

Building the Case for a Primary Stroke Center

NATIONAL STROKE ASSOCIATION
presents

***The Business of Stroke:
Building the Case for a
Primary Stroke Center***

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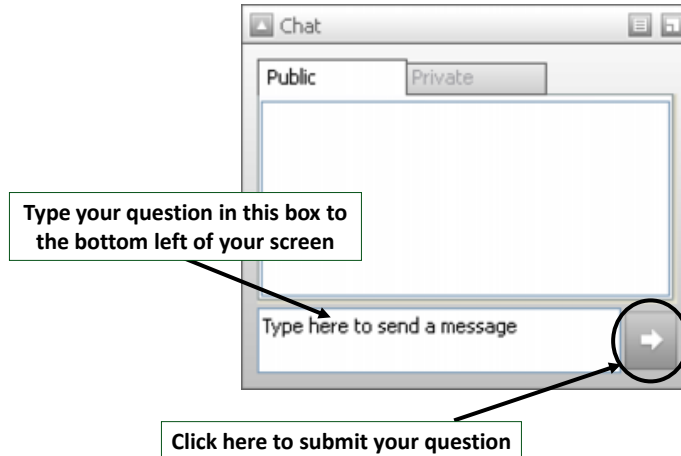
www.stroke.org/business

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Submit your questions (bottom left side of your screen)



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Presented by

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and

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Disclosures

- ⦿ **Wende Fedder, RN MBA**
None

- ⦿ **Philip B. Gorelick, MD MPH FACP**
Speaker's Bureau Member & Consultant to
Boehringer Ingelheim

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Webinar Objectives

In relation to Primary Stroke Centers, you will be able to better understand:

- 1. Background, Rationale and Components**

2. Planning, Development & Financials

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Question

What is the evidence that organizing stroke care is effective?

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Advantages of Organizing Stroke Care

- ⊙ Chemistry class and laws of free energy analogy: the most disordered state (positive entropy) is the lowest energy state.
- ⊙ One must pump energy into a chemical system to overcome disorder.
- ⊙ Similarly, one must pump 'energy' in terms of resources, good management plans and vision into *stroke care* to order it.
- ⊙ Coronary Care Units reduced morbidity and mortality in the 1950s
- ⊙ Do Stroke Units do the same?

Source: Gorelick PB. An Integrated Approach to Stroke Prevention. In: Clinician's Manual on Blood Pressure and Stroke Prevention, 2002.

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The Impact of Standardized Stroke Orders on Adherence to Best Practices

- ⊙ CDC-sponsored Coverdell Acute Stroke Pilot Registry Hospital sites in California
- ⊙ **6 points of care tracked after implementation of standardized stroke orders:**
 1. Thrombolysis
 2. Receipt of antithrombotic medication within 48 hrs.
 3. DVT prophylaxis
 4. Smoking cessation counseling
 5. Lipid lowering
 6. Anti-thrombotic medications at discharge
- ⊙ **Results:**
 1. 63% in Year 2 had a perfect score vs. 44% in Year 1 ($p < 0.0001$)
 2. Rates significantly improved in 4 of 6 hospitals demonstrating the potential impact of system-wide interventions

Source: California Acute Stroke Pilot Registry (CASPR) Investigators. Neurology 2005; 65: 360-65

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Systematic Review of Observational Studies on Stroke Units

- ⊙ **Hypothesis:** admission to a stroke unit (organized interdisciplinary inpatient care) reduces death and death or poor outcome
- ⊙ **Methods:** analyze articles which compare stroke unit to non-stroke unit care
- ⊙ **Results:** Stroke unit care was associated with reduced odds of:
 1. Death (OR=0.79, 95% CI .73, .86; $P = .00001$)
 2. Death/poor outcome (OR=0.87, 95% CI .80, .95; $P = .002$).
- ⊙ **Conclusion:** Results complicated by predominantly single-center heterogeneity, but are similar to clinical trials results

