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Comparing preferences for outcomes of psoriasis treatments among patients and dermatologists in the U.K.: results from a discrete-choice experiment*

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Conflicts of interest
F.M. was an employee of AbbVie Ltd at the time this study was conducted. J.M.G. and J.P. are employees of RTI HS, which was contracted by AbbVie Ltd to conduct the study. F.R.J. was an employee of RTI HS at the time of the study.

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Summary

Background Plaque psoriasis can have a significant negative effect on patients' quality of life, and treatments can result in serious toxicities. Although there have been several studies of patients' and physicians' relative preferences for the benefits and risks of psoriasis treatments, it is unclear how and whether patients' and physicians' preferences for the outcomes of psoriasis treatments differ.

Objectives To quantify patient and dermatologist preferences for improvements in psoriasis symptoms and for increases in the risk of treatment-related serious adverse events.

Methods Members of the U.K. Psoriasis Association and U.K. dermatologists with experience prescribing biologics completed a web-enabled discrete-choice experiment survey in which they evaluated efficacy and safety features of biological treatments for psoriasis. Choices between hypothetical treatment options were used to estimate preference weights indicating respondents' relative trade-off preferences among treatment outcomes. These outcomes included improvements in the severity and coverage of psoriatic plaques and treatment-related risks of tuberculosis, serious infections and lymphoma. Preference estimates were used to derive the maximum level of side-effect risks that respondents would accept for improvements in psoriasis symptoms.

Results Respondents' tolerance for side-effect risks varied with side-effect severity and location of plaques, and risk tolerance for serious side-effects was greater for patients than for dermatologists.

Conclusions Estimates of patients' risk tolerance for serious side-effects indicate that patients valued psoriasis symptom control highly and suggest that psoriasis symptoms have a significant effect on patients' quality of life. In light of research showing increased treatment satisfaction and improved treatment adherence among patients who receive therapies that are consistent with their preferences, our findings suggest that greater communication between dermatologists and patients about risk tolerance could help improve patient care.

What's already known about this topic?

- Plaque psoriasis is associated with a number of comorbidities and can have a significant negative effect on patients' quality of life.
- Systemic nonbiological and biological treatments for psoriasis can result in serious toxicities, including risks of serious infections and malignancies or lymphoma.

What does this study add?

- This study uses a discrete-choice experiment to elicit and contrast stated preferences for outcomes of psoriasis treatments from the perspective of patients with psoriasis and the dermatologists who treat them using a common instrument.

Plaque psoriasis is an inflammatory, autoimmune, chronic skin disease that affects about 2% of the adult population in the U.K. and Ireland.[1] The condition is associated with a number of comorbidities and can have a significant negative effect on patients' quality of life.[2–4] Approximately one-quarter of patients with severe psoriasis report feeling anxiety, depression or suicidality during their lifetime,[5] but distress is reported among patients with all severities.[3] Clinical guidelines from the National Institute for Health and Care Excellence (NICE) for psoriasis recommend early assessment of the impact on patients' psychological well-being in a primary-care setting, with referral to secondary care in appropriate cases.[6] However, many people have great difficulty obtaining referrals, and psychological well-being is seldom assessed among these patients despite the NICE guidelines.[7]

Treatments for psoriasis include topical agents, phototherapy and conventional systemic agents such as methotrexate and ciclosporin. These treatments offer modest efficacy in skin clearance, but over time they become less efficacious and can result in serious toxicities.[8–10] Biological treatments are also available for the treatment of psoriasis, and they work well to reduce both lesion severity and the amount of body surface area covered by plaques.[11] However, biological treatments are associated with serious adverse-event risks, including risks of serious infections and malignancies.[12,13] For example, efalizumab was withdrawn from the market in 2006 following fatal cases of progressive multifocal leucoencephalopathy in patients. The improvements in efficacy and the increased risk of serious adverse events associated with biological treatments highlight the importance of benefit–risk evaluations of these treatments to ensure that patients maximize the benefits of clinical interventions.

