The Journal of Rheumatology 2023;50:690–6
doi:10.3899/jrheum.220765
First Release February 1 2023

The Journal of Rheumatology

COVID-19 Vaccination Perceptions in Patients With Rheumatic Disease: A Cross-Sectional Online Survey

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ABSTRACT. ***Objective.*** To identify the factors that affect coronavirus disease 2019 (COVID-19) vaccine decision making among individuals diagnosed with a rheumatologic condition, given that previous international studies have demonstrated that a significant proportion of patients with rheumatic disease (RD) are vaccine hesitant.

Methods. This cross-sectional study involved an online survey with adult patients with RD from the Kaye Edmonton Clinic Rheumatology Clinic between June and August 2021. Quantitative results were descriptively analyzed, whereas qualitative thematic analysis was conducted for open-ended responses.

Results. The survey had a response rate of 70.9% (N = 231). Regarding COVID-19 vaccines, patients with RD were most concerned about the possible effect of vaccination on their rheumatic condition (45.2%) and about vaccine effectiveness (45.1%). Most patients had discussed COVID-19 vaccination (75.9%) and its risks and benefits (66.1%) with their medical team, and 83.6% of respondents were confident in the information provided. Patients' perceptions of the government's role in handling the COVID-19 pandemic varied: 33% reported that they found government-instituted public health measures effective. Surprisingly, 9.7% of patients with RD still reported concerns that they could develop COVID-19 from an approved COVID-19 vaccine.

Conclusion. This study describes factors implicated in COVID-19 vaccine decision making among patients with RD. Three important themes included possible adverse effects of the vaccine on RD control, reduced vaccine efficacy because of RD/treatment, and risk of contracting SARS-CoV-2 from the COVID-19 vaccine. Knowledge from this study can assist healthcare providers in looking after patients with RD to initiate discussions with patients to share evidence-based vaccine information and assist with informed decision making.

Key Indexing Terms: COVID-19 vaccines, rheumatology, vaccination hesitancy

Vaccination against SARS-CoV-2 is an important tool in the management of the coronavirus disease 2019 (COVID-19) pandemic, as well as to prevent future outbreaks. [1] Therefore, it is important to promote vaccine uptake among the public, particularly in vulnerable populations. Patients with rheumatologic conditions may be at elevated risk of COVID-19, especially if treated with specific agents such as glucocorticoids or B cell–depleting treatments.[2] Moreover, patients with rheumatic disease (RD) could be susceptible to poor outcomes if they contract COVID-19, although data are not yet conclusive.[3-6] Therefore, COVID-19 vaccination is critical in managing risk in those with rheumatic conditions. However, previous international studies have demonstrated that a significant proportion of patients with RD are vaccine hesitant.[7,8]

Although numerous effective vaccines are now readily available, various factors may influence vaccine hesitancy.[9] Some patients with RDs allege that their autoimmune condition was caused or exacerbated by vaccination.[10-12] Although a causative association has not always been established, this view, if amplified within patient groups, could contribute to vaccine hesitancy.[11,12] Additionally, given that early COVID-19 vaccine trials excluded immunocompromised patients, there was initially limited information around safety or effectiveness in this population, which could have contributed to the uncertainty.[13] Vaccine misinformation has affected the public health response to COVID-19. Therefore, it is essential to understand patients' perceptions around COVID-19 immunization to inform discussions between healthcare providers (HCPs) and patients, support educated medical decision making, and encourage vaccine uptake.

The objective of this study was to identify the factors that affect decision making by patients with RD regarding COVID-19 vaccination and to help bridge knowledge gaps between HCPs and patients. Results from this study can inform strategies to address vaccine hesitancy by patients with RD and empower patients to better manage their health.

METHODS

Study setting. The study setting was the Kaye Edmonton Clinic (KEC) Rheumatology Clinic in Edmonton, Alberta, Canada. The study was conducted between June and August 2021.

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The authors declare no conflicts of interest relevant to this article.

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Accepted for publication November 27, 2022.

Study design. This study made use of a cross-sectional survey, administered by an anonymous online platform, to collect perceptions by patients with RD regarding factors influencing COVID-19 vaccination decisions.[14,15]

Study participants. Patients were sequentially recruited from a convenience sample of patients with RD seen in clinic at the KEC between June and August 2021. Potential participants were informed of the research study and its purpose when they attended a scheduled appointment. Interested patients voluntarily provided their email address and were subsequently forwarded a link to an anonymous online survey. Participation was anonymous and voluntary, and submission of the survey constituted consent to having their responses included in the study. Participants were informed that they could respond to some or all questions and could also withdraw from the study entirely by not submitting the survey.

