



**Stroke Center Designation:
Impact on EM**

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Global Objectives

- Improve patient outcome for both hemorrhagic and ischemic stroke
- EM participation in protocol development
- Hospital financial interest
- Community education

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Clinical History

A 911 call was taken by the Chicago Fire Department dispatch service at 2:25 pm. The caller stated, “My husband is having a stroke and he can not move the left side of his body”. An ALS ambulance arrived at 2:34 pm and found the 67-year-old patient to be sitting in a chair with a BP 140/85, pulse 96, respiratory rate 16 and the inability to move his left arm or leg. His wife also noticed the left side of his face was “flat”. He was able to speak and denied headache, chest pain or shortness of breath.

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Clinical History

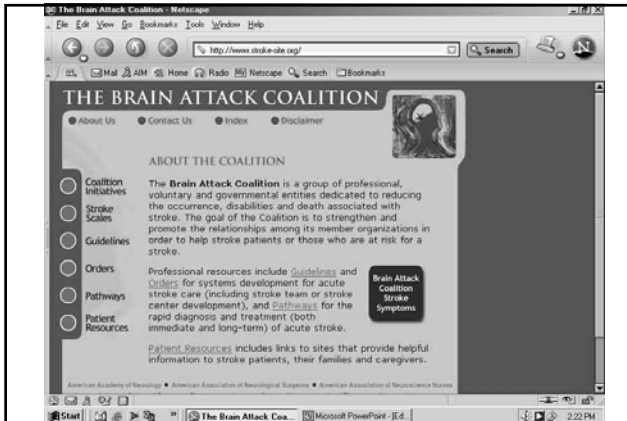
He had a history of hypertension, was on Labetalol and Lasix, with no allergies. The paramedics noted the time of onset for the symptoms to be 2:15 pm., which was agreed to by both the patient and his wife. The patient was placed on a cart, an IV was established, oxygen was applied, and glucose was 98. The paramedics called into the base station at 2:48 pm, stating, “We have a probable stroke, with two out of three abnormal on the Cincy scale” and arrived in the ED at 2:52 pm.

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HISTORY


- 1995- NINDS- TPA therapy for ischemic stroke
- 1996- EM controversy over use of TPA in stroke
- 1997- Brain Attack Coalition (BAC) formed
- 2000- Primary Stroke Center criteria published
- 2004- European Stroke Initiative
- 2005- Comprehensive Stroke Center criteria published

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BAC Members


- NINDS
- American Academy of Neurology
- American College of Emergency Physicians
- American Assn of Neurological Surgeons
- American Stroke Association
- National Stroke Association
- Am Soc of Intervent and Therapy Neuroradiology
- American Society of Neuroradiology
- Congress of Neurological Surgeons
- Stroke Belt Consortium
- Veterans Administration
- National Association of EMS Physicians
- Centers for Disease Control and Prevention
- American Assn of Neuroscience Nurses

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Why Were Stroke Centers Developed?


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TIME IS BRAIN

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Time is Brain

- **Narrow therapeutic window**
 - t-PA within three hours of symptom onset
 - Rapid identification, transport, diagnosis and treatment
 - Stroke “chain of survival” (AHA)

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Trauma Center Model

- Military experience with rapid evacuation
- 1966: Accidental Death and Disability: The neglected disease of modern society
- 1993 report: 20 states had trauma systems with legal authority
- Financial Crisis: decreased federal support, managed care, DRGs, staff retention
- Trauma center implementation has provided an infrastructure for the provision of emergency care

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Who is Designating Stroke Centers?

- American Stroke Association
- Joint Commission for the Accreditation of Hospital Organizations

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**JCAHO
Disease Specific Care Certification**

- Premise is that certification process will drive quality measures and improve outcomes
- No emergency medicine society has endorsed this initiative
 - t-PA controversy
 - Overcrowding
 - Medical legal implications

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**Brain Attack Coalition
Recommendations for
Developing Primary Stroke Centers**

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**Major Elements
of a Primary Stroke Center**

- | | |
|---|--|
| <ul style="list-style-type: none"> • Patient care areas <ul style="list-style-type: none"> • Acute stroke teams • Written care protocols • Emergency medical services • Emergency department • Stroke unit • Neurosurgical services | <ul style="list-style-type: none"> • Support services <ul style="list-style-type: none"> • Stroke center director • Neuroimaging services • Laboratory services • Outcome and quality improvement activities • Continuing medical education |
|---|--|

Alberts MJ, et al. JAMA. 2000;283:3102-3109.

