

# Understanding Vaccination Rates and Attitudes Among Patients With Rheumatoid Arthritis

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**P**atients with autoimmune rheumatic diseases have a risk of infection approximately double that of age- and gender-matched controls.<sup>1</sup> Patients with rheumatoid arthritis (RA) are at an increased risk for infection due both to inherent dysregulation of the immune system and, for many, the added effect of chronic immunosuppressive therapy. For example, the adjusted hazard ratio for contracting herpes zoster in patients with RA is 1.9 compared with healthy controls.<sup>2,3</sup>

Because of their increased risk of infection, the Advisory Committee on Immunization Practices (ACIP) recommends that immunocompromised adults receive an annual influenza vaccination (INFX), as well as the pneumococcal vaccination (PNVX) with the 13-strain pneumococcal conjugated vaccine (PCV-13) followed by the 23-strain pneumococcal polysaccharide vaccine (PPSV-23).<sup>4,5</sup> The recommendations are more complex for herpes zoster vaccination (HZVX), which uses a live virus and has historically been considered contraindicated in patients who are severely immunosuppressed. Currently, ACIP recommends HZVX for all individuals 60 years or older.<sup>6</sup> However, a recent study found that HZVX had even higher efficacy (ie, 70% risk reduction) among healthy adults aged 50 to 59 years<sup>7</sup>; HZVX (Zostavax) has FDA approval for use in adults 50 years or older.<sup>8</sup> ACIP states that HZVX is safe for patients who are taking less than 20 mg/day of prednisone and/or low doses of methotrexate ( $\leq 0.4$  mg/kg/week), azathioprine ( $\leq 3.0$  mg/kg/day) or 6-mercaptopurine ( $\leq 1.5$  mg/kg/day).<sup>6</sup> If a physician plans to initiate a strong immunosuppressant, ACIP recommends the patient be given the HZVX at least 14 days prior to starting the medication.<sup>6</sup> This recommendation has been challenged by findings from a recent analysis of Medicare patients with immune-mediated disease who were given HZVX. There was no increase in herpes zoster infections during the 42 days after HZVX, even among patients receiving biologic immunosuppression, whereas those vaccinated had a lower incidence of zoster over a median 2-year follow-up.<sup>9</sup>

## ABSTRACT

**Objectives:** Appropriate vaccinations are important for patients with rheumatoid arthritis (RA), who are often treated with highly immunosuppressive therapies that increase their risk of infection. However, rates of vaccination among patients with RA are below optimal levels.

**Study Design:** We conducted a patient survey to assess self-reported vaccination status and to compare that status with electronic health record (EHR) data.

**Methods:** We recruited randomly selected patients with RA in an academic practice in 2013. Eligible participants had a diagnosis of RA, at least 1 visit to a rheumatology clinic in each of the previous 2 years, were 18 years or older, and had English listed as their preferred language. The survey included the following domains: a) patient self-reported receipt of influenza, pneumococcal (PNVX), and herpes zoster (HZVX) vaccinations; b) attitudes about these vaccines, including reasons for unvaccinated status, if applicable; and c) provider recommendations about these vaccines.

**Results:** Based on participants' self-report, we found a high vaccination rate for influenza during the previous season (79.4%), a moderate rate of any previous vaccination for pneumococcus (53.9%), and a very low rate of any previous vaccination for herpes zoster (7.8%). If we assume that all self-reports are accurate and we include vaccinations recorded in the EHR that were not reported by patients, the vaccination rates were approximately 8% to 9% higher for PNVX and HZVX.

**Conclusions:** Vaccination rates are low among patients with RA based on self-report data. Further research is needed to investigate system-level barriers to vaccination and the impact of evidence-based, provider-level interventions on vaccination rates.

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### Take-Away Points

Vaccination rates are low among patients with rheumatoid arthritis based on self-report data.

- Lack of physician recommendation, as recalled by the patient, appears to be the most important factor for unvaccinated status. Only three-fourths of patients said their doctors had discussed their increased risk of infection, and only two-thirds said their doctors discussed the importance of vaccinations.
- Patient lack of knowledge or negative attitudes toward vaccinations appear to be less important contributors to suboptimal vaccination rates.
- Further research is needed to investigate system-level barriers to vaccination and the impact of evidence-based provider-level interventions on vaccination rates.

