Cost-effectiveness and Cost-Benefit Analysis of Using Methotrexate vs Goeckerman Therapy for Psoriasis

A Pilot Study

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Objective: To analyze the net benefit and cost-effectiveness of methotrexate use and Goeckerman therapy for psoriasis.

Design: Net benefit and cost-effectiveness depend on the costs, efficacy, and utilities of therapy. Utilities are quantitative measures of patient preferences. We obtained costs by using resource-based accounting techniques. Efficacy was estimated from literature reports. We surveyed patients with psoriasis, dermatologists, and healthy subjects using utility assessment methods. All assumptions were examined in a sensitivity analysis.

Main Outcome Measures: For net benefit, if benefits outweighed the costs, it was deemed worth providing. For the cost-effectiveness analysis, the ratio of costs-to-effectiveness of less than $35,000 was considered cost-effective.

Results: Using utilities from healthy nonexperts, the costs of both therapies exceeded the benefits in mild and moderate psoriasis. In severe psoriasis, only methotrexate demonstrates a net benefit. Both therapies were cost-effective compared with no therapy. Liquid methotrexate should be chosen over the tablet form since it was cheaper and had the same outcome. Goeckerman was cost-effective against liquid methotrexate in severe, but not mild or moderate psoriasis. There was a trend for therapies to be more cost-effective when using patient utilities and less with dermatologist utilities. The results were highly sensitive to efficacy and utilities.

Conclusions: The results of this study need to be confirmed in other settings, but they demonstrate that the tools of cost-effectiveness and cost-benefit analysis have great potential value in dermatology. Once efficacy is better characterized and utilities better quantified, these types of analyses will be crucial for health care policy.

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Psoriasis is a prevalent, chronic condition that is costly to control. The estimated cost in 1984 for outpatient treatment was $1,521,000,000.1 With the ever-increasing consciousness of limited resources for health care, there is a demand for outcome studies for costly conditions. In particular, studies that assess the cost-effectiveness (CE) of the different therapies are critical. Cost-effectiveness analysis (CEA), one aspect of evidence-based medicine, uses decision analysis methods to incorporate existing data on costs, efficacy, and patient preferences to compare the relative value of different interventions in improving health. There have been cost-comparison studies for psoriasis,2 but these have not taken into account the effectiveness of the therapy or patient preferences for different states of disease severity and treatment modalities. Although one would expect that the general quality of life and value that a patient places on his/her health status would correlate with the objective measures of the severity of the psoriasis, studies3 have shown that this is not necessarily true. Therefore, surveying patients for their health state values is essential.

Utilities are quantitative measures of patient preferences, and thus used in CEA to represent the improvement in health associated with an intervention. However, conventional methods for evaluating utilities are ill suited to compare treatments for skin diseases since virtually all the benefit for cutaneous therapy is in improvement in quality of life rather than prolonging life expectancy. The best method for assessing utilities in dermatologic conditions has not been established. Zug et al4 were one of first to apply the concept of utilities to measuring psoriatic patient preferences. They assessed 3 categories of psoriasis severity and potential adverse outcomes...
METHODS

UTILITIES ASSESSMENT

We constructed a survey with a 3-factor design. We assessed utilities with the WTP and VAS methods for each of the 2 forms of therapy (methotrexate and Goeckerman) for each of the disease severities: mild, moderate, and severe psoriasis. We defined the severities as follows: mild psoriasis covers less than 30% of the body, is hidden by clothing, and usually does not itch. Moderate psoriasis covers between 30% to 60% of the body, is not totally covered by clothing, and is associated with mild itching. Severe psoriasis covers more than 60% of the body, is visible above clothing, and is associated with constant itching.

We targeted 3 populations for the surveys. These included patients with psoriasis, faculty, and residents in the Department of Dermatology at Stanford University, Stanford, Calif, and a convenience sample of people who were neither patients with the disease nor physicians involved in its treatment. For each of the 3 groups, the surveys contained slightly different levels of detail explaining psoriasis, methotrexate, and Goeckerman. Photographs of psoriasis were shown to the subjects completing the societal survey. Under guidelines of the Panel of Human Subject in Nonmedical Research at Stanford University, course-related research projects do not require human subjects clearance by the panel. However, verbal informed consent was obtained from every subject.