Source: P Seenan et al. Stroke 2007; 38: 1886-1892

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Organized Inpatient (Stroke Unit) Care for Stroke: Cochrane Review

- ⊙ **Main Results**

- ⊙ 31 trials, 6936 participants

- ⊙ **Main results favoring Stroke Unit:**

- ⊙ Odds of death at median 1-yr f/u:

OR= 0.86 (95% CI: 0.76, 0.98); p=0.02

- ⊙ Odds of death or institutionalized care:

OR= 0.82 (95% CI: 0.73, 0.92); p=0.0006

- ⊙ Odds of death or dependency:

OR= 0.82 (95% CI: 0.73, 0.92); p=0.001

- ⊙ No indication that organized stroke care resulted in longer hospitalization

- ⊙ **Conclusion**

Acute stroke unit care results in greater survival, return home, and regaining of independence

Source: Govan L et al. Stroke 2008; 39: 2402-2403

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Benefits/Promises of Primary Stroke Centers

1. Improved efficiency of patient care
2. Fewer peri-stroke complications
3. Increased use of acute stroke therapies
4. Reduced morbidity and mortality
5. Improved long-term outcomes
6. Reduced costs to healthcare system
7. Increased patient satisfaction
8. Others

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Data Feedback for Quality Improvement of Stroke Care

CAPTURE Stroke Experience

Dilip K. Pandey for the CAPTURE Stroke Investigators
(AM J Prev Med 2006; 31: S224 – 29)

**Importance of data feedback (organization)
to assure quality and improved stroke care.**

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History of Stroke Center Certification in the U.S.

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University of Illinois Stroke Unit Early 1980s



Founder: Philip B. Gorelick, MD, MPH

"I began my career providing stroke unit care."

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Community Stroke Action Program Staff University of Illinois Hospital ~ 1984



Pictured are the young Dr. Gorelick (note slimmer version, full head of hair, and oversized eye glasses!) and staff

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History of Stroke Centers

Parallel and synergistic efforts by key stakeholders in the US to achieve organization of stroke care in 1990s & 2000s:

1. **Major Organizational Level**: The Joint Commission, American Heart Association & American Stroke Association, National Stroke Association, Brain Attack Coalition
2. **State Level**: public health departments
3. **US Government Level**: CDC, Coverdell legislation

Source: Fedder W. Neurologic Clin 2008; 26: 1191-1207

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Emergency Medical Service Initiatives

- ⊙ Telephone activation of “911”: educate patients, family members, caregivers, and co-workers; dial “911” if acute stroke symptoms
- ⊙ Integrating EMS response to “911” at local level/acute receiving hospital
- ⊙ EMS Diversion to Primary Stroke Centers
- ⊙ American Heart Association Operation Stroke: educational campaigns to improve ***chain of stroke survival***

Source: Fedder W. Neurologic Clin 2008; 26: 1191-1207

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Stroke Chain of Survival: 7 D's

- ⊙ **Detection** (stroke has occurred and a layman sounds the alarm)
- ⊙ **Dispatch** (911 alerts the EMS)
- ⊙ **Delivery** (EMS delivers the patient)
- ⊙ **Door** (rapid screening for stroke occurs in ED)
- ⊙ **Data** (NIH Stroke scale, labs, CT head, etc)
- ⊙ **Decision** (IV tPA? IA tPA? Experimental protocol?)
- ⊙ **Drug** (0-3 hour window for IV tPA)

Source: NINDS symposia in 1990s

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Cincinnati Pre-hospital Screening Stroke Scale

- ⊙ **Drift** (arm)
- ⊙ **Droop** (face)
- ⊙ **Dysarthria** (and language)

Source: Gorelick AR et al. Neurologic Clin 2008; 26: 923-42

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Other Key Advances/Initiatives Leading to Stroke Center Designation

Stroke unit reduces LOS and charges (Wentworth and Atkins, 1996)

“Time Zero Plan”: LOS major driver of cost and need coordinated care (Gorelick 1995)

