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Patient Perceptions and Preferences Regarding Telemedicine for Autoimmune Rheumatic Diseases Care During the COVID-19 Pandemic

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Objective. To assess the perceptions and preferences of telemedicine among patients with autoimmune rheumatic diseases during the COVID-19 pandemic.

Methods. We conducted an online survey among patients with autoimmune rheumatic diseases. Attitudes about telemedicine (i.e., telemedicine acceptability), evaluated using the validated Telemedicine Perception Questionnaire (TMPQ), and visit satisfaction were assessed for different telemedicine experiences and types of autoimmune rheumatic disease.

Results. Of 3,369 invitations, 819 responses were received. Participants had a mean ± SD age of 58.6 ± 11.6 years and were mostly White (n = 759, or 92.7%) and female (n = 702, or 85.7%). Of the 618 participants who said that telemedicine was available to them, 449 (72.7%) reported having a telemedicine visit, with 303 (67.5%) reporting attending a telemedicine video visit. On a 0 to 10 scale, the mean ± SD visit satisfaction score was 7.3 ± 1.8, with 25.8% of respondents being very satisfied (scores of 9 or 10). Video visits and higher TMPQ scores were associated with higher satisfaction. Compared to those who did not experience a telemedicine visit, patients who did were more likely to prefer telemedicine (video or phone) for routine visits (73.7% versus 44.3%; $P < 0.001$), reviewing test results (64.8% versus 53.8%; $P < 0.001$), when considering changing medications (40.5% versus 26.8%; $P < 0.001$), and when starting a new injectable medication (18.9% versus 12.7%; $P = 0.02$).

Conclusion. During the COVID-19 pandemic, patients with autoimmune rheumatic diseases frequently had telemedicine visits, with the majority held via video, and were satisfied with these visits. These results suggest that because patients prefer telemedicine for certain visit reasons, maximizing effective use of telemedicine will require personalized patient scheduling.

INTRODUCTION

Outpatient health care delivery has been significantly transformed due to the COVID-19 pandemic (1,2). The pandemic disrupted nonessential in-person outpatient visits (3) and led to a dramatic uptake in remotely delivered diagnostic and treatment services (e.g., telemedicine) for patients with chronic conditions, including autoimmune rheumatic diseases. These patients are distinctly at risk for worse COVID-19 outcomes due to multimorbidity (4) and the use of immunosuppressive drugs, such as glucocorticoids and biologics (5,6) that predispose them to infections (7–9) and require close monitoring for side effects (10,11).

Although communication technologies can facilitate timely assessment, treatment, and health education for people living with

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SIGNIFICANCE & INNOVATIONS

- During the COVID-19 pandemic, members of patient communities who had autoimmune rheumatic diseases frequently had telemedicine visits, with the majority held via video, and were satisfied with these visits.
- Compared to patients who did not have a telemedicine visit, those who had experienced telemedicine care were more likely to prefer telemedicine for routine visits, reviewing test results, and when considering changing medications, including new injectable medication.
- Because patients prefer telemedicine for certain visit reasons, maximizing effective use of telemedicine will require personalized patient scheduling.

chronic conditions, much remains to be learned about the impact of the telemedicine expansion on the access and quality of care that patients with autoimmune rheumatic diseases have received in the COVID-19 era. For example, while some patients were able to successfully engage in telemedicine visits for rheumatology care during the rapid transition to telemedicine (12), socially vulnerable populations (as defined by race, income, education, rural residence, computer literacy, and internet access) may experience unintended consequences from these factors that shape access to and the effectiveness of telemedicine (13–15).

To support policy-level changes and promote patient- and clinician-informed decisions about optimal rheumatology care via telemedicine during and beyond the COVID-19 pandemic, it is critical to understand patients' experiences with telemedicine, patients' access to different types of telemedicine visits (e.g., video, phone), and how availability of telemedicine may affect patient preferences for receiving care in-office or virtually. Thus, in June 2020, as part of the Autoimmune COVID-19 Project of the Autoimmune Research Collaborative, we launched an online survey focused on telemedicine for members of patient communities who have autoimmune or inflammatory conditions, including autoimmune rheumatic diseases. The goal of this study was to gain insight on uptake and utilization of telemedicine by video or phone among this medically vulnerable patient population and to better understand patients' perceptions and attitudes about telemedicine visits and factors that influence these perceptions.

PATIENTS AND METHODS

Study setting and population. Adults ages ≥19 years with an autoimmune/rheumatic condition participating in the Autoimmune COVID-19 Project (www.rheumcovid.com) conducted by the Autoimmune Research Collaborative were invited to participate in the present study (16). The Autoimmune Research Collaborative is an alliance of patient-powered research networks (PPRNs) including the Inflammatory Bowel Disease Partners, Multiple Sclerosis PPRN, ArthritisPower PPRN, and Vasculitis PPRN (17). Participants in the Autoimmune COVID-19 Project also include members of the following patient organizations: Myositis Support and Understanding, Lupus Allied Disease Association, American Bone Health, and the International Foundation for Autoimmune and Autoinflammatory Arthritis. Launched on March 28, 2020, the goal of the Autoimmune COVID-19 project is to understand the COVID-19–related concerns and behaviors of patients in the US and Canada who have autoimmune and rheumatic conditions and to collect information from patients about their experiences with medical care during the COVID-19 pandemic. We included participants who were ages ≥19 years because the ArthritisPower Registry has institutional review board (IRB) approval to recruit US participants who are ≥19 years of age. The protocol was approved by the Advarra IRB (protocol no. Pro00042873).

The cross-sectional survey specifically about telemedicine (e.g., access, satisfaction, perceptions about telemedicine, and preference for next visit type) was conducted between June 18, 2020, and August 10, 2020. We sent survey invitations to all participants in the Autoimmune COVID-19 Project (n = 3,369) (18), and the following results are of the participants with autoimmune rheumatic diseases who completed this telehealth survey.