Under our instructions, respondents assumed that their current insurance did not provide coverage for any psoriasis therapies. They assessed their WTP out-of-pocket for each therapy in each disease state. In addition to methotrexate and Goeckerman, each subject assessed his/her WTP for a third option, a hypothetical cure with or without adverse effects. For the VAS questions, the subjects were presented with a horizontal line anchored on one end by “0, death” and on the other end by “1, perfect health.” The subjects were asked to mark the line, the position of the mark reflected how they felt about their health. The subjects were asked to mark the line, the position of the mark reflected how they felt about their health. “The subjects were asked to mark the line, the position of the mark reflected how they felt about their health.” The subjects were asked to mark the line, the position of the mark reflected how they felt about their health.” The subjects were asked to mark the line, the position of the mark reflected how they felt about their health.” The subjects were asked to mark the line, the position of the mark reflected how they felt about their health.” The subjects were asked to mark the line, the position of the mark reflected how they felt about their health.”

We analyzed the WTP and VAS data using 3-way and 2-way analysis of variance, respectively.5 We also analyzed the WTP as a proportion of annual income using 3-way analysis of variance on ranked data. We defined significance as $P<.05$.

COSTS

Since hospital charges often fail to reflect the economic cost of a procedure, we used resource-based cost-accounting techniques, obtaining data from databases that contain cost information based on actual consumption of the resources. We queried appropriate departments at Stanford University to measure the costs for supplies, laboratory tests, and medications. Physicians’ professional fees and hospital fees were based on the 1996 Medicare reimbursement levels. We assumed that each of the 3 severity levels of psoriasis would receive the same 20-day, 4-week outpatient Goeckerman therapy.

We considered both the costs of methotrexate and the liver biopsy specimen in the total cost to provide methotrexate therapy. Three dosing regimens were modeled: 7.5 mg (mild psoriasis), 12.5 mg (moderate), and 20.0 mg (severe) per week for 52 weeks. We compared the costs of both the tablet and the liquid form of methotrexate since both forms are readily available and have the same efficacy, yet have different prices. The outpatient pharmacy at Stanford University provided the average wholesale prices from the 1998 Drug Topics Red Book.6

COST-EFFECTIVENESS ANALYSIS

Cost-effectiveness analyses are used to compare 2 therapies, one that may be more costly but more effective and one that is less costly. We analyzed the CE for 3 scenarios: methotrexate compared with no treatment, Goeckerman compared with no treatment, and Goeckerman compared with methotrexate. The model for the CEA consisted of a ratio of the difference in total costs to the differences in the effectiveness of the 2 therapies in question. Effectiveness reflects both the efficacy of the therapy as well as the strength of the patients’ preference for an outcome. Decision-analysis methods were used to determine effectiveness. We structured a decision tree (Figure) to incorporate the efficacy of the treatment and the preference of the survey respondents for the outcome that the treatment renders. Baseline values were assigned to the variables (cost, efficacy, and utilities) based on evidence from the literature or from primary data collection. We defined the base case as the model that incorporated these baseline values.

The mean VAS scores from the surveys were used as the base-case utilities. The literature implies a 100% clearing rate for all patients undergoing Goeckerman therapy. We assumed a base-case Goeckerman efficacy rate of 90% for severe and moderate psoriasis and 100% for mild psoriasis. The reported efficacy rate for methotrexate ranges between 43% and 82%.11-14 We modeled the base-case methotrexate efficacy on the average of these 2 numbers. The probabilities of attaining total clearance, no response, or other intermediate outcomes were modeled on plausible clinical results. Liquid methotrexate was assumed to have the same efficacy as the tablet form.

