ORIGINAL ARTICLE

Variation in dermatologist beliefs about the safety and effectiveness of treatments for moderate to severe psoriasis

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Background: Multiple systemic treatments are available for moderate to severe psoriasis, but dermatologists' perceptions of these treatments are unknown. Physician perceptions can influence prescribing patterns and patient outcomes, and may help to explain variations in clinical practice.

Objective: We sought to describe the variation in dermatologist's beliefs about the safety and effectiveness of psoriasis treatments and evaluate how these relate to dermatologist characteristics and treatment preferences.

Methods: We conducted a cross-sectional mail survey of a random sample of 500 National Psoriasis Foundation (NPF) members and 500 American Academy of Dermatology (AAD) members who treat psoriasis.

Results: Of 989 clinicians who could be contacted, 246 NPF members and 141 AAD members returned the survey (39% response rate). Respondents perceived infliximab, ustekinumab, cyclosporine, and adalimumab to have the highest likelihood of skin clearance in 3 months (67%-75%). Etanercept, adalimumab,

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ultraviolet B, and ustekinumab had the lowest perceived likelihood of side effects requiring treatment discontinuation (9%-11%). Up to 49% of respondents "didn't know" the effectiveness or likelihood of side effects; calculated coefficients of variation were higher for perceived likelihood of side effects than perceived effectiveness. There were few significant associations between safety and effectiveness perceptions and respondent characteristics, and treatment preferences were not consistently predictive of perceptions.

Limitations: Only dermatologists with interest in treating psoriasis were surveyed and general perceptions were elicited via survey format. Perceptions may differ between survey respondents and nonrespondents.

Conclusions: Psoriasis providers demonstrate wide variation in their perception of the effectiveness and especially safety of systemic treatments. (J Am Acad Dermatol 10.1016/j.jaad.2012.07.007.)

Key words: biologics; comparative effectiveness; pharmacoepidemiology; phototherapy; psoriasis; systemic therapies.

CAPSULE SUMMARY

- Physician perceptions can influence prescribing patterns and patient outcomes and may explain variations in clinical practice.
- There is wide variation in dermatologists' perceptions of the effectiveness and especially safety of systemic psoriasis treatments.
- Comparative effectiveness studies and educational efforts addressing the variation in perceptions may be most valuable.

Psoriasis is a costly and chronic disease that affects 2% to 4% of the population, significantly impacts patients' quality of life, and is associated with an excess risk of cardiovascular disease and mortality in patients with more severe disease.[1-5] In addition to topical treatments used for mild disease, a variety of systemic treatment options are available for moderate to severe psoriasis including phototherapy, oral retinoids, traditional systemic treatments such as cyclosporine and methotrexate, and newer biological medications including the tumor necrosis factor-alfa, T-cell, and interleukin-12/23 blockers. Despite the armamentarium of treatment options available, current guidelines do not distinguish among first-line treatments[6] and many patients believe that the treatment of their disease is inadequate. A large national survey performed in 2004 found that nearly half of patients with psoriasis surveyed are unsatisfied with their treatment, with higher levels of dissatisfaction among patients with more severe disease.[7]

Comparative effectiveness research (CER) aims to optimize value-based care for patients in real-world settings by comparing available treatment modalities. In addition to the generation and synthesis of evidence comparing treatments, the field of comparative effectiveness emphasizes the importance of input for decision-making and the dissemination of research to patients and providers.[8,9] Given the disease burden attributable to psoriasis, variety of treatment options available, and relative lack of head-to-head comparisons of therapeutic options, psoriasis is an important disease for CER efforts.[10] To date, however, little CER has focused on prescriber attitudes and beliefs about psoriasis treatment options.

Some authors have proposed a "value of information" approach to prioritize CER, arguing that additional data are most valuable in areas where uncertainty exists.[11-13] To guide future CER in the field of psoriasis, we sought to investigate areas of physician uncertainty about treatment options. Our goal was not to estimate the actual safety or effectiveness of psoriasis treatments, which are likely to be highly dependent on the population studied. Rather, our aim was to describe *variation* in dermatologist attitudes or beliefs about the safety and effectiveness of psoriasis treatments. In addition, we examined whether dermatologist characteristics and prescription preferences were related to their beliefs.

