The Journal of Rheumatology 2022;xx:xxxx
doi:10.3899/jrheum.201370
First Release December 15 2021

The Journal of Rheumatology

Risk of 30-day Readmission After Knee or Hip Replacement in Rheumatoid Arthritis and Osteoarthritis by Non-Medicare and Medicare Payer Status

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ABSTRACT. ***Objective.*** To determine the indication and risk of 30-day rehospitalization after hip or knee replacement among patients with rheumatoid arthritis (RA) and osteoarthritis (OA) by Medicare and non-Medicare status.

Methods. Using the Nationwide Readmission Database (2010–2014), we defined an index hospitalization as an elective hospitalization with a principal procedure of total hip (THR) or knee replacement (TKR) among adults aged ≥ 18 years. Primary payer was categorized as Medicare or non-Medicare. Survey logistic regression provided the odds of 30-day rehospitalization in RA relative to OA. We calculated the rates for principal diagnoses leading to rehospitalization.

Results. Overall, 3.53% of 2,190,745 index hospitalization had a 30-day rehospitalization. Patients with RA had a higher adjusted risk of rehospitalization after TKR (OR 1.11, 95% CI 1.02–1.21) and THR (OR 1.39, 95% CI 1.19–1.62). Persons with RA and OA did not differ with respect to rates of infections, cardiac events, or postoperative complications leading to the rehospitalization. After TKR, RA patients with Medicare had a lower venous thromboembolism (VTE) risk (OR 0.58, 95% CI 0.58–0.88), whereas those with RA had a greater VTE risk (OR 2.41, 95% CI 1.04–5.57) after THR.

Conclusion. Patients with RA had a higher 30-day rehospitalization risk than OA after TKR and THR regardless of payer type. While infections, postoperative complications, and cardiac events did not differ, there was a significant difference in VTE as the principal diagnosis of rehospitalization.

Key Indexing Terms: arthritis, arthroplasty, perioperative outcomes

Joint replacement is cost effective and associated with improvements in quality of life, function, and patient satisfaction.[1,2,3,4] It serves as an alternative when medical interventions are no longer alleviating symptoms. Such is the case for patients with severe joint damage resulting from end-stage osteoarthritis (OA) or rheumatoid arthritis (RA) with poor response to medications, resulting chronic synovitis and progressive erosive arthritis.

MMW was funded by the Intramural Research Program, National Institute of Arthritis, and Musculoskeletal and Skin Diseases, National Institutes of Health.

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The authors declare no conflicts of interest relevant to this article.

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Accepted for publication September 15, 2021.

Several adverse events potentially requiring rehospitalization after total joint replacement surgery include infections,[5,6,7,8] cardiovascular events,[9,10] venous thromboembolism (VTE),[11,12,13,14] and mortality.[15,16,17] Current literature on readmission rates after major joint replacement shows high variability with respect to the postoperative follow-up time, age, and specific underlying joint disease of study populations, as well as the number of potential confounders considered and the methods for accounting for these.[18–29] A number of studies have assessed risk after joint replacement among patients with RA.[20,22,29,30,31,32] To date, the majority of studies have either evaluated a 90-day follow-up period, or were limited to a single institution or to a specific aged population such as Medicare beneficiaries.

Using a large population-based sample representative database of US hospitalizations including both non-Medicare and Medicare patients, we describe the risk of 30-day rehospitalization along with the principal diagnosis for the rehospitalization among persons with RA and OA after primary total hip replacement (THR) or total knee replacement (TKR) while accounting for comorbid conditions.

METHODS

We conducted a cross-sectional analysis using the 2010–2014 Nationwide Readmissions Database (NRD), Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality. NRD databases have been

described elsewhere.[28,29] Briefly, NRD is a publicly available database that includes approximately 28 million annual hospital discharges along with linkage variables to allow patient tracking for readmission within the same calendar year. As a complex survey design database, it requires the incorporation of discharge-level weights to generate national estimates. Additionally, in the calculation of standard errors it requires the data elements of stratification and clusters. The NRD, a limited dataset, is not subject to HIPAA (US Health Insurance Portability and Accountability Act) review by an institutional review board.[30]

We defined an index admission as an elective hospitalization among persons aged ≥ 18 years including a principal procedure of primary THR or primary TKR, who were alive at discharge. Excluded were hospitalizations in the month of December in order to ensure a 30-day postdischarge follow-up period since linkage across calendar years is not possible. The International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM) codes were used to extract the principal procedure and diagnoses in the index hospitalization along with the principal diagnosis for the rehospitalization. Principal procedures of primary THR (81.51), TKR (81.54), along with diagnoses of RA (714), OA (715), and comorbid conditions, were extracted using their ICD-9-CM codes. Patients were categorized as RA if both RA and OA diagnoses were present. The primary payer for the index hospitalization was categorized as either Medicare or non-Medicare, where non-Medicare included Medicaid, private insurance, self-pay, no charge, or other payer.

