ORIGINAL RESEARCH

Patient Preferences Associated with Therapies for Psoriatic Arthritis: A Conjoint Analysis

Yihua Xu, PhD; Lavanya Sudharshan, MS; Ming-Ann Hsu, MPH; Andrew S. Koenig, DO, FACR; Joseph C. Cappelleri, PhD, MPH, MS; Wen F. Liu, PharmD, BCPS; Timothy W. Smith; Margaret K. Pasquale, PhD

BACKGROUND: As psoriatic arthritis (PsA) treatment choices continue to expand, it is important to consider patient preferences for treatment modalities for PsA. Involving patients in treatment decisions can influence adherence to treatment and outcomes of therapy.

OBJECTIVE: To determine patient preferences for medication attributes prescribed for patients with PsA.

METHODS: A choice-based conjoint survey was mailed to 2800 randomly selected patients with PsA who were enrolled in Humana Medicare and commercial plans. Patients had been diagnosed with PsA between January 1, 2012, and September 30, 2016. The medication attributes included in the survey were the medication route of administration, frequency of administration, ability to reduce daily joint pain and swelling, likelihood of serious infections, improvement in the patient's ability to perform daily activities, achieving clear or almost clear skin, and cost. Hierarchical Bayesian models were used to score patient preferences after adjusting for demographic and clinical characteristics. The mean attribute importance scores were used to rank patient preferences.

RESULTS: A total of 468 patients (258 with a Medicare plan and 210 with a commercial plan) completed the survey. The top 3 medication attributes for patients in Medicare plans were route of administration, cost, and improvement in the ability to perform daily activities. For patients in commercial plans, the top 3 medication attributes were cost, route of administration, and frequency of administration. Within the top 2 attributes for patients in both plans, the oral route of administration and lower cost were most preferred.

CONCLUSION: Medication route of administration and cost were the 2 most important considerations for patients diagnosed with PsA who were enrolled in Medicare or commercial plans with Humana. As PsA treatment choices continue to expand, considering patient preferences may improve patient adherence and treatment outcomes and should be considered when making treatment decisions for this patient population.

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Psoriatic arthritis (PsA) is a chronic, inflammatory disease-related form of arthritis that usually manifests on the skin and in the joints, and can occur in up to 39% of people who have psoriasis.[1] In the United States, the overall prevalence of PsA is 158 per 100,000 people, with an annual incidence of 7.2 in every 100,000 people.[2]

The symptoms of PsA can vary from mild arthritis to pain associated with erosive and destructive arthropathy.[3-5] As such, PsA can have a significant impact on health-related quality of life (HRQOL).[6] Understanding a patient's disease-associated HRQOL, as well as the characteristics of PsA treatments that are important to the patient, will enable the physician and the patient to make a joint decision in evaluating and choosing the most appropriate PsA treatment for the individual patient.[7]

Determining the appropriate treatment will become even more important as PsA treatment choices continue

Dr Xu is Research Science Lead, Comprehensive Health Insights, Humana, Louisville, KY; Ms Sudharshan was Research Consultant, Comprehensive Health Insights, Humana, during the study; Ms Hsu is Sr. Director, Health Economics & Outcomes Research, Patient & Health Impact, Inflammation & Immunology, Pfizer, Groton, CT; Dr Koenig is Inflammation & Immunology Group Lead, N. American Medical Affairs, Pfizer, Collegeville, CT; Dr Cappelleri is Executive Director, Statistics, Pfizer, Groton, CT; Dr Liu is Clinical Pharmacist, Humana Pharmacy Solutions Clinical Strategies, Humana; Mr Smith is Director, Real World Data & Analytics, Patient & Health Impact, Pfizer, New York, NY; Dr Pasquale is Director of Collaboration Research, Comprehensive Health Insights, Humana.

KEY POINTS

- With expanding treatment choices for psoriatic arthritis (PsA), involving patients in treatment decisions may improve treatment adherence and outcomes.
- This study was a survey-based conjoint analysis of treatment choices made by patients with PsA in Humana public and commercial health plans.
- The 3 most important medication attributes for Medicare beneficiaries were route of administration, cost, and improvement in the ability to perform daily activities.
- Cost, route, and frequency of drug administration were ranked most important by commercially insured patients.
- Treatment safety was ranked the lowest by Medicare beneficiaries and second lowest by commercially insured patients.
- The oral route of administration was preferred to self-injection or intravenous route.

to expand. Among the variety of medications that are approved for the treatment of PsA are tumor necrosis factor inhibitors, phosphodiesterase (PDE)-4 inhibitors, and interleukin-17 antagonists.[7]

The route of administration (ie, oral, self-injection, or infusion) may be an important differentiator between drugs used in the treatment of PsA, especially if patient preferences influence medication adherence and the outcomes of therapy. Although there have been a number of outcomes and tools that measure PsA manifestations and assessments, heterogeneity in the clinical manifestations and PsA disease course have resulted in a lack of conclusive evidence regarding the best treatment for patients with PsA.[8]

In addition, switching treatment is common among patients with PsA who are newly prescribed a nonbiologic or a biologic disease-modifying antirheumatic drug, because patients do not continue to use the index treatment for a long period.[9] Involving patients in treatment decisions can influence medication adherence, which, in turn, could have a considerable impact on treatment outcomes.

