

Project: Ghana Emergency Medicine Collaborative

Document Title: Stroke Management in the 21st Century: What Do You Need to Know?

Author(s): Rashmi Kothari (Michigan State University), MD 2012

License: Unless otherwise noted, this material is made available under the terms of the **Creative Commons Attribution Share Alike-3.0 License:**
<http://creativecommons.org/licenses/by-sa/3.0/>

We have reviewed this material in accordance with U.S. Copyright Law **and have tried to maximize your ability to use, share, and adapt it.** These lectures have been modified in the process of making a publicly shareable version. The citation key on the following slide provides information about how you may share and adapt this material.

Copyright holders of content included in this material should contact open.michigan@umich.edu with any questions, corrections, or clarification regarding the use of content.

For more information about **how to cite** these materials visit <http://open.umich.edu/privacy-and-terms-use>.

Any **medical information** in this material is intended to inform and educate and is **not a tool for self-diagnosis** or a replacement for medical evaluation, advice, diagnosis or treatment by a healthcare professional. Please speak to your physician if you have questions about your medical condition.

Viewer discretion is advised: Some medical content is graphic and may not be suitable for all viewers.

for more information see: <http://open.umich.edu/wiki/AttributionPolicy>

Use + Share + Adapt

{ Content the copyright holder, author, or law permits you to use, share and adapt. }



Public Domain – Government: Works that are produced by the U.S. Government. (17 USC § 105)



Public Domain – Expired: Works that are no longer protected due to an expired copyright term.



Public Domain – Self Dedicated: Works that a copyright holder has dedicated to the public domain.



Creative Commons – Zero Waiver



Creative Commons – Attribution License



Creative Commons – Attribution Share Alike License



Creative Commons – Attribution Noncommercial License



Creative Commons – Attribution Noncommercial Share Alike License



GNU – Free Documentation License

Make Your Own Assessment

{ Content Open.Michigan believes can be used, shared, and adapted because it is ineligible for copyright. }



Public Domain – Ineligible: Works that are ineligible for copyright protection in the U.S. (17 USC § 102(b)) *laws in your jurisdiction may differ

{ Content Open.Michigan has used under a Fair Use determination. }



Fair Use: Use of works that is determined to be Fair consistent with the U.S. Copyright Act. (17 USC § 107) *laws in your jurisdiction may differ

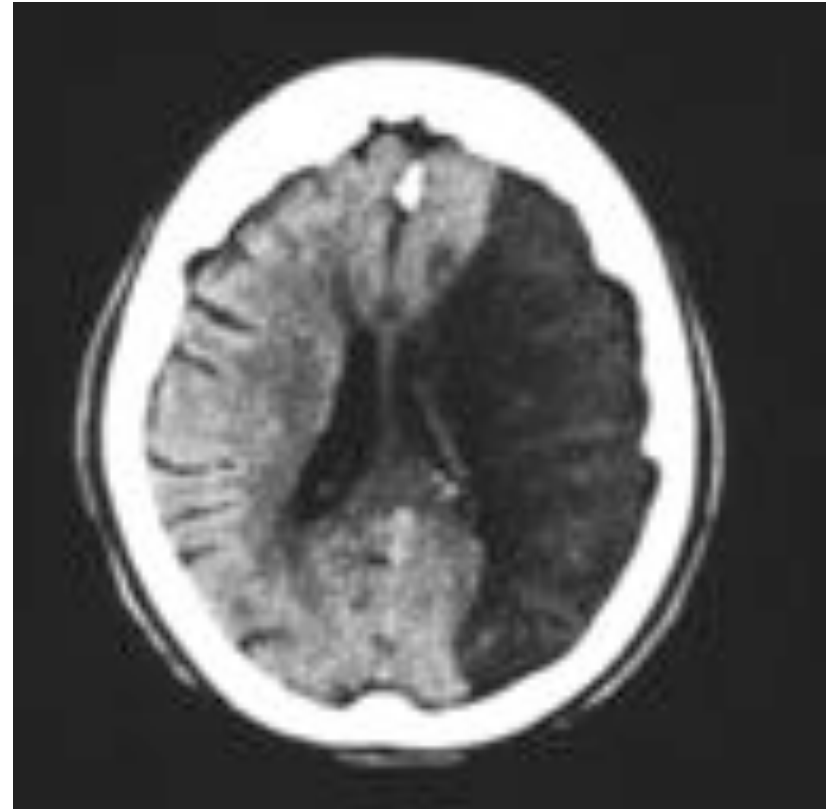
Our determination **DOES NOT** mean that all uses of this 3rd-party content are Fair Uses and we **DO NOT** guarantee that your use of the content is Fair.