Study participants included adult patients (aged ≥ 18 yrs) of any gender who were diagnosed with 1 or more rheumatologic condition(s). Participants were also required to have their own device with reliable internet access.

Survey development. The COVID-19 Vaccine Perceptions Survey items were internally developed, based on a review of vaccine hesitancy literature as well as circumstances and messaging regarding vaccination at the time. The survey included questions on demographics, as previous studies on vaccine acceptance demonstrated that demographic factors can affect vaccine acceptance.[16-19] Additionally, patient medical condition(s) and current treatment, views around contracting SARS-CoV-2, concerns about the COVID-19 vaccines, views of the government's role in handling the COVID-19 pandemic, and questions regarding informed decision making were included in the survey to identify factors that could affect patients' decisions to vaccinate. Questions on patient perceptions of the government's role in handling the COVID-19 pandemic were adapted from the previously validated COVID-19 Assessment Scorecard (COVID-SCORE) questionnaire.[20] With previous work suggesting the influence of healthcare teams in promoting vaccine acceptance, the final survey section also asked participants about their perceptions of their healthcare team.[21-23]

The 44-item survey was an anonymous University of Alberta survey based on the REDCap (Research Electronic Data Capture) platform, which included quantitative questions (ie, with checklists, yes/no/not sure responses, and strongly agree/strongly disagree Likert scales), open-ended clarification questions, and comment invitations. The survey was pilot tested for a grade 8 reading and comprehension level. Patients were provided a unique link to the online survey, which was estimated to take 20 minutes to complete.

Data analysis. All quantitative questions were descriptively analyzed (ie, percentages and frequencies) using Stata 17 (StataCorp). Responses from open-ended questions and comments were manually coded and categorized for common themes, using standard qualitative thematic analysis approaches and Standards for Reporting Qualitative Research guidelines.[24,25] Coding and themes for each set of comments were reviewed and agreed on by 2 analysts (INB and EY). Any disagreements were resolved through discussion or with a third analyst.

Ethics approval. This study received ethics approval from the Health Research Ethics Board at the University of Alberta (Pro00108774).

RESULTS

The COVID-19 Vaccine Perceptions Survey had a response rate of 70.9%, with 231 patients responding to 326 survey invitations sent out through email to interested patients.

Table 1 provides demographics and past medical profiles of patient responders. The majority of the survey participants were female (70.4%), were between 40 and 64 years old (53.7%), had postsecondary education (53.9%), and were employed (70.7%). One-quarter of the participants (23.8%) had been diagnosed

Table 1. Demographic and past medical characteristics of patients with rheumatic disease who participated in the COVID-19 Vaccine Perceptions Survey.

	N = 231[a], n (%)
Demographics	
Age, yrs (n = 229)	
18-24	6 (2.6)
25-39	33 (14.4)
40-64	123 (53.7)
≥ 65	66 (28.8)
Prefer not to say	1 (0.4)
Gender (n = 226)	
Female	159 (70.4)
Education (n = 228)	
Less than high school	5 (2.2)
High school	72 (31.6)
Postsecondary	123 (53.9)
Graduate degree	28 (12.3)
Annual household income, CAD $ (n = 229)	
< 69,000	82 (35.8)
≥ 69,000	102 (44.5)
Prefer not to say	45 (19.7)
Employment (n = 229)	
Unemployed	20 (8.7)
Employed	162 (70.7)
On disability	29 (12.7)
Homemaker	18 (7.9)
Medical history	
Rheumatologic diagnoses, n	
Spondyloarthropathy (ankylosing spondylitis and psoriatic arthritis)	8
Rheumatoid arthritis	46
Fibromyalgia	20
Gout	4
Lupus	10
Myositis	2
Systemic sclerosis	3
Large-vessel vasculitis (giant cell arteritis and Takayasu arteritis)	25
ANCA-associated vasculitis (GPA, MPA, and EGPA)	70
Small-vessel vasculitis (IgA vasculitis)	15
Polymyalgia rheumatica	12
Sarcoidosis	8
Autoimmune/inflammatory syndrome induced by adjuvants	18
Tendonitis/bursitis	9
Osteoporosis	23
Other	55
Length of rheumatic condition diagnosis, yrs (n = 223)	
< 1	23 (10.3)
1-5	104 (46.6)
5-10	39 (17.5)
10-20	28 (12.6)
> 20	29 (13)
Belief that rheumatic condition was triggered (n = 223)	
Yes	61 (27.6)
No	16 (7.2)
Not sure	146 (65.5)
Comorbidities (n = 230)	
Rheumatic	55 (23.8)
Other	152 (66.1)

Table 1. Continued.

