree

Table 7. Reviewer Responses to Structured Review Questions 9-12

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	9. All important studies that met the article inclusion criteria are included.	10. The validity of the studies is appropriately appraised.	11. The methods are described in such a way as to be reproducible.	12. The statistical methods are appropriate to the material and the objectives of this guideline.
1	Mathew Failla, PT, PhD	American Physical Therapy Association (APTA)	Strongly Agree	Strongly Agree	Agree	Strongly Agree
2	Karen Chen, MD	American College of Radiology (ACR)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
3	Eric Steifel, MD	Arthroscopy Association of North America (AANA)	Agree	Strongly Agree	Strongly Agree	Agree
4	Joesph Kostuch, PT, SCS	American Society of Shoulder and Elbow Therapist (ASSET)	Strongly Agree	Agree	Strongly Agree	Strongly Agree
5	Saurabh Mehta, PT, MSc, PhD	American Physical Therapy Association (APTA)	Neutral	Neutral	Agree	Agree
6	Joaquin Sanchez-Sotelo, MD, PhD	American Shoulder and Elbow Surgeons (ASES)	Neutral	Agree	Agree	Agree
7	Mark Ellen, MD, FABPMR, CAQ-SM	American Academy of Physical Medicine and Rehabilitation (AAPMR)	Agree		Strongly Agree	Strongly Agree

Table 8. Reviewer Responses to Structured Review Questions 13-16

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	13. Important parameters (e.g., setting, study population, study design) that could affect study results are systematically addressed.	14. Health benefits, side effects, and risks are adequately addressed.	15. The writing style is appropriate for health care professionals.	16. The grades assigned to each recommendation are appropriate.
1	Mathew Failla, PT, PhD	American Physical Therapy Association (APTA)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
2	Karen Chen, MD	American College of Radiology (ACR)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
3	Eric Steifel, MD	Arthroscopy Association of North America (AANA)	Agree	Strongly Agree	Strongly Agree	Neutral
4	Joesph Kostuch, PT, SCS	American Society of Shoulder and Elbow Therapist (ASSET)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
5	Saurabh Mehta, PT, MSc, PhD	American Physical Therapy Association (APTA)	Strongly Agree	Strongly Agree	Agree	Agree
6	Joaquin Sanchez-Sotelo, MD, PhD	American Shoulder and Elbow Surgeons (ASES)	Agree	Agree	Agree	Neutral
7	Mark Ellen, MD, FABPMR, CAQ-SM	American Academy of Physical Medicine and Rehabilitation (AAPMR)	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree

Reviewers' Recommendation for Use of this Guideline in Clinical Practice

Would you recommend these guidelines for use in clinical practice?

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Would you recommend these guidelines for use in clinical practice? (Required)	Additional Comments regarding this CPG?
1	Mathew Failla, PT, PhD	American Physical Therapy Association (APTA)	Strongly Recommend	
2	Karen Chen, MD	American College of Radiology (ACR)	Strongly Recommend	
3	Eric Steifel, MD	Arthroscopy Association of North America (AANA)		
4	Joesph Kostuch, PT, SCS	American Society of Shoulder and Elbow Therapist (ASSET)	Strongly Recommend	
5	Saurabh Mehta, PT, MSc, PhD	American Physical Therapy Association (APTA)	Strongly Recommend	
6	Joaquin Sanchez-Sotelo, MD, PhD	American Shoulder and Elbow Surgeons (ASES)	Recommend	
7	Mark Ellen, MD, FABPMR, CAQ-SM	American Academy of Physical Medicine and Rehabilitation (AAPMR)		

Reviewer Detailed Responses

Reviewer #1, Matthew Failla, PT, PhD

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
1	Mathew Failla, PT, PhD	American Physical Therapy Association (APTA)	A. It is not clearly defined in the methods how "high, moderate, or low" quality was determined which contribute to the strength of evidence recommendations. Once the reader gets to the appendices I can figure it out but it is not explicitly stated. B. With respect to the pre-operative and post-operative physical therapy recommendations: The spirit of the main recommendations are accurate, there is a dearth of high quality evidence to directly support physical therapy for improving outcomes in glenohumeral osteoarthritis. There is, however, plenty of moderate to low level evidence that physical therapy is effective at improving range of motion, strength, and function in patients with other shoulder conditions where stiffness, weakness, pain, and/or dysfunction are prevalent. Therefore, I believe the opinion in the consensus recommendation can be a bit stronger. C. Specifically: Line 1351: " In the absence of reliable evidence" consider changing "may" to "should" D. In other recommendations, such as radiographs (line 1597), the term "should" is used when there is a lack of direct evidence but there is a likelihood that outcomes can be impacted based on other evidence (imaging has not been shown to directly improve outcomes but it can improve accuracy which is plausible to have an effect on outcomes). I believe the physical therapy recommendation can fall under this same umbrella of plausibility. E. As currently written, it would appear to the reader that Physical Therapy has the same recommendation as the ones made for alternative non-surgical treatments(line 1413) which I think is a bit misleading in terms of the overall body of literature and plausibility of impacting outcomes. Thank you for the opportunity to review this well written and well-planned clinical practice guideline

