

Short-term Prognosis of Stroke Among Patients Diagnosed in the Emergency Department With a Transient Ischemic Attack

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Study objective: It is now clear that transient ischemic attacks and strokes are different manifestations of the same disease and transient ischemic attacks are often warning signs of an impending stroke. Unfortunately, it is unclear when the next event will occur in an individual patient. It is critical for emergency physicians to know what the true risk of stroke is for patients who present to the emergency department (ED) with a transient ischemic attack and a normal neurologic examination result. We perform an evidence-based emergency medicine shortcut review of the short-term outcome of stroke among patients diagnosed in the ED with a transient ischemic attack.

Methods: We searched PubMed for articles that studied patients with transient ischemic attack and reported their risk of stroke up to 30 days. We used standard criteria to appraise the quality of prognostic studies.

Results: Eight studies met the inclusion criteria; 5 were conducted prospectively and 3 had a retrospective design. Of the 5 prospective studies, only 2 enrolled patients from the ED. The 48-hour risk of stroke after transient ischemic attack ranged from 1.4% to 9.9% and the 7-day risk ranged from 3.8% to 12.8%. However, the 2 ED-based studies suggest that the short-term risk of having a stroke after a transient ischemic attack in the next 48 hours is approximately 3% to 5% and during the next week is 4% to 7%.

Conclusion: According to studies assessing the short-term prognosis of patients diagnosed with transient ischemic attack in the ED, approximately 1 in 20 patients will have a stroke during the following 48 hours. [Ann Emerg Med. 2008;51:316-323.]

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CLINICAL SCENARIO

You are the sole emergency physician working in a community practice setting with neurology on call by telephone 24 hours a day when a 65-year-old male patient is ushered into the emergency department (ED) by his wife, who states that her husband had a 15-minute episode of left facial droop, slurred speech, and left arm and leg weakness while eating breakfast. Now, in the ED, the patient states that he feels completely normal and really needs to get to work. The wife is very concerned and wants to know whether this “stroke” is likely to return. She asks, “Is he safe to go to work? Is he in any danger if he leaves the hospital?”

You know that at one of the hospitals you work at, nearly all transient ischemic attack patients are admitted, and at the other, most are discharged. You have never understood this inconsistency in practice and wonder about the data that underlie this phenomenon. What is the true short-term risk of a

stroke after a transient ischemic attack? Is risk of stroke high enough to warrant admission/observation in the event that thrombolytic therapy becomes necessary? The following evidence-based review seeks an answer to the question posed by the scenario.

FORMULATING THE QUESTION

We considered all candidate prognosis studies, including ED, general practitioner, and population-based studies. Presuming that the cohort of patients who present to the clinic weeks after their transient neurologic symptoms is likely to be different from the cohort of patients who rush to the nearest ED within hours of their symptoms, we decided to emphasize the estimates of risk in patients who presented to an ED within 48 hours of first-ever transient ischemic attack symptoms.

We do not expect to determine the risk of stroke in patients initially suspected of having a transient ischemic attack on arrival to the ED; our goal is to estimate the risk of stroke

among patients ultimately diagnosed with transient ischemic attack. Given that subtle transient ischemic attack presentations could be overlooked with this methodology, study results may overestimate the risk of stroke.

The period of short-term risk of stroke that emergency physicians care about most is probably the first 2 to 7 days because it would assist in making the critical decision of whether a patient needs to be admitted to the hospital for further evaluation and treatment or to be sent home for an outpatient evaluation. Regardless of the 30-day risk of stroke after a transient ischemic attack, if the 2- and 7-day risk is extremely low, transient ischemic attack patients could safely undergo prompt outpatient evaluation. On the other hand, if the 2- and 7-day risk of stroke is high, the emergency physician would likely want to facilitate the evaluation and treatment with admission to the hospital in hope of preventing a subsequent stroke.

The classic definition of transient ischemic attack is a neurologic deficit caused by focal brain ischemia that completely resolves within 24 hours. With the increased availability of sophisticated imaging modalities such as magnetic resonance imaging, the basic definition of transient ischemic attack has been questioned. The new proposed definition by the TIA Working Group is “a brief episode of neurologic dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting less than one hour, and without evidence of acute infarction.”¹ Given that the new definition is not universally accepted and remains controversial, we chose to use the classic (and current) definition of transient ischemic attack in our review.

