IMPORTANCE Recently, the clinical pemphigus disease activity indexes of Pemphigus Disease Area Index (PDAI), Autoimmune Bullous Skin Disorder Intensity Score (ABISIS), and Pemphigus Vulgaris Activity Score (PVAS) were validated to correlate with physician global assessment. The antidesmoglein (anti-Dsg) autoantibodies are known to correlate mostly with pemphigus disease activity. The correlation between these indexes and anti-Dsg1 and anti-Dsg3 enzyme-linked immunosorbent assay values has not been previously evaluated.

OBJECTIVES To evaluate the PDAI, ABSIS, and PVAS in a large number of patients with pemphigus vulgaris and to compare the interrater reliability of these indexes and the convergent validity according to anti-Dsg values.

DESIGN, SETTING, AND PARTICIPANTS A cross-sectional study was performed in 2012 in a referral university center for autoimmune bullous diseases. One hundred patients with confirmed diagnoses of pemphigus vulgaris and clinical pemphigus lesions (mean [SD] age, 43.3 [1.7] years; age range, 14-77 years; female-male ratio, 1:3) were studied. Three dermatologists familiar with immunobullous diseases and the indexes rated the patients.

INTERVENTIONS All 100 patients were evaluated with the PDAI, ABSIS, and PVAS. Three dermatologists independently rated all 3 indexes for each of the patients on the same day. Serum anti-Dsg1 and anti-Dsg3 enzyme-linked immunosorbent assay values were measured simultaneously.

MAIN OUTCOMES AND MEASURES Analyses of interrater reliabilities, convergent validities according to anti-Dsg titers, correlation between the distribution and types of lesions with disease activity, predictors of higher titers of antibody (multiple regression analysis), and cutoff values of measures for 2 titers of anti-Dsg with optimal area under the curve, sensitivity, and specificity were performed.

RESULTS The interrater reliabilities were highest for the PDAI, followed by the ABSIS and the PVAS (intraclass correlation coefficients of 0.98 [95% CI, 0.97-0.98], 0.97 [95% CI, 0.96-0.98], and 0.93 [95% CI, 0.90-0.95], respectively). The convergent validity was highest for the PDAI, followed by the PVAS and the ABSIS (Spearman ρ = 0.67, 0.52, and 0.33, respectively). Head, neck, and trunk involvement were predictors of higher titers of anti-Dsg1.

CONCLUSIONS AND RELEVANCE Among the 3 studied indexes, the PDAI had the highest validity and is recommended for use in multicenter studies for rare diseases, such as pemphigus vulgaris.
E ffective therapies have decreased the morbidity and mortality of pemphigus, but a recent Cochrane review of randomized controlled trials in patients with pemphigus concluded that evidence was insufficient to determine the optimal therapy because of the lack of validated outcome measures. Disease activity indexes are pivotal in clinical studies to provide comparable, interpretable results and to facilitate evidence-based decision making for physicians.

The Pemphigus Disease Area Index (PDAI) and the Autoimmune Bullous Skin Disorder Intensity Score (ABSIS) are 2 independent disease severity assessments of pemphigus disease extent. The PDAI was developed by the International Pemphigus Committee and the ABSIS was developed by Pfütze et al in 2007 and used in European studies. The Pemphigus Vulgaris Activity Score (PVAS) was developed by Chams-Davatchi et al and was validated and applied in a double-blind randomized controlled trial in Iran.

Elevated antidesmoglein (anti-Dsg) 1 and 3 antibody titers are used to diagnose pemphigus vulgaris (PV) and have been reported to correlate with disease activity in PV. Recently, the PDAI, ABSIS, and PVAS were validated to correlate with the Physician Global Assessment (PGA) of pemphigus disease activity in a limited number of patients. However, to our knowledge, the correlation between these measurements and anti-Dsg1 and anti-Dsg3 enzyme-linked immunosorbent assay (ELISA) values has not been previously evaluated. The high prevalence of PV in Iran provided the opportunity to evaluate disease activity indexes in a large number of patients with PV.