Workgroup Response to Reviewer #1

Dear Matthew Failla, PT, PhD

Thank you for your expert review of the Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline. We will address your comments by guideline section in the order that you listed them.

A. Please see full AAOS CPG Development methodology at www.aaos.org/quality/research-resources.

B. The scope of this clinical practice guideline was restricted to patients with a diagnosis of glenohumeral joint osteoarthritis.

C. AAOS consensus statements are created using the expert opinion of the work group without supporting evidence. The verbiage of the recommendation was developed and approved by the authors based on their expert opinion.

D. No response or edit. This is just a supportive statement of the line 1351 proposed edit.

E. No response or edit. This is just a supportive statement of the line 1351 proposed edit.

Reviewer #2, Karen Chen, MD

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
2	Karen Chen, MD	American College of Radiology (ACR)	A. On the whole, the guidelines are very well written and organized. There are a few typographical error associated with PROGNOSTIC FACTORS (COMORBIDITIES). Please check line 828 for spelling "comorbidities" B. line 842 change "was" to "were" C. In the TOTAL SHOULDER ARTHROPLASTY section: line 884 change "con version tot total" to "conversion to total."

Workgroup Response to Reviewer #2

Dear Karen Chen, MD,

Thank you for your expert review of the Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline. We will address your comments by guideline section in the order that you listed them.

A. Thank you, this typo has been corrected.

B. Thank you. This correction has been made.

C. Thank you. This typo has been corrected.

Reviewer #3, Eric Stiefel, MD

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
3	Eric Stiefel, MD	Arthroscopy Association of North America (AANA)	A. According to the "Description Of Evidence Quality" , "for a measure to meet the threshold for a "strong" recommendation, it must include "evidence from two or more high quality studies with consistent findings recommending for or against the intervention". It is my interpretation that the intent of this "strong" descriptive statement is that there exist two or more studies (level 1), in which the consensus of study group was in agreement with the primary findings and conclusion of the articles. It appears the findings of the authors from these studies was "for", but the findings from the review committee was "against". As a reader, these findings are not "consistent" as stated in the above description. For the orthopedic surgeon looking to apply "Strong" guideline to clinical practice, one would expect a measure of consistency between the findings cited in the article and the opinions of the review committee. I would assume the articles authors, and perhaps other readers might disagree with the statement "strong evidence for no benefit" upon detailed review of these two articles. May consider using the statement "strong evidence for limited benefit or short term" benefit and consider downgrade of the recommendation to moderate, given the cited shortcomings in the articles statistical methodology. I think that is important for readership to understand that the articles included did not conclude "no benefit", but that the committee did not feel the statistical methodology, crossover, or bias of the study meet the threshold for a "strong recommendation for routine use of HA". By stating "strong recommendation for no benefit", I was expecting to review two articles written strongly against the use of HA injections for the shoulder, surprised when this was not the case. It appears that the authors of these studies concluded that there was a statistically significant benefit in pain relief for shoulders with GHJ OA, but that the auditing statisticians and reviewers did not agree with this conclusion. My concerns regarding the disagreement between that authors conclusions and the reviewers occurred only in the first recommendation. Otherwise, I was in agreement with the conclusions reached by the committee members regarding other items. In general, well done!

Workgroup Response to Reviewer #3

Dear Eric Stiefel, MD,

Thank you for your expert review of the Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline. We will address your comments by guideline section in the order that you listed them.