To use this content you should **do your own independent analysis** to determine whether or not your use will be Fair.

Why do we care about stroke?

- Third leading cause of death
- Leading cause of adult disability
- 20-30% mortality

Middle Cerebral Infarction



Tissue-Plasminogen Activator in Acute Ischemic Stroke

- Double-blinded
- Placebo controlled
- 0.9mg/kg
- 624 patients
- Treated within 3 hours
 - 1/2 within 90 minutes
 - 1/2 within 91-180 minutes
- 4 Outcome measures

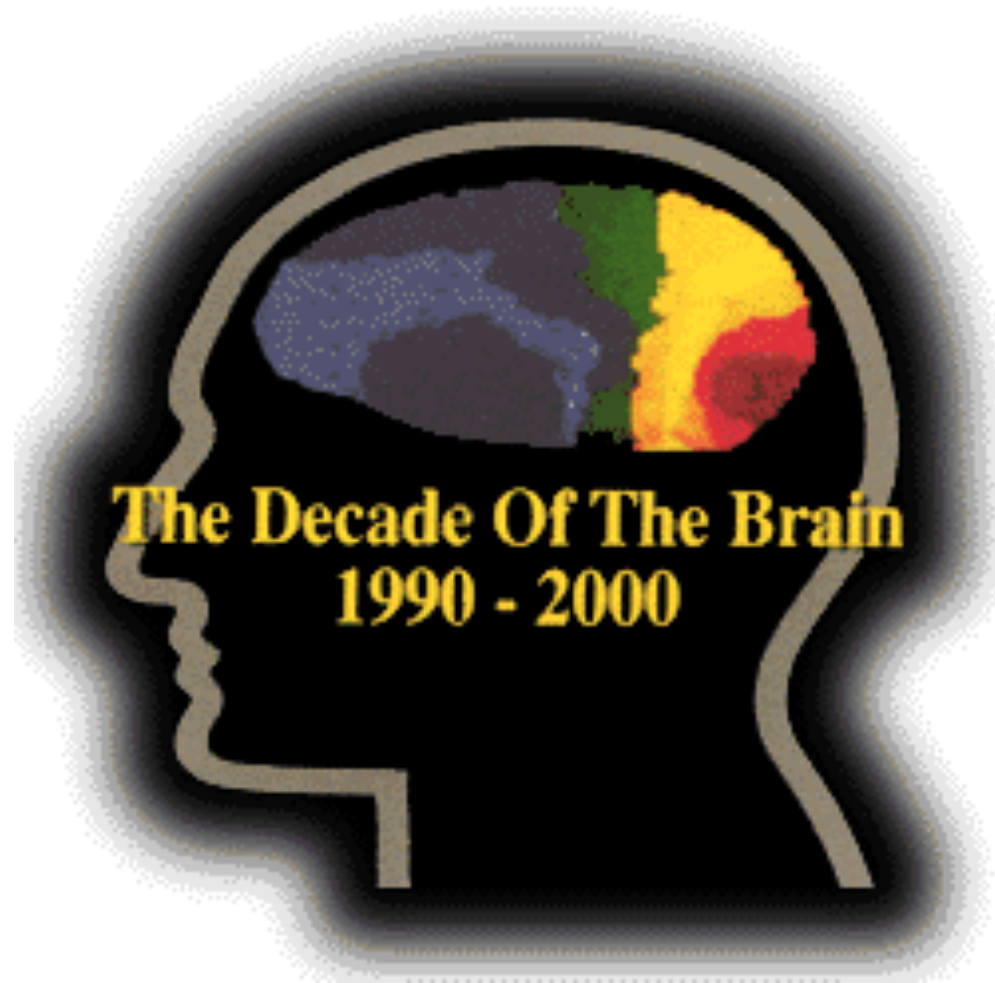
NINDS rt-PA Stroke Trial Results

- 30% more likely to have favorable 3-month outcome
 - 1.9 (1.2-2.9)=Odds Ratio (0-90 minutes)
 - 1.7 (1.3-2.9)=Odds Ratio (91-180) minutes)
- Significantly higher intracerebral hemorrhage rate
 - 0.6% Placebo
 - 6.4% rt-PA
- No difference in mortality
 - 21% Placebo
 - 17% rt-PA

Time to Treatment



- 3 hrs = therapeutic window
- 5.7 hrs = median time to ED arrival
- 3.6% = % treated in NINDS (624 of 17,324)



Stroke Chain of Survival & Recovery

- Detection: Early Recognition
- Dispatch: Early EMS Activation
- Delivery: Transport & Management
- Door: ED Triage