The primary objectives of this study were to evaluate all 3 PV disease activity indexes in a large number of PV patients, to compare the interrater reliability of these indexes, and to assess the convergent validity with anti-Dsg values. The secondary objectives were to assess the correlation among different components of these indexes with anti-Dsg values, detect the predictors of higher anti-Dsg titers, and determine the disease severity cutoffs for 2 different antibody titers (20 and 100 U/mL of antibody).

Methods

This study was performed at the Autoimmune Bullous Diseases Research Center, Razi Hospital, Tehran, Iran. The study was approved in 2012 by the Ethics Review Board of Tehran University of Medical Sciences.

One hundred PV patients were enrolled from the Autoimmune Bullous Diseases Research Center during July 2012. The inclusion criteria were a confirmed PV diagnosis and the presence of clinical pemphigus lesions. The diagnosis of PV had been confirmed by histopathologic testing and direct immunofluorescent microscopy. All patients signed informed consent forms.

The clinical evaluation of each patient was performed in 1 day. Each patient was examined separately by 3 dermatologists (N.A., P.H., and Z.R.), and each dermatologist rated all 3 disease indexes (PDAI, ABSIS, and PVAS) for each patient. The evaluations were performed during weekly visits to the Autoimmune Bullous Diseases Research Center by dermatologists exclusively dedicated to this study. On each clinic day, approximately 20 patients were rated completely by all 3 raters, resulting in 100 patient assessments during a 5-week period. Nine distinct measurements were performed for each patient.

The raters were familiar with immunobullous diseases and the disease activity indexes and performed the assessment independently. We assumed that the first index rating would take longer than the subsequent index ratings because the rater was unfamiliar with the patient. Thus, we randomized the order of performance of the 3 indexes for each patient.

The following pemphigus disease indexes were used: PDAI, ABSIS, and PVAS. The PDAI has a potential range of 0 to 263 (120 points for skin activity, 10 points for scalp activity, 120 points for mucosal activity, and 13 points for postinflammatory hyperpigmentation [PIH], representing disease damage). It assigns scores to defined anatomical regions based on the number and size of the lesions (eFigure 1 in the Supplement). The ABSIS has a potential range of 0 to 206 (150 points for skin involvement, 11 points for oral involvement, and 45 points for subjective oral discomfort). It takes into account body surface area weighted by the type of lesions to estimate skin activity. Discomfort during eating and drinking is also scored (eFigure 2 in the Supplement). The PVAS has a potential range of 0 to 18 (11 points for skin activity and 7 points for mucosal activity). The number of lesions and the involvement of defined anatomical regions are weighted by the types of lesions. The Nikolsky sign is also incorporated in skin activity scoring (eFigure 3 in the Supplement).

Serum samples were collected simultaneously and stored at −70°C. The autoantibody titers were performed at the end of the study by independent laboratory personnel not familiar with the clinical evaluation results using a commercially available Dsg1/Dsg3 ELISA kit (EUROIMMUN). Serum was diluted 1:100, according to the manufacturer’s instructions. An ELISA value at or above 20 U/mL was considered positive for both Dsg1 and Dsg3 antibodies. If both anti-Dsg1 and anti-Dsg3 titers were below 20 U/mL, they were considered in the low range, and if both titers were above 100 U/mL, they were considered in the high range.

Data computation and analysis were performed using SPSS statistical software, version 20 (SPSS Inc). Identical anatomical areas of skin and mucous membrane were recoded to compare the 3 measures (Table 1). Data were presented as mean (SD) for continuous variables. The scatterplot presented the statistical relationship among quantitative variables. To analyze the changes in the PDAI, ABSIS, and PVAS among the 3 physicians in the same patient, interrater reliability was assessed using the intraclass correlation coefficient (ICC). All ICCs were calculated using the 2-way random-effect analysis of variance model. The ICCs greater than 0.70 and 0.81 were considered acceptable and excellent, respectively. The Spearman ρ correlation coefficient between the mean PDAI, ABSIS, and PVAS and the anti-Dsg1 and anti-Dsg3 values estimated the convergent validity. In a subgroup analysis, the Kruskal-Wallis nonparametric analysis of variance test was performed to determine the differences in the anti-Dsg values based on the areas involved, type of lesions, and presence of a Nikolsky test.
Table 1. Distribution of Pemphigus Disease Activity Measurements in Defined Areas in 100 Patients With Pemphigus Vulgaris