Stroke care pathway and protocol reduces LOS and improves outcomes (Book 2001)

University Health System Consortium (UHC): establish stroke outcome measures at academic centers (1990s)

National Stroke Association’s Stroke Center Network and Recommendations for stroke center infrastructure (mid 1990s) later used by Brain Attack Coalition Primary Stroke Centers in 2000

LOS=length of stay

Source: Fedder W. Neurologic Clin 2008; 26: 1191-1207

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The Joint Commission Primary Stroke Centers (PSCs) and Certification

Disease Specific Certification (DSC)

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PSC Certification

- ◎ **AHA/American Stroke Association and Joint Commission agreed to certification process in 2003**
- ◎ **3 Major Elements of PSC Certification**
 1. **Compliance with evidence-based guidelines**
 2. **Implementation of Joint Commission standards (e.g., safety goals)**
 3. **Measurement of clinical outcomes (AHA/ASA Get with the Guidelines software)**

Source: Fedder W. Neurologic Clin 2008; 26: 1191-1207

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Statewide Approach

- ◎ **“The Mississippi Stroke Education Consortium (MSEC)- A State-Based Template to Promote Stroke Awareness, Prevention, and Emergency Treatment” (1990s)**
- ◎ **Components**
 1. **Professional and public education**
 2. **Stroke care criteria**
 3. **Level I-III medical center designation**
 4. **EMS transport criteria**

Source: Gordon DL. Neuroepidemiology 2000

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Main Concept of The Joint Commission (TJC) Primary Stroke Center Certification

Quality Improvement Program centered around:

1. tPA administration
2. Other TJC disease-specific acute performance measures
3. Patient education and treatment for recurrent stroke prevention

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Outreach Care Primer on Telemedicine

“...digitized health care now permits the outsourcing of a range of medical services from clinical diagnostic to direct care.”

Source: Singh SN, Wachter RM. NEJM 2008; 358; 15: 1622-27

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Physician "Rounding"?



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Major Elements of a Primary Stroke Center-1

Patient Care Areas

1. Acute stroke teams
2. Written care protocols
3. Emergency medical services
4. Emergency department
5. Stroke Unit
6. Neurosurgical services

Source: Brain Attack Coalition, JAMA 2000; 283: 3102-3109

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Major Elements of a Primary Stroke Center-2

Support Services

1. Commitment and support of medical organization: a stroke center director
2. Neuroimaging services
3. Laboratory services
4. Outcome and quality improvement activities
5. Continuing medical education

Source: Brain Attack Coalition, JAMA 2000; 283: 3102-3109

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Developing a Business Model for Primary and Comprehensive Stroke Care

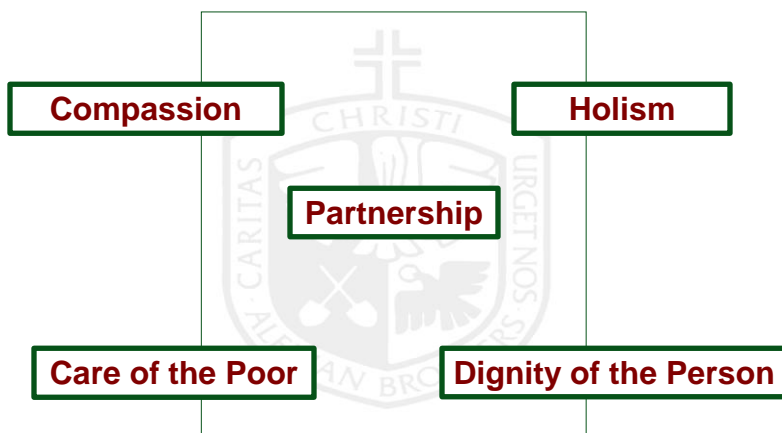
- ⦿ Alexian Brothers Health System Overview
- ⦿ Stroke Environment and Legislative Landscape
- ⦿ Alexian Brothers Stroke Business Model
- ⦿ Cerebrovascular Operations
- ⦿ Clinical Outcomes
- ⦿ Future Program Expansion