- Data: ED Evaluation & Management
- Decision: Specific Therapies
- Drug: Thrombolytic & Neuroprotective Therapy

Detection

- What are Signs & Symptoms?
 - 43% general public didn't know any
 - 39% of acute stroke patients didn't know any
- What are Risk Factors?
 - 32% general public didn't know any
 - 43% of acute stroke patients didn't know any

What do you need to know about stroke?

- Signs & Symptoms
 - one-sided extremity weakness
 - one-sided numbness
 - difficulty speaking
 - visual problems
- Risk Factors
 - hypertension
 - diabetes mellitus
 - smoking
 - heart disease
 - prior strokes
 - older age
 - race (African-Americans)

Cincinnati Prehospital Stroke Scale



Shantoo, [Wikimedia Commons](#)



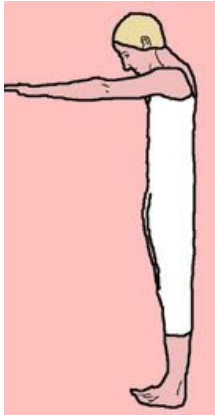
Facial Droop

Normal:

Both sides of face move equally

Abnormal:

One side of face does not move at all



Gonad, [Wikimedia Commons](#)



Arm Drift

Normal:

Both arms move equally or not at all

Abnormal:

One arm drifts compared to the other



318a
St Bartholomew's Hospital Archives & Museum, [Wellcome Images](#)



Speech

Normal:

Patients use correct words with no slurring

Abnormal:

Slurred or inappropriate words or mute

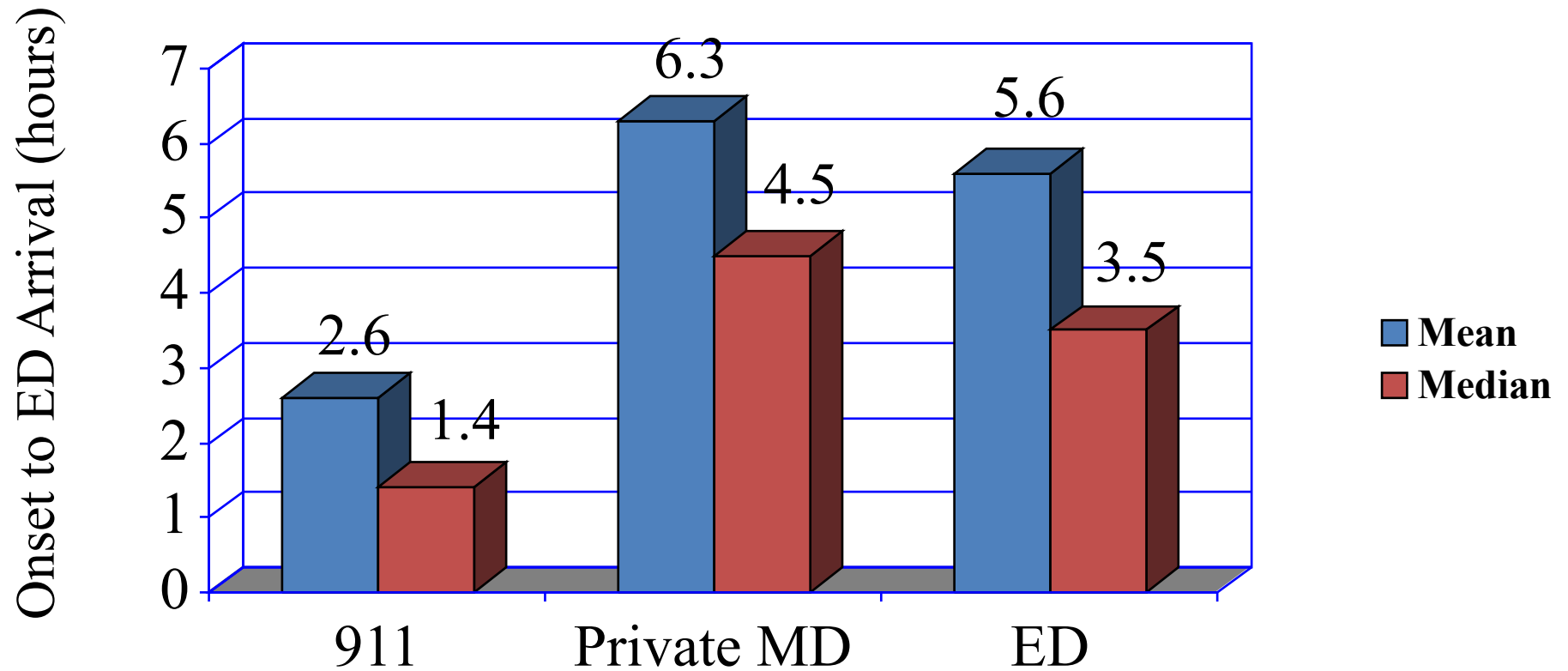
Dispatch: Call 911



General Publics' Perception of What to do in Case of a Stroke

- 90% would seek medical attention
 - 43% call 911 immediately
 - 26% call their family doctor
 - 11% go straight to the ED

Initial Medical Contact versus Time of ED Arrival



Delivery: Transport & Management



- ABCs
- Stroke recognition
- Time of onset
- Neurological evaluation
- Check glucose
- Early hospital notification
- Rapid Transport!!!!!!

Emergency Department Management

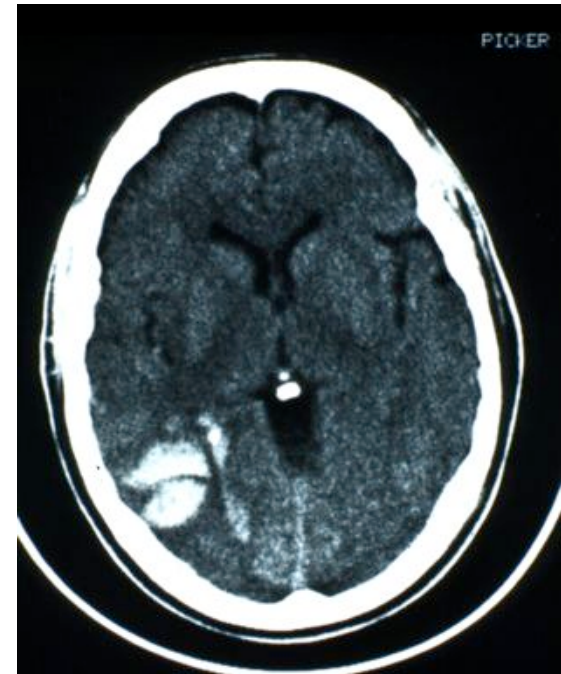


- Door: ED Triage
- Data: ED Evaluation
- Decision: Specific Therapies
- Drug: Thrombolytic Therapy

Triage



Data



Decision

(Who Should I Treat?)

