ARIZONA TELEMEDICINE PROGRAM

SOUTHWEST TRC TELEHEALTH RESOURCE · CENTER

Clinical Applications

Ronald S. Weinstein, M.D.
Director, Arizona Telemedicine Program

Tele-urgent Services

1. **Teleradiology**
2. **Telecardiology**
3. **Telepathology**
4. **Telepsychiatry**
5. **eICU (e-Intensive Care Unit)**
6. **Teletrauma**
7. **Telestroke**
8. **Teleburn**

Tele-urgent Services

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Teleradiology – 1,300,000+ cases

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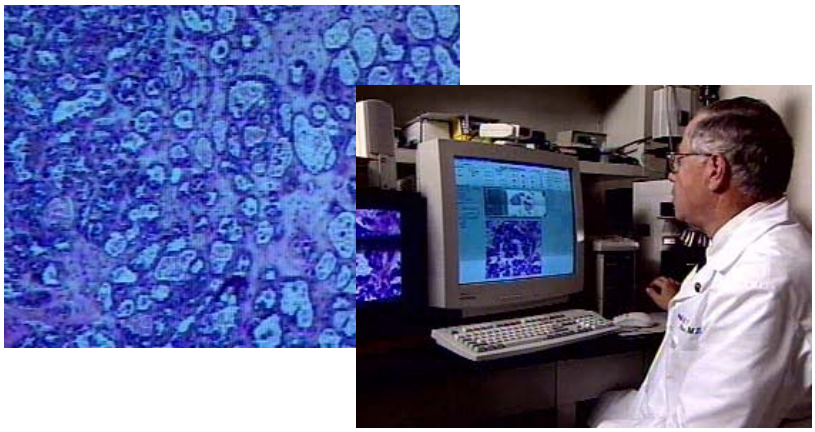
Telepathology



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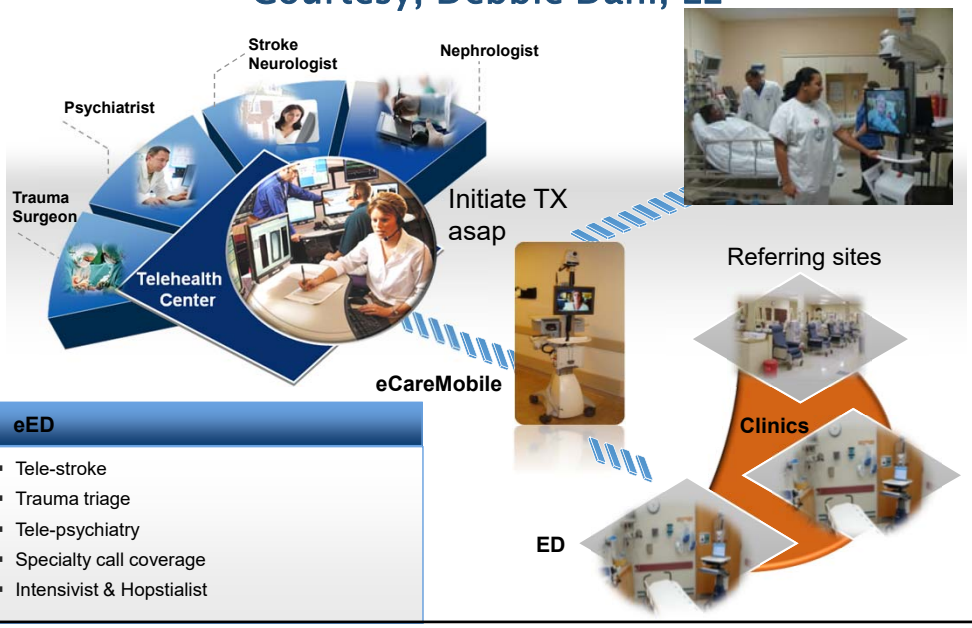
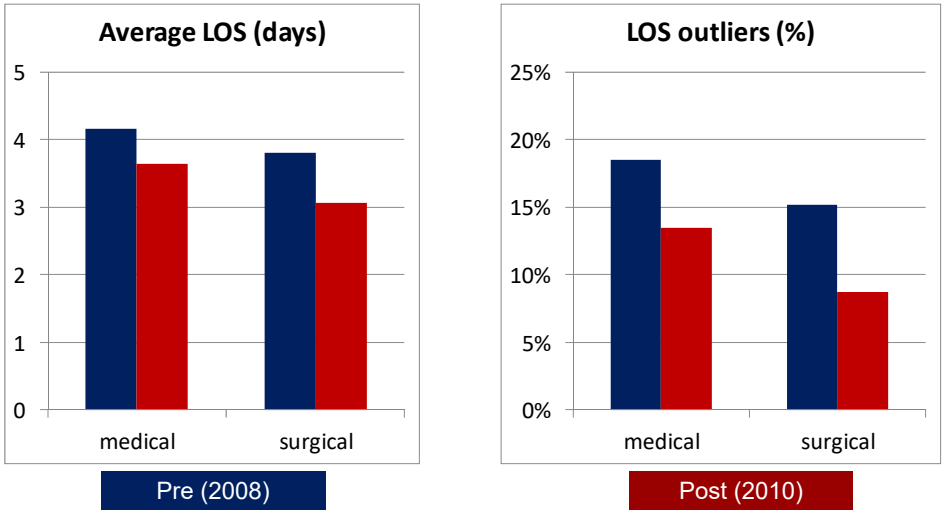
Emergency Medicine – Banner Health
Courtesy, Debbie Dahl, EE



