American College of Rheumatology
Empowering Rheumatology Professionals

Arthritis Care & Research
Vol. 74, No. 4, April 2022, pp 572–578
DOI 10.1002/acr.24830

Implementing a Treat-to-Target Approach for Rheumatoid Arthritis During the COVID-19 Pandemic: Results of a Virtual Learning Collaborative Program

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Objective. A treat-to-target (TTT) approach improves outcomes in rheumatoid arthritis (RA). In prior work, we found that a learning collaborative (LC) program improved implementation of TTT. We conducted a shorter virtual LC to assess the feasibility and effectiveness of this model for quality improvement and to assess TTT during virtual visits.

Methods. We tested a 6-month virtual LC in ambulatory care. The LC was conducted during the 2020–2021 COVID-19 pandemic when many patient visits were conducted virtually. All LC meetings used videoconferencing and a website to share data. The LC comprised a 6-hour kickoff session and 6 monthly webinars. The LC discussed TTT in RA, its rationale, and rapid cycle improvement as a method for implementing TTT. Practices provided de-identified patient visit data. Monthly webinars reinforced topics and demonstrated data on TTT adherence. This was measured as the percentage of TTT processes completed. We compared TTT adherence between in-person visits versus virtual visits.

Results. Eighteen sites participated in the LC, representing 45 rheumatology clinicians. Sites inputted data on 1,826 patient visits, 78% of which were conducted in-person and 22% of which were held in a virtual setting. Adherence with TTT improved from a mean of 51% at baseline to 84% at month 6 (P for trend < 0.001). Each aspect of TTT also improved. Adherence with TTT during virtual visits was lower (65%) than during in-person visits (79%) ($P < 0.0001$).

Conclusion. Implementation of TTT for RA can be improved through a relatively low-cost virtual LC. This improvement in TTT implementation was observed despite the COVID-19 pandemic, but we did observe differences in TTT adherence between in-person visits and virtual visits.

INTRODUCTION

Optimal long-term management of rheumatoid arthritis (RA) requires longitudinal assessment of disease activity and continued adjustment in management (1). A process of treating-to-target (TTT) has been advocated (2). These principles have been adopted by rheumatology professional societies and outlined in their guidelines for the management of RA (3,4) and are supported by consistent randomized controlled trial evidence demonstrating clinical improvement with TTT compared to usual care (5). While the data supporting TTT are strong and the recommendations are clear, this algorithm for managing RA is not routinely implemented in clinical care. Several large-scale studies from different practice settings suggest that RA treatments are frequently not adjusted even when patients have moderate or severe disease activity (6). Many reasons contribute to the lack of adherence to TTT in the management of RA, including absence of a formal disease activity assessment, failure to determine and/or document a treatment target, clinician preference not to accelerate therapy, and patient preference not to modify treatments (7,8).

In previous studies, we documented that implementation of TTT could be improved through a learning collaborative (LC) (9). An LC is

Supported by AbbVie.
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Author disclosures are available at https://onlinelibrary.wiley.com/action/downloadSupplement?doi=10.1002%2Facr.24830&file=acr24830-sup-0001-Disclosureform.pdf.
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Submitted for publication August 26, 2021; accepted in revised form December 2, 2021.

SIGNIFICANCE & INNOVATIONS

- A virtual learning collaborative is a feasible and effective method to perform quality improvement across rheumatology practices in the US.
- Adherence to a treat-to-target strategy for rheumatoid arthritis is higher during in-person visits compared to virtual visits.
- Virtual learning collaboratives should be considered for other areas in rheumatology that could benefit from quality improvement.

a systematic approach to process improvement, whereby organizations test and implement changes and measure the impact of these changes. Simultaneously, different organizations share their experiences to accelerate learning (10). This process was popularized in health care by the Institute for Healthcare Improvement in their Breakthrough Series (11). We used such a method to improve adherence to TTT for RA in the TRACTION trial (9,12–14), which recruited 11 US rheumatology practices to participate in an LC. The LC included a face-to-face kick-off meeting and 9 monthly webinars. Six practices were randomized to the LC intervention group during the first phase and experienced a significant improvement in TTT adherence, from 11% to 55% over 9 months. Since the LC intervention was effective and the benefits were sustained, we considered whether a less intensive LC might be as effective. The present study had been planned to occur over 6 months in 2020. When the COVID-19 pandemic occurred, limiting travel and other activities, the LC was switched to a 100% virtual setting. We hypothesized that a shorter and purely virtual LC to improve adherence with TTT for RA would result in increased implementation of TTT.