We performed the analysis with each of the 3 surveyed groups considered separately. To be considered cost-effective, the CE ratio cannot exceed the traditional threshold of $35 000. This threshold is derived historically from the CE ratio of hemodialysis compared with no dialysis for chronic renal failure.15

COST-BENEFIT ANALYSIS

Cost-benefit analyses are similar to CEA but the benefits of the health care intervention are represented in monetary terms. The model for the CBA consists of the difference of the total cost needed to generate each therapy and the amount survey respondents were willing to pay. We considered the WTP responses of each of the 3 surveyed groups separately, and performed the analysis for each disease severity. In each case, if the benefit was greater than the cost, that is, if a positive number was obtained, the therapy was deemed worth providing.
of methotrexate therapy using the methods of visual analog scale (VAS), time trade-off, and standard gamble. A fourth method to approximate utility is the willingness-to-pay (WTP) method, which may be a more sensitive method for non–life-threatening or life-limiting disorders. It has the advantage of measuring health care benefit in terms of dollars rather than a non-monetary effectiveness measure. By using this dollar amount, one can then evaluate interventions and therapies using cost-benefit analysis (CBA).

Not only is there uncertainty in the best method to assess utility for psoriasis but there is also controversy as to whose preferences should be used when performing CEA. Often the argument is made that the preferences from the society as a whole should be used, insofar as it is society’s money that is being apportioned. However, others claim that people without the disease cannot accurately assess utilities without experiencing the symptoms associated with the disease. This view proposes that utilities obtained from patients should be the ones used. Last, physician opinions are often used as a proxy for patients since it is often difficult to obtain utilities from patients.

In this study, we compare 2 of the common therapies for moderate to severe psoriasis, use of methotrexate and outpatient Goeckerman therapy, in a CBA and a CEA. The 2 therapies are ideal for this type of study since they differ in both cost and efficacy. Also, the preferences for these 2 therapies are unpredictable since they differ with respect to potential adverse effects. We queried patients, dermatologists, and members of society for their utilities using both the WTP and VAS methods.

### RESULTS

#### COSTS

The total cost to provide Goeckerman therapy is $5104. For liquid methotrexate, the total cost is $1836, $1861, and $1898 for mild, moderate, and severe psoriasis, respectively. For tablet methotrexate, the total cost is $2306, $2744, and $3311, respectively.

#### UTILITIES

Fifteen patients with psoriasis, 16 dermatologists, and 27 members of society completed the survey with respect to the severity of disease and therapy. We found differences in WTP (Table 1) among each of the different levels of disease severities and therapies that were greater than would be expected by chance after allowing for effects of differences from the other variables (P = .001). The pairwise multiple comparison procedure revealed a difference in WTP between severe and mild (P = .001) as well as severe and moderate (P = .002) psoriasis, but no difference between moderate and mild psoriasis. There was a difference in WTP between cure and methotrexate as well as cure and Goeckerman (P = .001), but no difference between Goeckerman and methotrexate.

Although the mean WTP among subjects when we subdivided them by disease severity and treatment appears to be different, there was no statistical difference among these groups after adjusting for disease severity and therapy factors. Differences became apparent when analyzing WTP as a proportion of income. There was a statistically significant difference among patients and dermatologists (P = .02) as well as society and dermatologists (P = .006) but not between society and patients.

We found differences in VAS between severity levels (P = .001) and between respondent groups (P = .04) that were greater than would be expected after allowing for the effects of the other variables (Table 2). The pairwise multiple comparisons revealed significant differ-

### Table 1. Mean Willingness-to-Pay Method*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gkm Methotrexate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>1664</td>
<td>1140</td>
<td>6470</td>
</tr>
<tr>
<td>All Residents</td>
<td>491</td>
<td>488</td>
<td>2744</td>
</tr>
<tr>
<td>Faculty</td>
<td>575</td>
<td>558</td>
<td>2833</td>
</tr>
<tr>
<td>Society</td>
<td>925</td>
<td>957</td>
<td>4215</td>
</tr>
</tbody>
</table>

*Gkm indicates Goeckerman therapy for psoriasis.
ences \( (P = .001) \) between mild and severe, mild and moderate, and moderate and severe psoriasis. There were also significant differences in VAS between dermatologists and patients \( (P = .02) \) as well as dermatologists and society \( (P = .04) \), but not between society and patients.

**CBA RESULTS**

The results from the CBA indicate that the cost of Goeckerman always exceeded the monetary value of its benefits, as measured by the WTP from the survey respondents (Table 3). The cost of methotrexate tablets exceeded the benefits, except in the cases of severe psoriasis using the utilities from the society group. The benefit of liquid methotrexate exceeded the cost for severe psoriasis in all groups. These findings did not change when the analysis was performed separately for the dermatology residents and the dermatology faculty. Comparing the 3 therapies, the net benefit is greatest for liquid methotrexate and is least for Goeckerman. Goeckerman provided no net benefit when compared with methotrexate therapy; ie, its costs relative to methotrexate exceed the value of its added benefits.

