Use of Disease-modifying Antirheumatic Drugs for Inflammatory Arthritis in US Veterans: Effect of Specialty Care and Geographic Distance

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ABSTRACT. ***Objective.*** To evaluate the effect of access to and distance from rheumatology care on the use of disease-modifying antirheumatic drugs (DMARD) in US veterans with inflammatory arthritis (IA).

Methods. Provider encounters and DMARD dispensations for IA (rheumatoid arthritis, psoriatic arthritis, and ankylosing spondylitis) were evaluated in national Veterans Affairs (VA) datasets between January 1, 2015, and December 31, 2015.

Results. Among 12,589 veterans with IA, 23.5% saw a rheumatology provider. In the general IA population, 25.3% and 13.6% of veterans were exposed to a synthetic DMARD (sDMARD) and biologic DMARD (bDMARD), respectively. DMARD exposure was 2.6- to 3.4-fold higher in the subpopulation using rheumatology providers, compared to the general IA population. The distance between veterans' homes and the closest VA rheumatology site was < 40 miles (Near) for 55.9%, 40–99 miles (Intermediate) for 31.7%, and ≥ 100 miles (Far) for 12.4%. Veterans in the Intermediate and Far groups were less likely to see a rheumatology provider than veterans in the Near group (RR = 0.72 and RR = 0.49, respectively). Exposure to bDMARD was 34% less frequent in the Far group than the Near group. In the subpopulation who used rheumatology care, the bDMARD exposure discrepancy did not persist between distance groups.

Conclusion. Use of rheumatology care and DMARD was low for veterans with IA. DMARD exposure was strongly associated with rheumatology care use. Veterans in the general IA population living far from rheumatology sites accessed rheumatology care and bDMARD less frequently than veterans living close to rheumatology sites. (J Rheumatol First Release November 15 2017; doi:10.3899/jrheum.170554)

Key Indexing Terms:
HEALTH SERVICE NEED
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Arthritis and other rheumatic conditions (AORC) are common and burdensome diseases. AORC affect more than 21% (46.4 million) of US adults, and about 10% of US adults have arthritis-attributable activity limitations[1]. In a study evaluating healthcare use involving AORC from 2007 to 2012, emergency department visits rose by 34%, hospitalizations increased by 22%, and charges increased from 30% to 70%[1].

Healthcare use differs according to rurality, particularly with specialty care[2,3]. Within a Veterans Health Administration (VHA) review, rural residents were less likely to see specialists than urban residents, and the low availability of specialists harmed health outcomes[4]. In a Southern US population, rural residence was associated with less use of rheumatology care and arthritis medications and lower quality of life[5,6]. Further, higher rates of emergency department visits for AORC in rural populations suggested that rural residents may not have accessed optimal outpatient care for AORC as frequently as urban residents[1].

Access to specialty care is particularly important for AORC subsets that require longterm immunosuppressive therapies. Specifically, patients with inflammatory arthritis (IA), including rheumatoid arthritis (RA), psoriatic arthritis

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(PsA), and ankylosing spondylitis (AS), often require indefinite treatment with disease-modifying antirheumatic drugs (DMARD). Primary care providers usually defer IA management to rheumatologists because DMARD therapy requires specialized knowledge and routine toxicity monitoring. There are insufficient numbers of rheumatologists to meet the growing need for rheumatology care, particularly in rural areas[7,8], and patients living far from rheumatologists are at high risk for undertreatment. The consequences of undertreatment can be debilitating, with chronic pain, functional limitations, irreversible joint destruction, and longterm disability[9,10,11,12].

The goal of our study was to identify healthcare use gaps for veterans with IA. Specifically, we evaluated the effect of rheumatology care and geographic distance on DMARD use.

MATERIALS AND METHODS

Design and data sources. This cohort study used historical data from the Corporate Data Warehouse, a national repository of data from the VHA medical record system, and other VHA clinical and administrative systems[13]. The patient Integration Control Number was used to link patients across VHA stations. Data were housed and analyzed within the Veterans Affairs Informatics and Computing Infrastructure[14].