METHODS

Study population and setting

We surveyed 1000 practicing dermatologists across the United States, of whom 500 were randomly selected from the National Psoriasis Foundation (NPF) list of 922 dermatologists with active memberships as of March 29, 2010, and the other 500 were randomly selected from the American Academy of Dermatology (AAD) list of 1417

Abbreviations used:

AAD: American Academy of Dermatology
CER: comparative effectiveness research
NPF: National Psoriasis Foundation
UV: ultraviolet

dermatologists who had identified themselves as treating psoriasis. All respondents were AAD members; if a dermatologist appeared on both lists, he/she was included in the NPF group for the purposes of selection and analysis.

Study design

We conducted a cross-sectional survey of US dermatologists as described above. The survey instrument was a 4-page questionnaire developed by dermatologists expert in the care of psoriasis with input from the steering committee members of the Dermatology Clinical Effectiveness Research Network. It assessed dermatologists' practices, preferences, and beliefs with respect to the treatment of moderate to severe psoriasis. Pilot studies conducted with a convenience sample of 12 dermatologists at the 2010 annual AAD meeting showed that fewer than 5 minutes were required to complete the survey.

We used a modified Dillman Tailored Design method of sending postcard reminders and duplicate surveys to nonrespondents.[14,15] Survey packets were also randomized to include 1 of 3 financial incentives ($0, $5, or $10) as part of a substudy on survey response incentives.[16] The survey study was conducted from May 2010 to August 2010, and all responses received within 15 weeks after the initial questionnaire mailing were included in the results. The study was approved by the University of Pennsylvania Institutional Review Board.

Outcomes

The primary outcomes of interest were dermatologists' beliefs about the safety and effectiveness of treatments for moderate to severe psoriasis. We included 10 systemic therapies that were approved at the time of the study by the US Food and Drug Administration: psoralen plus ultraviolet (UV) A phototherapy, UVB phototherapy, acitretin, cyclosporine, methotrexate, adalimumab, alefacept, etanercept, infliximab, and ustekinumab. To assess each treatment's effectiveness, we asked: "What percent of patients treated with each of the following therapies will have clear or almost clear skin after three months?" To facilitate ease of survey response, we created 9 categories for respondents to choose from: less than 20%, 21% to 30%, 31% to 40%, 41% to 50%, 51% to 60%, 61% to 70%, 71% to 80%, more than 80%, and "don't know." To assess each treatment's safety, we asked: "What percent of patients will have to discontinue each of the following therapies due to side effects (ie, laboratory abnormalities, adverse effects or general tolerability issues)?" Response categories included: less than 10%, 11% to 20%, 21% to 30%, 31% to 40%, 41% to 50%, 51% to 60%, 61% to 70%, more than 70%, and "don't know." Respondents were asked to base their responses on the average patient with moderate to severe psoriasis.

Respondent characteristics

Sex, practice setting, and number of patients with psoriasis treated in the last 3 months were assessed directly via the questionnaire. Information on duration of practice was obtained for all dermatologists surveyed using Vitals (http://www.vitals.com/, accessed July 26, 2010). We imputed the number of years in practice for 33 subjects in whom it was missing by subtracting 4 from years since medical school graduation, which we obtained from HealthGrades (http://www.healthgrades.com/, accessed July 26, 2010). We used the subjects' mailing addresses to determine their geographic region of practice as defined by the US Census Bureau (http://www.census.gov/popest/geographic/, accessed November 21, 2010).

Prescription preferences

Respondents' prescription preferences were measured by 2 methods. First, they were asked to indicate the number of patients treated with each psoriasis therapy over the prior 3 months. Second, we identified first-line treatment preferences for a standardized patient via 2 vignettes describing a typical healthy man or woman of childbearing age with moderate to severe psoriasis.

