ACR Open Rheumatology
Vol. 4, No. 4, April 2022, pp 332–337
DOI 10.1002/acr2.11406

American College of Rheumatology
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BRIEF REPORT

Provider Specialty and the Use of Disease-Modifying Antirheumatic Drugs for Rheumatoid Arthritis Among Older Adults in the 2005-2016 National Ambulatory Medical Care Survey

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Objective. We compared disease-modifying antirheumatic drug (DMARD) use for older adults with rheumatoid arthritis (RA)-related ambulatory visits from rheumatologists and primary care providers (PCPs).

Methods. In this study of national sample office visits, we characterized ambulatory visits by older adults 65 years of age or older seen by rheumatologists or PCPs for diagnosis of RA using the 2005-2016 National Ambulatory Medical Care Survey. We analyzed patterns and trends of DMARD use using descriptive statistics and multivariable analyses by provider specialty.

Results. We identified 518 observations representing 7,873,246 ambulatory RA visits by older adults over 12 years; 74% were with rheumatologists. Any DMARD use was recorded at 56% of rheumatologist and 30% of PCP visits. Among visits with any DMARD use, 20% of rheumatologist visits had two or more DMARDs compared with 6% of PCP visits. Over the 12-year study period, there was no statistical difference in trend of any or conventional synthetic DMARD use at visits by provider specialty, adjusted for patient characteristics, non-DMARD polypharmacy and multimorbidity. However, biologic DMARD use was more likely to incrementally increase with rheumatologist compared with PCP visits ($P = 0.003$).

Conclusion. DMARD use for older adults with RA remains low from both rheumatologists and PCPs, including biologic DMARDs, even though American College of Rheumatology guidelines recommend earlier and more aggressive treatment of RA. With predicted shortages in the rheumatology workforce and maldistribution of rheumatology providers, PCPs may play an increasingly important role in caring for older adults with RA. Further research is needed to understand to optimize appropriate use of DMARDs in older patients with RA.

INTRODUCTION

The American College of Rheumatology (ACR) updated guidelines for the pharmacologic management of rheumatoid arthritis (RA) in 2021 (1). Since its release in 2008, subsequent updates to the ACR treatment guidelines endorsed earlier and more aggressive use of disease-modifying antirheumatic drugs (DMARDs) to achieve low RA disease activity or remission using a treat-to-target approach. However, there are no tailored age-specific treatment guidelines, and older adults are less likely to receive aggressive therapy for reasons of polypharmacy and multimorbidity (2,3). Moreover, disparate treatment of RA in older adults is observed despite some data suggesting that the relative risk of adverse effects associated with DMARDs may be similar across the older age spectrum (4,5). This raises concerns for quality of care as a growing population of older adults are living with RA owing to increased life expectancy, along with advancement in understanding and treatment of rheumatic diseases (6,7).

Although rheumatologists are critical to the care of patients with RA, primary care providers (PCPs) are often the first to encounter patients with arthritis symptoms and play a unique role in the early identification of and timely referral to rheumatologists for late-onset RA in older adults (8,9).

Research reported in this publication was supported by the National Institute on Aging, part of the NIH, under awards 1-R03-AG-067975-01 (Lee) and P30-AG-024824-06 (Yung).

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No potential conflicts of interest relevant to this article were reported.

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Submitted for publication November 15, 2021; accepted in revised form December 16, 2021.

SIGNIFICANCE & INNOVATION

- Rheumatoid arthritis (RA) disproportionately affects older adults and yet receive less aggressive treatment, raising concern for gaps in care.
- In a large nationally representative sample of office visits, only 45% of all ambulatory visits by older adults with a diagnosis of RA to rheumatologists and primary care providers were associated with prescription of disease-modifying antirheumatic drugs (DMARDs).
- DMARD use at ambulatory visits related to RA for older adults differed by provider specialty. Primary care providers account for one in four ambulatory RA visits among older adults; however, they are less likely to prescribe DMARDs, suggesting a potential target of intervention to improve undertreatment.
- Understanding drivers of differential prescription patterns of DMARDs may inform opportunities to optimize care of older adults with RA.