A. The Blaine study's primary outcome was reported as at 13 weeks; there was no data available for the OA sub population at 13 weeks and the other timepoints cannot be used as evidence as they were not indicated as primary outcomes. Furthermore, the other high-quality studies showed no significant difference between groups; accordingly, the moderate quality evidence would not be considered when making the recommendation

Reviewer #4, Joseph Kostuch, PT, SCS

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
4	Joesph Kostuch, PT, SCS	American Society of Shoulder and Elbow Therapist (ASSET)	A. PRE-OPERATIVE PHYSICAL THERAPY RATIONALE: Keep lines 1307-1319 same. Suggested Edits - Line 1320-1323. The workgroup discussed that young patients with GJO who are poor candidates for arthroplasty due to concerns for implant survivorship along with older patients who are not surgical candidates due to medical co-morbidities may benefit most from physical therapy. Additionally, patients who demonstrate early signs of GJO, but have not yet progressed to the point of an arthroplasty recommendation, may benefit from physical therapy to aid in optimizing mobility, improving function and minimizing pain. B. BENEFITS AND HARMS: Suggested Edits - Line 1330-1333: Physical therapy may be beneficial for GJO shoulder patients to help improve mobility and strength. Patients should also realize improved function and decreased pain provided the therapy is delivered in a manner which meets the patient's level of both disease process and overall physical ability; overzealous therapy may result in increased pain. These benefits may be appreciated over a longer course of care and should focused on early stage GJO along with non-operative candidates for arthroplasty. C. COST EFFECTIVENESS/RESOURCE UTILIZATION: Line 1336-1338: Therapy services do pose an expense to both third party payers along with patients for deductibles/co-payments therefore the progressive nature of the GJO process should be considered by the treating therapist when developing a treatment plan for the non-operative patient. Due to third party-imposed therapy visit limits, arthroplasty candidates who are considering surgery should be evaluated and transitioned quickly to a home program in order to maximize their therapy benefits for post-operative physical therapy needs. D. POST-OPERATVE PHYSICAL THERAPY RATIONALE: Suggested Edits - Lines 1356-1361 Physical therapy following shoulder arthroplasty has been a common recommendation, however there are no high-quality studies addressing the delivery of this care. A systematic review by Bullock, et al demonstrated that there is significant diversity in post-surgical rehabilitation programs, specifically regarding when exercises are initiated, the amount of allowed shoulder motion, the timing and extent of resisted exercise, and short- and long-term precautions. In their opinion "Rehabilitation

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
			following TSA and rTSA is important for patients to have the best possible outcomes with minimal complications." (Bullock, et al). One level III study (Mulieri, et al) found no difference in outcome between formal physical therapy and a physician directed home program. However, the rehabilitation program was drastically different between the two groups and compliance with either program was not measured. E. Lines 1364-5 STRENGTH OF EVIDENCE: No reliable evidence F. Lines 1365 – Suggested NEW edits: BENEFITS AND HARMS: Physical therapy may be beneficial for post-arthroplasty shoulder patients to help maximize their mobility and strength. Patients should also realize improved function and decreased pain with their program. During this recovery, therapists must exhibit care in protecting the surgically reconstructed soft tissue along with any concomitant boney procedures performed. Additionally, the therapy must be delivered in a manner which meets the patient's level of overall physical ability while respecting any specific limitations created by the arthroplasty. These benefits will be appreciated over a post-operative period of varying timeframes due to pre-op condition, procedure performed and environmental aspects which may affect their recovery. G. COST EFFECTIVENESS/RESOURCE UTILIZATION: Post-operative therapy services do pose an expense to both third party payers along with patients for deductibles/co-payments therefore the expected healing timeframes and exercises introduced during these stages of recovery should be considered by the treating therapist when developing a treatment plan. Due to third party-imposed therapy visit limits, post-arthroplasty patients should be managed in a manner which combines necessary therapist clinic-based manual skills in combination with specific home program instruction. This will allow the patient to maximize their therapy benefits throughout the entire length of rehab and help ensure a full recovery and return to function. H. FUTURE RESEARCH: Future studies should evaluate the effect of clinic based physical therapy on outcomes following shoulder arthroplasty. These should include a comparison of post-arthroplasty exercise protocols (timing/selection of specific exercises along with value of therapist performed manual therapy), volume and timing of physical therapy visits

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
			along with the value of clinic based physical therapy vs. physician exercise instructed home based program. I. Additional References: 1.Bullock, J.S., Garrigues, G.E., Kennedy, J., Ledbetter, L., A systematic review of proposed rehabilitation guidelines following anatomic and reverse shoulder arthroplasty. J Orthopedic and Sports Physical Therapy. 2019; 49: 337-346.

Workgroup Response to Reviewer #4

Dear Joseph Kostuch, PT, SCS,

Thank you for your expert review of the Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline. We will address your comments by guideline section in the order that you listed them.

