Published in final edited form as:

Semin Arthritis Rheum. 2018 April ; 47(5): 649–653. doi:10.1016/j.semarthrit.2017.10.011.

Factors associated with use of disease modifying agents for rheumatoid arthritis in the National Hospital and Ambulatory Medical Care Survey

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Abstract

Objective—We examined the treatment patterns among adults with rheumatoid arthritis (RA) and identified factors influencing access to traditional and biological disease modifying antirheumatic drugs (DMARDs).

Methods—We analyzed visits recorded in the National Ambulatory Medical Care Survey from 2005 to 2014 with a RA diagnosis. The primary outcome was DMARD use (traditional and/or biological). We included prescriptions of all RA-related treatments such as traditional and biological DMARDs, glucocorticoids, gold preparations, immunosuppressants, and non-steroidal anti-inflammatory drugs. Covariates in the logistic regression models included age, gender, race/ethnicity, type of health care coverage, provider type, geographic region, and number of comorbidities.

Results—Among 1405 visits with a RA diagnosis, 60.4% ($n = 807$) were prescribed DMARDs and 23.8% ($n = 334$) biological DMARDs. In fully adjusted models, females have 1.57 times higher odds of any DMARD use (95% confidence interval (CI): 1.02–2.46). Also, Medicare beneficiaries as compared to privately insured have 2.31 times higher odds of receiving any DMARDs (95% CI: 1.40–3.82), while visits with specialist vs. general physician are 2.38 times more associated with any DMARD use (95% CI: 1.37–4.14). For biological DMARDs, Medicare beneficiaries were at 2.58 times higher odds (95% CI: 1.42–4.70) than privately insured, while visits with specialist are at 3.37 times higher odds than general physician (95% CI: 1.40–8.23).

Conclusion—Visits with a specialist and Medicare beneficiaries were significantly associated with any DMARD or biological DMARD use. Additionally, contrary to prior evidence, race/ethnicity was not associated with any DMARD or biological DMARD use, which may indicate reduction in disparity of treatment access.

Keywords

Rheumatoid arthritis; DMARD use; predictors of drug use; biological DMARDs

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Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory condition that affects multiple joints in the body. The manifestations of RA are mainly chronic pain and joint deformity, which may lead to loss of function.¹ The aim of RA treatment is to prevent joint deformation, reduce pain, and avoid disability. Central to RA treatment are the disease modifying antirheumatic agents (DMARDs).² The DMARDs include traditional small molecule agents, such as methotrexate (MTX), and biologic agents (bDMARDs) (e.g. adalimumab and abatacept). The most-recent American College of Rheumatology (ACR) guidelines recommend traditional DMARDs as the first-line of treatment for early-onset RA while bDMARDs are usually recommended for moderate-to-severe RA or if treatment failure is noted with traditional DMARDs.² Receiving DMARDs as recommended by the ACR, is also an indication of good-quality care for RA patients.³

In an earlier study (1996–2007) on National Ambulatory Care Medical Survey (NAMCS) by Solomon et al.,⁴ the use of any DMARD increased from 45% in 1996 to about 60% in 2005–2007 while the use of bDMARDs increased from 10% in 1996 to ~15% in 2005–2007. Additionally, another study looked at the impact of ACR guidelines (pre- vs. post-2008) on RA prescription patterns, and noted that among patients with low disease activity, the use of traditional DMARDs was about 91–93% and the adherence to ACR guidelines among this population was optimal.⁵ Although the initiation of bDMARDs for moderate-to-severe disease activity increased from 13–16% (pre-2008) to 15–16% (post-2008), the overall use of bDMARDs was found to be around 20–33%.⁵ This indicated moderate adherence to ACR guidelines among those with moderate-to-high disease activity. Even though previous studies have found that treatment with DMARDs (including bDMARDs) has increased among RA patients as compared to other treatments, such as glucocorticoids and pain medications, the overall use of bDMARDs is suboptimal.^{4–6} Previous studies have concluded that race/ethnicity, provider type (general physician vs. specialist) and type of drug coverage are factors associated with DMARD use among RA patients.^{7–9} Solomon et al.⁴ concluded that in NAMCS, most RA visits were not associated with DMARD prescription while African Americans and those who visited a general physician, were less likely to receive DMARDs. The study by Solomon et al., was one of the first studies to provide DMARD use estimates using a nationally representative data. However, this study did not focus on factors associated with bDMARD use and did not consider type of coverage as one of the factors associated with DMARD use.