At the regulatory level, agencies in Europe and the U.S.A. have expressed increased interest in greater patient-centred health care, including increased use of quantitative measures of patients' willingness to accept benefit–risk trade-offs.[14] Despite increased advocacy for patient-centred health care, patient concerns currently are not formally incorporated into the U.K. licensing decision framework.[15]

In the U.K., NICE clinical guidelines in psoriasis provide clear recommendations for when patients should be escalated through therapeutic options in secondary care. These criteria include changes in disease severity [evaluated with measures such as the Psoriasis Area and Severity Index (PASI) or Physician's Global Assessment] and changes in quality of life [evaluated with measures such as the Dermatology Life Quality Index (DLQI)]. However, there are data to suggest that many patients who are eligible for more efficacious treatment are maintained on standard of care despite showing inadequate response, resulting in poor clinical outcomes and a detrimental impact on patient quality of life. For example, a study found the mean duration from psoriasis diagnosis to the first biologic was 22·1 years.[16]

The objective of this study was to use a combination of a discrete-choice experiment (DCE) and contingent-behaviour data to quantify patient and dermatologist preferences for improvements in the severity and coverage of psoriasis plaques, as well as increases in the risk of serious adverse events. Previous preference studies in psoriasis have evaluated patient or physician perspectives on the benefits and risks of specific treatment lines,[17–21] variations in patient preferences for outcomes of psoriasis medications,[22–25] and willingness to pay for symptom reductions.[26–29] However, to date there are no evaluations of preferences from patients and physicians using a common preference-elicitation instrument.[18–23,26]

Recent research has found that following treatment approaches that are consistent with patient preferences increases patient-reported treatment satisfaction.[30] Also, issues of treatment nonadherence have been previously linked to discordance between patient preferences and the psoriasis treatments prescribed.[18] Thus, gaining greater understanding of commonalities and differences in the preferences of patients and dermatologists could help improve patient care and the benefits that patients derive from this care. Results from this study can improve patient–dermatologist communications by documenting differences between patients' and dermatologists' perceptions of the benefits and risks of treatments, and support more patient-centred regulatory decision making by helping to build evidence on patient preferences for psoriasis treatment outcomes.

Materials and methods

Study design

A DCE (also known as choice-based conjoint-analysis survey), a valid and reliable technique for eliciting stated preferences, was developed and administered using good practices.[31,32] In DCEs, patients are offered several designated treatments described in terms of general attributes and the level to which the treatment satisfies each attribute. Pairs of virtual and unlabelled psoriasis medications were designed to imply specific trade-offs, as respondents were asked to choose one treatment over another. Respondents' choices in a series of trade-off

Table 1 Attributes and levels for the treatment preference trade-off questions

Attribute	Levels
Location of plaques	Chest and back
	Arms and legs
	Face[a]
[Patients only] How red and scaly the psoriasis patches are after using the medicine	None
	Mild
[Dermatologists only] Erythema, induration and desquamation after treatment	Moderate
	Severe
	Very severe
[Patients only] How much of your {location} is still covered by psoriasis patches after using the medicines	None
	10%
[Dermatologists only] Extent of coverage after treatment	25%
	50%
10-year tuberculosis risk	No chance
	10 out of 1000 (1%)
	30 out of 1000 (3%)
	100 out of 1000 (10%)
10-year serious infection risk[b]	No chance
	100 out of 1000 (10%)
	200 out of 1000 (20%)
	400 out of 1000 (40%)
10-year lymphoma risk	No chance
	20 out of 1000 (2%)
	50 out of 1000 (5%)
	100 out of 1000 (10%)

[a]All respondents were asked a contingent-behaviour question regarding the face location. [b]Respondents were randomized to one of three serious infections: serious cellulitis, pneumonia or pyelonephritis.

questions indicate the extent to which various attribute levels satisfy patients' preferences.[33]

The treatment attributes in this study (Table 1) were selected based on a literature review of controlled clinical trials, consultation with clinical experts, and face-to-face interviews with patients and dermatologists. Based on this process, five attributes were identified as being most important in the evaluation of preferences for benefits and risks associated with psoriasis medications. The attributes included were (i) location of psoriasis plaques, (ii) severity of psoriasis plaques and percentage of body surface area covered with them (also presented as a PASI score to dermatologists completing the survey instrument), (iii) 10-year risk of tuberculosis, (iv) 10-year risk of lymphoma and (v) 10-year risk of serious infection. Across respondents, the specific type of serious infection was randomly assigned to be serious cellulitis, pneumonia or pyelonephritis to assess sensitivity to specific conditions.