We also used the standard clinical definition of stroke: neurologic deficit due to focal brain ischemia that lasts more than 24 hours. The degree of this deficit and its duration are variable. That said, this standard stroke definition is important to patients because it implies that they will still have ongoing impairments in their abilities to manage their day-to-day affairs to various degrees. Some patients may have problems only with buttoning a shirt, whereas others may be totally dependent for all their activities of daily living. Last, 11% to 18% of strokes are fatal.²

The cause of transient neurologic symptoms (and the course of the disease) is likely to be different between adults and children. Because the majority of patients presenting to the ED with transient ischemic attack symptoms are adults,³ we limited the study question to adults only.

In addition to knowing the overall short-term risk of stroke, we also want to know whether there are certain characteristics of the patient or the transient ischemic attack presentation that may predict a higher likelihood of stroke in the next few days. When studies attempt to elucidate these predictors, we will take note of the results with respect to identification of predictors of higher individual risk of completed stroke during the outcome period of interest, but there will be no attempt in this review to summarize quantitative instruments or prediction rules aimed at

identifying low-risk or high-risk groups with respect to short-term ischemic stroke after transient ischemic attack. Because such attempts involve different research designs and objectives from those aimed at estimating simple outcome rates, the quantitative prediction issues are being deferred to a subsequent article in this series.

We formulated our question as: What is the short-term risk (incidence within 2 to 7 days) of stroke after a transient ischemic attack among adult patients reliably assessed in the ED by either an emergency physician or neurologist?

SEARCHING FOR AND SELECTING THE BEST EVIDENCE

Older literature has focused predominantly on the long-term incidence of stroke after transient ischemic attack. More recent studies have reported stroke incidence during the 30 days after a transient ischemic attack, a much more relevant figure for patients and physicians. Although we are primarily interested in the risk of stroke in the first 2 to 7 days, we included all studies that reported stroke risk within 30 days of transient ischemic attack diagnosis. We used broader criteria for selecting studies than implied in our study question to capture all relevant studies in the event that our study question proved too restrictive.

Diagnosing transient ischemic attack is not always simple.⁴ Studies demonstrate that there is substantial interobserver disagreement.⁵⁻⁸ However, in one large study in which the ED diagnosis of transient ischemic attack was reviewed by a neurologist, the diagnosis was thought to be “improbable” in only 5.6% (92 patients) of the total cohort of patients diagnosed with transient ischemic attack.¹⁴ To capture a reliable cohort of transient ischemic attack patients, we wanted to include only studies that had transient ischemic attack diagnosed by emergency physicians or neurologists.

We excluded studies of pediatric patients, studies that report stroke incidence only beyond 30 days, and studies of patients with surgical interventions in the enrollment criteria (eg, transient ischemic attack outcome after valve replacement or carotid endarterectomy).

We sought to conduct an evidence-based shortcut review (not a full systematic review), and thus the following methodologic shortcuts were taken: only PubMed was used, only English-language papers were included, no effort was made to find unpublished studies, methodology was assessed only in qualitative terms, and estimates of risk were not combined.

We searched for studies that reported the incidence of stroke after transient ischemic attack in PubMed by casting a wide net for all prognosis or outcome studies of transient ischemic attack. We combined the following free-text terms: (“transient ischemic attack” OR “TIA”) AND (“prognosis” OR “outcome”). After limiting this search to the English language, adults (≥ 19 years), and humans, the database yielded 851 results. After review of the titles and abstracts for clear exclusion criteria (ie, pediatric studies, report of long-term risk of stroke only, surgical interventions as enrollment criteria), 38 articles were identified for detailed review.

