Telemedicine Applications (Part 1): Overview

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Lecture #2

TELEPHYSICIANS

• Dr. Tim Hunter – Teleradiology

• Dr. Stephen A. Klotz -- Tele-infectious diseases
TELEMEDICINE APPLICATIONS

Where to Start?

• Arizona Telemedicine Program (ATP) – Home page
• ATP -- Service Provider Directory

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Service Provider Directory
--138 Companies--

https://telemedicine.arizona.edu/servicedirectory
Overview:
Service Provider Directory

Telemedicine Consultation

Telemedicine Clinic – Spoke site
The Provision of Tele-Medical Care

How are clinics structured?

- **Patient/Referring Clinician**
- **Spoke Site**
  - *Medical Director*
  - *Site Coordinator*
- **Hub Site**
  - *Medical Director*
  - *Site Coordinator*
What makes a good teleconsultation?

- **Complete data**
  - *Avoid the incomplete consult!*

- **Diagnostic images**

- **Steps in review:**
  - Site Coordinator
  - Medical Director
  - Specialist
  - Professional appearance

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**Modalities**

- Tactile
- Visual
- Auditory

“Talk is the treatment”
Virtual Reality Palpation

Tactile – “virtual” palpation

Modalities

Visual

Auditory

“Talk is the treatment”
Modalities

Visual

Teleradiology
Telemammography

Tele-echocardiography
Fetal Ultrasound

https://www.youtube.com/watch?v=s48-hvFevEw
Telepathology
Teledermatology
Teledermatology

Teleophthalmology
Otorhinolaryngology (ENT)

Viral otitis media *versus* bacterial otitis media
Teleneurology
Telerheumatology

Tele–Home Health
Wound Management

Modalities

Visual

Auditory
Electronic Stethoscope

Dr. Conrad Clemens uses real-time video conferencing and digital stethoscope technology to evaluate a child’s asthma.
Modalities

Visual

Auditory

“Talk is the treatment”

Telepsychiatry
“The talk is the treatment”

- Psychiatry/psychology
- Genetic Counseling
- Pain Management
- Nutrition
- Support group
- Hospice care

Support Groups
Cancer Genetic Counseling
Workshop Locations:
State Universities of Arizona, Hawaii, Iowa, Utah, Massachusetts, Southern California @ Irvine
and Health Departments of Hawaii & Washington
Telegenetics Counseling Training

This training was in coordination with the University of Arkansas and the University of Arizona. Participants came from Washington, Hawaii, Arkansas and Kansas. This was a two-day training session with AMA and CEU credits.
DEEP BREATH

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DEEP BREATH

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Gap Service and Tele-urgent Services

1. Gap Services
2. Urgent Services
3. Mandatory Services

Gap Service and Tele-urgent Services

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Teleradiology
Teleradiology – 1,400,000+ cases

Gap Service and Tele-urgent Services

1. Gap Services
2. Urgent Services
3. Mandatory Services

Telestroke
Strokes

Haemorrhagic (13%)  Ischemic (87%)

Caused by blood vessel rupture.  Caused by blockage of blood vessel.

Reduced Costs

The efficient use of available health care resources is of paramount concern for all health care providers. And, the costs associated with establishing a comprehensive stroke care system may prevent smaller or more rural facilities from implementing effective stroke management.

Resource constraints no longer need to be an obstacle to acute stroke services. For community hospitals and other facilities that cannot afford 24/7 coverage by a neurologist, the TeleStroke program is a cost-effective way to deliver round-the-clock specialty stroke care to more patients.
The cost-effectiveness of telestroke in the treatment of acute ischemic stroke

**ABSTRACT**

Objective: To conduct a cost-effectiveness analysis of telestroke—a 2-way, audiovisual technology that links stroke specialists to remote emergency department physicians and their stroke patients—compared to usual care i.e., remote emergency departments without telestroke consultation or stroke apartant.

Methods: A decision-analytic model was developed for both 90-day and lifetime horizons. Model inputs were taken from published literature where available and supplemented with western states’ telestroke experience. Costs were gathered using a societal perspective and converted to 2008 US dollars. Quality-adjusted life-years (QALYs) gained were combined with costs to generate incremental cost-effectiveness ratios (ICERs). In the lifetime horizon model, both costs and QALYs were discounted at 3% annually. Both one-way sensitivity analysis and Monte Carlo simulations were performed.