Respondents were asked to answer eight trade-off questions in each survey: four trade-off questions asked respondents to consider treatments for plaques on the chest and back, and four trade-off questions asked respondents to consider treatments for plaques on the arms and legs. The treatment profiles were constructed using an experimental design with known properties that allowed the use of statistical methods to determine the impact that each trade-off had on recorded treatment choices.[34] The experimental design was prepared using an SAS algorithm based on the design D-efficiency (SAS version 9.3; SAS Institute Inc., Cary, NC, U.S.A.). This type of design minimizes the correlations between attributes across questions and is widely used in DCE applications in health.[34] The design algorithm was optimized under the assumption that the researchers had no prior knowledge of the preferential relationships between attributes. The overall experimental design consisted of 48 choice questions blocked into six groups of eight questions shown to each respondent. A sample trade-off question from the patient survey is presented in Figure 1.

Dermatologists were asked to assume that the treatments were prescribed to a virtual patient and were informed of the severity (very severe plaque psoriasis), coverage and location (alternating between 50% of the patient's torso and 50% of the patient's arms and legs) of the psoriasis plaques. They were also informed of the age, DLQI score and treatment history of the virtual patient (not responsive to topical medications, light therapy or traditional systemic medications).

Respondents in each sample (patients and dermatologists) also answered two contingent-behaviour questions, stating whether they would accept (patients) or prescribe (dermatologists) a treatment that eliminated moderate psoriatic plaques on the patient's face if it also carried a specific level of a 10-year risk of lymphoma. The contingent-behaviour questions were used as a simplified elicitation format that focused on the trade-offs that patients and dermatologists were willing to make between a dramatic improvement in symptoms and the most lethal potential outcome associated with psoriasis medications. The instrument also collected data on standard demographic information, health history and treatment experience from patients; and demographic information, prescribing patterns and clinical practice from dermatologists.

The survey instruments were pretested with patients who self-reported having a physician diagnosis of psoriasis, and dermatologists. The pretesting of the survey instrument consisted of 10 in-person interviews with patients with psoriasis and five telephone interviews with dermatologists. During the interviews, respondents were asked to follow a think-aloud protocol. The appropriateness of the attributes in the survey and respondents' understanding of the definition for each attribute were tested during the pretest interviews.

Sample and recruitment

The U.K. Psoriasis Association hosted a link on their website and social media channels to complete an online survey for members who were aged 18 years or older, lived in the U.K., had a self-reported diagnosis of psoriasis by a healthcare professional, and indicated that they had moderate or severe psoriasis corroborated using a DLQI questionnaire. Dermatologists were invited via e-mail to complete the survey by A Plus A (Lyon, France), an online survey research company, if they