Thirty-seven full-text articles were independently reviewed by 2 of the authors (K.H.S. and J.A.E.) to determine inclusion in the review. One article published in Bulgaria that followed 54 patients with reversible ischemic neurologic deficits for 1 year could not be obtained.⁹ We wanted to review the article to ensure that transient ischemic attack patients were not included in the cohort of reversible ischemic neurologic deficits patients. Because the cohort was small and reversible ischemic neurologic deficits patients are typically considered to be a separate group from transient ischemic attack or stroke, we believe the absence of this one article does not compromise the analysis of the search results. Inclusion criteria were (1) adult patients, (2) diagnosis of transient ischemic attack, and (3) report of 2- or 7-day risk of stroke after transient ischemic attack. With 100% concordance, 7 articles were selected and 30 articles were excluded. The bibliographies of the selected articles were reviewed to further capture all articles relating to our question of interest. One additional article was identified from the bibliographies that met inclusion criteria, for a total of 8 studies that report short-term risk of stroke after transient ischemic attack.¹⁰⁻¹⁷

ANALYZING THE EVIDENCE

Description of the Studies

Among the 8 studies selected, 5 were prospective and 3 were retrospective. Only 2 of the 5 prospective studies were based exclusively on ED visits; the other 3 studies relied predominantly on general practitioners to identify transient ischemic attack patients in the clinic/outpatient setting.

Table 1 summarizes the key features of the studies selected for review.

Susceptibility to Bias of the Studies

Table 2 summarizes our assessment of the likelihood of bias in the 8 studies.

The 3 retrospective studies^{13,15,17} are probably the least reliable because of the inherent bias in the retrospective design and particularly diagnostic uncertainty. Both Hill et al¹³ and Kleindorfer et al¹⁵ identified patients with *International Classification of Diseases, Ninth Revision* codes, and it remains unclear how follow-up was performed and how subsequent stroke was determined. Tsvigoulis et al¹⁷ also conducted the study retrospectively but had less susceptibility to bias in the methods because patients were all initially treated by an attending neurologist on presentation to the ED of the neurology department, and the outcome criteria were well defined, with only 5 of 238 patients lost to follow-up.

The enrolled patients in 3 of the prospective studies were identified by general practitioners at their local clinics/offices.^{10,11,16} These patient samples are not representative of our target ED population. Attempts were made in 2 of the studies to collect a well-defined sample of properly diagnosed transient ischemic attack patients: Lovett et al¹⁶ required a neurologist evaluation of all enrolled patients, and Correia et al¹⁰ required the general practitioners to attend

workshops and use standard definitions of transient ischemic attack and stroke. However, the patients were still identified in the outpatient setting, thereby making them a potentially different cohort of patients compared with those who present to an ED.

The 2 prospective studies that best answer our study question with the least amount of bias were done by Johnston et al¹⁴ and Gladstone et al.¹² Both studies were limited to patients who presented to the ED and were diagnosed by emergency physicians. Follow-up was complete and sufficiently short. The only salient flaw in the Gladstone et al¹² study is that they only followed transient ischemic attack patients who were discharged from the ED (and not the 24% who were admitted to the hospital); this would likely result in a selection bias toward a healthier transient ischemic attack patient population. Because of this methodology, Gladstone et al¹² likely underestimated the short-term risk of stroke after transient ischemic attack.

Primary Results

The short-term risk of stroke after transient ischemic attack reported in each of the reviewed articles is presented in Table 3.

The 2 high-quality, prospective, ED-based studies with well-documented criteria for diagnosis of transient ischemic attack and outcome varied slightly in their estimation of short-term risk of stroke.^{12,14} Gladstone et al¹² reported a slightly lower 2- and 7-day risk of stroke at 2.6% and 3.8%, whereas Johnston et al¹⁴ reported a 5.3% and 7.0% risk. Given that Gladstone et al¹² followed only transient ischemic attack patients who were discharged from the ED, the true short-term risk of stroke is probably more accurately reflected in the Johnston et al¹⁴ study.

Gladstone et al¹² performed a subgroup analysis for first-ever transient ischemic attack; the results are not substantially different. The 48-hour risk of stroke was 4.2% and the 7-day risk of stroke was 6.0%.

The other 3 prospective studies estimated the risk of stroke after transient ischemic attack to be slightly higher, with 48-hour risk ranging from 5% to 10% and the 7-day risk ranging from 8% to 13%.^{10,11,16}

Two of the 3 retrospective studies reported 48-hour risks of stroke slightly lower, at 1.4% and 3.9%, and only 1 reported a 7-day risk at 7%.^{13,15} The best-designed retrospective study by Tsvigoulis et al¹⁷ reported only a 30-day risk of stroke. The retrospective studies had results similar to those of the prospective studies (same direction and similar magnitude).