Result: In the base case analysis, compared to usual care, telestroke results in an ICER of $1,000,592/QALY in the 90-day horizon and $2,449/QALY in the lifetime horizon. For the 90-day and lifetime horizons, 37.9% and 50.7% of 10,000 Monte Carlo simulations yielded ICERs <$500,000/QALY, a ratio commonly considered acceptable in the United States.

Conclusion: When a lifetime perspective is taken, telestroke appears cost-effective compared to usual care, since telestroke costs are upfront but benefits of improved stroke care are waiting. If barriers to use such as low reimbursement rates and high equipment costs are reduced, telestroke has the potential to diminish the striking geographic disparities of acute stroke care in the United States. *Neurology*, 2011;77:1590-1596.

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**Telestroke**

Stroke telemedicine network at Mayo Clinic in Arizona

Mayo Clinic in Phoenix, Ariz., serves as the hub for several remote locations in a stroke telemedicine network.
CT Interpretation in a Telestroke Network
Agreement Among a Spoke Radiologist, a Hub Vascular Neurologist, and a Hub Neuroradiologist

Bert M. Demerschak, MD, MS; Sondra J. Johnson, MD; Steven Simonsen, MD; Kerri Lawton; Joseph M. Hagan, MD; Crystal L. Deatherage, MD; Michelle L. Chopra, MD; Mark C. Hertz, MD; Patrick A. Kallimani, MD; Julie M. Urban; and Jeffrey I. Sosun

Objectives: To determine the level of agreement of three readers (spoke radiologist, hub neurologist, and hub neuroradiologist) interpreting CT scans via video telemedicine from a single hospital to a spoke hospital.

Methods: A total of 134 head CT scans were reviewed from October 2010 to May 2011. For each patient, the spoke radiologist and the hub neurologist independently reviewed the CT scans and selected the appropriate ICH rating scale. The hub neuroradiologist reviewed the CT scans and independently selected the ICH rating scale.

Results: A total of 134 head CT scans were reviewed. The overall agreement of the three readers was 89%. The agreement of the spoke radiologist and the hub neuroradiologist was 88%. The agreement of the hub neurologist and the hub neuroradiologist was 87%. The agreement of all three readers was 87%.

Conclusion: Telestroke reduces acute stroke care disparities between urban stroke centers and rural hospitals. Current technologies used to conduct remote patient assessments lack both speed and cost, yet they cannot consistently establish quality timely connections. Simultaneous can be used for high-quality video teleconsulting. They are inexpensive and ubiquitous among healthcare providers. We aimed to study the reliability of high-quality video teleconsulting using smartphones for conducting the National Institutes of Health Stroke Scale (NIHSS).

Reliability of Real-Time Video Smartphone for Assessing National Institutes of Health Stroke Scale Scores in Acute Stroke Patients

Bert M. Demerschak, MD, MS, FRCP(C); Bernadette Vagnozzi, BS; Bert B. Vergas, MD; Qing Wu, SC; Dwight D. Claxton, MS; Joseph G. Hertz, MS

Objectives: To study the reliability of real-time video smartphone for conducting the National Institutes of Health Stroke Score (NIHSS) in acute stroke patients.

Methods: A total of 134 head CT scans were reviewed from October 2010 to May 2011. For each patient, the spoke radiologist and the hub neurologist independently reviewed the CT scans and selected the appropriate ICH rating scale. The hub neuroradiologist reviewed the CT scans and independently selected the ICH rating scale.

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Photograph depicting the bedside National Institutes of Health Stroke Scale (NIHSS) assessment scenario.

Demaerschalk B M et al. Stroke 2012;43:3271-3277

ResolutionMD mobile.

Demaerschalk B M et al. Stroke 2012;43:3098-3101
Gap Service and Tele-urgent Services

1. Gap Services → Teleradiology
2. Urgent Services → Telestroke
3. Mandatory Services → Tele-everything

Arizona Department of Corrections Telemedicine
11 State Prisons/36,000 prisoners

80% of subspecialty consults done by telemedicine