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**Anticipated Benefits
of a Primary Stroke Center**

- Increased patient-care efficiency
- Fewer peristroke complications
- Increased use of therapies for acute stroke
- Decreased morbidity and mortality
- Improved long-term outcomes
- Decreased costs to the healthcare system
- Improved patient satisfaction

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Acute Stroke Team

- Personnel with expertise in diagnosing and treating cerebrovascular disease (may include neurologist or neurosurgeon)¹
- Minimum team would include a physician and another healthcare provider (nurse, physician's assistant, nurse practitioner)
- National Stroke Association (NSA) and European Stroke Initiative (EUSI) organizational recommendations
 - Stroke center team should include a specialist and support in:
 - Neurology, neurological surgery, neuroradiology, as well as emergency medicine and rehabilitation medicine
 - Stroke center team should include, on an as-needed basis, a specialist and support in:
 - Cardiology, critical care, gastroenterology, hematology, infectious disease, internal medicine, pathology, primary care, and vascular surgery

¹. Alberts MJ, et al. JAMA. 2000;283:3102-3109.

². Brainin M, et al. Cerebrovasc. Dis. 2004;17(suppl 2):1-14.

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Acute Stroke Team (cont'd)

- Someone from the team should be available 24/7
 - Need system for quick notification and activation of the team
 - One member of the team should see patient within 15 minutes
- Written document should be developed to provide information on stroke team guidelines
- Logbook should be established to document call and response times, diagnoses, treatments, and outcomes


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Written Care Protocols

- Reduce tPA-related complications
- Protocols should include
 - Emergency care of ischemic and hemorrhagic strokes
 - Stabilization of vital functions
 - Initial diagnostic tests
 - Initial use of medications
- Protocols should be available any place where patients with stroke may be evaluated or treated
- Should be reviewed and updated once per year

Alberts MJ, et al. JAMA. 2000;283:3102-3109.
Brainin M, et al. Cerebrovasc. Dis. 2004;17(suppl 2):1-14.

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Emergency Medical Services

- Assigned a high priority
- EMS should be integrated with the stroke center
- During transportation, EMS and the stroke center need to communicate
- Quickly triage patients with a stroke upon arrival
- Educational activities should include stroke center and EMS staff and occur at least twice a year

Alberts MJ, et al. JAMA. 2000;283:3102-3109.
Brainin M, et al. Cerebrovasc. Dis. 2004;17(suppl 2):1-14.

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Emergency Department

- ED personnel should be trained to diagnose and treat all types of acute strokes
- ED staff should access the stroke team
- Communicate with EMS and be prepared for arrival of stroke patients
- Written protocols for stroke management and triage
- Educational activities should occur at least twice a year to reinforce stroke diagnosis and treatment

Alberts MJ, et al. JAMA. 2000;283:3102-3109.
Brainin M, et al. Cerebrovasc. Dis. 2004;17(suppl 2):1-14.

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Additional Hospital Units and Services

- Stroke Unit
 - Does not need to be a distinct unit in the hospital
 - Personnel should have expertise in managing cerebrovascular disease
 - Additional infrastructure includes: continuous telemetry, written care protocols, and ability to continuously, noninvasively monitor blood pressure

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Brainin M, et al. Cerebrovasc. Dis. 2004;17(suppl 2):1-14.

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Hospitals That are Stroke Centers

- Approximately 5,000 hospitals in the US
- As of August 2005 there are 146 certified Stroke Centers in 34 states
- 50 more in the pipeline
- California, Florida, Ohio lead
- State certification in Massachusetts and New York

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**Does my Hospital Have
to Become a Stroke
Center?**

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Opportunity Exists

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**Do Stroke Teams
Improve Outcomes?**

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**Stroke Team/Unit
VS
Stroke Center**

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TIME IS BRAIN

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**Importance of Rapid Identification and Triage
of Emergency Stroke Patients**

- Intervention in acute ischemic stroke requires the rapid and careful
 - Assessment
 - Selection
 - Treatment
 - Within 3 hours of symptom onset
- Multiple disciplines and departments
- Pre-hospital responders and in-hospital care providers
- Perceptions, attitudes, and behavior of the public
 - Warning signs of stroke
 - Need for rapid and immediate action

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Primary Stroke Center Team Improves Time to Treatment

Variable	Before Stroke Center Team	24-Hour Stroke Team Established
Time until notification of stroke team (min)	24	10
Time for stroke team arrival (min)	28	6
Time from triage to CT scan (min)	52	42

Attimore SU, et al. *Stroke*. 2003;34:e55-e57.

