AMERICAN COLLEGE of RHEUMATOLOGY
Empowering Rheumatology Professionals

American College of Rheumatology (ACR) and American Association of Hip and Knee Surgeons (AAHKS) Guideline: Indications for Total Hip and Knee Replacement

Project Plan – Updated October 2021

PARTICIPANTS

Core Oversight Team
Susan M. Goodman, MD *(ACR Principal Investigator)*
Matthew S. Austin, MD *(AAHKS Co-principal Investigator)*
Adolph Yates, Jr., MD, FAAOS, FAOA *(AAHKS Co-principal Investigator)*
Jasvinder Singh, MD, MPH *(ACR Literature Review Leader)*
Charles P. Hannon, MD, MBA *(AAHKS Literature Review Leader)*
Gordon Guyatt, MD *(GRADE Expert)*

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Jesse Wolfstadt, MD, MSc, FRCSC

Patient Panel
TBD

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Cindy Force
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ORGANIZATIONAL LEADERSHIP AND SUPPORT

This is a collaborative project of the American College of Rheumatology (ACR) and the American Association of Hip and Knee Surgeons (AAHKS). The group includes rheumatologists, orthopedic surgeons, patients, and methodologists, supported by ACR and AAHKS staff.

BACKGROUND While hip and knee arthroplasty performed for symptomatic osteoarthritis or osteonecrosis are two of the most common surgeries performed in the United States, with excellent overall outcomes, there is wide variability in risk and outcomes associated with factors such as co-morbidities, age, BMI, operative joint anatomy or deformity, as well as in access to and timing of surgery. There are no evidence-based indications for the two procedures that consider the impact of these clinically important factors. Existing Clinical Practice Guidelines (CPGs) using surgical appropriateness criteria are based on the current state of the scientific literature and provide evidence-supported, consensus-driven best practices for operative and non-operative treatment of arthritis of the hip and knee and may predict optimal outcomes (1). They are designed for the use of medical professionals caring for patients with the knowledge that there are significant gaps in the literature regarding both non-operative and operative care of the arthritic patient. These CPGs focus on the general diagnosis of osteoarthritis and prompt a dichotomous choice of non-operative versus operative options, and do not offer guidance on when non-operative interventions lose efficacy and arthroplasty is indicated. While presentation for arthroplasty with severe pain and advanced loss of function may lead to worse outcomes, and threshold values for pain and function for optimal TKA outcomes have been described, it is not known if delay for interventions such as physical therapy or weight reduction improve outcomes. Opinions differ on if and when hip or knee arthroplasty should be performed in patients with certain medical comorbidities (e.g., diabetes mellitus, nicotine use) or certain patient characteristics such as obesity (2). Only 9% of a cohort of 3417 knees deemed appropriate for surgery using validated TKA appropriateness criteria who were followed for up to 8 years underwent a “timely TKA” (defined as within 2 years of meeting appropriateness criteria). In this cohort, 91% were considered potentially appropriate and not replaced, and 26.4% may have been replaced prematurely (3). While the majority of patients who were likely appropriate candidates for surgery did not undergo surgery, there is limited evidence on the effectiveness of nonoperative treatment options such as physical therapy in these patients with end-stage osteoarthritis or of the impact of surgical delay to perform non-operative therapies. Evidence-based guidelines to guide indications and timing for total hip or knee arthroplasty do not exist. The risks and benefits of surgical delay in patients considered appropriate for arthroplasty is not known. The purpose of this CPG project is to develop evidence-based consensus recommendations for common clinical situations encountered in people with advanced symptomatic osteoarthritis or osteonecrosis of the knee or the hip and include consideration of those factors that are known to increase operative risk or change outcome.

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For the purposes of this clinical practice guideline, our defined population is patients who have been indicated for arthroplasty through a shared decision-making process with their physician and/or surgeon and have completed trials of appropriate conservative therapy such as physical therapy, NSAIDs, and/or intra-articular glucocorticoid injections. Our defined population has radiographically moderate to advanced osteoarthritis of the hip or knee and moderate to severe pain or loss of function. Moderate to severe pain or loss of function may be measured on a validated patient reported outcome scale (e.g., HOOS, KOOS, VAS, or WOMAC) or by patients' reported symptoms such as walking limited to less than two blocks or night pain. Radiographic severity may be measured by validated grading systems such as Kellgren-Lawrence or Tonnis.