	N = 231[a], n (%)
Previous severe infection (of any cause) requiring hospitalization (n = 224)	
Yes	57 (25.5)
No	145 (64.7)
Not sure	22 (9.8)
COVID-19 vaccine status (n = 229)	
Vaccinated	186 (81.2)
Do not want vaccine	19 (8.3)
Other	24 (10.5)

[a] Not all patients answered all questions. ANCA: antineutrophil cytoplasmic antibody; COVID-19: coronavirus disease 2019; EGPA: eosinophilic granulomatosis with polyangiitis; GPA: granulomatosis with polyangiitis; MPA: microscopic polyangiitis.

with multiple rheumatic conditions, and 66.1% listed nonrheumatic comorbidities. When asked about their COVID-19 vaccination status, 81.2% of patient responders had received at least 1 dose of an approved COVID-19 vaccine at the time of response between June and August 2021. A minority of participants (8.3%) indicated that they did not want a COVID-19 vaccine.

Table 2 ranks rheumatology patient concerns related to contracting SARS-CoV-2 as well as COVID-19 vaccines, and it describes the influence of HCPs. Most participants were worried about the potential for poor outcomes after contracting COVID-19 because of their rheumatic condition (59.1%), followed by fears of increased risk of contracting SARS-CoV-2 because of rheumatologic disease (57.1%) and medications taken for its management (46.8%).

Regarding vaccines, patients with RD were most concerned about a possible effect of vaccination on their rheumatic condition (45.2%) and about vaccine effectiveness (45.1%). Concerns of the risk of blood clots (39.7%) and vaccine safety (39.4%) were also common, with other issues (eg, risk of severe adverse reactions, speed of vaccine development, and side effects) ranked lower. Notably, almost 10% of respondents reported concerns of the possibility of contracting SARS-CoV-2 from the vaccine. Additionally, only a minority of patients (37.3%) were aware of how to manage their rheumatologic medications when getting a COVID-19 vaccine.

Patient perceptions and interactions with their HCPs regarding vaccination is also included in Table 2. Most patients had discussed COVID-19 vaccination (75.9%) and its risks and benefits (66.1%) with their medical team, with 64% reporting that their HCP(s) encouraged COVID-19 vaccination and 75.6% indicating that their medical team was able to answer their vaccine-related questions. Most respondents (83.6%) were completely or mostly confident in the information provided, with 62.3% indicating that their medical team influenced their COVID-19 vaccine decision making.

The perceptions of patients with RD of the government's role in handling the COVID-19 pandemic varied, as shown in Table 3. In summary, approximately 33% of patients believed that the government instituted effective public health measures and vaccine rollout plans. Almost half of the patients trusted the reports on COVID-19 and its spread, but fewer (39.1%) trusted reports on details/evidence of vaccines. Nearly half of the patients believed that the government acquired the highest-quality vaccines, whereas fewer (43.4%) felt that the government gave clear details on available vaccines.

Finally, Table 4 lists select quotes from responses from the open-ended questions in the survey. Using thematic analysis, 3 major themes related to vaccine decision making were identified. These themes—vaccine concerns, HCP role, and government actions—were formed by grouping subthemes (eg, common concerns expressed by patients). The most frequently reported subthemes are presented in Table 4 with corresponding example quotes. The thematic analysis of comments revealed the same major factors implicated in vaccine decision making as did the quantitative results.