MATERIALS AND METHODS

Study design and setting. We conducted an LC from October 2020 through April 2021. The LC recruited rheumatology practices in the US. The practices were recruited through personal emails, and none of these practices had participated in our previous LC. The recruitment of practices took place in early 2020, but the LC was postponed when the COVID-19 pandemic occurred; it was then subsequently initiated in the fall of 2020 as a virtual LC. One practice closed during the COVID-19 pandemic, but the rheumatologist from this practice participated without contributing data. The LC was considered a quality improvement project by the Partners Human Research Committee and was thus exempt from Institutional Review Board oversight. No patient recruitment occurred, and patient consent was not required.

Learning collaborative. The LC was based on prior quality improvement literature in health care that had demonstrated the value of sequenced learning sessions, allowing teams to collaborate and work with expert faculty (15). In between learning sessions, teams could implement changes using various methods, often relying on small tests of change (otherwise known as "Plan-Do-Study-Act" [PDSA] cycles). In our prior LC on this topic, we developed a model for improvement that included 3 principles: 1) the treatment of RA is based on a process of shared decision-making, 2) validated disease activity measures are used to assess and track RA disease activity, and 3) decisions regarding treatment are made with purposeful consideration of the patient's disease activity and an agreed-upon target. Each of these principles is supported by evidence, and there are clear steps to enhance these principles in the management of RA. For example, to achieve principle 3, providers and patients must decide on a target, measure disease activity, and consider treatment changes when disease activity exceeds target—but also decide when other factors (e.g., comorbidities, coexistent fibromyalgia) should mitigate against a treatment change.

To support the LC, we recruited faculty who had expertise in each facet of TTT. This included an expert on TTT in RA and measuring disease activity (JS), an expert on implementing disease activity measures (TP), and 2 experts on patient communications (NAS and JNK). One faculty member (DHS) facilitated the LC and discussed methods for quality improvement, including the PDSA cycle.

Adherence with TTT. While TTT for RA has many components, we focused on several critical factors that could be measured through chart review. The factors included presence of a disease activity measure, documentation of a disease activity target, description of treatment changes in patients not at target, and discussion of shared decision-making if a treatment or target decision was made. In a prior study of TTT, we found that these measures could be reliably determined from reviewing medical records (9).

We did not focus on a specific disease activity measure, but records must have documented an objective measure of RA disease activity, such as those described by the American College of Rheumatology (e.g., Routine Assessment of Patient Index Data 3, Clinical Disease Activity Index, Disease Activity Score) (16). Disease activity targets that were assessed in this LC included remission and low, moderate, or high disease activity, with most patients having a target of remission or low disease activity. In patients not at target based on disease activity measurement, records were examined for changes in treatment. These might include dose increases, addition of a treatment for RA, or change in treatment. Finally, medical records were reviewed for evidence of shared decision-making when a decision was made (i.e., treatment change or target change), which may have included mention of patient preferences and/or education about specific treatments. If no change in treatment was made even when patients were found not be at target, the chart review assessed the reasons given for no change in treatment among these patients.

Data on these components were collected monthly during 20–25 RA visits at each rheumatology practice. We did not specify

Table 1. Practice and patient visit characteristics in the learning collaborative

Characteristics	No. (%)
Practice setting	
Academic setting or affiliated with academic center	14 (77.8)
Private practice, non-academic	3 (16.7)
Community safety net hospital	1 (5.6)
Number of rheumatoid patients in the practice (estimate)	
1–300	5 (27.8)
301–600	1 (5.6)
601–900	3 (16.7)
901–1,500	5 (27.8)
>1,500	2 (11.1)
Not reported	2 (11.1)
Virtual visits during the learning collaborative	
0–5%	3 (16.7)
6–10%	5 (27.8)
11–30%	4 (22.2)
31–80%	5 (27.8)
>80%	1 (5.6)
Types of visit	
Urgent	14 (0.83)
Routine	1,703 (93.2)
Initial consult	109 (6.0)

which patients or which visits but asked sites to distribute the visits across participating clinicians seeing patients in the week before the monthly webinar. Most practices allowed clinicians to review their own medical records, but some had a staff person review all records.