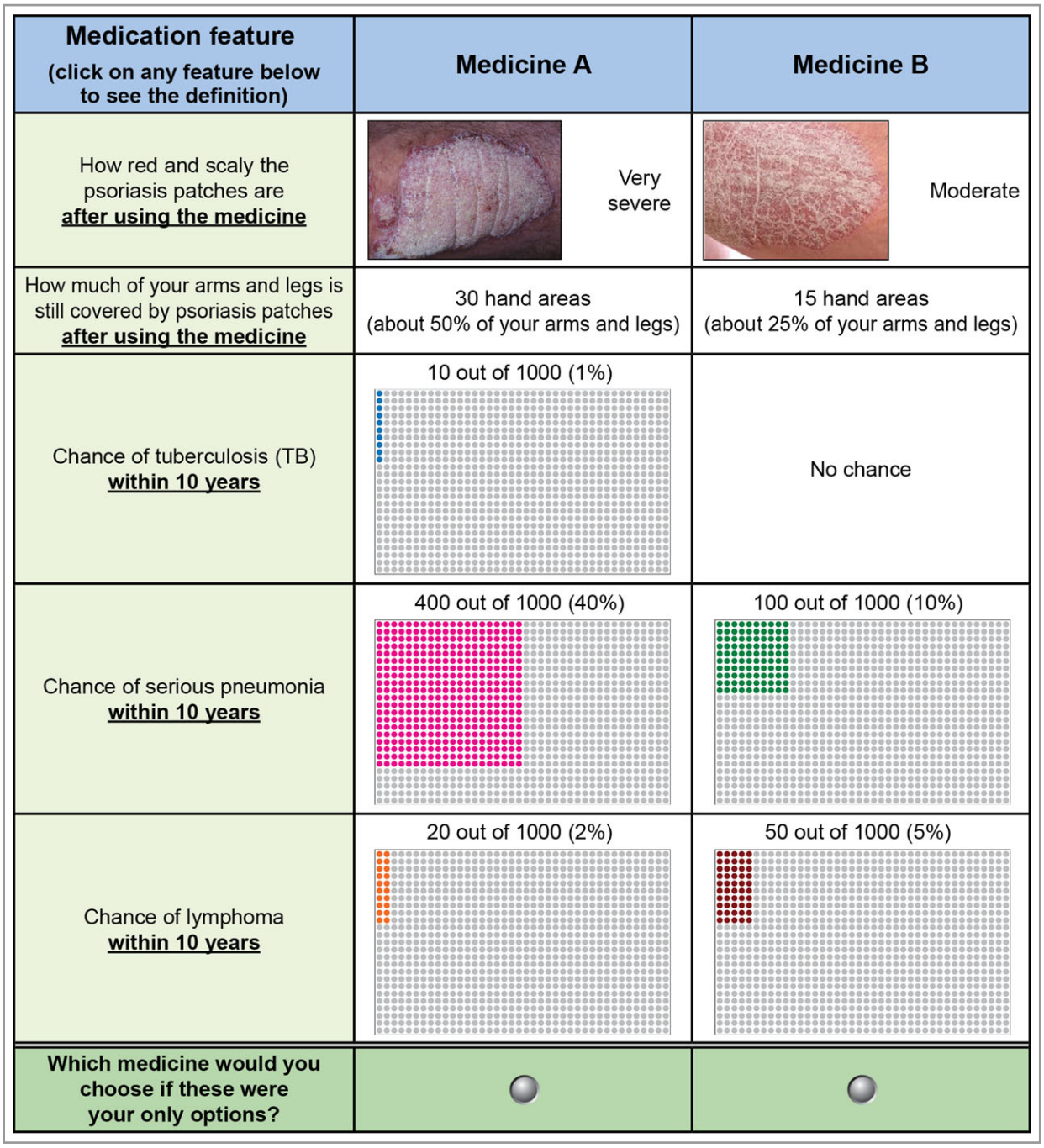

Fig 1. Example choice question from the patient survey.

were registered with the General Medical Council, were currently practising in the U.K., and had experience in prescribing biological agents.

Recruitment of the patient and dermatologist samples was done sequentially. The average age and self-assessed DLQI scores in the patient sample were incorporated into the definition of the virtual patient considered in the choice questions by dermatologists. This information was used to ensure that the treatment recommendations made by the dermatologists were relevant for the average patient in the study. All respondents provided online informed consent. The study was reviewed by RTI International's institutional review board, and researchers followed the guidelines of the British Healthcare Business Intelligence Association.

Statistical analysis

Preference parameters were estimated with separate random-parameters logit (RPL) regression models (NLOGIT software version 5.0; Econometric, Plainview, NY, U.S.A.), one to

analyse patients' responses and a second to analyse physicians' responses. Thus, results were obtained separately for patients and physicians, avoiding potential poolability issues in DCE data.[35] The RPL model relates the likelihood of choosing a treatment to the treatment trade-offs (changes in attribute levels) in each choice question. The effect of trade-offs on treatment choices indicates respondents' preferences for changes in each attribute, and the relative intensity of preferences for attribute levels.[36] All of the attributes in Table 1 were included in the RPL models.

The specification of the RPL model combined several types of variable coding for the treatment attribute levels. Plaque severity and treatment-related risk levels were included in the RPL model as effects-coded categorical variables. This type of coding permits identification of estimates for all levels in a categorical attribute because it normalizes attribute-level parameters to be relative to the mean effect of the attribute instead of an omitted category.