DISCUSSION

This study identified factors that patients with RD indicated influenced their decision making regarding COVID-19 vaccination. At the time of the survey, 81.2% of patients with RD surveyed had received at least 1 dose of an approved COVID-19 vaccine, paralleling the vaccine acceptance rate of age-matched individuals of the general population.[26] These findings are consistent with a recent Canadian study on COVID-19 vaccine acceptance in patients with RD.[27]

Previous studies have demonstrated that demographic and medical factors influence COVID-19 vaccine decision making in the general population. In those studies, older age, higher education levels, higher income levels, male sex, and having more comorbidities were associated with increased likelihood of vaccination.[28-30] Patients with RD also had disease-specific concerns; however, these affected their COVID-19 vaccination decision making. Similar to a recent international survey study evaluating COVID-19 vaccine perceptions among individuals with RDs, our study found that patients with RD had multiple concerns related to COVID-19 vaccines.[31] Not only were they concerned about potential worse outcomes (eg, blood clots and safety) or a flare of their condition because of the vaccine—as reported in Table 4, a patient reported being "worried about any...treatment that might exacerbate or cause a flare up" of their rheumatic condition—over half feared that their rheumatic condition would increase their risk of contracting SARS-CoV-2. Relatedly, 1 study showed that perception of increased susceptibility to COVID-19 is associated with greater vaccine acceptance.[32] Additionally, research from various countries demonstrated that COVID-19 vaccine hesitancy in patients with RD was heavily influenced by fear of side effects.[8,32-34] Other concerns included vaccine safety, especially in the context of expedited production, and effectiveness, given that initial vaccine trials excluded patients with rheumatologic conditions.[32] These findings are consistent with our study, which further demonstrated that surveyed patients with RD were most concerned about the effect of COVID-19 vaccines on their rheumatic condition.

Over 60% of patients indicated that HCPs influenced their decision making to vaccinate against SARS-CoV-2, with 83.6%

Table 2. Concerns of patients with rheumatic disease related to COVID-19 infection and vaccines, and perceptions regarding communication, information, and influence of their HCPs (N = 231).

	Patients With RD Who Responded, n (%)			Rank[a]
	Yes	No	Not Sure	
COVID-19 infection concerns				
COVID-19 infection and rheumatic condition				
Are you concerned about worse outcome after infection due to rheumatic condition? (n = 215)	127 (59.1)	52 (24.2)	36 (16.7)	1
Rheumatic condition increases risk of infection (n = 217)	124 (57.1)	61 (28.1)	32 (14.8)	2
Rheumatic medications increase risk of infection (n = 218)	102 (46.8)	86 (39.5)	30 (13.8)	3
Previous COVID-19 infection				
Previously tested positive for COVID-19 (n = 228)	13 (5.7)	206 (90.4)	9 (4)	–
COVID-19 vaccine concerns				
Possible impact on rheumatic condition (n = 219)	99 (45.2)	105 (48)	15 (6.9)	1
Reduced effectiveness (n = 215)	97 (45.1)	103 (47.9)	15 (7)	2
Risk of blood clots (n = 214)	85 (39.7)	114 (53.3)	15 (7)	3
Safety (n = 216)	85 (39.4)	116 (53.7)	15 (6.9)	4
Severe adverse reactions (n = 215)	76 (35.4)	128 (59.5)	11 (5.1)	5
Speed of vaccine development (n = 215)	71 (33)	124 (57.7)	20 (9.3)	6
Side effects (n = 212)	69 (32.6)	135 (63.7)	8 (3.8)	7
Impact on rheumatic medications (n = 219)	58 (27.2)	133 (62.4)	22 (10.3)	8
Components (ie, vaccine ingredients) (n = 211)	53 (25.1)	128 (60.7)	30 (14.2)	9
Getting COVID-19 from vaccine (n = 207)	20 (9.7)	173 (83.6)	14 (6.8)	10
COVID-19 vaccination and rheumatology medications				
Know what to do with medications when getting vaccine (n = 217)	81 (37.3)	101 (46.5)	35 (16.1)	–
HCP communication, information, and influence				
Perception of interaction with HCP				
Spoke to HCP about getting COVID-19 vaccine (n = 228)	173 (75.9)	54 (23.7)	1 (0.4)	1
Feel that providers can answer questions regarding COVID-19 vaccine (n = 226)	171 (75.6)	29 (12.8)	26 (11.5)	2
Spoke to HCP about risks and benefits of COVID-19 vaccine (n = 227)	150 (66.1)	71 (31.3)	6 (2.6)	3
HCP encouraged getting COVID-19 vaccine (n = 225)	144 (64)	51 (22.7)	30 (13.3)	4
Confidence in the information given by HCPs (n = 225)				
Completely confident	103 (45.8)	–	–	–
Mostly confident	85 (37.8)	–	–	–
Somewhat confident	25 (11.1)	–	–	–
Not very confident	9 (4)	–	–	–
Not very confident at all	3 (1.3)	–	–	–
Individuals who influence COVID-19 vaccine decision making				
HCP	144 (62.3)	87 (37.7)	–	1
No one—I make my own decisions	101 (43.7)	130 (56.3)	–	2
Family/friends	44 (19.1)	187 (81)	–	3
Other	6 (2.6)	225 (97.4)	–	4
Not applicable	5 (2.2)	226 (97.8)	–	5
HCP role in COVID-19 vaccine decision making				
Major role	60 (42)	–	–	–
Minor role	50 (35)	–	–	–
No role	30 (21)	–	–	–
Other	3 (2.1)	–	–	–