Vaccination rates remain low among RA patients, despite their high risk of infection, strong evidence of vaccine safety and efficacy, and recommendations from national organizations. A recent large study found that only 25% of RA patients were adherent to current vaccine recommendations.<sup>10</sup> Studies have shown adherence rates among RA patients ranging from 10% to 34% for INFVX,<sup>10-13</sup> 17% to 54% for PNVX,<sup>12,14,15</sup> and 1% to 21% for HZVX.<sup>16,17</sup> The reasons for these low vaccination rates are not entirely clear.<sup>18</sup>

At our institution, the Northwestern Memorial Medical Center in Chicago, vaccination rates for patients with RA measured using electronic health record (EHR) data have been similar to national data. However, EHR vaccination data may be incomplete because many patients receive vaccinations outside of their rheumatologist's office and their primary care clinician may practice in a different health system. The completeness of EHR data on vaccinations is also limited, as many patients may get vaccinated in pharmacies and retail stores with no automated way to transfer documentation to their healthcare team.<sup>19</sup> Therefore, at the start of a quality improvement research project to improve vaccination rates, we conducted a telephone survey to capture patients' self-report of vaccination status and to better understand vaccination behavior and attitudes of patients with RA.

## METHODS

### Setting and Participants

This study was conducted at an academic rheumatology clinic from July through September 2013 and was approved by the Northwestern University Institutional Review Board. Structured query language was used to identify all eligible patients from EHR data. Patients were eligible if they had a diagnosis of RA (*International Classification of Diseases, Ninth Revision, Clinical Modification* codes 714.0-714.9) in the problem list, at least 1 visit to the study clinic in each of the previous 2 years, English listed as their preferred language, and were aged at least 18

years. A total of 1119 patients were identified as eligible based on EHR data. Query output included patient contact information for recruitment. A random number was generated for each patient on the list, and the list was sorted by this number to ensure that a random sample of patients would be recruited.

Our goal was to complete 100 interviews. Assuming a 50% participation rate based on previous work with a similar patient population, we initially selected the first 200 patients for recruitment. Manual chart reviews were done prior to recruitment to confirm that the patients had a diagnosis of RA. After initial chart reviews found that some patients did not have a confirmed diagnosis of RA, we selected an additional 50 patients for possible recruitment. We stopped chart reviews and recruitment of new subjects once we reached 100 completed interviews. Of the 245 manual charts we reviewed, 48 did not have an RA diagnosis, resulting in 197 patients whom we attempted to recruit.

### Recruitment

A study interviewer called potential respondents up to 6 times and invited them to participate in a 10-minute structured telephone interview. We varied the time of day for the calls to maximize the chance of contact and to decrease selection bias. A message was left on identified voicemails on the second and fifth attempts asking patients to return the call if they were interested in participating in the study. Patients were offered a \$10 gift card for completing the survey.

### Survey Instrument

The survey included published items from the Behavioral Risk Factor Surveillance System survey<sup>20</sup> and items developed for this project by the study team. The survey had 22 to 27 items (depending on skip patterns) and addressed the following content areas: a) self-reported receipt of INFVX, PNVX, and HZVX; b) attitudes about these vaccines, including reasons for being unvaccinated, if applicable; and c) provider recommendations about these vaccines. Additionally, if participants reported receipt of a vaccination, we asked for details on the type of setting/place they had received each vaccine. If a participant reported ever receiving an influenza vaccination, we asked if they had been vaccinated during the previous year's flu season (2012-2013). As HZVX is contraindicated for some immunosuppressed patients, we included an item inquiring whether a provider had ever recommended

**Table 1. Participant Characteristics (N = 102)**

Female, n (%)	87 (85.3)
Age in years, mean (SD)	57.8 (14.5)
Self-reported race/ethnicity, n (%)	
White	68 (67.3)
Black	20 (19.8)
Hispanic	9 (8.9)
Other/missing	5 (4.9)
Years since diagnosis of rheumatoid arthritis	15.6 (12.3)
Number of comorbid conditions, n (%)	
0	70 (68.6)
1	21 (20.6)
2+	11 (10.8)
≥1 immunosuppressive drugs on active medication list, n (%)	93 (91.2%)

against receipt of this vaccine. Participants responded to several items regarding attitudes toward vaccinations on a 4-point Likert scale. Open-ended questions were asked to elicit participants' reasons for not being vaccinated. Interviewers coded responses to open-ended items about reasons for not being vaccinated into the following pre-defined categories if appropriate: a) no one ever recommended vaccine, b) did not think they needed vaccine, and c) do not like vaccinations/do not think safe. Responses that could not be coded into the above categories were reviewed by 2 authors (DB and DS) and an additional category—d) MD/pharmacist recommended against vaccination—was added. If more than 1 reason was mentioned, multiple responses were recorded. Demographic items were asked at the conclusion of the survey.