Data collection. As part of the Autoimmune COVID-19 Project, participants completed questions about their age, race/ethnicity, sex, state and 5-digit zip code of their residence, smoking habits, comorbidities, Patient-Reported Outcomes Measurement Information System (PROMIS) anxiety score (18), type of autoimmune or rheumatic condition, and use of immunosuppressive/immunomodulatory therapies, glucocorticoids, and nonsteroidal antiinflammatory drugs. For participants indicating multiple autoimmune rheumatic conditions, a hierarchical approach was used to categorize their autoimmune rheumatic condition considering the relative specificity of various diagnoses (antineutrophil cytoplasmic antibody [ANCA]–associated vasculitis > other vasculitis or relapsing polychondritis > myositis > lupus > psoriatic arthritis [PsA] > ankylosing spondylitis [AS] > rheumatoid arthritis [RA]), similar to previous studies (19). For example, participants reporting diagnoses of PsA and RA were categorized as having PsA, given the expectation of greater specificity for that diagnosis. Participants' residence in a rural versus urban county was defined using the Centers for Disease Control 2013 National Center for Health Statistics classification (20).

In the cross-sectional telemedicine survey, the participants were asked, "Is your rheumatologist/specialist that manages your rheumatic/autoimmune condition offering telephone or telehealth visits?" with possible response options being "Yes," "No," or "I don't know." Participants self-reported whether they had a telemedicine visit and its type (e.g., phone only or video), reported satisfaction with their telemedicine visit using the 1-item overall visit satisfaction (0–10 scale, with 0 representing "worst possible

visit" and 10 representing "best possible visit") from the validated Agency for Healthcare Research and Quality Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey (21,22). Patients also reported preference for type of visit at the next appointment (i.e., "If you had a choice, what type of visit would you prefer?" with survey choices for types of visits including in-office, videoconference, phone, or videoconference or phone visit, with the last choice listed indicating no preference for video or phone visit [23]) as well as attitudes about telemedicine using (with permission) a modified version of the validated Telemedicine Perception Questionnaire (TMPQ) (24). The TMPQ score is a validated measure to assess patient acceptability of health care delivered via telemedicine that takes into account perceptions of benefits and limitations of in-home telemedicine monitoring (24). A total TMPQ score (range 17–85) was calculated for each of the respondents, with higher scores showing higher acceptability.

All participants were also asked to indicate their preference for a future telemedicine visit compared to an in-office visit with their rheumatologist or autoimmune disease specialist (choices included preferences for an in-office visit, preference for a telemedicine visit, no preference, and not sure) for specific clinical scenarios (i.e., reasons for visits) including routine visit when feeling well, during a disease flare, for reviewing test results, for having medication side effects, for a new problem, when considering changing therapy, and when starting a new injectable medication. Because the telemedicine survey was deployed during the COVID-19 pandemic, respondents answered questions regarding future telemedicine visits in relation to the pandemic being ongoing.

Statistical analysis. To summarize the data, we used the mean ± SD for continuous variables, and frequencies and proportions for categorical variables. Because visit satisfaction ratings were positively skewed, we standardized visit satisfaction ratings (mean = 0 and variance = 1). We used *t*-tests and multivariable linear regression analysis to compare the satisfaction and TMPQ scores in respondents who reported participating in video and phone-only visits and by disease type, grouping together RA, AS, and PsA as "inflammatory arthritis" versus other conditions. Chi-square tests were used to compare preferences for telemedicine visits for specific clinical scenarios between those who had experience receiving care with telemedicine versus those who did not have experience with telemedicine (i.e., our comparator group comprised those who did not have a telemedicine visit irrespective of whether they were aware or not of the fact that they had access to such visits). We built multivariable logistic regression models that included age, sex, place of residence, and diagnosis to determine patient factors associated with preference for telemedicine visits versus in-person visits as a future visit type among those who experienced a telemedicine visit. We categorized disease type as follows: other autoimmune condition (group 1), RA, PsA, and AS (group 2), myositis and systemic lupus erythematosus (group 3), and ANCA-associated vasculitis and other vasculitis (group 4).

We built a multinomial logistic regression model evaluating preference for telemedicine (phone or video) versus in-office visit for multiple different clinical scenarios (i.e., routine visit, disease flare, reviewing test results, discussing medication side effects, discussing a new problem, changing medications, and starting a new injectable medication). The clinical scenario was included in the model as a factor variable where each scenario served as a category and where the "discuss new problem" scenario was the referent. This model included age, residence (rural versus urban), and visit type for the patient's previous telemedicine visit (video versus phone). Because we thought that the type of telemedicine visits a patient may have already experienced might also influence their preference for telemedicine versus in-office visit across different clinical scenarios, we focused our analysis on the group of participants who previously experienced telemedicine visits for each clinical situation. To control for correlations within patients, we estimated the model with clustered SEs. We validated the estimates from the multinomial logistic regression analysis using bootstrap resampling (25). The referent group for the dependent variable in this model was preference for in-office visit. Odds ratios (ORs) shown are for comparisons made between telemedicine visits and in-office visits, with an OR of >1 indicating that a patient had a higher preference for a telemedicine visit and an OR of <1 indicating a lower preference for a telemedicine visit compared to an in-office visit. ORs for "no preference" versus in-office visit are not shown. All analyses were conducted in SAS (version 9.3; Enterprise Guide version 4.3) and R (version 4.0.2).