OBJECTIVES

The objective of this project is to develop a clinical practice guideline that includes evidence-based consensus recommendations regarding indications for total hip and knee replacement versus conservative treatments in patients with moderate to severe osteoarthritis or osteonecrosis of the hip or knee.

Specifically, we aim to:

1. Define the indications for*, and efficacy o*f*, continuing* conservative treatment or proceeding to arthroplasty in patients with moderate to severe osteoarthritis or osteonecrosis *that have developed moderate to severe symptoms and/or significant loss of function.*
2. Develop recommendations regarding the timing of hip or knee arthroplasty for patients with specific modifiable medical co-morbidities.

METHODS

Identification of Studies

Literature search strategies, based on PICO questions (Population/patients, Intervention, Comparator, and Outcomes; *see Appendix A and Appendix C*) were drafted by the Core Team and a research librarian. Searches were performed in OVID Medline (1946 +), Embase (1974 +), and PubMed (mid-1960s +).

The search strategies were developed using the controlled vocabulary or thesauri language for each database: Medical Subject Headings (MeSH) for OVID Medline and PubMed; and Emtree terms for Embase. Text words were also used in OVID Medline, PubMed, and Embase.

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Search Limits
Only English language articles will be retrieved.

Literature Search Update
Literature searches will be updated just before the voting panel meeting to ensure completeness.

Inclusion/Exclusion Criteria
Appendix A includes the project's PICO questions, which outline the defined patient population, interventions, comparators, and outcomes (also in *Appendix C*). *Appendix B* includes the list of inclusion/exclusion criteria.

Management of Studies and Data
References and abstracts have been imported into bibliographic management software (EndNote) (4), duplicates removed, and exported to Distiller SR, a web-based systematic review manager (5). Screening and data abstraction forms are being created in Distiller SR. Search results will be divided among reviewers, and two reviewers will screen each title/abstract, with disagreements at the title/abstract screening stage defaulting to inclusion for full manuscript review. Following the same dual review process, disagreements at the full manuscript screening stage will be discussed and adjudicated by the literature review leadership, if necessary.

Phases
1. A search for randomized controlled trials and observational studies has been performed to determine existing studies covering outcomes of interest.
2. Additionally, recently published systematic reviews covering outcomes of interest will also be sought and used for reference cross-checking.
3. Chosen studies will be quality-assessed using the Instrument to assess the Credibility of Effect Modification Analyses (6).
4. Subsequently, identified studies will be assessed using the RevMan (7) and GRADE Pro tools (8).

GRADE Methodology

GRADE methodology will be used in this project to grade available evidence and facilitate development of recommendations. The certainty in the evidence (also known as 'quality' of evidence) will be graded as high, moderate, low or very low. The recommendations will have a strength, strong or conditional, and a direction, as in favor or against the intervention. The strength of recommendations will not depend solely on the certainty in the evidence, but also on patient preferences and values, and the weight between benefits and harms. A series of articles that describe the GRADE methodology can be found on the GRADE working group's website: www.gradeworkinggroup.org.

Data Analysis and Synthesis

The literature review team will analyze and synthesize data from included studies that address the PICO questions. An evidence profile, including a GRADE Summary of Findings table, will be prepared for each PICO question using Review Manager (RevMan) (7) and GRADEprofiler (GRADEpro) software (8). The Summary of Findings table contains the benefits and harms for each outcome across studies, the assumed and corresponding risk for comparators and interventions (95% CI), the absolute risk and relative effect (95% CI), the number of participants/number of studies, and the certainty in the evidence for each critical and important outcome (i.e., high, moderate, low or very low).

The evidence profile documents the overall certainty in the evidence for each critical and important outcome across studies and summarizes the rationale of the GRADE criteria for downgrading (risk of bias, inconsistency, indirectness, imprecision, and publication bias), or upgrading the certainty in a body of evidence (large magnitude of effect, dose-response gradient, and all plausible confounding that would reduce a demonstrated effect).