<table>
<thead>
<tr>
<th>Disease Site</th>
<th>PDAI-No. of Patients</th>
<th>Mean (SD)</th>
<th>Range/Score Range</th>
<th>ABSIS-No. of Patients</th>
<th>Mean (SD)</th>
<th>Range/Score Range</th>
<th>PVAS-No. of Patients</th>
<th>Mean (SD)</th>
<th>Range/Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>81</td>
<td>18.6 (17.5)</td>
<td>0-94.3/0-130</td>
<td>83</td>
<td>6.3 (7.7)</td>
<td>0-38.5/0-150</td>
<td>78</td>
<td>3.3 (2.3)</td>
<td>0-10.5/0-11</td>
</tr>
<tr>
<td>Head and neck</td>
<td>68</td>
<td>9.7 (7.5)</td>
<td>0-32.7/0-50</td>
<td>68</td>
<td>2.1 (2.0)</td>
<td>0-8.7/0-13.5</td>
<td>68</td>
<td>No. of lesions: 0, 22%; ≤20, 17%; &gt;20, 38%</td>
<td></td>
</tr>
<tr>
<td>Trunk</td>
<td>68</td>
<td>7.8 (5.5)</td>
<td>0-25/0-30</td>
<td>67</td>
<td>3.7 (4.2)</td>
<td>0-24.7/0-54</td>
<td>66</td>
<td>Type of lesions: none, 24%; crusted, 45%; erosion, 31%</td>
<td></td>
</tr>
<tr>
<td>Limbs</td>
<td>54</td>
<td>5.3 (6.2)</td>
<td>0-31.7/0-40</td>
<td>42</td>
<td>2.5 (4.6)</td>
<td>0-27/0-81</td>
<td>49</td>
<td>Presence of Nikolsky sign: 0, 85%; around the lesion, 12%; on unaffected skin, 3%</td>
<td></td>
</tr>
<tr>
<td>Genital</td>
<td>14</td>
<td>2.3 (2.5)</td>
<td>0-10/0-10</td>
<td>11</td>
<td>0.5 (0.3)</td>
<td>0-1/0-1.5</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Mucosal</td>
<td>81</td>
<td>12.4 (11.1)</td>
<td>0-54.3/0-120</td>
<td>82</td>
<td>4.3 (2.4)</td>
<td>0-10/0-11</td>
<td>82</td>
<td>2.2 (1.1)</td>
<td>0-6/0-7</td>
</tr>
<tr>
<td>Oral and pharynx</td>
<td>81</td>
<td>11.4 (10.4)</td>
<td>0-47/0-90</td>
<td>82</td>
<td>4.3 (2.4)</td>
<td>0-10/0-11</td>
<td>81</td>
<td>No. of lesions: 0, 20%; 1-2, 10%; &gt;2, 70%</td>
<td></td>
</tr>
<tr>
<td>Nasal and upper airways</td>
<td>34</td>
<td>1.1 (0.6)</td>
<td>0-3/0-10</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>47</td>
<td>Type of lesions: none, 22%; ulcer, 31%; erosion, 47%</td>
<td></td>
</tr>
<tr>
<td>Anogenital</td>
<td>17</td>
<td>1.3 (1.7)</td>
<td>0-6.7/0-10</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye</td>
<td>11</td>
<td>1.1 (0.5)</td>
<td>0-2/0-10</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damage or discomfort</td>
<td>75</td>
<td>3.3 (2.4)</td>
<td>0-10.3/0-13</td>
<td>57</td>
<td>20.4 (13.7)</td>
<td>0-45/0-45</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>27.7 (21.1)</td>
<td>0-101.3/0-263</td>
<td>100</td>
<td>20.4 (18.7)</td>
<td>0-75.7/0-206</td>
<td>100</td>
<td>4.5 (3.1)</td>
<td>0-14.8/0-18</td>
</tr>
</tbody>
</table>

Abbreviations: ABSIS, Autoimmune Bullous Skin Disorder Intensity Score; PDAI, Pemphigus Disease Area Index; PVAS, Pemphigus Vulgaris Activity Score.

