Comprehensive Stroke Center Certification and the Neurointerventionalist

Mark J. Alberts, MD, FAHA, FANA

Vice-Chair, Dept of Neurology
Professor of Neurology
UT Southwestern Medical Center

Dallas, TX

Presenter Disclosure Information

FINANCIAL DISCLOSURE:

Speakers Bureau/Consultant: Genentech, Inc.

Unpaid Consultant: The Joint Commission, HFAP

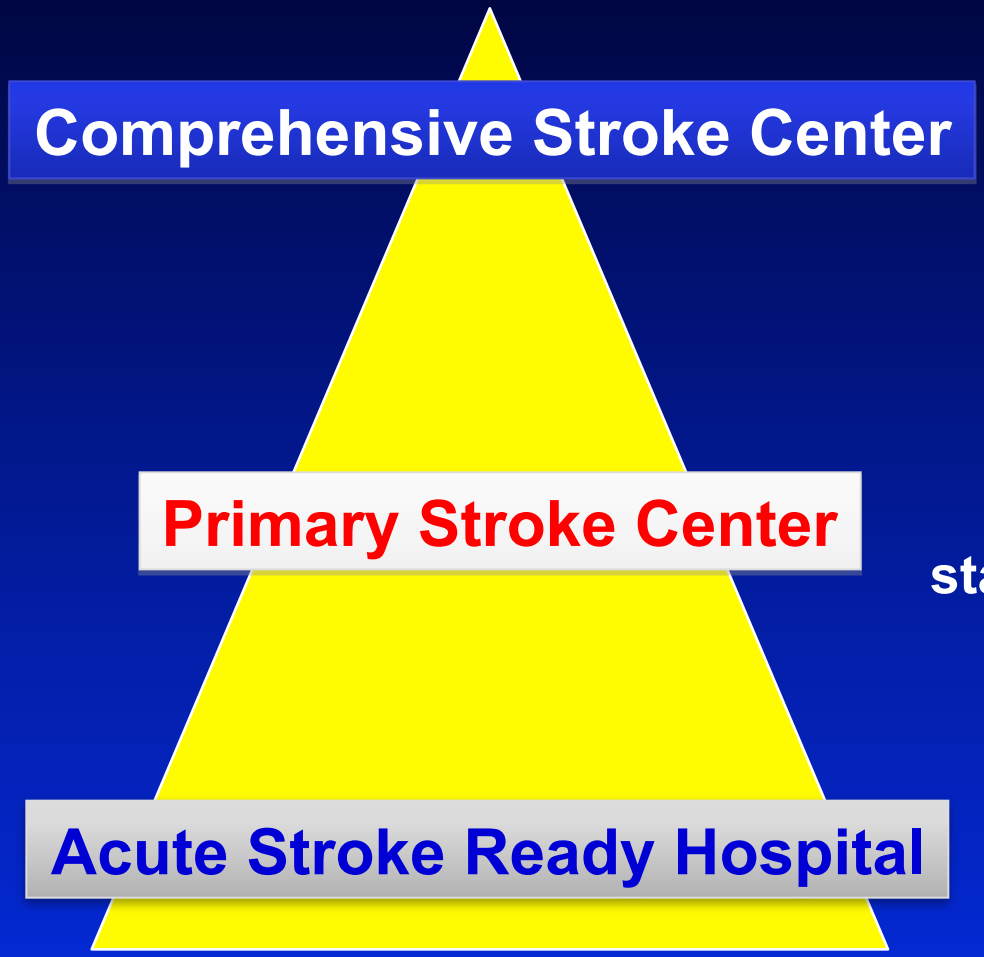
UNLABELED/UNAPPROVED USES DISCLOSURE:

None

EMS Plays a Key Role in a Stroke System

- Typically the first medical professionals with direct patient contact
- Their initial assessments, actions, treatments, and decisions will have significant consequences in the patient's subsequent care
- *Their role in patient triage, diversion, and routing cannot be under-estimated*
- Actions and treatments provided (or not provided) in the first few hours after a stroke will often seal the fate of patients for the rest of their lives.