Development of Recommendation Statements

PICO questions will be revised into drafted recommendation statements. Using the GRADE Evidence Profiles and Summaries of Findings tables, the voting panel, consisting of 5 rheumatologists, 5 orthopedic surgeons, and 2 patients who have undergone total joint replacement, will consider the drafted recommendation statements in two stages. The first assessment will be done individually, and the results will be anonymous; this vote will only be used to determine where consensus might or might not already exist and develop the voting panel meeting agenda. At the face-to-face voting panel meeting, chaired by the principal investigators, the panelists will discuss the evidence in the context of their clinical experience and expertise to arrive at consensus on the final recommendations. The voting panel meeting discussions will be supported by the literature review leader, the GRADE expert, and selected members of the literature review team, who will attend the meeting to provide details about the evidence, as requested. Voting panel discussions and decisions will also be informed by a separately convened patient panel, which will meet in the days before the voting panel meeting, to provide unique patient perspectives on the drafted recommendations based on their experiences and the available literature.

PLANNED APPENDICES (AT MINIMUM)

A. Final literature search strategies
B. Inclusion/Exclusion Criteria
C. GRADE evidence profiles and summary of findings tables for each PICO question

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AUTHORSHIP

Authorship of the guideline will include: ACR principal investigator, Dr. Susan Goodman, and AAHKS co-principal investigators, Drs. Adolph Yates and Matthew S. Austin, as lead authors; ACR literature review leader Dr. Jasvinder Singh; AAHKS literature review leader Dr. Charlie Hannon; and Dr. Gordon Guyatt, GRADE expert. Members of the voting panel and literature review team will also be authors. The PIs will determine final authorship, dependent on the efforts made by individuals throughout the guideline development process, using international authorship standards as guidance.

DISCLOSURES/CONFLICTS OF INTEREST

The ACR's disclosure and COI policies for guideline development will be followed for this project. These can be found in the ACR Guideline Manual on this page of the ACR web site, under Policies & Procedures. *See Appendix D for participant disclosures.*

REFERENCES

1. Riddle DL, Perera, RA, Jiranek WA, Dumenci L. Using surgical appropriateness criteria to examine outcomes of total knee arthroplasty in a United States sample. Arthritis Care Res 2015; Mar;67(3):349-57.
2. Judge A, Arden NK, Cooper C, Kassim Javaid M, Carr AJ, Field RE, Dieppe PA. Predictors of outcomes of total knee replacement surgery. Rheumatology (Oxford). 2012 Oct; 51(10):1804-13.
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7. Review Manager [software]. https://training.cochrane.org/online-learning/core-software-cochrane-reviews/revman
8. GRADEprofiler [software]. https://gradepro.org/

APPENDIX A – PICO Questions

DRAFT QUESTIONS FOR ACR/AAHKS HIP AND KNEE ARTHROPLASTY INDICATIONS WORKGROUP

1. In our defined population, what is the relative impact of a 3 month "waiting period" prior to arthroplasty versus no waiting period on patient reported outcomes including pain, function, infection, hospitalization, and death at one year?

All answers to the following questions assume the waiting period in #1 has been met and the patient meets our defined inclusion criteria listed above.

2. In our defined population, what is the relative impact of physical therapy versus arthroplasty at one year on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

3. In our defined population, what is the relative impact of NSAIDs versus arthroplasty in patient important outcomes including pain, function, infection, hospitalization, and death at one year?