* The PVAS uses a complex formula and calculates total skin or mucosal membrane score as follows: Score of Type of Skin Lesions × (Score of Number of Lesions + Score of Distribution of Lesions + Presence of Nikolsky Sign) + Score of Type of Mucosal Lesions × (Score of Number of Lesions + Score of Distribution of Lesions). The discrete scores for defined anatomical areas cannot be independently measured.

** Variable numbers of patients reported by different measurements were due to differences in the corresponding scoring systems. The PDAI considers postinflammatory hyperpigmentation as a damage component that is not included in the skin activity score, the ABSIS includes postinflammatory hyperpigmentation in the score, and the PVAS gives a zero score to postinflammatory hyperpigmentation. In addition, the PDAI includes visible mucosal involvement according to regular physical examination, but the ABSIS and PVAS include subjective involvements of aerodigestive tract in addition to visible lesions.

The estimated interrater reliability revealed an ICC of 0.98 for the PDAI, 0.97 for the ABSIS, and 0.93 for the PVAS. Table 2 gives the ICCs for skin, mucosal, and damage components of these indexes. The interrater reliability of the indexes at both ends of the spectrum of patients was also assessed. If anti-Dsg1 and anti-Dsg3 values were both negative, they were considered in the lower range (n = 10), and if anti-Dsg1 and anti-Dsg3 levels were greater than 100 U/mL, they were considered in the upper range (n = 35). The ICCs (95% CI) for those in the upper range were 0.96 (0.93-0.98), 0.97 (0.95-0.98), and 0.88 (0.80-0.94) for the PDAI, ABSIS, and PVAS, respectively, and

Results

We evaluated 100 PV patients. The mean (SD) patient age was 43.3 (1.7) years (age range, 14-77 years), and the female: male ratio was 1:3. For disease activity measurement, only the skin and mucosal activity scores were used. The damage score was to remind the physicians not to score damage as part of activity. Because no significant differences were found among the raters’ evaluations, the mean of their measurements were used to report the results. Table 1 gives the prevalence of skin, mucous membrane, and damage involvement in 100 patients and the distribution of measures according to the PDAI, ABSIS, and PVAS.

Reliability and Convergent Validity

The estimated interrater reliability revealed an ICC of 0.98 for the PDAI, 0.97 for the ABSIS, and 0.93 for the PVAS. Table 2 gives the ICCs for skin, mucosal, and damage components of these indexes. The interrater reliability of the indexes at both ends of the spectrum of patients was also assessed. If anti-Dsg1 and anti-Dsg3 values were both negative, they were considered in the lower range (n = 10), and if anti-Dsg1 and anti-Dsg3 levels were greater than 100 U/mL, they were considered in the upper range (n = 35). The ICCs (95% CI) for those in the upper range were 0.96 (0.93-0.98), 0.97 (0.95-0.98), and 0.88 (0.80-0.94) for the PDAI, ABSIS, and PVAS, respectively, and

- **P** < .05 was considered statistically significant.
the ICCs (95% CIs) for those in the lower range were 0.98 (0.94-0.99), 0.88 (0.64-0.97), and 0.88 (0.62-0.97). The ICCs revealed a statistically significant difference in the lower range of titers for the PDAI but not the ABSIS and PVAS because it showed higher values with no overlap within the 95% CIs. The correlation between the PDAI and the other indexes revealed a Spearman ρ coefficient of 0.82 for the PVAS and 0.66 for the ABSIS. See eTable 1 in the Supplement for the ICCs of the 3 different indexes measured for a single patient by each rater.

The convergent validity between anti-Dsg1 values and different measurements was 0.67 for the PDAI (P < .001), 0.33 for the ABSIS (P = .002), and 0.52 (P < .001) for the PVAS. However, the correlations between the measures and anti-Dsg3 titers were poor, with ICCs of 0.35 (P = .001), 0.38 (P < .001), and 0.35 (P = .001) for the PDAI, ABSIS, and PVAS, respectively.

Scoring Time
The time required to complete forms was recorded. The times for the PDAI, ABSIS, and PVAS ranged from 20 seconds to 5.8 minutes (mean [SD], 2.9 [1.3] minutes), 25 seconds to 5.6 minutes (mean [SD], 1.9 [1.1] minutes), and 15 seconds to 3.9 minutes (mean [SD], 1.1 [0.7] minutes), respectively.