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Stroke Units Improve Outcomes

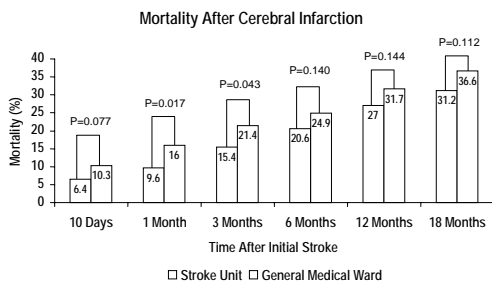
- Study included 802 patients admitted with a stroke diagnosis to a hospital in Norway
- Study patients arrived within 24 hours of stroke onset and were at least 60 years old
- Patients were treated in the stroke unit or in the general medical ward
- Stroke outcomes were assessed

Ronning OM, et al. *Stroke*. 1998;29:58-62.

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Stroke Units Improve Outcomes in Ischemic Stroke

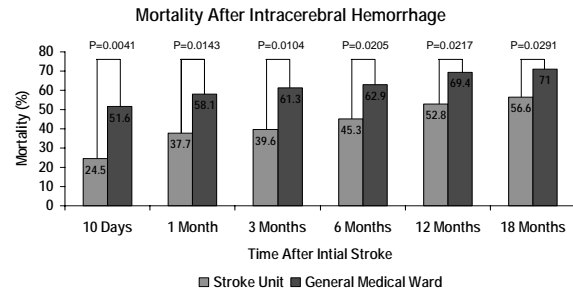


Ronning OM, et al. *Stroke*. 1998;29:58-62.

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Stroke Units Improve Outcomes in Hemorrhagic Stroke



Ronning OM, et al. *Stroke*. 1998;29:58-62.

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Stroke Units Improve Outcomes

- Stroke Unit Trialists' Collaboration 2002
- 3% absolute reduction in all-cause mortality, number needed to treat 33
- 6% increase in independent survivors, number needed to treat 16

Stroke Unit Trialists' Collaboration: Cochrane Library, issue 1 2002.

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Stroke Units Improve Outcomes

- The Mannheim Declaration of Stroke in Eastern Europe
- 10 elements to improve patient care
- Education- community and physician
- Stroke units
- Treatment
- Prevention

Bogousslavsky LJ et al. *Cerebrovasc. Dis.* 2004;18:248

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Is There a Role for “Drip and Ship”?


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Strict Protocol is the KEY

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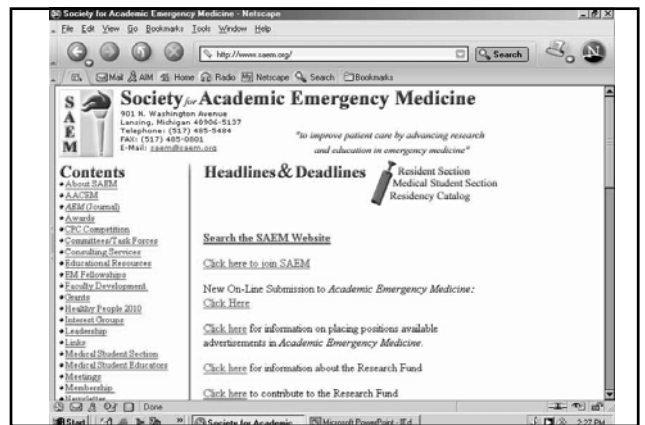
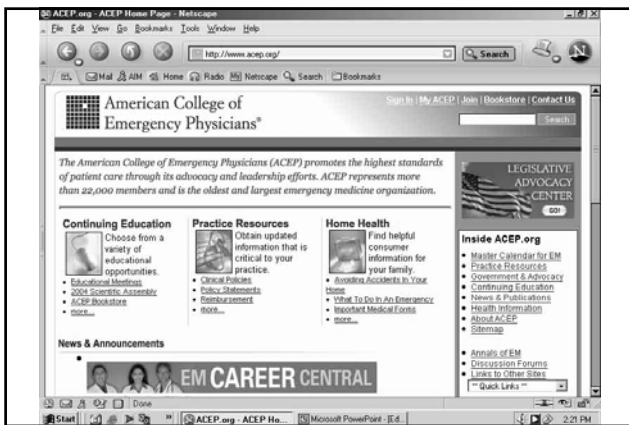
Rural Nevada