RESULTS

Of the 3,369 invitations sent for our online telemedicine survey, 1,852 individuals (55.0%) opened the invitation email, and 819 people with self-reported autoimmune rheumatic diseases completed the survey. Compared to nonrespondents, respondents were older, more likely to have RA, and more likely to be receiving a biologic disease-modifying antirheumatic drug, a JAK inhibitor, methotrexate, and/or hydroxychloroquine (Supplementary Table 1, available on the *Arthritis Care & Research* website at http://onlinelibrary.wiley.com/doi/10.1002/acr.24860). A total of 618 respondents (75.5%) said that they were aware that telemedicine was available to them if they needed it. Among respondents who already had a telemedicine visit (n = 449), the most common reported autoimmune rheumatic conditions were RA (41.6%), ANCA-associated vasculitis (16.3%), PsA (11.8%), and AS (7.8%). Those who self-reported experiencing a telemedicine visit had a mean ± SD age of 57.7 ± 12.1 years and were mostly White (92.2%) and female (86.0%); a minority of respondents resided in a rural area (11.0%). The mean ± SD T score on the PROMIS Anxiety questionnaire among people who reported

Table 1. Demographic and clinical characteristics of respondents, stratified by type of telemedicine visit*

Characteristic	All participants (n = 819)	Video telemedicine visit (n = 303)	Phone telemedicine visit (n = 146)	No telemedicine visit (n = 370)	*P*
Age, mean ± SD years	58.6 ± 11.6	56.7 ± 12.6	59.8 ± 10.6	59.7 ± 10.8	0.01†
Female sex	702 (85.7)	264 (87.1)	122 (83.6)	316 (85.4)	0.82
White	759 (92.7)	278 (91.8)	136 (93.2)	345 (93.2)	0.57
Hispanic	37 (4.5)	11 (3.6)	4 (2.7)	22 (6.0)	0.07
Rural residence	99 (13.2)	28 (9.8)	16 (13.8)	55 (15.9)	0.05†
Autoimmune condition					
Rheumatoid arthritis	353 (43.1)	128 (42.2)	59 (40.4)	166 (44.9)	0.35
ANCA-associated vasculitis	115 (14.0)	47 (15.5)	26 (17.8)	42 (11.4)	0.04†
Psoriatic arthritis	108 (13.2)	32 (10.6)	21 (14.4)	55 (14.9)	0.20
Ankylosing spondylitis	66 (8.1)	26 (8.6)	9 (6.2)	31 (8.4)	0.76
Other autoimmune rheumatic disease‡	54 (6.6)	16 (5.3)	10 (6.9)	28 (7.6)	0.31
Other vasculitis or relapsing polychondritis	54 (6.6)	24 (7.9)	10 (6.9)	20 (5.4)	0.21
Lupus	38 (4.6)	16 (5.3)	6 (4.1)	16 (4.3)	0.70
Myositis	31 (3.8)	14 (4.6)	5 (3.4)	12 (3.2)	0.46
Medications					
Biologic DMARD	376 (45.9)	147 (48.5)	75 (51.4)	154 (41.6)	0.03†
JAK inhibitor	70 (8.6)	24 (7.9)	11 (7.5)	35 (9.5)	0.40
Methotrexate	250 (30.5)	101 (33.3)	52 (35.6)	97 (26.2)	0.02†
Hydroxychloroquine	195 (23.8)	77 (25.4)	36 (24.7)	82 (22.2)	0.32
Glucocorticoids	241 (29.4)	101 (33.3)	47 (32.2)	93 (25.1)	0.01†
NSAIDs	285 (34.8)	103 (34.0)	52 (35.6)	130 (35.1)	0.85
Comorbidities					
Hypertension	354 (43.2)	136 (44.9)	69 (47.3)	149 (40.3)	0.12
Lung disease§	299 (36.5)	111 (36.6)	52 (35.6)	136 (36.8)	0.90
Diabetes mellitus	101 (12.3)	41 (13.5)	14 (9.6)	46 (12.4)	0.95
Kidney disease	81 (9.9)	28 (9.2)	20 (13.7)	33 (8.9)	0.40
Heart disease	72 (8.8)	21 (6.9)	12 (8.2)	39 (10.5)	0.11
Current smoking	60 (7.3)	21 (6.9)	6 (4.1)	33 (8.9)	0.11
Malignancy	17 (2.1)	5 (1.7)	3 (2.1)	9 (2.4)	0.52
PROMIS anxiety, mean ± SD T score¶	58.2 ± 8.8	58.9 ± 8.2	58.1 ± 9.0	57.6 ± 9.1	0.06

* Except where indicated otherwise, values are the number (%) of respondents. Rural residence status is shown for participants who had available zip codes. *P* values were calculated based on differences between the characteristics of respondents who had a telemedicine visit versus those who did not. ANCA = antineutrophil cytoplasmic antibody; DMARD = disease-modifying antirheumatic drug; NSAIDs = nonsteroidal anti-inflammatory drugs; PROMIS = Patient-Reported Outcomes Measurement Information System.
† Statistically significant at $P = 0.05$.
‡ Other rheumatic diseases included antiphospholipid antibody syndrome, anti–glomerular basement membrane antibody disease, juvenile idiopathic arthritis, mixed connective tissue disease, psoriasis, sarcoidosis, scleroderma, and Sjögren's syndrome.
§ Lung disease included asthma, emphysema, chronic obstructive pulmonary disease, pulmonary hypertension, and other chronic lung disease.
¶ Anxiety was measured using the PROMIS anxiety short form (score range 1–100). For reference, the mean ± SD PROMIS anxiety T score in the US adult population is 50 ± 0.

having a telemedicine visit was 58.7 ± 8.5, and among those who did not report experiencing telemedicine, it was 57.6 ± 9.1, which is 8.7 SDs and 7.6 SDs higher, respectively, than normative values for people living in the US ($P = 0.06$) (18). We observed statistically significant differences between those who experienced a telemedicine visit (n = 449) and those who did not have a telemedicine visit (n = 370) in age, place of residence, ANCA-associated vasculitis diagnosis, and types of medication used (e.g., methotrexate and glucocorticoids) (Table 1).