[a] Ranked by percentage of patients who responded yes. COVID-19: coronavirus disease 2019; HCP: healthcare provider; RD: rheumatic disease.

indicating high confidence in the information provided by their HCPs. One study showed that vaccine-accepting patients with RD were more likely to report that they were able to speak with their doctor.[32] This suggests that HCPs should proactively identify opportunities to assist patients in their vaccine decision making, especially since previous international research has demonstrated that patients would be more willing to accept vaccination if recommended by their rheumatologist.[33] One patient reported that they "had some concerns about getting the vaccine," but because their "rheumatologist and family doctor did not see a concern... [they] felt comfortable going ahead with the vaccine" (Table 4). These findings are consistent with the results reported from the COVID-19 Global Rheumatology Alliance Vaccine Survey study.[31] Whereas over 75% of responders had

Table 3. Perceptions of patients with RD of the government's role in handling COVID-19 measures, reports, and vaccines.

	Patients With RD Who Responded, n (%)						Rank[a]
	Completely Disagree	Disagree	Neutral	Agree	Completely Agree	N/A	
I believe government had effective public health measures (n = 224)	36 (16.1)	63 (28.1)	49 (21.9)	58 (25.9)	16 (7.1)	2 (0.9)	1
I trust reports on COVID-19 and its spread (n = 224)	36 (16.1)	38 (17)	41 (18.3)	79 (35.3)	29 (13)	1 (0.5)	1
I believe government had effective vaccine rollout plan (n = 223)	32 (14.4)	56 (25.1)	60 (26.9)	54 (24.2)	19 (8.5)	2 (0.9)	2
I trust government reports on details and evidence of vaccines (n = 225)	30 (13.3)	42 (18.7)	64 (28.4)	65 (28.9)	23 (10.2)	1 (0.4)	3
I think the government gave clear details on available vaccines (n = 226)	25 (11.1)	52 (23)	51 (22.6)	71 (31.4)	27 (12)	0 (0)	4
I believe government acquired highest-quality vaccines (n = 224)	17 (7.6)	20 (8.9)	80 (35.7)	79 (35.3)	26 (11.6)	2 (0.9)	5

[a] Ranked by percentage of patients who completely disagreed. COVID-19: coronavirus disease 2019; N/A: not applicable; RD: rheumatic disease.

Table 4. Select quotes from responses of patients with rheumatic disease to open-ended questions from the COVID-19 Vaccine Perceptions Survey.

Factor	Quotes
Vaccine concerns	
Impact on rheumatic condition	• "I received the vaccine two weeks ago, and have had disease flare up and have been sick ever since. It has made me hesitant about the second shot." [Participant 4] • "Having a rheumatological condition I am always worried about any medication or treatment that might exacerbate or cause a flare up." Participant 20]
Effectiveness	• "If the vaccine would make my condition worse or if my treatment would reduce the effectiveness of the vaccine" [Participant 13] • "Unknown how autoimmune will respond to the vaccine and I don't believe people with various autoimmune issues were included in trials." [Participant 135]
Safety	• "Safety Concern: Longterm side effects of mRNA not studied or communicated" [Participant 12] • "...there is zero long term knowledge of potential side effects." [Participant 50]
HCP role	
Spoke to HCP about getting COVID-19 vaccine and its risks/benefits	• "I told the doctor I was getting the vaccine and that's when we had the conversation about the benefits, etc. I was eager to get it and I always prefer to believe in science." [Participant 3] • "I had some concerns about getting the vaccine that included worsening of my pre-existing symptoms as well as long term side effects. Both my rheumatologist and family doctor did not see a concern so I felt comfortable going ahead with the vaccine..." [Participant 11]
Government actions	
Believe government had effective public health measures	• "I believe things would have not been as bad had the governments acted sooner and been more rigid rather than stop and start and stop again..." [Participant 184] • "The way that the Government handled contact tracing is shameful. They were so far behind in Summer 2020 from the Spring that they literally stopped and started from scratch in the Fall again." [Participant 92]
Trust government-provided reports on COVID-19, its spread, as well as the details and evidence of vaccines	• "I don't trust the manufacturers of the vaccines and the information they provide to our Government." [Participant 22] • "I do not trust our government[']s information about covid 19 especially when it contradicts health care providers." [Participant 52] • "There was too much misinformation. One minute AstraZeneca was a good choice then it wasn't, then it was." [Participant 190]

