Door to TPA in 60 minutes

Where does the time go?

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FINANCIAL DISCLOSURE:
No relevant financial relationship exists
During acute ischemic stroke, a blood vessel is occluded which blocks blood flow to an area of the brain. As this area is deprived of nutrition and oxygen, it slowly begins to die.

The symptoms of stroke are related to the specific functions of the area that is being deprived.
In Acute Stroke

• “The typical patient loses 1.9 million neurons each minute in which stroke is untreated”.

• “Compared with the normal rate of neuron loss in brain aging, the ischemic brain ages 3.6 years each hour without treatment.”

Saver, Jeffrey L. Comments, Opinions, and Reviews. Stroke. 2006;37:263-266
Current Treatment for Stroke

• Since 1996, there has only been one medication approved for the acute treatment of ischemic stroke
TISSUE PLASMINOGEN ACTIVATOR FOR ACUTE ISCHEMIC STROKE

The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group*

Abstract  Background. Thrombolytic therapy for acute ischemic stroke has been approached cautiously because there were high rates of intracerebral hemorrhage in early clinical trials. We performed a randomized, double-blind trial of intravenous recombinant tissue plasminogen activator (t-PA) for ischemic stroke after recent pilot studies suggested that t-PA was beneficial when treatment was begun within three hours of the onset of stroke.

Methods. The trial had two parts. Part 1 (in which 291 patients were enrolled) tested whether t-PA had clinical activity, as indicated by an improvement of 4 points over base-line values in the score of the National Institutes of Health stroke scale (NIHSS) or the resolution of the neurologic deficit within 24 hours of the onset of stroke. Part 2 (in which 333 patients were enrolled) used a global test statistic to assess clinical outcome at three months, according to scores on the Barthel index, modified Rankin scale, Glasgow outcome scale, and NIHSS.

Results. In part 1, there was no significant difference between the group given t-PA and that given placebo in the percentages of patients with neurologic improvement at 24 hours, although a benefit was observed for the t-PA group at three months for all four outcome measures. In part 2, the long-term clinical benefit of t-PA predicted by the results of part 1 was confirmed (global odds ratio for a favorable outcome, 1.7; 95 percent confidence interval, 1.2 to 2.6). As compared with patients given placebo, patients treated with t-PA were at least 30 percent more likely to have minimal or no disability at three months on the assessment scales. Symptomatic intracerebral hemorrhage within 36 hours after the onset of stroke occurred in 6.4 percent of patients given t-PA but only 0.6 percent of patients given placebo (P<0.001). Mortality at three months was 17 percent in the t-PA group and 21 percent in the placebo group (P = 0.30).

Conclusions. Despite an increased incidence of symptomatic intracerebral hemorrhage, treatment with intravenous t-PA within three hours of the onset of ischemic stroke improved clinical outcome at three months. (N Engl J Med 1995;333:1581-7.)
TPA

• The original TPA trial led to the approval of IV tpa up to 3 hours after symptom onset.
• After 3 hours, the risk of hemorrhage increased and the chance for a functional outcome decreased.
Current Recommendations from the AHA

• Intravenous rt-PA is recommended for selected patients who may be treated within 3 hours of onset of ischemic stroke (Class I Recommendation, Level of Evidence A)
Discussing shadows in a field, an American sage once famously observed, "It gets late early out there."
So why 60 mins?

- As IV tpa was studied more, pooled data from 6 randomized placebo-controlled trials were analyzed.
- This demonstrated that the sooner that IV rt-PA is given to stroke patients, the greater the benefit, especially if started within **90 minutes** of symptom onset.

Time to hospital

• Average time from 911 call to arrival at hospital for acute stroke study patients was 28 minutes.

• Community Socioeconomic Status and Prehospital Times in Acute Stroke and Transient Ischemic Attack: Do Poorer Patients Have Longer Delays From 911 Call to the Emergency Department? Kleindorfer, Lindsell, et al.
ASA/AHA Guidelines

• In patients eligible for intravenous rtPA, benefit of therapy is time dependent, and treatment should be initiated as quickly as possible. The door-to-needle time (time of bolus administration) should be within 60 minutes from hospital arrival (Class I; Level of Evidence A). (New recommendation)
Mr. C

- Door to needle 17 mins
Original Contribution

Stoke Thrombolysis

Save a Minute, Save a Day

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Abstract

Background and Purpose—Stroke thrombolysis is highly time-critical, but data
on long-term effects of small reductions in treatment delays have not been
available. Our objective was to quantify patient lifetime benefits gained from
faster treatment.

Methods—Observational prospective data of consecutive stroke patients treated
with intravenous thrombolysis in Australian and Finnish centers (1998-2011; n=2258)
provided distributions of age, sex, stroke severity, onset-to-treatment
times, and 3-month modified Rankin Scale in daily clinical practice. Treatment
effects derived from a pooled analysis of thrombolysis trials were used to model
the shift in 3-month modified Rankin Scale distributions with reducing treatment
delays, from which we derived the expected lifetime and level of long-term
So now what!!!!
### Why do the 60 minutes go so fast?

#### 0-10 minutes:
- Arrival
- Registration
- Triage (VS, History, Translation, other mandatory questionnaires)
- Neuro exam/ Cincinnati/FAST?
- Alerting the responsible MDs and RNs for bed
- Documentation
- Did anyone call the stroke team yet?

#### 10-25 minutes
- EKG
- IV placement, Labs
- Changing patient
- Hooking up to a monitor
- More history, medication history, when were they last seen normal?
- Neuro assessment
- Vital signs
- Order the CT
- Transportation to CT
- Is the stroke team there yet?

