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Can 90-Day NIHSS Be Used for Outcome Assessment in TIA and Minor Stroke Studies?Veronique Dubuc^{a, b}, Philip Choi^{a, b}, Michael D. Hill^{a–f},
Shelagh B. Coutts^{a–c, f}^aCalgary Stroke Program, Departments of ^bClinical Neurosciences, ^cRadiology, ^dMedicine and ^eCommunity Health Sciences, ^fHotchkiss Brain Institute, University of Calgary, Calgary, Alta., Canada**Background**

Patients with TIA and minor stroke present a significant risk of disability at 3 months. Despite mild symptoms at presentation, up to 15% of patients will have a disabled outcome [1]. Historically, studies that focused on this population used recurrent stroke as the primary outcome in trials. In comparison, studies in moderate to severe strokes frequently use disability as principal end-points. Disability is often measured using the modified Rankin Scale (mRS), whereas neurological impairment is assessed using the National Institute of Health Stroke Scale (NIHSS). In this specific population, it remains unclear which outcome scale is preferable to capture subtle deficits [2]. We aimed at determining whether the 90 days NIHSS was a reasonable outcome measure in TIA and minor stroke patients.

Methods

Participants were prospectively enrolled in the CATCH study [3] if they suffered a high-risk TIA (motor or speech dysfunction lasting 5 minutes or greater), or a minor stroke with initial NIHSS ≤ 3 . Subjects were excluded if they had pre-morbid mRS > 1 or were treated acutely with thrombolysis. Disability was defined as 90-day mRS ≥ 2 . Effects of clinical and radiological variables on disability were studied, including age, sex, hypertension, diabetes, recurrent stroke, baseline NIHSS, intracranial occlusion, acute ischemic lesions on MRI and anterior or posterior circulation stroke location.

Results

In all, 510 subjects were enrolled in CATCH; 450 subjects with both NIHSS and mRS at 90 days were included in this sub-study. Sixty two out of 450 (14%) were disabled at 3 months (table 1) and 83% (372/450) had an NIHSS of 0 at 90 days. Complete concordance of scores (mRS 0 and NIHSS 0) was observed in only 54% (244/450). Partial concordance (mRS 0–1 and NIHSS 0–1) occurred in 84% (379/450). Up to 93% (345/372) of subjects with 90-day NIHSS of 0 had an mRS < 2 . However, 42% (27/62) with mRS

Table 1. Relationship between 90-day NIHSS and 90-day mRS scores

90-day NIHSS	90-day mRS						total, n (%)
	0	1	2	3	4	5	
0	244	101	21	6	0	0	372 (83)
1	10	24	10	4	0	0	48 (10.7)
2	1	7	5	5	0	0	18 (4)
3	0	1	3	0	1	0	5 (1)
4	0	0	0	3	0	0	4 (<1)
6	0	0	0	1	0	0	1 (<1)
11	0	0	0	0	1	0	1 (<1)
25	0	0	0	0	1	0	1 (<1)
Total, n (%)	255 (57)	134 (30)	39 (9)	19 (4)	3 (<1)	0	450

NIHSS = National Institutes of Health Stroke Scale; mRS = modified Rankin Score.

Complete concordance (mRS = 0 and NIHSS = 0) occurred in 54% (244/450) of subjects. Partial concordance (mRS 0–1 and NIHSS 0–1) occurred in 84% (379/450).

≥ 2 had an NIHSS of 0. There was no association between the clinical factors and functional disability in the setting of a 90-day NIHSS 0. Analysis of radiological variables showed that ischemic stroke involving the posterior circulation was more frequently associated with disability despite a score of 0 on the NIHSS (RR 3.1, 95% CI 1.41–6.65).

Discussion

Despite no quantifiable impairment on the NIHSS, a proportion of subjects with TIA or minor stroke were disabled at 3 months. Stroke in the posterior circulation increased the risk of achieving NIHSS 0 despite having some disability. Potential explanations include the presence of gait ataxia or cranial nerve palsies, which are not well captured by the NIHSS. This finding is concordant with the observation that patients with stroke in the posterior circulation tend to have lower NIHSS at presentation [4, 5], while having a significant risk of disability [6]. Another limitation of NIHSS includes a bias towards higher scores in left hemispheric strokes. With small numbers of patients, we were not able to assess this in our study. Finally, patients may be affected by cognitive decline or mood disorders, which demand detailed assessment. We suggest that NIHSS should not be used on its own when assessing outcome in this population. It remains unclear as to what the most appropriate tools are with regard to measuring disability in TIA and minor stroke patients.

References

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