Urban Stroke Systems
Comprehensive Care is Better Care

Where Would You Want Your Mom Treated?

Peter D. Panagos, MD, FAHA, FACEP
Departments of Neurology and Emergency Medicine
Washington University School of Medicine
Barnes-Jewish Hospital
St Louis, Missouri

Disclosures

- Salary: Washington University
- Speaker's Bureau: Genentech
- Consultant: AHA/ASA (Unpaid)
- Advisory Board: Pulse Therapeutics

Faster Stroke Treatment is Better Treatment

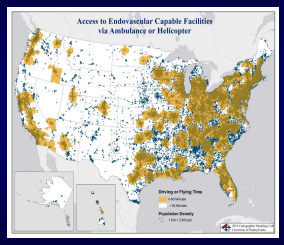
Patients treated within 60 minutes experience improved outcomes, including lower in-hospital mortality and reduced long-term disability

GC Fonarow et al. *JAMA*. 2014;311(16):1632-1640
Saver et al. *JAMA*. 2013;309(23):2480-8

What Does This Mean For You?

Access to Endovascular Therapy

- By ground
  - 56% US population have access to endovascular capable hospital



Adeoye, et al. Stroke 2014

The New Standard of Care

A. Patients eligible for IV rtPA should receive IV rtPA even if endovascular treatments are being considered
(Class I; Level of Evidence A). **(Unchanged from the 2013 guideline)**

B. Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria:
(1) acute ischemic stroke receiving IV rtPA within 4.5 hours of onset according to guidelines from professional medical societies,
(2) causative occlusion of the internal carotid artery or proximal middle cerebral artery (M1 or M2),
(3) age 18 years and over,
(4) NIHSS score of 6 or greater,
(5) Alberta Stroke Program Early Computed Tomography Score (ASPECTS) of 6 or greater, and
(6) treatment can be initiated (groin puncture) < 6 hrs of symptom onset
(Class I; Level of Evidence A). **(New Recommendation)**

Powers WJ et al. 2015 AHA/ASA Focused Update. Stroke. 2915

The New Normal

Number Needed to Treat (NNT) for One Good Outcome

	MR CLEAN	ESCAPE	EXTEND-IA	SWIFT PRIME	REVASCAT	IV tPA
OR good outcome at 90d (mRS 0-2)	2.16	2.6	3.8	2.75	2.1	**1.8**
NNT for good outcome	6.1	4.2	3.2	4.0	6.4	**8.0**

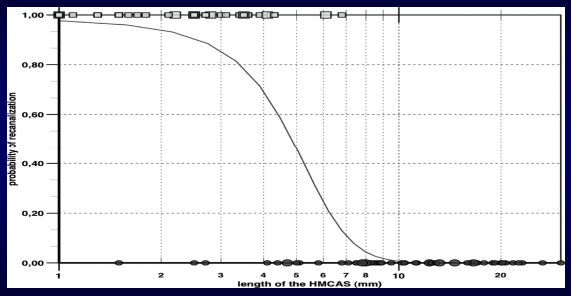
Good Outcomes for IA utilized mRS 0-2
Good Outcomes for IV utilized mRS 0-1

IV tPA Doesn't Always Work

- Angiographic evaluation to identify presence and location of clot and effect of agent in 93 patients
- IV t-PA (0.12-0.75 mg/kg) given 0-6 hours
- Angiographic Findings
  - 26% (12/46) complete or partial lysis in M1, M2
  - 9% (2 of 23) lysis in ICA
- Similar data by del Zoppo (Ann Neurol 1992) and Tomsick (AJNR 1996), Bhatia (Stroke 2010)

Wolpert S, et al AJNR 1993; 14: 3-13.

Longer Clot Length = Less Chance to Work



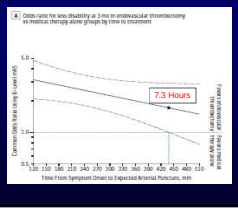
Reidel et al. Stroke 2011

Evolving Endovascular Data

JAMA | Original Investigation

Time to Treatment With Endovascular Thrombectomy and Outcomes From Ischemic Stroke: A Meta-analysis