#### 25-45 minutes
- Getting patient off the table
- Transportation back to ED
- Second IV line Line
- More history?
- Order TPA
- Getting a weight
- Who is making the decision to treat?
- Indecisive patients/family
- Waiting for CT reading

#### 45-60 mins
- Calculating the dose
- Double check by second practitioner
- Obtaining TPA
- Mixing TPA
- Setting Pump
In Acute Ischemic Stroke
• tPA 0-3 hours (up to 4.5 hours in selected patients)
• IA tPA 0-6 hours
• Interventional clot retrieval/aspiration up to 8 hours in selected patients
• Basilar artery recanalization may be attempted up to 12 hours
TEAM WORK

- EMS
- ED nurses (bedside and triage)
- Stroke team members
- Stroke Neurologist
- ED physician
- ED patient care tech
- Pharmacy
- Transporter
- Radiologist
- CT tech
What can happen before arrival?

EMS providers should obtain as much history at the scene as possible.

- TIME OF ONSET
- TIME OF ONSET
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- Medical/Surgical Hx
- Medications
What can happen before arrival??

• IV lines
• Drawing labs only if can be sent to lab on arrival
• Checking glucose

Although all these interventions may be helpful in reducing door to needle time, none of these should be performed if it presents a delay in transportation
Pre-notification

- As is the case for patients with trauma or acute myocardial infarction, prehospital notification by EMS of a potential stroke is essential.

- Several studies have shown that prehospital notification leads to significant reductions in several stroke time benchmarks, and is associated with higher rates of intravenous rtPA administration.
Arrival

0-10 minutes \(\rightarrow 5\) mins

- Registration
- Triage (VS, History, Translation, other mandatory questionnaires)
- Neuro exam/ Cincinnati/ FAST?
- Alerting the responsible MDs and RNs for bed
- Documentation
- Did anyone call the stroke team yet?
Arrival Best Practices

• Single pager system to include Stroke Team, CT tech (clear the table), and Radiologist
• Stroke Page immediately after pre-notification
• Stroke Team decision makers at door waiting
• Quick registration (name and DOB) only for CT and labs
• Stroke Order Sets: Labs, CT, TPA
Diagnostic Tests

10-25 minutes------------->5 mins
- EKG
- Hooking up to a monitor
- IV placement
- Labs
- Changing patient
- More history, medication history, when were they last seen normal?
- Neuro assessment
- Vital signs
- Order the CT
- Transportation to CT
- Is the stroke team there yet?
Best Practices: Diagnostic Testing

- EKG- The EKG can be performed after the CT and while the IV tpa is being infused.
- Hooking up to a monitor- The patient should be placed on a portable monitor for transport and can be placed on a hard wired monitor after CT.
Best Practices: Neurological Exam

- An initial neurological exam should be brief
- Formal stroke scores or scales, such as the NIHSS or Canadian Neurological Scale, may be performed rapidly, and help select patients for various interventions, and identify the potential for complications.

Best Practices/Current Guidelines - Laboratory

• Fibrinolytic therapy should not be delayed while awaiting the laboratory results unless a bleeding abnormality is suspected, or if the patient may have been taking an anticoagulant.

• The only laboratory result required prior to initiating thrombolytics in most patients is a finger stick blood glucose level.
Best Practices-CT scan

- Standard Orders for Stroke to include non-contrast head CT
- CT tech on stroke pager to clear the table
- CT close to ED to decrease transportation times
- Wet reads acceptable to begin TPA
- Hold off on CTP/CTA until after initiation of IV tpa unless patient has already been ruled ineligible for IV tpa
- While patient is in CT, begin discussing IV tpa with patient and family
- Pre-mix IV TPA while patient is in CT
Determining Eligibility

25-45 minutes\longrightarrow 5 \text{ mins}

- Transportation back to ED
- More history?
- Order TPA
- Getting a weight
- Who is making the decision to treat?
- Indecisive patients/family
- Waiting for CT reading
Best Practices-Determining Eligibility

• Final Review of inclusion and exclusion (Are you sure that they haven’t had brain surgery recently?)

• TIME OF ONSET, TIME OF ONSET, TIME OF ONSET

• Weight- Use stretcher scales or roll over scales outside CT

• No written informed consent- TPA is standard of care
Administration of TPA

45-60 mins

- Calculating the dose
- Double check by second practitioner
- Obtaining TPA
- Mixing TPA
- Setting Pump
Administration Best Practices

- TPA kits can be kept in the ER to decrease times, if keeping it in the pharmacy presents a delay.
- Infusion Pumps also in ED.
- IV tpa (for stroke) programmed into pump
GO!
How to give it **EVEN FASTER!**

- Pre-registration
- Eliminate the transportation time
- EMS takes to CT
- Stroke Team determines eligibility while in triage and en route to CT
- TPA administered in CT
References

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• Community Socioeconomic Status and Prehospital Times in Acute Stroke and Transient Ischemic Attack: Do Poorer Patients Have Longer Delays From 911 Call to the Emergency Department? Dawn O. Kleindorfer, Christopher J. Lindsell, Joseph P. Broderick, Matthew L. Flaherty, Daniel Woo, Irene Ewing, Pam Schmit, Charles Moomaw, Kathleen Alwell, Arthur Pancioli, Edward Jauch, Jane Khoury, Rosie Miller, Alexander Schneider and Brett M. Kissela. Stroke. 2006;37:1508-1513; originally published online May 11, 2006;

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