Moreover, there is regional maldistribution of and projected shortfall in the rheumatology workforce in the United States (10). Therefore, PCPs are pivotal and may play an increasing role in the care of older patients with RA in areas with limited access to rheumatologists.

Better understanding of the overall prescribing practices for older adults with rheumatic diseases by provider specialty can inform interventions to optimize use of DMARDs; however, data in the United States are sparse. In this study, we used the National Ambulatory Medical Care Survey (NAMCS) data because they are a nationally representative sample of office visits with records of treatments and have been used to study prevalence of and factors associated with DMARD use for RA (11–14). In an early study using NAMCS data from 1996 to 2007, Solomon et al showed most visits coded with RA did not have an associated DMARD prescription (13). Another study using later NAMCS data showed any DMARD use was associated with visits with specialists and Medicare beneficiaries (2005-2014) (14). However, these studies did not focus on older adults and did not evaluate variations in DMARD prescriptions by provider specialty over time.

Therefore, this study aims to evaluate patterns and trends of DMARD use for older adults with RA by rheumatologists and PCPs, accounting for patient factors such as age, sex, polypharmacy, and multimorbidity burden and using recent most available NAMCS data.

PATIENTS AND METHODS

This was a study using the NAMCS from 2005 to 2016. NAMCS is an annual ambulatory-visit-based cross-sectional survey of nonfederal physician practices across the United States (11). The NAMCS database was considered for this study because its purposeful multistage stratified sampling strategy and use of complex survey weights account for nonresponse and produce unbiased national estimates about the provision and use of ambulatory medical care services, including medications prescribed, in the United States. The outpatient visit is the unit of observation, rather than a sample of people, and physicians and patients are not repetitively sampled across the years. NAMCS data are publicly available, and institutional review board review is not required.

Study sample and variables. The study involved all sampled rheumatologist and PCP visits involving patients aged 65 years or older with RA recorded as one of the top three diagnoses specifically related to the visits by relevant *International Classification of Disease, Ninth Revision* codes 714.0, 714.2, and 714.81 (2005-2015) and *International Classification of Disease, 10th Revision* codes M05 and M06 (2016).

The independent variables were patient and physician characteristics recorded for each visit, including patient demographic characteristics, diagnosis, reason for visit, medications, and provider specialty. Patient age was used as a categorical variable because it is top coded at 92 years of age to maintain confidentially in the publicly available NAMCS data. We defined polypharmacy as a categorical variable based on the number of non-DMARD medications: less than three, three to five, or five or more recorded at each visit. Specific medical comorbidities are recorded and reported as a summary count in NAMCS. The survey years were grouped in consecutive three-year blocks (2005-2007, 2008-2010, 2011-2013, and 2014-2016) across the 12-year study period as recommended by NAMCS to provide more reliable annual visit rate estimates (11).

DMARD use (RA treatment). NAMCS records medications prescribed, ordered, supplied, administered, or continued at each visit, according to the Multum Lexicon Drug Database scheme. We dichotomized visits by patterns of DMARD use categorized as follows: any DMARD, any conventional synthetic DMARD (csDMARD), and any biologic DMARD (bDMARD) use. Five csDMARDs (methotrexate, leflunomide, azathioprine, hydroxychloroquine, and sulfasalazine) and nine bDMARDs (adalimumab, etanercept, certolizumab, golimumab, infliximab, abatacept, anakinra, tofacitinib, and tocilizumab) were identified based only on the first eight listed medications to be consistent across all years.

