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Implementation of Treat to Target for Rheumatoid Arthritis in the US: Analysis of Baseline Data from the TRACTION Trial

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Abstract

Background—A treat to target (TTT) strategy is recommended in rheumatoid arthritis (RA). However healthcare providers' adherence to TTT in clinical practice remains unclear. We examined adherence to TTT for RA in US rheumatology sites.

Methods—We used baseline information from the randomized controlled TRACTION trial, which recruited 641 patients from 46 providers practicing at 11 US sites. We obtained data on implementation of TTT, patient covariates, provider characteristics, and site variables. We examined the implementation of TTT using four cardinal features: recording a disease target, recording a disease activity measure, engaging in shared decision-making, and changing treatment if not at disease target. These features were assessed across sites and providers. We calculated a “TTT implementation score” as the percentage of features noted. We examined the association between patient, provider, and site covariates and TTT implementation score using proportional odds models.

Results—Implementation of TTT at baseline was sub-optimal: 64.3% of visits had none of the TTT components present, 33.1% had one component, 2.3% had two components, and 0.3% had all components. Implementation of TTT was significantly different across providers and sites (P -values < 0.0001). In the multivariable model, we observed that longer experience as a rheumatologist was associated with having higher implementation score (P -trend=0.01). Compared with fellows, providers with >20 years of practice were more likely to have more TTT components recorded (OR 7.68, 95% CI 1.46–40.52).

Conclusions—Our study indicated that adherence to a TTT strategy in RA was sub-optimal, and it differed across providers and sites.

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Treat to target (TTT) is a strategy for improving the clinical management of several chronic diseases, including rheumatoid arthritis (RA), diabetes, and hypertension. Using this treatment strategy, the health-care provider treats patients to reach and maintain a target disease activity. TTT in RA was developed based on several major principles and recommendations articulated by an international task force of rheumatologists (1, 2). It includes at least four main aspects: selection of remission or low-disease activity as the target for most patients; measuring disease activity regularly to assess whether patients have achieved target; using shared decision-making to identify target and treatment strategy; and to adjust treatment if patients are not at target and there are no contraindications to treatment changes.

A TTT strategy has been recommended by the American College of Rheumatology (ACR) (3) and by the European League Against Rheumatism (4) in RA management for several years. Over the past 15 years, randomized controlled trials (RCTs) have consistently demonstrated that a TTT strategy achieves better clinical outcomes compared with usual care in RA (5–8). However, very few studies have examined healthcare providers' current adherence to TTT strategy in clinical practice settings (9, 10). One study, using data from the largest US-based RA registry, Corrona, compared prescribing practices in RA before and after the publication of ACR treatment recommendations and observed no significant change in treatment patterns for active disease (9). Another study, using data from the same source, examined the management of patients with moderate disease activity with a poor prognosis or high disease activity and found that only around half of them received treatment changes over the subsequent 6–12 months (10). Both studies, however, focused on treatment adjustment only, not on the more comprehensive TTT strategy. Therefore, in the current study, we aimed to examine adherence to TTT as a strategy in rheumatology sites across the US. We also identified the factors associated with TTT adherence.

METHODS

Study Population and Data Collection

We used the baseline information of a trial aimed at improving adherence to TTT. The TRACTION trial has been described elsewhere (11). In brief, the TRACTION trial was a cluster randomized controlled trial (RCT) and collected data through examining patient visits conducted by providers who practiced at each of 11 sites in the US. All patient visits were stored in electronic medical records. All providers were aware that their visit notes would be reviewed. The sites were diverse in geography, patient populations, and organization. None of the participating sites was actively engaged in a systematic TTT strategy at baseline. All sites had at least 2 rheumatic disease providers, which could be multiple physicians or a physician and a mid-level provider such as nurse practitioner and/or physician assistant. Each site provided a sample of at least 40 RA patients.

Information from baseline patient visits of the TRACTION trial was used for this study. Baseline visits were defined as the first visit during September to December 2014, prior to the start of the intervention of the trial. Trial study staff, rather than local site personnel, independently reviewed and collected information from the medical records of patients at

each of the 11 sites. Research activities were approved by the Institutional Review Board of Partners Healthcare.