Conjoint analysis can be used to estimate the relative importance of different treatment characteristics and explores the trade-offs that patients are willing to make to avoid or accept specific treatment characteristics or "attributes," as often referred to in conjoint analyses.[10-13] Levels are assigned to different treatment attributes, and treatment scenarios are drawn up according to the attributes and levels chosen. Patient preferences for different treatment scenarios are then elicited by ranking, rating, or discrete choices.[13] Previous conjoint analyses have shown that sociodemographics, comorbidities, treatment experience, and treatment process attributes can all have an impact on the patient's preferences for treatment modalities in psoriasis[14-17] and in rheumatoid arthritis (RA).[18]

Nevertheless, little is known about the relative importance of treatment attributes for PsA. This is especially important with the addition of orally administered medications for PsA, such as apremilast, a PDE-4 inhibitor, which was approved by the US Food and Drug Administration (FDA) for PsA in 2014,[19] and tofacitinib, a Janus kinase inhibitor, which was approved by the FDA for PsA in 2017.[20] (Other medications approved by the FDA for PsA are not administered orally and are therefore not cited here.)

To close the evidence gap regarding the importance of medication characteristics, such as route and frequency of administration, efficacy, and safety, to patients, this study used patient survey and conjoint analysis methodology to evaluate patient preferences for attributes of medications used for PsA.

Methods

This study was based on a survey of patients diagnosed with PsA to evaluate their preferences regarding currently available and FDA-approved therapies for PsA. Patients were selected from the Humana Research Database (Louisville, KY). The study was approved by a central Institutional Review Board. Guidelines and best practices for conjoint analysis produced by the International Society for Pharmacoeconomics and Outcomes Research[10,12,13] were used to design a choice-based conjoint survey and to estimate the relative importance to patients of individual attributes of PsA medications.

The patients were presented with a selection of relevant PsA medication attributes without the use of any particular drug names. Patients received a $10 reimbursement after completing the survey.

To be eligible for the study, patients had to have at least 2 diagnoses of PsA (*International Classification of Diseases, Ninth Revision, Clinical Modification* [*ICD-9-CM*] diagnosis code 696.0 or *ICD-10-CM* diagnosis code L40.51 or L40.59) between January 1, 2012, and September 30, 2016, with the most recent diagnosis in 2015 or later (ie, the index date); be between age 18 and 80 years on the index date; and be enrolled in a fully insured Humana commercial or Medicare plan.

Patients were excluded from the study if they resided in skilled nursing facilities for more than 90 days pre-index; if they were eligible for low-income subsidies

(known to have a different cost-sharing for medications, including no copayment); or if they did not have a valid mailing address on file.

Survey Design

A choice-based conjoint survey was mailed to 2800 randomly selected patients enrolled in Humana Medicare and commercial health plans (1400 patients in each type), using a 4-wave survey rollout. The survey included 10 comparison choices, and each choice included 2 treatment scenarios (Drug A or B). We randomly chose the medication attributes, and designed the choice tasks using Sawtooth SSI Web software (version 8.2; Sawtooth Software, Inc; Sequim, WA).[11]

The medication attributes used for comparison were the drug route of administration, frequency of administration, ability to reduce daily joint pain and swelling, likelihood of causing serious infections, improvement in the ability to perform daily activities, achieving clear or almost clear skin, and cost. These attributes were based on real-world examples of FDA-approved medications for the treatment of PsA.[19-23]

The survey included 2 sections, one with general questions regarding the respondent's demographic and clinical characteristics, and the second was a treatment scenarios (ie, choice-based conjoint) section. The patients were instructed to complete questions in the general section and to select 1 preferred medication from the 2 hypothetical medications, namely, with randomly combined attributes, within each of the 10 choices in the choice-based conjoint question section.

A total of 8 versions of the choice-based conjoint component were generated, with 4 versions specific to the Medicare respondents and 4 versions specific to the commercially insured respondents. Each of these 4 versions contained the same questions, but the choice-based conjoint question section followed a different sequence. The only difference between the Medicare and the commercial insurance versions was the cost attribute, because real-world copays are generally different for these 2 populations; all other attributes were the same between the 2 versions. The respondents were randomly assigned a survey version to mitigate ordering bias (see **Supplemental Example Survey** at **www.AHDBonline.com**).