Clinical scenarios favored for telemedicine visits. Among the survey respondents, a majority preferred a telemedicine visit by video or phone for routine visits (n = 495, or 60.4%) or for review of test results (n = 490, or 59.8%) (Figure 1). However, a minority of the respondents also preferred telemedicine visits for evaluation of a new problem (n = 176, or 21.5%), during a disease flare (n = 150, or 18.3%), or when starting a new injectable medication (n = 132, or 16.1%) (Figure 1). The proportion of survey respondents preferring telemedicine versus in-office visits among different clinical scenarios were similar between those who had video visits versus phone visits (data not shown).

More participants who had experienced a video or phone telemedicine visit reported preferring a telemedicine visit for a routine check-in when feeling well (73.7%) than participants who had not had a telemedicine visit (44.3%; $P < 0.001$). The results were similar for a visit to review blood work or other tests (64.8% versus 53.8%; $P < 0.001$), when considering changing medications

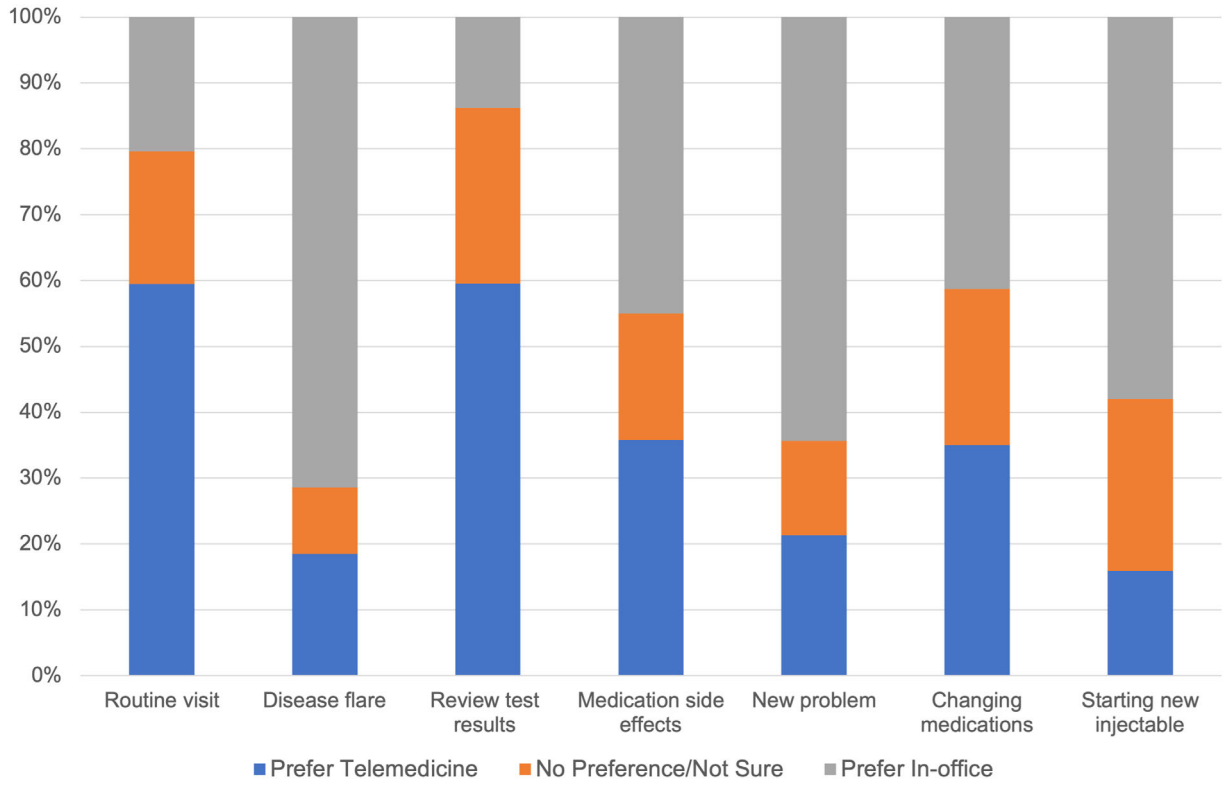

Figure 1. Preference for telemedicine visits versus in-office visits among all survey respondents (n = 819), stratified by reason for visit.

(40.5 versus 26.8; $P < 0.001$), and when starting a new injection medication (18.9% versus 12.7%; $P = 0.02$) (Table 2).

Visit satisfaction and telemedicine acceptability among respondents who experienced a telemedicine visit. The mean ± SD satisfaction rating was 7.3 ± 1.8, and 25.8% of the respondents (n = 116) reported high levels of satisfaction with the telemedicine visit (score of 9 or 10) (Table 3). The mean ± SD telemedicine acceptability from the validated TMPQ score was 62.8 ± 10.7, supporting a favorable attitude toward telemedicine among patients who participated in a telemedicine visit. Among survey respondents who experienced a telemedicine visit, satisfaction and telemedicine perception scores were similar between respondents with autoimmune inflammatory arthritis (e.g., RA, AS, and PsA) and those with other autoimmune conditions (7.2 ± 1.9 versus 7.4 ± 1.7 for satisfaction scores and 62.5 ± 10.5 versus 63.4 ± 10.9 for telemedicine perception scores). Levels of agreement/disagreement with specific statements within the TMPQ are presented in Supplementary Figure 1, available on the *Arthritis Care & Research* website at http://onlinelibrary.wiley.com/doi/10.1002/acr.24860. More participants who had a video visit agreed with the statement that telemedicine was a convenient form of health care delivery for them (78.2%) versus participants who had a phone visit (69.9%; $P = 0.05$). Similarly, more participants who had video visits agreed that telemedicine saves time (90.4% versus 82.9%; $P = 0.02$) (Supplementary Table 2).