- Inclusion Criteria
- Exclusion Criteria

Inclusion Criteria

- Clinical Presentation of Ischemic Stroke
- Onset within 3 hours

Exclusion Criteria

- *Onset >3 hours*
- *BP>185/110*
- Hemorrhage on CT
- *Seizure at onset*
- Surgery 14 days
- Trauma 3 months
- Stroke 3 months
- Minimal or resolving symptoms
- GI/GU bleed 21 days
- Prior ICH or SAH
- *Recent MI*
- On Coumadin $PT > 1.5$
- *On heparin $PTT > 21$*
- Platelets $< 100,000$
- *Glucose > 400*

Drug

(How Do You Treat?)

- Pre-Treatment
 - glucose, NIHSS, CT, Consent
- Dosing
- Monitoring

Dosing



- 0.9 mg/kg (max.=90 mg)
- 10% bolus (over 1 minute)
- 1 hour infusion

Patient Monitoring

- ICU admission (24 hours)
- Neuro checks
 - Q 15 minute X 6 hours
 - Q 1 hour X 18 hours
- BP checks

Blood Pressure Management

- Non-Thrombolytic Candidates
- Thrombolytic Candidates
 - pre-treatment (185/110 mmHg)
 - during & post-treatment

BP Management

- Non-Thrombolytic Candidate
 - Don't Treat!!!
- Pre-Thrombolysis
 - Be Gentle!!!
- During & Post-Thrombolysis
 - Be Aggressive!!!