### Chart Review

We reviewed EHRs of consented participants who completed the telephone interview to identify whether they were receiving an immunosuppressive drug for treatment of RA, the presence of comorbid conditions, and documented immunizations (administered in the clinic and/or historical vaccinations). We classified patients as receiving immunosuppressive medications if the current medication list included any biologic agents, corticosteroids, methotrexate, leflunomide, or azathioprine; hydroxychloroquine and sulfasalazine were not considered immunosuppressive agents. Comorbid conditions were identified from the participants' problem list and included cancer, chronic pulmonary disease, coronary artery disease, chronic heart failure, peripheral vascular disease, severe chronic liver disease, diabetes with end organ damage, renal failure, and dementia.

### Analysis

The survey response rate was calculated using guidelines from the American Association for Public Opinion Research.<sup>21</sup> Survey responses were summarized using descriptive statistics. We calculated kappa statistics to analyze the agreement between self-reported vaccination and vaccination documentation in EHR data; for these analyses, if a respondent said he or she did not know whether they had been vaccinated, this was categorized as a “no” response.

## RESULTS

Of the 197 patients we attempted to recruit, 13 had no valid telephone number, 19 refused participation, 63 were not reached after 6 attempts, and 102 patients enrolled in the study and completed the interview (55.4% response rate). Most participants were female (85.3%) and the mean age was 57.8 years (Table 1). A total of 91.2% of participants were prescribed immunosuppressive therapy based on chart review; 85.2% of participants reported they were taking immunosuppressive therapy.

### Vaccination Status

Most participants (90.2%) reported that they had received INFVX at least once; 79.4% reported receiving INFVX during the 2012-2013 season (Table 2). Of the 81 participants who self-reported INFVX in the last year, only 28 (34.6%) had INFVX recorded in the EHR. This low rate of INFVX documentation in the EHR is consistent with the variety of settings in which patients reported receiving INFVX (Table 3). Of the 21 patients who said they had not received INFVX in the previous year (or were unsure), only 1 (5%) had an INFVX documented in the EHR.

Approximately half of participants (53.9%) reported that they had received PNVX at least once. Only 32 of the 55 (58.2%) who reported getting PNVX had a PNVX documented in the EHR; conversely, of the 47 who said they had never received PNVX, 9 (19.1%) had a PNVX documented in the EHR. If either self-reported or EHR-documented PNVX were included, the rate of receiving 1 or more PNVX was 62.7%.

Only 8 patients (7.8%) reported receiving HZVX; of these, only 1 (12.5%) was documented in the EHR. Of the 94 who said they had not received HZVX, 8 (8.5%) had a documented HZVX in the EHR. Among patients who reported HZVX, 87.5% said they received it at a doctor's office.

### Patient Attitudes About Vaccination

When participants were asked, “How important do you think it is to get vaccinations to prevent infections?” 16.3%

**Table 2.** Vaccination Status by Patient Self-Report and Medical Record Documentation

Influenza Vaccination			
Self-report	Medical Record		Total
	No (%)	Yes (%)	
No/not sure	20 (95.2)	1 (4.8)	21
Yes	53 (65.4)	28 (35.6)	81
Total	73	29	102

Kappa = 0.1555  
P < .0001

  

Pneumococcal Vaccination*			
Self-report	Medical Record		Total
	No (%)	Yes (%)	
No/not sure	38 (80.9)	9 (19.1)	47
Yes	23 (41.8)	32 (58.2)	55
Total	61	41	102

Kappa = 0.3821  
P = .01

  

Zoster Vaccination			
Self-report	Medical Record		Total
	No (%)	Yes (%)	
No/not sure	86 (91.5)	8 (8.5)	94
Yes	7 (87.5)	1 (12.5)	8
Total	93	9	102

Kappa = 0.0377  
P = .80

\*Receipt of any type of pneumococcal vaccine in the past.

said it was somewhat important and 65.3% said it was very important to get vaccinations. However, 15.3% thought vaccines were not important at all. Of note, of the 18 participants who did not feel it was important to be vaccinated, all but 1 were taking immunosuppressive medications at the time of the survey, including 9 taking tumor necrosis factor inhibitors and 12 taking methotrexate. When participants were asked how much they worried about getting infections because of the medications they take for RA, 20% responded “somewhat” and 21% responded “a great deal.”

Participants’ reasons for not being vaccinated varied by type of vaccine. The majority of participants who had not received PNVX or HZVX reported that it had never been recommended to them (Table 4). Patient dislike or distrust of vaccination was more common for INFX than for PNVX or HZVX. Of the 10 patients who had never been vaccinated for influenza, 7 stated that this was because they did not like or trust the vaccine.