Subgroup Analyses
Distribution of Lesions
Table 3 lists the total PDAI and anti-Dsg1 values by anatomic area. Total PDAI activity and anti-Dsg1 titers were higher in patients with genital and lower limb lesions compared with patients who had head and neck lesions. In addition, patients with anogenital mucosal lesions presented with higher PDAI activity and anti-Dsg3 titers compared with those with oral involvement.

Lesion Types
Patients with either active erosive or crusted lesions had higher PDAI and anti-Dsg1 values compared with those with only skin damage. Anti-Dsg1 titers did not reveal significant differences between crusted or erosive lesions (eTable 2 in the Supplement).

Nikolsky Sign
The presence of a Nikolsky sign was significantly associated with a higher titer of anti-Dsg1 antibodies, PDAI, and ABSIS compared with patients without a Nikolsky sign (anti-Dsg1: 313.16 vs 114.37; P < .001; anti-Dsg3: 254.28 vs 189.13, P = .35; PDAI: 50.2 vs 23.8, P = .01; and ABSIS: 34.8 vs 17.9, P = .03).

Mucosal Involvement
The correlations of PDAI mucosal activity with ABSIS oral involvement, PDAI mucosal activity with ABSIS subjective oral discomfort, and PDAI mucosal activity with PVAS mucosal involvement were acceptable (Spearman ρ = 0.96, 0.68, and 0.76, respectively). However, the scatterplot presented poor correlations between positive anti-Dsg3 titers and mucous membrane involvement (Spearman ρ < .4). In addition, the mean (SD) anti-Dsg3 titer was 127.73 (144.99) in 18 cutaneous dominant PV patients, although they had no clinical mucous membrane lesions.
Predictors of Anti-Dsg Titers
The multiple linear regression models demonstrated that head and neck, trunk, and limb involvement and the type of lesions were associated with higher titers of anti-Dsg1. Oral and upper airway involvement was associated with higher titers of anti-Dsg3 (eTable 3 in the Supplement).

Cutoff Values
On the basis of ROC curve analyses, we determined cutoff values of total PDAI, ABSIS, and PVAS activity for 2 titers of 20 and 100 U/mL of anti-Dsg1 and anti-Dsg3 (eFigure 4 in the Supplement). The point in the ROC curves with the highest sensitivity, at which an increase in sensitivity resulted in an abrupt decrease in specificity, was considered a cutoff. The AUC values above 0.5 revealed a better performance of each test with higher sensitivity and specificity. Comparing the AUCs of total activity, mucosal activity, and skin activity for anti-Dsg1 titer revealed the highest AUC value for skin activity. The same analysis performed for anti-Dsg3 titer revealed the highest AUC value for mucosal activity. We used skin activity measures to present cutoffs for anti-Dsg1 and mucosal activity measures for anti-Dsg3 cutoffs.

The estimated cutoff values of PDAI skin activity for 20- and 100-U/mL anti-Dsg1 titers were 5 and 10, respectively. The estimated cutoff values of PDAI mucosal activity for 20- and 100-U/mL anti-Dsg3 titers were 3 and 5, respectively. The ABSIS and PVAS cutoffs for 20- and 100-U/mL antibody titers are summarized in Table 4.

Discussion
This is the first study, to our knowledge, that evaluated the reliability and validity of the PDAI, ABSIS, and PVAS in a large number of PV patients and correlated these with anti-Dsg1 and anti-Dsg3 ELISA titers. We found the highest interrater reliability for skin activity and mucosal activity of the PDAI, followed by oral involvement of the ABSIS and skin activity of the PVAS (ICCs = 0.99, 0.95, 0.95, and 0.94, respectively). According to our convergent validity results, anti-Dsg1 ELISA values were closely correlated with the skin activity indexes, but anti-Dsg3 titers did not necessarily correlate with the mucosal activity indexes. The time to complete the disease activity form was minimal in PVAS compared with the other indexes. To date, few studies2,5,7,14 have compared the pemphigus disease activity indexes.