These strokes are clinically relevant events. In the Johnston et al¹⁴ study, which reported stroke severity, 64% were disabling (defined by a modified Rankin score of ≥ 2 , which means that, at best, patients were unable to carry out all previous activities but able to look after their own affairs without assistance) and 21% were fatal. These strokes that followed transient ischemic attack were clearly ones that were relevant to patients and their families and would likely figure into their decisionmaking.

Table 1. Summary of studies selected for short-cut review.

Study	Patients	Individual Predictors Examined	Outcomes Reported	Study Design
Correia et al, 2006 ¹⁰	141 first-known-episode TIA patients identified by general practitioners, neurologists, and emergency physicians (population-based registry from Northern Portugal) during 2 years, and followed up at 3 and 12 months. Patients with previous CVA or TIA were excluded.	Predictors of stroke within 120 days after TIA Age >65 Episode in the carotid distribution Duration of symptoms >3 h	TIA incidence and risk of stroke following index TIA at 2, 7, and 30 days and at 1 y	Prospective cohort
Coull et al, 2004 ¹¹	87 TIA and 87 minor CVA patients from 63 general practitioners in 9 family health centers in Oxfordshire, England, during 1 year. Included first or recurrent TIA or minor stroke (≤ 3 on NIH stroke scale). Excluded patients with NIH stroke score ≥ 3 .	No individual predictors The TIA patients were analyzed separately from the stroke patients.	Incidence of stroke at 7 days, 1 mo, and 3 mo after TIA or minor stroke	Prospective cohort
Gladstone et al, 2004 ¹²	271 TIA patients discharged from ED were followed for stroke, death, and readmission. Ontario Stroke Registry prospectively identified consecutive patients with cerebrovascular disease who presented to the ED during 8 months.	No individual predictors measured	Incidence of stroke after first TIA at 2, 7, 30, and 90 days	Prospective cohort
Hill et al, 2004 ¹³	2,285 patients in Alberta with ICD-9 diagnosis of TIA in ED, 1,475 of which were first-known-episode TIA identified by Alberta public health insurance during 1 y. ED diagnoses only (physician office visits excluded)	Hazards ratios showing difference between stroke free survival in patients with diabetes, hypertension, age >65 y, rural-urban residence, and first ever TIA.	Incidence of TIA and stroke after TIA at 2 days, 30 days, and 90 days. Also incidence of stroke, recurrent TIA, MI, and death within 1 y.	Retrospective cohort
Johnston et al, 2000 ¹⁴	1,797 adult ED patients from Kaiser-Permanente Northern California with a primary diagnosis of TIA during 1 y who were followed for 90 days. Excluded those who did not have ED records available (n=30), were not members of the health plan (n=27), had coded diagnoses other than TIA (n=25), or had a previous TIA treated in the ED during the study period (n=8).	5 Factors associated with stroke Age >60 y Diabetes Symptom duration >10 min Weakness Speech impairment	Incidence of stroke during the 2 and 90 days after index TIA. Adverse events, including death, recurrent TIA, and hospitalization for cardiovascular events.	Prospective cohort
Kleindorfer et al, 2005 ¹⁵	927 TIA patients from Greater Cincinnati/Northern Kentucky metropolitan region found to have a diagnosis of TIA. Sources: inpatient diagnosis of TIA, ED diagnosis of TIA, and from a random sample of local primary care offices/clinics, nursing homes, and coroner's offices during 1 y.	Age, race, and sex. Study was unable to evaluate affect of concomitant medical conditions because of a lack of information on patients	Incidence of recurrent TIA, stroke, and death after TIA at 2 days, 7 days, 1 mo, 2 mo, 3 mo, and 6 mo Age-specific incidence of TIA by race (black and white) and sex	Retrospective cohort
Lovett et al, 2003 ¹⁶	209 patients from the Oxfordshire Community Stroke Project, registered as first-known-episode TIA during the 5-year study period. Identified by family practitioners and referred to neurologist.	No individual predictors	Incidence of stroke after first ever TIA at 7 days and 30 days	Prospective cohort
Tsivgoulis et al, 2006 ¹⁷	238 consecutive patients hospitalized during 5-year period with a diagnosis of definite TIA. All patients presenting to the ED of the neurology department primarily screened by the attending neurologist.	ABCD score: Age Blood pressure Clinical features Duration of symptoms	30-Day stroke risk	Retrospective cohort

TIA, Transient ischemic attack; CVA, cerebrovascular accident; NIH, National Institutes of Health; ICD-9, *International Classification of Diseases, Ninth Revision*; MI, myocardial infarction.