Population. Veterans were included with ≥ 2 International Classification of Diseases, 9th ed (ICD-9) codes on different days for RA (714.0), PsA (696.0) or AS (720.0) between January 1, 2005, and December 31, 2014, and ≥ 1 outpatient visit between January 1, 2015, and December 31, 2015. Veterans with address changes during 2015 were excluded. For the provider use analyses, subgroups with exposure to ≥ 1 synthetic DMARD (sDMARD) or ≥ 1 biologic DMARD (bDMARD) during 2015 were evaluated. For the DMARD use analyses, the subgroup with ≥ 1 rheumatology visit during 2015 was analyzed.

Veterans were assigned to IA subtypes (RA, PsA, or AS) by ICD-9 code. Patients with ICD-9 codes for > 1 IA subtype were assigned to the IA subtype with the largest number of ICD-9 codes. Chart review was used to classify veterans with equal numbers of ICD-9 codes for ≥ 2 IA subtypes. This research was conducted in compliance with the Helsinki Declaration, with the approval of the University of Utah Institutional Review Board (IRB_00052363).

Variables. The independent variables were rheumatology encounters and distance. Rheumatology encounters were identified with stop codes 314.x. Rheumatology encounters without a face-to-face encounter with a rheumatology provider were excluded (telephone encounters, etc.). Distance was measured with geocoding, by calculating the distance between the veteran's home address and the geographically closest Veterans Affairs (VA) rheumatology site, using longitude and latitude coordinates. Driving distance data were unavailable. We assumed that veterans received rheumatology care at the rheumatology site located closest to their home. Rheumatology sites were defined as VA sites with ≥ 50 rheumatology encounters in 2015.

Dependent variables measuring DMARD use included the number of veterans with ≥ 1 DMARD, mean number of DMARD per veteran, and proportion of days covered (PDC) during 2015. The number of veterans with ≥ 1 DMARD included veterans with ≥ 1 dispensation for any sDMARD or bDMARD during the study period. Number of sDMARD and bDMARD included the number of sDMARD and bDMARD medications dispensed during 2015 (multiple dispensations of the same DMARD were counted as exposure to 1 DMARD). Veterans were included in both the sDMARD and bDMARD groups if sDMARD and bDMARD were dispensed during 2015. PDC included the mean number of days between January 1, 2015, and December 31, 2015, that were covered by the amount of medication dispensed to the veteran. Days covered in 2015 by DMARD dispensed in late 2014 were included in the PDC. sDMARD included apremilast, auranofin, azathioprine, chloroquine, cyclophosphamide, cyclosporine, gold sodium thalomalate, hydroxychloroquine, leflunomide, methotrexate, minocycline, penacillamine, sulfasalazine, and tofacitinib. bDMARD included abatacept, adalimumab, anakinra, certolizumab, etanercept, golimumab, infliximab, rituximab, secukinumab, tocilizumab, and ustekinumab. Covariates included age, sex, race, and ethnicity.

Dependent variables measuring provider use included number of veterans with ≥ 1 rheumatology visit, mean number of provider visits (any specialty) for IA per veteran, and mean number of rheumatology visits. Visits for IA with providers (any specialty) were identified with ICD-9 codes for RA, PsA, or AS. The category of any specialty included all primary care and specialist providers. IA subtype (RA, PsA, AS) data were shown for the number of veterans with DMARD exposures, because exposures are expected to differ according to subtype. IA subtype comparisons were not included for all variables because the sample sizes were insufficient.

Statistical analyses. Descriptive statistics were summarized as means with SD for continuous variables and frequencies with percentages for categorical variables. For all variables, 95% CI were calculated. For continuous outcome variables (i.e., PDC), outcomes were compared with mean differences (MD), and linear regression was used to adjust for covariates. For count variables (i.e., no. unique DMARD), outcomes were compared with mean ratios, and Poisson regression was used to adjust for covariates. For dichotomous outcomes (i.e., exposure to DMARD), relative risk (RR) was used to compare outcomes, and Poisson regression with robust standard errors was used to adjust for covariates. Statistical analyses were completed with SAS Enterprise Guide 7.1.