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OUR VALUES



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Alexian Brothers Hospital Network

- Alexian Brothers Medical Center
- St. Alexius Medical Center
- Alexian Brothers Behavioral Health Hospital
- Alexian Rehabilitation Hospital
- Alexian Brothers Medical Group
- Alexian Brothers Pediatric Specialty Group
- Alexian Brothers Mental Health Center
- Alexian Brothers Corporate Health Services
- Alexian Brothers Immediate Care
- Alexian Brothers Imaging Centers
- Alexian Brothers Home Health and Hospice
- Alexian Brothers Reference Laboratories

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Network Statistics

Licensed Beds:	855
Inpatient Discharges:	42,500
Outpatient Visits:	430,000
Surgeries:	23,000
Deliveries:	6,500
Emergency Room Visits:	101,000

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Clinical Institute Tenets

- ⊙ Interdisciplinary collaboration of administrative and clinical professionals with enfranchised physicians and staff leadership
- ⊙ Advanced clinical technology with high quality specialty care and outcomes consistent with - and measured against – national benchmarks
- ⊙ Active participation and advancement of clinical research and other educational pursuits
- ⊙ Significant market share and branding potential

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Neurosciences Institute Program Model

- ⊙ **Private and Employed Primary Care Physicians**
- ⊙ **Private General Neurologists**
- ⊙ **Neurosciences Institute Center**
 - ⊙ Employed Sub-Specialists
 - ⊙ Academically Affiliated Sub-Specialists
 - ⊙ Clinics
 - ⊙ Administration
- ⊙ **NSI General Research Center**
 - ⊙ Neurodegenerative Research
- ⊙ **Center for Brain Research**
 - ⊙ NeuroMEG Research
- ⊙ **Medical Center Services**
 - ⊙ Gamma Knife, Neuroimaging, Bi-Plane Suite, NeuroMEG

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Stroke Center Designation

- ⊙ **The Joint Commission Disease Specific Certification**
- ⊙ **Initial designation at both Alexian Brothers hospitals June 2005**
- ⊙ **American Heart Association “Get With the Guidelines”**
 - ⊙ Both Alexian Brothers acute care hospitals awarded Gold Level recognition for two years sustained compliance of 80% or greater in 2008

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Illinois Legislation

- ⊙ Primary Stroke Center Designation Act
- ⊙ Bill passed in 2009
- ⊙ Over 20 PSCs in Illinois to date with greater concentration in larger cities (Chicago, Peoria, Rockford)

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Stroke Program Genesis

- ⊙ **“Brain Child” of Corporate CEO**
- ⊙ **Strong Executive Sponsorship**
- ⊙ **Bringing academics to the community**
- ⊙ **Mission**
 - ⊙ *To provide best practice for the prevention, diagnosis, treatment and rehabilitation of cerebrovascular disease while upholding the Core Values of the Alexian Brothers*

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STROKE PROGRAM STRUCTURE



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Alexian Brothers Stroke Program Components

- ⊙ **Comprehensive Stroke Center Goal**
- ⊙ **Research**
 - ⊙ First and only hospital in Illinois to enroll in the IMS III acute stroke study (top 3 enrolling site in study)
 - ⊙ IMS III NIH funded study launch and first patient enrolled December 2006; Top 3 enroller in US
 - ⊙ AVAIL study launch 2006 at both acute care hospitals (completed)
 - ⊙ Coverdell Stroke Registry (CAPTURE Stroke)
 - ⊙ Continuous dialogue with CRC at NIH
- ⊙ **Urgent Transfer Line**
 - ⊙ 24/7 access to Neuro expertise/INR and Neurosurgery
 - ⊙ 5-10 calls per month since July 2007

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Alexian Brothers Stroke Program Components

