Treatment Patterns with Disease-Modifying Antirheumatic Drugs in U.S. Veterans with Newly Diagnosed Rheumatoid Arthritis, Psoriatic Arthritis, or Ankylosing Spondylitis

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ABSTRACT

BACKGROUND: Delays in treatment for inflammatory arthritis (IA) are associated with unfavorable outcomes, including impaired quality of life, irreversible joint damage, and disability.

OBJECTIVE: To characterize treatment initiation patterns in veterans with newly diagnosed rheumatoid arthritis (RA), psoriatic arthritis (PsA), or ankylosing spondylitis (AS).

METHODS: ICD-9/10-CM codes and natural language processing were used to identify incident cases of RA, PsA, or AS between January 1, 2007, and December 31, 2015, in patients enrolled in the Veterans Health Administration. Patterns of treatment initiation and nontreatment with disease-modifying antirheumatic drugs (DMARDs) were assessed in the 12-month follow-up period after the incident diagnosis. Outcomes included the percentage of veterans treated with a DMARD, the mean time to the initial DMARD after diagnosis, and the percentage of veterans who accessed rheumatology care before DMARD initiation. To assess outcomes over time, veterans were grouped by year of initial IA diagnosis. Additionally, outcomes were compared between nonbiologic and biologic DMARDs and among IA subtypes (RA, PsA, and AS). Groups were statistically compared with 95% confidence intervals.

RESULTS: The population consisted of 12,118 IA veterans (9,711 RA, 1,472 PsA, and 935 AS), with 91.3% males and a mean age of 63.7 years. The percentage of veterans treated with ≥ 1 DMARD (nonbiologic or biologic) during the 12-month follow-up period increased from 48.8% in 2007 to 66.4% in 2015. In veterans diagnosed with IA in 2015, DMARD treatment was more common for PsA patients (72.9%) and RA patients (68.6%) than for AS patients (28.9%). In the subset treated with a DMARD within 12 months after diagnosis, the mean time to the initial DMARD after diagnosis did not change throughout the observation period (35.5 days for RA, 43.9 days for PsA, and 59.5 days for AS). Rheumatology specialty care was accessed by 87.4% of veterans treated with a nonbiologic DMARD and 92.2% of veterans treated with a biologic DMARD, in patients diagnosed in 2015.

CONCLUSIONS: DMARD treatment rates during the initial 12 months after diagnosis increased between 2007 and 2015, but nontreatment remained common, particularly in veterans with AS. The time to treatment after diagnosis was stable over time; it was shortest for RA, intermediate for PsA, and longest for AS. DMARD treatment was uncommon in veterans who did not access rheumatology specialty care.

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What is already known about this subject

- Treatment delays and nontreatment for inflammatory arthritis (IA) have been reported in various populations and contribute to quality-of-life limitations, functional impairment, and irreversible joint damage.
- Treatment guidelines from the American College of Rheumatology and the European League Against Rheumatism recommend that treatment with disease-modifying antirheumatic drugs (DMARDs) should begin as soon as the diagnosis of rheumatoid arthritis is made, and multiple studies have demonstrated the benefits of early DMARD treatment for rheumatoid arthritis (RA), psoriatic arthritis (PsA), and ankylosing spondylitis (AS).
- Estimates of treatment delays and nontreatment within the Veterans Affairs Health Care System patients are important for understanding potential opportunities to improve care for veterans with IA.

What this study adds

- DMARD nontreatment during the 12 months after the initial diagnosis of IA was common in U.S. veterans, but rates of nontreatment improved over time (51% in 2007 to 34% in 2015).
- Nontreatment rates were higher for AS than RA and PsA (71.1%, 31.4%, 27.1%, respectively, in 2015), and the mean time to treatment after diagnosis was longer for AS than RA and PsA (59.5, 35.5, and 43.9 days, respectively).
- DMARD treatment was uncommon in veterans who did not access rheumatology specialty care (12.6% with nonbiologics, 7.9% with biologics in 2015).