RESULTS

Study population. The population was composed of 12,589 veterans with IA, including 9733 (77.3%) with RA, 1706 (13.6%) with PsA, and 1150 (9.1%) with AS. Distance from the closest VA rheumatology site was Near (< 40 miles) for 55.9%, Intermediate (40–99 miles) for 31.7%, and Far (≥ 100 miles) for 12.4% of veterans. The mean age range was 70.3–71.4 years, and 93.2%–95.3% were male (Table 1).

Provider use in 2015. For the entire IA population, the number of veterans with ≥ 1 rheumatology visit (in all distance groups) was 2963 (23.5%). Comparisons between distance groups demonstrated higher provider use in the Near group than the Intermediate and Far groups, as measured by percentage of veterans with ≥ 1 rheumatology visit (28.1%, 19.5%, and 13.1%, respectively), mean number of provider visits (any specialty) for IA (1.7, 1.4, and 1.3, respectively), and mean number of rheumatology visits (0.8, 0.5, and 0.3, respectively; Table 2). The adjusted RR of not having a rheumatology visit during 2015 was 28% higher in the Intermediate group and 51% higher in the Far group than the Near group (Table 3).

For the subpopulation with sDMARD exposure, provider use was higher in the Near group than the Intermediate and Far groups, as measured by percentage of veterans with ≥ 1 rheumatology visit (71.3%, 54.5%, and 32.9%, respectively), mean number of provider visits (any specialty; 3.9, 3.3, and 2.6, respectively), and mean number of rheumatology visits (2.2, 1.5, and 0.8, respectively; Table 2). The adjusted RR of not having a rheumatology visit during 2015 was 20% higher in the Intermediate group and 50% higher in the Far group than the Near group (Table 3).

Table 1. Demographics according to distance from closest VA rheumatology site.

Characteristics	Near (< 40 miles), n = 7038		Intermediate (40–99 miles), n = 3995		Far (≥ 100 miles), n = 1556	
	Freq/Mean (%/SD)	95% CI	Freq/Mean (%/SD)	95% CI	Freq/Mean (%/SD)	95% CI
Age, yrs	70.3 (12.1)	70.0–70.6	71.0 (11.3)	70.7–71.4	71.4 (11.5)	70.9–72.0
Male	6558 (93.2)	92.6–93.8	3808 (95.3)	94.6–95.9	1481 (95.2)	94.0–96.1
Race						
White	5554 (78.9)	78.0–79.9	3130 (78.4)	77.0–79.6	1242 (79.8)	77.8–81.7
Black	641 (9.1)	8.5–9.8	293 (7.3)	6.6–8.2	58 (3.7)	2.9–4.8
Other*	141 (2.0)	1.7–2.4	51.0 (1.3)	1.0–1.7	36 (2.3)	1.7–3.2
Unknown†	702 (10.0)	9.3–10.7	521 (13.0)	12.0–14.1	220 (14.1)	12.5–16.0
Ethnicity						
Hispanic	342 (4.9)	4.4–5.4	138 (3.5)	2.9–4.1	67 (4.3)	3.4–5.4
Non-Hispanic	6323 (89.8)	89.1–90.5	3561 (89.1)	88.1–90.1	1377 (88.5)	86.8–90
Unknown	373 (5.3)	4.8–5.9	296 (7.4)	6.6–8.3	112 (7.2)	6.0–8.6

*Other race includes American Indian or Alaska Native, Asian, Native Hawaiian, or Other Pacific Islander. †Unknown includes declined to answer, unknown by patient, and null. VA: US Veterans Administration; Freq: frequency.

Table 2. Provider use in 2015.