Characteristics of Different Stroke Centers



Academic Medical Center
Tertiary Care facility

Wide range of hospitals;
standard stroke care; stroke unit;
use TPA

Rural hospitals; basic care;
drip and ship;
use tele-technologies

Numbers of Various Types of Stroke Centers

> 5000 total acute care hospitals in the U.S.

Comprehensive Stroke Center — 150-200 total

Primary Stroke Center — Final count 1200-1500

Acute Stroke Ready Hospital — Perhaps 1200-1800

The Comprehensive Stroke Center Concept

- Provides complete care to patients with the worst, most severe, most complex strokes
  - Large ischemic strokes (might need ICP interventions)
  - ICH
  - SAH
  - Multi-system disease
  - Cryptogenic strokes
- Might require surgical or endovascular therapy
- Might require NICU level care
- Has all services available 24/7, 365 days/year

Key Personnel at a CSC

- Vascular Neurology
- Vascular Neurosurgery
- Neuro-radiology
- Neuro-interventional expertise
- Neuro-Critical Care
- Nursing expertise in all of the above areas
- Multidisciplinary care teams
- Rehabilitation expertise
- Patient education
- Social work
- All elements of a PSC

Challenges to CSC Certification

- All care elements must be in place on a 24/7 basis
- Comprehensive means comprehensive; the process is very detailed for all aspects of patient care
- Suggested volumes for SAH, aneurysm coiling and clipping:
  - At least 10 aneurysms Rx with clipping
  - At least 20 aneurysms Rx with coiling/endovascular
  - At least 35 aneurysmal SAH patients each year
  - At least 10 endovascular procedures for acute ischemic stroke/yr (still unclear—under JC review)
  - (these have not been approved by TJC at present)
- A CSC must provide care for ALL types of stroke patients

Neurointerventional Staffing at a CSC

- NIR services must be available 24/7—but staff does not need to be in-house 24/7
- Cannot have only one NIR physician cover > 1 hospital
- Nursing and support staff are a KEY aspect of the CSC review process
- Must have a PLAN for how your organization would deal with 2 simultaneous cases that require NIR services
  - Coiling an aneurysm and another patient needs endovascular Rx for AIS

Current Status of CSC Certification

- Several options:
  - The Joint Commission, DNV, HFAP (coming soon)

- Latest numbers from TJC
  - About 78 organizations have applied for CSC certification
  - About 55 approved so far
  - Several awaiting initial visit, second visit, or approval
  - Several found deficient and not approved

Procedures and Numbers at a CSC

Procedure	Estimated National Volume*
Cerebral Angiogram	150,680
Carotid endarterectomy	124,265
Carotid stent	17,580
Aneurysm embolization	13,430
Aneurysm clipping	5,615
Endovascular Rx AIS	5,090
Intracranial stent/Angioplasty	1,870

* Data based on 2008 statistics

Grigoryan et al., Stroke, 2012

Procedures and Numbers at a CSC

Procedure	Recommended Volumes*	Percentage of hospitals meeting volume level
Cerebral Angiogram	30-99	10.6%
Carotid endarterectomy	> = 25/yr	27.3%
Carotid stent	> = 25/yr	4.9%
Aneurysm embolization	> = 30/yr	2.6%
Aneurysm clipping	> = 10/yr	3.2%
Endovascular Rx AIS	> = 10/yr	2.6%