eED

- Tele-stroke
- Trauma triage
- Tele-psychiatry
- Specialty call coverage
- Intensivist & Hopstialist

iCare BGMC MedSurg LOS



Courtesy of Debbie Dahl, R.N.
Banner Health

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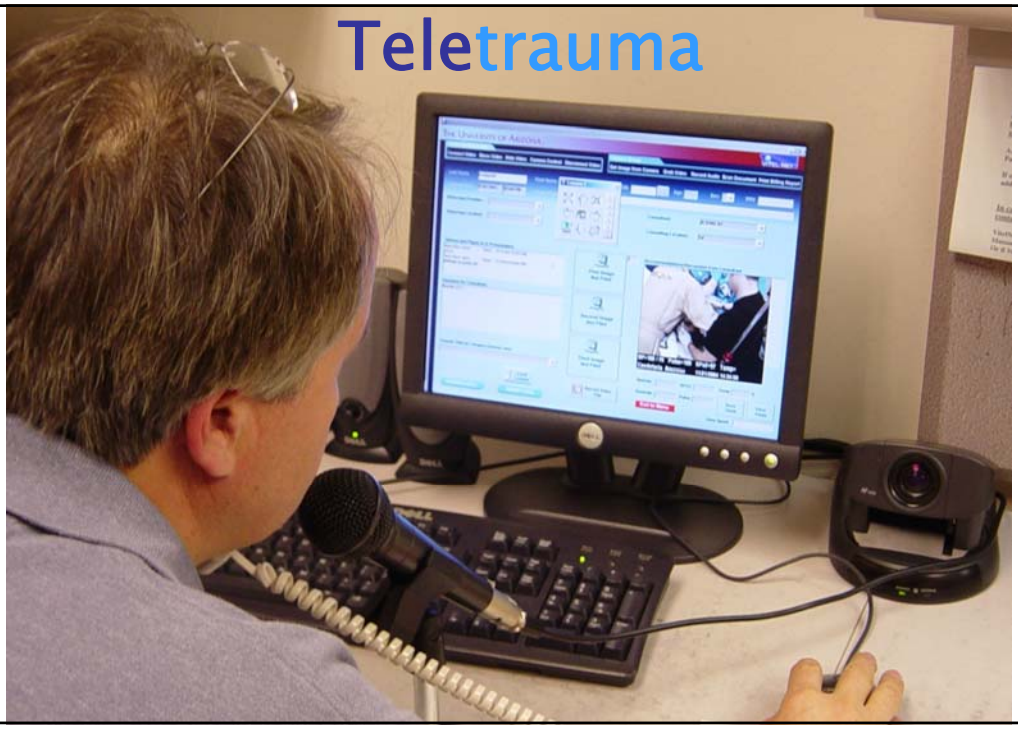
Teletrauma



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MAYO CLINIC

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.