	Near (< 40 miles)		Intermediate (40–99 miles)		Far (≥ 100 miles)	
	Freq/Mean (%/SD)	95% CI	Freq/Mean (%/SD)	95% CI	Freq/Mean (%/SD)	95% CI
All veterans with IA	n = 7038		n = 3995		n = 1556	
No. veterans with ≥ 1 rheumatology visit	1979 (28.1)	27.1–29.2	780 (19.5)	18.3–20.8	204 (13.1)	11.5–14.9
No. provider visits (any specialty) per veteran	1.66 (2.92)	1.6–1.73	1.40 (2.75)	1.31–1.48	1.26 (2.36)	1.15–1.38
No. rheumatology visits per veteran	0.79 (1.57)	0.75–0.83	0.49 (1.21)	0.46–0.53	0.30 (0.96)	0.26–0.35
Subgroup of all IA exposed to sDMARD in 2015	n = 1757		n = 994		n = 431	
No. veterans with ≥ 1 rheumatology visit	1253 (71.3)	69.2–73.4	542 (54.5)	51.4–57.6	142 (32.9)	28.7–37.5
No. provider visits (any specialty) per veteran	3.94 (3.96)	3.76–4.13	3.30 (3.87)	3.06–3.54	2.57 (3.31)	2.26–2.88
No. rheumatology visits per veteran	2.19 (2.04)	2.09–2.28	1.52 (1.79)	1.41–1.63	0.8 (1.43)	0.66–0.93
Subgroup of all IA exposed to bDMARD in 2015	n = 1051		n = 507		n = 148	
No. veterans with ≥ 1 rheumatology visit	875 (83.3)	80.9–85.4	387 (76.3)	72.4–79.8	89 (60.1)	52.1–67.7
No. provider visits (any specialty) per veteran	4.78 (4.42)	4.52–5.05	4.62 (5.36)	4.16–5.09	4.22 (5.08)	3.40–5.04
No. rheumatology visits per veteran	2.53 (2.15)	2.4–2.66	2.02 (1.81)	1.86–2.18	1.53 (1.9)	1.23–1.84

IA: inflammatory arthritis; Freq: frequency; sDMARD: synthetic disease- modifying antirheumatic drugs; bDMARD: biologic DMARD.

For the subpopulation with bDMARD exposure, provider use was higher in the Near group than the Intermediate and Far groups, as measured by percentage of veterans with ≥ 1 rheumatology visit (83.3%, 76.3%, and 60.1%, respectively), mean number of provider visits (any specialty; 4.8, 4.6, and 4.2, respectively), and mean number of rheumatology visits (2.5, 2.0, and 1.5, respectively; Table 2). The adjusted RR of not having a rheumatology visit was 8% higher in the Intermediate group and 17% higher in the Far group than the Near group (Table 3).

DMARD use in 2015. For the entire IA population, DMARD exposure (sDMARD and/or bDMARD) occurred in 5304 (32.0%) veterans. There were 3182 (25.3%) veterans with sDMARD exposure (25.0% Near group, 24.9% Intermediate group, and 27.7% Far group; Table 4). Exposure to bDMARD occurred with 1706 (13.6%) veterans (14.9% Near group, 12.7% Intermediate group, and 9.5% Far group). In the adjusted analyses, veterans in the Far group were 13% more likely to receive ≥ 1 sDMARD than veterans in the Near group, while sDMARD exposure was similar in the Intermediate and Near groups (Table 5). Exposure to bDMARD was 12% lower in the Intermediate group and 34% lower in the Far group, compared to the Near group (Table 5).

For the subgroup with ≥ 1 rheumatology visit, both sDMARD and bDMARD use was higher in patients using rheumatology care compared to the general veteran population (Figure 1). With sDMARD, 65.4% veterans received ≥ 1 sDMARD (63.3% Near group, 69.5% Intermediate group, and 69.6% Far group; Table 4). With bDMARD, 45.6% were exposed to ≥ 1 bDMARD (44.2% Near group, 49.6% Intermediate group, and 43.6% Far group). In the adjusted analyses, veterans in the Intermediate and Far groups were 10% and 11% more likely to receive ≥ 1 sDMARD than veterans in the Near group, respectively (Table 5). Exposure to bDMARD was 12% higher in the Intermediate group than the Near group and similar in the Near and Far groups.

Table 3. Comparison of provider use, according to geographic distance from the closest rheumatology site in 2015.