4. In our defined population, what is the relative impact of braces/ambulatory aides versus arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

5. In our defined population, what is the relative impact of corticosteroid injections versus arthroplasty at one year on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

6. In our defined population, what is the relative impact of viscosupplementation versus arthroplasty at one year on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

7. In our defined population with BMI between 35-39, what is the relative impact of delaying arthroplasty to achieve weight reduction to BMI <35 versus proceeding to arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

8. In our defined population with BMI between 40-49, what is the relative impact of delaying arthroplasty to achieve weight reduction to BMI <40 versus proceeding to arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

9. In our defined population with BMI between >50, what is the relative impact of delaying arthroplasty to achieve weight reduction to BMI <50 versus proceeding to arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

10. In our defined population with poorly controlled diabetes mellitus, what is the relative impact of delaying arthroplasty to improve glycemic control versus proceeding to arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

11. In our defined population with nicotine dependence, what is the relative impact of delaying arthroplasty for nicotine cessation versus proceeding to arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

12. In our defined population who have bone loss with deformity, or severe ligamentous instability, what is the relative impact of delaying arthroplasty for optimization of non-life-threatening conditions versus proceeding to arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

13. In our defined population who have a neuropathic joint, what is the relative impact of delaying arthroplasty for optimization of non-life-threatening conditions versus proceeding to arthroplasty at one year?

14. In our defined population with unicompartmental osteoarthritis, what is the impact of medical co-morbidities such as obesity or inflammatory arthritis or mechanical conditions such as instability or deformity on unicondylar versus total joint arthroplasty on patient important outcomes including pain, function, infection, hospitalization, and death at one year?

APPENDIX B – INCLUSION/EXCLUSION CRITERIA

The purpose of this clinical practice guideline is to provide evidence-based recommendations regarding indications for total joint arthroplasty and conservative treatments in patients with moderate to severe degenerative joint disease of the hip or knee.

For the purposes of this clinical practice guideline, our defined population is patients with radiographically moderate to advanced osteoarthritis of the hip or knee and moderate to severe pain or loss of function. Moderate to severe pain or loss of function may be measured on a validated patient reported outcome scale (e.g. HOOS, KOOS, VAS, or WOMAC) or by patients' reported symptoms such as walking limited to less than two blocks or night pain. Radiographic severity may be measured by validated grading systems such as Kellgren-Lawrence or Tonnis.

Below are the inclusion and exclusion criteria reviewers will consider when reviewing titles/abstracts and full manuscripts.

1. Study must have had a full journal publication; studies published only as meeting abstracts will be excluded.

2. Study must be an English language publication.

3. Study must include a population, intervention, comparison, and outcome specified in the protocol.

4. Population studied must include patients with moderate to severe degenerative joint disease of the hip or knee. If patients with both mild and moderate to severe degenerative joint disease are included in the study, data must be able to be extracted for only the subset of patients with moderate to severe degenerative joint disease.

5. The following study designs may be included:
    a. Randomized controlled trial

b. Controlled clinical trial
c. Prospective cohort study
d. Retrospective cohort study
e. Case-control study
f. Registry studies
g. Systematic review
    i. Systematic reviews will be included only to scan reference lists to capture relevant individual studies that may have been missed by the literature search.

6. Studies of the following designs should be excluded:
    a. Case series
    b. Case report
    c. Narrative review
    d. Editorials or commentaries
    e. Surveys
    f. Expert opinion
    g. Foreign language studies

7. Studies evaluating conservative treatment must have a minimum of 20 patients with moderate or severe degenerative joint disease.

8. Studies evaluating arthroplasty must have a minimum of 20 patients who underwent hip or knee arthroplasty.

APPENDIX C: OUTCOMES

1. Infection including peri- and post-operative
    - Deep surgical site infections within 30 days, within 90 days, within 1 year
    - Superficial surgical site infections within 30-90 days
    - Minor, non-surgical site infections within 30-90 days
    - Serious, non-surgical site infections such as pneumonia, bacteremia/sepsis within 30-90 days
    - Delayed wound healing within 30-90 days
2. Venous thromboembolic disease within 30-90 days
3. Acute cardiac/cardiovascular events within 30-90 days
4. Death within 30-90 days
5. Need for revision surgery within 5 years
6. Return to OR within 30-90 days
7. Readmission to the hospital within 30-90 days
8. Emergency department visits within 30-90 days
9. Admission to a higher level of care (ICU or CCU) during index hospital admission
10. Overall complication rates within 30-90 days
11. Length of hospital stay
12. Discharge to long-term care facility up to 3 weeks post-op and the duration of long-term facility use
13. Arthroplasty patient-reported outcomes up to 5 years