- ⊙ Urgent Care Centers and Ambulatory Network
- ⊙ Emergency Department Protocols
- ⊙ ICU – Intensivists 24/7
- ⊙ Stroke Unit
- ⊙ Inpatient Rehabilitation affiliation with Rehab Institute of Chicago
- ⊙ Prevention Programs (BP screenings, Strike Out Stroke)
- ⊙ Second Opinion Stroke Clinic

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Alexian Brothers Stroke Program Components

- ⊙ EMS Outreach (over 120 presentations at Fire Stations)
- ⊙ Outpatient Day Rehabilitation Program
- ⊙ Vocational Rehabilitation/Drivers Program
- ⊙ Stroke Camp
- ⊙ Senior Leadership “Passion”
- ⊙ STARS (NSA)
- ⊙ SSEO (AHA/ASA)

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Stroke Program Technology/Physician Expertise

- ⊙ Six 64 Slice CT Scanners
 - ⊙ Hospital Based
 - ⊙ Ambulatory
- ⊙ fMRI
- ⊙ Neuroradiologists/Endovascular Interventionalists
 - ⊙ Hospital Radiologist Groups – Four
 - ⊙ Employed Interventional Neuroradiologists- Two, full time
- ⊙ Fully Equipped Neurosurgery Suites and Vascular Neurosurgeon
- ⊙ Bi-Plane Angiography Suite
 - ⊙ Diagnostic angiograms, Wingspan Stent, Clot Retrieval, Epistaxis repair, Aneurysm coiling

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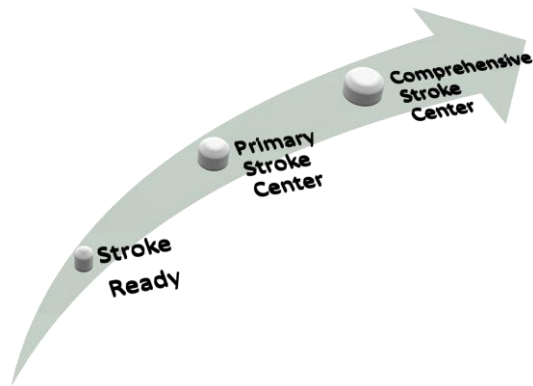
Level of Designation and Cost Assessment

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Levels of Stroke Designation



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Stroke Ready

Emergency Care Focus

- ⊙ Written Care Protocols
- ⊙ Neuroimaging 24x7
- ⊙ Laboratory services 24x7
- ⊙ EKG 24x7
- ⊙ Diagnostic Imaging 24x7
- ⊙ Acute Stroke Response 24x7
- ⊙ Others (TBD)*

*In development in Illinois

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Primary Stroke Center Cost

- ⊙ **Capital Investment (None)**
 - ⊙ Neuroimaging 24x7
 - ⊙ Laboratory services 24x7
 - ⊙ EKG 24x7
 - ⊙ Diagnostic Imaging 24x7
 - ⊙ Outcome and QI activities including database tracking
 - ⊙ Eight hours of Stroke education
 - ⊙ Neurosurgical services including OR services available 24x7
 - ⊙ Acute Stroke Response 24x7
 - ⊙ CME for EMS
 - ⊙ Two community stroke prevention programs



BAC JAMA 2000 June

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Primary Stroke Center Estimated Cost

Annual average cost for a facility is \$20,000-\$30,000

Public education, additional staff, quality improvement program management and material development and printing.

JAMA article breaks out the costs as follows:

Acute Stroke Team	\$5,000-\$20,000
Stroke Unit*	\$0-\$120,000
Radiology Technician	\$0-\$50,000
Physician Leader	\$0-\$20,000
Staff Education Support	\$1,000-\$5,000
Public Education	\$2,000-\$10,000
Marketing	\$0-\$20,000