	Intermediate vs Near				Far vs Near			
	Unadjusted ^RR/MR	95% CI	Adjusted † ^RR/MR	95% CI	Unadjusted ^RR/MR	95% CI	Adjusted † ^RR/MR	95% CI
All veterans with IA								
No. veterans with ≥ 1 rheumatology visit	0.69**	0.65–0.75	0.72**	0.67–0.78	0.47**	0.41–0.53	0.49**	0.43–0.56
No. provider visits (any specialty) per veteran	0.84**	0.81–0.87	0.86**	0.83–0.89	0.76**	0.72–0.80	0.79**	0.75–0.82
No. rheumatology visits per veteran	0.63**	0.59–0.66	0.65**	0.62–0.69	0.38**	0.35–0.42	0.41**	0.37–0.45
Subgroup exposed to sDMARD in 2015								
No. veterans with ≥ 1 rheumatology visit	0.76**	0.72–0.82	0.80**	0.75–0.85	0.46**	0.40–0.53	0.50**	0.43–0.57
No. provider visits (any specialty) per veteran	0.84**	0.80–0.87	0.86**	0.83–0.90	0.65**	0.61–0.69	0.69**	0.65–0.74
No. rheumatology visits per veteran	0.70**	0.65–0.74	0.73**	0.68–0.77	0.36**	0.33–0.41	0.39**	0.35–0.44
Subgroup exposed to bDMARD in 2015								
No. veterans with ≥ 1 rheumatology visit	0.92*	0.87–0.97	0.92*	0.87–0.97	0.72**	0.63–0.83	0.73**	0.64–0.84
No. provider visits (any specialty) per veteran	0.97	0.92–1.01	0.97	0.92–1.01	0.88*	0.81–0.96	0.90*	0.83–0.98
No. rheumatology visits per veteran	0.80**	0.74–0.86	0.81**	0.75–0.87	0.61**	0.53–0.69	0.62**	0.54–0.71

*p < 0.05. **p < 0.001. †Adjusted for age, race, ethnicity, and sex. ^RR (relative risk) used for no. veterans with ≥ 1 rheumatology visit. MR (mean ratio) used for no. provider visits (any specialty) and no. rheumatology visits per veteran. sDMARD: synthetic disease-modifying antirheumatic drugs; bDMARD: biologic DMARD; IA: inflammatory arthritis.

Table 4. DMARD use in 2015.

	Near (< 40 miles)		Intermediate (40–99 miles)		Far (≥ 100 miles)	
	Freq/Mean (%/SD)	95% CI	Freq/Mean (%/SD)	95% CI	Freq/Mean (%/SD)	95% CI
All veterans with IA	n = 7038		n = 3995		n = 1556	
No. veterans with ≥ 1 sDMARD	1757 (25.0)	24.0–26.0	994 (24.9)	23.6–26.3	431 (27.7)	25.5–30.0
No. sDMARD in veterans exposed to sDMARD	1.32 (0.57)	1.30–1.35	1.31 (0.55)	1.27–1.34	1.31 (0.57)	1.26–1.36
PDC in veterans exposed to sDMARD	0.72 (0.26)	0.71–0.74	0.73 (0.26)	0.72–0.75	0.75 (0.25)	0.72–0.77
No. veterans with ≥ 1 bDMARD	1051 (14.9)	14.1–15.8	507 (12.7)	11.7–13.8	148 (9.5)	8.2–11.1
No. bDMARD in veterans exposed to bDMARD	1.07 (0.28)	1.05–1.09	1.06 (0.26)	1.04–1.08	1.09 (0.33)	1.03–1.14
PDC in veterans exposed to bDMARD	0.71 (0.25)	0.69–0.72	0.70 (0.24)	0.68–0.73	0.73 (0.23)	0.69–0.77
Subgroup with ≥ 1 rheumatology visit	n = 1979		n = 780		n = 204	
No. veterans with ≥ 1 sDMARD	1253 (63.3)	61.2–65.4	542 (69.5)	66.2–72.6	142 (69.6)	63.0–75.5
No. sDMARD in veterans exposed to sDMARD	1.39 (0.62)	1.36–1.43	1.42(0.63)	1.37–1.47	1.5 (0.71)	1.38–1.62
PDC in veterans exposed to sDMARD	0.73 (0.25)	0.71–0.74	0.74 (0.26)	0.72–0.76	0.77 (0.25)	0.73–0.81
No. veterans with ≥ 1 bDMARD	875 (44.2)	42.0–46.4	387 (49.6)	46.1–53.1	89 (43.6)	37.0–50.5
No. bDMARD in veterans exposed to bDMARD	1.08 (0.30)	1.06–1.10	1.07 (0.29)	1.04–1.10	1.10 (0.34)	1.03–1.17
PDC in veterans exposed to bDMARD	0.71 (0.24)	0.70–0.73	0.71 (0.24)	0.69–0.73	0.73 (0.23)	0.68–0.77
IA subtypes (regardless of rheumatology visit)	n = 2305		n = 1221		n = 498	
RA, no. veterans with ≥ 1 sDMARD	1479 (27.9)	26.7–29.1	853 (26.9)	25.4–28.5	381 (30.2)	27.7–32.8
PsA, no. veterans with ≥ 1 sDMARD	223 (21.4)	19.1–24.0	125 (24.5)	21.0–28.4	39 (25.0)	18.9–32.3
AS, no. veterans with ≥ 1 sDMARD	55 (7.9)	6.1–10.2	16 (5.0)	3.1–8.0	11 (8.0)	4.5–13.8
RA, no. veterans with ≥ 1 bDMARD	590 (11.1)	10.3–12.0	330 (10.4)	9.4–11.5	99 (7.8)	6.5–9.5
PsA, no. veterans with ≥ 1 bDMARD	317 (30.5)	27.8–33.4	143 (28.0)	24.3–32.1	33 (21.2)	15.5–28.2
AS, no. veterans with ≥ 1 bDMARD	144 (20.8)	17.9–23.9	34 (10.7)	7.7–14.5	16 (11.7)	7.3–18.1