APPLYING THE EVIDENCE

Returning to our clinical scenario of the 65-year-old man who presented after a 15-minute transient ischemic attack, there

are at least 2 important issues to address: risk of stroke and outcome of such an event. The evidence from the studies we selected is certainly applicable to our clinical scenario because

Table 2. Critical appraisal of selected studies.

Study	Are Enrolled Patients Representative of an ED Population?	Well-Defined Sample of TIA Patients? Properly Diagnosed?	Are Patients at a Similar Point in the Disease?	Objective and Unbiased Outcome Criteria?	Was Follow-up Complete and Sufficiently Short?
Correia et al, 2006 ¹⁰	Partly; population: residents of northern Portugal presenting to GP offices, emergency departments or local hospitals.	Yes; all GPs and neurologists attended workshops, used standard definitions and all diagnoses reviewed by primary investigator	Yes; all patients are first ever TIA without history of stroke; 48.2% presented within 48 h and 61.7% presented within 7 days of symptom onset.	All patients were followed up by a study neurologist at 3 and 6 mo	Yes; according to authors, all patients had follow-up at 3 and 6 mo
Coull et al, 2004 ¹¹	Partly; population: 90,542 registered patients at 63 GP offices in 9 family health centers in Oxfordshire, England, including patients diagnosed in the ED.	Maybe; standard definition of TIA diagnosed by GPs and found in hospital records. No reviewing body for accuracy of diagnosis. Neurologists were not involved in the diagnosis of TIA.	Maybe; does not mention time of event to when they presented to a physician. Included first or recurrent TIA or minor stroke.	Yes; follow-up performed by study nurse at 1 and 3 mo; if nurse suspected a recurrent event, the patient was reexamined by a study neurologist	Maybe; study does not provide numbers on lost to follow-up. Follow-up performed at 1 and 3 mo
Gladstone et al, 2004 ¹²	Partly; population: Ontario Stroke Registry representing 11.5 million people but limited to those who presented to ED, diagnosed with TIA and discharged home. Admitted TIA patients not included.	Yes; all patients diagnosed as TIA within 24 h of arrival to ED. Evaluation by attending physicians but does not specify their specialty	Maybe; all presented to the ED but no mention of symptom onset time. Included patients with previous TIA and previous stroke	Unclear; outcome criteria from ICD-9 billing codes for stroke	Yes; 90-day follow-up but did not capture strokes presenting to nonaffiliated hospital or who died in another area. 6 (0.02%) Non-Ontario residents were lost to follow-up
Hill et al, 2004 ¹³	Yes; population: all residents of Alberta except military and police (1%), identified by ICD-9 codes, excluding patients diagnosed in primary care office without ED visit.	Sample: all patients with ICD-9 diagnosis of TIA in inpatient, ED, or mortality data. Excluded primary care TIA diagnosis without ED visit because of known poor accuracy. Diagnosis depends on accuracy of ICD-9 codes. Specialty of evaluating physician not specified.	Yes; patients divided according to first ever TIA and those having previous cerebral event. Does not give average time from incident event to time of medical evaluation	Unclear; follow-up done by medical record and billing review	Yes; follow-up by administrative data from 4 databases performed for 1 y for all patients
Johnston et al, 2000 ¹⁴	Yes; population: 2.9 million enrollees visiting 16 hospitals of HMO (Kaiser-Permanente) in northern California and diagnosed in the ED.	Yes; patients diagnosed with TIA by ED physician. Yes; above sample reviewed by a neurologist blinded to outcomes	99% Of patients presented within 1 day of symptoms. 26% With previous TIA and 23% with previous stroke	Diagnosis required independent confirmation by 2 neurologists (who reviewed the charts). Standard criteria for diagnosis	Unclear; follow-up obtained for 90 days but does not provide specific numbers
Kleindorfer et al, 2005 ¹⁵	Partly; population: Greater Cincinnati/North Kentucky Stroke Study, representing 1.3 million people presenting to regional hospitals, EDs, GPs, and nursing homes.	Yes; sample identified by medical records as having ICD-9 diagnosis of TIA within the study period. Cases reviewed by study nurse and borderline cases reviewed by study neurologist	Maybe; no mention of time of TIA to time evaluated. Included both first-time TIA and those with history of TIA or stroke	Unclear; does not mention how follow-up was performed or how subsequent TIA or stroke was determined	Yes; all TIA and strokes after index TIA should have been captured unless patient moved outside study area or did not seek medical attention. Does not give number lost to follow-up