Background and Purpose

- ResolutionMD mobile application runs on a Smartphone and affords vascular neurologists access to radiological images of patients with stroke from remote sites in the context of a telemedicine evaluation.
- Although reliability studies using this technology have been conducted in a controlled environment, this study is the first to incorporate it into a real-world hub and spoke telestroke network.
- The study objective was to assess the level of agreement of brain CT scan interpretation in a telestroke network between hub vascular neurologists using ResolutionMD, spoke radiologists using a Picture Archiving and Communications System, and independent adjudicators.

Stroke. 2012; 43:3271-3277

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

Bart M. Demaerschalk, MD, MSc, FRCP(C); Sravanthi Vegunta, BS;
Bert B. Vargas, MD; Qing Wu, ScD; Dwight D. Channer, MS; Joseph G. Hentz, MS

Background and Purpose—Telestroke reduces acute stroke care disparities between urban stroke centers and rural hospitals. Current technologies used to conduct remote patient assessments have high start-up costs, yet they cannot consistently establish quality timely connections. Smartphones can be used for high-quality video teleconferencing. They are inexpensive and ubiquitous among health care providers. We aimed to study the reliability of high-quality video teleconferencing using smartphones for conducting the National Institutes of Health Stroke Scale (NIHSS).

Methods—Two vascular neurologists assessed 100 stroke patients with the NIHSS. The remote vascular neurologist assessed subjects using smartphone videoconferencing with the assistance of a bedside medical aide. The bedside vascular neurologist scored patients contemporaneously. Each vascular neurologist was blinded to the other's NIHSS scores. We tested the inter-method agreement and physician satisfaction with the device.

Results—We demonstrated high total NIHSS score correlation between the methods (r=0.949; P<0.001). The mean total NIHSS scores for bedside and remote assessments were 7.93±8.10 and 7.28±7.85, with ranges, of 0 to 35 and 0 to 37, respectively. Eight categories had high agreement: level of consciousness (questions), level of consciousness (commands), visual fields, motor left and right (arm and leg), and best language. Six categories had moderate agreement: level of consciousness (consciousness), best gaze, facial palsy, sensory, dysarthria, and extinction/inattention. Ataxia had poor agreement. There was high physician satisfaction with the smartphone.

Conclusions—Smartphone high-quality video teleconferencing is reliable, easy to use, affordable for telestroke NIHSS administration, and has high physician satisfaction. **(*Stroke*. 2012;43:3271–3277.)**

ARIZONA TELEMEDICINE PROGRAM

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Stroke 2012: 43; 3095-3097

CT Interpretation in a Telestroke Network

Agreement Among a Spoke Radiologist, Hub Vascular Neurologist, and Hub Neuroradiologist

Bart M. Demaerschalk, MD, MSc; Bentley J. Bobrow, MD; Rema Raman, PhD; Karin Ernstrom; Joseph M. Hoxworth, MD; Ameet C. Patel, MD; Terri-Ellen J. Kiernan, MSN; Maria I. Aguilar, MD; Timothy J. Ingall, MD, PhD; David W. Dodick, MD; Brett C. Meyer, MD; for the Stroke Team Remote Evaluation Using a Digital Observation Camera (STRokE DOC) in Arizona—The Initial Mayo Clinic Experience (AZ TIME) Investigators

Background and Purpose—The American Stroke Association guidelines emphasized the need for further high-quality studies that assess agreement by radiologists and nonradiologists engaged in emergency telestroke assessments and decision-making. Therefore, the objective of this study was to determine the level of agreement of baseline brain CT scan interpretations of patients with acute stroke presenting to telestroke spoke hospitals between central reading committee neuroradiologists and each of 2 groups, spoke hospital radiologists and hub hospital vascular neurologists (telestrokologists).