Table 2. Participant preference for telemedicine visit for different visit reasons based on prior experience with telemedicine*

Reason for clinic visit	All participants (n = 819)	Had a telemedicine visit (n = 449)	Did not have a telemedicine visit (n = 370)	*P*
Routine care	495 (60.4)	331 (73.7)	164 (44.3)	<0.001†
Disease flare	150 (18.3)	79 (17.6)	71 (19.2)	0.56
Review of test results	490 (59.8)	291 (64.8)	199 (53.8)	<0.001†
Medication side effects	293 (35.8)	169 (37.6)	124 (33.5)	0.22
New problem	176 (21.5)	101 (22.5)	75 (20.3)	0.44
Medication change	281 (34.3)	182 (40.5)	99 (26.8)	<0.001†
Starting a new injectable medication	132 (16.1)	85 (18.9)	47 (12.7)	0.02†

* Values are the number (%) of patients.
† Statistically significant at $P = 0.05$.

Table 3. Respondents' perceptions about telemedicine by type of telemedicine visit experienced*

Characteristic	All telemedicine visits (n = 449)	Video visit (n = 303)	Phone visit (n = 146)
Mean ± SD satisfaction rating on a 0–10 scale	7.3 ± 1.8	7.5 ± 1.7	7.0 ± 2.0
<6	83 ± 18.5	49 ± 16.2	34 ± 23.3
6–8	250 ± 55.7	173 ± 57.1	77 ± 52.7
9–10	116 ± 25.8	81 ± 26.7	35 ± 24.0
Mean ± SD score on the TMPQ†	62.8 ± 10.7	63.3 ± 10.4	61.8 ± 11.1
Office visit is better	258 (57.5)	167 (55.1)	91 (62.3)
Telemedicine visit is better	41 (9.1)	31 (10.2)	10 (6.9)
No difference/unsure	150 (33.4)	105 (34.7)	45 (30.8)
Preference for next visit type‡			
In-office	255 (56.8)	166 (54.8)	89 (61.0)
Video or phone	57 (12.7)	32 (10.6)	25 (17.1)
Phone	23 (5.1)	6 (2.0)	17 (11.6)
Video	114 (25.4)	99 (32.7)	15 (10.3)

* Except where indicated otherwise, values are the number (%) of respondents.
† Telemedicine perception questionnaire (TMPQ) scores range from 17 to 85, with higher values indicating a more favorable perception of telemedicine.
‡ Next visit type preference was assessed using answers to the following question, "If you had a choice, what type of visit would you prefer."

Patient factors associated with preference for telemedicine versus in-office as the next visit type among respondents who had a telemedicine visit. Among respondents who experienced telemedicine visits (n = 449), 255 (56.8%) stated that they preferred an in-office visit as their next visit type, and 194 (43.2%) preferred a telemedicine visit (Table 3). More than half of respondents (57.5%) said that an office visit is better than a telemedicine visit. In multivariable logistic regression models, we found that patient diagnosis, place of residence, age, or sex were not associated with preference for telemedicine as the next type of visit (data not shown).

Furthermore, in an adjusted multinominal logistic regression model for preference of the next visit type (with in-office visit as the referent), compared to having a visit to discuss a new problem, ORs (95% confidence intervals [95% CIs]) were higher when the patient would indicate preferring a telemedicine visit versus an in-office visit when the reason for the visit was to review test results (OR 18.45 [95% CI 12.25–25.75]), for routine care (OR 17.76 [95% CI 12.25–25.75], to discuss medication change (OR 3.30 [95% CI 2.41–4.52]), and to discuss medication side effects (OR 2.35 [95% CI 1.73–3.20]). In contrast, compared to having a visit to discuss a new problem, ORs (95% CIs) were lower when the patient would prefer a telemedicine visit versus an in-office visit for evaluation of a disease flare (OR 0.66 [95% CI 0.47, 0.92]) (Table 4).

Table 4. Multinomial regression model evaluating preference for telemedicine visit versus in-office visit for specific clinical scenarios among respondents who already had a telemedicine visit*

Parameter	OR (95% CI)	*P*
Video visit	1.27 (1.04–1.55)	0.017†
Rural residence	1.03 (0.692–1.520)	0.899
Age	0.994 (0.987–1.002)	0.139
Review test results	18.45 (12.25–25.75)	<0.0001†
Medication change	3.30 (2.41–4.52)	<0.0001†
Start a new injectable medication	0.98 (0.70–1.37)	0.902
Disease flare	0.66 (0.47–0.92)	0.026†
Routine care	17.76 (12.25–25.75)	<0.0001†
Medication side effects	2.35 (1.73–3.20)	<0.0001†

* 95% CI = 95% confidence interval; OR = odds ratio. Clinical scenarios included in the analysis were modeled using a "discuss new problem" scenario as the referent.
† Statistically significant at $P = 0.05$.

Patient factors associated with telemedicine visit satisfaction and telemedicine perception score. Among participants who reported having a telemedicine visit (n = 449), most of these visits occurred by videoconferencing (n = 303, or 67.5%). Compared to those who had phone-only telemedicine visits, respondents who experienced video visits were slightly younger, resided in urban areas, and reported higher satisfaction with the telemedicine visit; a higher proportion of these respondents also expressed a preference for a video telemedicine visit as a future visit (Table 2). However, there were no differences in the TMPQ score between those who had video telemedicine visits and those who had phone telemedicine visits.