The main outcome of interest was a 30-day rehospitalization defined as the first rehospitalization within a 30-day time period after discharge from the index hospitalization. We considered the reason for the 30-day rehospitalization to be represented by the principal diagnosis listed. The principal diagnoses of primary interest included cardiac events, strokes, VTE, infections, acute renal failure, and postprocedural complications (Supplementary Table 1, available from the authors on request). Briefly, cardiac diagnoses included acute coronary syndrome, acute myocardial infarction, acute congestive heart failure (CHF), and dysrhythmias. VTEs included diagnoses of deep VTE or pulmonary embolism. Infections were categorized as either localized or distant to the surgical site. Infections localized to the surgical site consisted of ICD-9-CM diagnoses including an infection and inflammatory reaction due to internal joint prosthesis (996.66) or other postoperative infection (998.59). Infections not localized to the surgical site were referred to as distant infections and included sepsis, pneumonia, superficial infections of the skin and abscesses, or infections involving the upper or lower genitourinary tract. Postprocedural complications were extracted using ICD-9-CM codes 998 and 996 (Supplementary Table 1). For example, a dislocation of prosthetic joint was identified by using ICD-9-CM 996.42 and a hematoma complicating a procedure by using ICD-9-CM 998.12. We defined a composite event as the occurrence of a cardiac event, stroke, VTE, infection, acute renal failure, or a postprocedural complication.

Statistical analysis. Categorical variables were expressed as weighted frequencies (± standard error [SE]) and percentages. Continuous variables were expressed as means (± SE). The Rao-Scott chi-square test was used to test the association between the categorical variables. Survey logistic regression provided the odds of outcomes among persons with RA relative to OA. The regression models included an unadjusted model (Model 1); Model 1 plus age and sex (Model 2); and Model 2 plus comorbid conditions including coronary artery disease, hypertension, diabetes mellitus (DM), chronic kidney disease, chronic pulmonary disease, chronic CHF, and cancer (Model 3). All statistical tests were based on a 2-sided test with a significance level of 0.05 and accounted for the survey design features of NRD in order to provide population-based estimates. All statistical analyses were conducted using SAS statistical software (SAS Institute Inc.).

RESULTS

There were 2,190,745 index hospitalizations for TKR or THR of which 67,059 were persons with RA and 2,123,686 with OA (Supplementary Table 2, available from the authors on request). Persons with RA were younger (64.38 ± 0.10 vs 65.79 ± 0.06 yrs, $P < 0.001$) and more likely to be female (75.59% vs 59.62%, $P < 0.001$), have coexisting conditions of chronic CHF (2.57% vs 1.93%, $P < 0.001$), and have chronic obstructive pulmonary disease (COPD; 19.17% vs 14.13%, $P < 0.001$), while less likely to have hypertension (HTN; 64.27% vs 65.36%, $P = 0.003$).

A total of 2,184,477 (99.7%) of the 2,190,745 index hospitalizations had nonmissing payer information including 1,207,899 (55.29%) with Medicare and 976,578 (44.71%) with non-Medicare (Table 1). Among the non-Medicare hospitalization, persons with RA were less likely than those with OA to have coronary artery disease (CAD; 4.20% vs 4.71%, $P = 0.04$), DM (15.99% vs 16.92%, $P = 0.04$), but more likely to have CHF (1.41% vs 0.91%; $P = 0.0001$) and COPD (16.81% vs 13.04%, $P < 0.0001$). Among the Medicare hospitalizations, persons with RA were less likely than those with OA to have HTN (69.3% vs 71.6%, $P < 0.0001$), CAD (9.45% vs 10.19%, $P = 0.01$), DM (20.48% vs 21.95%, $P = 0.0002$), but more likely to have CHF (3.37% vs 2.75%, $P = 0.0003$), and COPD (20.77% vs 15.02%, $P < 0.001$). A significantly greater proportion of patients with RA were aged < 65 years as compared to those with OA in the Medicare group (22.03% vs 10.10%, $P < 0.001$).