Statistical analysis. Personnel from each rheumatology practice were asked to list site characteristics and their role in the LC in an exit survey. We described these features and those of the patient visits across the 6-month duration of the LC. Adherence with TTT was estimated as a simple proportion of the TTT components collected from the medical records (described above). Visits had 2, 3, or 4 possible components as the denominator, with the numerator being the number of TTT components present based on review of the medical record. However, the denominator differed by component because the number of patients eligible for a given component differed. For example, if no disease activity measure and/or target was recorded, then it would be impossible to determine how clinicians responded when patients were not at the disease activity target. Further, if no decisions were made at a visit (no change in treatments or target), then no shared decision-making was expected. This proportion of TTT adherence was assessed monthly, by practice and aggregated across all practices. Overall change in adherence by month was tested using mixed-effects linear regression models that only included month as a continuous covariate and a random intercept to account for correlation among rheumatology practice sites. Since each component of adherence was considered present or absent, we tested changes in components using a mixed-effects regression model with a binomial distribution.

Because the LC took place during the COVID-19 pandemic, many visits were conducted virtually. After the first month of the LC, we asked practices to identify whether visits were held in-person or in a virtual setting. We compared adherence for the in-person visits with those that were conducted virtually. Statistical significance of the comparisons was tested using linear mixed-effects regression analysis adjusted for month where appropriate; again, a random intercept was used to account for rheumatology practice site. All analyses were conducted in R (version 3.6.2).

RESULTS

Eighteen practices participated in the LC, representing 45 rheumatology clinicians (rheumatologists and nurse practitioners). The practices were from 10 US states and Washington, DC. As noted in Table 1, 14 practices were located in or affiliated

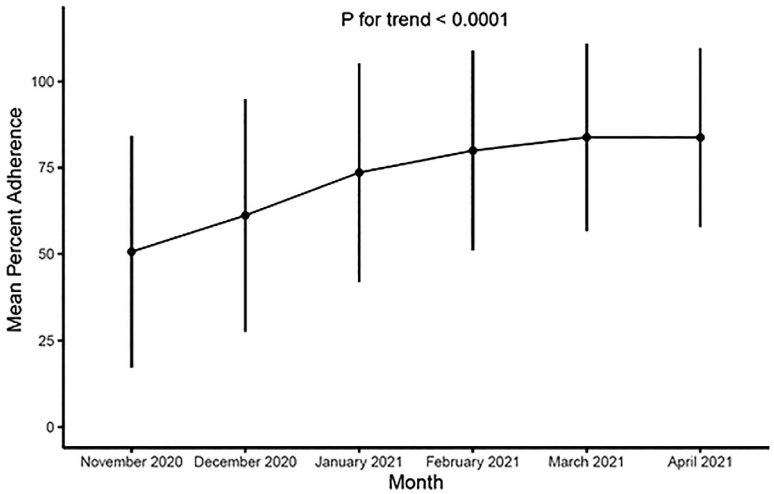

Figure 1. Trend in mean adherence with treat-to-target over a 6-month learning collaborative program. *P* values were calculated using mixed-effects linear regression models that accounted for correlation among practice sites. Error bars represent the SD.