**CEA RESULTS**

When compared with no therapy, Goeckerman and both forms of methotrexate were always cost-effective (Table 4 and Table 5). When comparing the liquid methotrexate with the tablet form, we found that the liquid is cheaper than the tablet. Since the outcomes are the same for both, we conclude by the concept of dominance that liquid methotrexate should always be preferred over the tablet form. Under this concept, an option will never be chosen when it involves moving to a more expensive alternative that will yield a lower or equivalent outcome.

When compared with liquid methotrexate (Table 6), Goeckerman is not cost-effective in the mild or moderate psoriasis except when using utilities from the patient group. For severe psoriasis, Goeckerman was cost-effective across all respondent groups. In another way of comparing the data, Goeckerman is

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**Table 2. Summary of Utilities Obtained by the Vertical Rating Scale Method**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Visual Analog Scale</th>
<th>Patient</th>
<th>Dermatologist</th>
<th>Society</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td>Mild</td>
</tr>
<tr>
<td>No. of respondents</td>
<td>13</td>
<td>11</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Mean</td>
<td>0.74</td>
<td>0.55</td>
<td>0.44</td>
<td>0.85</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.48</td>
<td>0.21</td>
<td>0.11</td>
<td>0.32</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.99</td>
<td>0.82</td>
<td>0.79</td>
<td>0.99</td>
</tr>
</tbody>
</table>

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**Table 3. Cost-Benefit Analysis: Results**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Benefit Costs, $</th>
<th>Incremental Comparison, $</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gkm Tablet Methotrexate</td>
<td>Liquid Methotrexate</td>
</tr>
<tr>
<td>Mild Patients</td>
<td>-3441 -1226</td>
<td>-696</td>
</tr>
<tr>
<td>Dermatologists</td>
<td>-4614 -1879</td>
<td>-1349</td>
</tr>
<tr>
<td>Society</td>
<td>-4179 -1410</td>
<td>-880</td>
</tr>
<tr>
<td>Moderate Patients</td>
<td>-3254 -1149</td>
<td>-266</td>
</tr>
<tr>
<td>Dermatologists</td>
<td>-4170 -1529</td>
<td>-646</td>
</tr>
<tr>
<td>Society</td>
<td>-3189 -899</td>
<td>-15</td>
</tr>
<tr>
<td>Severe Patients</td>
<td>-977 -966</td>
<td>-447†</td>
</tr>
<tr>
<td>Dermatologists</td>
<td>-2926 -1105</td>
<td>308†</td>
</tr>
<tr>
<td>Society</td>
<td>-1384 313†</td>
<td>1726†</td>
</tr>
</tbody>
</table>

*Gkm indicates Goeckerman therapy for psoriasis; WTP, willingness to pay.†Results in which benefits outweigh costs.

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**Table 4. Cost-effectiveness Analysis: Results Comparing With No Therapy**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Cost (Gkm) – Cost (No Rx)</th>
<th>Q (Gkm) – Q (No Rx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Psoriasis</td>
<td>19 807</td>
<td>12 136</td>
</tr>
<tr>
<td>Moderate Psoriasis</td>
<td>34 314</td>
<td>17 941</td>
</tr>
<tr>
<td>Severe Psoriasis</td>
<td>28 169</td>
<td>14 230</td>
</tr>
</tbody>
</table>

*Gkm indicates Goeckerman therapy for psoriasis; Rx, therapy; Q, effectiveness; and values, cost-effectiveness ratio is less than $35 000.
always cost-effective compared with liquid methotrexate using utilities from the patient group. Using utilities from society and dermatologists, Goeckerman was cost-effective against liquid methotrexate only in severe psoriasis.

**SENSITIVITY ANALYSIS**

Since the model for the CEA was based on a number of assumptions, we performed a sensitivity analysis to determine whether plausible variations in these assumptions would alter the findings. If the CE ratio changes significantly by altering one of these variables we can conclude that particular assumption requires further investigation. For example, if the CE ratio for Goeckerman against methotrexate initially exceeded the $35 000 threshold but was no longer cost-effective once Goeckerman efficacy was varied, then this would suggest that the CE ratio is sensitive to Goeckerman efficacy. Goeckerman efficacy may require further investigation.