The principal procedure was THR 513,021 (23.48%) and TKR in 1,671,456 (76.52%) hospitalizations. Table 2 and Table 3 display patient characteristics by joint replacement type among persons with non-Medicare and Medicare, respectively. In both types of joint replacement surgeries and payer types, there was a higher prevalence of CHF and COPD and lower prevalence of HTN among patients with RA. In both non-Medicare and Medicare patients who underwent TKR, there was a lower prevalence of CAD, HTN, and DM in persons with RA.

Study outcomes. The overall 30-day readmission rate was 77,196 (3.53%). The readmission rate was higher when comparing persons with RA to OA (4.02% vs 3.52%, $P = 0.0003$) and those with Medicare vs non-Medicare as payer (4.13% vs 2.80%, $P < 0.0001$). The 30-day readmission rate after TKR was 3.55%, which did not significantly differ between persons with RA and OA among those with non-Medicare (3.12% vs 2.83%, $P = 0.16$) or Medicare (4.26% vs 4.10%, $P = 0.47$). The readmission rate after THR was 3.47%. Persons with RA had a higher readmission rate after THR among both non-Medicare (3.85% vs 2.63%, $P = 0.005$) and Medicare (5.51% vs 4.16%, $P = 0.002$) payers (data not shown).

As shown in Table 4, the adjusted OR of 30-day rehospitalization after TKR was significantly higher (OR 1.11; 95% CI 1.02–1.21) in persons with RA as compared to OA. In analysis by payer type, the increased risk was limited to those with non-Medicare (OR 1.15, 95% CI 1.00–1.32) and not to those with Medicare (OR 1.04, 95% CI, 0.93–1.16). After THR, the risk of 30-day readmission was higher among patients with RA, a finding which was consistent overall (OR 1.39, 95% CI, 1.19–1.62) and by non-Medicare (OR 1.45; 95% CI 1.10–1.91) and Medicare (OR 1.27, 95% CI 1.05–1.54).

The study composite event, which included cardiac events, strokes, VTEs, infections, acute renal failure, and postprocedural

Table 1. Characteristics by RA and OA status by insurance type status.

	Non-Medicare, n = 976,578		*P*	Medicare, n = 1,207,899		*P*
	RA n = 26,940	OA n = 949,638		RA n = 39,919	OA n = 1,167,980	
Age, yrs			< 0.001			< 0.001
18–64	23,437 (86.99)	808,699 (85.16)		8796 (22.03)	117,911 (10.10)	
≥ 65	3503 (13.01)	140,939 (14.84)		31,123 (77.97)	1,050,069 (89.90)	
Female sex	19,926 (73.96)	531,668 (55.99)	< 0.001	30,644 (76.77)	731,009 (62.59)	< 0.001
Surgery			< 0.001			0.0001
Hip	5590 (20.75)	237,871 (25.05)		8270 (20.72)	261,290 (22.37)	
Knee	21,350 (79.25)	711,767 (74.95)		31,649 (79.28)	906,690 (77.63)	
CAD	1131 (4.20)	44,707 (4.71)	0.04	3774 (9.45)	119,011 (10.19)	0.01
CHF	380 (1.41)	8712 (0.91)	0.0001	1343 (3.37)	32,074 (2.75)	0.0003
DM	4310 (15.99)	160,713 (16.92)	0.04	8177 (20.48)	256,330 (21.95)	0.0002
Cancer	56 (0.21)	2583 (0.27)	0.27	186 (0.47)	7105 (0.61)	0.06
HTN	15,287 (56.74)	547,796 (57.68)	0.12	27,677 (69.33)	836,297 (71.60)	< 0.0001
CKD	561 (2.08)	18,316 (1.93)	0.31	1973 (4.94)	61,451 (5.26)	0.17
COPD	4528 (16.81)	123,830 (13.04)	< 0.0001	8290 (20.77)	175,442 (15.02)	< 0.001
VHD	642 (2.38)	18,245 (1.92)	0.01	1598 (4.00)	47,610 (4.08)	0.70

Values are expressed as n (%) unless otherwise indicated. CAD: coronary artery disease; CHF: congestive heart failure; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; DM: diabetes mellitus; HTN: hypertension; OA: osteoarthritis; RA: rheumatoid arthritis; VHD: valvular heart disease.

