

Brain Health Outcome Scale (BHOS): An Integrated Functional And Cognitive Measure Of Brain Health After Stroke

P#850

Minwoo Lee¹, Dong Hyeong Bak², Hyunjoo Song³, Yeonwook Kang⁴, Juneyoung Lee⁵, Hee-Joon Bae⁶, CRCS-K-NIH and STROKOG

¹Department of Neurology, Hallym University Sacred Heart Hospital, Anyang-si, Korea, Republic of, ²Department of Biostatistics, Korea University College of Medicine, Seoul, Korea, Republic of, ³Soongsil University, Seoul, Korea, Republic of, ⁴Hallym University, Chuncheon-si, Korea, Republic of, ⁵Korea University, Seoul-si, Korea, Republic of, ⁶Department of Neurology, Seoul National University Bundang Hospital, Bundang-si, Korea, Republic of.

BHOS provides a clinically interpretable 6-level measure of post-stroke brain health by integrating functional disability and cognitive impairment, overcoming the limitations of single-domain outcome measures.

INTRODUCTION	METHODS	RESULTS	CONCLUSIONS	REFERENCES																																																																																																									
- Post-stroke functional disability and cognitive impairment frequently coexist and jointly determine overall brain health - mRS captures physical disability only and does not account for cognitive status - Cognitive impairment substantially modifies real-world outcomes - An integrated, clinically interpretable brain health outcome is needed - The Brain Health Outcome Scale (BHOS) was developed to integrate functional and cognitive outcomes	- Prospective stroke registry (n = 1,668) 24-cell matrix crossing mRS (0–5) and cognitive strata defined by K-MMSE z-scores - Polyomino-based grouping applied to ensure clinical contiguity and interpretability - A total of 408,500 candidate configurations were evaluated - The optimal 6-group BHOS was selected based on the highest Welch’s F-statistic - K-IADL was selected as the reference outcome representing real-world functional independence and brain health	- Final BHOS was selected from the top 20 configurations based on Welch’s F-statistic - BHOS showed clear ordinal gradient from optimal to severe brain health - BHOS explained more variance in K-IADL than conventional classifications: -BHOS: R² = 0.374 -mRS alone :R² = 0.198 -MMSE alone : R² = 0.277 <table><caption>Modified Rankin Scale</caption><tr><th>K-MMSE group</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>1: normal (-1 ≤ z)</td><td></td><td>1</td><td></td><td></td><td></td><td></td></tr><tr><td>2: mild (-2 ≤ z < -1)</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td></tr><tr><td>3: moderate (-3 ≤ z < -2)</td><td></td><td></td><td>4</td><td>5</td><td></td><td></td></tr><tr><td>4: severe (z < -3)</td><td></td><td></td><td></td><td></td><td>6</td><td></td></tr></table><table><caption>Modified Rankin Scale</caption><tr><th>K-MMSE group</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>1: normal (-1 ≤ z)</td><td></td><td></td><td>1</td><td></td><td></td><td></td></tr><tr><td>2: mild (-2 ≤ z < -1)</td><td></td><td></td><td>2</td><td>3</td><td></td><td></td></tr><tr><td>3: moderate (-3 ≤ z < -2)</td><td></td><td></td><td></td><td>4</td><td></td><td></td></tr><tr><td>4: severe (z < -3)</td><td></td><td></td><td></td><td></td><td>5</td><td></td></tr></table><table><caption>Modified Rankin Scale</caption><tr><th>K-MMSE group</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>1: normal (-1 ≤ z)</td><td></td><td></td><td></td><td>1</td><td></td><td></td></tr><tr><td>2: mild (-2 ≤ z < -1)</td><td></td><td></td><td></td><td>2</td><td>3</td><td></td></tr><tr><td>3: moderate (-3 ≤ z < -2)</td><td></td><td></td><td></td><td></td><td>4</td><td>5</td></tr><tr><td>4: severe (z < -3)</td><td></td><td></td><td></td><td></td><td></td><td>6</td></tr></table>	K-MMSE group	0	1	2	3	4	5	1: normal (-1 ≤ z)		1					2: mild (-2 ≤ z < -1)		2	3				3: moderate (-3 ≤ z < -2)			4	5			4: severe (z < -3)					6		K-MMSE group	0	1	2	3	4	5	1: normal (-1 ≤ z)			1				2: mild (-2 ≤ z < -1)			2	3			3: moderate (-3 ≤ z < -2)				4			4: severe (z < -3)					5		K-MMSE group	0	1	2	3	4	5	1: normal (-1 ≤ z)				1			2: mild (-2 ≤ z < -1)				2	3		3: moderate (-3 ≤ z < -2)					4	5	4: severe (z < -3)						6	- BHOS captures multidimensional post-stroke brain health - BHOS resolves discordance between physical and cognitive recovery - BHOS provides a more sensitive and clinically meaningful outcome measure - BHOS is applicable to clinical trials and routine stroke care	1.Benjamin, E.J., et al., <i>Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association</i>. Circulation, 2019. 139(10): p. e56-e528. 2.Feigin, V.L., et al., <i>Global and regional burden of stroke during 1990-2010: findings from the Global Burden of Disease Study 2010</i>. Lancet, 2014. 383(9913): p. 245-54. 3.Feigin, V.L., B. Norrving, and G.A. Mensah, <i>Global Burden of Stroke</i>. Circ Res, 2017. 120(3): p. 439-448. 4.Broderick, J.P., O. Adeoye, and J. Elm, <i>Evolution of the Modified Rankin Scale and Its Use in Future Stroke Trials</i>. Stroke, 2017. 48(7): p. 2007-2012. 5.Wardlaw, J.M., et al., <i>Isosorbide Mononitrate and Cilostazol Treatment in Patients With Symptomatic Cerebral Small Vessel Disease: The Lacunar Intervention Trial-2 (LACI-2) Randomized Clinical Trial</i>. JAMA Neurol, 2023. 80(7): p. 682-692. 6.Rimmele, D.L., et al., <i>Health-related quality of life 90 days after stroke assessed by the International Consortium for Health Outcome Measurement standard set</i>. Eur J Neurol, 2020.
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