*

Grigoryan et al., Stroke, 2012

Procedures and Numbers at a CSC

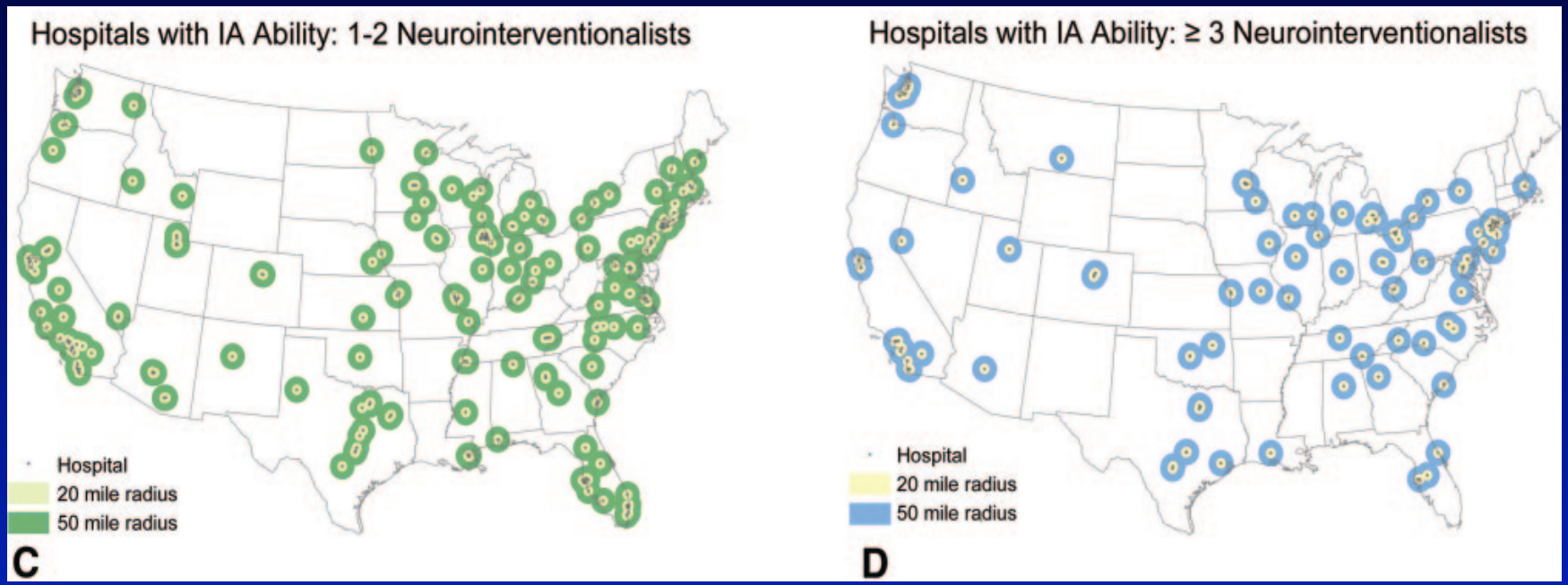
Procedure	Number of Hospitals Meeting Level*
Cerebral Angiogram	530
Carotid endarterectomy	1365
Carotid stent	245
Aneurysm embolization	130
Aneurysm clipping	160
Endovascular Rx AIS	130

* Based on 5000 acute care hospitals in the US

Grigoryan et al., Stroke, 2012

Hospital NIR Staffing

About 800 NIRs live within 50 miles of a large metro area
4% to 14% of AIS patients may be eligible for IA therapy