- Pain
- Function
- Quality of life scores
- Work/at-home productivity
- Social participation, and
- Patient satisfaction

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APPENDIX D: DISCLOSURES

Participant Disclosures - American College of Rheumatology (ACR) and American Association of Hip and Knee Surgeons (AAHKS) Guideline: Indications for Total Hip and Knee Replacement

In order for the College to most effectively further its mission and to otherwise maintain its excellent reputation in the medical community and with the public, it is important that confidence in the College's integrity be maintained. The cornerstone of the ACR's Disclosure Policy is disclosure of actual and potential conflicts so that they can be evaluated by the College in order to avoid undue influence of potential conflicts. The purpose of the ACR's Disclosure Policy is identification of relationships which may pose actual or potential conflicts. These actual or potential conflicts can then be evaluated by the College so that adjustments can be made that will avoid any undue influence. This policy is based on the principle that, in many cases, full disclosure of the actual or potentially conflicting relationship will of itself suffice to protect the integrity of the College and its interests.

Participants	Role	Primary Employer	Interest Held By	Interest Type	Entity/Licensee	Additional Information	Value
Susan M. Goodman	Core Team - ACR Co-PI	Hospital for Special Surgery	Self	Independent Contractor - Data and Safety Monitoring	UCB Biosciences Inc.		$5,000.00
			Self	Grant/Contract	Novartis		$601,771.00
Matthew S. Austin	Core Team - AAHKS Co-PI	Rothman Orthopaedic Specialty Hospital	Self	Intellectual Property - Other Intellectual Property			
			Self	Intellectual Property - Patent			
			Self	Stock	Corin Group		$200,000.00
Adolph Yates, Jr.	Core Team - AAHKS Co-PI	University of Pittsburgh Medical Center		NA		Nothing to disclose	
Jasvinder Singh	Core Team - ACR Literature Review Leader	University of Alabama at Birmingham	Self	Stock	TPT Global Tech		$440.00
			Self	Independent Contractor - Consultant	Trio Health		
			Self	Independent Contractor - Consultant	Putnam Associates		
			Self	Stock	Moderna		$8,300.00

	Spouse/ Partner	Stock	Amarin Pharma Inc.		$1,997.00
	Self	Stock	Charlotte's Web Holdings		$2,375.00
	Self	Independent Contractor - Consultant	Simply Speaking		$10,650.00
	Self	Independent Contractor - Consultant	WebMD		
	Self	Independent Contractor - Consultant	Jupiter Life Science		
	Self	Independent Contractor - FDA Arthritis Advisory Committee Committee member	U.S. FDA		
	Self	Stock	Vaxart		$1,900.00
	Self	Independent Contractor - Consultant	Clearview Healthcare Partners		
	Self	Independent Contractor - Consultant	Spherix		
	Self	Independent Contractor - Consultant	UBM, LLC		
	Self	Independent Contractor - Consultant	Two Labs Inc.		
	Self	Independent Contractor - committee chair	Veterans Affairs Rheumatology Field Advisory Committee	No compensation	
	Self	Independent Contractor - Steering Committee Member	OMERACT		
	Self	Independent Contractor - Consultant	Focus Forward		
	Self	Independent Contractor - Consultant	Adept Field Solutions		
	Self	Independent Contractor - editor and the Director of the center	University of Alabama at Birmingham (UAB) Cochrane Musculoskeletal Group	No compensation received for this position.	

