Use of Telemedicine for Acute Stroke:
The Utah Experience

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Stroke Epidemiology

- Leading cause of disability in U.S.
- Third leading cause of death
- > 700,000 total strokes per year
- 100,000 recurrent strokes per year
- Over 6 million stroke survivors
Differential Diagnosis
Sudden Focal Neurological Symptoms

- TIA
- Seizure
- Migraine
- Metabolic (hypoglycemia)
- Multiple sclerosis
- Radiculopathy, myelopathy
  - or neuropathy
- Conversion Disorder
- Unmasking of old deficits
Acute Stroke Treatment

Thrombolysis

- FDA approved powerful “clot - buster” called tissue activator or tPA
- Effective only if given within plasminogen 3 hours from onset
- 30% better chance of having no disability
- Dangerous - can cause life threatening bleeding
Earlier treatment with tPA leads to better outcomes
(Hacke et al, Lancet 2004;363:768-774)
2003 hospital survey: Smaller bed size and rural hospitals are less likely to have the proper acute stroke resources

Survey question domain

- Smaller hospitals (<200 beds, 43/72) more likely rural hospitals (p<0.0001).
- Smaller hospitals, surveyed in 2003, less likely to express interest in achieving state-based designation as a Primary Stroke Service (p=0.01).

Data presented at 2006 International Stroke Conference, Orlando, FLA.
Challenges to deliver acute stroke care in the Western US

- Limited stroke awareness
- Few stroke specialists
- Narrow therapeutic time window
- Traditional patterns of practice
- Large rural areas
- Transport
- Cost
Evolution of Acute Stroke Care

Before 1996

After 1996

Secondary Prevention

“I’ve got this guy here…”

Telestroke
USE OF TECHNOLOGY TO BRIDGE THE GAP
TEMPIS--Germany

TEMPiS in Bavaria
(Audebert HJ, Lancet 2006; 9:742-8)

- Open intervention trial of telestroke-directed care vs. control of 3,122 patients.
- 5 community hospitals in telestroke network vs. 5 control community hospitals.
- Treatment in telestroke group had better outcomes (44%) vs. 54% poor outcome at 3 months.
Feasibility and Reliability

• Neurological exam
  Journal Telemedicine and Telecare 1999;5:177-181

• NIHSS
  – Germany (w kappa=0.85-0.99) Stroke. 2003 Dec;34(12):2842-6
  – REACH (r =0.95 p<0001) Stroke. 2003 Oct;34(10):e188-91
  – MGH (r=0.97, p<0.0001) Stroke 1999;30:2141-2145
  – Stroke DOC (r=0.93) Neurology. 2005 Mar 22;64(6):1058-60

• In-ambulance-TeleBat J Stroke Cerebrovasc Dis. 2004 Jul-Aug;13(4):148-54
HUB AND SPOKE MODEL

“Stroke Center”
Telestroke Applications

• Rural Model
  – Low volume
  – Rare or no neurology
• Urban Model
  – Busy urban ED with no neurology coverage
  – Call schedule
• Teaching Model
  – Resident
  – ED staff
• Office Based Model
TeleStroke: Provider-to-Provider Link

DICOM Image Server

CT Scanner

Fixed / Mobile VC Unit
ED Physician or APRN
Patient

TCP-IP or ISDN

Fixed / Mobile VC Unit
Hospital or Home Based TeleStroke Consultant
Desktop PC with Monitor or integrated Image Viewer

DICOM Image Server
The TeleStroke “Third Party Consult” Model
**Telestroke Technology Options**

**Critical Success Factor**

Use relatively simple, low-cost, “off-the-shelf” technologies that are easy to deploy, use and maintain.
“Bad news, Phil—due to federal funding cutbacks, we can’t afford to put your head back on.”
Issues and Obstacles

• Efficacy
• Cost
• Reimbursement
• Credentialing and Licensing
• Sustainability
• Liability
Efficacy

1. Stroke DOC trial
   NINDS SPOTRIAS grant funding
   Randomized trial
   - Telephone consultation vs Teleconferencing
   - Projected N = 400
   - Primary outcome: MRS 90days

2. American Stroke Association
   Commissioned a scientific statement position paper on the use of telemedicine for the treatment of stroke--ongoing
# The Economics of Telestroke

**Saving**

1. Cost effectiveness of iv tPA has been clearly established
2. Increased utilization of tPA has been shown with the use of rural outreach or telemedicine
3. Air transportation is costly

**Cost**

1. Equipment cost is prohibitive for small hospitals
2. T1 connections are not present in all areas
3. Medicare does not reimburse for the complexity of treatment
4. Federal and State Grants competitive and do not replenish

**Different Pots of Funds**

Billing for Telemedicine

- Medicare (CMS)
  - Only consultations to rural areas can use the modifier (99421-99245 GT)
  - No code for critical care approved
  - Only physicians and NP can bill – not SLP/PT
New DRG (559) Covers the Cost of t-PA

**DRG 14**
Intracranial Hemorrhage or Cerebral Infarction
Average LOS 5.8 days
Medicare Reimbursement $6,590 (includes Outliers)

+ 

**ICD9 99.01**
Injection or infusion of thrombolytic agent (Est. Cost $2,000 per Patient)
(must be coded in order to receive additional reimbursement)

= 

**DRG 559**
Acute Ischemic Stroke with Use of Thrombolytic Agent
Average LOS 7.2 Days
Medicare Reimbursement $11,540

Adapted from May 2006 “Stroke Care of the Future” Presentation with permission from SG2
Credentialing and Licensing

- Medical license per state
- Credentialing each physician in each hospital

Time consuming

Costly
Liability

- The consultant relationship in telemedicine is the same as if the consulting neurologist is on site.