Inflammatory arthritis (IA) is a group of autoimmune inflammatory diseases characterized by chronic pain, systemic inflammation, and damage to joints and other tissues. Common forms of IA include rheumatoid arthritis (RA), psoriatic arthritis (PsA), and ankylosing spondylitis (AS). RA is characterized by symmetric and erosive polyarticular peripheral arthritis. PsA is a heterogeneous disease that may present as oligoarticular or polyarticular arthritis and may affect the entheses, tendons, and axial skeleton. AS, the prototype of axial spondyloarthritis (SpA), is characterized by

FIGURE 1 Patient Selection Protocol

DMARD=disease-modifying antirheumatic drug; IA=inflammatory arthritis; ICD=International Classification of Diseases; NLP=natural language processing; VA=Veterans Affairs.

inflammation in the sacroiliac joints and spine and may involve inflammatory manifestations in the peripheral joints, entheses, and eyes. The estimated prevalence of IA is 1%-3%, affecting an estimated 3.2 to 10 million individuals in the United States.¹

IA produces substantial burdens for individuals and society. In a rheumatic disease population (51.4% RA, 23.8% axial SpA, and 19.6% PsA), patients reported that their disease had moderate to severe effects on their quality of life (51.9%), work/daily activities (49.2%), emotional well-being (41.0%), personal relationships (26.0%), and close relatives' lives (32.3%).² In an RA study, 39% of employees with early disease suffered from work disability after 10 years,³ and 50% reported disability in an SpA population composed of 39% AS patients and 36% PsA patients.⁴ In terms of cost, the annual direct costs in an RA population were approximately 10.6 billion, and indirect costs were 36.7 billion, in 2013 U.S. dollars.³ In AS patients, compared with matched controls, the median direct health care costs were 10 times higher (\$24,978 vs. \$2,139 per patient per

year in 2015 U.S. dollars).⁵ Thus, IA broadly affects patients, family members, employers, health care payers, and society.

In the past 2 decades, effective options for IA treatments have greatly expanded. Treatment with disease-modifying antirheumatic drugs (DMARDs), particularly in early stages of disease, improves outcomes such as quality of life, physical function, clinical treatment responses, radiographic joint damage, and disability.⁶⁻¹⁷ According to expert consensus, patients with active IA should be treated with a DMARD (nonbiologic or biologic), barring a contra-indication or patient refusal. Specifically, treatment guidelines from the American College of Rheumatology (ACR) and European League Against Rheumatism (EULAR) recommend that patients with active PsA or RA should be treated with a DMARD as first-line therapy,^{18,19} and DMARDs (biologic) are recommended for AS patients with intolerance or inadequate response to a 4-week trial of nonsteroidal anti-inflammatory drugs (NSAIDs).²⁰ Furthermore, guidelines recommend that DMARD treatment

should begin as soon as the IA diagnosis is made.²¹ Since DMARD treatment is a top priority for IA patients, DMARD use became the first rheumatology-specific quality measure for assessing health systems with the Health Plan Employer Data and Information Set (HEDIS).²²

Studies in U.S. administrative claims datasets have raised concerns regarding the underuse of DMARDs. For example, in Medicare and commercially insured populations, rates of DMARD treatment ranged from 30%-63% in RA patients.²³ The goal of this study was to characterize treatment patterns in Veterans Affairs (VA) patients with newly diagnosed IA. We quantified rates of DMARD nontreatment and initiation delays within the 12 months after the initial IA diagnosis and characterized trends in DMARD treatment over time in all incident IA cases and in subgroups with RA, PsA, and AS.

Methods

Data Sources

This study used historical data from veterans enrolled in the Veterans Health Administration (VHA). The data source was the Corporate Data Warehouse, a national repository of data from the VHA medical record system (VistA) and other VHA clinical and administrative systems.²⁴ 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.²⁵ This research was conducted in compliance with the Helsinki Declaration, with the approval of the University of Utah Institutional Review Board.