Statistical Analysis

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study sample, which were obtained from Humana's administrative claims data and from patients' responses to the first 5 survey questions, and pertained to confirming a diagnosis for PsA, patients' perception of their PsA severity, length of time with symptoms, length of time since diagnosis, and whether the respondent was comfortable responding to the survey in English.

The administrative claims data included age, sex, geographic region, and the RxRisk-V score, which is a prescription claims–based comorbidity index originally developed as an enhancement of the RxRisk risk assessment instrument for the Veterans Health Administration population.[24-26] The RxRisk-V score is determined based on the identification of 45 distinct comorbid conditions through their associated medication treatments (score range, 0-45). Two-sample *t*-tests and chi-square tests were used to compare descriptive statistics between respondents and nonrespondents.

The results of the conjoint analysis were analyzed to determine the relative preference for each medication attribute (ie, order of importance of attribute). An importance score reflects the effect that each attribute had on the patient's choice, given the range of levels included in the questionnaire. The preference for each level within an attribute was evaluated by counting the number of times that the patient chose a level relative to the number of times it was offered, to estimate the main effects and joint effects of the attributes.

Joint effects were evaluated by the number of times that medication concepts (ie, which were random combinations of different attributes) were chosen when the attributes were listed together as part of the same medication concept. The Sawtooth software was used to calculate the number of times that an attribute level was chosen relative to the number of times that it was available for choice. The software was also used to calculate a chi-square test value for each main effect and joint effect. This test is called "within-attribute chi-square" and indicates whether levels of a particular attribute differ significantly in frequency of choice within the respective attribute.

The influence of patients' demographic and clinical characteristics on each attribute was assessed using hierarchical Bayesian estimation, which allows for part-worth utilities (ie, attribute-level utilities), with a higher score for a level indicating greater desirability or preference (ie, utility). This set of utilities was calculated at the individual patient level, thereby overcoming the limitation associated with having only aggregate data available after a conjoint analysis. The part-worth utility data were then used to perform conjoint simulations to predict the share of preference for medications routinely used in clinical practice for the treatment of PsA.[19-23,27] Therefore, although the attributes were randomly mixed to create hypothetical medications for the survey, the simulation exercise preserved the actual combination of the attributes for each unique medication that is routinely used in actual clinical practice (**Table 1**).

Table 1 Baseline Demographic and Clinical Characteristics: Survey Respondents versus Nonrespondents

Characteristics	Medicare beneficiaries (N = 1400)			Commercially insured patients (N = 1400)		
	Survey respondents (N = 258)	Survey nonrespondents (N = 1142)	*P* value	Survey respondents (N = 210)	Survey nonrespondents (N = 1190)	*P* value
Age, yrs, mean ± SD (median)	66.7 ± 7.6 (67.5)	66.6 ± 8.6 (68.0)	.732	51.4 ± 10.7 (53.0)	50.3 ± 10.1 (52.0)	.154
Female sex, N (%)	150 (58.1)	650 (56.9)	.728	118 (56.2)	610 (51.3)	.203
Geographic region, N (%)						
Northeast	12 (4.7)	18 (1.6)	<.001	[a]	[a]	<.001
Midwest	69 (26.7)	218 (19.1)		50 (23.8)	142 (11.9)	
South	157 (60.9)	784 (68.7)		154 (73.3)	1011 (85.0)	
West	20 (7.8)	122 (10.7)		[a]	34 (2.9)	
RxRisk-V comorbidity score, mean ± SD (median)	1.1 ± 1.8 (0.0)	1.1 ± 1.7 (0.0)	.483	0.3 ± 0.9 (0.0)	0.3 ± 1.0 (0.0)	.878
Premailing injection/infusion utilization (2007-Nov 2016), N (%)	65 (25.2)	215 (18.8)	.025	142 (67.6)	736 (61.8)	.122
Years diagnosed with PsA,[b] N, mean (SD)	12.2 (11.0)	N/A[b]	—	9.9 (8.9)	N/A[b]	—
Years since first symptoms of PsA,[b] N, mean (SD)	18.4 (13.7)	N/A[b]	—	15.3 (10.7)	N/A[b]	—
PsA severity reported by patients, N (%)						
Mild	66 (25.6)	N/A[b]	—	73 (34.8)	N/A[b]	—
Moderate	124 (48.1)	N/A[b]	—	107 (51.0)	N/A[b]	—
Severe	66 (25.6)	N/A[b]	—	30 (14.3)	N/A[b]	—

[a]Suppressed in accordance with privacy rules from the Health Information Portability and Accountability Act, because cell count was <10.
[b]These measures were collected from the survey and therefore were not available for nonrespondents.
N/A indicates not applicable; PsA, psoriatic arthritis; SD, standard deviation.

