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National Institutes of Health Stroke Scale (NIHSS)

The NIHSS is used to quantify the severity of ischemic stroke.

Points & Pearls

- The National Institutes of Health Stroke Scale (NIHSS) was developed to help clinicians objectively rate the severity of ischemic strokes.
- Increasing NIHSS scores indicate a more severe stroke and have been shown to correlate with the size of the infarction as measured by both computed tomography and magnetic resonance imaging.
- When assessed within the first 48 hours following a stroke, NIHSS scores have been shown to correlate with clinical outcomes at the 3-month and 1-year marks.
- Patients who have a total NIHSS score ≤ 4 generally have favorable clinical outcomes and a high likelihood of functional independence regardless of treatment.

Points to keep in mind:

- Many guidelines and protocols warn that administration of tissue plasminogen activator (tPA) in patients with an NIHSS score > 22 is associated with an increased risk of hemorrhagic conversion; however, these patients are also the most severely debilitated and dependent from their strokes.
- Some components of the NIHSS have lower interrater reliability (eg, facial movement, limb ataxia, neglect, level of consciousness, and dysarthria), and some may be quite limited (eg, due to altered mental status).

- A simpler, modified version of the NIHSS has been found to have greater interrater reliability with equivalent clinical performance, although it has not been adopted as widely as the original NIHSS.
- A patient with a large-territory posterior circulation stroke syndrome may have a low or normal NIHSS score, which highlights an important limitation of the scale.

Critical Actions

- The NIHSS is broadly predictive of clinical outcomes, but individual case outcomes will vary and management decisions must be made in consultation with the patient whenever possible.
- Patients who have an NIHSS score ≤ 4 are highly likely to have good clinical outcomes.
- Whenever possible, patients with acute stroke should be transferred to a stroke center for initial evaluation and treatment, as holistic care (medical optimization, early initiation of physical and occupational therapies, patient and family education, and discharge planning) is associated with improved clinical outcomes; some experts argue that most of the gains in reduction of stroke morbidity and mortality are due to these improvements in stroke care.

Evidence Appraisal

The first iteration of the NIHSS was created in a pilot study of 10 patients who were evaluated within 3 weeks of having an ischemic stroke. The study applied the Toronto Stroke Scale, the Oxbury Initial Severity Scale, and the Cincinnati

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Stroke Scale to these patients, then analyzed the results and created a composite scale, which was intended for use in a trial of naloxone for stroke (Brott 1989). The scale was modified later by Lyden et al (1994) for use in the National Institute of Neurological Disorders and Stroke (NINDS) study on tPA in patients with ischemic stroke (NINDS tPA Stroke Study Group 1995).

A retrospective review of 1281 patients with ischemic stroke found that each 1-point increase in the NIHSS score decreased the likelihood of an excellent outcome by 24% at 7 days and by 17% at 3 months (Adams 1999). In 2003, Schlegel et al conducted a trial of 94 patients and found that when the NIHSS score was assessed within 24 hours of stroke,

each 1-point increase in the score correlated with a decreased likelihood of the patient being discharged.

A study of 893 patients found that the initial NIHSS score, if assessed within 72 hours of the ischemic event, was predictive of whether the patient would need to be placed in either a nursing home or a rehabilitation facility following discharge. Patients with moderate (defined as 6-13 points) or severe (≥ 14 points) NIHSS scores had a threefold increased risk of being placed in a nursing home after discharge and an eightfold increased risk of requiring inpatient rehabilitation therapy (Rundek 2000).

In a 2004 study of 377 patients, Appelros et al found that NIHSS scores that were assessed 24 to 48 hours after an ischemic stroke were broadly

Why to Use

The NIHSS can be used to help clinicians determine the severity of a stroke and predict clinical outcomes.

When to Use

The NIHSS is used in patients presenting with stroke in the acute setting.