Population

Cohort Selection. The cohort was assembled in 5 steps (Figure 1). First, patients were identified with ≥ 2 *International Classification of Diseases, Ninth/Tenth Revision, Clinical Modification* (ICD-9/10-CM) billing codes on separate days for RA (714.x, M05.x, M06.x), PsA (696.0, L40.5x), or AS (720.0, M45.x), during the observation period (January 1, 2007-December 31, 2016; Appendix A, available in online article). The earliest ICD code date (index date) was required to be within the enrollment period (January 1, 2007-December 31, 2015).

Second, veterans who were actively using the VA system before the index date were selected (defined by an encounter with a provider or a medication dispensation ≤ 24 months before the initial IA diagnosis code).

Third, patients with sufficient follow-up time were selected (VA system use for ≥ 12 months after the index date).

Fourth, patients were selected if IA was their only diagnosis for which DMARD treatment would be appropriate. Patients were excluded if they had an ICD code for an alternative diagnosis that may be treated with a DMARD before the index date

or during the 12-month follow-up period. Excluded alternative diagnoses were chronic lymphocytic leukemia, connective tissue disease, Crohn disease, cutaneous lupus, malaria, non-Hodgkin lymphoma, noninfectious uveitis, organ transplant, Paget disease, polymyalgia rheumatic, porphyria cutanea tarda, sarcoidosis, ulcerative colitis, and vasculitis.

Fifth, patients with an incident IA diagnosis were selected. The inclusion criteria for incident IA were (a) VA system use for ≥ 12 months before the index date and (b) ≥ 1 IA diagnosis identified by natural language processing (NLP) in clinical notes after the index date. Patients were excluded if there was evidence of an IA diagnosis before the index date (prevalent IA). Criteria for prevalent IA were (a) IA diagnosis on the problem list before the index date, (b) IA diagnosis in a clinic note identified by NLP before the index date, (c) a negated IA diagnosis identified by NLP after the index date, (d) DMARD use identified by NLP before the index date, and (e) DMARD dispensation from the pharmacy before the index date.

The NLP used for identifying incident IA cases applied a rule-based approach for affirming or negating specific terms relating to IA diagnostic and treatment language.^{26,27} The IA diagnostic terms for NLP included *rheumatoid*, *psoriatic arthritis*, *ank* spond**, *spondyloarthritis*, *spondyloarthritis*, *spondyloarthropathy*, *spondyloarthropathies*, *psoriasis with arthritis*, *inflamm* arth**, and *RA*. RA terms representing “right atrium” and “room air” were excluded. A previously validated implementation of the ConText algorithm in R version 3.4.0 (R Foundation for Statistical Computing, Vienna Austria) was used to detect the presence of diagnostic terms in clinical care notes.²⁷⁻²⁹

Cohort Validation. Chart review was performed by 2 rheumatologists (coauthors JAW and GKP) to establish criteria for patient selection. The chart review population consisted of a training subset (n=118) for developing incident IA criteria and an independent testing subset (n=151) for quantifying the accuracy of the criteria. The a priori accuracy goal was $\geq 80\%$. For each patient, the chart reviewers confirmed or negated the IA diagnosis and estimated the initial date of diagnosis. Patients with evidence of an IA diagnosis per chart review before the index date were classified as prevalent cases. Patients without a confirmed diagnosis of IA were classified as non-IA cases. The remainder of cases (with a confirmed IA diagnosis and no evidence of an IA diagnosis before the index date) were classified as incident IA cases. The population was subdivided into groups according to the calendar year of the initial IA diagnosis.