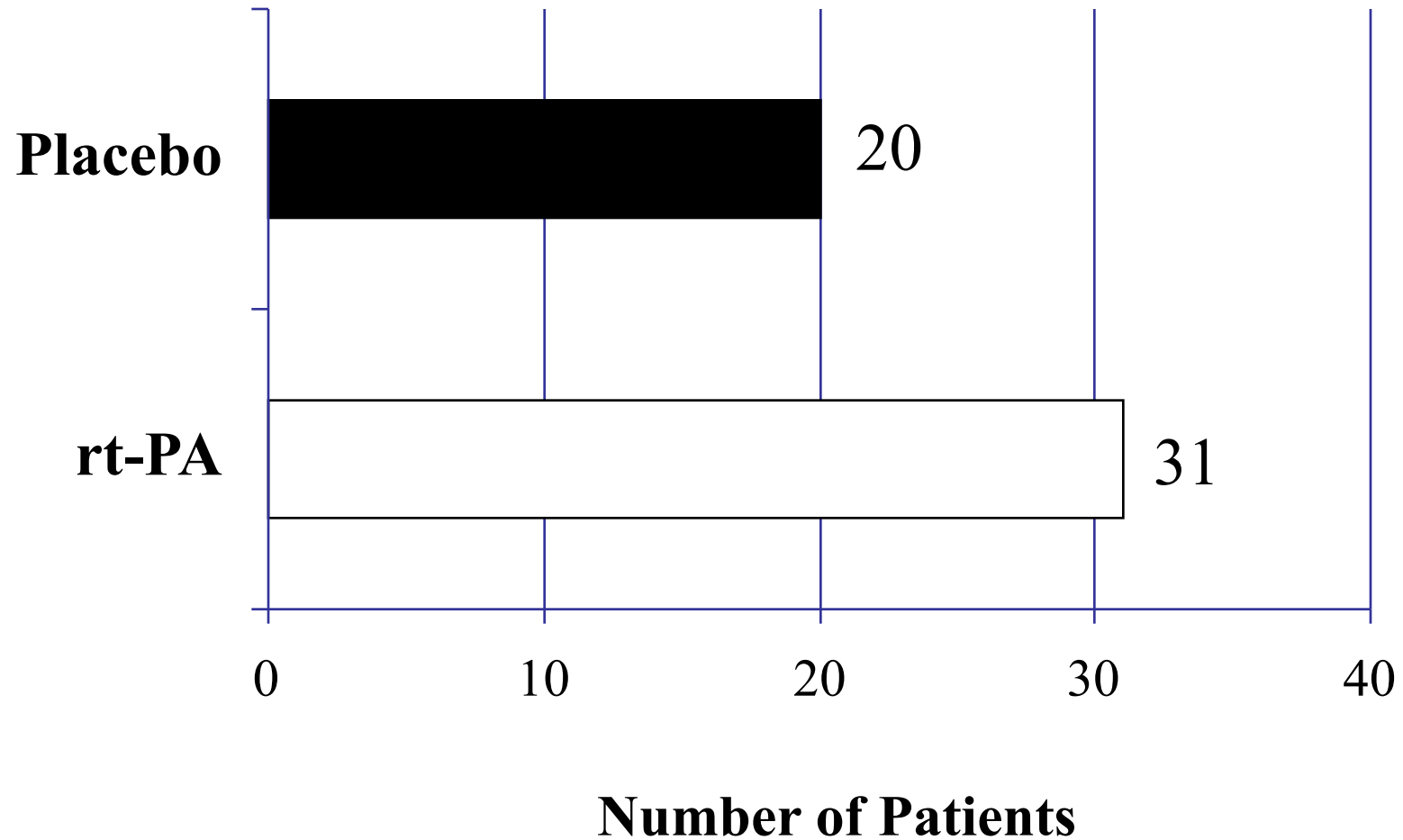
NINDS-Recommended Targets

- Door-to-doctor 10 minutes
- Door-to-CT 25 minutes
- Door-to-CT reading 45 minutes
- Door-to-treatment 60 minutes