Statistical analyses. Data were analyzed using survey design elements, including visit weights to account for the complex multistage survey design, which incorporates several stages of clustering, stratification, and probabilistic sampling (11). Descriptive analyses were used to evaluate sampled visits and prescribing practices of DMARDs over the 12-year study period

by provider specialty. We used survey-weighted multivariable logistic regression models, adjusting for patient age, sex, race and ethnicity, non-DMARD polypharmacy, and burden of multimorbidity to evaluate patterns and trends in DMARD use by provider specialty. We performed marginal analyses to determine the predicted proportion of older adult ambulatory visits for RA by patterns of DMARD use from rheumatologists and PCPs.

We conducted sensitivity analyses by varying definition of the time period. Data were analyzed using Stata/MP 17 (Stata Corp). A *P* value ≤0.05 is considered statistically significant.

RESULTS

Characteristics of the study population. We identified 518 observations (preweighted sample size) corresponding to 7,873,246 ambulatory visits associated with RA from older adults over 12 years; 74% were with rheumatologists. Characteristics of these visits are described in Table 1. The majority of visits were from women (72%) and non-Hispanic White patients (85%). One in five visits (21%) were associated with greater than or equal to three non-RA comorbid conditions and 60% with use of greater than or equal to five non-DMARD medications. Over the

Table 1. Characteristics of ambulatory visits related to rheumatoid arthritis for older adults in the NAMCS from 2005 to 2016[a] (weighted to US national estimates)

Variables	2005-2007 (n = 1.55 M)	2008-2010 (n = 1.21 M)	2011-2013 (n = 2.23 M)	2014-2016 (n = 2.88 M)	*P*
Patient demographic and clinical characteristics, %					
Age					0.076
65-74	49.4	55.2	68.8	67.9	
≥75	50.6	44.8	31.2	32.1	
Female	72.4	74.2	81.6	63.7	0.013
Race and ethnicity					0.377
Non-Hispanic White	81.9	83.2	86.8	85.6	
Non-Hispanic Black	10.0	9.7	3.7	3.7	
Hispanic	4.7	3.5	7.4	2.6	
Other[b]	3.4	3.6	2.1	8.1	
No. of comorbid conditions[c]					0.715
1-2	78.4	71.2	78.2	82.0	
≥3	21.6	28.8	21.8	18.0	
No. non-DMARD medications					0.035
<3	13.1	25.9	24.1	33.2	
3-5	9.2	24.3	25.9	4.4	
≥5	77.7	49.8	50.0	62.4	
Provider visit characteristics, %					
Provider specialty					0.071
Rheumatology	60.7	59.5	76.7	85.3	
Established patient visit	89.6	95.8	92.0	94.8	
New patient visit	10.4	4.2	8.0	5.2	
Primary care	39.3	40.5	23.3	14.7	
Established patient visit	94.2	99.0	90.3	99.6	
New patient visit	5.8	1.0	9.7	3.7	
Major reason for visit					0.437
Rheumatology					
New condition	20.1	6.3	7.1	1.6	
Chronic, routine	67.1	87.1	75.1	70.3	
Chronic, flare	5.4	5.5	17.0	10.0	
Other	7.4	1.1	0.8	18.1	
Primary care					
New condition	21.8	38.7	28.8	15.9	
Chronic, routine	65.5	30.1	44.1	56.5	
Chronic, flare	4.7	19.9	9.5	7.1	
Other	8.0	11.3	17.6	20.5	

Abbreviations: DMARD, disease-modifying antirheumatic drug; M, million; NAMCS, National Ambulatory Medical Care Survey.
[a] Survey weighting and clusters accounted for reflecting unbiased national estimates of visit occurrences for the proportion of the study population.
[b] Other race and ethnicity includes other race or multiple-race, Non-Hispanic.
[c] No. of comorbidities, excluding RA diagnosis.

