

# **Stroke Centers and the Brain Attack Coalition: A Model for Improving Cardiac Arrest Care**

Mark J. Alberts, MD, FAHA  
Professor and Vice-Chair  
Dept of Neurology and Neurotherapeutics  
UTSW Medical Center  
Dallas, TX

# Disclosures

- Dr. Alberts is a consultant (unpaid) and member of various technical expert panels (unpaid) for the Joint Commission

# Motivational Speaker??



# Case

- “Maria”
- 26 year old woman
- 16 weeks pregnant—first child
- Sudden onset of global aphasia, forced R gaze deviation, R hemiplegia
- Care options in 2016 vs 1996

# Hypothesis

- A national network of Cardiac Arrest Centers (CACs) will improve the care and outcomes of patients with CA

# Applying Lessons from Trauma and Stroke Centers

<b>Clinical Feature</b>	<b>Trauma</b>	<b>Stroke</b>	<b>Cardiac Arrest</b>
<b>Onset</b>	<b>Sudden without warning</b>	<b>Sudden without warning</b>	<b>Sudden without warning</b>
<b>Time Frame for Treatment</b>	<b>Golden Hour</b>	<b>ASAP but up to 8 hours in some cases</b>	<b>Immediate</b>
<b>Care Paradigm</b>	<b>Multidisciplinary Team</b>	<b>Multidisciplinary Team</b>	<b>Multidisciplinary Team</b>
<b>Initial Goals of Care</b>	<b>Stabilize, repair damage</b>	<b>Reperfuse brain</b>	<b>Maintain brain perfusion; Restart heart</b>

# Effects of Trauma Centers on Mortality

**TABLE 4.** Effect of state trauma systems on MVC-related mortality

Variable	Adjusted Incidence Rate Ratio (95% confidence interval)
Presence of a state trauma system	0.91 (0.89–0.94)
Primary enforcement of restraint laws	0.94 (0.91–0.97)
65 mph speed limit	1.37 (1.30–1.44)
Rural population	
<18%	1
18–31%	1.08 (1.05–1.11)
32–43%	1.28 (1.24–1.32)
>43%	1.53 (1.47–1.59)

# Effects of Trauma Centers on Mortality

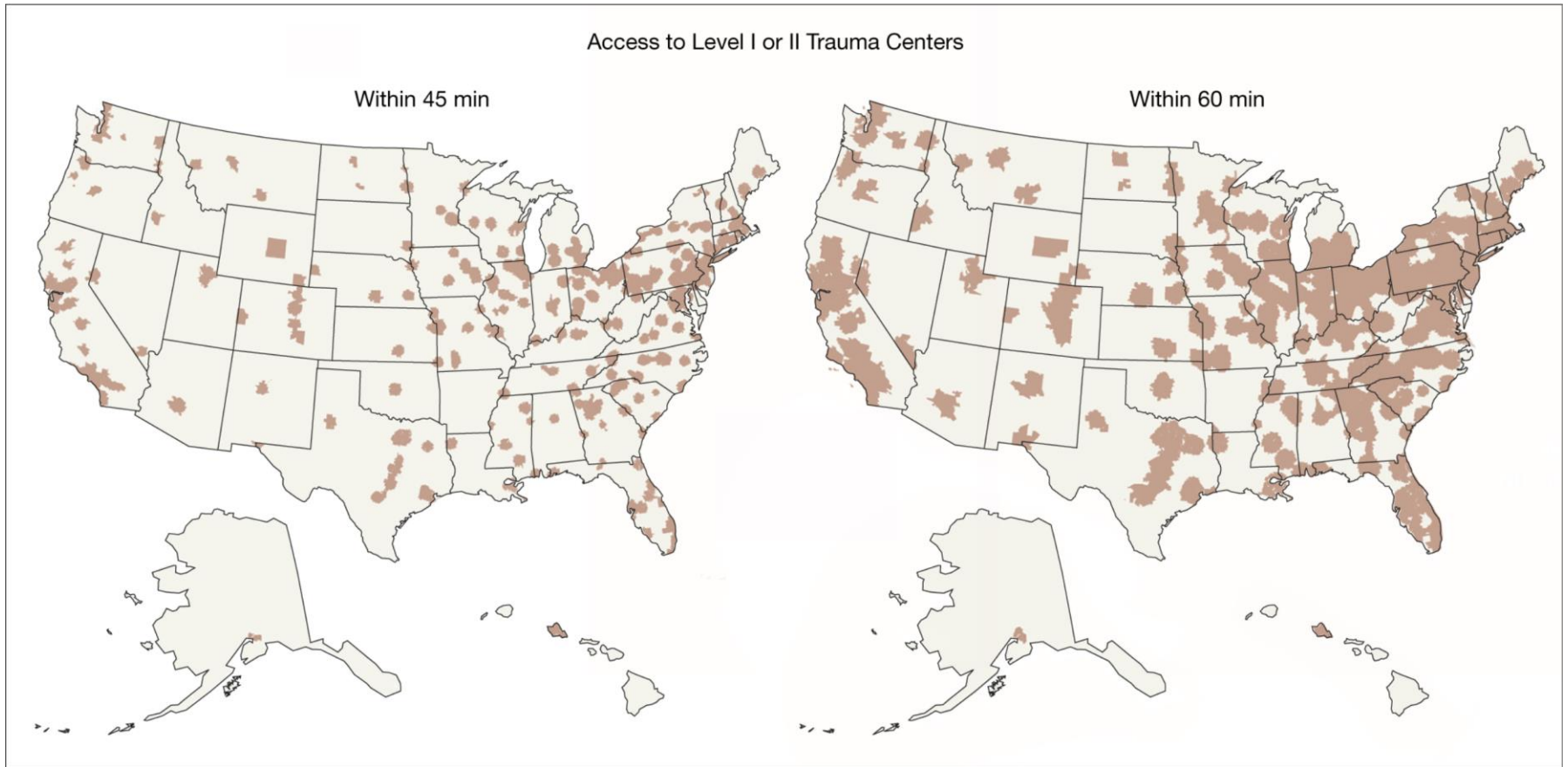
**TABLE 5.** Effect of state trauma systems on MVC-related mortality by age stratum