Results

After applying the inclusion and exclusion criteria, 1400 patients were randomly selected from each of the Medicare and commercial insurance eligible patient cohorts to participate in the survey. A total of 258 (18.4%) patients in Medicare plans and 210 (15%) patients in commercial plans returned the survey (Table 1).

A comparison of the survey respondents with the nonrespondents (Table 1) shows significant differences between the 2 groups only in region of residence (*P* <.001 for the 2 insurance types). The mean age of the Medicare respondents was 66.7 years (standard deviation [SD], 7.6 years) and of commercially insured respondents, 51.4 years (SD, 10.7 years). The majority of respondents were female (58.1% with Medicare, 56.2% with commercial insurance), and most resided in the South (60.9% with Medicare, 73.3% with commercial insurance) or the Midwest (26.7% with Medicare, 23.8% with commercial insurance).

Approximately 25% (N = 65) of Medicare respondents had received an injection or infusion during the premailing period (2007-November 2016), and their average RxRisk-V comorbidity index score was 1.1 (SD, 1.8). By contrast, 67.6% (142 of the 210) of commercially insured respondents had received an injection or infusion during the premailing period (2007-November 2016), and their average RxRisk-V comorbidity index score was 0.3 (SD, 0.9).

The Medicare respondents had lived with a formal diagnosis of PsA for an average of 12.2 years (SD, 11 years) and had begun having symptoms an average of 18.4 years (SD, 13.7 years) before receiving the survey. The largest proportion (48.1%) of the respondents indicated that they had moderate PsA, 25.6% had mild PsA, and 25.6% had severe PsA.

The respondents and nonrespondents of the commercial insurance survey had similar demographic and clinical characteristics, with the exception of geographic region of residence. A higher proportion of respondents resided in the Midwest compared with nonrespondents (*P* <.05). The commercially insured respondents were diagnosed with PsA an average of 9.9 years (SD, 8.9 years) before receiving the survey and had begun having symptoms an average of 15.3 years (SD, 10.7 years) before receiving the survey. More than 50% of respondents indicated that they had moderate PsA. A lower proportion (34.8%) of patients had mild PsA and even fewer (14.3%) had severe PsA.

Table 2 Choice-Based Conjoint Count Analysis

Medication attributes/levels	Medicare beneficiaries (N = 265)				Commercially insured patients (N= 258)			
	Times a concept containing attribute levels was selected,[a] %	Within attribute chi-square[b]	Degrees of freedom	*P* value	Times a concept containing attribute levels was selected,[a] %	Within attribute chi-square[b]	Degrees of freedom	*P* value
Route of administration								
Oral	0.667				0.651			
Self-injection	0.573	295.11	2	<.01	0.524	144.57	2	<.01
Infusion	0.267				0.330			
Frequency of administration								
Once or twice daily	0.422				0.455			
Once weekly	0.536	22.25	3	<.01	0.493	8.01	3	<.05
Every other week	0.506				0.511			
Once every 12 weeks	0.536				0.541			
Chance of serious infections during 1 year of treatment								
1 of 100 patients	0.547				0.528			
2 of 100 patients	0.460	12.91	2	<.01	0.460	6.80	2	<.05
3 of 100 patients	0.491				0.511			
Cost to patients, Medicare (commercial insurance)								
$80 ($50)	0.605				0.689			
$100 ($150)	0.505	75.25	2	<.01	0.571	291.60	2	<.01
$160 ($600)	0.393				0.246			
Patients who achieve clear or almost clear skin								
25 of 100 patients	0.426				0.429			
45 of 100 patients	0.537	27.05	2	<.01	0.568	26.65	2	<.01
60 of 100 patients	0.535				0.500			
Ability to reduce daily joint pain and joint swelling								
40 of 100 patients	0.479				0.498			
50 of 100 patients	0.505	2.43	2	NS	0.523	2.76	2	NS
60 of 100 patients	0.516				0.478			
Improvement in the ability to perform daily tasks and activities								
20% improvement	0.360	198.28	1	<.01	0.415	60.05	1	<.01
40% improvement	0.640				0.585			

[a]The proportion of times a concept containing an attribute level was selected, among the number of times it was presented as a possible choice.
[b]The within-attribute chi-square test for each main effect indicates whether levels of the respective attributes differ significantly in their frequency of choice within the respective attribute.
NS indicates not significant.