Variables

Outcome variables included (a) percentage of veterans with DMARD treatment during the 12-month follow-up period, (b) mean number of days to the initial DMARD after IA diagnosis

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TABLE 1 Baseline Demographics

	All IA (n = 12,118)			RA (n = 9,711)			PsA (n = 1,472)			AS (n = 935)		
	N/Mean (%/SD) [95% CI]			N/Mean (%/SD) [95% CI]			N/Mean (%/SD) [95% CI]			N/Mean (%/SD) [95% CI]		
Age	63.7	(13.3)	[63.4-63.9]	65.2	(12.6)	[64.9-65.4]	57.8	(13.1)	[57.1-58.5]	57.6	(16.1)	[56.5-58.6]
Male	11,060	(91.3)	[90.8-91.8]	8,798	(90.6)	[90.0-91.2]	1,376	(93.5)	[92.1-94.6]	886	(94.8)	[93.1-96.0]
Ethnicity												
Hispanic	618	(5.1)	[4.7-5.5]	487	(5.0)	[4.6-5.5]	93	(6.3)	[5.2-7.7]	38	(4.1)	[3.0-5.5]
Non-Hispanic	10,932	(90.2)	[89.7-90.7]	8,746	(90.1)	[89.5-90.6]	1,320	(89.7)	[88.0-91.1]	866	(92.6)	[90.8-94.1]
Unknown	568	(4.7)	[4.3-5.1]	478	(4.9)	[4.5-5.4]	59	(4.0)	[3.1-5.1]	31	(3.3)	[2.4-4.7]
Race												
White	9,281	(76.6)	[75.8-77.3]	7,302	(75.2)	[74.3-76.0]	1,247	(84.7)	[82.8-86.5]	732	(78.30)	[75.5-80.8]
Black	1,600	(13.2)	[12.6-13.8]	1,407	(14.5)	[13.8-15.2]	90	(6.1)	[5.0-7.5]	103	(11.0)	[9.2-13.2]
Other	642	(5.3)	[4.9-5.7]	508	(5.2)	[4.8-5.7]	75	(5.1)	[4.1-6.3]	59	(6.3)	[4.9-8.1]
Unknown	595	(4.9)	[4.5-5.3]	494	(5.1)	[4.7-5.5]	60	(4.1)	[3.2-5.2]	41	(4.4)	[3.3-5.9]
Geographic region at cohort entry												
Southeast	2,119	(17.5)	[16.8-18.2]	1,701	(17.5)	[16.8-18.3]	222	(15.1)	[13.3-17.0]	196	(20.7)	[18.5-23.7]
North Atlantic	3,129	(25.8)	[25.1-26.6]	2,546	(26.2)	[25.4-27.1]	406	(27.6)	[25.4-29.9]	177	(18.9)	[16.6-21.6]
Midwest	2,862	(23.6)	[22.9-24.4]	2,336	(24.1)	[23.2-24.9]	325	(22.1)	[20.0-24.3]	201	(21.5)	[19.0-24.2]
Continental	2,123	(17.5)	[16.9-18.2]	1,691	(17.4)	[16.7-18.3]	260	(17.7)	[15.8-19.7]	172	(18.4)	[16.0-21.0]
Pacific	1,885	(15.6)	[14.9-16.2]	1,437	(14.8)	[14.1-15.5]	259	(17.6)	[15.7-19.6]	189	(20.2)	[17.8-22.9]

AS = ankylosing spondylitis; CI = confidence interval; IA = inflammatory arthritis; PsA = psoriatic arthritis; RA = rheumatoid arthritis; SD = standard deviation.

in veterans treated with a DMARD during the 12-month follow-up period, and (c) rheumatology subspecialty care utilization within 12 months before DMARD dispensation. Outcomes were evaluated in the entire population (All IA) and in subsets with RA, PsA, and AS.

Patients with nonbiologic and a biologic DMARDs dispensed on the same day, as the initial DMARDs after the index date, were included in the nonbiologic and biologic DMARD categories. DMARD treatment was defined as a dispensation of the DMARD from a VA pharmacy or documentation by a VA provider of a DMARD from an outside pharmacy in the non-VA medication database. Assessed nonbiologic DMARDs included apremilast, azathioprine, cyclosporine, hydroxychloroquine, leflunomide, methotrexate, sulfasalazine, and tofacitinib. Biologic DMARDs included abatacept, adalimumab, anakinra, certolizumab, etanercept, golimumab, infliximab, rituximab, tocilizumab, and ustekinumab.