Outcome Assessment

The outcome of this study was a summary composite of four critical aspects of TTT that can be reliably abstracted from medical records. The four items include: (1) specifying a disease activity target (“treatment target”); (2) recording RA disease activity, using 1 of 6 ACR-recommended measures (i.e., Clinical Disease Activity Index, Disease Activity Score with 28-joint counts, Patient Activity Scale (PAS), PAS-II, Routine Assessment of Patient Index Data with 3 measures, and Simplified Disease Activity Index) (12) (“disease activity measure”); (3) when a decision was being made (i.e., change in target or change in treatment), documenting shared-decision making, defined as a discussion between the patient and provider comparing at least 2 options and a subsequent treatment decision made by both (13) (“shared decision making”); (4) basing treatment decisions on target and disease activity measure or describing reason why TTT was not adhered to (“treatment decision”). Each item was determined as absent (“0”) or present (“1”) based on the medical record review conducted by trained study staffs of the TRACTION trial (inter-rater kappa = 94% (95% confidence interval: 90–99%) and intra-rater reliability kappa = 98% (95% confidence interval 95–99%)). For the regression analyses, we calculated an ordinal “TTT implementation score” for each patient visit as the percentage of TTT items noted in the visit at baseline visit.

Covariates

We obtained the demographic and clinical characteristics of patients (i.e. age, body mass index (BMI), gender, RA duration, RA family history, serologic status, use of synthetic disease modifying anti-rheumatic drugs (DMARDs), use of biologic DMARDs, comorbidity index, joint erosion, and total medication used) through reviewing the medical records (including visit notes, laboratory and radiology orders, and medication lists) of patients involved in the study. Provider information on gender and years of experience as a rheumatologist was collected through interviews conducted by a study staff of the trial (AZ). Site information, including whether site had multiple locations, whether site was hospital based, and whether sites only had full-time providers, was collected through questionnaires.

Statistical Analyses

We examined the distribution of components of TTT present using the implementation score at baseline visits for the whole study population as well as that of each site and each provider. We used Kruskal-Wallis tests to compare whether the distribution of the TTT implementation scores was significantly different among the providers and among the sites (two-sided P-value < 0.05 was considered to be statistically significant). We examined the univariate association between each covariate (at patient, provider, or site level) and the implementation score. Covariates tested include age (continuous), BMI (continuous), gender of patient, RA duration (< 2 years / 2–5 years / 6–10 years / >10 years), RA family history (yes / no), serologic status (RF or CCP positive / negative), use of synthetic DMARDs (yes / no), use of biologic DMARDs (yes / no), comorbidity index (continuous), total medication (0 / 1–5 / 6–10 / 10+), gender of provider (male / female), provider and patient of the same

sex (yes / no), provider's experience as a rheumatologist (fellow / <10 years of practice / 10–20 years of practice / >20 years of practice), site having multiple locations (yes / no), provider work status (only having full-time providers / having some part-time providers), and whether the site was hospital-based (yes / no). For continuous covariates, we assigned corresponding medians to the missing values. For categorical covariates, subjects with missing data were assigned to an “unknown” category. Proportional odds models accounting for clustering within providers were used to examine the univariate association between each covariate and the ordinal outcome. Then we put all variables having a significant univariate test at P-value < 0.15 level in the final multivariable adjusted model. Based on our primary findings, we evaluated the approximate linear-trend of provider's experience as a rheumatologist by assigning numbers to each category (1- fellow, 2 - providers with <10 years of practice, 3 - providers with 10–20 years of practice, 4 - providers with >20 years of practice) and modeling the categories as a continuous variable, and we conducted a subgroup analysis by running the final multivariable adjusted model only among sites having fellows. All data analyses were performed using SAS software, version 9.4 (SAS Institute, Cary, NC).

RESULTS

The characteristics of the 641 patients, 46 providers, and 11 sites included in this study are shown in Table 1. The patients had a mean age of 60 years, 79% were female, and 79% demonstrated at least one positive serologic test for RA. Approximately half of the treating rheumatologists were female and 41% of them had 10 years of practice. Five of the 11 participating sites had multiple locations; eight had only full-time providers; five were hospital-based.