Choice-Based Conjoint Analysis

Table 2 shows the proportion of times that levels within an attribute were selected by the survey respondents. Differences in frequency of respondents' choice of levels for all attributes were observed, with the exception of the drug's ability to reduce joint pain and joint swelling. The most often selected route of administration was oral, and once every 12 weeks was the most preferred frequency of administration (tied with once weekly for Medicare beneficiaries). As can be expected, the lowest incidence of serious side effects, lowest copayment, and the highest likelihood of clinical benefit were most often chosen.

A summary of the utilities' and attributes' importance scores for respondents was generated from the hierarchical Bayes models (**Table 3**). After adjusting for utilities and average importance by demographic and clinical covariates, the top 2 drug attributes of importance for patients were route of administration (mean score ± SD, 31.1 ± 14.8 for Medicare vs 23.0 ± 11.3 for commercially insured patients) and cost (mean score ± SD, 19.5 ± 11.5 for Medicare vs 30.6 ± 17.1 for commercially insured patients), with route of administration as the most

important for Medicare beneficiaries and cost the most important for commercially insured patients.

In the 2 cohorts, oral formulation was preferred to self-injection or intravenous administration, and, as expected, lower cost was preferred to high cost. The third most important attribute was improvement in the ability to perform daily tasks and activities for Medicare-covered patients (mean score ± SD, 13.3 ± 7.3) and frequency of administration for commercially insured patients (mean score ± SD, 12.1 ± 5.2).

Conjoint Market Simulations

A conjoint analysis can tease out a specific trade-off, such as willingness to tolerate self-injection over oral administration in exchange for higher effectiveness. Assumptions for each drug attribute in the base-case (Scenario 1) market simulation are shown in **Table 4**, and the results of patient preference shares for each drug are shown in **Table 5**. The route of administration for the top 3 choices for both groups were self-injection or oral, and self-injection was preferred between the 2 methods of administration if accompanied by higher effectiveness (ie, the number of patients who achieve clear or almost clear skin) and safety, as well as lower frequency of administration.

The results for alternative-market simulation are listed in Table 5. Scenario 2 suggests that preferences for lower frequency of administration outweighed the preference for oral versus self-injection in both surveys.

Table 3 Choice-Based Conjoint Utilities Importance[a]

Medication attributes and levels	Medicare beneficiaries		Commercially insured patients	
	Average utility, utils (SD)	Average importance score (SD)	Average utility, utils (SD)	Average importance score (SD)
Route of administration[b]				
Oral	65.2 (63.3)		57.7 (47.0)	
Self-injection	46.4 (54.7)	31.1 (14.8)	18.3 (49.2)	23.0 (11.3)
Infusion	–111.6 (81.8)		–76.0 (59.5)	
Frequency of administration				
Once or twice daily	–36.5 (31.1)		–32.0 (36.9)	
Once weekly	13.8 (19.7)	12.3 (5.4)	7.7 (19.9)	12.1 (5.2)
Every other week	14.8 (28.7)		7.3 (24.9)	
Once every 12 weeks	7.9 (34.3)		17.1 (34.3)	
Chance of serious infections during 1 year of treatment				
1 of 100 patients	–7.8 (18.6)		0.0 (28.9)	
2 of 100 patients	6.8 (22.4)	6.6 (3.2)	8.3 (25.3)	7.6 (4.2)
3 of 100 patients	1.0 (22.2)		–8.3 (20.1)	
Cost to Medicare/commercially insured patients				
$80/$50 copay monthly	61.1 (45.1)		88.6 (63.4)	
$100/$150 copay monthly	3.3 (21.9)	19.5 (11.5)	25.3 (21.4)	30.6 (17.1)
$160/$600 copay monthly	–64.4 (51.8)		–113.9 (75.5)	
Patients achieving clear or almost clear skin				
25 of 100 patients	–20.8 (28.5)		–19.7 (21.4)	
45 of 100 patients	0.2 (20.4)	8.7 (6.3)	9.4 (17.2)	7.2 (3.5)
60 of 100 patients	20.6 (31.5)		10.3 (20.3)	
Ability to reduce daily joint pain and joint swelling				
40 of 100 patients	–24.6 (26.6)		–19.4 (25.1)	
50 of 100 patients	2.7 (15.7)	8.5 (5.3)	11.1 (26.8)	9.8 (5.9)
60 of 100 patients	21.9 (24.4)		8.3 (39.7)	
Improvement in the ability to perform daily tasks and activities				
20% improvement	–44.2 (29.7)	13.3 (7.3)	–28.4 (33.7)	9.7 (8.1)
45% improvement	44.2 (29.7)		28.4 (33.7)	

[a]Results based on hierarchical Bayesian model estimates of utilities and importance of attributes and levels. The sum of the average utilities within an attribute is set to equal zero. The relative importance of each attribute is characterized by considering how much difference each attribute could make in the total utility of a drug. That difference is the range in the attribute's utility values. Percentages are calculated from relative ranges, obtaining a set of attribute importance values that add to 100%. The higher the score, the more important the attribute was to the respondents.
[b]Among respondents to the Medicare survey, those receiving injection or infusion preferred self-injection, followed by oral and then infusion, whereas those not receiving injection or infusion preferred oral, followed by self-injection and then infusion ($P < .01$). The differences were not statistically significant for respondents to the commercial insurance survey.
SD indicates standard deviation.