Table 2. Continued

Study	Are Enrolled Patients Representative of an ED Population?	Well-Defined Sample of TIA Patients? Properly Diagnosed?	Are Patients at a Similar Point in the Disease?	Objective and Unbiased Outcome Criteria?	Was Follow-up Complete and Sufficiently Short? ->
Lovett et al, 2003 ¹⁶	No; population: Oxfordshire Community Stroke Project includes approximately 105,000 patients from 10 family practices (patients identified by 50 family physicians)	Yes; all patients registered as first ever definite TIA during the study period, with patients evaluated by a neurologist	Probably; only included first ever definite TIA, but patients presented to the study at various times after incident TIA, including 30 patients who registered after having stroke	Unclear; does not mention how follow-up was performed	Yes; follow-up short enough; performed at 7 and 30 days No exact numbers on those lost to follow-up
Tsivgoulis et al, 2006 ¹⁷	Yes; all patients presented to the ED	All patients were evaluated by a neurologist on presentation to the ED	No mention of time of symptoms relative to ED presentation	Yes; well-defined stroke definition	5 (0.02%) Patients were lost to follow-up at 30 days

GP, General practitioner; HMO, health maintenance organization.

Table 3. Short-term risk of stroke after transient ischemic attack.

Study	Stroke Outcome, %		
	2 Days (95% CI)	7 Days (95% CI)	30 Days (95% CI)
Correia et al, 2006 ¹⁰	9.9 (5.0–14.8)	12.8 (7.3–18.3)	17.7 (11.4–24.0)
Coull et al, 2004 ¹¹	nr	8.0 (2.3–13.7)	11.5 (4.8–18.2)
Gladstone et al, 2004 ^{12*}	2.6 (1.1–5.4)	3.8 (1.8–6.9)	4.9 (2.6–8.4)
Hill et al, 2004 ¹³	1.4 (1.0–1.8)	nr	6.7 (5.7–7.7)
Johnston et al, 2000 ^{14*}	5.3 (4.3–6.5)	7 [†]	9 [†]
Kleindorfer et al, 2005 ^{15*}	3.9 (2.9–5.3)	7.0 (5.6–8.8)	11.2 (9.4–13.3)
Lovett et al, 2003 ¹⁶	nr	8.6 (4.8–12.4)	12.0 (7.6–16.4)
Tsivgoulis et al, 2006 ¹⁷	nr	nr	9.7 (5.8–13.6)

CI, Confidence interval; nr, not reported.

*Calculated 95% CI from <http://graphpad.com/quickcalcs/ConfInterval1.cfm>.

[†]Numbers estimated from graph.

the patient quickly presented to an ED and was assessed by an emergency physician. The data suggest that his risk of having a stroke in the next 48 hours is approximately 3% to 5% and during the next week is 4% to 7%.^{12,14} If he were to have a stroke, the chances are 1 in 5 that it would be fatal and 3 in 5 that he would have some kind of measurable long-term disability. If we consider some factors that have been associated with a higher risk of stroke,^{14,17} our patient is concerning: he is older than 60 years, speech impairment and weakness were present, and symptoms lasted for more than 10 minutes.