A. AAOS consensus statements are created using the expert opinion of the work group without supporting evidence and represent the approved upon consensus of the group.

Reviewer #5, Saurabh Mehta, PT, MSc, PhD

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
5	Saurabh Mehta, PT, MSc, PhD	American Physical Therapy Association (APTA)	Thank you for this opportunity to review the practice guidelines and recommendations for managing patients with osteoarthritis of glenohumeral joint. Broadly, my opinion is that the recommendations have been written well for the intended readership which will hopefully enhance its uptake and integration in clinical practice. I have some questions and concerns after reading this draft. They stem from lack of clarity regarding some methodological aspects, limited and selective consideration of the evidence in some recommendations versus considering totality of evidence before making recommendations, and lastly some typing errors in the draft. Below I have provided detailed description of these concerns. General Comments: A. Who performed the review of abstracts for determining eligibility? B. Was the process of full text review of 896 articles completed by two independent reviewers consistent with systematic review methodology? C. If two reviewers independently reviewed the 896 articles, was the agreement between reviewers in selecting 69 articles that were used in formulating these guidelines was assessed? D. Similarly, was the quality of the studies included in the guidelines examined by two reviewers? E. While reviewing the published literature and developing the recommendations for different interventions, did the guideline developers consider the chronicity of the OA or duration of symptoms and how treatment effect may be influenced by that? F. Specific comments: The flowchart on page 23 has incorrect date for literature search (should be June 7, 2019) G. Page 24 - guideline for hyaluronic acid suggests that the studies conducted by DiGiacomo et al were of poor quality. However, DiGiacomo 2017 is

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
			classified as high quality and DiGiacomo 2015 is classified as moderate quality. Suggest correcting this inconsistency. Also, the rationale indicates that the treatment did not meet its primary endpoint as there was no difference in pain scores at 13 weeks. However, when I see the table 6 in e-Appendix 2, I get the impression that at 17 weeks and at 6 - months, patients reported statistically greater pain relief in night pain as well as mean overall pain. Can the authors clarify? H. Page 26 (Prognostic factors - sex) - authors use terms sex and gender interchangeably. If discussing about men and women, they need to be consistent and use sex versus gender. I. Page 28 - (Prognostic factors - comorbidities) - authors have synthesized the evidence from two high quality studies: Bernstein 2017 and Chalmers 2014. However, the rationale does not appear to comprehensively reflect the results shown in Table 35. According to the table, Bernstein 2017 showed that ONLY having hypertension controlled by meds is associated with unplanned readmission and having other pathologies such as diabetes, kidney dysfunction, or those with poor composite scores on ASA physical status were not at risk of poor outcomes. SO, having medically controlled hypertension is the only comorbid condition that is associated with higher risk of unplanned readmission. Authors need to revise their recommendation and rationale to reflect consistency with the literature. J. Page 33 - recommendation is that older age is associated with lower revision rates. If the revision rate was the only outcome authors are looking to provide recommendation for, the current write-up is fine (except a typo in the table, more on that below). However, if authors want to discuss comprehensive set of outcomes and whether old age is associated with them or not, they should be mentioning that the function outcomes (Robinson et al; Rispoli et al) were not associated with age. K. About typo, summary of findings tables have awkward spelling for Odquist et al.

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
			L. Page 34 - recommendation is that smoking is associated with inferior post-surgical outcomes. The high-quality study (Bernstein et al) suggested that smokers had no better/worse outcomes for unplanned readmission. Authors need to at least mention that in the rationale. This is because authors seem to have selectively picked the outcome they want to discuss here (i.e. pain) and avoided talking about readmission but in the examples for other prognostic variables (comorbid conditions - readmission; age - revision rates), they have chosen to acid discussion on pain. M. Page 39 - recommendation is that surgeons can utilize subscapularis peel, lesser tuberosity osteotomy, or tenotomy when performing shoulder arthroplasty. The authors need to cite/name the specific studies when they suggest that "One high quality study and 2 lower quality studies resulted in no clinically significant…….". There are actually 2 high quality studies, albeit from the same author, so it is difficult to determine which study was integrated in this recommendation. N. Page 44 - recommendation is that it is the opinion of the work group that clinicians may prescribe physical therapy in patients following shoulder arthroplasty. Authors have provided a very reflective discussion on benefits and harms as well as cost effectiveness/resource utilization for pre-operative PT on page 42. Can authors provide similar reflection on Page 44, especially for Benefit and Harms? Also, authors frequently target recommendation (for this particular recommendation and many others such as non-prosthetic surgical options), to "young patients". Do they have any specific age that they would recommend consider being young for having Glenohumeral OA? This will help the readers understand the context in which they should apply these recommendations.