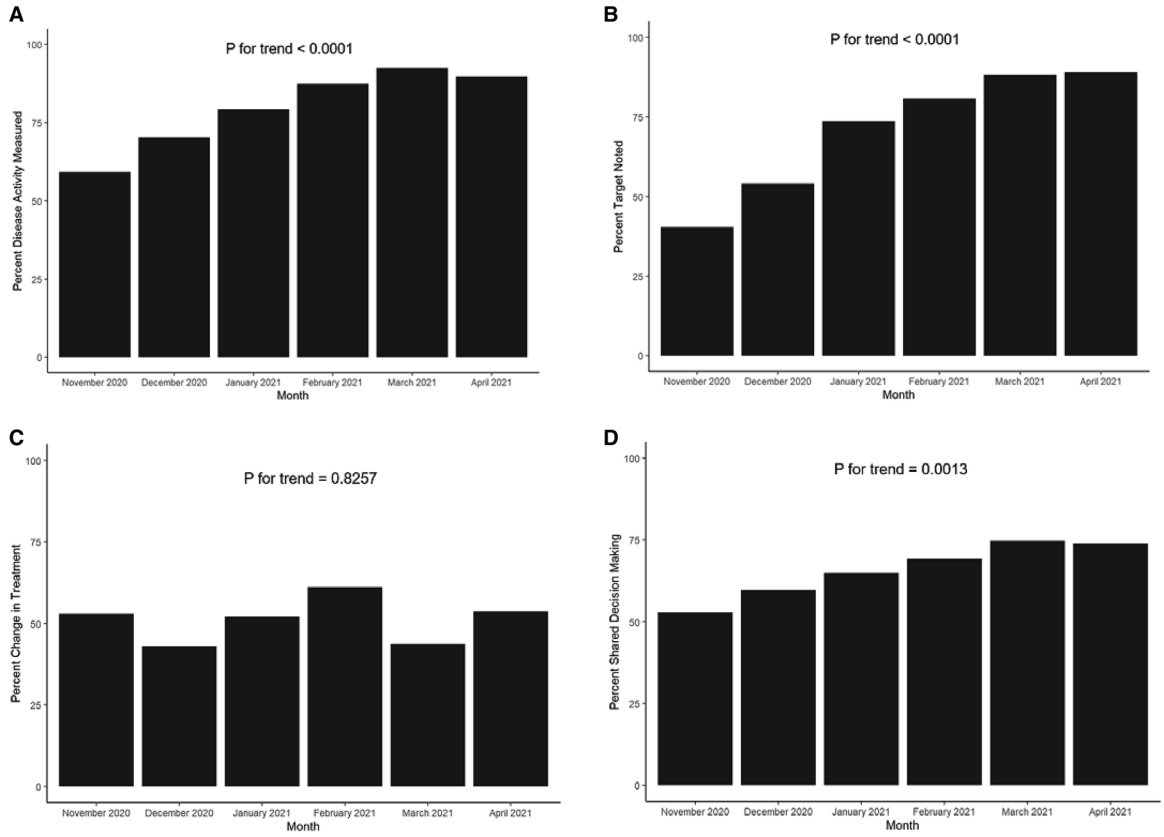

Figure 2. Trends in mean adherence with treat-to-target, by component. Adherence is shown with measurement of disease activity (**A**), description of disease activity target (**B**), change in treatment when not at disease activity target (**C**), and shared decision-making (**D**).

with an academic medical center. The practices varied, with some treating <300 RA patients per year to some treating >1,500 RA patients. The practices reported substantial variation in the estimated percentage of visits that were virtual during the 6 months of the LC, with 3 practices (17%) estimating 0–5% of visits being held virtually, and 1 practice (5.6%) estimating >80% of visits as being held in a virtual setting. The level of participation in the LC varied across sites—5 sites met weekly or every other week, and 11 sites described meeting monthly or never. Three sites submitted 5–6 PDSA reports, whereas 8 sites submitted 1–2 PDSA reports. Sites submitted data on a mean 305 visits per month, with several sites missing submissions for several months. Most of these visits were routine and not of an urgent nature (Table 1).

Figure 1 demonstrates the change over time in adherence with TTT. The trend in adherence increased from 50–85% over the 6 months of the LC (*P* for trend < 0.0001). Components of the LC that showed an increase in adherence were clinical measurement and shared decision-making (Figure 2). Change in treatment among patients not at disease activity target, which ranged between 45% and 60%, did not increase over time (Figure 2). However, the odds of changing treatment differed by the presence of a disease activity target being recorded. For example, patients for whom remission was noted as a disease activity target had an odds ratio of 2.48 (95% confidence interval 1.80–3.44) for changing treatment compared to patients without a disease activity target.

There were 292 visits in which patients were noted to not be at target disease activity and wherein RA treatments were not changed. The chart review allowed for multiple reasons to be given for not changing treatment, with 346 reasons noted for these visits. Of the reasons given for not changing treatment, one-third of responses cited patient preference, 19% cited clinician preference, 25% of responses specifically indicated that pain was not from RA, 19% of responses indicated that patients wanted more time to allow current treatment to work, 1.4% of responses specified COVID-19, and 2.6% noted other miscellaneous reasons for not changing treatment.