Study size

A sample size of 1000 was calculated to be sufficient to give precise confidence intervals around our primary outcomes: if the SD of the perceived effectiveness of a particular treatment was 15%, then the width of the 95% confidence interval about the mean estimate would be 3.4%, or 2.9%, assuming response rates of 30%, or 40%, respectively.

Statistical analysis

Data on respondent characteristics and safety and effectiveness beliefs were summarized descriptively. Responses to the safety and effectiveness questions were recoded to reflect the median of each numeric

category (ie, 25% if a respondent selected 21%-30%), which were then used in further analyses.

The nonparametric Skillings-Mack test was used to test whether there was any overall difference between average responses for all of the 10 treatments within the safety and effectiveness categories.[17] We then tested for significant differences between average responses to each possible pairwise comparison of treatments using the Wilcoxon signed rank sum test.

To describe the variation in responses, we calculated the coefficient of variation and the ratio of the 75th to 25th percentile. The coefficient of variation is the ratio of the SD to the mean multiplied by 100.[18] This variable is unitless, thus allowing for comparison across safety and effectiveness perceptions. The ratio of 75th to 25th percentile reflects the amount of dispersion around the median. For both measures, higher values correspond to greater variability.

We analyzed whether there were differences in safety and effectiveness perceptions by respondent characteristics and prescription preferences for each of the top 4 preferred first-line therapies. The most commonly preferred first-line treatments for either a man or woman in standardized patient vignettes included UVB (57%), etanercept (22%), methotrexate (17%), and adalimumab (14%); details are reported elsewhere.[19] We used Fisher exact tests for categorical variables, *t* test, or 1-way analysis of variance for normally distributed continuous variables, and Wilcoxon-Mann Whitney or Kruskal-Wallis tests for nonparametric continuous variables.

We used 2-sided tests of statistical significance (α = 0.05) for all analyses. No adjustments for multiple comparisons were made, as hypotheses were not interdependent.[20,21] Data analysis was performed using Stata/IC 11.0 (StataCorp, College Station, TX).

RESULTS

Of the 1000 physicians surveyed, 6 were unreachable because of undeliverable mailings and 5 were considered ineligible for study inclusion because they were nondermatologists or not in current practice. Of the remaining 989 dermatologists, 387 returned the survey (246 NPF members and 141 AAD members), yielding a 39.1% response rate. Survey respondents were similar to nonrespondents with respect to sex, duration of practice, and region. NPF members were, however, more likely to respond than AAD members (odds ratio 2.37, 95% confidence interval 1.81-3.11).

As shown in Table I, respondents were mostly male (277/387, 72%) and they represented all regions of the United States. Most were in private practice (272/387, 70%), had been in practice for over 20 years

Table I. Baseline characteristics of survey respondents (N = 387)

Characteristic	n (%)*
Sex	
Female	110 (28)
Male	277 (72)
NPF member	
Yes	246 (64)
No	141 (37)
Region of practice in United States	
Northeast	90 (23)
Midwest	90 (23)
South	135 (35)
West	72 (19)
Years in practice	
Mean (SD)	23.1 (11)
Missing†	15 (4)
Practice type	
Private dermatology practice:	272 (70)
Solo practice	133 (49)
<5 Dermatologists	97 (36)
≥5 Dermatologists	37 (14)
No response	5 (2)
Academic	40 (10)
Multispecialty, VA, HMO, other	51 (14)
No response	24 (6)
No. of patients with moderate to severe psoriasis treated in last 3 mo	
Median (IQR)	30 (15-60)
No response	10 (3)
No. of patients treated with UVB in last 3 mo	
≤10	267 (69)
>10	105 (27)
No response	15 (4)
No. of patients treated with etanercept in last 3 mo	
≤10	280 (72)
>10	90 (23)
No response	17 (4)
No. of patients treated with adalimumab in last 3 mo	
≤10	312 (81)
>10	62 (16)
No response	13 (3)
No. of patients treated with methotrexate in last 3 mo	
≤10	302 (78)
>10	67 (17)
No response	18 (5)

HMO, Health maintenance organization; *IQR*, interquartile range; *NPF*, National Psoriasis Foundation; *UV*, ultraviolet; *VA*, Department of Veterans Affairs.