IA: inflammatory arthritis; Freq: frequency; sDMARD: synthetic disease-modifying antirheumatic drugs; bDMARD: biologic DMARD; PDC: proportion of days covered; RA: rheumatoid arthritis; PsA: psoriatic arthritis; AS: ankylosing spondylitis.

In the comparisons between IA subtypes, sDMARD exposure was lower in patients with AS than in RA and PsA in all distance groups (non-overlapping CI; Table 4). In the Near group, sDMARD use was lower in PsA than in RA. In all distance groups, bDMARD use was higher in PsA than RA and AS, and higher in AS than RA in the Near group.

DISCUSSION

Rheumatology provider use was strongly associated with geographic proximity to rheumatology sites. In particular, veterans living ≥ 100 miles (Far) from VA rheumatology sites were less than half as likely to see a rheumatologist as veterans living < 40 miles (Near) from a rheumatology site.

Table 5. Comparison of DMARD use, according to geographic distance from the closest rheumatology site in 2015.

	Intermediate vs Near				Far vs Near			
	Unadjusted		Adjusted†		Unadjusted		Adjusted†	
	^RR/MR/MD	95% CI	^RR/MR/MD	95% CI	^RR/MR/MD	95% CI	^RR/MR/MD	95% CI
All veterans with IA								
No. veterans with ≥ 1 sDMARD	1.10	0.93–1.07	1.01	0.94–1.08	1.11*	1.01–1.21	1.13*	1.03–1.24
No. sDMARD in veterans exposed to sDMARD	0.99	0.92–1.06	0.99	0.93–1.06	0.99	0.90–1.08	1.00	0.91–1.10
PDC in veterans exposed to sDMARD	0.01	–0.01 to 0.03	0.00	–0.02 to 0.02	0.02	–0.01 to 0.05	0.01	–0.02 to 0.03
No. veterans with ≥ 1 bDMARD	0.85*	0.76–0.94	0.88*	0.79–0.98	0.64**	0.54–0.76	0.66**	0.56–0.79
No. bDMARD in veterans exposed to bDMARD	0.99	0.89–1.10	0.99	0.89–1.10	1.02	0.86–1.20	1.02	0.86–1.20
PDC in veterans exposed to bDMARD	0.00	–0.03 to 0.03	0.00	–0.03 to 0.02	0.03	–0.01 to 0.07	0.02	–0.02 to 0.07
Subgroup with ≥ 1 rheumatology visit in 2015								
No. veterans with ≥ 1 sDMARD	1.10*	1.04–1.16	1.10*	1.04–1.17	1.10	1.00–1.21	1.11*	1.00–1.22
No. sDMARD in veterans exposed to sDMARD	1.02	0.94–1.11	1.02	0.94–1.11	1.08	0.93–1.24	1.08	0.93–1.24
PDC in veterans exposed to sDMARD	0.01	–0.01 to 0.04	0.01	–0.01 to 0.04	0.04	0.00–0.09	0.03	–0.01 to 0.08
No. veterans with ≥ 1 bDMARD	1.12*	1.03–1.22	1.12*	1.03–1.22	0.99	0.84–1.16	0.96	0.82–1.13
No. bDMARD in veterans exposed to bDMARD	0.99	0.88–1.11	0.99	0.88–1.11	1.02	0.83–1.25	1.02	0.83–1.26
PDC in veterans exposed to bDMARD	0.00	–0.03 to 0.03	0.00	–0.03 to 0.03	0.01	–0.04 to 0.07	0.01	–0.04 to 0.07