To perform the sensitivity analysis, each of the assumptions is altered individually, holding all other assumptions at their baseline. The base case is defined as using all the assumptions at their baseline. The results in Table 6 represent the base case. A best case is defined as the best plausible assumption for that variable, and the worst case is the worst plausible assumption. We individually tested the efficacy of both Goeckerman and methotrexate, the costs used to provide the 2 therapies, and the utilities.

We modeled the best-case Goeckerman efficacy with 100% chance of total clearing for all disease severity. We modeled the worst case with a 100% chance of total clearing in mild psoriasis and 90% chance of total clearing for moderate and severe psoriasis. To analyze sensitivity of the CEA results to methotrexate efficacy, we modeled the best case with 82% chance of total clearing and 18% chance of clearing to a mild state across all initial severity states. The worst case was modeled as a 43% chance of total clearing and 57% chance of no effect. For costs, we calculated the amount that Goeckerman costs would have to decrease by in order for the incremental CE ratio against liquid methotrexate to reach $35 000. Since the utilities used in the CEA were derived from the VAS scores, the mean VAS scores were varied for the sensitivity analysis of the utility variable. The best-case utilities were defined as 1.25 times the original utilities and the worst-case utilities were defined as 0.75 of the original utilities.

**GOECKERMAN EFFICACY**

We had compared the CE of Goeckerman with no therapy as well as with methotrexate, thus the sensitivity analysis was performed for both. Varying the efficacy of Goeckerman from best to worst case did not alter the CE ratio of Goeckerman to no therapy. The CE ratio of Goeckerman to methotrexate varied slightly with the efficacy of Goeckerman.

**METHOTREXATE EFFICACY**

Again, we had compared the CE of methotrexate with no therapy as well as with Goeckerman, thus the sensitivity analysis was performed for both. Varying the efficacy of methotrexate did not alter the CE ratio of methotrexate to no therapy. The CE ratio of Goeckerman to methotrexate was sensitive to the efficacy of methotrexate. Assuming the best-case efficacy rate for methotrexate, Goeckerman was no longer cost-effective compared with liquid methotrexate for all disease states for all groups. In the worst case, Goeckerman became much more cost-effective. Only in mild psoriasis, using utilities from dermatologists, did the CE ratio not become less than the $35 000 threshold.

**COST VARIATION**

Using utilities from society, the cost of Goeckerman costs would have to be decreased by $731 and $108 in mild and moderate psoriasis, respectively. Using utilities from dermatologists, Goeckerman costs would have to be decreased by $1185 (mild) and $732 (moderate).
UTILITY VARIATION

The CE ratios were sensitive to variations in utility. For both methotrexate and Goeckerman, the comparison with no therapy was no longer as cost-effective when using worst-case utilities but varied little when using worst-case utilities. Goeckerman was never cost-effective compared with liquid methotrexate when best-case utilities were used, but became cost-effective in all groups across all severity levels when worst-case utilities were used.

CONCLUSIONS

Like other health services research experts, the Panel on Cost-Effectiveness in Health and Medicine has recommended using preferences obtained from society as a whole rather than obtaining preferences exclusively from patients with disease. Results from this type of analysis should thus be interpreted from a societal perspective and applied on a policy level, not for an individual patient. The perspective of a CEA is defined by the costs and outcomes used in the analysis. We chose to include costs important to society. If the analyses were to be performed for an individual patient, only the costs and outcomes that directly affect the individual would be considered. Our rationale for analyzing the results using utilities measured from patients, society, and dermatologists was that controversy exists as to whose preferences should be used when performing CEA.