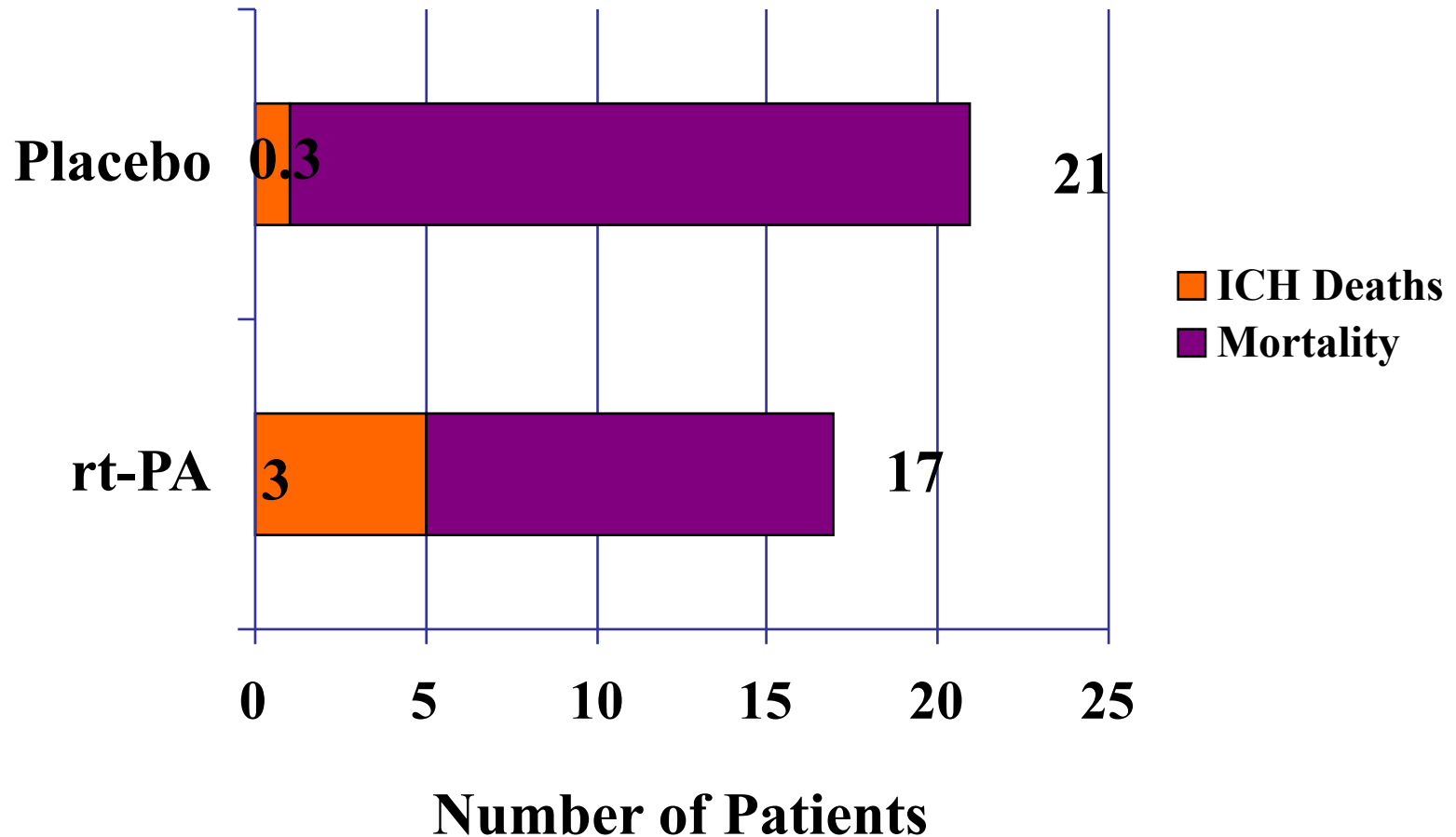
Stroke Chain of Survival & Recovery

- Detection: Early Recognition
- Dispatch: Early EMS Activation
- Delivery: Transport & Management
- Door: ED Triage
- Data: ED Evaluation & Management
- Decision: Specific Therapies
- Drug: Thrombolytic & Neuroprotective Therapy