Discussion

This survey provides insight into patient preferences for drug attributes associated with therapies for PsA among patients enrolled in Humana's Medicare and commercial insurance plans. Although patient preferences associated with therapies for RA and psoriasis have been well-researched, no information has been uncovered regarding the relative importance of drug attributes associated exclusively with therapies for PsA. To our knowledge, this is the first study to survey patient preferences for PsA treatments. These insights may be useful to payers who are making formulary decisions and physicians who are making prescribing decisions. When evaluating treatments based on clinical evidence and cost, it may also be useful to take into consideration patient preferences for route of administration when 2 therapies are otherwise equal in terms of safety, efficacy, and cost.

Overall, the route of administration was ranked the most important drug attribute by Medicare beneficiaries and was ranked second most important by patients with commercial insurance, with the oral route being the most preferred. This is expected, because of the general public awareness and perceptions about injections, fear of injection-site pain, and the additional handling and temperature-controlled storage requirements for treatments administered by injection or infusion. Furthermore, patients may need to travel to their physician's office for infused medications, which adds time and may make a drug's administration less convenient. These results are consistent with other studies that highlight the

Table 4 Simulation Base-Case Scenario for Drug Concepts

	Medicare beneficiaries					Commercially insured patients				
	JAK1	TNF inhibitor	PDE inhibitor	TNF inhibitor	IL-17	JAK1	TNF inhibitor	PDE inhibitor	TNF inhibitor	IL-17
Drug measure	**Tofacitinib**	**Adalimumab**	**Apremilast**	**Infliximab**	**Secukinumab**	**Tofacitinib**	**Adalimumab**	**Apremilast**	**Infliximab**	**Secukinumab**
Route of administration	Oral	Self-injection	Oral	Infusion	Self-injection	Oral	Self-injection	Oral	Infusion	Self-injection
Frequency of administration	Once or twice daily	Every other week	Once or twice daily	Once every 12 weeks	Every other week	Once or twice daily	Every other week	Once or twice daily	Once every 12 weeks	Every other week
Chance of serious infections during 1 year of treatment, of 100 people	3[a]	3[b]	1[c]	3[d]	1[e]	3[a]	3[b]	1[c]	3[d]	1[e]
Monthly cost to patients, $	100	100	100	100	100	150	150	150	150	150
Patients who achieve clear or almost clear skin, N, of 100 people	45[a]	60[b]	25[c]	60[d]	60[e]	45[a]	60[b]	25[c]	60[d]	60[e]
Ability to reduce daily joint pain and joint swelling, of 100 people	60[a]	60[b]	40[c]	50[d]	50[e]	60[a]	60[b]	40[c]	50[d]	50[e]
Improvement in the ability to perform daily tasks and activities, %	45	45	20	45	45	45	45	20	45	45

[a]Xeljanz (tofacitinib) tablets prescribing information; June 2015.
[b]Humira (adalimumab) injection prescribing information; November 2015.
[c]Otezla (apremilast) tablets prescribing information; June 2017.
[d]Remicade (infliximab) prescribing information; October 2015.
[e]Cosentyx (secukinumab) injection prescribing information; January 2015.
IL indicates interleukin; JAK, Janus kinase; PDE, phosphodiesterase; TNF, tumor necrosis factor.

Table 5 Drug Preference Shares for Market Simulation Base-Case and Alternative Scenarios

	Medicare beneficiaries					Commercially insured patients				
	JAK1	TNF inhibitor	PDE inhibitor	TNF inhibitor	IL-17	JAK1	TNF inhibitor	PDE inhibitor	TNF inhibitor	IL-17
Drug concept	**Tofacitinib**	**Adalimumab**	**Apremilast**	**Infliximab**	**Secukinumab**	**Tofacitinib**	**Adalimumab**	**Apremilast**	**Infliximab**	**Secukinumab**
Base case,[a,b] %	29.0	50.6	2.8	6.4	11.2	17.4	25.4	10.8	7.1	39.4
Alternative scenario,[b,c] %	17.2	27.6	17.2	10.4	27.6	17.8	27.5	17.8	9.4	27.5