The implementation score was low for most baseline patient visits: 64.3% visits had no TTT components (implementation score equal to 0 out of 100%); 33.1% had one component (implementation score of 25% or 33%, depending on whether shared decision-making was appropriate); 15 (2.3%) patient visits had two components (implementation score equal to 50% or 67%); and 2 (0.3%) patients had all components (implementation score equal to 100%) (Figure 1). Regarding the specific components: disease activity measure was present in 161 out of 641 (25.1%) visits; shared decision-making item was present in 84 out of 217 (38.7%) visits; and both treatment target and treatment decision were present in 2 patient visits (0.3%). The implementation score differed across providers (Supplemental Figure 1) and sites (Figure 1). Kruskal Wallis test results indicated that there were statistically significant differences among the providers (P-value < 0.0001) and among the sites (P-value < 0.0001).

In the univariate examination, we found that more experience as a rheumatology provider and whether sites only having full-time providers were associated with the implementation score at P-value < 0.15 level (see Table 2). We put these variables into the final multivariate model. In the multivariate model, we observed that longer experience as a rheumatologist appears to be associated with having higher implementation score (providers with <10 years of practice vs. fellows OR 3.23, 95% CI 0.65 to 16.13, P-value = 0.15; providers with 10 – 20 years of practice vs. fellows OR 4.53, 95% CI 0.76 to 27.09, P-value = 0.10; providers

with >20 years of practice vs. fellows OR 7.68; 95% CI 1.46 to 40.52, P-value = 0.02. P-trend=0.01). Subgroup analysis conducted only among sites having fellows showed similar results (Supplemental Table 1).

DISCUSSION

In this clustered sample of RA patients with data captured from patients, providers, and sites, we examined the adherence to the TTT strategy in rheumatology sites across the US and identified the factors associated with the adherence. We observed that TTT implementation score was sub-optimal for most patient visits. TTT implementation was significantly different across providers and across sites. After accounting for clustering within providers, we observed that compared with fellows, providers with >20 years of practice were significantly associated with having more components of TTT present.

Current TTT implementation was found to be suboptimal in our study, despite the fact that RCTs have consistently demonstrated that a TTT strategy results in better outcomes compared with usual care in RA (5–8). Only 2 out of 641 patient visits were adherent with all four of the components of TTT assessed (all four items were not always warranted; shared decision-making item was recorded in 217 patient visits). Similarly, previous evidence suggests that TTT is not practiced consistently across rheumatology settings (9, 10), suggesting approaches to improve the adherence to the TTT strategy in RA are necessary. We have not analyzed this fully yet in the current study. However, it is our impression that common reasons for non-adherence were patient preference and discordance between physician and patient global impact of RA.

The implementation of TTT appeared to be provider and site dependent. We observed significant differences among the providers and among the participating sites, both with P-values < 0.0001. In the univariable examination, none of the patient-level variables was associated with the outcome at a P-value < 0.15 level. A single provider-level variable, experience as a rheumatologist, and site-level variable, provider work status was selected to put into the final multivariable model. As fellows were only present in several sites, we conducted a subgroup analysis by running the final multivariable adjusted model only among those sites, and the results were consistent with the main findings. Our results indicate that future approaches to improve TTT implementation in RA need to be broad-based but could initially focus on improved training and TTT receptivity amongst trainees and junior rheumatologists. It would be useful to survey rheumatology training programs to better understand how TTT is currently taught. The recently published TRACTION trial found that a learning collaborative, a well-accepted method for quality improvement in healthcare (14), resulted in substantial improvements in TTT implementation score (11).

There are several strengths of this study, including detailed information on a large cohort of RA patients as well as their rheumatologists and sites. The staff of the TRACTION trial reviewed medical records to avoid the potential errors and bias of self-assessment. However, the study has limitations. The outcome of our study was a process measure rather than a clinical outcome. However, as previous evidence has demonstrated improved clinical outcomes in RA with using TTT strategy (15), it was less of a concern. Our study only

included 11 rheumatology practice sites in the US, therefore further testing is needed before generalizing our results to a larger population. As well, patients of trainees may come from specific patient groups that may be less well insured, accounting for some of the difference in TTT implementation.