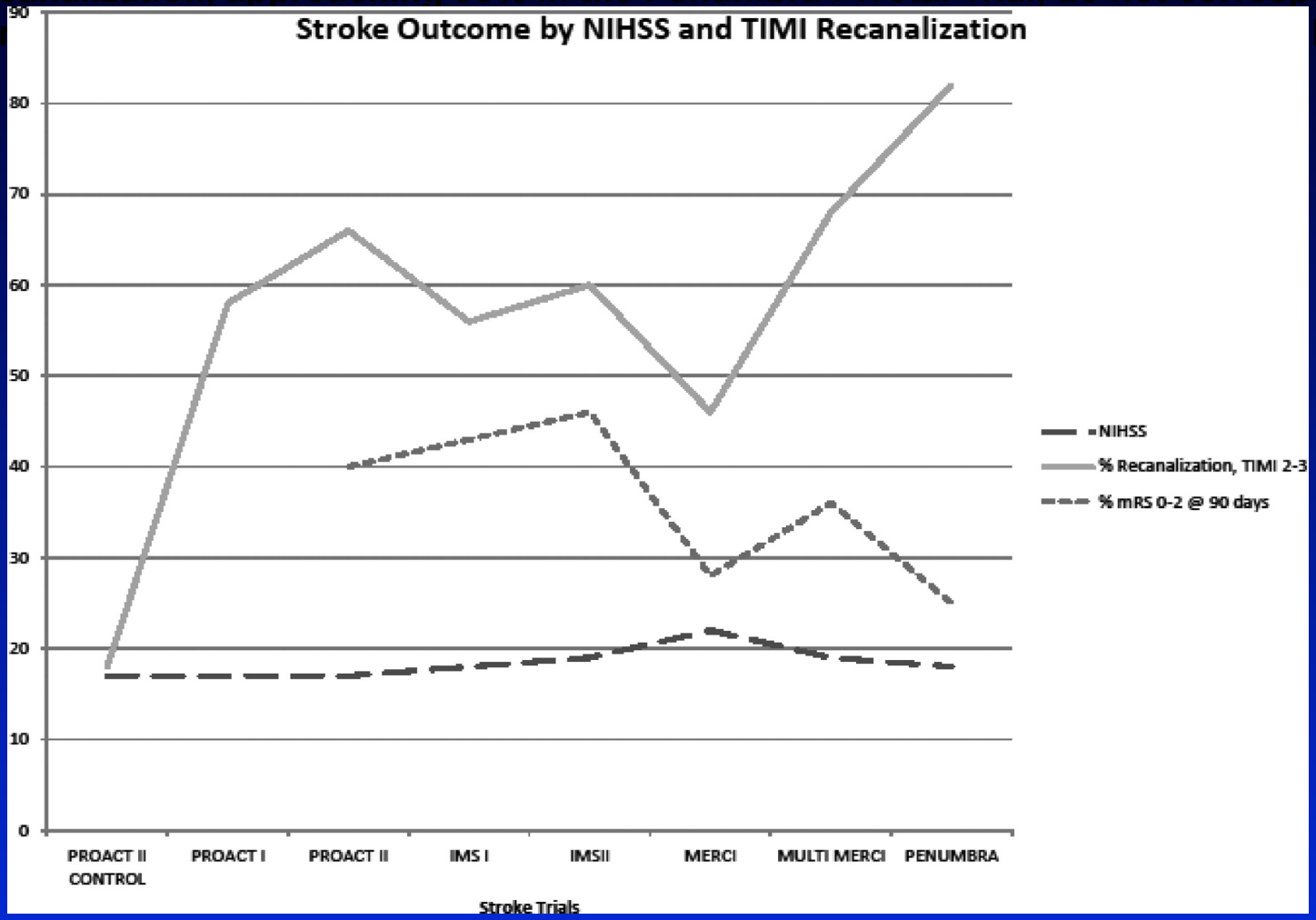
2 major caveats:
*** This was before IMS3 and other results**
*** Having 1 or more NIR does not = a CSC**