Rules for Scoring

- Score what you see, not what you think.
- Score the first response, not the best response (except for item 9, "Best Language").
- Don't coach.

Next Steps

In patients who present with symptoms that are concerning for ischemic stroke, the following actions are generally considered to be standard practice:

- Obtain a neurology consult.
- Determine the onset of stroke symptoms or the time the patient last felt or was observed as normal.
- Obtain a stat CT scan of the head to rule out hemorrhagic stroke.
- In appropriate circumstances and in consultation with both the neurologist and the patient, consider intravenous thrombolysis for ischemic stroke in patients who have no contraindications.
- Always consider stroke mimics in the differential diagnosis, especially in cases with atypical features (eg, age, risk factors, history, physical examination), including:
 - » Recrudescence of a previous stroke due to metabolic or infectious stress
 - » Todd paralysis after seizure
 - » Complex migraine
 - » Pseudoseizure or conversion disorder
- Consider ordering further imaging studies, including CT, CT angiography, and MRI/MRA.

Instructions

The NIHSS has many caveats buried within it. If a patient has prior known neurologic deficits (eg, prior weakness, hemiplegia or quadriplegia, blindness), is intubated, has a language barrier, or has other limitations, assessment of the score becomes especially complicated. In those cases, clinicians should consult the NIHSS website at www.stroke.nih.gov/resources/scale.htm. The score calculator discussed and linked to in this article attempts to clarify many of the caveats to the NIHSS but is not to be substituted for the official protocol.

Abbreviations: CT, computed tomography; MRA, magnetic resonance angiogram; MRI, magnetic resonance imaging; NIHSS, National Institutes of Health Stroke Scale.

predictive of group outcomes at 1 year, with 75% of patients who had scores ≤ 4 being functionally independent at the 1-year mark. The median score in this study was 6, and 33% of patients died within the first year after their stroke event.

A prospective trial of 54 patients found that combining diffusion-weighted magnetic resonance imaging with the NIHSS score was more predictive of clinical outcomes at 3 months (70% of outcomes predicted) than the score or imaging alone (43% and 54%, respectively) (Yoo 2010).

An analysis of 312 patients with acute ischemic stroke who were treated with tPA found that an NIHSS score ≥ 20 was associated with a 17% rate of intracerebral hemorrhage, while a score < 10 was associated with a 3% rate (NINDS t-PA Stroke Study Group 1997).

Use the Calculator Now

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Calculator Creator

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References

Original/Primary Reference

- Lyden P, Brott T, Tilley B, et al. Improved reliability of the NIH Stroke Scale using video training. *Stroke*. 1994;25(11):2220-2226.
<https://www.ncbi.nlm.nih.gov/pubmed/7974549>

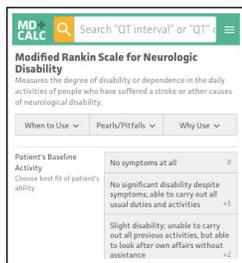
Validation References

- Johnston KC, Connors AF Jr, Wagner DP, et al. Predicting outcome in ischemic stroke: external validation of predictive risk models. *Stroke*. 2003;34(1):200-202.
<https://www.ncbi.nlm.nih.gov/pubmed/12511774>
- Adams HP Jr, Davis PH, Leira EC, et al. Baseline NIH Stroke Scale score strongly predicts outcome after stroke: A report of the Trial of Org 10172 in Acute Stroke Treatment (TOAST). *Neurology*. 1999;53(1):126-131.
DOI: <https://doi.org/10.1212/wnl.53.1.126>
- Schlegel D, Kolb SJ, Luciano JM, et al. Utility of the NIH Stroke Scale as a predictor of hospital disposition. *Stroke*. 2003;34(1):134-137.
<https://www.ncbi.nlm.nih.gov/pubmed/12511764>
- Rundek T, Mast H, Hartmann A, et al. Predictors of resource use after acute hospitalization: the Northern Manhattan Stroke Study. *Neurology*. 2000;55(8):1180-1187.
DOI: <https://doi.org/10.1212/wnl.55.8.1180>
- Appelros P, Terént A. Characteristics of the National Institute of Health Stroke Scale: results from a population-based stroke cohort at baseline and after one year. *Cerebrovasc Dis*. 2004;17(1):21-27.
DOI: <https://doi.org/10.1159/000073894>