**Patient Perceptions of Provider Communication Regarding Vaccines**

Three-fourths of respondents said that a physician had told them they had an increased risk of infection (Table 5); however, only 64% recalled being told the importance of vaccines by their providers. Communication about vaccinations also varied by vaccination type (Table 5). Nearly

all (96.1%) participants reported that their provider had recommended INFX, and only 2 patients reported that one of their providers had recommended against INFX. Only 60.8% said they were told to get PNVX, and only 16.7% reported that HZVX had been recommended (Table 5). Thirteen participants (12.8%) reported they were told not to get HZVX; of these, only 1 patient was eligible for this vaccine (ie, not on biologic therapy).

**DISCUSSION**

Based on participants’ self-report, we found a high vaccination rate for influenza during the previous season (79.4%), a moderate rate of any previous vaccination for pneumococcus (53.9%), and a very low rate of any previous vaccination for herpes zoster (7.8%). If we assume that all self-reports are accurate and we include vaccinations recorded in the EHR that were not reported by patients, the vaccination rates were approximately 8% to 9% higher for PNVX and HZVX (Table 2).

A variety of factors likely contribute to suboptimal vaccination rates for patients with RA; lack of physician recommendation, as recalled by the patient, appears to be the most important. Only three-fourths of patients said their doctors had discussed their increased risk of infection, and only two-thirds said their doctors discussed the importance of vaccinations (Table 5). Although almost all participants reported they had been told to be vaccinated for INFX, less than two-thirds had been advised to get PNVX and only 1 in 6 had been advised to have HZVX. These rates of recommendations correspond well to the self-reported vaccination rates; when patients who said they had not received a PNVX or HZVX were asked why, the most common response was that it was not recommended by their provider.

The reasons why physicians fail to recommend vaccinations for immunocompromised patients are not fully

**Table 3.** Settings in Which Participants Reported Receiving Influenza Vaccine in 2012-2013 Flu Season

Setting	N (%)
Doctor’s office or health maintenance organization	44 (54.3)
Hospital (eg, inpatient)	1 (1.2)
Store (eg, supermarket, drug store)	23 (28.4)
Another type of clinic or health center (eg, a community health center)	1 (1.2)
At work	9 (11.1)
Don’t remember	2 (2.5)
Some other kind of place	1 (1.2)

■ **Table 4.** Participants' Reasons for Nonreceipt of Vaccination<sup>a</sup>

	No one recommended it, n (%)	Did not think I needed it, n (%)	Dislike/lack of trust in vaccine, n (%)	MD or pharmacist recommended against, n (%)
Influenza vaccination, last season (n = 8)	2 (25)	1 (13)	5 (63)	–
Influenza vaccination, ever (n = 10)	–	6 (60)	7 (70)	1 (10)
Pneumococcal vaccination (n = 44)	32 (73)	10 (23)	5 (11)	–
Zoster vaccination (n = 93) <sup>b</sup>	49 (53)	26 (28)	6 (6)	13 (14)

<sup>a</sup>Patients were allowed to give multiple reasons; therefore, the number of reasons reported exceeds the number of patients responding.  
<sup>b</sup>In addition, 2 patients reported a financial barrier to zoster vaccination.

understood. Some failures may occur because patients with RA are often cared for by both a rheumatologist and a primary care physician. The rheumatologist may see preventive care as the responsibility of the primary care physician, but primary care physicians may not be knowledgeable about guidelines for vaccination of immunosuppressed patients or may feel this is the responsibility of the rheumatologist prescribing the immunosuppressants.

A 2009 German study found that only 65% of patients with RA were vaccinated against influenza despite 95% patient awareness of the vaccine's availability. This was thought to be due to the fact that in Germany, the rheumatologist "delegates" vaccinations to the general practitioner.<sup>22</sup> Similarly, a 2009 study in Ireland found that approximately half of rheumatologists did not advise influenza vaccination due to insufficient time during the visit, and they also felt vaccination was the responsibility of the general practitioner.<sup>23</sup> However, it is not certain whether these European findings are generalizable to the United States. General practitioners in European countries tend to have a more primary role in patients' care and serve as gatekeepers to specialty services.<sup>23</sup> In contrast, in the United States, rheumatologists often share the responsibility of primary care for their patients' overall health (eg, monitoring cardiovascular risk, blood glucose, malignancy screening), recognizing that many comorbid conditions have a higher prevalence with autoimmune disease. It may be appropriate for specialty societies to address shared responsibility for vaccination and to issue guidance statements to help avoid situations in which responsibility is not clear.