Adherence at in-person visits (n = 1,137) and virtual visits (n = 317) was considered separately to better understand the impact of virtual visits on TTT. Figure 3 illustrates that there was similar improvement across both types of visits (*P* for trend < 0.0001). At the start of the LC, adherence with TTT at virtual visits (43%) was significantly lower than in-person visits (67%) ($P \leq 0.0001$). However, by the end of the LC, adherence was more comparable between virtual visits (76%) and in-person visits (85%) ($P = 0.55$).

Finally, we examined the components of TTT adherence, comparing in-person visits to visits performed in a virtual setting

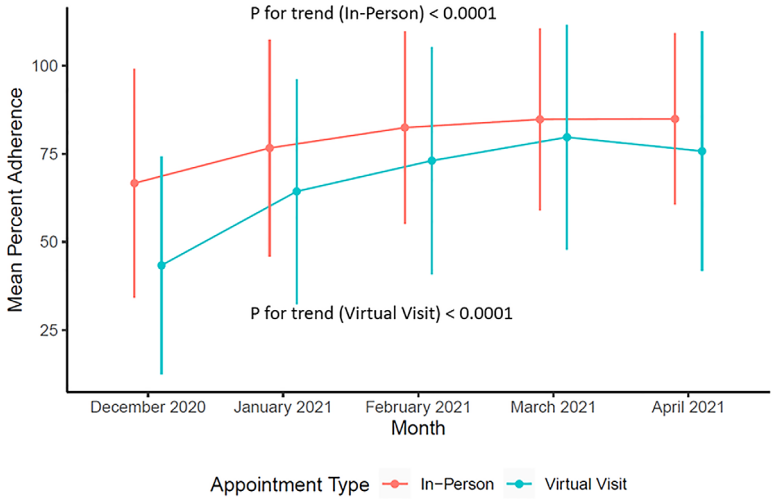

Figure 3. Trends in mean adherence with treat-to-target across 5 months when in-person visits versus virtual visits were recorded. The percentage of adherence in December was significantly higher for in-person visits compared to virtual visits ($P < 0.001$), although the percentage of adherence in April between in-person and virtual visits was not significantly different ($P = 0.55$). *P* values were calculated from mixed-effects linear regression models that determined correlation among practice sites. Error bars represent the SD.

(Table 2). Recording a disease activity measure and a target was much more common during in-person visits than in virtual visits. Additionally, changing treatment was slightly more common during in-person visits. However, shared decision-making was recorded at similar levels during the 2 types of visits. We also found an approximately similar percentage of visits that were deemed at target for both types of visits (36.7% of in-person visits versus 36.9% of virtual visits).

DISCUSSION

Learning collaboratives have been effective methods for promoting quality improvement in health care (15). In prior work, we conducted an LC over 9 months that included both in-person and virtual aspects (9). The current single-arm study assessed whether a larger-scale, shorter, and fully virtual LC could be effective at improving adherence with TTT for RA. Eighteen rheumatology practices in the US participated and contributed visit data over 6 months. We observed significant improvement in TTT adherence across the LC, with improvement being similar for both in-person and virtual visits. The improvement that we observed in the present single-arm study was smaller (from 50% adherence at baseline to 75% adherence at 6 months) in magnitude than what we observed in our prior work (from 11% at baseline to 55% at 9 months), but the duration of the study, measurement methods, and the period when the study was conducted differed (9).

The one outcome of the TTT that did not demonstrate an improvement was the lack of change of treatment in patients not at disease activity target. This has been noted in other cohorts, but we hoped that in the formal construct of this LC, which had an emphasis on TTT, this process measure would have improved. It is possible that with a longer observation period more patients would have changed treatments when not at target, an observation we noted in our previous trial (9). This issue remains a critical point for rheumatologists to consider. Treatment decisions in symptomatic chronic illnesses such as RA are always based on patient and clinician preferences. When patients and/or clinicians deem that their symptoms are not the results of RA, treatment changes will be less likely. The appropriateness of these decisions is difficult to ascertain from medical record review, but a shared

Table 2. Percent adherence with treat-to-target components, comparing in-person visits with virtual visits*