Other References

- Yoo AJ, Barak ER, Copen WA, et al. Combining acute diffusion-weighted imaging and mean transit time lesion volumes with National Institutes of Health Stroke Scale Score improves the prediction of acute stroke outcome. *Stroke*. 2010;41(8):1728-1735.
DOI: <https://doi.org/10.1161/STROKEAHA.110.582874>
- NINDS t-PA Stroke Study Group. Intracerebral hemorrhage after intravenous t-PA therapy for ischemic stroke. *Stroke*. 1997;28(11):2109-2118.
DOI: <https://doi.org/10.1161/01.STR.28.11.2109>
- Brott T, Adams HP Jr, Olinger CP, et al. Measurements of acute cerebral infarction: a clinical examination scale. *Stroke*. 1989;20(7):864-870.
<https://www.ncbi.nlm.nih.gov/pubmed/2749846>

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Modified Rankin Scale (mRS) for Neurologic Disability

The modified Rankin Scale (mRS) for neurologic disability measures the degree of disability or dependence in the daily activities of people who have suffered a stroke.

Points & Pearls

- The modified Rankin Scale (mRS) assesses disability in patients who have suffered a stroke. The mRS score is compared over time to check for recovery and degree of continued disability. A score of 0 indicates no disability, a score of 5 indicates disability requiring constant care for all needs, and a score of 6 indicates death.
- The mRS has been used in clinical research for more than 30 years and is a common standard for assessing functional outcomes in patients with stroke.
- Multiple studies have shown that the mRS correlates with physiological indicators such as stroke type, lesion size, and neurological impairment as assessed by other stroke evaluation scales.

Points to keep in mind:

- There has been criticism that the mRS contains subject components that result in variability and bias that can lower the score's reliability.
- The use of structured interviews when assessing the mRS appears to result in improved interrater reliability, although the evidence for this effect is not completely consistent.

Critical Actions

The mRS is used to evaluate the degree of disability in patients who have suffered a stroke, but individual quality of life and independence are influenced by a wide variety of factors, including the presence of comorbidities and socioeconomic status.

Evidence Appraisal

The original Rankin Scale was introduced in 1957 by Dr. John Rankin. It was changed to the current modified Rankin Scale form for use in the UK-TIA (United Kingdom transient ischaemic attack) study (van Swieten 1988). The interrater reliability of

Why to Use

The mRS is widely used to measure the functional outcomes for patients who have suffered a stroke. It can also provide a common language for describing the degree of disability for these patients.

When to Use

The mRS can be used to help determine the degree of disability in patients who have suffered a stroke.

Next Steps

Decisions about further medical management, the need for physical and/or occupational therapy, and the degree of care that a patient requires can be partially informed by the mRS, but final determinations should be made on an individual basis.

Abbreviation: mRS, modified Rankin Scale.

the mRS was first assessed in a trial of 100 stroke patients who each participated in 2 separate interviews that were conducted by pairs of raters drawn from a group of 10 staff neurologists and 24 neurology residents. The overall kappa was 0.56 with a weighted kappa of 0.91.

A trial of 63 stroke patients evaluated by 2 raters found that the use of structured interviews to conduct the mRS improved reliability and decreased variability and bias (Wilson 2002). A similar trial of 113 patients assessed by 2 trained raters found that overall agreement between the raters was 43% without a structured interview (kappa = 0.25), while agreement improved markedly (81%, kappa = 0.74) when a structured interview was used (Wilson 2005). In 2007, Banks et al conducted a literature review and systematic analysis of 50 trials and found an overall moderate interrater reliability for the mRS (kappa = 0.56) that improved when structured interviews were used (kappa = 0.78).