The provider specialty was assigned as rheumatology if the patient had ≥ 1 VA rheumatology visit within 365 days before DMARD dispensation from a VA pharmacy. Provider specialty was assigned as nonrheumatology if there was no VA rheumatology visit during the study period before DMARD dispensation. Provider specialty was categorized as unknown for veterans with a DMARD recorded by a VA provider as a “non-VA medication” (i.e., dispensed by a non-VA pharmacy).

Results

Cohort

The population consisted of 12,118 veterans with IA, including 9,711 (80.1%) with RA, 1,472 (12.1%) with PsA, and 935

(7.7%) with AS (Table 1). The mean age for the total cohort was 63.7 years, and 91.3% were male. White race was reported by 76.6% of patients, and 90.2% reported non-Hispanic ethnicity. The mean age was higher for RA (65.2) than PsA (57.8) and AS (57.6), and RA patients were less frequently male (90.6%) than PsA (93.5%) and AS (94.8%) patients.

The accuracy of the patient selection protocol for identifying patients with incident IA was 83.3% (95% confidence interval [CI] = 69.4-91.7) in the training set. In the independent testing set, the accuracy of the patient selection protocol was 80.8% (95% CI = 73.8-86.3). Among the 19.3% (95% CI = 13.7-26.2) of misclassified patients in the testing set, 6.0% (95% CI = 3.2-10.9) did not have an IA diagnosis, and 13.3% (95% CI = 8.7-19.6) were prevalent IA cases.

Treatment Within 12 Months of Diagnosis

DMARD treatment (nonbiologic or biologic) within the 12-month follow-up period after diagnosis increased between 2007 and 2015 (48.8% [95% CI = 46.3-51.4] in 2007 to 66.4% [95% CI = 63.7-68.9] in 2015; Figure 2). Treatment rates increased over time with the nonbiologics and biologics subgroups (nonbiologics: 46.1% [95% CI = 43.5-48.7] in 2007 to 61.4% [95% CI = 58.7-64.1] in 2015; biologics: 8.8% [95% CI = 7.4-10.4] in 2007 to 15.4% [95% CI = 13.5-17.5] in 2015). DMARD treatment (biologic or nonbiologic) was less frequent for AS than RA and PsA throughout the observation period (AS: 28.9% [95% CI = 20.5-39.0]; RA: 68.6% [95% CI = 65.6-71.4]; and PsA: 72.9% [95% CI = 66.1-78.7] in 2015; Figure 3).

The percentage of veterans with DMARD treatment statistically increased in the RA subgroup between 2007 and 2015

FIGURE 2 Percentage of Veterans with IA Treated with ≥ 1 DMARD Within 12 Months After Diagnosis

DMARD = disease-modifying antirheumatic drug; IA = inflammatory arthritis.

(50.4% [95% CI=47.5-53.2] to 68.6% [95% CI=65.6-71.4]). The percentage of veterans with PsA receiving a DMARD numerically increased between 2007 and 2015, but the difference was not statistically significant (58.7% [95% CI=50.8-66.2] vs. 72.9% [95% CI=66.1-78.7]). Similarly, the percentage with AS who received a DMARD increased numerically but not statistically between 2007 and 2015 (20.2% [95% CI=13.8-28.5] vs. 28.9% [95% CI=20.5-39.0]).

Time Between Diagnosis and Treatment

In veterans with DMARD treatment during the 12-month follow-up period, the mean number of days between the initial IA diagnosis and the initial DMARD did not change between 2007 and 2015 (36.9 [95% CI=35.2-38.6] days for nonbiologic DMARDs or 122.0 [95% CI=116.4-127.6] days for biologic DMARDs, averaged over the observation period; Figure 4). Comparisons between IA subtypes demonstrated that the mean number of days between diagnosis and initial DMARD (nonbiologic or biologic) was shortest for RA, intermediate for PsA, and longest for AS (RA: 35.5 days [95% CI=33.8-37.2]; PsA: 43.9 days [95% CI=39.2-48.6]; and AS: 59.5 days [95% CI=49.9-69.0], averaged across time).