*Percentages may not total to 100% because of rounding.

†As described in "Methods" section, attempts were made to impute number of years in practice from publicly available information, but in some cases it was unavailable.

Table II. Variation in perceptions of treatment effectiveness and safety

	Clearance or discontinuation rate				
	Don't know	Mean (SD)	Median (IQR)	Ratio of 75th-25th percentile	Coefficient of variation*
Perceived effectiveness (clear or almost clear skin after 3 mo)†					
PUVA‡,§	16%	59 (20)	65 (45-75)	1.7	35
UVB	9%	53 (19)	55 (45-65)	1.4	36
Acitretin	12%	37 (19)	35 (25-55)	2.2	52
Cyclosporine	21%	69 (20)	75 (65-90)	1.4	29
Methotrexate‡	6%	56 (18)	55 (45-65)	1.4	32
Adalimumab	16%	67 (15)	65 (55-75)	1.4	23
Alefacept	36%	32 (20)	25 (10-45)	4.5	62
Etanercept§	6%	60 (15)	65 (55-75)	1.4	25
Infliximab‖	26%	75 (16)	75 (65-90)	1.4	22
Ustekinumab‖	38%	72 (18)	75 (65-90)	1.4	25
Perceived likelihood of side effects requiring discontinuation of treatment†					
PUVA#	15%	18 (16)	15 (5-25)	5	90
UVB**,††	8%	11 (12)	5 (5-15)	3	112
Acitretin	11%	28 (18)	25 (15-35)	2.3	64
Cyclosporine	19%	35 (21)	35 (15-45)	3	62
Methotrexate	7%	22 (16)	15 (15-25)	1.7	73
Adalimumab**,‡‡	17%	10 (10)	5 (5-15)	3	96
Alefacept	37%	13 (15)	5 (5-15)	3	114
Etanercept	9%	9 (8)	5 (5-15)	3	89
Infliximab#	29%	17 (13)	15 (5-25)	5	75
Ustekinumab††,‡‡	49%	11 (11)	5 (5-15)	3	101

All other pairwise comparisons Wilcoxon rank sum $P < .05$.
IQR, Interquartile range; *PUVA*, psoralen plus ultraviolet A; *UV*, ultraviolet.
*Coefficient of variation = (SD/mean) × 100.
†Skillings-Mack $P < .000$.
‡Wilcoxon signed rank sum $P = .071$.
§Wilcoxon signed rank sum $P = .999$.
‖Wilcoxon signed rank sum $P = .388$.
#Wilcoxon signed rank sum $P = .178$.
**Wilcoxon signed rank sum $P = .473$.
††Wilcoxon signed rank sum $P = .095$.
‡‡Wilcoxon signed rank sum $P = .286$.

on average, and had seen a median of 30 patients with moderate to severe psoriasis in the last 3 months.

As shown in Table II, infliximab was perceived to have the highest mean effectiveness, followed by ustekinumab, cyclosporine, and adalimumab (75%-67%). Overall, there was a statistically significant difference between average perceived effectiveness by treatment category (Skillings-Mack $P < .000$), although the difference between infliximab and ustekinumab was not statistically significant (Wilcoxon signed rank sum $P = .388$). All other pairwise comparisons among these 4 treatments were significant at the P less than .05 level. Etanercept was perceived to have the lowest likelihood of side effects requiring discontinuation of treatment, followed by adalimumab, UVB, and ustekinumab (9%-11%). Overall, there was a statistically significant difference among average perceived likelihood of side effects between treatment categories (Skillings-Mack $P < .000$), although the differences between adalimumab and UVB, adalimumab and ustekinumab, and UVB and ustekinumab were not statistically significant (Wilcoxon signed rank sum $P = .473$, $P = .286$, and $P = .095$, respectively). The 3 traditional oral systemic treatments acitretin, cyclosporine, and methotrexate were thought to have the highest discontinuation rates because of side effects (22%-35%).