In a study of 50 patients assessed using a simplified mRS questionnaire, paired raters had good

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agreement ($\kappa = 0.72$) and the average time to administer the simplified mRS was 1 minute and 40 seconds versus an average of 5 minutes for the standard mRS (Bruno 2010).

A systematic review that included 10 trials found wide variability in interrater reliability for the mRS ($\kappa = 0.25-0.95$) and only moderate reliability overall ($\kappa = 0.46$) (Quinn 2009). A study assessing the reliability of prestroke function as described by the mRS found 56% agreement for the standard mRS (weighted $\kappa = 0.55$; 95% confidence interval [CI], 0.39-0.71) and 70% agreement for prestroke mRS (weighted $\kappa = 0.70$; 95% CI, 0.53-0.87). The poor correlation of prestroke mRS with certain markers of function raised concerns about the validity of the mRS as a measure of prestroke function and introduced the possibility of bias in trial samples (Fearon 2012).

A 2015 trial compared mRS assessments completed by local evaluators to assessments completed by central evaluators who used either phone or video interviews. The study found that video assessment had higher agreement rates (weighted $\kappa = 0.92$; 95% CI, 0.88-0.96) than phone assessment (weighted $\kappa = 0.77$; 95% CI, 0.72-0.83), demonstrating the potential utility of video interviews for mRS assessment (López-Cancio 2015).

Use the Calculator Now

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

Calculator Creator

John van Swieten, MD, PhD

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References

Original/Primary Reference

- van Swieten JC, Koudstaal PJ, Visser MC, et al. Interobserver agreement for the assessment of handicap in stroke patients. *Stroke*. 1988;19(5):604-607.
<https://www.ncbi.nlm.nih.gov/pubmed/3363593>

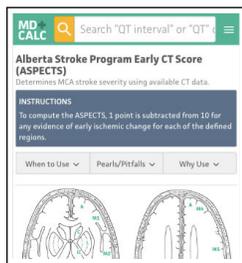
Validation References

- Banks JL, Marotta CA. Outcomes validity and reliability of the modified Rankin scale: implications for stroke clinical trials: a literature review and synthesis. *Stroke*. 2007;38(3):1091-1096.
DOI: <https://doi.org/10.1161/01.STR.0000258355.23810.c6>
- Fearon P, McArthur KS, Garrity K, et al. Prestroke modified Rankin stroke scale has moderate interobserver reliability and validity in an acute stroke setting. *Stroke*. 2012;43(12):3184-3188.
DOI: <https://doi.org/10.1161/STROKEAHA.112.670422>
- López-Cancio E, Salvat M, Cerdà N, et al. Phone and video-based modalities of central blinded adjudication of modified Rankin scores in an endovascular stroke trial. *Stroke*. 2015;46(12):3405-3410.
DOI: <https://doi.org/10.1161/STROKEAHA.115.010909>

Other References

- Wilson JT, Hareendran A, Grant M, et al. Improving the assessment of outcomes in stroke: use of a structured interview to assign grades on the modified Rankin Scale. *Stroke*. 2002;33(9):2243-2266.
DOI: <https://www.ncbi.nlm.nih.gov/pubmed/12215594>
- Wilson JT, Hareendran A, Hendry A, et al. Reliability of the modified Rankin Scale across multiple raters: benefits of a structured interview. *Stroke*. 2005;36(4):777-781.
DOI: <https://doi.org/10.1161/01.STR.0000157596.13234.95>
- Bruno A, Shah N, Lin C, et al. Improving modified Rankin Scale assessment with a simplified questionnaire. *Stroke*. 2010;41(5):1048-1050.
DOI: <https://doi.org/10.1161/STROKEAHA.109.571562>
- Farrell B, Godwin J, Richards S, et al. The United Kingdom transient ischaemic attack (UK-TIA) aspirin trial: final results. *J Neurol Neurosurg Psychiatry*. 1991;54(12):1044-1054.
DOI: <https://doi.org/10.1136/jnnp.54.12.1044>
- Quinn TJ, Dawson J, Walters MR, et al. Reliability of the modified Rankin Scale: a systematic review. *Stroke*. 2009;40(10):3393-3395.
DOI: <https://doi.org/10.1161/STROKEAHA.109.557256>