[a]The base case assumes all drug attributes displayed in the top panel of Table 4.
[b]Each row should sum to 100% (± rounding error).
[c]The alternative case assumes all efficacy and safety attributes to be the same between drug concepts, with differences only in the route and frequency of administration.
IL indicates interleukin; JAK, Janus kinase; PDE, phosphodiesterase; TNF, tumor necrosis factor.

importance of regimen convenience, location, delivery method, and treatment frequency.[16,17]

Of note, when patients who are covered by a Medicare plan were stratified by previous injection or infusion experience, self-injection was chosen among patients who had a previous injection or infusion experience, whereas oral administration was chosen by patients who did not have previous injection or infusion experience (see Table 3, footnote b), which indicates that a patient's comfort level with self-injection may increase with experience. This finding is consistent with previous research in other conditions that investigated patient preferences.[17,28,29]

Administering medication less frequently was more appealing than more frequently for patients with commercial insurance plans. The option of administering the medication once every 12 weeks was the most preferred frequency for commercially insured patients, and every other week was the most preferred rate for Medicare beneficiaries. Once or twice daily was the least preferred frequency for both groups. These findings are similar to those by Nolla and colleagues, who conducted a conjoint analysis of patients and rheumatologists in Spain and found that a low frequency of administration plays a key role in preferences for biologic therapy.[30]

Cost was second in importance for Medicare beneficiaries and most important for patients covered by a

commercial plan. Augustovski and colleagues used choice-based conjoint survey responses to examine patient preferences for biologic treatments in patients with RA,[31] and Hong and colleagues used choice-based conjoint survey responses to determine patient preferences in medication therapy management programs,[32] and they also found cost to be an important attribute. A more recent study reported that rheumatologists take into consideration the cost paid by patients when choosing treatments for RA.[33] In our study, the patient cost-share attribute had a wider range in the commercial insurance cohort ($50-$600) than that of the Medicare cohort ($80-$160), which may have resulted in this attribute ranking higher by those with commercial insurance.

Improvement in the ability to perform daily tasks and activities was selected as the third most important attribute among Medicare respondents, but did not rank in the top 3 for respondents with commercial insurance. This difference may be explained in part by Medicare beneficiaries having been diagnosed with PsA for a longer duration than those with commercial insurance (approximately 12 years vs 10 years, respectively; Table 1), and having more comorbidities than patients with commercial insurance. Loss of functional capacity as a result of joint pain and the chronic nature of PsA can cause significant disability in the elderly population; therefore, the effectiveness of a medication in improving functionality could be increasingly important with age.

Other than improvement in the ability to perform daily tasks and activities, efficacy attributes were less important to patients than route of administration, frequency of administration, and cost. Similarly, safety did not appear in the top attributes of importance. In fact, it ranked the lowest in the Medicare group and second lowest in the commercial insurance group (Table 2). This finding may be surprising to those who evaluate therapies based on efficacy and safety, and then cost. However, this finding may reflect the small differences among the levels of safety attributes available for respondent choice (range, 1-3 of 100). It is expected that patients will focus on attributes with wider ranges and clear distinctions between levels of safety. This finding is consistent with a previous conjoint analysis of patients diagnosed with RA and enrolled in a Humana plan.[18] In that study, ranges of efficacy and safety were narrow.[18]

In the current study, the range in efficacy between drugs was slightly wider, resulting in trade-offs between levels within efficacy, route of administration, frequency of administration, and safety, despite the route of administration being considered by patients to be most important. In some cases, drugs with a self-injection route of administration were preferred versus oral if they were administered less frequently and with higher effectiveness. In these instances, a negligible increase in the risk for serious infections was tolerated by the respondent in favor of other attributes that differed more markedly.

Limitations

Limitations that are common in studies involving conjoint analysis apply to this study, including respondents ranking certain attributes lower than others if their levels were similar, in favor of attributes with clear differences between the levels. Safety and efficacy would be the most important attributes evaluated by prescribers and formulary decision makers. However, if 2 treatments were equal in safety and efficacy, one could argue that route of administration and cost should be the next most important attributes used to compare and rank 2 therapies.

The limitations associated with surveys apply to our study, including nonresponse bias. Receiving reimbursement for the completion of the survey might have incentivized some patients more than others to complete the survey. With a response rate of less than 20%, it is possible that responses were not representative of all patients diagnosed with PsA. Differences between patients in our study versus other patients diagnosed with PsA may include years since diagnosis of PsA, years since the start of the first symptoms of PsA, and disease severity, any of which could have affected the results. However, a comparison between respondents and nonrespondents indicated that these 2 groups have comparable demographic and clinical characteristics.