A dichotomous (dummy) variable was included in the model specification to account for no psoriasis symptoms. This variable was set to 1 whenever a treatment eliminated all plaques and 0 otherwise. Other severity-adjusted coverage levels were included in the RPL model as interactions between the effects-coded severity levels and a continuous specification of the coverage of psoriasis plaques. Separate preference parameters were estimated for improvements in plaques on the chest and back, and arms and legs.

Willingness to accept treatment-related lymphoma risk in exchange for total clearing of psoriasis patches on the face was estimated with an interval-regression model using data from the contingent-behaviour questions (Stata statistical software release 13; StataCorp, College Station, TX, U.S.A.). An interval-regression model relates respondents' choices to accept (patients) or prescribe (dermatologists) treatments that would clear all facial patches to the risk of lymphoma associated with the treatment. Results from the interval-regression model are interpreted as the impact that changes in the risk of lymphoma have on the acceptability of psoriasis treatments. Specifically, the interval-regression model estimates the highest level of lymphoma risk that respondents would accept in a psoriasis treatment, given specific treatment benefits.

Table 2 Characteristics of the respondents (patients and dermatologists) who participated in the survey

Characteristic of respondents	Patients (n = 174)
Age (years), mean ± SD	39·5 ± 12·7
Female	104 (59·8)
Self-reported severity of psoriasis plaques	
Mild or mild to moderate	67 (38·5)
Moderate or moderate to severe	89 (51·1)
Severe or severe to very severe	16 (9·2)
Very severe	1 (0·6)
DLQI score, mean ± SD	10·9 ± 5·4
History of psoriatic arthritis	19 (10·9)
	Dermatologists (n = 100)
Age (years), mean ± SD	41·0 ± 8·3
Female	48 (48)
Type of practice[a]	
General practice	2 (2)
Dermatology tertiary referral department	45 (45)
National Health Service hospital	73 (73)
Private practice	10 (10)
Other[b]	1 (1)
Average monthly number of patients with psoriasis treated	
≤ 40	44 (44)
> 40	56 (56)
Years since completing medical training	
< 10	26 (26)
10–20	59 (59)
> 20	15 (15)
Proportion of patients receiving biological agents for psoriasis treatment	
None	3 (3)
< 25%	60 (60)
25–75%	37 (37)
Guidelines followed[a]	
NICE	79 (80)
BAD	89 (90)
SIGN	5 (5)
Other local guideline	14 (14)

Values are n (%) unless stated otherwise. DLQI, Dermatology Life Quality Index; NICE, National Institute for Health and Care Excellence; BAD, British Association of Dermatologists; SIGN, Scottish Intercollegiate Guidelines Network. [a]Respondents were allowed to provide multiple responses. [b]Community dermatology service.

Results

Patient characteristics

Recruited through the Psoriasis Association's website, 174 patients met the inclusion criteria and all completed the patient DCE survey (Table 2). The mean age of the patients was 39 years, and most patients were female (60%) and married (57%). Over 75% of patients had received their psoriasis diagnosis more than 5 years earlier. The arms (82%), legs (80%) and scalp (69%) were the most commonly reported areas having active plaques. Most patients (86%) reported using creams, lotions and ointments (including prescription and over the counter), 8% of patients reported using injectable medicines and 23% of patients reported using oral medicines to treat their psoriasis.

Dermatologist characteristics

One hundred dermatologists were recruited from a healthcare panel, and all completed the dermatologist DCE survey (Table 2). The mean dermatologist age was 41 years, and more than half of the respondents (59%) reported having between 10 and 20 years of experience since completing their medical training. Also, nearly three-quarters of the dermatologists worked at National Health Service hospitals (73%). Most dermatologists reported following the clinical guidelines

recommended by the British Association of Dermatologists (90%) and NICE (80%).

Preference weights

Figure 2 includes results for plaques occurring on the patient's torso and limbs. For ease of interpretation, respondents' preference weights in Figure 2 were rescaled relative to no symptoms, where no symptoms in each attribute had a preference weight of 0 and the least-preferred attribute level had a preference weight of −10. Less negative preference weights indicate greater preference for the level of a treatment attribute. The vertical bars around each preference-weight estimate indicate the 95% confidence interval. If the confidence intervals in two levels of the same attribute do not overlap, the two levels are statistically significantly different at the 95% confidence level.