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Alberta Stroke Program Early CT Score (ASPECTS)

The Alberta Stroke Program Early CT Score (ASPECTS) assesses the severity of middle cerebral artery stroke using available computed tomography data.

Points & Pearls

- The Alberta Stroke Program Early CT Score (ASPECTS) quantifies computed tomography (CT) changes in early middle cerebral artery stroke. More early changes seen on CT suggest a poorer outcome from stroke.
- Patients with ASPECTS ≥ 8 points have a better chance for an independent outcome.

Points to keep in mind:

- ASPECTS does not predict treatment response or intracranial hemorrhage consistently, nor does it offer nuanced prognostic information.
- The score has been studied primarily in patients treated with or eligible for stroke reperfusion therapy, but many stroke patients do not qualify for that therapy.
- More recent studies have evaluated ASPECTS on the basis of the entire scale, as well as dichotomous (< 8 vs ≥ 8 points) or trichotomous (0-4 points, 5-7 points, and 8-10 points) divisions, but few robust prospective trials have been published.

Critical Actions

- ASPECTS relies on subtle CT findings and thus requires interpretation by an experienced radiologist. Its only validated use is as a binary variable (< 8 vs ≥ 8 points) for general outcome prediction in those patients who are eligible for reperfusion therapy.
- For patients being considered for intra-arterial tissue plasminogen activator administration, ASPECTS may be useful to exclude patients who are not likely to do well in terms of functional independence (ie, patients for whom intra-arterial treatment is likely to be futile) (Yoo 2014).

Evidence Appraisal

There appears to be a lack of consistency in studies evaluating the interrater reliability of ASPECTS.

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A trial using ASPECTS assessments of 43 patients by a senior radiology resident, a neuroradiology fellow, and 2 senior neuroradiologists found that agreement varied from 0.486 to 0.678 in Cohen's kappa coefficient when comparing the fellow to the neuroradiology staff, and 0.198 to 0.491 when comparing the radiology resident to the neuroradiology staff (Kobkitsuksakul 2018).

Using the binary outcome, a study of 34 cases found only 42% observer agreement for ASPECTS (kappa = 0.34) (Mak 2003). In contrast, a trial of 214 patients using the binary outcome compared CT scans read for ASPECTS in real time by the treating physician with later readings by an expert assessor, showing substantial agreement (weighted kappa = 0.69) (Coutts 2004).

Use the Calculator Now

[Click here to access the ASPECTS on MDcalc.](#)

Calculator Creator

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References

Original/Primary Reference

- Barber PA, Demchuk AM, Zhang J, et al. Validity and reliability of a quantitative computed tomography score in predicting outcome of hyperacute stroke before thrombolytic therapy. ASPECTS Study Group. Alberta Stroke Programme Early CT Score. *Lancet*. 2000;355(9216):1670-1674. DOI: [https://doi.org/10.1016/s0140-6736\(00\)02237-6](https://doi.org/10.1016/s0140-6736(00)02237-6)

Validation Reference

- Pexman JH, Barber PA, Hill MD, et al. Use of the Alberta Stroke Program Early CT Score (ASPECTS) for assessing CT scans in patients with acute stroke. *Am J Neuroradiol*. 2001;22(8):1534-1542. <https://www.ncbi.nlm.nih.gov/pubmed/11559501>