The percentage of respondents who reported they "don't know" the effectiveness or likelihood of side effects for a particular treatment ranged from 6% to 38% and 7% to 49%, respectively. Among respondents who indicated a numeric belief, there was considerable variation in responses, particularly for safety perceptions. The coefficient of variation for effectiveness ranged from 22 to 62, and that for likelihood of side effects ranged from 62 to 114. The traditional systemic treatments including

cyclosporine, methotrexate, and acitretin had the lowest coefficients of variation for the likelihood of side effects (62-73), whereas the coefficients for phototherapy and the biologics ranged from 75 to 114.

For each of the 4 most commonly preferred first-line treatments we analyzed effectiveness and safety perceptions by respondent characteristics and prescription preferences (Table III). We found only 2 significant differences in perception by respondent characteristics of 56 tested associations, and there were no consistent trends across medications. Prescription preferences were only significantly correlated with safety and effectiveness perceptions in the case of UVB phototherapy. In addition to the analyses by median presented in Table III, we compared safety and effectiveness perceptions between respondents above and below the median, above and below the 25th percentiles, and including respondents who answered "don't know." In each case, the results were similar (data not shown).

DISCUSSION

We conducted a large national study of dermatologists self-identified as having an interest in psoriasis, and found variation in beliefs about effectiveness and safety of treatments for moderate to severe disease. We found few significant associations between respondent characteristics and beliefs. Of note, the significant associations may have occurred by chance; if 56 independent associations are examined for statistical significance, the probability that at least one of them will be found statistically significant with an α of 0.05 is 0.94 $(1-(1-\alpha)^n)$.[22] Prescription preferences were only significantly associated with beliefs in the case of UVB. National surveys of primary care providers also failed to find consistent correlations between beliefs about antihypertensive medications and prescription practices.[23,24] We focused on safety and effectiveness because these were reported to be of utmost importance in pilot testing and were ranked highest among factors influencing prescription practices in our survey.[19] Taken together, these data suggest that prescription decisions are complex, and additional research is needed to understand how safety and effectiveness perceptions influence prescription choices among clinicians.

As with any study, ours is not without limitations. First, our results may be subject to misclassification bias. We assessed safety and effectiveness perceptions via generally worded questions. It is possible that the questions were too general to capture nuances of opinion. For example, we only asked about side effects that would terminate treatment use and we did not differentiate between bothersome versus serious or life-threatening side effects or treatment dosages. Each time a physician encounters an individual patient, the precise nature of the risks and benefits discussed will vary. Nonetheless, our goal was to capture how physicians generally think about psoriasis treatments and evaluate how these related to prescription preferences for a general patient. Issues such as availability, cost, and ease of administration may influence real-life prescription practices, and we attempted to control for these factors in our survey by using patient vignettes that asked respondents to assume that all of the options are readily available and cost to the patient and insurance approval are not major issues. We were unable to test, however, whether respondent's answers differed based on this assumption.

Second, we could not track actual treatment use but rather used self-reported data on frequency of visits and medication use by patients with psoriasis. In addition to self-reported data on actual use, we used vignettes to ask about preferences for a typical standardized patient, a method that has been shown to be a good proxy for clinical practice.[25] Results were similar with both variables. Third, our response rate was 39%, which may limit generalizability of our results if nonrespondents differ with respect to respondents; however, our response rate is not particularly low for a physician survey, especially within the field of dermatology, which often has survey response rates from 29% to 38% and survey respondents were similar to nonrespondents with respect to sex, duration of practice, and region.[26-30] Finally, these results may be not generalizable to all dermatologists and subject to sampling bias because we only surveyed those who had an indicated interest in psoriasis through the NPF and AAD. Of note, this group represents approximately 15% of the total AAD membership.