Age Stratum (yr)	Adjusted Incidence Rate Ratio (95% confidence interval)
All ages	0.91 (0.89–0.94)
1–14	0.83 (0.76–0.92)
15–54	0.93 (0.90–0.96)
55–74	0.88 (0.83–0.94)

Nathens et al., J Trauma, 2000, vol 48



# Distribution of Level I and Level II Trauma Centers



JAMA. 2005;293(21):2626-2633. doi:10.1001/jama.293.21.2626

# Effects of Stroke Centers on Mortality

**Table 3.** Mortality at Designated Stroke Centers and Nondesignated Hospitals

	No. (%)		Adjusted Mortality Difference (95% CI) <sup>a</sup>	P Value
	Designated Stroke Center (n = 15 297)	Nondesignated Hospital (n = 15 650)		
1 d	90 (0.6)	134 (0.9)	-0.3 (-0.6 to -0.0)	.04
7 d	665 (4.3)	842 (5.4)	-1.3 (-2.1 to -0.6)	.001
30 d	1543 (10.1)	1951 (12.5)	-2.5 (-3.6 to -1.4)	<.001
1 y	3412 (22.3)	4067 (26.0)	-3.0 (-4.4 to -1.5)	<.001

Xian et al., JAMA, 2011, vol 305

# Effects of Stroke Centers on Outcomes

**Table 4. Outcome of Finnish Patients With Ischemic Stroke**

	CSC (n=20 045)	PSC (n=10 749)	GH (n=30 891)
Unadjusted outcome, no. (%)			
Case-fatality by 1 year	3321 (16.6)	2051 (19.1)	8428 (27.3)
Institutional care at 1 year	1773 (8.8)	1037 (9.6)	4071 (13.2)
Home at 1 year	14 951 (74.6)	7661 (71.3)	18 392 (59.5)
Outcome adjusted for patient demographics, OR (95% CI)			
Case-fatality by 1 year	0.84 (0.80–0.89)	0.89 (0.84–0.94)	1
Institutional care at 1 year	0.87 (0.82–0.93)	0.89 (0.83–0.96)	1
Home at 1 year	1.22 (1.17–1.28)	1.16 (1.10–1.23)	1

# Lessons Learned from the Stroke Center Experience

1. Assemble a multidisciplinary group with expertise and experience
  - Brain Attack Coalition

<b>AAN</b>	<b>AANN</b>
<b>ACEP</b>	<b>ASNR</b>
<b>NAEMSP</b>	<b>CNS</b>
<b>SBC</b>	<b>VA</b>
<b>NINDS/NIH</b>	<b>CDC</b>
<b>AHA</b>	<b>NSA</b>
<b>NCS</b>	<b>SNIS</b>