The estimated preference weights for almost all attributes were consistent with the natural ordering of the levels; better clinical outcomes were preferred to worse clinical outcomes. For example, on average, patients and dermatologists always preferred lower levels of lymphoma risk to higher levels of lymphoma risk (0% risk of lymphoma had a weight of 0 for both patients and dermatologists, whereas a 2% risk had weights of approximately −2 and −4 for patients and dermatologists, respectively), and these differences were statistically significant ($P < 0{\cdot}05$).

Within an attribute, the vertical distance between levels indicates the relative importance of moving from one level to the other. The relative importance of changes in attribute levels can then be directly compared across attributes. For example, for dermatologists, the relative importance of an improvement from very severe psoriasis plaques covering 50% of the patient's chest and back to no psoriasis plaques was approximately 7·7 [= 0 − (−7·7)]. An improvement from 2% to 0% lymphoma risk had a relative importance of approximately 4 [= 0 − (−4)]. Therefore, an improvement from very severe psoriasis plaques covering 50% of the patient's chest and back to no psoriasis plaques was almost 2 (= 7·7 ÷ 4) times as important to dermatologists as a reduction in lymphoma risk from 2% to 0%.

Among patients, there were no statistically significant differences in preferences for equivalent reductions in the size of plaques on the limbs and torso, while dermatologists perceived improvements in plaques on the limbs to be more important than improvements in plaques on the torso. In addition, dermatologists perceived no benefit in reducing mild plaque area from 10% to 0%, while patients perceived a significant benefit in that improvement. Similarly, the impact of very severe plaques covering 10% of the limbs or torso was much more important to patients than dermatologists. However, dermatologists valued improvements in very severe plaques for areas greater than 10%, but patients were insensitive to changes in the affected area beyond 10%. Dermatologists were more sensitive to risks than patients for all serious side-effects, although at these sample sizes the differences in preferences for treatment-related risks between patients and physicians were statistically significant only for 10% lymphoma risk in the next 10 years.

Maximum acceptable risk

Using preference-weight estimates, it is possible to determine what increase in the risk of a serious adverse event is as important to respondents as specific improvements in clinical outcomes. With this equivalence in importance, one can calculate the maximum level of acceptable adverse-event risk for specific treatment benefits. In our study, maximum acceptable risk (MAR) is the largest treatment-related risk that patients are willing to accept in return for a given improvement in psoriasis treatment outcomes. Figure 3 presents lymphoma MARs for improvements from various severity-adjusted body surface areas to no psoriasis plaques. For example, patients were willing to accept up to a 17% risk of lymphoma in the next 10 years to clear very severe psoriasis from the limbs,

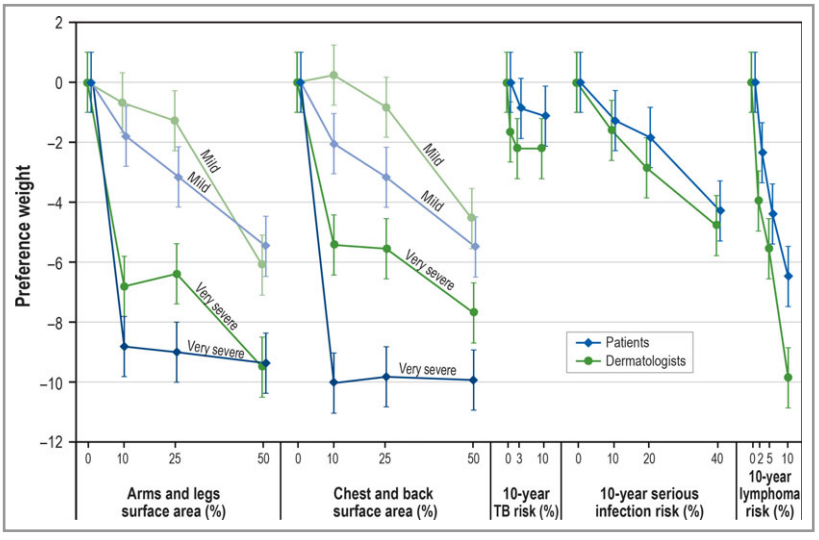

Fig 2. Patient and dermatologist preference parameters (log odds) relative to no symptoms for plaques and treatment risk of adverse events. TB, tuberculosis. Vertical bars denote 95% confidence intervals.