Other References

- Aviv RI, Mandelcorn J, Chakraborty S et al. Alberta Stroke Program Early CT Scoring of CT perfusion in early stroke visualization and assessment. *AJNR Am J Neuroradiol*. 2007;28(10): 1975-1980. DOI: <https://doi.org/10.3174/ajnr.A0689>
- Puetz V, Dzialowski I, Hill MD et al. The Alberta Stroke Program Early CT Score in clinical practice: what have we learned?. *Int J Stroke*. 2009;4(5):354-364. DOI: <https://doi.org/10.1111/j.1747-4949.2009.00337.x>

- Yoo AJ, Zaidat OO, Chaudhry ZA, et al. Impact of pre-treatment noncontrast CT Alberta Stroke Program Early CT Score on clinical outcome after intra-arterial stroke therapy. *Stroke*. 2014;45(3):746-751.
DOI: <https://doi.org/10.1161/STROKEAHA.113.004260>
- Kobbitsuksakul C, Tritanon O, Suraratdecha V. Interobserver agreement between senior radiology resident, neuroradiology fellow, and experienced neuroradiologist in the rating of Alberta Stroke Program Early Computed Tomography Score (ASPECTS). *Diagn Interv Radiol*. 2018;24(2):104-107.
DOI: <https://doi.org/10.5152/dir.2018.17336>
- Mak HK, Yau KK, Khong PL, et al. Hypodensity of >1/3 middle cerebral artery territory versus Alberta Stroke Programme Early CT Score (ASPECTS): comparison of two methods of quantitative evaluation of early CT changes in hyperacute ischemic stroke in the community setting. *Stroke*. 2003;34(5):1194-1196.
DOI: <https://doi.org/10.1161/01.STR.0000069162.64966.71>
- Coutts SB, Demchuk AM, Barber PA, et al. Interobserver variation of ASPECTS in real time. *Stroke*. 2004;35(5):e103-e105.
DOI: <https://doi.org/10.1161/01.STR.0000127082.19473.45>

Why to Use

Identification of patients who have a greater likelihood of poor functional outcome following middle cerebral artery stroke may be helpful in the early stages of care for supporting transfer or therapy decisions.

When to Use

ASPECTS can be used for patients presenting within the first minutes and hours of a stroke, when there is clinical suspicion for middle cerebral artery occlusion.

Next Steps

In patients who present with symptoms that are concerning for ischemic stroke, the following actions are generally considered to be standard practice:

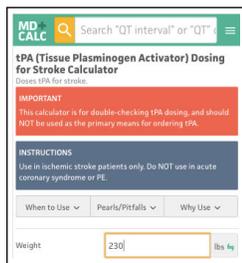
- Obtain a neurology consult.
- Determine the onset of stroke symptoms or the time the patient last felt or was observed as normal.
- Obtain a stat CT scan of the head to rule out hemorrhagic stroke.
- In appropriate circumstances and in consultation with both the neurologist and the patient, consider intravenous thrombolysis for ischemic stroke in patients who have no contraindications.
- Always consider stroke mimics in the differential diagnosis, especially in cases with atypical features (eg, age, risk factors, history, physical examination), including:
 - » Recrudescence of a previous stroke due to metabolic or infectious stress
 - » Todd paralysis after seizure
 - » Complex migraine
 - » Pseudoseizure or conversion disorder

Advice

Using the traditional cutoff scores (< 8 vs ≥ 8 points) as a rough estimate for predicting independence may help inform decisions. Some ASPECTS studies suggest that early CT changes in stroke may be a harbinger of poor outcomes.

Abbreviations: ASPECTS, Alberta Stroke Program Early CT Score; CT, computed tomography.

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tPA (Tissue Plasminogen Activator) Dosing for Stroke Calculator

The tPA dosing for stroke calculator indicates the weight-based dose of tPA for stroke patients.