In multivariable linear regression models after controlling for age and place of residence (rural versus urban), we found that compared to those who had phone-only visits, those who had video visits expressed higher satisfaction (an average of 0.145 units on the standardized scale). Similarly, a positive relationship existed between TMPQ score and telemedicine visit satisfaction rating. A 0.068-unit increase in the TMPQ score led to a 1-unit increase in satisfaction with visit rating (Table 5). There was no association between type of telemedicine visit (phone versus video) and TMPQ score (Table 5).

Table 5. Factors associated with telemedicine visit satisfaction and telemedicine perception score (n = 449)*

Variable	Outcome: patient satisfaction			Outcome: telemedicine perception score		
	Estimate	SE	*P*	Estimate	SE	*P*
Rural residence	0.029	0.111	0.796	−1.321	1.571	0.401
Video visit	0.145	0.073	0.047†	−0.147	0.785	0.852
Age	0.002	0.003	0.371	−0.018	0.03	0.546
TMPQ score	0.068	0.003	<0.0001†	NA	NA	NA
Satisfaction score	NA	NA	NA	7.613	0.356	<0.0001†

* NA = not applicable; TMPQ = telemedicine perception questionnaire score.
† Statistically significant at $P = 0.05$.

DISCUSSION

Early in the COVID-19 pandemic, we found that approximately three-fourths of respondents in this population of patients with autoimmune rheumatic diseases had access to telemedicine visits, that the majority of respondents had already had at least 1 telemedicine visit, and that they reported overall good levels of satisfaction with both video and phone-only home-based telemedicine visits. We found that those who had ANCA-associated vasculitis or those who were receiving methotrexate or glucocorticoids were more likely to have experienced telemedicine, possibly indicating they may have had to use telemedicine sooner than other groups. A plurality of respondents thought that telemedicine was as good as or better than in-office visits. The respondents in our present study were much more likely to prefer telemedicine for certain types of clinical scenarios (e.g., routine visits, review of test results, among others), although for all scenarios some patients preferred telemedicine. These results highlight that patients with autoimmune rheumatic diseases have rapidly embraced the expansion of telemedicine for care of chronic diseases, as necessitated by the COVID-19 pandemic, including the use of video and phone-only telemedicine visits.

In our study, we found that the mean ± SD home telemedicine visit satisfaction score was 7.3 ± 1.8, with one-fourth of participants being very satisfied (score 9 or 10 on the 0–10 patient satisfaction scale). The level of satisfaction we observed in the present study was slightly lower than in that in a study of veterans with inflammatory arthritis who received in-facility telemedicine visits (26). While telemedicine may somewhat mitigate current and likely future rheumatology workforce issues, including geographic maldistribution of rheumatologists (27)—and although home-based telemedicine expanded dramatically due to the COVID-19 pandemic due to major health policy changes (28,29)—patients' perceptions, attitudes, and perspectives about telemedicine for rheumatology care are understudied. Home-based telemedicine visits conducted via phone or video-conferencing enable rheumatology care for socially and medically vulnerable groups (30–32) and allow patients to avoid travel that increases COVID-19 risk (33). We collected data on patient experience with telemedicine visits because patient satisfaction is a key quality of care outcome, and satisfaction has been tied to Medicare reimbursement for clinical services (34). We found that the respondents were satisfied with telemedicine visits irrespective of whether the visits were phone-only or conducted via video-conferencing, a finding that is in line with previous studies on patient satisfaction with telemedicine in rheumatology (35) and supports continued access to telemedicine after the COVID-19 pandemic.

Phone-only telemedicine visits have expanded access to care to patients who may have experienced barriers due to health policy (e.g., insurance coverage) and factors such as age, rural residence, lack of broadband internet, or limited digital literacy (13–15). Given the differences in the type and extent of physical examination that can be performed during phone-only visits compared to video telemedicine visits, we explored whether patients' acceptability of telemedicine differed among those who reported participating in these 2 types of home-based telemedicine visits. We found that the acceptability of home-based telemedicine was good and similar for both video visits and phone-only visits, which supports the perceived value of both types of telemedicine visits for patients with autoimmune rheumatic diseases. In addition, visit satisfaction and telemedicine acceptability were correlated with one another. Compared to a phone-only visit, having a video visit was associated with higher visit satisfaction rating after adjustment for TMPQ score, which is a measure that accounts for the benefits and limitations of different types of home-based telemedicine. This observation is not surprising given that interpersonal communication through phone-only visits is limited to verbal cues and thus lacks the additional visual information that video visits bring into conversations (e.g., non-verbal cues, elements of physical examination). However, this result does not negate the utility of phone-only telemedicine visits for both patients and their rheumatologists as means to preserve access to limited chronic disease care when videoconferencing capability is lacking and in areas that may have limited broadband access, particularly if other data (e.g., electronically collected patient-reported outcomes or passive data from health tracker devices) might be available to supplement the information available to the medical team (36). Our findings can be used by patients, clinicians, and policy makers as they make decisions about participating in and supporting access to telemedicine, both video and phone visits, in the future.

Previous studies have reported rheumatologists' views on the appropriateness of a clinical situation for telemedicine, but to

our knowledge, our study is the first to evaluate the patient perspective on the suitability of particular scenarios for a telemedicine visit. Importantly, the patients surveyed in our study favored telemedicine versus in-office visits in some specific clinical contexts, such as for reviewing results of blood work and other testing and for routine visits when feeling well, perhaps because these visits may not require a full hands-on physical examination. These clinical scenarios are commonly encountered in clinical practice and conducting such visits via telemedicine could reduce the burden on patients associated with travel for in-person office visits, alleviate illness-related work productivity loss, and mitigate other social impacts such as the need to arrange for care of children or other family members. As telemedicine for rheumatology care grows, future research needs to address best practices for delivering care remotely. For example, for video visits, expanding access to high-speed internet, defining the appropriate audiovisual equipment needed (computer versus smartphone), visit setting (in-home versus a facility close to a patient's home), environmental characteristics (e.g., a quiet and well-lit space), and training of patients and medical teams on how to participate in and guide with physical examination are key for enabling best quality of care.