In conclusion, our study found sub-optimal adherence with TTT for RA patient visits. This appears to be an important area for quality improvement and different methods for implementing TTT should be tested. While there was variation across sites and providers, none demonstrated consistent adherence, suggesting that interventions should be broad-based across US rheumatology, and in particular, incorporated more consistently into rheumatology training programs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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North Shore	Grober, Malik, Woodrick, Lynn, Sun, Drevlow, Zaacks, Bilbrey, Chavez, Casey, Gan, Myers
Park Nicollet	Paisansinsup, Shousboe, Glickstein, Steele
University of Kansas	Lindsley, Schmidt, Colbert, Springer, Bhadbhade, Parker, Estephan, McMillian, Heneghan
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SIGNIFICANCE AND INNOVATIONS

- A treat to target (TTT) strategy is recommended by the American College of Rheumatology (ACR) in rheumatoid arthritis (RA) management. However, healthcare providers' adherence to TTT strategy in clinical practice settings is unclear. Our study found that current adherence to TTT strategy in RA was suboptimal, and it differed across providers and sites.
- Utilizing data captured from patients, providers, and sites, we identified that longer experience as a rheumatologist was significantly associated with better adherence to TTT strategy after accounting for clustering within providers.

Figure 1. Distribution of Implementation Score of Patient Visit by Site and in Total in TRACTION Trial

Numbers of visits vary: site 1 (n = 73), site 2 (n = 72), site 3 (n = 56), site 4 (n = 69), site 5 (n = 43), site 6 (n = 51), site 7 (n = 69), site 8 (n = 40), site 9 (n = 76), site 10 (n = 42), site 11 (n = 50), total (n=641).

Table 1

Characteristics of Patients, Providers, and Sites Included in TRACTION Trial and Statistics of Implementation Score.

	N (%) unless noted
Patient-level variables (Patient N=641)	
Age ^I , years, mean (SD)	60.0 (22.6)
BMI ^I , kg/m ² , mean (SD)	29.7 (7.5)
Female sex	503 (78.5)
RA duration ^I , years	
2	72 (21.7)
2–5	88 (26.5)
6–10	77 (23.2)
>10	95 (28.6)
RA family history ^I	
Yes	91 (31.5)
No	198 (68.5)
Serologic status ^I	
Positive	409 (79.1)
Negative	108 (20.9)
Use of synthetic DMARDs	507 (79.1)
Use of biologic DMARDs	279 (43.5)
Comorbidity index, mean (SD)	1.3 (0.6)
Joint erosion ^I	
Yes	251 (56.8)
No	191 (43.2)
Total medications	
0	1 (0.2)
1–5	95 (14.8)
6–10	221 (34.5)
10+	324 (50.6)
Provider-level variables (Provider N=46)	
Female sex	25 (54.4)
Experience as a rheumatologist	
Fellow	7 (15.2)
<10 years of practice	20 (43.5)
10–20 years of practice	7 (15.2)
>20 years of practice	12 (26.1)
Site-level variables (Site N=11)	
Multiple locations	

	N (%) unless noted
Yes	5 (45.5)
No	6 (54.6)
Provider work status	
Only having full-time providers	8 (72.7)
Having some part-time providers	3 (27.3)
Hospital-based	
Yes	5 (45.5)
No	6 (54.6)

Notes:

¹ Some data were missing for the following variables: age, missing = 64; body mass index, missing = 52; rheumatoid arthritis duration, missing = 309; rheumatoid arthritis family history, missing = 352; serologic status, missing = 123; and joint erosions, missing = 199.

Abbreviations: BMI, body mass index; RA, rheumatoid arthritis; DMARD, disease modifying anti-rheumatic drug.

Table 2

Multivariable Association between Patient-level, Provider-level, and Hospital-level Covariates and Implementation Score in TRACTION Trial (N=641)¹

	Model ^{2,3}	
	OR (95% CI)	P-value
Experience as a rheumatologist		0.08
Fellow	Ref	NA
<10 years of practice	3.23 (0.65, 16.13)	0.15
10–20 years of practice	4.53 (0.76, 27.09)	0.10
>20 years of practice	7.68 (1.46, 40.52)	0.02
Provider work status		0.13
Having some part-time providers	Ref	NA
Only having full-time providers	2.09 (0.80, 5.47)	0.13

Notes:

¹ Any variable having a significant univariate test at the 0.15 level was put in multivariate analysis.

² Model used proportional odds models accounting for clustering within providers.

³ Mean (standard deviation) implementation score: fellow 3.88 (16.60); <10 years of practice 7.89 (12.89); 10–20 years of practice 11.79 (17.24); >20 years of practice 15.23 (16.61); having some part-time providers 7.04 (12.87); only having full-time providers 12.56 (16.58)

Abbreviations: OR, odds ratio; CI, confidence interval; RA, rheumatoid arthritis.