To our knowledge, this is among the first studies to examine dermatologist beliefs about safety and effectiveness of psoriasis medications. Physician beliefs may impact patient outcomes, and could help to explain variations in clinical practice, a topic central to health care reform. Our data indicate that there is variation among psoriasis providers' perceptions of treatments. Additional work is needed to contextualize the amount of variation in beliefs and to understand the causes of this variation, which was not explained by respondent characteristics or prescription preferences in our study. Variation in beliefs about treatments may be a result of differences in the understanding of medical evidence or differences among the actual real-world experiences of providers.[25]

Table III. Perceptions of treatment effectiveness and safety by respondent characteristics and prescription preferences

	UVB		Etanercept		Adalimumab		Methotrexate		UVB		Etanercept		Adalimumab		Methotrexate	
	Median (IQR)	*P**	Median (IQR)	*P**	Median (IQR)	*P**	Median (IQR)	*P**	Median (IQR)	*P**	Median (IQR)	*P**	Median (IQR)	*P**	Median (IQR)	*P**
	Perceived effectiveness (clear or almost clear skin after 3 mo)								Perceived likelihood of side effects requiring discontinuation of treatment							
Respondent characteristics																
Male	55 (45-65)	**.01**	65 (55-75)	.29	65 (55-75)	.45	55 (45-65)	.33	5 (5-15)	.91	5 (5-15)	.77	5 (5-15)	.83	15 (5-25)	.19
Female	50 (35-65)		55 (45-75)		65 (55-75)		55 (45-65)		5 (5-15)		5 (5-15)		5 (5-15)		25 (15-35)	
NPF member																
Yes	55 (45-65)	.08	65 (55-75)	.48	65 (65-75)	.38	55 (45-65)	.74	5 (5-15)	.81	5 (5-15)	.80	5 (5-15)	.89	25 (15-25)	.58
No	55 (35-65)		65 (55-75)		65 (55-75)		55 (45-75)		5 (5-15)		5 (5-15)		5 (5-15)		15 (15-25)	
Region																
Northeast	55 (45-65)	.83	65 (55-75)	.96	65 (55-75)	.48	55 (45-65)	.96	5 (5-5)	.74	5 (5-5)	.62	5 (5-10)	.38	15 (5-25)	.19
Midwest	55 (45-65)		60 (45-75)		65 (55-75)		55 (45-65)		5 (5-15)		5 (5-15)		5 (5-15)		15 (15-25)	
South	55 (35-65)		65 (55-75)		70 (65-75)		55 (45-65)		5 (5-15)		5 (5-15)		5 (5-15)		25 (15-35)	
West	55 (35-65)		65 (55-65)		65 (55-75)		55 (45-65)		5 (5-15)		5 (5-5)		5 (5-5)		25 (5-35)	
Practice type																
Academic	55 (45-65)	.08	65 (45-65)	.58	65 (65-75)	.72	55 (45-65)	.54	5 (5-15)	.25	5 (5-15)	.42	5 (5-15)	.29	15 (15-25)	.70
Private	55 (35-65)		65 (55-75)		65 (55-75)		55 (45-65)		5 (5-15)		5 (5-5)		5 (5-15)		15 (15-25)	
Other	55 (55-65)		65 (55-75)		65 (65-75)		55 (45-65)		5 (5-15)		5 (5-15)		5 (5-15)		15 (15-35)	
Practice size (private practice only)																
Solo	55 (35-65)	.73	65 (55-75)	.14	65 (55-75)	.83	60 (45-75)	.31	5 (5-5)	.86	5 (5-15)	.77	5 (5-15)	.70	15 (5-25)	.40
<5 Dermatologists	55 (35-65)		55 (45-65)		65 (65-75)		55 (40-65)		5 (5-15)		5 (5-5)		5 (5-15)		25 (15-35)	
≥5 Dermatologists	55 (35-65)		55 (55-75)		65 (55-75)		55 (45-65)		5 (5-15)		5 (5-15)		5 (5-15)		25 (15-35)	
Years in practice†	0.09	.15	0.05	.44	0.03	.74	0.10	.09	−0.04	.58	−0.02	.87	−0.09	.16	−0.14	**.01**
No psoriasis patients in last 3 mo†	0.07	.30	0.02	.75	0.06	.27	0.00	.98	0.05	.39	−0.05	.37	0.00	.99	0.07	.19
Prescription preferences																
First-line treatment choice‡																
No	45 (35-55)	**<.001**	65 (55-75)	.90	65 (55-75)	.15	55 (45-65)	.95	5 (5-15)	**<.001**	5 (5-15)	.49	5 (5-15)	.10	25 (15-25)	.11
Yes	55 (45-65)		65 (55-75)		75 (65-75)		55 (45-65)		5 (5-5)		5 (5-15)		5 (5-5)		15 (5-25)	
Heavy use of treatment§																
No	55 (35-65)	**<.001**	65 (55-75)	.70	65 (55-75)	.32	55 (45-65)	.64	5 (5-15)	**.004**	5 (5-15)	.08	5 (5-15)	.08	15 (15-25)	.24
Yes	65 (55-75)		55 (55-65)		75 (65-75)		55 (45-65)		5 (5-5)		5 (5-5)		5 (5-5)		15 (5-35)	