Table 2. Patterns and trends of DMARD use for older adults in ambulatory visits related to RA from rheumatologists and primary care providers in the NAMCS, 2005-2016 (weighted to US national estimates)

Provider specialty	Patterns of DMARD use	Proportion of older adult RA visits (N = 7,873,246)				
		2005-2007	2008-2010	2011-2013	2014-2016	P^a
Rheumatologist	Any DMARDs	49.4	59.7	54.7	44.7	0.555
	csDMARDs	40.1	48.7	42.5	20.7	0.013
	bDMARDs	12.8	23.7	22.8	25.4	0.279
Primary care	Any DMARDs	30.8	32.8	37.1	22.2	0.723
	csDMARDs	30.8	28.1	34.6	22.2	0.724
	bDMARDs	0.0	7.0	6.3	1.7	0.363

Abbreviations: bDMARD, biologic DMARD; csDMARD, conventional synthetic DMARD; DMARD, disease-modifying antirheumatic drug; RA, rheumatoid arthritis.
[a] *P* value compares 2005-2007 with 2014-2016.

study period, increasingly more RA-related visits were to a rheumatologist; however, a greater proportion of PCP visits were for the reason new condition evaluation (26%) compared with rheumatologist visits (7%).

Prescribing practice of DMARDs. Over the 12-year study period, any DMARD use was associated with less than half (45%; 95% confidence interval [95% CI] 46%-63%) of the approximately 7.87 million ambulatory visits related to RA among older adults in the United States and more frequently with visits to rheumatologists (50%; 95% CI 41%-60%) compared with PCPs (31%; 95% CI 22%-41%). The unadjusted proportions of visits to rheumatologists and PCPs with DMARD use in 3-year blocks across the study period are described in Table 2. Any DMARD use with rheumatologist visits remained mostly stable over the study period; however, csDMARD use halved in 2014-2016