Table 2. Characteristics among non-Medicare patients by type of arthritis and joint replacement.

	Total Knee Replacement, n = 733,117		*P*	Total Hip Replacement, n = 243,461		*P*
	RA n = 21,350	OA n = 711,767		RA n = 5590	OA n = 237,871	
Age, yrs			< 0.001			0.83
18–64	18,521 (86.75)	599,961 (84.29)		4916 (87.94)	208,738 (87.75)	
≥ 65	2829 (13.25)	111,806 (15.71)		674 (12.06)	29,133 (12.25)	
Female sex	16,403 (76.83)	418,614 (58.81)	< 0.001	3523 (63.20)	113,054 (47.53)	< 0.001
CAD	915 (4.29)	34,627 (4.87)	0.04	215 (3.85)	10,080 (4.24)	0.47
CHF	306 (1.43)	6849 (0.96)	0.002	74 (1.33)	1863 (0.78)	0.03
DM	3609 (16.90)	133,817 (18.80)	0.0002	702 (12.55)	26,896 (11.31)	0.13
Cancer	35 (0.16)	1869 (0.26)	0.13	22 (0.39)	713 (0.30)	0.50
HTN	12,517 (58.63)	429,211 (60.30)	0.02	2770 (49.54)	118,585 (49.85)	0.82
CKD	460 (2.15)	14,712 (2.07)	0.62	101 (1.81)	3604 (1.52)	0.30
COPD	3707 (17.36)	97,191 (13.65)	< 0.0001	821 (14.69)	26,639 (11.20)	< 0.001
VHD	516 (2.42)	13,954 (1.96)	0.02	126 (2.25)	4291 (1.80)	0.16

Values are expressed as n (%) unless otherwise indicated. CAD: coronary artery disease; CHF: congestive heart failure; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; DM: diabetes mellitus; HTN: hypertension; OA: osteoarthritis; RA: rheumatoid arthritis; VHD: valvular heart disease.

complication as principal diagnoses, accounted for 36,665 (47.49%) of the 77,196 30-day rehospitalizations, with the remaining hospitalizations due to alternate principal diagnoses. Patients with RA and OA did not differ in the proportion of rehospitalizations due to the composite event (49.7% vs 48.93%, $P = 0.66$).

The principal diagnosis for the rehospitalization was an infection in 14,425 (18.69%), a postoperative complication in 11,815 (17.74%), a VTE event in 5349 (6.93%), and a cardiac diagnosis in 3174 (4.11%). Rehospitalizations with an infection, including both local and distant to surgical site, as the principal diagnosis did not significantly differ between RA and OA (20.97% vs 18.60%, $P = 0.09$). Infections distant to the surgical site occurred in 1579 (4.96%) and those localized to the surgical site accounted for 10,598 (13.73%) of the rehospitalizations with no significant difference between RA and OA in local (14.51% vs 13.70%, $P = 0.50$) or distant infections (6.47% vs 4.90%, $P = 0.06$; data not shown). Figure 1 displays the rates of infections listed as primary indicators for 30-day rehospitalization. Regardless of payer type, persons with RA and OA did not differ significantly in the rate of local, distant, or overall infections.

Figure 2 displays the rates of cardiac, VTE, and postoperative complications as the indication for the 30-day rehospitalization. There was no significant difference between RA and OA in either cardiac events or postoperative complications after TKR or THR. After TKR, RA patients with Medicare had a

Table 3. Characteristics among Medicare patients by type of arthritis and joint replacement.

	Total Knee Replacement, n = 938,339		*P*	Total Hip Replacement, n = 269,560		*P*
	RA n = 31,649	OA n = 906,690		RA n = 8270	OA n = 261,290	
Age, yrs			< 0.001			< 0.001
18–64	6965 (22.01)	91,267 (10.07)		1830 (22.13)	26,643 (10.20)	
≥ 65	24,684 (77.99)	815,423 (89.93)		6440 (77.87)	234,646 (89.80)	
Female sex	24,607 (77.75)	576,969 (63.63)	< 0.001	6037 (72.99)	154,040 (58.95)	< 0.001
CAD	3003 (9.49)	92,131 (10.16)	0.04	771 (9.32)	26,879 (10.29)	0.16
CHF	1020 (3.22)	25,034 (2.76)	0.01	323 (3.91)	7040 (2.69)	0.01
DM	6706 (21.19)	210,721 (23.24)	< 0.001	1472 (17.80)	45,609 (17.46)	0.68
Cancer	133 (0.42)	5315 (0.59)	0.05	53 (0.64)	1790 (0.69)	0.78
HTN	22,218 (70.20)	658,387 (72.61)	< 0.001	5459 (66.01)	177,910 (68.09)	0.03
CKD	1558 (4.92)	48,405 (5.34)	0.11	415 (5.02)	13,046 (4.99)	0.96
COPD	6496 (20.52)	136,797 (15.09)	< 0.0001	1794 (21.69)	38,645 (14.79)	< 0.001
VHD	1226 (3.87)	36,198 (3.99)	0.56	372 (4.50)	11,412 (4.37)	0.79