Workgroup Response to Reviewer #5

Dear Saurabh Mehta, PT, MSc, PhD,

Thank you for your expert review of the Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline. We will address your comments by guideline section in the order that you listed them.

A. Please see full AAOS CPG Development methodology at www.aaos.org/quality/research-resources.

B. Evidence is reviewed by AAOS staff methodologists, please see full AAOS CPG development methodology at www.aaos.org/quality/research-resources.

C. Evidence is reviewed by AAOS staff methodologists, please see full AAOS CPG development methodology at www.aaos.org/quality/research-resources

D. Evidence is reviewed by AAOS staff methodologists, please see full AAOS CPG development methodology at www.aaos.org/quality/research-resources.

E. Please see full AAOS CPG Development methodology at www.aaos.org/quality/research-resources.

F. Thank you. The date has been corrected to 2019.

G. The primary outcome as reported by the study was 13 weeks, at which point there was no data available for the OA subgroups; no other data was usable for the OA groups as they were outside the primary timepoint; the work group focused on the primary outcome. Three high quality studies were found in support of the recommendation as written; the DiGiacomo study was of lesser quality and therefore not considered. The reference has been amended to read 'lesser quality' as the study is not of poor quality. In regards to the 17 week and 6 mos. being significant, that is true but the study reported that their primary timepoint of interest was 13 weeks, in which they found no sig. dif. between groups (week 13 results were only reported for total population and not the OA population specifically; as the only OA data was reported for the non-primary end date, we cannot use the other data as evidence, and mod quality study removed).

H. Thank you. This correction has been made.

I. The PICO question was defined as evaluating combined comorbidities, so all studies were taken in conjunction with one another. As the Shairer study states that more comorbidities are associated with complications, the other studies showing what individual risk factors result in worse outcomes can be used to further support that statement.

J. The sole outcome reviewed and addressed in this recommendation was revision rate.

K. Thank you. This typo has been addressed.

L. Per AAOS CPG development methodology, if there is not a minimum of 2 high quality studies in agreement, we must include the studies of a lower quality. For this recommendation, all studies included are considered in conjunction with one another. The work group chose to highlight all significant outcomes within the rationale.

M. Thank you. This item has been corrected.

N. AAOS consensus statements are created using the expert opinion of the work group without supporting evidence. The Evidence to Decision Framework sections (e.g. cost effectiveness/resource utilization and Benefits and Harms) are completed at the discretion of the work group; the work group elected to omit these sections for the referenced consensus statement. For the "young patients" comment: Response only, no edits. The PICO question did not contain age cutoffs and included all patients. The available literature did not supply strict cutoffs to define young patients and the work group utilized the terminology found in the evidence.

Reviewer #6, Joaquin Sanchez-Solelo, MD, PhD

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
6	Joaquin Sanchez-Sotelo, MD, PhD	American Shoulder and Elbow Surgeons (ASES)	AAOS Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline ASES Review: Joaquin Sanchez-Sotelo MD PhD A. Line 197 – 201 Suggestion: "In some studies, pegged components are associated with less radiolucent lines…" B. Line 231 Suggestion "Moderate evidence supports that surgeons not use anatomic metal-backed cementless glenoid components until new designs are proven to provide adequate safety and efficacy." C. Line 235 – 241, wondering if evidence should be considered Strong since there is one more high quality study published: (Levine WN, Munoz J, Hsu S, Byram IR, Bigliani LU, Ahmad CS, Kongmalai P, Shillingford JN. Subscapularis tenotomy versus lesser tuberosity osteotomy during total shoulder arthroplasty for primary osteoarthritis: a prospective, randomized controlled trial. J Shoulder Elbow Surg. 2019 Mar;28(3):407-414. doi: 10.1016/j.jse.2018.11.057. PMID: 30771825) D. Line 288 Suggestion: "…may or may not provide certain short-term…) E. Line 300, Suggestion: I would remove "… and a well-functioning rotator cuff…", since cuff function has nothing to do with humeral component fixation. F. Lines 302 – 306, should read "In the absence of reliable evidence, it is the opinion of the workgroup that clinicians may use either anatomic total shoulder arthroplasty (TSA) or reverse total shoulder arthroplasty (RTSA) for the treatment of glenohumeral joint osteoarthritis depending on glenoid morphology and bone loss, the condition of the rotator cuff, and the presence of absence of soft-tissue imbalance."