			Self	Independent Contractor - Editorial Board Member	JCR: Journal of Clinical Rheumatology	
			Self	Independent Contractor - Consultant	Horizon Orphan LLC	
			Self	Independent Contractor - Consultant	Health Advances	
			Self	Independent Contractor - Editorial Board Member	BMC Medicine	
			Self	Independent Contractor - Consultant	Foundation for the National Institutes of Health	
			Self	Independent Contractor - Consultant	Krog Partners	
			Self	Independent Contractor - Consultant	MedIQ	$2,625.00
			Self	Independent Contractor - Consultant	PK Med	
			Self	Independent Contractor - Consultant	Medscape	
			Self	Independent Contractor - Consultant	Clinical Care Options	
			Self	Independent Contractor - Consultant	Fidia Pharma USA Inc.	
			Self	Independent Contractor - Rheumatology Field Advisory Committee member, now Chair	Veterans Affairs Rheumatology Field Advisory Committee	
			Self	Independent Contractor - Consultant	Medisys	
			Self	Stock	Viking Pharmaceuticals	$2,600.00
			Self	Independent Contractor - Consultant	Navigant Consulting	
			Self	Independent Contractor - Consultant	The American College of Rheumatology	
Charles P. Hannon	Core Team - AAHKS Literature Review Leader	Rush University Medical Center	Self	Independent Contractor - Committee Member	American Association of Hip and Knee Surgeons	

			Self	Independent Contractor - Health Policy Fellow	American Association of Hip and Knee Surgeons	
			Self	Independent Contractor - Investigator	American Association of Hip and Knee Surgeons	
Gordon Guyatt	Core Team - GRADE Expert	McMaster University				Nothing to disclose
Eric M. Ruderman	ACR Board of Directors Liaison	Northwestern University	Self	Independent Contractor - Consultant	Smith and Nephew Orthopaedics	
			Self	Independent Contractor - Consultant	Selecta	
			Self	Other Business Ownership	The Rheumatology Education Group	
			Self	Independent Contractor - Consultant	Scipher	
			Self	Employment	Northwestern Medicine	
			Self	Independent Contractor - Consultant	Novartis	
			Self	Independent Contractor - Consultant	Aurinia Pharma	
			Self	Independent Contractor - Consultant	Pfizer	
			Self	Independent Contractor - MD	American College of Rheumatology Research and Education Foundation	
			Self	Independent Contractor - Consultant	AbbVie, Inc.	
			Self	Independent Contractor - Consultant	Gilead Sciences Inc	
			Self	Independent Contractor - Consultant	Amgen	
			Self	Independent Contractor - Consultant	Bristol-Myers Squibb Company	

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			Self	Independent Contractor - Consultant	Janssen Biotech, Inc.		
			Self	Independent Contractor - Consultant	Eli Lilly and Company		
			Self	Intellectual Property - Other Intellectual Property	Smith and Nephew Orthopaedics		
			Self	Independent Contractor - Consultant			
Kimberly Bartosiak	Literature Review Team	Washington University in St. Louis				Nothing to disclose	
Nicholas Bedard	Literature Review Team	University of Iowa Hospitals & Clinics	Self	Independent Contractor - Consultant	DePuy Orthopaedics Inc.		
			Self	Independent Contractor - Editorial Board Member	Journal of Arthroplasty		
Jason L. Blevins	Literature Review Team	Hospital for Special Surgery	Self	Independent Contractor - Consultant	Limacorporate S.p.A.		$2,000.00
			Self	Independent Contractor - Consultant	Globus Medical, Inc.		$1,000.00
Cara A. Cipriano	Literature Review Team					Disclosures forthcoming	
Anna R. Cohen-Rosenblum	Literature Review Team	Independent contractor	Self	Gift	Stryker Corporation	Pizza on call	$31.00
			Self	Independent Contractor - committee chair	Ruth Jackson Orthopaedic Society		
			Self	Independent Contractor - editorial board member	Journal of Arthroplasty		
			Self	Independent Contractor - Secretary of Young Arthroplasty Group committee	American Association of Hip and Knee Surgeons		
			Self	Independent Contractor - Curriculum writer for JBJS Clinical Classroom	Journal of Bone & Joint Surgery		
			Self	Independent Contractor - Editorial board	Arthroplasty Today		