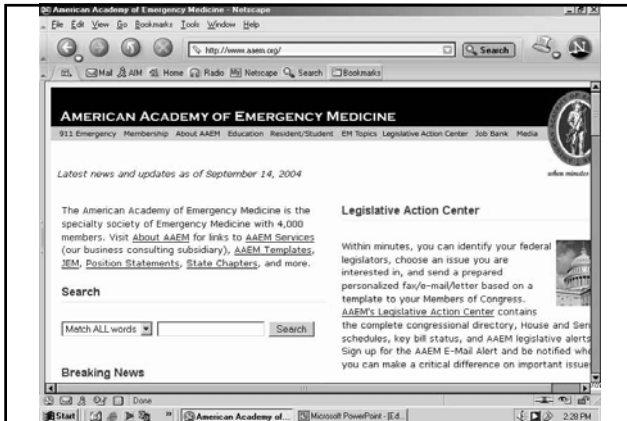
- One designated stroke center
- 8 rural EDs
- One protocol agreed to by all hospitals
- Managed through the central stroke team
- Site visits to confirm protocol adherence and promote team approach

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EM Controversies in Stroke Management

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EM Concerns

- Internal and external validity of the NINDS trial
 - Single trial (two parts)
 - Treated group not as sick as the placebo group
 - Hemorrhage rate
 - Neuroradiology interpretation
- Infrastructure needed to provide timely care
 - EMS not prepared for their role
 - Hospitals not prepared for their role
- Medical legal concerns in the emergency medicine and neurology communities
- Reimbursement issues



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EM Role in the Process

- A hospital can not embark on becoming a stroke center without EM participation
- Models exist where EM has taken the lead role in developing the stroke team
 - Conversely, models exist where EM has blocked the initiative



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ACEP and Stroke Centers

- October 2003: ACEP Council and Board of Directors unanimously adopted a resolution to monitor the progress of any federal stroke legislation and dedicate resources to make members of Congress aware that:
 - Standards of care in stroke treatment remain controversial
 - The designation of stroke centers based on their ability / willingness to adhere to such standards of care may have many unintended negative consequences



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Where do We go From Here?

- Work with the BAC, EUSI
- Educational programs
 - Medical students
 - Residents
- Implementation packets for stroke center or stroke unit development
 - Pathways, protocols, tools
- Focus on future therapies and having systems in place to facilitate utilization



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Clinical Course

The patient was met by a nurse, a doctor and an EM tech and taken to the resuscitation room. They confirmed the onset time of 2:15pm. Vital signs were BP 142/88, P 98, R 16, T 99.2 F. HEENT: eyes were deviated to the right but came back to midline with command, PERRL, Ears clear, neck supple. Heart, lungs and abdomen were normal. Neurological exam: CN mild left facial droop, strength 5/5 R arm and leg, 1/5 L arm and leg, no light touch or pin prick sensation in the L arm and leg. NIHSS=17-18.



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Clinical Course

- The stroke team was called at 3:05pm
- Labs were drawn and sent.
- The patient went to CT at 3:20 pm and returned at 3: 41pm.
- The stroke team assessed the patient on return from CT and agreed with the diagnosis of CVA and NIHSS=18.
- Head CT reading was “negative for bleed, normal brain” at 4:03pm.

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Clinical Course

- The patient was felt to be a good candidate for thrombolytics. The patient was advised of the risks and benefits.
- The patient, along with his wife refused thrombolytic therapy, stating “I want nature to take its course”.
- The patient was given 325 mg. of aspirin and admitted to the hospital.
- His 24 hour NIHSS=14.
- On discharge, 5 days later, NIHSS=10.

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Key Learning Points

- Stroke Center certification requires multi-disciplinary cooperation
- Strict adherence to stroke protocols improves outcomes in these patients
- EMS plays a KEY role in maximizing the management of stroke patients
- The EM community has numerous concerns about the Stroke Center designation concept

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Questions??

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