There may also be unmeasured biases inherent in survey research, such as the ability to understand the survey questions and tasks, although more than 99% of the respondents in our study reported the ability to read English. This survey was quite lengthy; because of fatigue or loss of concentration, some individuals might have failed to make fully informed choices. Nonetheless, where a clear order existed among levels in an attribute, such as efficacy-related measures and cost measures, the results signal appropriate directionality for all levels across most attributes, indicating that individuals were attentive when completing the survey.

Because this study uses data from patients diagnosed with PsA and enrolled in Humana health plans, the results may not be generalized to a broader population of individuals with PsA. Humana, however, is a large national health plan with commercial and Medicare-insured patients who reside in a broad array of geographic regions.

The results of the simulation study should be interpreted with caution. Market simulations do not take into account real-world factors that shape market shares, such as length of time on the market, distribution, out-of-stock conditions, advertising, effectiveness of sales force,

and drug awareness. Finally, the market simulations assume that all relevant attributes that influence market share have been measured. As such, these results should not be interpreted as market shares, but as relative indications of preference.

Conclusion

Our study findings suggest that route of administration and cost are the most important considerations for patients diagnosed with PsA. As PsA treatment choices continue to expand, payers and physicians should consider such patient preferences among other factors when making treatment decisions for patients with PsA.

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Author Disclosure Statement

Dr Xu is an employee of Humana; Ms Sudharshan was an employee of Humana during the study; Dr Koenig is an employee of Pfizer; Ms Hsu, Dr Cappelleri, and Mr Smith are employees and stockholders of Pfizer; Dr Pasquale is an employee of Humana and holds stock at Humana and Pfizer; Dr Liu has no conflicts of interest to report.

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STAKEHOLDER PERSPECTIVE

Engaging Patients in Decision-Making for Psoriatic Arthritis Treatment

By F. Randy Vogenberg, PhD, RPh
Board Chairperson, Employer-Provider Interface Council, Hospital Quality Foundation
Principal, Institute for Integrated Healthcare, Greenville, SC

For a growing number of medical conditions, including psoriatic arthritis, there are increasingly more treatment options and choices to be made by clinical providers with their patients. All patients as decision makers in the US healthcare system have a perspective regarding their own care and the extent to which they can appropriately exercise their decision authority regarding a specific treatment for a medical condition. As a result, it is important to understand the preferences of those decision makers (ie, patients) who are affecting the financial and clinical outcomes that we see in performance reports from health plans every year.

PATIENTS: Patients, mostly those who are predominantly employees, as well as their employers, share a desired set of outcomes and involvement in optimal decision-making, yet they may not be fully aligned with the actions that are taken by their providers.

The current study by Xu and colleagues sheds some light on patient preferences specific to the treatment of psoriatic arthritis that may be expected or unexpected to be reported based on a randomly selected direct patient survey.[1] Determining patient engagement in medication-taking behavior is complex and has significant implications for all healthcare stakeholders regarding the clinical or financial outcomes of care.

The populations in the study by Xu and colleagues were covered by Medicare or by a commercial plan, which have several dissimilarities. Some of the important survey findings for these patient populations were (1) that medication safety was not a major issue for patients; (2) the order of influence on patients' drug choice was oral route of administration, cost, and frequency of administration; and (3) the ability to perform activities of daily living (or work) as an outcome was a key consideration.[1] These preference insights illustrate the similarity across age-groups in the patient population regarding what is most important, and what actions patients may be taking to achieve their clinical goals.

EMPLOYERS: Similar to studies and surveys in patients, in employers' surveys, although economic cost is important, other factors—such as clinical outcomes, health outcomes improvement, and care efficiency—are rated higher by employers in many independent surveys.

Alignment for optimal outcomes remains a priority for patients (ie, employee plan members) and employers. As a self-funded plan sponsor or a fully funded insurance program, many employers remain frustrated with the lack of transparency regarding information by their third-party administrators, along with a primary reliance only on economic data.

In the face of limited information to make better health plan decisions, there is an urgent need for meaningful measures and actionable metrics that employers, as purchasers of care, can use. Otherwise, economic cost alone remains the default. Such a status quo is not preferred by drug manufacturers or by patients who are members of an employer's plan.

As technologies continue to evolve and emerge from research pipelines for biologic drugs, devices, or diagnostics, it will be increasingly important to determine actionable metrics that the purchaser insurance market can utilize to enhance health plan structure decisions. As the health insurance structure improves, plan design features can become innovated and implemented over subsequent plan years. Just as new technology takes time to emerge, health insurance structures and health benefit designs also need time to evolve. Understanding stakeholders' (ie, patients') preferences, and taking action to address those preferences through insurance benefits become the starting points to make change happen for the benefit of patients.

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