

# Trends in Total Joint Arthroplasty Among Patients with Rheumatoid Arthritis: The Impact of Recent DMARD Utilization Guidelines

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**INTRODUCTION:** The 2015 change in the American College of Rheumatology (ACR) guidelines narrowed indications for initiating treatment with biologic disease modifying anti-rheumatic drugs (bDMARDs) in patients with rheumatoid arthritis (RA). This study sought to evaluate trends in total joint arthroplasty (TJA) in RA patients and to characterize the impact of bDMARDs on arthroplasty risk in this population after the change in ACR treatment guidelines.

**METHODS:** A retrospective review was conducted using the PearlDiver database. TJA procedures included total shoulder (TSA), elbow (TEA), hip (THA), and knee (TKA) arthroplasty. The Cochran-Armitage Trend Test was used to evaluate trends in the volume of TJA procedures performed in RA patients between 2010 and 2019. Logistic regression was used to compare two-year arthroplasty risk following an initial joint-specific RA ICD-10 diagnosis for RA patients with versus without bDMARD exposure.

**RESULTS:** A total of 2,942,360 patients with RA were identified, and 80,744 (2.74%) underwent TJA between 2010 and 2019. Rates of TJA procedures trended significantly upward over the decade (2.6% vs. 5.1%,  $p < 0.001$ ) with a sharp increase between 2015 and 2016 (2.1% vs. 4.9%,  $p < 0.001$ ). Among the 16,736 identified patients with an initial ICD-10 joint-specific RA diagnosis, 3,362 (20.09%) patients were treated with bDMARDs and 13,374 (79.91%) were not. Untreated patients exhibited significantly lower risk of any TJA (5.92% vs. 7.73%; OR: 0.72; 95% CI: 0.64–0.82), THA (OR: 0.69, 95% CI: 0.50–0.95), and TKA (OR: 0.63, 95% CI: 0.52–0.75) compared to treated patients.

**DISCUSSION AND CONCLUSION:** The volume of TJA procedures performed in patients with RA has trended significantly upward over the last decade with a sharp increase after 2015. bDMARD treatment was associated with significantly increased risk of TJA, likely due to initiation of bDMARDs in only patients with advanced disease per ACR guidelines.

Figure 1. The trend of arthroplasty procedures in rheumatoid arthritis patients over the past decade. (a) total shoulder arthroplasty, (b) total elbow arthroplasty, (c) total hip arthroplasty, (d) total knee arthroplasty. P value corresponds to the change in arthroplasty volume from 2015 to 2016.

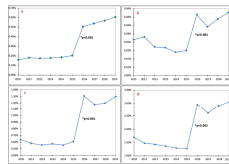


Table 1. The total number of patients with rheumatoid arthritis who underwent each individual arthroplasty procedure from 2010-2019. TSA, total shoulder arthroplasty; TEA, total elbow arthroplasty; THA, total hip arthroplasty; TKA, total knee arthroplasty.

Year	TSA (%)	TEA (%)	THA (%)	TKA (%)	Total TJA (%)
2010	587 (0.18%)	80 (0.022%)	2387 (0.62%)	6231 (1.71%)	9225 (2.53%)
2011	699 (0.18%)	90 (0.024%)	2254 (0.59%)	5638 (1.49%)	8681 (2.29%)
2012	712 (0.18%)	69 (0.018%)	2240 (0.57%)	5489 (1.44%)	8510 (2.21%)
2013	763 (0.18%)	71 (0.017%)	2441 (0.59%)	5722 (1.38%)	8997 (2.34%)
2014	836 (0.18%)	47 (0.004%)	2443 (0.59%)	5633 (1.31%)	8963 (2.34%)
2015	788 (0.21%)	58 (0.017%)	2338 (0.62%)	4828 (1.28%)	8014 (2.12%)
2016	340 (0.37%)	31 (0.033%)	1943 (1.31%)	4399 (1.00%)	7693 (6.92%)
2017	817 (0.34%)	44 (0.033%)	1753 (1.22%)	3844 (1.64%)	6458 (4.47%)
2018	836 (0.39%)	30 (0.037%)	1751 (1.24%)	4189 (2.96%)	6806 (4.87%)
2019	939 (0.47%)	60 (0.040%)	2037 (1.25%)	4703 (1.11%)	7740 (5.14%)
p-value	<0.001	<0.001	<0.001	<0.001	<0.001

Table 2. Anatomic distribution of ICD-10 joint specific RA diagnosis

Procedure	bDMARD Treatment	% bDMARD Treatment	p-value
Total	3,362 (19%)	13,374 (80%)	-
Shoulder	1,333 (59.4)	5,368 (40.1)	<0.001
Elbow	433 (12.9)	3,264 (87.1)	<0.001
Hip	386 (11.9)	3,055 (88.1)	0.197
Knee	1,219 (36.6)	3,087 (63.4)	0.002

Table 3. Risk of TJA in patients who were not versus on taking biologic disease modifying antirheumatic drug (bDMARD). Reference group: No bDMARD Treatment

Procedure	bDMARD Treatment	% bDMARD Treatment	OR	95% CI
All TJA	266 (7.7)	795 (5.1)	0.73	0.65-0.82
TSA	29 (2.3)	10 (1.4)	0.73	0.46-1.19
TEA	12 (2.8)	22 (2.0)	0.52	0.26-1.04
THA	40 (16.3)	33 (10.0)	0.67	0.48-0.92
TKA	162 (13.4)	481 (16.3)	0.66	0.54-0.82

\*Percentages calculated out of the total number of patients in each group (All TJA or the number of patients from each group with pathology in the given joint).