Conversely, patients who had used telemedicine at least once favored in-office visits to a telemedicine visit for the evaluation of a new problem, during a disease flare or when starting a new injectable medication, although a sizeable minority preferred telemedicine even in these situations. These patients' views are remarkably concordant with the perspectives of a group of academic rheumatologists who participated in center-based telemedicine visits and deemed that telemedicine visits were not optimal because of unclear diagnosis (e.g., disease flare in the context of another rheumatic condition), complexity of the disease process (e.g., requiring physical examination that could not be performed remotely), or previous poor engagement in care (e.g., lack of recent in-person evaluation) (35). However, for those patients who have a good relationship with their medical team and who understand their disease well, telemedicine for a disease flare might be appropriate.

Our study had several strengths, including a large sample size and use of validated instruments to measure patients' perceptions about different types of telemedicine visits, satisfaction, and acceptability of telemedicine in rheumatology care. Despite its strengths, the study also had some limitations. We surveyed members of an online community of patients with rheumatic diseases, and hence, they may be more comfortable with using technology compared to patients who are not active online.

Although participants in this survey live in different geographical areas, they are primarily White, and their perceptions and attitudes about different types of telemedicine visits may not reflect those of people from other racial/ethnic groups who live with rheumatic diseases in the US. In addition, most respondents reported residing in an urban area, and so the present findings might not be generalizable to people with autoimmune rheumatic diseases who live in rural areas. We did not collect data about patient satisfaction with in-office visits, and thus, we were not able to compare satisfaction with home-based telemedicine versus that with an in-office visit. Because we did not collect information on educational attainment, income level, or whether participants were able to choose the type of telemedicine visit they reported as part of this cross-sectional survey, our study did not examine the association of these factors with perceptions and attitudes about phone or video telemedicine visits. While our survey was conducted in the first 4–6 months of the COVID-19 pandemic, it is possible that the participants who had experienced telemedicine may have had multiple telemedicine visits, both by video and phone, and their responses may reflect these experiences overall, rather than one experience in particular. We chose as a comparator group those who did not have a telemedicine visit, irrespective of their knowledge of telemedicine availability, rather than those who had access to telemedicine but did not have a telemedicine visit because we could not ascertain the reasons why this group did not experience a telemedicine visit (e.g., did not need a visit, had an in-office visit). Thus, our results are not generalizable to those patients with autoimmune rheumatic diseases who did not experience a telemedicine visit. Furthermore, attitudes about both the limitations and benefits of telemedicine versus in-person visits may be different in the middle of the COVID-19 pandemic from what patients may feel once the pandemic has subsided. Although our findings are subject to recall bias, which may affect the estimates of satisfaction with the telemedicine visit, this is less likely to impact assessment of telemedicine benefits and limitations for each modality (video versus phone). Importantly, it is unclear how preferences for types of visits might change when the pandemic is better controlled, especially since phone visits were not considered telehealth/telemedicine and were not reimbursed in the same way as video visits in the past.

In conclusion, during the COVID-19 pandemic, patients with autoimmune rheumatic diseases that were members of an online patient community frequently had telemedicine visits, with the majority held via video, and were satisfied with these visits. Patient preference for telemedicine versus in-office visits depended on the reasons for a visit, past experiences with telemedicine, and attitudes about different types of telemedicine visits. These findings highlight the need to ensure equitable access to telemedicine and to integrate telemedicine into clinical practice in a way that maximizes effectiveness of and satisfaction with visits, with a focus on the reason for a patient's visit and patient preferences.

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. Danila 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.

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Analysis and interpretation of data. Danila, Gavigan, Rivera, Nowell, George, Christopher-Stein, Banerjee, Venkatachalam.