*p < 0.05. **p < 0.001. † Adjusted for age, race, ethnicity, and sex. ^RR (relative risk) used for no. veterans with ≥ 1 rheumatology visit. MR (mean ratio) used for no. provider visits (any specialty) and no. rheumatology visits per veteran. MD (mean difference) used for PDC. sDMARD: synthetic disease-modifying antirheumatic drugs; bDMARD: biologic DMARD; PDC: proportion of days covered; IA: inflammatory arthritis.

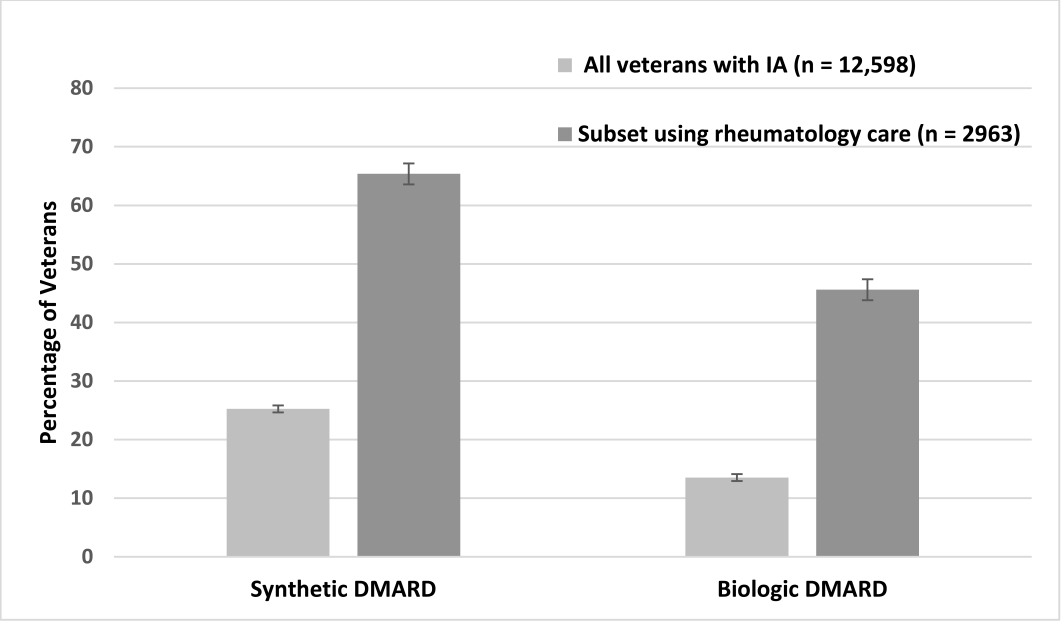

Figure 1. DMARD exposure in veterans accessing and not accessing rheumatology care during 2015. DMARD: disease-modifying antirheumatic drugs; IA: inflammatory arthritis.

The use of rheumatology care has been associated with better health outcomes in RA[15]. Further, rheumatology provider use is strongly associated with DMARD use[16,17], and DMARD improve outcomes for all types of IA[18,19,20,21]. Therefore, the rheumatology use disparity may have contributed to lost opportunities to optimize outcomes in geographically distant veterans.

DMARD use in 2015 was relatively low in the RA group (27.9% sDMARD and 10.5% bDMARD). These use rates were comparable to the annual DMARD use rates in Medicare (government-backed health insurance) and commercially insured RA populations between 2005 and 2009 (31%–35% sDMARD and 7%–26% bDMARD)[22,23]. Comparisons between the 2015 veteran population and earlier studies should be interpreted cautiously because use has changed over time with the expansion of DMARD

options. Nonetheless, the relatively low DMARD use in each of these populations raises concerns that many patients may have been undertreated, because DMARD therapy is considered the standard of care for RA[24,25].