Significant values with $P < .05$ are shown in bold.

IQR, Interquartile range; *NPF*, National Psoriasis Foundation; *UV*, ultraviolet.

*Mann-Whitney test for comparisons between 2 groups, Kruskal-Wallis test for comparisons among ≥3 groups.

†Spearman correlation coefficient and *P* value.

‡Chosen as first-line treatment for either man or woman with moderate to severe psoriasis.

§Use >10 patients in last 3 mo.

A value of information approach would argue for additional comparative studies in psoriasis, especially those focusing on safety where variation in beliefs was greatest. Investigation of provider beliefs may prove to be an important addition to the field of CER, and can be used to guide future research and educational efforts.

REFERENCES

1. Gelfand JM, Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB. Risk of myocardial infarction in patients with psoriasis. JAMA 2006;296:1735-41.
2. Gelfand JM, Dommasch ED, Shin DB, Azfar RS, Kurd SK, Wang X, et al. The risk of stroke in patients with psoriasis. J Invest Dermatol 2009;129:2411-8.
3. Mehta NN, Azfar RS, Shin DB, Neimann AL, Troxel AB, Gelfand JM. Patients with severe psoriasis are at increased risk of cardiovascular mortality: cohort study using the General Practice Research Database. Eur Heart J 2010;31:1000-6.
4. Langley RG, Krueger GG, Griffiths CE. Psoriasis: epidemiology, clinical features, and quality of life. Ann Rheum Dis 2005; 64(Suppl):ii18-25.
5. Kurd SK, Gelfand JM. The prevalence of previously diagnosed and undiagnosed psoriasis in US adults: results from NHANES 2003-2004. J Am Acad Dermatol 2009;60:218-24.
6. Van Voorhees AS, Feldman SR, Koo JY, Lebwohl MG, Menter A. The psoriasis and psoriatic arthritis pocket guide: treatment algorithms and management options. Portland (OR): National Psoriasis Foundation; 2009.
7. Stern RS, Nijsten T, Feldman SR, Margolis DJ, Rolstad T. Psoriasis is common, carries a substantial burden even when not extensive, and is associated with widespread treatment dissatisfaction. J Investig Dermatology Symp Proc 2004;9:136-9.
8. Avorn J, Fischer M. 'Bench to behavior': translating comparative effectiveness research into improved clinical practice. Health Aff (Millwood) 2010;29:1891-900.
9. Selby JV, Beal AC, Frank L. The Patient-Centered Outcomes Research Institute (PCORI) national priorities for research and initial research agenda. JAMA 2012;307:1583-4.
10. Committee on Comparative Effectiveness Research Prioritization, Institute of Medicine. "2 What Is Comparative Effectiveness Research?." Initial National Priorities for Comparative Effectiveness Research. Washington, DC: The National Academies Press, 2009.
11. Claxton K, Cohen JT, Neumann PJ. When is evidence sufficient? Health Aff (Millwood) 2005;24:93-101.
12. Welton NJ, Madan J, Ades AE. Are head-to-head trials of biologics needed? The role of value of information methods in arthritis research. Rheumatology (Oxford) 2011;50(Suppl):iv19-25.