Component of treat-to-target	In-person visit (n = 1,137)	Virtual visit (n = 317)	*P*
Disease activity measure	994 (87.4)	215 (67.8)	<0.0001
Target noted	914 (80.4)	190 (59.9)	<0.0001
Number of visits not at target	720	200	
Not at target, change treatment	378 (52.5)	84 (42.0)	0.0089
Shared decision-making	480 (66.7)	139 (69.5)	0.45

* Except where indicated otherwise, values are the number (%) of visits. *P* values were generated from a mixed-effects linear regression model with a binomial distribution. This model included the presence (or absence) of the treat-to-target adherence component as a dependent variable, in-person visits versus virtual visits as the exposure of interest, and a random intercept shared by observations within the same rheumatology practice site. These are nominal *P* values where $P < 0.05$ should be considered statistically significant.

decision-making framework could work in either direction (i.e., a greater or reduced likelihood in changing RA treatments in the setting of not reaching target disease activity).

The results of this study suggest that relatively brief LCs, conducted virtually, can be effective at producing quality improvement in ambulatory rheumatology practices in the US. While it is not clear that the experience described would apply to all potential areas of quality improvement, we expect that it would be generalizable to other topics and other settings outside of the US.

There is a small amount of literature on prior experiences with virtual LCs (17–22). The prior virtual LCs have been primarily nurse-led, and all (as known to the authors of the present work) within the VA health care system in the US. Several of the LCs have produced positive results for fall prevention and catheter-associated urinary tract infections. However, it has been unclear whether a shorter virtual LC (most LCs are at least 1 year) focused on outpatient care would be feasible and productive. The results of the current LC suggest that short and virtual LCs focused on outpatient care can be productive.

Collecting data on the performance of sites regarding the area targeted for improvement is a cornerstone of all LCs. Most LCs include self-assessment. In our prior LC on TTT, study staff external to the involved practices also collected data. In the current LC, sites performed self-assessment and demonstrated gradual improvement across most components of TTT. While it is possible (maybe even likely) that the self-assessment introduced some bias, we believe that the demonstration of improvement in TTT was a valid observation. We also did not survey patients about their experience with care guided by TTT; it is possible that the patients appreciated the change in how clinicians address RA management while using a TTT paradigm.

We observed that adherence with TTT was moderate during virtual visits and improved during the LC, similar to in-person visits. The disease activity measures used during in-person and virtual visits differed somewhat (see Supplementary Table 1, available on the *Arthritis Care & Research* website at http://onlinelibrary.wiley.com/doi/10.1002/acr.24830/abstract), with the biggest difference being that no disease activity measurement was recorded in a larger proportion of virtual visits. Many disease activity measures cannot be performed without results from tender and swollen joint counts, and many clinicians in the LC discussed the challenges of virtual disease activity measures during the monthly webinars. The group discussed adaptations, such as using email for patient global assessment, patient self-assessed tender joint counts, and visual inspection by video for swollen joint counts. We do not have specific data on these adaptions, and they are all imperfect methods of ascertaining disease activity. Nonetheless, virtual visits are likely to be continued in many areas of medicine, particularly in the management of chronic diseases. We believe that our data demonstrate that quality of care for RA as evidenced by adherence with TTT can be high even with virtual visits, but it may be worthwhile to develop valid disease activity measures that can be performed virtually.

While continuing medical education is a cornerstone of professional development, quality improvement should be included as a goal of educational programs. However, delivering organized quality improvement efforts involving many practices is not a simple task. We note that the American College of Rheumatology RISE registry has organized a collective of rheumatology practices engaging in quality improvement through an LC (23). Focusing these efforts on areas requiring quality improvement in rheumatology should produce important changes. Possible areas for improvement might include glucocorticoid-induced osteoporosis management, vaccination practices, and cardiovascular risk factor management (24). The results of our study suggest that short-term virtual LCs may be appropriate to pursue in rheumatology.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Solomon had full access to all data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Solomon, Smolen.
Acquisition of data. Stratton, Ellrodt, Santacroce.
Analysis and interpretation of data. Pincus, Shadick, Katz.

ROLE OF THE STUDY SPONSOR

AbbVie had no role in the study design or in the collection, analysis, or interpretation of the data, the writing of the manuscript, or the decision to submit the manuscript for publication. Publication of this article was not contingent upon approval by AbbVie.

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APPENDIX A: TRACTION VIRTUAL LEARNING COLLABORATIVE PARTICIPANTS

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