Range of \$8,000-\$245,000

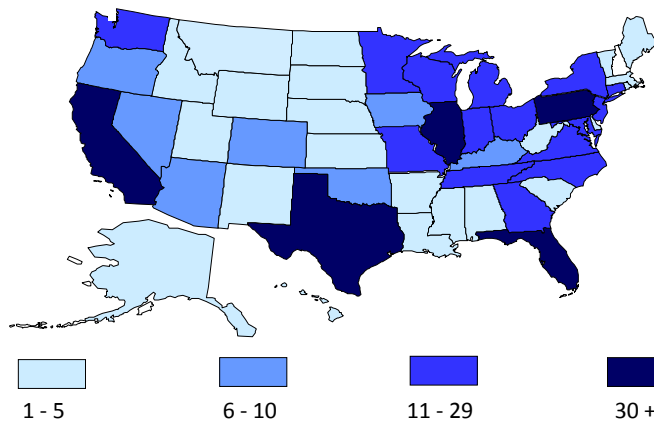
**Cost of more staff for stroke team. Does not include cost for any new infrastructure required.*

Consensus Statement from the Brain Attack Coalition (published in the June 21, 2000 edition of the *Journal of the American Medical Association*) www.strokeassociation.org



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Number of Primary Stroke Centers Certified by The Joint Commission 11/11/2009



www.thejointcommission.org



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Comprehensive Stroke Program Cost

All Primary Stroke Center Criteria

Additional Capital Investment

● Neuro Bi-Plane Capital Investment (2004)

○ Equipment Cost	\$1,826,286
○ Construction Cost	\$2,973,000
○ Annual Lease Cost (bi-plane 5yr)	\$ 370,000
○ Neuro Lab Equipment	\$ 499,290
○ TOTAL INVESTMENT	\$ 5,668,576

● Neurosurgery Capital Investment

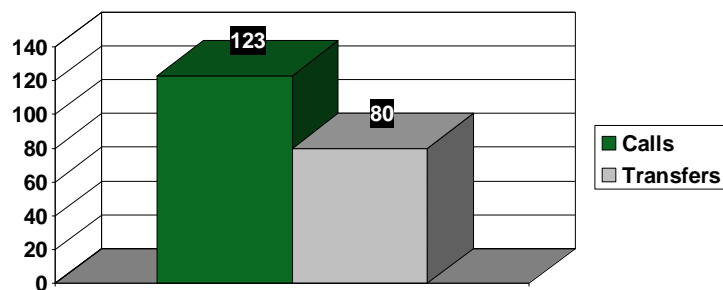
○ Brain Lab upgrades 2008	\$ 166,691
○ Leica Microscope	\$ 356,754
○ TOTAL INVESTMENT	\$ 523,445

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Stroke Urgent Transfer Line



Period Capture: Initial 15 months of Operation

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Neurosciences Inpatient/Outpatient Payer Mix

Inpatient Payer	Percent	Outpatient Payer	Percent
MEDICARE	50%	MEDICARE	24.3%
MEDICAID	3%	MEDICAID	10.6%
MANAGED CARE	38%	MANAGED CARE	74.1%
OTHER	8%		

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Strategies to Improve Cost Savings

- ⊙ Device Pricing Negotiations
- ⊙ Standing Orders
- ⊙ Clinical Pathways
- ⊙ Speech Pathology 24/7
- ⊙ Stroke Alert improved door to CT and protocol development
- ⊙ Dedicated Case Management-LOS dropped from 5.2 to 4.3
- ⊙ Timely Rehab Evaluations