With PsA and AS, there is a paucity of information about DMARD use rates in the United States. The lower use of sDMARD in AS than RA and PsA was expected, because sDMARD are not effective for inflammatory axial manifestations[26]. Reasons for higher bDMARD use in PsA than RA and AS are unclear, and additional research in rheumatology, dermatology, and other settings is warranted.

With rheumatology treatment, sDMARD use was 2.6-fold higher and bDMARD use was 3.4 times higher than with the general IA population. These findings are consistent with RA literature documenting a 2- to 7-fold increase in DMARD use in patients seeing a rheumatologist compared to patients not seeing a rheumatologist[16,27]. These large differences in DMARD exposures according to rheumatology care use suggest that access to rheumatology providers is important for accessing DMARD.

In the comparison of DMARD exposures according to distance, bDMARD use was less common in the Far group (9.5%) than the Near group (14.9%), but this disparity did not persist in the subset using rheumatology care. Interestingly, sDMARD exposure was slightly higher in the Far group than the Near group, and bDMARD use was higher in the Intermediate groups than the Near group, in the subset accessing rheumatology care. It is likely that longer distance reduced DMARD exposure, but unmeasured factors, such as IA severity, may have had a greater effect in the opposite direction (increased sDMARD exposure), in the more distant groups than the Near group.

Strengths of our study include the large sample size. The uniform medical record system enabled consistent data collection across VA sites throughout the United States. Moreover, the findings in our study may inform future research and policy aimed at optimizing equitable access to specialty care and appropriate treatments within the expanding therapeutic arena of immunotherapies. This may include improving access by telehealth, travel support, and additional rheumatology providers.

The inability to measure IA severity is a limitation that likely caused underestimations of the differences between distance groups for all use outcomes. Inherent to this observational study design is a selection bias favoring patients with more severe IA in the longer distance groups. Veterans with severe IA were likely more motivated to travel longer distances to access care than veterans with mild IA. Thus, the Intermediate and Far distance groups may have been disproportionally enriched with patients with severe IA. Because IA severity is also anticipated to be associated with higher provider and DMARD use, the usage differences between the distance groups were likely smaller than would be expected if IA severity was balanced between distance groups. As a result, the estimates of differences between distance groups with provider and DMARD use were likely conservative.

The data imply that non-rheumatologists prescribed DMARD, especially for veterans living far from rheumatology sites. Accessing and monitoring DMARD can be challenging, particularly for providers who do not routinely prescribe DMARD. It is unknown how frequently non-rheumatologists prescribed DMARD with and without involvement of rheumatologists. Rheumatologists may have been uninvolved in DMARD prescriptions that also targeted diseases that overlap with IA, such as psoriasis. Alternatively, co-management of IA between rheumatologists and non-rheumatologists may have occurred. Our analysis (data not shown) suggested that formal channels of co-management, such as telerheumatology or chart consults, were infrequently used (< 2% of veterans without ≥ 1 traditional rheumatology encounter in 2015), but less formal collaborations were not identified.

Additional study limitations include the possibility that other unmeasured factors, such as socioeconomic status, patient preferences, or comorbidities may have influenced use outcomes[28]. Further, the accuracy of IA diagnoses is imperfect when relying on diagnosis codes. Another limitation is that healthcare use outside the VA system was not counted. Veterans living far from VA rheumatology sites may have accessed rheumatologists and DMARD outside the VA more frequently than veterans living close to VA rheumatology sites. However, a recent study in RA demonstrated that non-VA system use was uncommon, with 6% of veterans reporting use of non-VA rheumatologists and 2% reporting DMARD use outside the VA system[29].

Use of rheumatology care and DMARD for IA was low in 2015. DMARD use was substantially more frequent among veterans accessing rheumatology care than veterans not accessing rheumatology care. Close geographic proximity to rheumatology sites was associated with greater use of rheumatology care and bDMARD in the general IA population. Additional research is required to identify and address barriers to rheumatology care and DMARD use, for the general IA population and for veterans living far from VA rheumatology sites.

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