CAD: coronary artery disease; CHF: congestive heart failure; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; DM: diabetes mellitus; HTN: hypertension; OA: osteoarthritis; PVD: peripheral vascular disease; RA: rheumatoid arthritis; VHD: valvular heart disease.

Table 4. Risk of 30-day readmission and composite adverse events after index hospitalization for primary joint replacement.

	Model 1	Model 2	Model 3
Total knee replacement			
30-day readmission			
Overall	1.08 (0.99–1.17)	**1.14 (1.04–1.24)**	**1.11 (1.02–1.21)**
By payer type			
Non-Medicare	1.10 (0.96–1.26)	**1.16 (1.01–1.33)**	**1.15 (1.00–1.32)**
Medicare	1.04 (0.94–1.16)	1.05 (0.94–1.17)	1.04 (0.93–1.16)
Composite event			
Overall	1.03 (0.87–1.23)	1.07 (0.90–1.27)	1.05 (0.89–1.25)
By payer type			
Non-Medicare	1.23 (0.95–1.59)	**1.32 (1.02–1.71)**	**1.31 (1.01–1.70)**
Medicare	0.96 (0.78–1.19)	0.96 (0.78–1.19)	0.95 (0.77–1.17)
Total hip replacement			
30-day readmission			
Overall	**1.43 (1.23–1.67)**	**1.45 (1.24–1.70)**	**1.39 (1.19–1.62)**
By payer type			
Non-Medicare	**1.48 (1.12–1.96)**	**1.50 (1.13–1.98)**	**1.45 (1.10–1.91)**
Medicare	**1.34 (1.11–1.62)**	**1.31 (1.09–1.59)**	**1.27 (1.05–1.54)**
Composite event			
Overall	1.01 (0.76–1.35)	0.99 (0.74–1.32)	1.00 (0.74–1.33)
By payer type			
Non-Medicare	0.91 (0.54–1.55)	0.86 (0.51–1.46)	0.84 (0.50–1.42)
Medicare	1.07 (0.74–1.55)	1.05 (0.73–1.51)	1.07 (0.74–1.54)

Values are expressed as OR (95% CI). Values in bold are statistically significant. Model 1 = unadjusted model. Model 2 = Model 1 plus age and sex. Model 3 = Model 2 plus comorbidities (coronary artery disease, hypertension, diabetes mellitus, chronic kidney disease, chronic pulmonary disease, chronic congestive heart failure, cancer).

significantly lower rate of VTE as compared to OA (4.2% vs 7.1%, $P = 0.01$), while the difference in VTE events among non-Medicare patients did not reach statistical significance (5.5% vs 8.7%, $P = 0.06$). After THR, in contrast to non-Medicare patients, Medicare patients with RA had a significantly higher rate of VTE as the principal diagnosis for the rehospitalization (9.0% vs 3.9%, $P = 0.03$). RA patients with Medicare had a lower risk of VTE (OR 0.58; 95% CI 0.58–0.88) after TKR, whereas those with RA had a greater VTE risk post-THR (OR 2.41, 95% CI 1.04–5.57; data not shown).