Another factor contributing to lack of recommendation for vaccination is the lack of adequate reminder systems. Patients with RA have complex healthcare needs, and preventive care may be a low priority for providers when they address acute management issues during busy

clinic visits. Similarly, physicians have insufficient time to address preventive needs.<sup>24</sup> Reminder systems, especially those in EHRs with linked order sets to facilitate prescribing, can help overcome these barriers. Point-of-care paper reminder forms for rheumatologists improved PNVX rates from 67.6% to 80% in patients receiving immunosuppressive medications.<sup>25</sup> An EHR alert significantly increased use of both INFVX and PNVX, as well as documentation rates in rheumatology patients taking immunosuppressants.<sup>18</sup> Efficacy was better if the process was nurse-driven, which speaks to the potential for team-based care to improve vaccinations.<sup>18</sup> The value of such team-based intervention led Kaiser Permanente Southern California to adopt a "Complete Care" program beginning in 2005, which incorporated proactive team-based care, supplemental tactics, and health information technology in order to increase quality of care for patients with chronic illnesses.<sup>26</sup>

Patient lack of knowledge and negative attitudes toward vaccinations appear to be less important contributors to suboptimal vaccination rates. In our study, more than 80% of participants said that vaccinations were somewhat or very important. Among the 81 patients who reported not receiving PNVX or HZVX, only 11 said this was because of dislike or lack of trust of the vaccine. Nevertheless, in light of the high risk of infection for this patient population, ad-

■ **Table 5.** Participants' Report of Provider Recommendations About Vaccinations (N = 102)

	"Yes" Responses N (%)
Doctor told me about increased risk of infection	76 (74.5)
Doctor spoke with me about importance of vaccines	65 (63.7)
Doctor recommended influenza vaccination	98 (96.1)
Doctor recommended NOT getting influenza vaccination	2 (2.0)
Doctor recommended pneumococcal vaccination	62 (60.8)
Doctor recommended zoster vaccination	17 (16.7)
Doctor recommended NOT getting zoster vaccination	13 (12.8)

ditional efforts are needed to develop ways to explain the importance of vaccination to resistant patients.

A variety of factors likely contribute to the very low rate of HZVX observed here. First, current guidelines and recommendations for HZVX are difficult to interpret for many patients with RA and have not incorporated recent evidence. Current ACIP recommendations only recommend HZVX for patients 60 years or older, despite strong evidence of the need and efficacy in patients aged 50 to 59 years. The average age in our patient population was 57 years, so many patients may not have been considered candidates for HZVX by their rheumatologists or primary care physicians. ACIP advises against HZVX in patients taking biologic immunosuppressants or high-dose prednisone; however, patients on these medications could often be vaccinated earlier in the course of their disease, before starting a biologic, if age were not an issue. In our study, among 13 patients who reported receiving a recommendation against receipt of HZVX, 1 was actually eligible to receive it (ie, not taking biologic or other high-dose immunosuppressive therapy). Conversely, 8 patients were on biologics and still had HZVX recommended to them by a physician. This confusion seen in our practice may represent the overall uncertainty surrounding the HZVX recommendations.

### Limitations

This study was conducted at a single academic practice, and the patients and care patterns may not be representative of the average patient with RA and rheumatology practice in the United States. Our study relied primarily on self-report, which is subject to recall bias, especially regarding the type of vaccine received, its timing, and physician recommendations for or against the inoculation. Patients may over- or underreport vaccinations at the time of query.

### CONCLUSIONS

Patients with RA are at increased risk of infection due to inherent dysregulation of their immune systems and to immunosuppressive regimens. Vaccinations are, therefore, an essential part of their care. Multiple steps are necessary to improve vaccination rates, including clarification of guidelines and recommendations from national organizations, better education of patients about their risk of infection and need for vaccination, reminder systems, team-based care to identify patients needing vaccination, education of physicians and other clinicians, delineation of responsibilities for patients whose care is shared by a primary care physician and

a rheumatologist, and outreach programs to facilitate timely influenza vaccination without requiring patients to come to a physician's office.

On a broader scale, there is a risk in any healthcare system that inadequate communication may impair the ability to deliver optimal care. In any situation, such as in patients with chronic pulmonary disease, where maximizing vaccination rates is an important element of care, there are important lessons to be gleaned from this study about the role of identifying and delineating responsibilities in team-based care. The increasing use of EHRs, including patient portals for secure electronic communication, should facilitate implementation of multifaceted interventions to improve vaccination rates.

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