3-Month Favorable Outcome

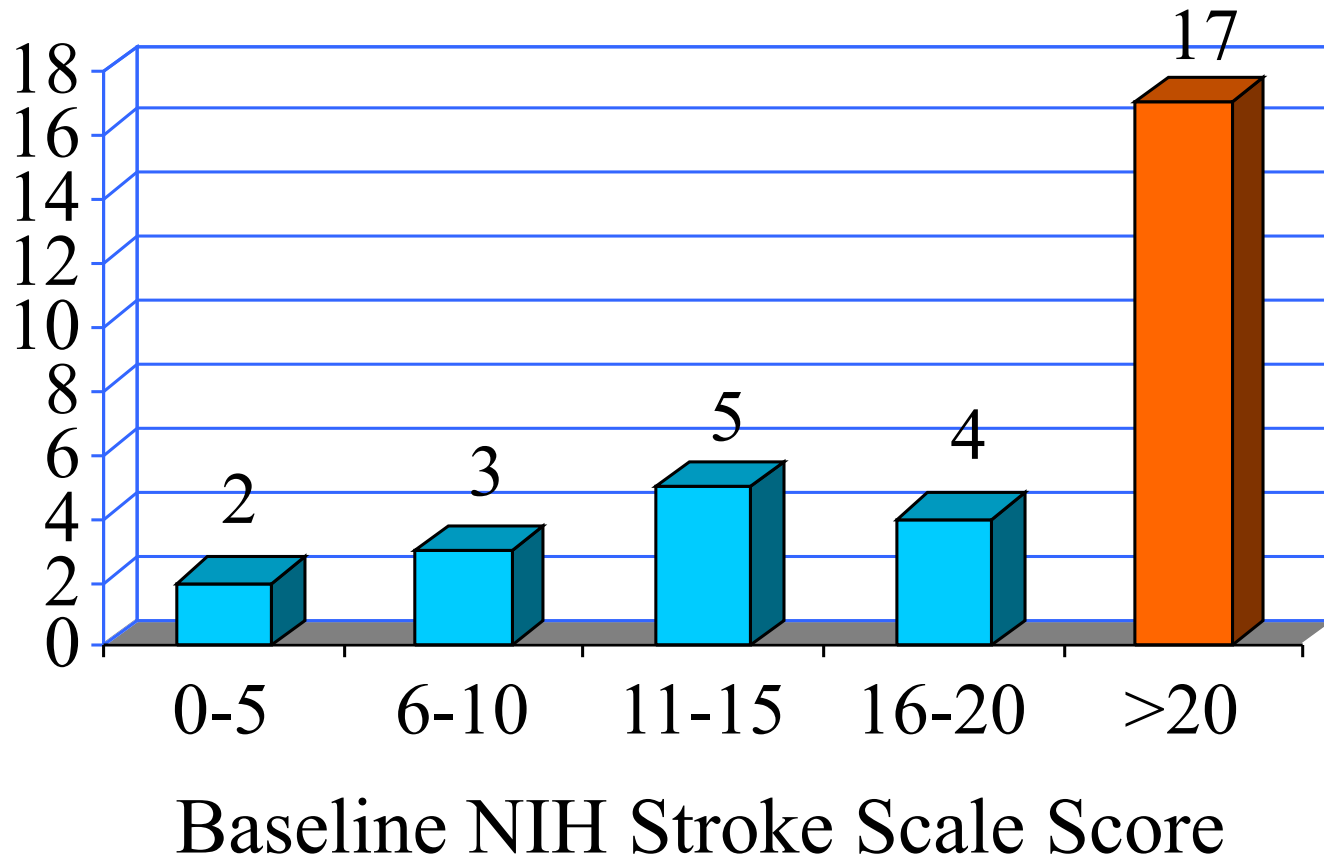


ICH Deaths and Mortality



Baseline NIHSS and ICH in the NINDS Trial

Percentage of t-PA Patients with Symptomatic ICH



(Broderick, Stroke 1997)

Disposition Results from NINDS Trial

	rt-PA n=312	Placebo n=312	p Value
LOS (mean days +SD)	10.88+10.04	12.41+11.10	0.02
Disposition			0.002*
Home	151 (48%)	112(36%)	
Rehab unit	91 (29%)	115 (37%)	
Nursing home	22 (7%)	39 (13%)	
Dead	35 (11%)	40 (13%)	
Other	13 (4%)	6 (2%)	

Extending the Therapeutic Window

		Outcome 3-month [§]	ICH symp.	Mortality 3-month
ATLANTIS	<i>tPA</i>	33%	6.7%*	10.9%
	<i>placebo</i>	33%	1.1%*	6.9%
ECASS	<i>tPA</i>	36%	20%*	18%*
	<i>placebo</i>	29%	7%*	13%*
ECASS II	<i>tPA</i>	40.3%	8.8%*	10.5%
	<i>placebo</i>	36.6%	3.4%*	10.7%

[§] % mRankin 0-1 for ECASS I & II, NIHSS < 1 for ATLANTIS at 3-months

Randomized Streptokinase Trials

<u>Study</u>	<u>N</u>	<u>Time to Treat</u>	<u>Treatment</u>	<u>ICH</u>	<u>Mortality</u>
ASK	228	<4 hrs	SK+ASA	NA	43%
			ASA	NA	22%
MAST-E	270	≤6 hrs	SK	18%	35%
			Placebo	3%	18%
MAST-I	622	≤6 hrs	SK+ASA	10%	34%
			SK	6%	19%
			ASA	2%	10%
			Placebo	0.6%	13%