REFERENCES

1. Hollander JE, Carr BG. Virtually Perfect? Telemedicine for Covid-19. N Engl J Med 2020;382:1679–81.
2. Bachireddy C, Chen C, Dar M. Securing the safety net and protecting public health during a pandemic: Medicaid's response to COVID-19. JAMA 2020;323:2009–10.
3. Kuy S, Gupta R, Correa R, Tsai R, Vohra S. Best practices for a Covid-19 preparedness plan for health systems. NEJM Catalyst Innovations in Care Delivery. 2020. URL: https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0108.
4. Radner H, Yoshida K, Smolen JS, Solomon DH. Multimorbidity and rheumatic conditions—enhancing the concept of comorbidity. Nat Rev Rheumatol 2014;10:252–6.
5. Michaud K, Wipfler K, Shaw Y, Simon TA, Cornish A, England BR, et al. Experiences of patients with rheumatic diseases in the United States during early days of the COVID-19 Pandemic. ACR Open Rheumatol 2020;2:335–43.
6. Mikuls TR, Johnson SR, Fraenkel L, Arasaratnam RJ, Baden LR, Bermas BL, et al. American College of Rheumatology guidance for the management of rheumatic disease in adult patients during the COVID-19 pandemic: version 1. Arthritis Rheumatol 2020;72:1241–51.
7. Dixon WG, Suissa S, Hudson M. The association between systemic glucocorticoid therapy and the risk of infection in patients with rheumatoid arthritis: systematic review and meta-analyses. Arthritis Res Ther 2011;13:R139.
8. Sciascia S, Mompean E, Radin M, Roccatello D, Cuadrado MJ. Rate of adverse effects of medium- to high-dose glucocorticoid therapy in systemic lupus erythematosus: a systematic review of randomized control trials. Clin Drug Investig 2017;37:519–24.
9. Singh JA, Cameron C, Noorbaloochi S, Cullis T, Tucker M, Christensen R, et al. Risk of serious infection in biological treatment of patients with rheumatoid arthritis: a systematic review and meta-analysis. Lancet 2015;386:258–65.
10. Singh JA, Saag KG, Bridges SL Jr, 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.
11. Saag KG, Teng GG, Patkar NM, Anuntiyo J, Finney C, Curtis JR, et al. American College of Rheumatology 2008 recommendations for the use of nonbiologic and biologic disease-modifying antirheumatic drugs in rheumatoid arthritis. Arthritis Rheum 2008;59:762–84.
12. Bashshur R, Doarn CR, Frenk JM, Kvedar JC, Woolliscroft JO. Telemedicine and the COVID-19 pandemic, lessons for the future. Telemed J E Health 2020;26:571–3.
13. Kruse CS, Karem P, Shifflett K, Vegi L, Ravi K, Brooks M. Evaluating barriers to adopting telemedicine worldwide: a systematic review. J Telemed Telecare 2018;24:4–12.
14. Weinstein RS, Lopez AM, Joseph BA, Erps KA, Holcomb M, Barker GP, et al. Telemedicine, telehealth, and mobile health applications that work: opportunities and barriers. Am J Med 2014;127:183–7.
15. Nouri S, Khoong EC, Lyles CR, Karliner L. Addressing equity in telemedicine for chronic disease management during the Covid-19 pandemic. NEJM Catalyst Innovations in Care Delivery. 2020. URL: https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0123.
16. Nowell WB, Merkel PA, McBurney RN, Young K, Venkatachalam S, Shaw DG, et al. Patient-powered research networks of the autoimmune research collaborative: rationale, capacity, and future directions. Patient 2021;14:699–710.
17. Daugherty SE, Wahba S, Fleurence R. Patient-powered research networks: building capacity for conducting patient-centered clinical outcomes research. J Am Med Inform Assoc 2014;21:583–6.
18. Liu H, Cella D, Gershon R, Shen J, Morales LS, Riley W, et al. Representativeness of the Patient-Reported Outcomes Measurement Information System Internet panel. J Clin Epidemiol 2010;63:1169–78.
19. George MD, Venkatachalam S, Banerjee S, Baker JF, Merkel PA, Gavigan K, et al. Concerns, healthcare use, and treatment interruptions in patients with common autoimmune rheumatic diseases during the COVID-19 pandemic. J Rheumatol 2020;48:603–7.
20. Centers for Disease Control and Prevention. NCHS urban-rural classification scheme for counties. 2013. URL: https://www.cdc.gov/nchs/data/series/sr_02/sr02_166.pdf.
21. Mukherjee S, Rodriguez HP, Elliott MN, Crane PK. Modern psychometric methods for estimating physician performance on the Clinician and Group CAHPS survey. Health Serv Outcomes Res Methodol 2013;13:109–23.
22. Agency for Healthcare Research and Quality. Consumer Assessment of Healthcare Providers and Systems. URL: https://www.ahrq.gov/cahps/about-cahps/index.html.
23. Walter SD, Turner RM, Macaskill P, McCaffery KJ, Irwig L. Estimation of treatment preference effects in clinical trials when some participants are indifferent to treatment choice. BMC Med Res Methodol 2017;17:29.
24. Demiris G, Speedie S, Finkelstein S. A questionnaire for the assessment of patients' impressions of the risks and benefits of home telecare. J Telemed Telecare 2000;6:278–84.
25. Suzuki R, Shimodaira H. Hierarchical clustering with P-values via multiscale bootstrap resampling. R package. 2013.
26. Wood PR, Caplan L. Outcomes, satisfaction, and costs of a rheumatology telemedicine Program: a longitudinal evaluation. J Clin Rheumatol 2019;25:41–4.
27. Ward IM, Schmidt TW, Lappan C, Battafarano DF. How critical is telemedicine to the rheumatology workforce? Arthritis Care Res (Hoboken) 2016;68:1387–9.
28. Centers for Medicare & Medicaid Services. Trump Administration issues second round of sweeping changes to support U.S. healthcare system during COVID-19 pandemic. 2020. URL: https://www.cms.gov/newsroom/press-releases/trump-administration-issues-second-round-sweeping-changes-support-us-healthcare-system-during-covid.
29. Centers for Medicare & Medicaid Services. Medicare Telemedicine Health Care Provider Fact Sheet. 2020. URL: https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet.
30. Hayes BL, Curtis JR, Laster A, Saag K, Tanner SB, Liu C, et al. Osteoporosis care in the United States after declines in reimbursements for DXA. J Clin Densitom 2010;13:352–60.
31. Heath B, Salerno R, Hopkins A, Hertzig J, Caputo M. Pediatric critical care telemedicine in rural underserved emergency departments. Pediatr Crit Care Med 2009;10:588–91.
32. Feldman CH, Ramsey-Goldman R. Widening disparities among patients with rheumatic diseases in the COVID-19 era: an urgent call to action. Arthritis Rheumatol 2020;72:1409–11.
33. Uscher-Pines L, Fischer S, Tong I, Mehrotra A, Malsberger R, Ray K. Virtual first responders: the role of direct-to-consumer telemedicine in caring for people impacted by natural disasters. J Gen Intern Med 2018;33:1242–4.
34. Centers of Medicare and Medicaid Services. Quality Measures Requirements. 2020. URL: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures.
35. Kulcsar Z, Albert D, Ercolano E, Mecchella JN. Telerheumatology: a technology appropriate for virtually all. Semin Arthritis Rheum 2016;46:380–5.
36. Nowell WB, Curtis D, Thai M, Wiedmeyer C, Gavigan K, Venkatachalam S, et al. Digital interventions to build a patient registry for rheumatology research. Rheum Dis Clin North Am 2019;45:173–86.