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P. Maxwell Courtney	Literature Review Team	Rothman Orthopaedic Specialty Hospital	Self	Independent Contractor - Data and Safety Monitoring	Hip Innovation Technology		
			Self	Fiduciary Officer	AAHKS		
			Self	Independent Contractor - Consultant	Smith and Nephew		
			Self	Independent Contractor - Consultant	Stryker		
			Self	Stock	Parvizi Surgical Innovation		$100,000.00
Ruth Fernandez	Literature Review Team	NYU Langone Medical Center	Self	Employment	NYU Langone Medical Center		
Elizabeth Gausden	Literature Review Team	Hospital for Special Surgery	Self	Independent Contractor - Consultant	DePuy Orthopaedics Inc.	Hourly rate	
Nilasha Ghosh	Literature Review Team	Hospital for Special Surgery	Self	Employment	Hospital for Special Surgery	Employment	
			Self	Employment	New York Presbyterian	Hourly rate Trainees were paid to cutover/abstract information from one EMR to another as hospital switches to EPIC	
Lauren King	Literature Review Team	University of Toronto	Self	Independent Contractor - Canadian Rheumatology Association Annual Scientific Meeting Committee Member	Canadian Rheumatology Association		
			Self	Independent Contractor - Canadian Rheumatology Association Research Committee	Canadian Rheumatology Association		

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			Self	Grant/Contract	Canadian Institutes of Health Research	$560,000.00
			Self	Independent Contractor - OMERACT Flares in Osteoarthritis Working Group Steering Committee	OMERACT	
Alexa Simon Meara	Literature Review Team	The Ohio State Wexner Medical Center	Self	Independent Contractor - Consultant	AbbVie Biotherapeutics	
			Self	Independent Contractor - Consultant	Ampel	
			Self	Independent Contractor - Consultant	Aurinia	
			Self	Independent Contractor - Consultant	GLG	
Bella Mehta	Literature Review Team	Hospital for Special Surgery	Self	Independent Contractor - Consultant	Novartis	$2,500.00
Adam J. Rana	Literature Review Team	Maine Medical Partners	Self	Independent Contractor - Consultant	Smith and Nephew Orthopaedics	
Nancy Sullivan	Literature Review Team	ECRI		NA	Nothing to disclose	
Marat Turgunbaev	Literature Review Team	American College of Rheumatology		NA	Nothing to disclose	
Katherine D. Wysham	Literature Review Team	VA Puget Sound Health Care System	Brother	Independent Contractor - Consultant	Verathon	
			Brother	Independent Contractor - Consultant	AstraZeneca	
			Parent-Mother	Grant / Contract	Corcept Therapeutics	$10,000.00
			Parent-Mother	Grant / Contract	Regeneron Pharmaceuticals, Inc.	$15,000.00
			Parent	Independent Contractor - President	Endocrine Society	
			Brother	Other Business Ownership	Veronix	
			Parent-Mother	Grant / Contract	Allergan	$25,000.00

			Parent-Mother	Grant / Contract	Abbott Diabetes Care		$12,000.00
			Self	Grant / Contract	Rheumatology Research Foundation		$225,000.00
			Parent-Mother	Grant / Contract	Eli Lilly and Company		$36,000.00
			Self	Employment	U.S. Department of Veterans Affairs		
			Parent-Mother	Grant / Contract	Novo Nordisk		$40,000.00
			Self	Independent Contractor - Chapter Lead	Association of Women in Rheumatology		
Kevin Yip	Literature Review Team	Hospital for Special Surgery	Self	Independent Contractor - OMERACT Fellow	OMERACT	Fellow in rheumatology training program at HSS	
Linda Yue	Literature Review Team	Hospital for Special Surgery		NA		Nothing to disclose	
Michael Zywiel	Literature Review Team	Toronto Western Hospital	Self	Independent Contractor - Consultant	DePuy Synthes Products LLC		
			Self	Independent Contractor - Consultant	Smith and Nephew		
			Self	Independent Contractor - Editorial board member	Clinical orthopaedics and related research		
Joshua F. Baker	Voting Panel	University of Pennsylvania	Self	Independent Contractor - Consultant	Bristol-Myers Squibb		$2,400.00
			Self	Independent Contractor - Consultant	Pfizer		$2,100.00
Delamo Isaac Bekele	Voting Panel	Mayo Clinic	Matthew Koster MD, Primary Investigator	Independent Contractor - Epidemiology of Polymyalgia Rheumatica 2000-2014: A Population Based Study	Mayo Clinic		