Rheumatology Care

Throughout the observation period, rheumatology specialty care within the VA system was accessed before DMARD initiation by 78.0%-92.2% of veterans treated with a DMARD (non-

biologic or biologic; Appendix B, available in online article). The percentage of patients who accessed rheumatology care statistically increased throughout the observation period for the group with a nonbiologic as their initial DMARD (79.0% [95% CI=75.4-82.2] in 2007 to 87.4% [95% CI=84.6-89.7] in 2015). The percentage of veterans who accessed rheumatology care was statistically similar in all years for the group treated with a biologic as their initial DMARD (range: 83.7% [95% CI=75.4-89.5] to 92.2% [95% CI=87.3-95.3]). Averaged across study years, the percentage of veterans who accessed rheumatology care before DMARD treatment (nonbiologic or biologic) was lowest for RA and highest for AS (RA: 83.2% [95% CI=82.2-84.2]; PsA: 86.1% [95% CI=83.9-88.1]; and AS: 88.5% [95% CI=84.3-91.8]).

Discussion

Approximately one third to one half of veterans with IA were not treated with a DMARD (nonbiologic or biologic) within 12 months after their initial IA diagnosis. Similar rates of DMARD nontreatment were reported for commercially insured and Medicare beneficiaries with incident RA, ranging from 28% to 45% during follow-up periods, ranging from 1 year to a mean of 3.5 years after diagnosis.³⁰⁻³⁴ These high rates of nontreatment raise concern for lost opportunities to improve outcomes. In RA, prompt treatment after disease onset is well established as a major predictor of favorable long-term clinical, functional, and radiographic outcomes.¹⁰ Similarly, treatment in early

FIGURE 3 Percentage of Veterans with RA, PsA, and AS Treated with ≥ 1 DMARD (Nonbiologic or Biologic) Within 12 Months After Diagnosis

AS = ankylosing spondylitis; DMARD = disease-modifying antirheumatic drug; IA = inflammatory arthritis; PsA = psoriatic arthritis; RA = rheumatoid arthritis.

stages of AS and PsA improves long-term clinical and radiographic outcomes.³⁵⁻³⁸ Thus, understanding and minimizing treatment delays is critical to optimizing care for IA patients.

Among veterans treated with a DMARD (nonbiologic or biologic) during the 12-month follow-up period, the mean time between initial diagnosis and treatment was 37.5 days. This time interval was similar to the 39-day interval reported in a claims database study of patients with commercial and Medicare insurance (MarketScan).³³ In contrast, time to initial DMARD in a U.S. military TRICARE claims database was 125.4 days after diagnosis.⁸ Differences in study design and populations likely contributed to differences in the treatment delays. For example, the follow-up period in the TRICARE study was 2 years, compared with 1 year in the VA and the MarketScan studies. Additionally, the TRICARE population was younger than the VA and MarketScan populations (mean ages 47.2, 63.7, and 58.6 years, respectively). Lower health care utilization was associated with longer treatment delays in the TRICARE population, and it is likely that health care utilization was lower in the younger and presumably healthier TRICARE patients, compared with the older VA and MarketScan populations.

In this veteran population, there were differences in treatment patterns between IA subtypes. In particular, AS patients were less commonly treated with DMARDs than RA and PsA patients (29% AS, 69% RA, and 73% PsA in 2015). AS

differs from RA and PsA in that DMARDs (biologic) are recommended as second-line treatment for AS, rather than first-line treatment.¹⁸⁻²⁰ However, the recommended first-line treatment, with NSAIDs, is often inadequate or contra-indicated,³⁹ and the recommended NSAID trial period, before DMARD initiation, is only 4 weeks. Thus, the 71% nontreatment rate for AS during the 12 months after diagnosis suggests that many AS patients were undertreated with DMARDs.