COVID-19: coronavirus disease 2019; HCP: healthcare provider.

spoken with HCPs regarding COVID-19 vaccines and felt that their medical team was able to answer their vaccine-related questions, fewer patients (64%) reported that their HCP encouraged them to get vaccinated against SARS-CoV-2. These findings suggest that there are some missed opportunities concerning patient education, and they reinforce the importance of regular patient-provider conversations regarding COVID-19 vaccines.

Some vaccine misperceptions were identified, which suggest that HCPs should reinforce that approved COVID-19 vaccines do not contain live virus and cannot cause COVID-19, although

a potential risk for disease worsening exists.[35,36] Additionally, patients should be reminded that research to date indicates that available COVID-19 vaccines are safe in patients with rheumatic conditions.[37,38] Vaccine effectiveness is also an important concern for patients with RD because some immunosuppressive therapies used in RD management can hinder antibody response to COVID-19 vaccination and can theoretically make patients more susceptible to infection.[2,39] One patient questioned "if [their rheumatologic] treatment would reduce the effectiveness of the vaccine" (Table 4). This is particularly important, as very few patients knew how to manage their rheumatic medications when getting a COVID-19 vaccine. Therefore, medical teams should also discuss vaccine-related therapy adjustments with patients when assisting with vaccine decision making, including vaccine risks and benefits, with special focus on vaccine safety and side effects.

Finally, it has been shown that trust in the government is important in population vaccine acceptance.[29,40] In this survey, patients' views on the government's role and reporting on the COVID-19 pandemic were diverse. More patients with RD were displeased with the effectiveness of the government's pandemic public health measures (44.2%), as well as their COVID-19 vaccine rollout plan (39.5%), compared to responders who agreed with the statements. One patient "believe[d] things would have not been as bad had the government acted sooner and been more rigid" (Table 4) in their pandemic response. However, more patients trusted the government-provided reports on COVID-19 (48.3%) and evidence of its vaccines (39.1%), and found government provided clear details on available vaccines (43.4%). Such discrepancy between what patients believe or trust could adversely affect vaccine decision making. HCPs can help patients with RD sort through the mixed perceptions by providing them with accessible evidence-based information on the efficacy of pandemic public health measures, COVID-19, and vaccines.

This study had limitations inherent in the cross-sectional design and with survey methods. Since a cross-sectional study considers a specific time frame (ie, between June and August), captured data only pertain to that moment and are not generalizable beyond that period. Surveys also have limitations because they gather self-reported perspectives from voluntary participants. Therefore, answers could be influenced by personal biases, including positive predispositions toward HCPs, recollection errors, or misunderstanding questions.[41,42] Additionally, with 81% of patients being vaccinated, it is difficult to retrospectively conclude the effect of HCPs on vaccine decision making. The in-clinic convenience sample of patients was also a limitation. Because only patients with RD seen in clinic were invited to complete the survey, patients not followed in clinic at the time of the study were excluded. Additionally, survey participation required internet access, a grade 8 comprehension level, and computer literacy, which could limit representation of disadvantaged, and possibly older, populations. Despite these limitations, the study had a 70.9% response rate (N = 231) over a 2-month period between the third and fourth waves of COVID-19 (ie, between June and August 2021).

In conclusion, this study describes COVID-19 vaccine acceptance considerations identified by patients with RD. Participants reported worries regarding developing COVID-19, as well as concerns regarding COVID-19 vaccines in the context of their rheumatic condition. These concerns can be best addressed by HCPs, who were identified to be influential in vaccine decision making. Medical providers looking after patients with RD should initiate discussions with patients to share evidence-based vaccine information. Themes identified specifically as patient concerns could be used to develop resource guides or tools to assist HCPs with these discussions.

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