Workgroup Response to Reviewer #6

Dear Joaquin Sanchez- Sotelo, MD, PhD,

Thank you for your expert review of the Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline. We will address your comments by guideline section in the order that you listed them.

A. The full recommendation and rationale found on page 31 provides full details regarding the studies used to support the recommendation.

B. The full recommendation and rationale found on page 37 includes a Future Research section in which the authors highlighted the need for future studies to develop and design new glenoid implants if metal backed cementless implant concept is to be pursued.

C. The study referenced was included in the recommendation on total shoulder arthroplasty - subscapularis peel, lesser tuberosity osteotomy, tenotomy. A secondary search was performed on June 10, 2019 that captured this study.

D. AAOS consensus statements are created using the expert opinion of the work group without supporting evidence. The verbiage of the recommendation was developed and approved by the authors based on their expert opinion.

E. AAOS consensus statements are created using the expert opinion of the work group without supporting evidence. The verbiage of the recommendation was developed and approved by the authors based on their expert opinion.

F. The consensus statements are not based on evidence, therefore the verbiage of the recommendation is at the discretion of the work group.

Reviewer #7, Mark Ellen, MD, FABPMR, CAQ-SM

Reviewer #	Name of Reviewer (Required)	What is the name of the society that you are representing?	Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:
7	Mark Ellen, MD, FABPMR, CAQ-SM	American Academy of Physical Medicine and Rehabilitation (AAPMR)	I think this was a well thought out CPG although only 69 references could be utilized for the entire effort. It shows that there is still much more work to be done. A. I would like to see Physiatrists (specifically) included in the target audience as many of our specialty see significant populations of patients with GH OA. (now listed as other) B. I understand the rational for consensus regarding PT for pre-op or non-op rx but, i think it need to be clearly documented that only the group that underwent multimodal treatment noted any benefit and the pure PT group did not. C. I would be much more hesitant acknowledging Dr. Frankels book chapter on home PT which appears to be pure opinion and conjecture and would recommend to omit this statement in its entirety. Overall, it appears as a well thought out document

Workgroup Response to Reviewer #7

Dear Mark Ellen, MD, FABPMR, CAQ-SM,

Thank you for your expert review of the Management of Glenohumeral Joint Osteoarthritis Evidence-Based Clinical Practice Guideline. We will address your comments by guideline section in the order that you listed them.

A. Other will be changed to “Intended Users”.

B. The rationale found on page 42 states that physical therapy alone was not effective at 3 months and a multi-modal treatment approach was added.

C. AAOS consensus statements are created using the expert opinion of the work group without supporting evidence. The work group augmented their expert opinion with the work of Dr. Frankels.

Appendix A – Structured Review Form

Review Questions (REQUIRED)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The overall objective(s) of the guideline is (are) specifically described.	○	○	○	○	○
2. The health question(s) covered by the guideline is (are) specifically described.	○	○	○	○	○
3. The guideline's target audience is clearly described.	○	○	○	○	○
4. There is an explicit link between the recommendations and the supporting evidence.	○	○	○	○	○
5. Given the nature of the topic and the data, all clinically important outcomes are considered.	○	○	○	○	○
6. The patients to whom this guideline is meant to apply are specifically described.	○	○	○	○	○
7. The criteria used to select articles for inclusion are appropriate.	○	○	○	○	○
8. The reasons why some studies were excluded are clearly described.	○	○	○	○	○
9. All important studies that met the article inclusion criteria are included.	○	○	○	○	○
10. The validity of the studies is appropriately appraised.	○	○	○	○	○
11. The methods are described in such a way as to be reproducible.	○	○	○	○	○
12. The statistical methods are appropriate to the material and the objectives of this guideline.	○	○	○	○	○
13. Important parameters (e.g., setting, study population, study design) that could affect study results are systematically addressed.	○	○	○	○	○
14. Health benefits, side effects, and risks are adequately addressed.	○	○	○	○	○
15. The writing style is appropriate for health care professionals.	○	○	○	○	○
16. The grades assigned to each recommendation are appropriate.	○	○	○	○	○

Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline:

Would you recommend these guidelines for use in clinical practice? (REQUIRED)

- ○ Strongly Recommend
- ○ Recommend
- ○ Would Not Recommend
- ○ Unsure

Additional Comments regarding this clinical practice guideline?