Interrater Agreement in Evaluation of Stroke Patients With the Unified Neurological Stroke Scale

T.A. Treves; V.G. Karepov; B.D. Aronovich; A.Y. Gorbulev; N.M. Bornstein, MD; A.D. Korczyn

**Background**
We sought to determine interrater agreement in evaluation of stroke patients with the Unified Form for Neurological Stroke Scales (UFNSS).

**Summary of Report**
Fifty inpatients were independently examined by three neurologists. Kendall coefficients of concordance were computed for the different items of the UFNSS. There was a high concordance among the raters. The best agreements were obtained for motor functions and the worst for grading of eye movements.

**Conclusions**
The UFNSS was shown to be reliable for evaluation of motor functions, verbal communication, orientation, and vigilance in stroke patients. (Stroke. 1994;25:1263-1264.)

**Key Words**
- stroke assessment

**Evaluation**
Evaluation of therapy requires valid measures that can be reliably reproduced. The choice of such measures depends on the aim of the study. For example, in evaluating the effect of a drug against spasticity, tests that reflect muscle tone should be emphasized. The evaluation of acute stroke is more difficult because of the heterogeneous clinical presentation, affecting factors such as speech, sensation, power, and equilibrium. Therefore, scored rating scales were devised and later modified. The interrater agreement of these scales was measured using Kendall coefficients of concordance (W) as indexes of reliability for the items included in these scales. These showed a wide range of variation from one study to the other, depending on the item that was examined.

**Subjects and Methods**
Fifty inpatients with acute hemispheric stroke were independently evaluated with the UFNSS by three neurologists (B.D.A., A.Y.G., and V.G.K.) of the stroke unit. On the same day, each patient was examined by all three investigators. The results of their examinations were used to compute Kendall coefficients of concordance (W) for interrater agreement.

**Results**
Interrater agreement for the different items of the scale was very good: none of the Kendall coefficient of concordance values for individual functions tested were less than .87 (Table).

**Discussion**
The aim of the study was to determine which items should be chosen from a uniform general scale as suggested by Orgogozo et al. Previous studies of the UFNSS reported Kendall coefficients of concordance (W) values for two observers or more that were high for motor functions but variable for facial paresis or orientation. Eye movement assessment had the lowest agreement by the present raters, although it was still very good (W = .87; Table); post hoc analysis revealed disagreements regarding definitions for this function. Moreover, gaze examination may be redundant, since deficit generally correlates with either hemiplegia or altered level of consciousness. Interrater reliability for consciousness was also relatively low, possibly because of the interpretation of the intensity of the stimulus required to catch the attention of a drowsy patient. Better agreement was observed for items that score easily and for which raters are experienced, such as paresis. It is obvious that better results also depend on clear definition of the items, with closed structure options. The UFNSS does not include items that relate to sensory functions, visual fields, or cognition, presumably because impairments are less easy to define. It also does not include autonomic functions (such as incontinence), which, for the purpose of evaluation of acute stroke, is not a drawback. Longitudinal studies examining whether the UFNSS is also sensitive to clinical changes, and for which functions in particular, are still lacking. The present study did not intend to determine whether additional functions should be included in the UFNSS or redundant items should be discarded; it was conducted to evaluate the reliability of this scale before its implementation in a large-scale clinical trial.

In conclusion, the UFNSS was shown to be reliable and useful for evaluation of vigilance and motor functions in acute stroke patients, even when used by three
Kendall Coefficients of Agreement on Unified Form for Neurological Stroke Scale Items Evaluated by Three Raters

<table>
<thead>
<tr>
<th>Function (Scoring)</th>
<th>W*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness (0-4)</td>
<td>.91</td>
</tr>
<tr>
<td>Speech (0-3)</td>
<td>.94</td>
</tr>
<tr>
<td>Eye movements (0-2)</td>
<td>.87</td>
</tr>
<tr>
<td>Facial palsy (0-1)</td>
<td>.93</td>
</tr>
<tr>
<td>Arm power (0-4)</td>
<td>.97</td>
</tr>
<tr>
<td>Hand power (0-3)</td>
<td>.96</td>
</tr>
<tr>
<td>Leg power (0-4)</td>
<td>.97</td>
</tr>
<tr>
<td>Foot dorsiflexion (0-2)</td>
<td>.95</td>
</tr>
<tr>
<td>Upper limb tone (0-1)</td>
<td>.96</td>
</tr>
<tr>
<td>Lower limb tone (0-1)</td>
<td>.96</td>
</tr>
<tr>
<td>Orientation (0-3)</td>
<td>.97</td>
</tr>
<tr>
<td>Gait (0-4)</td>
<td>.95</td>
</tr>
</tbody>
</table>

*For all Kendall coefficient of agreement (W) values, $\chi^2$ test (49 df) was used for statistical significance of association between the raters, allowing rejection of the null hypothesis (of nonassociation between the raters), with $P<.001$.

observers. Its reliability can be improved by common training of raters.

References

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