Therefore, this study aims to provide new information on prevalence of traditional and biological DMARD use using recent-most NAMCS data. We plan to assess the association of type of coverage in addition to previously studied factors such as type of provider and patient race/ethnicity.

Materials and methods

Data source

The National Ambulatory Medical Care Survey (NAMCS) is a publicly available data collected through a national survey designed for information on the utilization and provision

of ambulatory care services in hospital emergency and outpatient department visits. The data source is a nationally representative probability sample of office-based physician practices and out-patient settings across the US that uses a multistage cluster strategy to select physicians in hospital and outpatient settings by geographic location and provider specialty.

Study design and population

We studied all the visits recorded in the NAMCS data with a RA diagnosis using the following diagnosis codes—714.0, 714.1, and 714.3. We included adults (≥ 18 years) who had a record of RA among the first three diagnoses recorded per visit in the database. We pooled the NAMCS data and the emergency department (ED) files for 2005–2014 and the OPD visit files from 2005 to 2011 for a cross-sectional study design to examine the factors associated with DMARD and biological DMARD use.

Dependent variables

We looked at up to eight new or ongoing medications recorded per visit for RA treatment as the dependent variable. These treatments included any DMARD treatment (traditional or biological), NSAIDs, and glucocorticoids. The visits associated with traditional DMARDs, such as methotrexate, hydroxychloroquine, sulfasalazine, and minocycline and those with biological DMARDs, such as infliximab, etanercept, adalimumab, certolizumab, abatacept, tocilizumab, and tofacitinib, were included. The primary dependent variable in our analysis was any DMARD treatment compared to no treatment or treatment with NSAIDs and/or glucocorticoids only. Any DMARD use included traditional or biological DMARDs and its combination with NSAIDs and glucocorticoids. Additionally, we analyzed the use of biological DMARDs or its combinations compared to no treatment, treatment with traditional DMARDs, and its combinations or NSAIDs and/or glucocorticoids only.

Independent variables

We used the Andersen Behavioral Model to guide the selection of variables that included predisposing (age, gender, and race/ethnicity), enabling (type of health insurance coverage, type of provider, and geographic region), and need (number of comorbidities).

We categorized the age groups as less than 45 years, between 45 and 59 years, and 60 years and over. We compared the DMARD use among non-Hispanic White, non-Hispanic Black, Hispanic, and others. We considered the following geographical regions in our analysis—Northeast, Midwest, South, and West. We categorized the type of health insurance as private insurance, Medicare, Medicaid, self-pay, and other, while the type of provider as general physician vs. specialist. Further, we categorized the comorbidities as less than three and greater than or equal to three.

Statistical analysis

We assessed the percentage distribution of the demographic characteristics among any DMARD users vs. non-DMARD users and/or no RA treatment and among biological DMARD users vs. no treatment or traditional DMARD users. We used chi-square to test the significance of distribution of characteristics among the above treatment groups.

Additionally, we explored the percentage use of any DMARDs and biological DMARDs by race/ethnicity and type of health insurance, over the years 2005–2014.

We used multivariable logistic regression to assess any/biological DMARD use adjusting for the aforementioned sociodemographic characteristics. All analyses were conducted using SAS 9.4, and were weighted to get national estimates.

