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

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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

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

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)

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

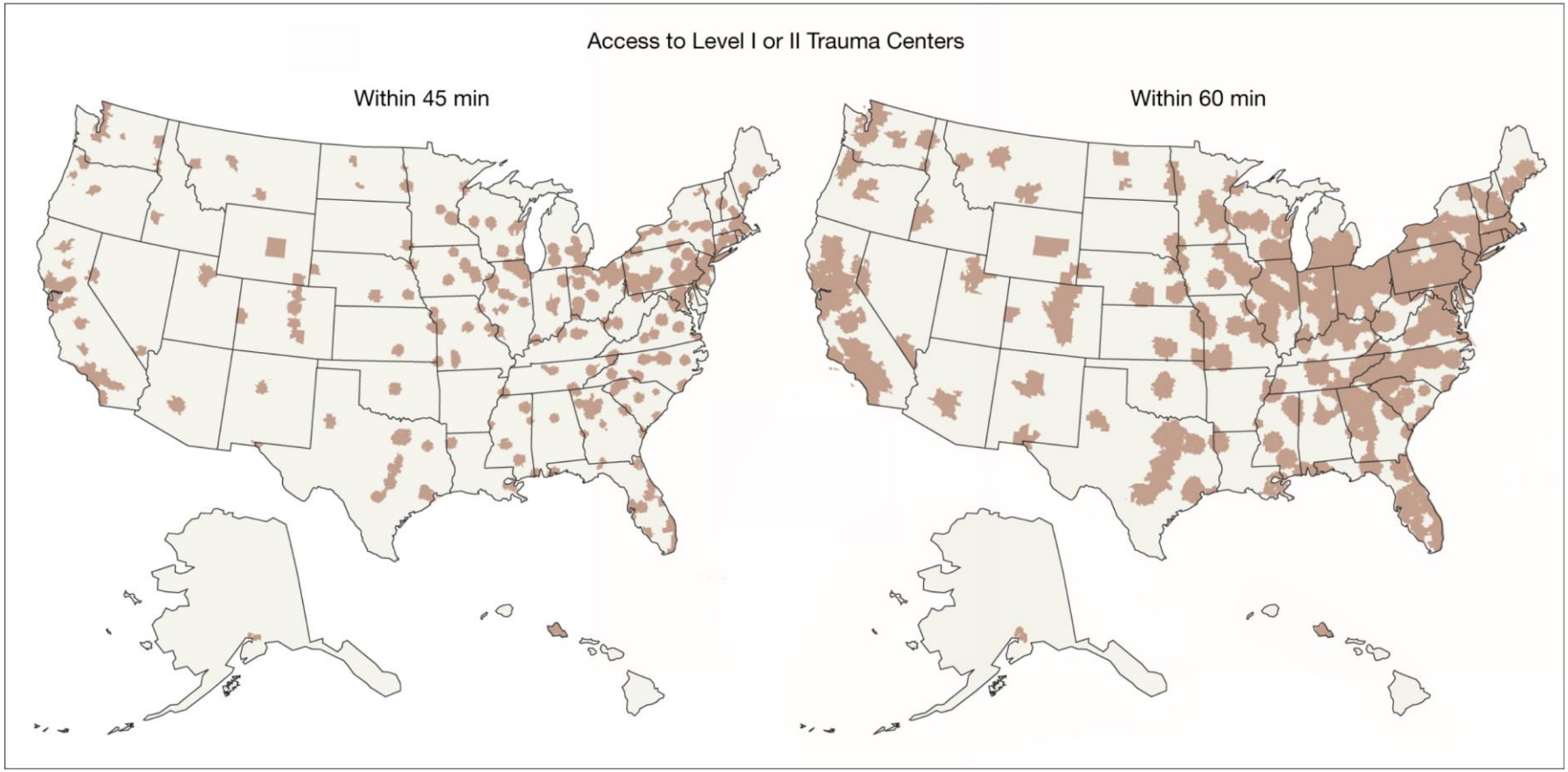
Effects of Trauma Centers on Mortality

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. (%)			
	Designated Stroke Center (n = 15 297)	Nondesignated Hospital (n = 15 650)	Adjusted Mortality Difference (95% CI)[a]	*P* Value
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

Meretoja et al., Stroke, 2010, vol 41

Lessons Learned from the Stroke Center Experience

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

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

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