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CLINICAL OUTCOMES

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Quality Awards



2005



2007



2008

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Overview Quality Measures

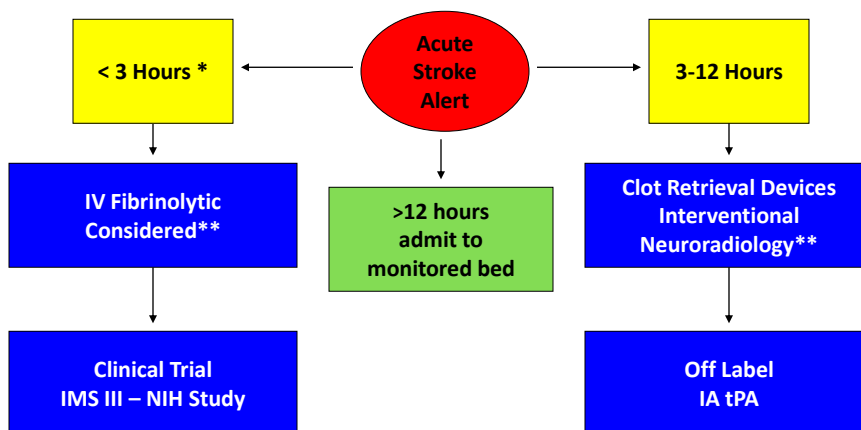
- ⊙ Overall trends in 10 selected measures improving at ABMC
- ⊙ Performance improvement plans developed at Network Stroke PI and Stroke Task Force Meetings
- ⊙ Established “validation” meeting for data review
- ⊙ ABMC received the GWTG Gold Plus Achievement Award awarded in 2009 Mortality below top 25% (Premier)

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Acute Stroke Treatment Options for Patients



*Currently giving IV TPA in 3-4.5 hour window

**Denotes FDA approved therapy

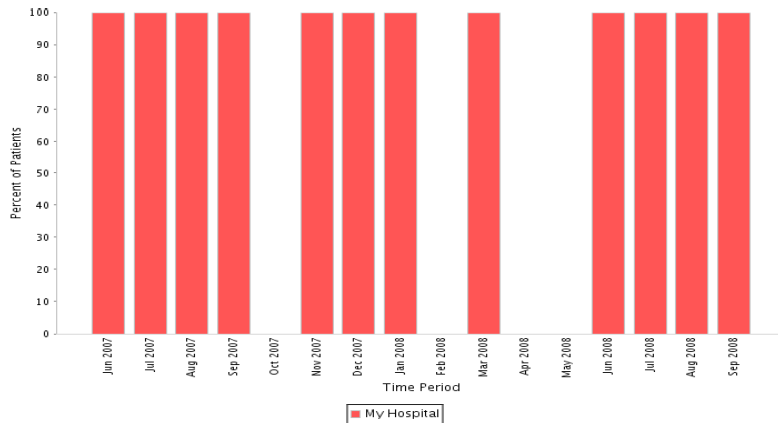
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PSC Stroke-4

Percent of acute ischemic stroke patients who arrive at the hospital within 120 minutes (2 hours) of time last known well and for whom IV t-PA was initiated at this hospital within 180 minutes (3 hours) of time last known well. Alexian Brothers Medical Center : Jun 2007 - Sep 2008



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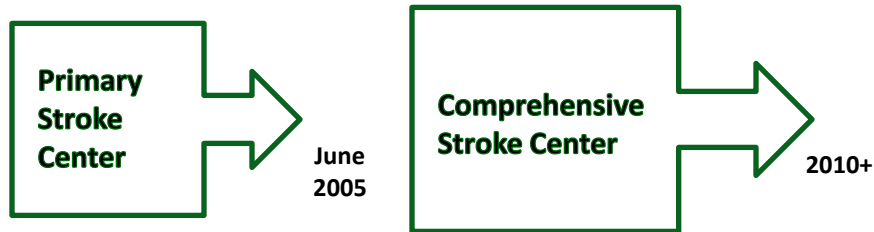
Future Program Expansion

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Long Term Plan



- Comprehensive Stroke Center Guidelines published July 2005 *Stroke*
- Prepare for future comprehensive certification

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Future Focus

- ⊙ Expansion of a Regional Stroke Network
- ⊙ Telemedicine
- ⊙ Nurse Navigation
- ⊙ Additional Infrastructure Investment

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Summary Checklist

- Level of designation
- Staffing availability
- Leadership commitment
- Capital budget
- Long term commitment

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Questions?

National Stroke Association Professional Members
continue “The Business of Stroke” discussion on
BrainWave

www.stroke.org/memberships

memberships@stroke.org

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*The Business of Stroke:
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Wednesday, March 31
noon – 1 pm eastern
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