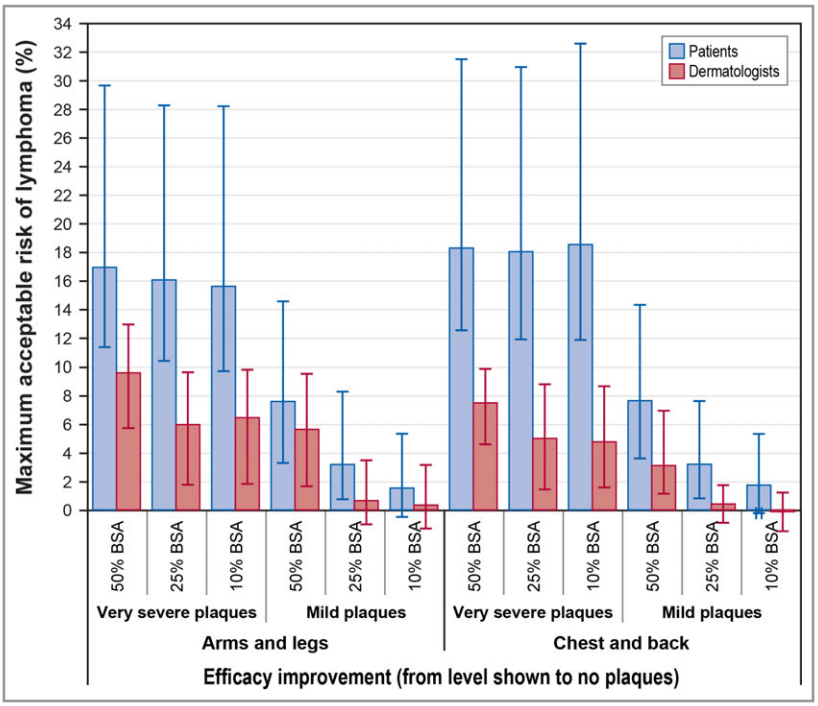

Fig 3. Maximum acceptable 10-year risk of lymphoma. BSA, body surface area. Vertical bars denote 95% confidence intervals.

whereas dermatologists were willing to accept only a 9% risk of lymphoma in the next 10 years. This result implies that patients were more tolerant of risks than dermatologists at all benefit levels. However, the differences in risk tolerance were statistically significant only for clearance of very severe plaques given the samples sizes.

The results from the interval-regression model using the contingent-behaviour data indicated that the lymphoma 10-year MAR for total clearance of psoriasis patches of moderate severity on the face was 16% for patients and 9% for dermatologists. The difference in risk tolerance for improvements in facial patches was statistically significant at the 95% confidence level.

Discussion

The numbers of patients (174) and dermatologists (100) in the study samples were within the usual ranges of participants in applications of DCEs in health care.[37] Patient and dermatologist respondents generally discriminated well among different levels of plaque severity and body surface area covered with plaques. However, the data indicated that the location of plaques on the body, other than the face, did not significantly influence patient preferences. One plausible rationale for this may be that patients would consider using clothing to cover plaques presenting on the arms and legs or chest and back.

Also, the impact of the coverage of plaques changed with their severity. For example, increases in the coverage of very severe plaques beyond 10% coverage did not have a statistically significant additional effect on patients' well-being. This result suggests that, among patients with severe plaques, changes in the PASI score associated with reductions in plaque coverage are potentially less correlated with changes in patients' well-being, as measured by the DLQI, for example. However, among patients with milder symptoms, the impact of changes in plaque coverage on patients' well-being is likely more highly correlated with changes in the PASI score. This hypothesis may offer a rationale for a complementary use of the DLQI in gauging the impact of severe psoriasis on patients and in guiding appropriate treatment choices. This result is consistent with previous findings[5] showing that disease severity does not necessarily correspond with psychological or social morbidity considered in the DLQI.