Results

Among the total visits recorded over 2005–2014, $n = 1405$ were associated with RA. Among these the majority (76.3% [weighted]; $n = 1092$) were females and non-Hispanic White (74.9% [weighted]; $n = 953$). Additionally, 8.7% (weighted) ($n = 243$) were less than 45 years of age, 33.2% (weighted; $n = 479$) were 45 to <60 years of age, while 58% (weighted; $n = 683$) were 60 years or older. Overall, of the total treatment-related visits, 76.8% ($n = 807$) were associated with any DMARD use while 31.7% ($n = 334$) were associated with biological DMARD use and 33.1% ($n = 519$) of RA visits were not associated with any RA treatment. About 18.8% ($n = 198$) were prescribed traditional DMARDs alone while 25.7% ($n = 270$) were prescribed a traditional DMARD along with a non-DMARD RA treatment, such as NSAIDs or glucocorticoids. About 5.7% ($n = 60$) were prescribed biological DMARDs only, 6.7% ($n = 70$) were prescribed biological DMARDs along with traditional DMARDs and 12.6% ($n = 133$) were prescribed biological DMARDs plus non-DMARDs. The distribution of patient characteristics among visits associated with any DMARDs and biological DMARDs is presented in Table 1. The percentage of any DMARD use as compared to other or no RA treatment was significantly higher among males, those from the Southern region, obtaining coverage from private insurance, and with three or more comorbidities. Among the visits associated with biological DMARDs, the distribution of use was significantly higher among <45 year olds, covered by private insurance, and those visiting a general physician.

In adjusted analysis, among RA-related visits, gender, health insurance type, and provider type were significantly associated with any DMARD use, as compared to non-DMARD RA treatment or no RA treatment (Fig. 1). Females had 1.57 times higher odds of receiving any DMARD treatment (95% confidence interval [CI]: 1.02–2.46), Medicare beneficiaries had 2.31 times higher odds of receiving any DMARDs as compared to those covered by private insurance (95% CI: 1.40–3.82), and those visiting a specialist had 2.38 times higher odds of receiving any DMARDs as compared to those visiting a general physician (95% CI: 1.37–4.14). Health insurance type and provider type were significantly associated with biological DMARD use as compared to nonbiological DMARD use (Fig. 2). RA patients covered under Medicare were at 2.58 times higher odds of receiving biological DMARD treatment than those covered by private insurance (95% CI: 1.42–4.70) while those visiting a specialist had 3.37 times higher odds of receiving biological DMARDs as compared to visiting a general physician (95% CI: 1.40–8.23).

As seen in Table 2, the percentage any DMARD and biological DMARD use has increased over the years among non-Hispanic Blacks. However, when we compared the odds of

receiving treatment in years 2011–2014 as compared to 2005–2007, the results were not statistically significant for either any DMARD or biological DMARDs.

Discussion

Our assessment of factors associated with DMARD treatment using the recent-most available nationally representative data on outpatient physician visits yielded the following findings. First, a significantly higher distribution of males, visits in the Southern region, those with private insurance and three or more comorbidities were found among any DMARD-related visits while a significantly higher distribution of privately insured and age <45 years were found among bDMARD-related visits. Second, RA-related visits from females had higher odds of receiving any DMARD while Medicare beneficiaries compared to private insurance and those visiting a specialist had higher odds of receiving any DMARD, including bDMARDs. Third, the overall percentage distribution of African Americans (non-Hispanic Blacks) was lower as compared to non-Hispanic Whites among any DMARD- and bDMARD-related visits. However, contrary to the earlier study from Solomon et al., we did not find an association between patient race/ethnicity with DMARD use. However, type of coverage was found to be associated with DMARD treatment use. Therefore, inadequate health care coverage may lead to underutilization of RA treatment overall, especially the expensive bDMARDs, resulting in lower quality of care among RA patients.

Studies using older data that evaluated factors associated with receiving DMARDs demonstrated that African Americans as compared to Whites are less likely to receive any DMARD treatment.^{4,6,8,9} However, we did not find a significant association between patient race/ethnicity and DMARD use. Therefore, we decided to explore the DMARD use by race over the years. Although the percentage distribution of African Americans as compared to Whites was lower among any DMARD- and bDMARD-related visits, we found that prevalence of use among African Americans increased over time. However, this increase over the years was not statistically significant. Therefore, we cannot definitively comment on the reduction in disparity associated with DMARD use among African American RA patients over the years. Although a higher distribution of RA-related visits was among privately insured, it is noteworthy that in adjusted analysis, visits to a rheumatologist and Medicare coverage were factors significantly associated with overall DMARD use. The higher odds of DMARD use among Medicare beneficiaries compared to those privately insured could be because the prevalence of RA is increasing among older adults, as the life expectancy of RA patients increases.^{10,11} Therefore, RA-associated use of health services are likely to increase in this subgroup. However, we did not find a significant association between age group and any DMARD treatment or bDMARD treatment use. Additionally, we conducted a sensitivity analysis re-stratifying the age groups to 45–65 years and 65 years. Despite making one of the categories in the age group homogenous in terms of insurance coverage, patient age was not found to be associated with DMARD or bDMARD treatment.