DISCUSSION

In this large population-based sample representing US hospitalization with a primary THR/TKR, both non-Medicare and

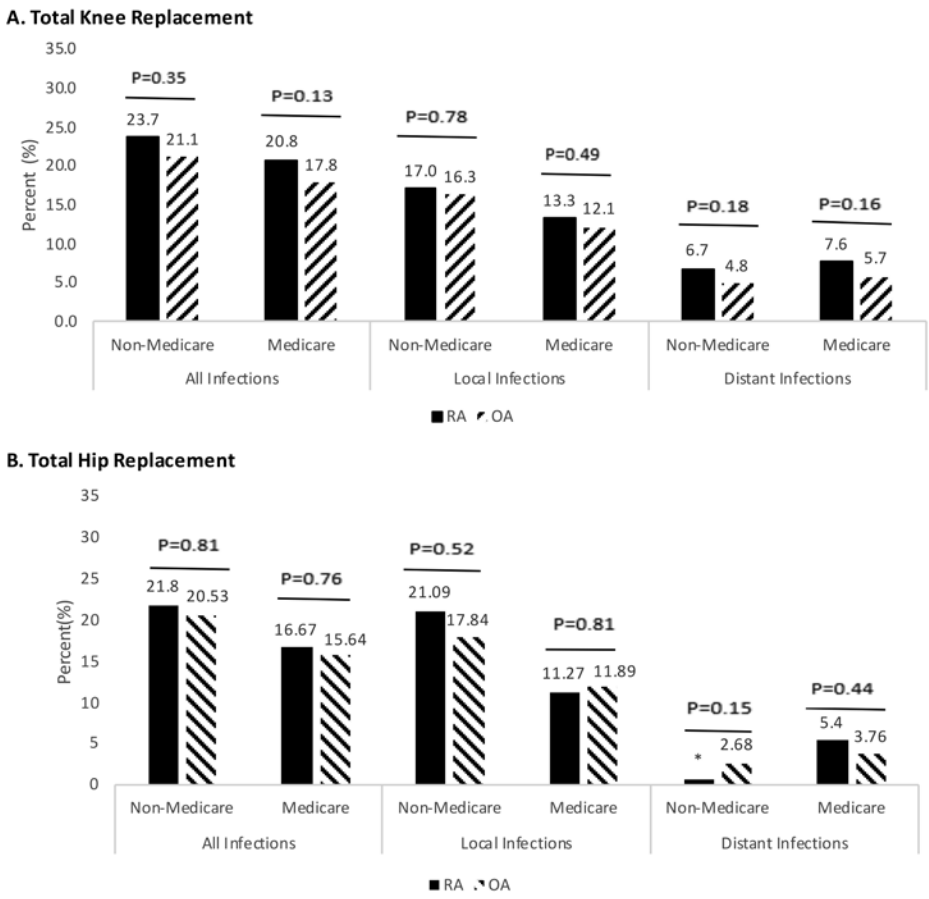

Figure 1. Infectious indication for 30-day readmission rates for (A) total knee replacement, and (B) total hip replacement. * Cell sizes n < 10 not reported as per HCUP reporting recommendations. HCUP: Healthcare Cost and Utilization Project; OA: osteoarthritis; RA: rheumatoid arthritis.

Medicare patients with RA were at a greater risk for 30-day rehospitalization after THR, and non-Medicare patients with RA after TKR, as compared to those with OA. Nearly half of the rehospitalizations were due to infections, postoperative wound complications, cardiac events, or VTE events. Infections accounted for approximately 1 in 5 rehospitalizations. Whereas both non-Medicare and Medicare patients with RA had a slightly higher rate of rehospitalization with an infection as a principal diagnosis after TKR and THR, the difference with patients with OA was not statistically significant. The proportion of 30-day rehospitalizations with postoperative wound complications or cardiac reasons as the etiology after TKR and THR did not differ between patients with RA and OA in either the non-Medicare or Medicare populations. While Medicare patients with RA had a significantly higher risk of VTE events post-THR, patients with OA had a higher proportion of readmissions due to VTE events after TKR. Overall, patients with RA had a higher risk for 30-day rehospitalization than those with OA. The increased rehospitalization among patients with RA was not due to differences in infections, cardiac events, or postoperative complications.