As in previous preference studies, our results suggest that patients see great value in efficacy improvements from psoriasis medications. Among both groups of respondents, greater treatment efficacy resulted in greater tolerance for serious side-effect risks. However, we observed marked differences in the perceived importance of both benefits and risks of treatment between patients with psoriasis and dermatologists, with patients generally having greater risk tolerance. These differences in risk tolerance between groups were observed across all severities, but the results suggest greater differences in preferences over very severe plaques. The mean MAR estimates for patients appear to be greater than the incidence rates of adverse events observed in clinical trials that have studied systemic non-biological vs. biological treatments in psoriasis. These include the adalimumab randomized clinical trial CHAMPION,[38] where no cases of tuberculosis, serious infections or lymphoma were reported, and REVEAL,[39] where 0·5% of patients treated with biological treatments experienced serious infections. These estimates also appear to be greater than incidences for other biological treatments for psoriasis like etanercept and infliximab, where the incidence of lymphoma was < 0·001%.[12]

Several important limitations in our study must be highlighted. Firstly, although choice questions are intended to simulate clinical decisions in DCEs, they do not have the clinical or emotional consequences of actual decisions. Differences can arise between stated and actual choices. With this in mind, the hypothetical scenarios were prepared to mimic real-world trade-offs as closely as possible to minimize hypothetical bias.

Secondly, patients with psoriasis were invited to complete the survey through an announcement on the Psoriasis Association website. This passive type of recruitment technique makes it difficult to know the survey response rate because it is not possible to determine the contact rate. Furthermore, without data on the characteristics of nonparticipants, it is not possible to determine whether the recruitment procedure used in this study resulted in selection bias. We also acknowledge that there may be differences between our patient sample and the population of patients with psoriasis in the U.K. For example, the patients considered in this study were younger ($P < 0{\cdot}001$) and more likely to be female ($P < 0{\cdot}001$) than those who participated in the adalimumab randomized clinical trial REVEAL.[39] For these reasons, some caution would be advised if generalizing these results to all patients in the U.K.

Thirdly, to avoid well-known cognitive problems with evaluating small probabilities, we defined the risk exposure as the chance of each of three serious side-effects over 10 years. The actual risk of serious infection, in particular, is greatest in the first 6 months of exposure and declines significantly afterwards. Exploring preferences for such nonlinearities in risk exposure was beyond the scope of this study but should be considered in future research.

Fourthly, the experimental design used to populate the alternatives in the trade-off questions assumed no prior knowledge of the preferential relationships between attributes. This implies that the design was not optimized to make specific comparisons of preferences. It is not possible to determine whether an experimental design optimized to evaluate a specific hypothesized preferential relationship could have resulted in greater statistical significance of the differences found in this study. However, reduced efficiency may suggest that our design might have limited our ability to reach more definite conclusions about differences in preferences. Nevertheless, we found no evidence that the approach used to develop the experimental design biased our mean preference estimates.

Similarly, more granularity in location, such as the relative importance of scalp and genital plaques, could be of clinical interest. However, good-practice DCE methods require balancing the amount of information that respondents are asked to evaluate with acceptable levels of measurement error. Pretest interviews indicated that the level of difficulty of the survey instrument was acceptable to most patients, and a decision was made to include no additional information about treatment in the trade-off questions.

The reasons behind differences in preferences for treatment outcomes between patients and dermatologists are not explored in this study, but these differences could affect how clinicians define optimal treatment and make prescribing decisions. In light of research showing increased treatment satisfaction and improved treatment adherence among patients who receive therapies that are consistent with their preferences, greater attention to differences in preferences between patients and dermatologists could help address the low levels of patient satisfaction with psoriasis treatments.[40,41] Our results suggest that there is room to align further the views of patients and physicians on the benefits and risks of psoriasis treatments. In that sense, more communication between dermatologists and patients about risk tolerance could help improve patient care.

From a wider perspective, the results from this study could also be of interest to regulatory authorities to support the formal incorporation of patient benefit-risk preferences into evidence-driven regulatory decision making. The results could also be of interest to policy makers and practitioners who see shared decision making as a way to improve health outcomes through enhanced patient and physician interactions.

Future research should evaluate factors that could help explain discrepancies in risk tolerance between patients with psoriasis and dermatologists. Furthermore, it would be important to understand the impact of greater communication about risk tolerance on treatment satisfaction and adherence.

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Video S1. Author video.