Implicit in a question about the timing of a stroke after transient ischemic attack are at least 2 other issues. Are there acute diagnostic tests that need to be done urgently? And are there acute treatments? Rapid evaluation is important to try to exclude diagnostic mimics and to define the underlying vascular lesion. For example, imaging the carotid arteries may detect flow-limiting stenoses, and electro- and echocardiography may find potential sources of cardioembolism. Both of these findings trigger acute treatments: significant carotid stenosis can be corrected with carotid endarterectomy, and potential cardioembolic events may be prevented with full anticoagulation. Last, although the economic justification of admitting transient ischemic attack patients for tissue plasminogen activator use (in case of early stroke) remains in question, this is a potential reason for admitting such patients.¹⁸

PATIENT COMMUNICATION

The American Heart Association and other medical organizations, as well as the lay press, have increasingly focused on cerebrovascular disease in recent years.¹⁹ As this problem becomes more visible, patients will become better informed and will often have questions about the rationale for our medical decisionmaking. The following is an example of how an emergency physician might convey the risks of subsequent stroke to a patient presenting to the ED with a transient ischemic attack. In practice, the details of such a communication will be modified to reflect the actual clinical circumstances.

“We believe that you had what is called a TIA, or transient ischemic attack. This means that the area of your brain that controls your ability to move the left side of your body was temporarily not getting enough blood flow. In your case, the decreased blood flow resolved by itself and now the question is, what is the likelihood that these symptoms will return and be permanent, which is to say, that you will have a stroke?”

Transient ischemic attack and stroke are both parts of the same disease, but there is not wide agreement on whether or not to admit patients with transient ischemic attack to the hospital. The best information we have is that about 1 in 20 patients with a transient ischemic attack will have a stroke in the next 48 hours and that risk increases slightly during the next week. If you happen to be one of these patients who have a stroke, you have a 15% chance that it will be a fatal event and a 60% chance that you will have some long-term disability.² Your best option is to take an aspirin, or something similar, now but you will also need other tests to be done urgently to see whether the cause of your transient ischemic attack requires additional treatment. We would ordinarily recommend admission to the hospital to expedite these tests, and there would be the added potential advantage of having ‘clot buster’ therapy or ‘lytics’ immediately available; however, another approach is to do these tests with your primary care physician outside the hospital in the next few days.”

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Critically Appraised Topic (CAT): Short-term risk of stroke after transient ischemic attack.

Question	What is the 48-hour and 7-day risk of stroke after a TIA?
Reviewed by	Shah K, Kleckner K, and Edlow J
Date of search	2006
Expiration date	2008
Clinical bottom line	Current available data suggest that the 48-hour risk of TIA is approximately 3% to 5% and the 7-day risk is approximately 4% to 7%.
Search strategy	The search for studies that reported the incidence of stroke after TIA in PubMed was performed by combining the following broad terms: ("transient ischemic attack" or "TIA") and ("prognosis" or "outcome"). The search was then limited to English language, adults (≥ 19 years), and humans.
Citations	Prospective, ED-based studies selected 1. Johnston SC, Gress DR, Browner WS, et al. Short-term prognosis after emergency department diagnosis of TIA. <i>JAMA</i> . 2000;284:2901-2906. 2. Gladstone DJ, Kapral MK, Fang J, et al. Management and outcomes of transient ischemic attacks in Ontario. <i>CMAJ</i> . 2004;170:1099-1104.
Primary study characteristics	Study Population Johnston et al followed 1,797 ED patients from Kaiser-Permanente in northern California, with a primary diagnosis of TIA for 90 days. Gladstone et al followed 271 Canadian patients with TIA discharged from the ED for 90 days. Outcome Measures Both studies reported the risk of stroke in the 90 days after the index TIA. Johnston et al reported 48-hour risk of stroke, and the 7-day risk was extrapolated from the survival curve. Gladstone reported 48-hour and 7-day risk of stroke. Critical appraisal Gladstone et al followed only those TIA patients who were discharged from the ED; this cohort of relatively more healthy patients explains the relatively lower estimates of short-term stroke risk compared to the risk estimated by Johnston et al.

Results

TIA Study	48-h Stroke Risk, %	7-Day Stroke Risk, %
Johnston et al	5.3 (4.3–6.5)	7 (estimated)
Gladstone et al	2.6 (1.1–5.4)	3.8 (1.8–6.9)