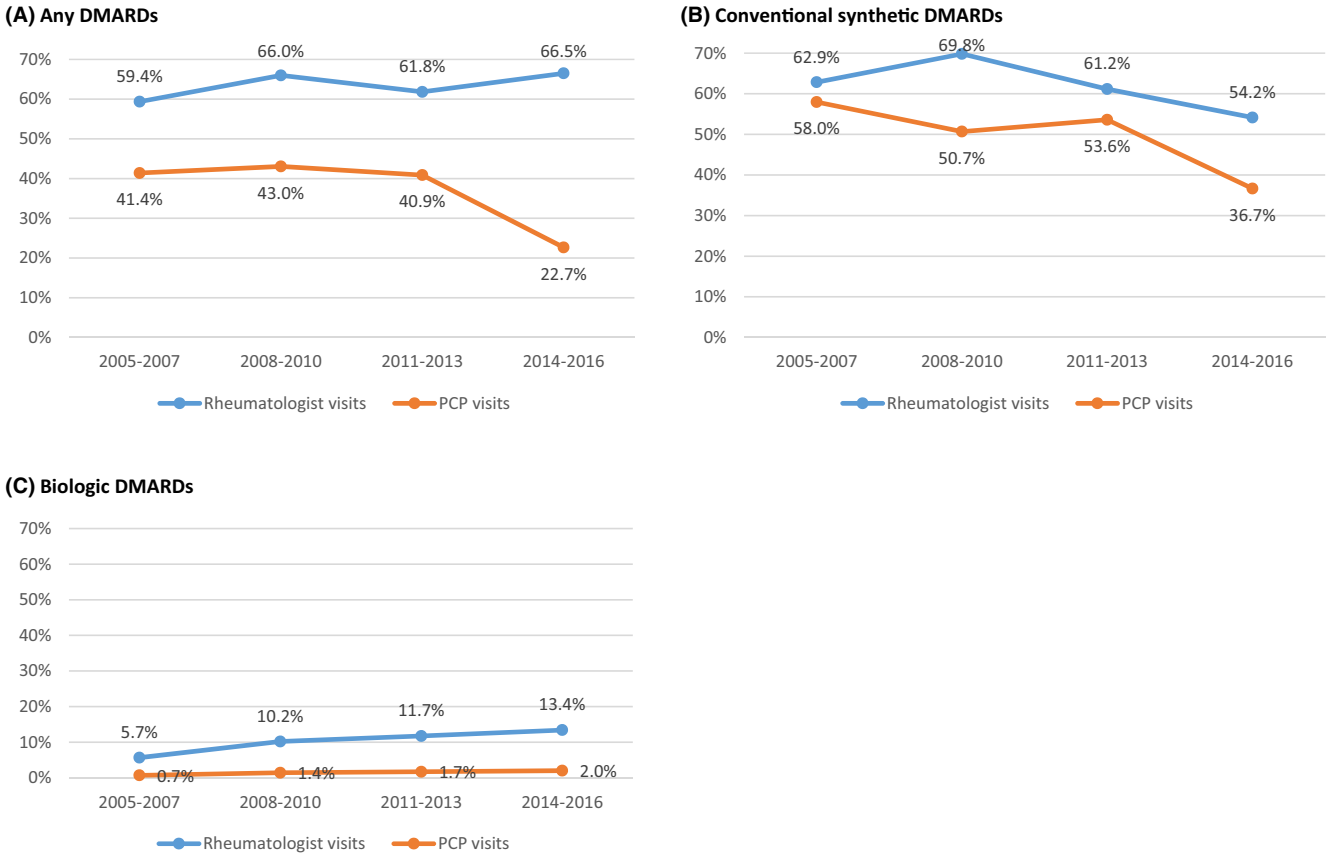

Figure 1. Predicted probability of DMARDs in visits related to rheumatoid arthritis among older adults by patterns of use and provider specialty in the NAMCS, 2005-2016 (weighted to US national estimates)
**All figures adjusted for patient age, sex, race/ethnicity, non-DMARD polypharmacy, number of co-morbidities and survey weights to provide national estimates.

compared with 2005-2013, and bDMARD use in 2008-2016 was double that in 2005-2007. Among PCP visits, any DMARD use closely correlated with csDMARD use, in which both decreased by a third in 2014-2016 compared with 2005-2013, whereas bDMARD use overall remained low.

To better understand trends in prescribing practice by provider specialty, we analyzed predicted proportions of visits, adjusting for patient age, sex, race and ethnicity, non-RA multimorbidity count, and non-DMARD polypharmacy (Figure 1). Across the 12-year study period, there were no statistical differences in trends of any DMARD (P = 0.259) and csDMARD (P = 0.658) use between rheumatologists and PCPs. However, there was a greater predicted proportion of and incremental increase in bDMARD prescriptions from visits to rheumatologists compared with PCPs (P = 0.004).

The ACR guidelines recommend methotrexate as first-line DMARD therapy (1); and for RA-related visits by older adults, rheumatologists and PCPs were comparable in their use of methotrexate as well as other csDMARDs (Supplemental Table 1). However, bDMARD use was five times more frequent at rheumatologist visits than at PCP visits during the study period. The ACR also recommends limiting use of glucocorticoids to treat pain and inflammation in patients with RA because of their toxicity (1,13), and yet monotherapy with glucocorticoids accounted for one in five rheumatologist and PCP visits without any DMARDs (Supplemental Table 2). The predicted mean numbers of any DMARD medications were 0.75 at rheumatologist visits and 0.42 at PCP visits, with adjustment for patient age, sex, race and ethnicity, non-RA multimorbidity count, and non-DMARD polypharmacy (Supplemental Table 3). Among visits with records of any DMARD use, 19% of rheumatologist and 6% of PCP visits were associated with two or more concurrent DMARD prescriptions. Of those visits with concurrent use of multiple DMARDs, two thirds of rheumatologist visits and all PCP visits were associated with csDMARD and bDMARD combination therapy.

Sensitivity analyses. Sensitivity analyses supported the main results. In analyses using 2005-2013 and 2014-2016 as two time blocks to account for the divergence in any DMARD use seen in Figure 1, there was no statistical difference in prescribing practice trends between visits to rheumatologists and PCPs (P = 0.146).