- Liability remains the same as in any other consulting arrangement in medicine.

- For clarity, the responsibilities of all parties involved in the telemedicine arrangement should be documented in a written agreement between the Hub and Spoke hospitals.
Sustainability

- Too few physician to take call
- Systems incompatible
- Hospital competition may prevent collaboration
- Poor reimbursement

BURN OUT
Telemedicine Survey

19 Respondents
7 States
- California: 9
- Washington: 3
- New Mexico: 2
- Colorado: 2
- Oregon: 1
- Arizona: 1
- Utah: 1
Telemedicine for Acute Stroke?

Where are the Telemedicine Cameras Located?

How are Cameras Funded?

Telemedicine Sole Responsibility?
What Systems are Utilized?

- BF Technologies, 6
- Polycom Carts, 1
- Tandberg, 1
- REACH Basis, 1
- RP-6 robot (InTouch Health), 3
- Other, 2
Primary JACHO certified Stroke centers
Utah Stroke Facts

- Only 17% of respondents could correctly identify stroke warning signs and would call 911 (2001 BRFSS)
- Utah is ranked #1 healthiest for age-adjusted coronary heart mortality-rate
- BUT
- Utah is ranked #25 for age-adjusted stroke mortality rate
Distribution of Acute Stroke (2002) to # Neurologists per 100,000 people

- Total = 71
  - Cache = 1
  - Davis = 3
  - Salt Lake = 51
  - Utah = 7
  - Washington = 5
  - Weber = 5
Utah Department of Health
Ad Campaign
Utah Emergency Medical Services
Joint Commission’s Certificate of Distinction for Primary Stroke Centers

A Certificate of Distinction that recognizes primary stroke centers that make exceptional efforts to foster better outcomes for stroke care.

American Stroke Association

A Division of American Heart Association

Criteria developed in conjunction with the American Stroke Association
Remote Site
Operational Musts

• ER – with willing staff participation
• 24/7 CT scan (in house tech/CT on)
• 24/7 hour lab with stat turn around <45 minutes
• Mechanism for weighing patient
• Computer in ED
• Technician
• Activase on formulary
ED Evaluation
Telehealth Equipment

- Costs

- ~$3,000--14,500 equipment
- ~$3,000 Security/HIPPA
- ~$600 annual maintenance
- ~$300/mo T1
Patient enters hospital with symptoms of stroke. Triage verifies the time of onset or time last seen well. Contact U of U Hospital Operator at 1-877-ADMIT-2-U. State “Telestroke in Hospital X” and give patients name, time of onset of symptoms, age, location of weakness and patient's primary language. Telemedicine consent signed and faxed. Preplanned protocol initiated (iv, labs, x-ray, CT).

Telestroke MD receives page directly
MD up-dials video conferencing
MD introduces self to patient & family as consultant
CT scan and lab data reviewed directly
NIHSS completed
Physicians discuss most appropriate treatment for patient
Written consultation provided via web
Transport arranged if needed
Training and Evaluation

• Develop clinical protocols with remote site

• Interface with pharmacy, lab, EMS, community

• Practice mock visits
  – Communicating with remote side on regular basis

• Satisfaction, quality, cost and outcome
Telestroke Business
Rural Models
-Supported by USF and grants
-Membership Fee
-Use of telemedicine modifiers for billing

Disadvantages
-Relies on variable funding
-Not an emergent model
Rural Medicare Reimbursement

In person
- Critical Care time (30-74 minutes) ($192.76)

Telestroke
- Comprehensive- limited by PE requirements ($138.15)
- Detailed- most cases ($75.29)
- Does not cover call
- Does no cover technology
Telestroke Business
Urban Model

• 24/7 less than 20 minute response acute stroke consultation
  – Program fee- similar to paying for on call physicians but substantially less cost

• No obligation to transfer patient to the HUB. No minimum or maximum utilization required
  (No kickback)
Advantage for Urban Remote Site

- BETTER PATIENT CARE
- New DRG reimburses t-PA at 11,278.00 = (7.2/yr)
- Currently cannot use DRG for drip-ship
- Saves patient transfer dollars – keeps them local
- Retain patient follow up charges (Rehab, Lab, Radiology)
- Can use same equipment for other telemedicine services
Capacity
Transfer only those needing tertiary care
Early Utah Telestroke Experience

- IS, 36
- ICH, 5
- iv tPA, 7
- nonstroke, 45
TELESTROKE MISSION —
To provide emergent access to specialized acute stroke care for all intermountain regions.
Collaborative Relationships

American Stroke Association
Academic Centers
American Academy of Neurology
CMS
National Institute of Health
OAT
National Stroke Association

Private Vendors
ED Docs
State Licensing Board
Stark Law
Third Parties Payers
Emergency Medical Services
Competitive Medical Industry
Publications