13. Meltzer DO, Hoomans T, Chung JW, Basu A. Minimal modeling approaches to value of information analysis for health research. Med Decis Making 2011;31:E1-22.
14. Dillman DA. Mail and telephone surveys: the total design method. New York: Wiley; 1978.
15. Dillman DA. Mail and Internet surveys: the tailored design method. New York: J Wiley; 2000.
16. Wan J, Abuabara K, Shin DB, Troxel AB, Bebo BF Jr, Gelfand JM. Dermatologist response rates to a mailed questionnaire: a randomized trial of monetary incentives. J Am Acad Dermatol 2012;66:e18-20.
17. Chatfield M, Mander A. The Skillings-Mack test (Friedman test when there are missing data). Stata J 2009;9:299-305.
18. Bedeian AG, Mossholder KW. On the use of the coefficient of variation as a measure of diversity. Organizational Research Methods 2000;3:285-97.
19. Wan J, Abuabara K, Troxel AB, Shin DB, Van Voorhees AS, Bebo BF Jr, et al. Dermatologist preferences for first-line therapy of moderate to severe psoriasis in healthy adult patients. J Am Acad Dermatol 2012;66:376-86.
20. Savitz DA, Olshan AF. Multiple comparisons and related issues in the interpretation of epidemiologic data. Am J Epidemiol 1995;142:904-8.
21. Veazie PJ. When to combine hypotheses and adjust for multiple tests. Health Serv Res 2006;41:804-18.
22. Rothman KJ. No adjustments are needed for multiple comparisons. Epidemiology 1990;1:43-6.
23. Hobbs FD, Jones MI, Allan TF, Wilson S, Tobias R. European survey of primary care physician perceptions on heart failure diagnosis and management (Euro-HF). Eur Heart J 2000;21: 1877-87.
24. Ubel PA, Jepson C, Asch DA. Misperceptions about beta-blockers and diuretics: a national survey of primary care physicians. J Gen Intern Med 2003;18:977-83.
25. Gelfand JM, Wan J, Callis Duffin K, Krueger GG, Kalb RE, Weisman JD, et al. Comparative effectiveness of commonly used systemic treatments or phototherapy for moderate to severe plaque psoriasis in the clinical practice setting. Arch Dermatol 2012;148:487-94.
26. Chow EY, Searles GE. The amazing vanishing Canadian dermatologist: results from the 2006 Canadian Dermatology Association member survey. J Cutan Med Surg 2010;14: 71-9.
27. Farrant P, Darley C, Carmichael A. Is erythromycin an effective treatment for chronic bullous disease of childhood? A national survey of members of the British Society for Paediatric Dermatology. Pediatr Dermatol 2008;25:479-82.
28. Gelbard SN, Tripp JM, Marghoob AA, Kopf AW, Koenig KL, Kim JY, et al. Management of Spitz nevi: a survey of dermatologists in the United States. J Am Acad Dermatol 2002;47: 224-30.
29. Resneck JS Jr, Tierney EP, Kimball AB. Challenges facing academic dermatology: survey data on the faculty workforce. J Am Acad Dermatol 2006;54:211-6.
30. Tripp JM, Kopf AW, Marghoob AA, Bart RS. Management of dysplastic nevi: a survey of fellows of the American Academy of Dermatology. J Am Acad Dermatol 2002;46:674-82.