The more frequent use of biologics than nonbiologics in AS was expected, since nonbiologics are ineffective for the axial manifestations that are the hallmark of AS.²⁰ In contrast, nonbiologics and biologics are effective for RA, and nonbiologics are typically required by payers as first-line treatment because of lower cost. Historically, in PsA, the first-line treatment was a nonbiologic DMARD, but patterns are changing, with growing evidence that biologics, but not nonbiologics, improve clinical and radiographic outcomes in PsA.^{19,40-43} These changes likely contributed to the slightly higher rates of biologic DMARDs in PsA than RA as the initial DMARD after diagnosis.

DMARD treatment (biologic and nonbiologic) was infrequent in newly diagnosed IA patients who did not access rheumatology subspecialty care before DMARD dispensation (13% with nonbiologics and 8.0% with biologics in 2015). Similarly, in other studies, IA patients who received care from a rheumatology provider were 2-7 times more likely to receive DMARD treatment, compared with patients who were not receiving

FIGURE 4 Time to Initial DMARD After IA Diagnosis

DMARD = disease-modifying antirheumatic drug; IA = inflammatory arthritis.

care from a rheumatologist.^{5,44-47} These associations between DMARD treatment and rheumatology care utilization suggest that prompt access to a rheumatology provider may be important for accessing DMARDs in a timely manner.

The percentage of patients with DMARD treatment during the 12 months after IA diagnosis increased over the years. These results demonstrated that VA providers gradually changed their prescribing patterns. These patterns may have been influenced by a growing acceptance, by providers and patients, of treat-to-target concepts that promote more aggressive therapies earlier in the course of disease.⁴⁶⁻⁴⁸ Furthermore, with expanding DMARD experience and safety literature,^{4,49-52} providers and patients may be increasingly comfortable with DMARD safety. Also, the lower rates of nontreatment over time may have been influenced by the selection of DMARD treatment as a HEDIS health care quality indicator in RA and recommendations for early treatment from professional organizations such as the ACR and EULAR.^{18,22,53,54}

Among veterans with DMARD treatment within 12 months after diagnosis, treatment was initiated approximately 1-2 months after diagnosis, on average. There may be differences between patients with early treatment, delayed treatment, and no treatment in terms of demographics, disease severity, access to specialty care, comorbidities, and patient treatment preferences. Understanding the contextual factors associated with early, delayed, and nontreatment is necessary to identify modifiable patterns of treatment delays and nontreatment.

Strengths

A strength of this study is the large cohort with widespread geographic representation across the United States. Another advantage is that we were able to comprehensively review individual patient medical records to develop and test methods for accurately identifying patients with incident IA. Our rigorous cohort identification methods minimized erroneous inclusions of patients without IA or with prevalent IA.

Limitations

Study limitations included imperfect capture of incident IA cases, since some incident IA cases were inevitably excluded, and we were unable to eliminate all prevalent IA cases. Another weakness is that the exclusion of IA patients with DMARD treatment before the IA diagnosis date may have selected against PsA patients with severe psoriasis, since psoriasis typically occurs before PsA,⁵⁵ and DMARD use is expected to be higher with severe psoriasis than mild psoriasis. Also, this study likely selected for AS patients with long diagnostic delays, since AS onset is typically before the age of 45, and the mean age of the initial AS diagnosis in this population was 57.6 years. Thus, the PsA and AS patients in this study may not be closely representative of the general PsA and AS populations. The generalizability of the study findings to non-VA populations is also limited due to relatively unique aspects of the veteran population (i.e., primarily older males) and the VA health care system (i.e., funded and administered by the federal government).

Conclusions

Many veterans were not treated with a DMARD in the first year after IA diagnosis, despite literature demonstrating that nontreatment and treatment delays are associated with quality-of-life impairments, disability, and irreversible joint damage. Additional research will expand our understanding of reasons for nontreatment and opportunities for improving care for individuals with IA.

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APPENDIX A Study Design

IA = inflammatory arthritis.

APPENDIX B Percentage of Veterans Who Accessed Rheumatology Care Before DMARD Initiation

DMARD = disease-modifying antirheumatic drug; IA = inflammatory arthritis.