Accordingly, we first discuss our results using utilities from the society group. The CBA revealed that the cost of Goeckerman and both formulations of methotrexate always exceeded the benefits in mild and moderate psoriasis. In severe psoriasis, only methotrexate produced net benefits. When compared against each other, there was no net benefit of Goeckerman to methotrexate. In the CEA, Goeckerman and both forms of methotrexate were always cost-effective when compared with no therapy across all levels of severity. The liquid form of methotrexate was far less costly than the tablet form; thus, liquid methotrexate should always be chosen over the tablet. This conclusion is further emphasized by consideration of the annual cost savings of $330 (mild psoriasis), $883 (moderate), and $1413 (severe) that can be obtained by using liquid methotrexate over the tablet form. When compared with each other, Goeckerman was cost-effective against liquid methotrexate only for severe psoriasis.

When comparing the results across the different survey respondents, there was a general trend for therapies to be more cost-effective when using utilities from patients. Therapies were the least cost-effective when using utilities from dermatologists. The analysis for VAS revealed no difference between society and patients, but showed a significant difference between dermatologists and the other 2 groups. Similarly, there was no statistical difference between the WTP among respondents, but once the WTP was analyzed as a proportion of income, there was a significant difference between dermatologists and the other 2 respondent groups. From these results, it would appear that dermatologists might not be good proxies for their patients when assessing utilities. Society’s utilities may adequately reflect that of patients. This finding is potentially important since controversy exists as to whose preferences should be used when performing CEA. If utilities from interviewing society and patients are comparable for skin diseases, psoriasis in particular, future investigators need only interview whichever group is more convenient.

When comparing the results of the CBA with that of the CEA, the decision between Goeckerman and liquid methotrexate may appear paradoxical. Goeckerman should be chosen over liquid methotrexate for severe psoriasis in all 3 utility groups in the CEA. For mild and moderate psoriasis, Goeckerman was more cost-effective using patient utilities; methotrexate was more cost-effective for the other 2 respondent groups. From the CBA, liquid methotrexate, rather than Goeckerman, should be provided for all forms of psoriasis.

When comparing with no therapy, the conclusions also appear to contradict one another. For the most part, all 3 therapies were cost-effective when compared with no therapy. In contrast, the cost of therapies for the most part always exceeded the WTP amount except in severe psoriasis. Two reasons may explain these apparent discrepancies. First, one must remember that the results of CEA cannot be interpreted from their absolute value; the results are best interpreted relative to the CE of other therapies. The $35 000 cutoff is arbitrary. The upper limit for an acceptable CE ratio remains controversial. In our study, if the cutoff were placed at $27 700, the results of the CEA would resemble that of the CBA. A more plausible explanation for the discrepancy between the CEA and CBA lies in the utilities, specifically the VAS. From the sensitivity analysis, we see that by raising the utilities by 25%, the results of the CEA more closely approximate those of the CBA. In this pilot study, we observed a tendency for the subject to be overly focused on the disease presented. They, thus, rated their utilities too low on the vertical rating scale. Future studies need to frame utilities assessment surveys so that the respondents consider the disease in question in an appropriate context. Also, a larger and more general population should be approached when reassessing these utilities. Last, there is also controversy as to whether the VAS method represents the most accurate way to measure utilities. The study by Zug et al found that utilities obtained by the VAS did not correlate well with utilities obtained by the other 2 assessment methods.

Another important finding was detected in the sensitivity analysis. The direct comparison between the 2 therapies in the CEA was sensitive to efficacy rates. It is obvious that further clinical research is necessary for determining the true efficacy of both methotrexate and Goeckerman. There are 2 final points to consider. First, all costs were derived from Stanford University Hospital. To use these findings at other institutions, one must account for cost differences between institutions. Second, it is recognized that most psoriasis severity scores reported in clinical studies would be different than that
used herein. For broader application, subsequent studies should define mild psoriasis as involving less than 10% total body surface area, moderate as involving 10% to 30%, and severe psoriasis as involving more than 30% of total body surface area.

We can conclude that liquid methotrexate should be offered instead of the tablet form if the efficacy of both is truly comparable. However, it is premature to offer general policy recommendations for Goeckerman and methotrexate based on these analyses. Considerable work is needed in the assessment of methotrexate and Goeckerman efficacy and of utilities. Nevertheless, these models are important to describe since CEAs and CBA using these techniques have not been reported in the dermatology literature. Once efficacy is better characterized and utilities better quantified, these types of analyses can support decision making in psoriasis. Analyses in other dermatologic problems can help identify areas where future research would be particularly helpful.

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REFERENCES