It is important to consider the following limitations while interpreting the presented results. NAMCS data captures the physician-reported information about medical visits in outpatient

and ambulatory care setting. Therefore, we could not confirm the diagnoses or medication intake among our study population. NAMCS is a visit-level and not a patient-level database; therefore, individual patients may have multiple visits. The differences noted in DMARD or any other health service use by patient race/ethnicity should be interpreted with caution, as the patient weights used in this analysis do not account for the overall population distribution of race/ethnicity in the U.S. For example, lower RA visits among African Americans could be a function of the data sampling and may not accurately indicate “disparity.” In addition, the NAMCS data does not capture information about duration of the disease condition or severity, which are some of the clinically established determinants of choosing bDMARD treatment. Further, the predisposing factors such as income, education, and occupation were not included in our study. However, arguably, the type of health insurance is a better proxy to assess the access to DMARDs, mainly expensive bDMARDs.

In conclusion, we estimate that the overall DMARD use has increased in recent years (post-2007) and type of insurance coverage and provider are significant indicators of RA treatment with DMARDs. However, future research should consider if this optimal uptake of DMARD treatment is translating into favorable outcomes among RA patients in different subgroups, stratified by race/ethnicity and insurance coverage.

Acknowledgments

Funding: Priyanka Gaitonde, MS is supported as a Maryland CERSI scholar (FDA grant 1U01FD005946); Laura M. Bozzi, MS is funded by the NIA T32 AG00262

References

1. Maini Ravinder, N.Venebles, PJW.O’Dell, JR., Romain, P., editors. Patient education: rheumatoid arthritis symptoms and diagnosis (beyond the basics). Wolters Kluwer; 2015. UpToDate
2. Singh JA, Saag KG, Bridges SL, Akl EA, Bannuru RR, Sullivan MC, et al. 2015 American College of Rheumatology Guideline for the Treatment of Rheumatoid Arthritis. *Arthritis Rheumatol*. 2016; 68:1–26.
3. MacLean CH, Louie R, Leake B, McCaffrey DF, Paulus HE, Brook RH, et al. Quality of care for patients with rheumatoid arthritis. *J Am Med Assoc*. 2000; 284:984–92.
4. Solomon DH, Ayanian JZ, Yelin E, Shaykevich T, Brookhart MA, Katz JN. Use of disease-modifying medications for rheumatoid arthritis by race and ethnicity in the National Ambulatory Medical Care Survey. *Arthritis Care Res*. 2012; 64:184–9.
5. Harrold LR, Harrington JT, Curtis JR, et al. Prescribing practices in a US cohort of rheumatoid arthritis patients before and after publication of the american college of rheumatology treatment recommendations. *Arthritis Rheum*. 2012; 64:630–8. [PubMed: 21953645]
6. Schmajuk G, Schneeweiss S, Katz JN, Weinblatt ME, Setoguchi S, Avorn J, et al. Treatment of older adult patients diagnosed with rheumatoid arthritis: improved but not optimal. *Arthritis Care Res*. 2007; 57:928–34.
7. Zhang J, Xie F, Delzell E, Chen L, Kilgore ML, Yun H, et al. Trends in the use of biologic agents among rheumatoid arthritis patients enrolled in the US Medicare program. *Arthritis Care Res*. 2013; 65:1743–51.
8. Solomon DH, Yelin E, Katz JN, Lu B, Shaykevich T, Ayanian JZ. Treatment of rheumatoid arthritis in the Medicare Current Beneficiary Survey. *Arthritis Res Ther*. 2013; 15:R43. [PubMed: 23506671]
9. Schmajuk G, Trivedi AN, Solomon DH, Yelin E, Trupin L, Chakravarty EF, et al. Receipt of disease-modifying antirheumatic drugs among patients with rheumatoid arthritis in Medicare managed care plans. *J Am Med Assoc*. 2011; 305:480–6.