Rehospitalizations represent a considerable concern after major joint surgery. The need for rehospitalization within a 30-day time period is of both clinical and economic significance.[33,34,35] Among Medicare beneficiaries, the 30-day readmission rate after major joint replacement has been reported to range from 5.9% to 8.5% for the time period of 1991–2008 and 6.2% for 2006–2015.[18,19] Single-center studies that were not limited to Medicare beneficiaries reported a 30-day readmission rate of 6.2% and 4.4% after primary TKR and THR, respectively.[20,21] Studies with a focus on patients with inflammatory arthritis (IA) have also reported on the risk for readmission after replacement.[22,28,31] Singh et al reported arthritis-specific 90-day readmission rates after knee or hip replacement to be 8.5% and 6.7% in persons with RA and OA, respectively.[22] Based on an age- and sex-matched study population of 768 persons with RA and 3940 with OA included in the Taiwan National Health Insurance Research Database, Kang et al reported that 90-day readmission rates were higher in patients with RA (14.2%) vs OA (11.3%).[31] Our study provides the 30-day readmission risk among persons with RA vs OA after primary joint replacement among a nationally representative US study population. In our cohort, the crude 30-day readmission rate was 3.5%, which was significantly higher among patients with RA than those with OA (4.0% vs 3.5%, $P = 0.0003$). Patients with RA who underwent primary TKR and THR had an 11% and 39% increase in the odds of 30-day rehospitalization, respectively, compared to patients with OA.

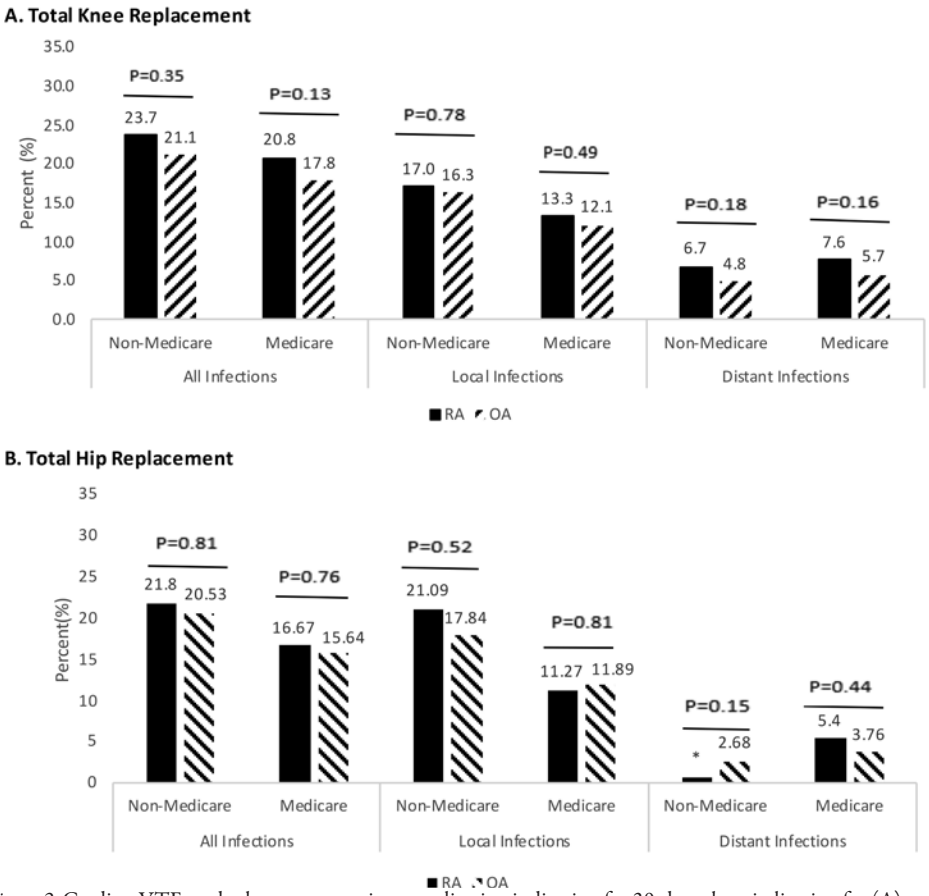

Figure 2. Cardiac, VTE, and other postoperative complication indication for 30-day rehospitalization for (A) total knee replacement, and (B) total hip replacement. * Cell sizes n < 10 not reported as per HCUP reporting recommendations. HCUP: Healthcare Cost and Utilization Project; N/A: not applicable; OA: osteoarthritis; RA: rheumatoid arthritis; VTE: venous thromboembolism.