Methods—The Stroke Team Remote Evaluation Using a Digital Observation Camera Arizona trial was a prospective, urban single-hub, rural 2-spoke, randomized, blinded, controlled trial of a 2-way, site-independent, audiovisual telemedicine and teleradiology system designed for remote evaluation of adult patients with acute stroke versus telephone consultation to assess eligibility for treatment with intravenous thrombolysis. In the telemedicine arm, the subjects' CT scans were interpreted by the hub telestrokologist and in the telephone arm by the spoke radiologist. All subjects' CT scans were subsequently interpreted centrally, independently, and blindly by 2 hub neuroradiologists. The primary CT outcome was determination of a CT-based contraindication to thrombolytic treatment. Kappa statistics and exact agreement rates were used to analyze interobserver agreement.

Results—Fifty-four subjects underwent random assignment. The overall agreement for the presence of radiological contraindications to thrombolysis was excellent (0.91) and did not differ substantially between the hub telestrokologist to neuroradiologist and spoke radiologist to neuroradiologist (0.92 and 0.89, respectively).

Conclusions—In the context of a telestroke network designed to assess patients with acute stroke syndromes, agreement over the presence or absence of radiological contraindications to thrombolysis was excellent whether the comparisons were between a telestrokologist and neuroradiologist or between spoke radiologist and neuroradiologist.

Clinical Trial Registration—URL: http://www.clinicaltrials.gov. Unique identifier: NCT00623350.

(***Stroke***. **2012;43:3095-3097.**)

Key Words: computed tomography ■ randomized controlled trials ■ rural health ■ rural hospitals ■ stroke ■ telemedicine ■ telestroke

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

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

American Heart Association
Learn and Live

Stroke
Journal of the American Heart Association

American Heart Association | American Stroke Association

Smartphone Teleradiology Application Is Successfully Incorporated Into a Telestroke Network Environment

Bart M. Demaerschalk, Jason E. Vargas, Dwight D. Channer, Brie N. Noble, Terri-Ellen J. Kiernan, Elizabeth A. Gleason, Bert B. Vargas, Timothy J. Ingall, Maria I. Aguilar, David W. Dodick and Bentley J. Bobrow

Stroke. 2012;43:3098-3101; originally published online September 11, 2012;
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ARTICLES

The cost-effectiveness of telestroke in the treatment of acute ischemic stroke

R.E. Nelson, PhD
G.M. Saltzman, PhD
E.J. Skalabrin, MD
B.M. Demaerschalk, MD, MSc, FRCP(C)
J.J. Majersik, MD, MS

Address correspondence and reprint requests to Dr. Jennifer J. Majersik, Stroke Center, Department of Neurology, University of Utah School of Medicine, Salt Lake City, UT 84132
jennifer.majersik@hsc.utah.edu