Jeffrey L. Saver, MD; Mayank Goyal, MD; Aad van der Lugt, MD; Bijoy K. Menon, MD; Charles B. L. M. Majoie, MD; Diederik W. Dippel, MD; Bruce C. Campbell, MD, PhD; Raul G. Nogueira, MD; Andrew M. Demchuk, MD; Alejandro Tomasello, MD; Pere Cardona, MD; Thomas G. Devlin, MD; Donald F. Frei, MD; Richard du Mesnil de Rochemont, MD; Olvert A. Berkhemer, MD; Tudor G. Jovin, MD; Adnan H. Siddiqui, MD, PhD; Wim H. van Zwam, MD; Stephen M. Davis, MD; Carlos Castaño, MD; Biggya L. Sapkota, MD; Puck S. Fransen, MD; Carlos Molina, MD; Robert J. van Oostenbrugge, MD; Ángel Chamorro, MD; Hester Lingsma, PhD; Frank L. Silver, MD; Geoffrey A. Donnan, MD; Ashfaq Shuaib, MD; Scott Brown, PhD; Bruce Stouch, PhD; Peter J. Mitchell, MD; Antoni Davalos, MD; Yvo B. W. E. M. Roos, MD; Michael D. Hill, MD, MS; for the HERMES Collaborators



- 1287 Total Patients
  - 634 Endo + IV tPA
  - 653 IV tPA Only
- OR of better mRS at 90-days
- Early treatment, recanalization led to lower degrees of disability at 3 months c/w IV tPA
- Benefit nonsignificant > 7.3 hours

JAMA 2016;316(12):1279-1288

Levels of Stroke Care

- **Comprehensive Stroke Center (CSC)**
  - Neurosurgery, Endovascular therapies, NICU, research
- **Primary Stroke Center (PSC)**
  - Stroke coordinator, Stroke Unit, systematic ischemic stroke assessment
- **Acute Stroke Ready Hospital (ARSH)**
  - IV tPA 'Drip and ship', TeleStroke support
- **Basic Care (Critical Access)**
  - Assess, identification, stabilize, transfer

Levels of Care
Primary Stroke Center (2)

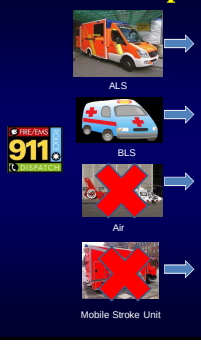
- Joint Commission 'Disease Specific Certification'
- Written protocols:
  - Focuses on ischemic stroke and tpa administration. Includes therapy evaluation and education for all stroke patients however. Dedicated 'Stroke Unit' available.
- Adoption of Clinical Practice Guidelines (evidence based)
- Hospital support (*essential* in order to run the program)
- A core team, with minimum annual educational requirements, including nursing, ER, MDs, therapy services.
- Community outreach and education.
- Quality improvement, periodic review of quality measures.

Levels of Care
Comprehensive Stroke Center (1)

- Joint Commission 'Advanced Disease Specific Certification'
- Primary Stroke Center plus:
  - **Care for SAH (endovascular and clipping), AVMs, ICH**
  - **24/7 Neurosurgery, Neuroradiology, ICU care**
  - **24/7 Endovascular AIS Therapy**
  - Educational outreach to community, medical community, EMS, and referring hospitals
  - **Joint protocol development with referring network, EMS**
  - **Expanded Quality metrics**
  - Peer Review and QI required for the Stroke Center
  - Public reporting of additional key measures required.

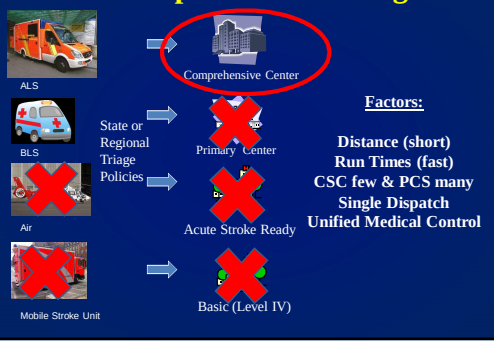
Why Doesn't EMS Just Triage the Right Patient to the Right (CSC) Hospital?

Pre-Hospital Urban Triage



Where to go?

Pre-Hospital Urban Triage



Factors:

Distance (short)
Run Times (fast)
CSC few & PCS many
Single Dispatch
Unified Medical Control

What is the Solution?

- Recognize Clear Benefits of CSCs
- Admit to the Limitations to PSCs
- Create Regional Triage Plans to Shunt ALL Patients to CSCs with acceptable bypass times
- Wouldn't You Want the Best Care for Your Mom? Of Course You Would!!