Infections, including prosthetic joint infections, represent a major postoperative concern after joint replacement surgery. Factors such as immunosuppressive medications, increased operating time, hematomas, and surgical site infections, along with several comorbid conditions including obesity, malignancy, and RA, have been associated with increased risk for prosthetic joint infections.[36] The association between RA and infections may be due to factors such as disease-related altered immune state, comorbid conditions, and immunosuppressive treatment regimens including corticosteroids, conventional disease-modifying antirheumatic drugs (DMARDs), and biologic DMARDs. George et al reported the rate of postoperative hospitalized infections occurring within 30 days among Medicare participants with RA who underwent elective hip or knee replacement as 9.0%.[19] In a matched case-control study, patients with RA had 2-fold higher risk of serious infections.[37] Among patients receiving knee replacement, Stundner et al reported a significantly higher rate of infections among persons with RA vs OA (4.5% vs 3.8%, $P < 0.01$).[38] As for posthip replacement, a higher incidence of sepsis (0.40% vs 0.14%, $P < 0.01$), pneumonia (1.21% vs 0.80%, $P = 0.0036$), and all other infections (6.32% vs 4.38%, $P < 0.01$) was reported in persons with RA vs OA.[39] In contrast, a study by Michaud et al using data from the Veterans Affairs Surgical Quality Improvement Program to compare the 30-day postoperative hip and knee replacement rate of infections found no significant difference in the infection rates (4.17% vs 4.15%, $P = 0.97$) or in the relative risk between the RA and OA groups (OR 1.02, 95% CI 0.72–1.47).[40] Our study assessed the risk of both local and distant infections at 30 days after primary TKR and THR. Our findings did not identify a significant difference between patients with RA and OA with respect to the risk of infections, a finding that was consistent among non-Medicare and Medicare patients.

In addition to infections, other postoperative complications such as wound dehiscence, hematomas, and seromas could complicate patient recovery. Dislocation, for example, can be a potential early complication after hip replacement. The rates and contributing factors to postoperative hip dislocation after hip replacement have been previously published.[32,41,42,43] Dislocation rates as high as 11% have been reported after hip replacement,[32] and it is reportedly more common in patients with RA. Ravi et al reported that the rate of hip dislocations after hip replacement was 2.6% and 1.2% among patients with RA vs OA, respectively.[30] Zwartelé et al reported on a risk of dislocation more than 3-fold greater among those with IA relative to those without.[32] The results of our study did not reveal any significant difference

between RA and OA with respect to postoperative complications, including dislocation of internal joint prothesis, wound disruption, postoperative seroma, or hematoma.

Studies reporting on the risk of VTE among patients with RA have been mixed, with some reporting a higher risk while others a decreased or similar risk as compared with patients with OA.[12,44,45,46] We found the rate of VTE events at 30 days post-TKR and also among non-Medicare patients who underwent THR to be lower among patients with RA as compared with OA. In contrast, after THR, Medicare patients with RA had a higher rate of VTE events as compared with those with OA. Several possibilities may account for our findings. First, given our need to rely on ICD codes provided in the NRD to capture diagnoses, there may have been missed patient characteristics or diagnoses that could have led to differential outcomes. Alternatively, patients with RA may have had greater limitations in their mobility before and/or after THR, leading to a greater risk of VTE events. There may also have been a differential detection bias in the post-THR phase. Last, we could account for neither the duration nor the severity of inflammation, either in acute or chronic phases, in the patients with RA; this could have affected hypercoagulability.

It is important to highlight several strengths and limitations of our study. The main strength of our study is the use of a nationally representative US study population that included patients with and without Medicare. Several limitations of our study include lack of information on medication use, including immunosuppressives used to treat RA, as well as lack of data on functional status, duration, and severity of RA, and specific details regarding the operation such as duration and type of prosthetic implant. Since NRD lacks patient identifiers, the possibility of multiple index hospitalizations for the same patient undergoing primary THR and TKR cannot be excluded.

In summary, patients with RA are at a significantly higher risk for a 30-day rehospitalization after both primary TKR and THR surgery in both non-Medicare and Medicare payer populations. There was no significant difference between patients with RA and OA with respect to infections, postoperative complications, or cardiac events within the 30-day follow-up period. However, there was a statistically higher rate of VTE as the indication for readmission in patients with RA and Medicare.

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Correction

Risk of 30-day Readmission After Knee or Hip Replacement in Rheumatoid Arthritis and Osteoarthritis by Non-Medicare and Medicare Payer Status

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J Rheumatol 2022; doi:10.3899/jrheum.201370

Figure 2 was printed incorrectly and is a duplicate of Figure 1. The figure legends are correct.

This correction applies to the print edition and the First Release published online on December 15, 2021. The correct Figure 2 appears online. We apologize for this error.

doi:10.3899/jrheum.201370.C1