10. Helmick CG, Felson DT, Lawrence RC, Gabriel S, Hirsch R, Kwoh CK, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States: Part I. *Arthritis Rheum.* 2008; 58:15–25. [PubMed: 18163481]
11. Rasch EK, Hirsch R, Paulose-Ram R, Hochberg MC. Prevalence of rheumatoid arthritis in persons 60 years of age and older in the United States: effect of different methods of case classification. *Arthritis Rheum.* 2003; 48:917–26. [PubMed: 12687533]

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Significance and innovations

- The recent-most U.S. national survey of outpatient physician visit data shows that 76.8% visits among RA patients are associated with any DMARD use while 31.7% are associated with specifically biological DMARD use.
- Our results indicate that the type of insurance coverage and provider are significant indicators of RA treatment with traditional and biological DMARDs.
- Type of coverage may be a better indicator of DMARD treatment use than patient race/ethnicity and therefore, inadequate coverage may lead to underutilization of any DMARD treatment, especially the expensive biological DMARDs.

Fig. 1.
Multivariable correlates of any DMARD use.

Fig. 2.
Multivariable correlates of biological DMARD use.

Table 1

Distribution of characteristics among any DMARD and biological DMARD (bDMARD) treatment visits

Characteristics	Any DMARD treatment, N (%) ^{a,b}	bDMARD treatment, N (%) ^{a,b}
Age group		
<45 years	143 (62.3)	63 (31.9)
45 to <60 years	287 (66.4)	118 (26.8)
60 years	377 (56.6)	153 (20.9)
Gender		
Male	637 (63.5)	260 (25.2)
Female	170 (50.4)	74 (19.6)
Race/ethnicity		
Non-Hispanic White	565 (60.9)	233 (23.7)
Non-Hispanic Black	83 (51.2)	21 (22.3)
Hispanic	108 (63.5)	55 (28.2)
Other	44 (64.7)	23 (18.5)
Health insurance		
Private insurance	328 (71.5)	156 (32.3)
Medicare	270 (52.5)	102 (15.3)
Medicaid	105 (59.9)	35 (20.2)
Self-pay	28 (50.4)	9 (24.6)
Other	39 (67.2)	12 (27.4)
Type of provider		
General physician	661 (64.0)	293 (26.6)
Specialist	146 (43.3)	41 (10.8)
Geographic region		
Northeast	165 (58.2)	66 (29.6)
Midwest	186 (57.7)	86 (22.0)
South	284 (64.6)	100 (19.8)
West	172 (57.8)	82 (27.5)
Number of chronic comorbid conditions		
3 or more	580 (65.9)	252 (26.3)
Less than 3	227 (51.9)	82 (20.0)

Bolded values indicate $p < 0.05$ according to chi-square test.

^aPercentages are weighted.

^bPercentages have been rounded to single decimal point.

Table 2

Patterns of any DMARD and biological DMARD use by race/ethnicity, 2005–2014

	2005–2007, N (%) ^a	2008–2010, N (%) ^a	2011–2014, N (%) ^a	Adjusted OR ^b (95% CI)	Interaction, P value ^c
<i>Any DMARD use</i>					
Any DMARD use vs. other/no RA treatment	136 (58.9)	122 (46.8)	549 (61)	–	–
Race/ethnicity					0.84
Non-Hispanic White	81 (64.9)	63 (50.9)	421 (60.9)	1.22 (0.84–1.78)	
Non-Hispanic Black	25 (49.2)	15 (33.8)	43 (53.1)	0.93 (0.42–2.03)	
<i>Biological DMARD use</i>					
Race/ethnicity					0.26
Non-Hispanic White	26 (15.4)	25 (17.1)	182 (24.5)	1.39 (0.84–2.31)	
Non-Hispanic Black	3 (4.8)	2 (4)	16 (16.8)	1.84 (0.41–8.34)	

^aRow percentages are weighted and rounded.^bOdds ratios for DMARD use in 2011–2014 vs. 2005–2007 were adjusted for gender, age, insurance type, region, physician type, and number of comorbidities.^cP-value indicates nonsignificant difference in the odds of receiving DMARD in 2011–2014 vs. 2005–2007 by race.