Rosenbach et al2 scored the PDAI and ABSIS in 15 patients with pemphigus by 10 assessors and estimated the reliability and the convergent validity relative to the PGA. The ICCs were 0.86 for the PDAI skin activity and 0.39 for the ABSIS skin involvement. Their results revealed that the PDAI correlated more closely with the PGA. The mean time to completion in minutes was 4.7 for the PDAI and 3.9 for the ABSIS.2

Pfütze et al5 assessed the ABSIS in 13 PV patients for 6 months after initiation of immunosuppressive therapy and found that the decrease of the ABSIS skin score was accompanied by a gradual decrease of anti-Dsg1 and anti-Dsg3. The correlation coefficients between the scores and autoantibody titers were not presented.5

Chams-Davatchi et al7 evaluated the PVAS in 50 PV patients relative to 5 experts and reported a convergent validity of 0.75 with the PGA. The reported mean time to completion was 3.1 minutes.

The findings for the interrater reliability, our primary objective, revealed that the PDAI skin activity measure provided the most reproducible results. This measure is sensitive to low numbers of lesions and incorporates sensitivity for the size of lesions in its scoring system within the defined anatomical areas, which results in increased interrater reliability. On the other hand, the ABSIS and PVAS use some items that make the measures less reproducible. The ABSIS uses the low-agreement rule of 9 to estimate the body surface area involve-

### Table 4. Cutoff Values of Skin and Mucosal Activity on the PDAI, ABSIS, and PVAS That Predict 20- and 100-U/mL Titers of Anti-Dsg1 and Anti-Dsg3

<table>
<thead>
<tr>
<th>Measure</th>
<th>Anti-Dsg1, a U/mL</th>
<th>Anti-Dsg3, a U/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDAI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutoff</td>
<td>4.8</td>
<td>2.8</td>
</tr>
<tr>
<td>AUC</td>
<td>0.84</td>
<td>0.84</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.75</td>
<td>0.77</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.87</td>
<td>0.83</td>
</tr>
<tr>
<td>ABSIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutoff</td>
<td>0.92</td>
<td>1.0</td>
</tr>
<tr>
<td>AUC</td>
<td>0.84</td>
<td>0.80</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.70</td>
<td>0.76</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.70</td>
<td>0.77</td>
</tr>
<tr>
<td>PVAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutoff</td>
<td>0.70</td>
<td>0.77</td>
</tr>
<tr>
<td>AUC</td>
<td>0.77</td>
<td>0.81</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.76</td>
<td>0.75</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.87</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Abbreviations: AUC, area under the curve; Dsg, desmoglein; PDAI, Pemphigus Disease Area Index. a Skin activity score had highest accuracy for anti-Dsg1 titer, and mucosal activity scores were better for anti-Dsg3 titer.
The PDAI is a highly reliable measurement, especially for skin activity, because it simply calculates the visible lesions in a systematic order. It does not require assessment of the Nikolsky sign, types of lesions, or use of the rule of nines that would be sources of variability. Although it takes slightly more time than other measures and seems more difficult in the beginning, it is reasonable to use this measure in future multicenter studies on pemphigus.

Conclusions

The PDAI is a highly reliable measurement, especially for skin activity, because it simply calculates the visible lesions in a systematic order. It does not require assessment of the Nikolsky sign, types of lesions, or use of the rule of nines that would be sources of variability. Although it takes slightly more time than other measures and seems more difficult in the beginning, it is reasonable to use this measure in future multicenter studies on pemphigus.
ARTICLE INFORMATION

Accepted for Publication: September 7, 2013.
Published Online: January 15, 2014.

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Conflict of Interest Disclosures: None reported.
Funding/Support: This study was supported by research grant 91-03-101-19111 from the Deputy of Research, Tehran University of Medical Sciences, Tehran, Iran (Drs Rahbar, Daneshpazhooh, and Chams-Davatchi).

Role of the Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, or interpretation of the data; or preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Contributions: Victoria P. Werth, MD, inspired the idea of this study during the International Pemphigus and Pemphigoid Foundation Meeting, 2010. We thank Fereydoun Davatchi, MD, from Rheumatology Research Centre of Tehran University of Medical Sciences for his valuable insights.

REFERENCES