DISCUSSION

In this nationally representative ambulatory visit study over a 12-year period, DMARDs were recorded in less than half of all older adult visits for RA to rheumatologists and PCPs. ACR guidelines and Healthcare Effectiveness Data and Information Set quality measures outline that most patients with RA should receive some form of DMARDs to improve clinical, radiographic, and functional outcomes (1). Based on the literature, DMARD use in the 1990s and early 2000s was estimated in less than 50% of the RA population and less than 30% of older adults with RA (3,12,13). Findings from our study suggest that DMARD use in older adults remain low but improved in recent decades. This is likely reflective of the paradigm shift in RA treatment from step-up to early and aggressive use of DMARDs for a treat-to-target approach. In addition, a greater armamentarium of DMARDs became available in recent years, and Medicare introduced the Part D pharmacy benefit in 2006, which provides coverage for high-cost bDMARDs. Concerning yet was the finding that glucocorticoid use was high, as monotherapy or even when DMARDs were prescribed, which can have detrimental effects and allude to possible suboptimal use of DMARDs in older adults with RA.

Prescribing and therapeutic drug monitoring of DMARDs is complex, and prescribing practices differed by provider specialty. Older patients with RA with visits to a rheumatologist were more likely to be prescribed DMARDs, with a twofold increase in bDMARD use over time. In a previous cross-sectional study, we showed that rheumatologists differ in their propensity to prescribe bDMARDs for older adults, and high-prescribers are more likely to care for those 75 years of age or older, which suggests that experience caring for an older panel may influence prescribing behavior (2). The trend in variability of bDMARD prescribing among rheumatologists is unknown, and further research to understand drivers of differential prescription patterns of bDMARDs may inform opportunities to optimize use of these high-risk and high-cost medications in older adults with RA.

Although rheumatologists are critical in RA management, PCPs are often the first to encounter and take on the role of primary prescriber for patients with RA (3,8,9). In our study, PCPs accounted for one in four older adult ambulatory visits for RA and were more likely than rheumatologists to have visits for new condition evaluation. PCPs were less likely to prescribe DMARDs and mostly used csDMARDs, at comparable frequencies with rheumatologists but more as monotherapy. This difference is likely attributable to several factors, including knowledge, comfort, and ease of prescribing from nonspecialty clinics. With limited access to rheumatologists in certain regions and projected shortfall in the rheumatology workforce in the United States (10), PCPs are expected to continue to play an important role in the care of patients with RA. Thus, challenges faced by PCPs leading to undertreatment should be addressed, and targeted interventions to provide education and expedite referrals to rheumatologists may improve care of older adults with RA.

This study has several limitations common to complex survey-based observational analyses. The unit of analysis is the ambulatory visit associated with an RA diagnosis and not persons with RA, and RA cases are not followed longitudinally over 12 years because different individuals are sampled every year. Similar to other studies using NAMCS data with acceptable accuracy, we used up to the first three diagnoses and eight medications to evaluate DMARD use for visits likely to have been for RA

(13,14). However, diagnosis cannot be confirmed, and medication data are not validated against the prescription date, nor do they include dosage information. NAMCS also does not include information about several sociodemographic variables, such as income and education, and disease activity measures that may influence prescribing practices. Despite some limitations, the use of survey weights produces unbiased national estimates and allowed us to study a relatively large group of visits over a long period of time.

In conclusion, DMARD use for older adults with RA remains low from both rheumatologists and PCPs, including bDMARDs, even though ACR guidelines recommend earlier and more aggressive treatment of RA. With predicted shortages in the rheumatology workforce and maldistribution of rheumatology providers, PCPs may play an increasingly important role in the care for older adults with RA. Further research is needed to understand how to optimize delivery of DMARDs to patients RA.

ACKNOWLEDGMENTS

Dr. Lee gratefully acknowledges Prof. Matthew A. Davis for advice and critical reading of the manuscript.

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