Zaidat et al, Neurology, vol 79, S 35-41, 2012

NIR and Case Distribution

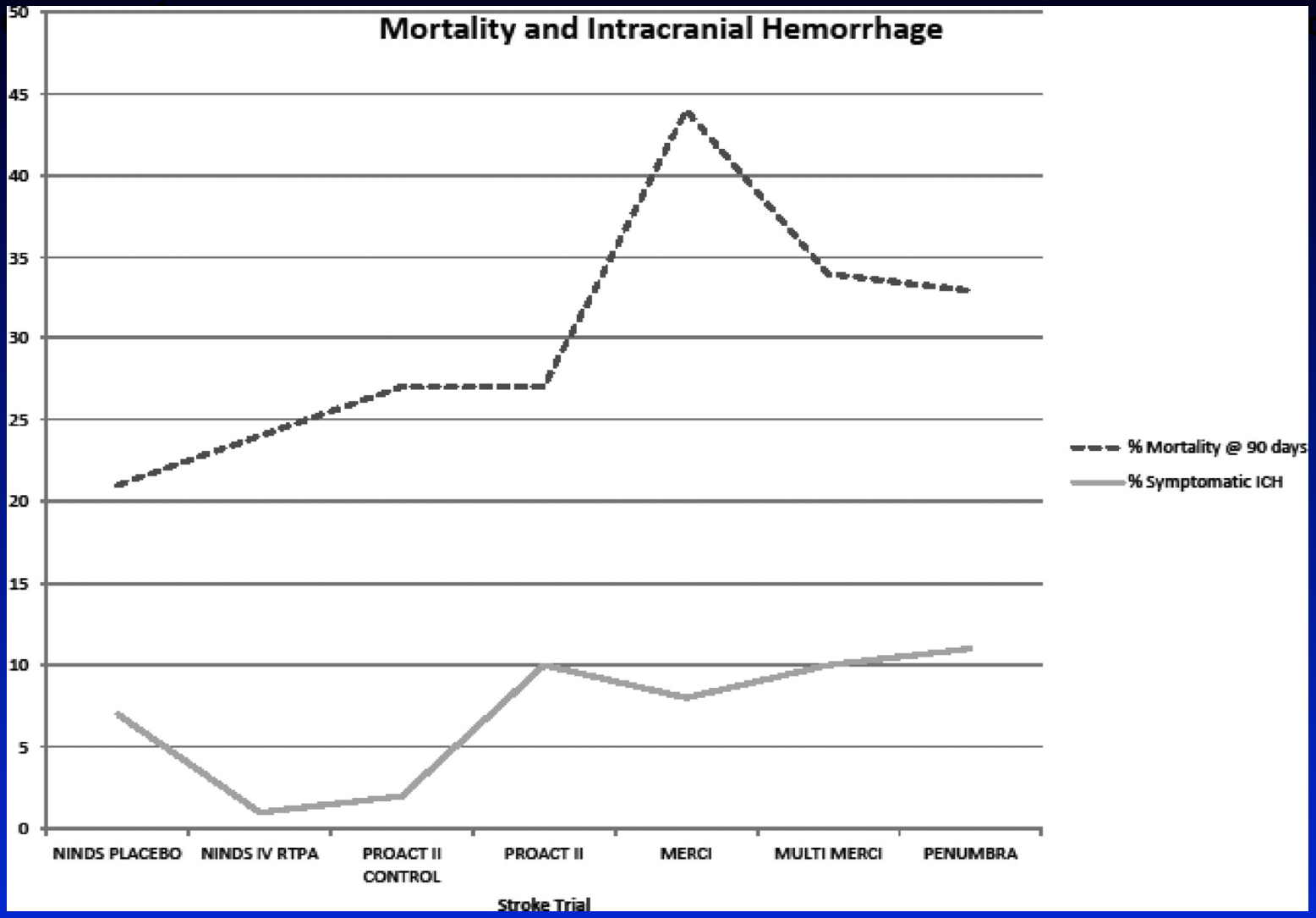
- JC survey of PSCs showed that NIR procedures were VERY common among PSCs
- Assume 30 coiling procedures/yr in a medium sized city
- 10 hospitals could each do 3 procedures/yr, or 3 hospitals could each do 10 procedures/yr
- NIR cannot be viewed in isolation
  - Need diagnostic support, nursing support, NICU care, vascular neurology support
  - Also need 24/7 coverage
  - Lack of such support was a major reason for failing JC site visit for CSCs

Higher rates of recanalization, approaching 90% in the Penumbra Pivotal Trial, do not correspond with similar rates of clinical improvement after treatment as measured by the modified Rankin scale (mRS) at 90 days.