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			Self	Independent Contractor - Committee Member	SPARTAN	Meeting every 3 months	
			Cornelia Weyand MD, PI	Independent Contractor - Biomarkers in Patients with Rheumatoid Arthritis and Interstitial Lung Disease	Mayo Clinic		
			Self	Grant / Contract	Mayo Clinic		$10,000.00
			Floranne Ernste MD, primary investigator	Independent Contractor - Use of plasma exchange for the treatment of MDA-5 positive dermatomyositis patients and anti-synthet	Mayo Clinic		
			Hu Zeng PhD	Independent Contractor - Biomarkers in Autoimmune and Inflammatory Diseases	Mayo Clinic	Co-investigator	
Hassan Ghomrawi	Voting Panel	Northwestern Medicine	Self	Independent Contractor - Associate Editor	Clinical Orthopaedics and Related Research		
			Self	Other Business Ownership	Aspis Health LLC		
			Self	Employment	Northwestern University		
			Self	Independent Contractor - Editorial Board member	BMJ Surgery, Interventions, & Health Technologies		
			Self	Grant / Contract	National Institute of Arthritis and		$2,943,689.00

					Musculoskeletal and Skin Diseases		
David S. Jevsevar	Voting Panel	Dartmouth-Hitchcock	Dartmouth-Hitchcock	Grant / Contract	DePuy Mitek		$16,000.00
C. Kent Kwoh	Voting Panel	University of Arizona Arthritis Center	Self	Independent Contractor - Consultant	LG Chem		
			Self	Employment	University of Arizona		
			Self	Grant / Contract	Eli Lilly and Company		$263,732.00
			Self	Independent Contractor - Speaker	Prime Education, LLC	Speaker at CME event	
			Self	Independent Contractor - Data and Safety Monitoring	Kolon Tissue Gene	Cell and gene therapy for osteoarthritis	
			Self	Grant / Contract	GlaxoSmithKline		$314,050.00
			Self	Fiduciary Officer	International Chinese Osteoarthirtis Research Society		
			Self	Grant / Contract	Cumberland Pharmaceuticals, Inc.		$55,928.00
			Self	Independent Contractor - Speaker at CME event	Focus Medical Communications	Speaker at CME event	
			Self	Independent Contractor - Consultant	Regeneron Pharmaceuticals, Inc.		
			Self	Grant / Contract	AbbVie, Inc.		$338,295.91
			Self	Independent Contractor - Consultant	Avalor Therapeutics	development of an intra-articular IL-1b inhibitor,	

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						initially for gout and CPPD	
			Self	Independent Contractor - Consultant	Express Scripts		$32,086.00
			Self	Grant / Contract	Pfizer		$225,841.54
Claudette M. Lajam	Voting Panel	NYU Langone Health	Self	Fiduciary Officer	American Academy of Orthopaedic Surgeons		
			Spouse/Partner	Employment	Pfizer	Husband is Pfizer employee- Senior Director of Environmental Remediation, part of Global Engineering	
			Self	Fiduciary Officer	American Association of Hip and Knee Surgeons		
			Self	Independent Contractor - Expert Witness	German, Gallagher and Murtaugh	Expert testimony for medical malpractice defense	$13,000.00
Larry W. Moreland	Voting Panel	University of Colorado Anschutz Medical Campus		NA		Nothing to disclose	
Linda A. Russell	Voting Panel	Hospital for Special Surgery	Self	Independent Contractor - Physician	Arthritis Foundation		
Bryan D. Springer	Voting Panel	OrthoCarolina	Self	Independent Contractor - Consultant	Stryker		$800,000.00

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			Self	Independent Contractor - Consultant	Convatec Inc.	$15,000.00
			Self	Independent Contractor - Consultant	Osteoremedies, LLC	$20,000.00
Linda I. Suleiman	Voting Panel	DePuy Orthopaedics Inc.	Self	Independent Contractor - Consultant	DePuy Orthopaedics Inc.	$1,800.00
Jesse Wolfstadt	Voting Panel	Mount Sinai Hospital		NA	Nothing to disclose	

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