Points & Pearls

- There are strict protocols concerning the appropriate administration of intravenous (IV) tissue plasminogen activator (tPA) in patients with ischemic stroke.
- For patients within the 3-hour window who meet the inclusion criteria and have no contraindications, earlier administration of tPA was associated with improved outcomes in 1 randomized trial (NINDS t-PA Stroke Study Group 1997).

Points to keep in mind:

- Administration of IV tPA for patients with acute ischemic stroke is associated with a significant increase in symptomatic intracranial hemorrhage, so it is essential to adhere to accepted protocols and to engage in shared decision-making with the patient and/or the family when considering treatment with tPA.
- The evidence and strength of recommendations for administration of tPA within the 3- to 4.5-hour window from symptom onset is less robust than for giving thrombolytics inside the 3-hour window.

Critical Actions

- Patients presenting with a potential acute ischemic stroke should have a noncontrast computed tomography scan of the head performed as soon as is safely possible.
- Any patient who is a candidate for IV thrombolysis with tPA should be evaluated carefully for any absolute or relative contraindications.
- The patient should be assessed using the National Institutes of Health Stroke Scale (NIHSS) as part of the evaluation. The assessment should be completed by an NIHSS-certified provider if one is available.
- While a high NIHSS score (> 22) is not an absolute contraindication to tPA within the 3-hour window, the rate of symptomatic or fatal intracranial hemorrhage is higher among this cohort.

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Why to Use

Because of the time-sensitive and high-stress nature of cases involving administration of IV tPA to patients with ischemic stroke, there is a risk for medication error. Using a calculator to double-check dosing prior to administration can reduce this risk.

When to Use

This calculator is intended solely for calculating the IV tPA (also known as alteplase) dose for ischemic stroke. It does not apply to dosing for acute coronary syndromes or pulmonary embolism.

Next Steps

In patients who present with symptoms that are concerning for ischemic stroke, the following actions are generally considered to be standard practice:

- Obtain a neurology consult.
- Determine the onset of stroke symptoms or the time the patient last felt or was observed as normal.
- Obtain a stat CT scan of the head to rule out hemorrhagic stroke.
- Administer tPA when indicated. The American Heart Association/American Stroke Association guidelines for administration of IV tPA include these criteria:
 - » Patient was last known well within the previous 3 hours.
 - » Age ≥ 18 years
 - » Blood pressure is $< 185/110$ mm Hg (or blood pressure can be lowered safely to $< 185/110$ mm Hg)
 - » Blood glucose level > 50 mg/dL

Individual institutions may have different absolute and relative contraindications for tPA administration.

Abbreviation: CT, computed tomography; IV, intravenous; tPA, tissue plasminogen activator.

- If the patient has an elevated blood pressure (systolic blood pressure > 185 mm Hg or diastolic blood pressure > 110 mm Hg) as the only contraindication to receiving tPA, consider using parenteral medication to lower the patient's blood pressure to an acceptable level. If the blood pressure can be adequately controlled, the patient may be given tPA if the other inclusion criteria are met and there are no other contraindications.
- When considering administration of tPA in the extended window (3-4.5 hours), clinicians should remember that an NIHSS score > 25 is generally considered a contraindication to thrombolysis.

Instructions

Use the tPA Dosing for Stroke Calculator only for ischemic stroke patients. Do NOT use this calculator for patients with acute coronary syndromes or pulmonary embolism.

Use the Calculator Now

[Click here to access the tPA Dosing Calculator for Stroke on MDCalc.](#)

References

Original/Primary Reference

- Genentech, Inc. Activase® (alteplase) product insert. Available at: https://www.accessdata.fda.gov/drugsatfda_docs/label/2015/103172s5203lbl.pdf. Accessed on July 1, 2019.

Validation Reference

- The NINDS t-PA Stroke Study Group. Intracerebral hemorrhage after intravenous t-PA therapy for ischemic stroke. *Stroke*. 1997;28(11):2109-2118. <https://www.ncbi.nlm.nih.gov/pubmed/9368550>

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