Meyers P et al. Circulation 2011;123:2591-2601

High Mortality and ICH rates with Endovascular Therapy



Meyers P et al. Circulation 2011;123:2591-2601

Use of TPA at a CSC in a Care Network

- **Patient population:**
  - CSC = 1576
  - GWTG-Stroke = 423,809
  - Premiere (community) hospitals = 91,598

- **Use of TPA**
  - IV TPA up to 4.5 hours — 28.5% at CSC
    . — 6.8% at GWTG
  - Any TPA — 30.5% at CSC
    . — 4.1% at community hosp

Rymer et al, Stroke, 2013

CSCs in a Network

- Orange County, CA Study
- Involved EMS
- 9 Hub Hospitals—most were CSCs
- Did not use telemedicine

- EMS transported 1360 patients with suspected strokes
  - 66% had a true stroke or TIA
- 20% treated with IV TPA
- 10.6% received some endovascular Rx
- DTN time for IV TPA = 60 min for only 25% of patients

Cramer et al, Stroke, 2012

Limitations of Field Triage

- Inaccurate Diagnosis
  - Stroke type
  - Stroke size
  - Stroke severity
- Cannot predict deterioration or complications
- Patient preference
- Prior care

Reasons to Contemplate or Require Transfer

- Patient requires higher level of care upon admission
  - NICU
  - Surgery
  - Specialized intervention
- Patient deteriorates after admission
  - Increased ICP
  - Bleeding complications
  - Medical complications

Patients and Inter-Hospital Transfers

- West Virginia study
- 24 hospitals
- 4 hospitals accounted for 49% of transfers
- Neurologic and critical care conditions = 54% of requests
- Stroke and suspected-stroke were most common transfer Dx or reason

Nair, Gibbs; W V Med J, 2013

Inefficiencies with PSC to CSC Transfer

Initially taken to PSC, then to CSC	Taken to CSC Initially
1) Ambulance dispatch to scene	1) Ambulance dispatch to scene
2) Scene to hospital	2) Scene to hospital
3) PSC back to base	3) CSC back to base
4) Base back to PSC	
5) PSC to CSC	
6) CSC back to base	

Wasted Time and Effort

- Assume each transfer leg = 30 to 40 minutes
- 3 extra trips = 90 to 120 minutes
- May delay needed care for 2-3 hours, if not more
- Risk of miscommunication
- Need to repeat some or all testing
- Increases stress on family members

Characteristics of Transferred Patients

- Almost 41,000 patients, of which 1874 were inter-hospital transfers
- 49% of transfers were VERY SICK vs 35% of direct admits
- Ratio of in-hospital deaths = 1.99 (transfers vs direct admits)
- Overall increase in mortality and increased LOS (after adjustment for illness and other factors)

Gordon and Rosenthel, Med Care, 1996

Do Transfers Have Worse Outcomes?

- Definitive proof would require a prospective trial (these data do not exist)
- Current data could be biased by several factors
- Confounding issues
  - Delayed care could have led to worse outcomes
  - Mistakes in care at outside institution
  - Higher severity of illness (not fully accounted for in various models) for transferred patients

By-passing Hospitals in a Stroke System of Care

With multiple hospitals of various capabilities in a geographic area (or Stroke System), how can we properly triage and divert patients to the most appropriate facility?

Guiding Principles # 1

<u>If all are close, go to the highest level Stroke Center initially</u>

WHY?

- **Do not know the type of stroke**
- **Patients can deteriorate**
- **Unclear what tests and treatments will be needed.**

By-passing Hospitals in a Stroke System of Care

Besides the level of Stroke Center, what are other considerations for field triage?

Guiding Principle # 2

Time is more important than distance, because time is brain

Limit diversion to 15-20 minutes in most cases

- Factors to consider include:
  - Weather
  - Traffic
  - Local geography
  - Mode of transportation

Future Opportunities

- More accurate EMS Field Triage
  - Cameras in ambulance
  - Field brain imaging capabilities
- Field assessment tools for stroke severity
- Early ED assessment of the patient
  - Rapid evaluation
  - Back into ambulance ASAP if patient needs CSC level care
  - Do not waste time with an admission for a few hours
  - Highly inefficient

Conclusions

- A CSC will likely benefit the most severely affected patients, but not all patients will need a CSC
- Interventional cases will remain a major focus of CSC care, especially for aneurysmal SAH and patients who cannot or do not receive IV TPA therapy
- While some patients will require transfer to a CSC from a CSC, it is far more efficient to have most patients taken to a CSC initially
- Better field triage and related tools will greatly increase the efficiency of caring for these patients