# More BAC Partnerships

- BAC asked for advice and cooperates with:
  - CMS
  - The Joint Commission
  - FDA
  - NIH
- This provided the BAC with a certain level of 'gravitas', which aided its initiatives

# Advantages of the BAC

- Instant expertise in all major areas
- Credibility of recommendations
- Buy-in from all major organizations
- No one left to object

# Disadvantages of the BAC

- Large number of member organizations
- Slows decision making
- Can cause disagreements for some recommendations
  - Can lead to lowest common denominator
- Competing priorities

# Stroke Centers in the U.S. in 2016

- Currently at least 1500 Primary Stroke Centers
- About 200-250 Comprehensive Stroke Centers
- Most states have a Stroke System of Care
- Most states have some type of stroke triage or diversion paradigm
- **HOW DID WE GET THIS DONE??**



# Key Steps

- Verification of Stroke Centers
  - Prove staffing, infrastructure, care protocol, and outcomes
  - BIG STEP: Joint Commission begins formal a certification program in 2005
    - Instant credibility
    - Actual competition in some cities and regions
  - Then other groups begin certification programs
    - HFAP, DNV, etc.

# State Designation

- Many states then designated hospitals as Stroke Centers based on JC certification
- This motivated/allowed EMS to by-pass non-stroke center hospitals
- Regional triage protocols were developed
- Still faced important hurdles.....

# Overcoming Hurdles

- We asked hospitals if they minded being by-passed
  - about 30% had no interest in treating stroke and were OK with by-pass
- EMS has significant national diversity
  - Like herding cats.....
  - Empowered EMS to develop local protocols
  - Move system forward
- Concerns about over-crowding specific hospitals and long transport times
  - Marketplace adapted
  - More hospitals became stroke centers
  - Trend continues.....

# Design a System with Flexibility

- Track outcomes and change protocols as indicated by the data
- Evolve as the standards of care change
  - Stroke centers changing due to proof of EVT
- Look for opportunities to collaborate in terms of care, research, etc.
  - GWTG-Stroke—national registry of in-patient care metrics and outcomes
  - Mission Lifeline-Stroke—focusing on EMS/ED care metrics

# Important Differences

## STROKE/BAC

- EMS recognition incorrect in 50% of cases
- Only 1% of EMS calls
- Many mimics
- Poor lay knowledge
- Public education for recognition, not Rx

## CARDIAC ARREST

- EMS recognition pretty good
- Common EMS call
- Few mimics
- Reasonable lay knowledge
- Public education for TREATMENT

# Different Levels of Centers

Disease	Level of Center	Services	Comments
Stroke	CSC	Full diagnostic and Rx services All stroke types	24/7 availability; NICU, EVT; research and outreach
	PSC	Routine diagnostic and Rx services	24/7 availability
	ASRH	Limited services	Stabilize patient; IV TPA, Telestroke, transfer most patients to PSC, CSC
Trauma	Level 1	Full services provided by specialists in many areas	24/7 in-house staffing
	Level II	Most essential services available	Research not required
	Level III	Emergency resuscitation	Transfer some patients
CACs	Comprehensive	Restart heart; advanced cardiac care, hypothermia	Research program; 24/7 staffing
	Primary	Restart heart; some cardiac care	Likely transfer some patients
	Initial Care	Restart heart	Transfer most patients

# PROPOSAL

- 1. Set up a CAC (Cardiac Arrest Coalition):
  - Reach consensus on key care elements
  - Set priorities
  - Speak with one voice
  - Help organize various groups
  - Bring focus to various care initiatives

# Proposal

- 2. Form a national network of Cardiac Arrest Centers
  - Backbone of care
  - Establish a formal objective certification process
    - Avoid self-certification or self-attestation
  - Focal point for education and research
  - Track outcomes
  - Lobby for funds and support



# “Maria” Follow-Up

- EMS recognized a severe stroke
- Taken to our CSC
- Not treated with IV TPA
- Received EVT for L distal internal carotid occlusion
- Excellent reperfusion
- Discharged in 4 days with minimal deficit
- Delivered a normal baby girl few months later

# Conclusions

- Cardiac Arrest centers make perfect sense
- Concept worked very well for Trauma and Stroke
- Many parallels in the diseases and care paradigms
- When the going gets tough....always ask “What is best for the patient?”
- The answer will guide you to the best path forward