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## Pediatric National Institutes of Health Stroke Scale (PedNIHSS)

The PedNIHSS quantifies stroke severity using a child-specific version of the National Institutes of Health Stroke Score.

### Points & Pearls

- The presentation of stroke in younger children can be subtle and may include altered mental status, depressed level of consciousness, and apneas.
- Presenting the questions and tasks in the Pediatric National Institutes of Health Stroke Scale (PedNIHSS) as a game may aid in motivating patients, especially younger children.
- The developmental age of the child in the pre-morbid state must be considered. Consultation with the patient's primary care clinician may be useful in estimating the patient's developmental age; it may also be helpful to utilize a validated developmental screening tool that uses parental recall.
- Muscle strength in uncooperative patients may be assessed by careful observation of spontaneous movement or elicited movement, as compared to a developmentally and neurologically appropriate child of the same age as the patient.

### Critical Action

Pediatric patients with sickle cell disease who present with acute ischemic stroke will likely benefit from emergent blood transfusion to reduce hyperviscosity. Early consultation with a pediatric hematologist, in addition to a pediatric neurologist, is recommended for these patients.

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### Why to Use

Pediatric stroke is relatively uncommon, but it remains an important cause of morbidity and mortality in children. Adult stroke scales have limited sensitivity when applied to pediatric populations (62%-67% sensitivity according to an analysis by Mackay et al [2016]). The PedNIHSS is up to 87% sensitive (Beslow 2012). It quantifies the severity of pediatric stroke and can be trended over time to assess recovery, while the initial score may be predictive of future disability at 90 days.

### When to Use

The PedNIHSS should be used in pediatric patients aged  $\geq 2$  years who have clinical and radiologic signs of acute ischemic stroke.

### Instructions

In order to improve the accuracy of the PedNIHSS, the patient's family members should be instructed to refrain from hinting at the correct responses to the questions asked.

### Next Steps

- The PedNIHSS has not been validated for hemorrhagic stroke; in such cases, emergent neurosurgical consultation is needed.
- Given the overall rarity of pediatric stroke, the benefit of tPA in children is not well supported in the literature, emphasizing the importance of expert consultation.

Abbreviation: tPA, tissue plasminogen activator.

## Advice

Pediatric stroke is rare, and the true predictive value of the PedNIHSS is subject to change as the scale continues to be studied. Retrospective application of the PedNIHSS has been shown to be valid and reliable in 1 cross-sectional study (Beslow 2012).

## Evidence Appraisal

The PedNIHSS was developed by expert consensus of a panel of adult and pediatric stroke experts (Ichord 2011). The panel adapted the validated adult NIHSS to be appropriate for age-related variations in the comprehension of examination materials. The scoring strategy and ranges were not changed. The panel evaluated the interrater reliability of the PedNIHSS among 113 patients aged 2 to 18 years in a multicenter prospective cohort study. Overall, the interrater reliability was found to be quite high, ranging from 0.63 to 1.00 among the evaluating pediatric neurologists.

The PedNIHSS was externally validated by applying it to 75 children enrolled in a prospective study (Beslow 2012). Patients were scored both prospectively and retrospectively (based on the chart). Retrospectively applied scores correlated well with prospective scores ( $r^2 = 0.76$ ). Interrater reliability was good overall (intraclass correlation coefficient of 0.95; 95% confidence interval, 0.94-0.97), with similar findings for individual test items.

## Use the Calculator Now

[Click here to access the PedNIHSS on MDCalc.](#)

## Calculator Creator

Rebecca N. Ichord, MD

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## References

### Original/Primary Reference

- Ichord RN, Bastian R, Abraham L, et al. Interrater reliability of the Pediatric National Institutes of Health Stroke Scale (PedNIHSS) in a multicenter study. *Stroke*. 2011;42(3):613-617.

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