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SURGICAL NEUROLOGY INTERNATIONAL
SNI: Neurovascular, a supplement to Surgical Neurology International
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Editor: James I. Ausman, MD, PhD University of California, Los Angeles, CA, USA

Modified world federation of neurosurgical societies subarachnoid hemorrhage grading system

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Received: 27 April 16 Accepted: 18 May 16 Published: 01 August 16

Sir,

The World Federation of Neurosurgical Societies (WFNS) scale for grading patients with aneurysmal subarachnoid hemorrhage (SAH) was originally published in 1988,[1] and has gained widespread acceptance. The original WFNS (o-WFNS scale) scale uses Glasgow Coma Scale (GCS) score as an input together with the presence of focal neurologic deficits: GCS 13–14 patients with/without focal neurologic deficits are automatically classified into grade II/III, respectively [Figure 1]. However, there seems to be substantial inter-rater variability in the application of the original WFNS scale because of ambiguity in identifying the presence of neurologic deficits. Historically, several attempts to modify the original WFNS scaling system has been made to improve its accuracy for prognostication.[3] Recently, the WFNS CVD and T Committee and the Japan Neurosurgical Society have jointly proposed a modified WFNS scale (m-WFNS scale), in which aneurysmal SAH patients with a total GCS score of 14 are assigned to grade II and those with a total GCS score of 13 are assigned to grade III [Figure 1], regardless of the presence of neurologic deficits, with a purpose to improve the prognostic accuracy in patients with grade II and III. A multicenter prospective observational study was conducted from October 2010 and March 2013, with 38 high-volume neurosurgical institutions across Japan participating in the study.[2] A total of 1656 aneurysmal SAH patients were registered during the 2.5-year study period, and the outcome predictability, using the Glasgow Outcome Scale (GOS) and modified Rankin Scale (mRS) scores at discharge and at 90 days after onset, was evaluated by comparing the m-WFNS with o-WFNS scale. There was marked superiority (i.e., better outcome predictability) of the m-WFNS scale both in the GOS and mRS.[2] For example, there was significant difference between any neighboring grades

Original vs. Modified WFNS grading scale

Grade	Original WFNS [1]	Modified WFNS [3]
I	GCS 15	GCS 15
II	GCS 13-14 w/ focal neurologic deficits	GCS 14
III	GCS 13-14 w/o focal neurologic deficits	GCS 13
IV	GCS 7-12	GCS 7-12
V	GCS 3-6	GCS 3-6

Figure 1: Comparison between the original and modified WFNS grading scale for aneurysmal subarachnoid hemorrhage

Access this article online
Quick Response Code:
Website: www.surgicalneurologyint.com
DOI: 10.4103/2152-7806.187491

How to cite this article: Sano H, Inamasu J, Kato Y, Satoh A, Murayama Y, WFNS Cerebrovascular Diseases and Treatment Committee. Modified world federation of neurosurgical societies subarachnoid hemorrhage grading system. Surg Neurol Int 2016;7:S502-3.
http://surgicalneurologyint.com/Modified-world-federation-of-neurosurgical-societies-subarachnoid-hemorrhage-grading-system/

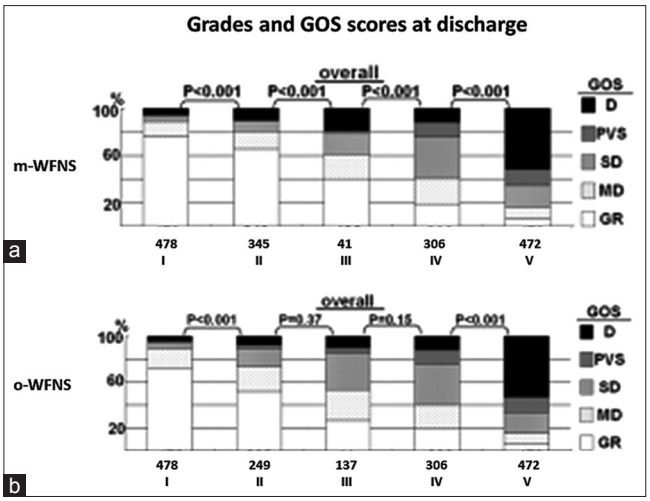

Figure 2: Mean GOS scores at discharge showing that in the m-WFNS scale, there was significant difference between any neighboring grades (a). By contrast, in the o-WFNS scale, the significant difference was observed only between grade I/II and between grade IV/V patients (b). Originally published as Figure 4 by Sano H *et al.*: Modified World Federation of Neurosurgical Societies subarachnoid hemorrhage grading system. World Neurosurg 2015;83:801-7. Permission granted from Elsevier Inc

in the m-WFNS scale at discharge [Figure 2a]. By contrast, significant difference was observed only between grade I and II and between grade IV and V patients in the o-WFNS scale [Figure 2b]. The receiver operating characteristic curve analysis showed significantly higher area under the curve values (i.e. better outcome predictability) in the m-WFNS scale on mRS [Figure 3].[2] Although the superiority of the m-WFNS scale was less prominent at 90 days, it still showed better outcome predictability over the o-WFNS scale. We believe that the m-WFNS scale has a potential of providing neurosurgeons with simpler and more reliable prognostication of SAH patients. However, our study is limited in that only Japanese neurosurgeons participated: We hope that the m-WFNS grading scale will be used more frequently by neurosurgeons across the world for further validation of its accuracy.

Area Under the Curve Values on the Modified WFNS Scale and Original WFNS Scale

	Modified WFNS	Original WFNS	*P* Value
At discharge			
GOS = 1	0.819	0.816	0.0516
mRS ≤ 1	0.830	0.827	0.0161*
At 90 days			
GOS = 1	0.830	0.828	0.147
mRS ≤ 1	0.834	0.830	0.0331†

WFNS, World Federation of Neurosurgical Societies; GOS, Glasgow Outcome Scale; mRS, modified Rankin Scale.
*,†Statistically significant.

Figure 3: The results of receiver operating characteristic curve analysis showing that the m-WFNS scale had significantly higher area under the curve values (i.e. better outcome predictability) than the o-WFNS scale by mRS. Originally published as Table 2 by Sano H *et al.*: Modified World Federation of Neurosurgical Societies subarachnoid hemorrhage grading system. World Neurosurg 2015;83:801-7. Permission granted from Elsevier Inc

Acknowledgement

1. The original article (same title) was published in World Neurosurgery (Volume 83, Issue 5, Pages 801–807, May 2015)
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Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Drake CG. Report of World Federation of Neurological Surgeons Committee on a universal subarachnoid hemorrhage scale. J Neurosurg 1988;68:985-6.
2. Sano H, Satoh A, Murayama Y, Kato Y, Origasa H, Inamasu J, *et al.* Modified World Federation of Neurosurgical Societies subarachnoid hemorrhage grading system. World Neurosurg 2015;83:801-7.
3. van Heuven AW, Dorhout Mees SM, Algra A, Rinkel GJ. Validation of a prognostic subarachnoid hemorrhage grading scale derived directly from the Glasgow Coma Scale. Stroke 2008;39:1347-8.