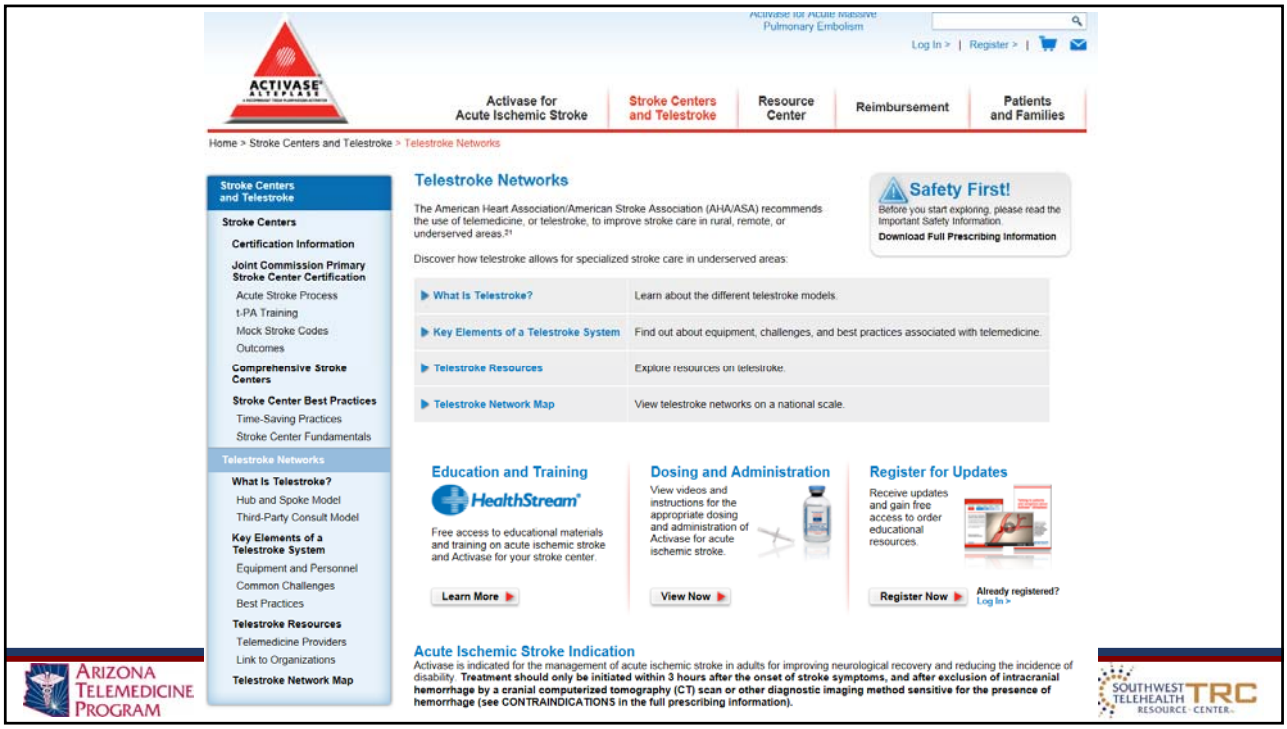
ABSTRACT

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 experts).

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 experiences. 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 analyses and Monte Carlo simulations were performed.

Results: In the base case analysis, compared to usual care, telestroke results in an ICER of $108,363/QALY in the 90-day horizon and $2,449/QALY in the lifetime horizon. For the 90-day and lifetime horizons, 37.5% and 99.7% of 10,000 Monte Carlo simulations yielded ICERs <$50,000/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 lifelong. 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;77:1590–1598


ACTIVASE
Activase for Acute Ischemic Stroke
Stroke Centers and Telestroke
Resource Center
Reimbursement
Patients and Families
Log In > | Register > |
Home > Stroke Centers and Telestroke > Telestroke Networks
Stroke Centers and Telestroke
Stroke Centers
Certification Information
Joint Commission Primary Stroke Center Certification
Acute Stroke Process
t-PA Training
Mock Stroke Codes
Outcomes
Comprehensive Stroke Centers
Stroke Center Best Practices
Time-Saving Practices
Stroke Center Fundamentals
Telestroke Networks
What Is Telestroke?
Hub and Spoke Model
Third-Party Consult Model
Key Elements of a Telestroke System
Equipment and Personnel
Common Challenges
Best Practices
Telestroke Resources
Telemedicine Providers
Link to Organizations
Telestroke Network Map
Telestroke Networks
The American Heart Association/American Stroke Association (AHA/ASA) recommends the use of telemedicine, or telestroke, to improve stroke care in rural, remote, or underserved areas.21
Discover how telestroke allows for specialized stroke care in underserved areas:
Safety First!
Before you start exploring, please read the Important Safety Information.
Download Full Prescribing Information
What Is Telestroke? Learn about the different telestroke models.
Key Elements of a Telestroke System Find out about equipment, challenges, and best practices associated with telemedicine.
Telestroke Resources Explore resources on telestroke.
Telestroke Network Map View telestroke networks on a national scale.
Education and Training
HealthStream
Free access to educational materials and training on acute ischemic stroke and Activase for your stroke center.
Learn More
Dosing and Administration
View videos and instructions for the appropriate dosing and administration of Activase for acute ischemic stroke.
View Now
Register for Updates
Receive updates and gain free access to order educational resources.
Register Now
Already registered? Log In >
Acute Ischemic Stroke Indication
Activase is indicated for the management of acute ischemic stroke in adults for improving neurological recovery and reducing the incidence of disability. Treatment should only be initiated within 3 hours after the onset of stroke symptoms, and after exclusion of intracranial hemorrhage by a cranial computerized tomography (CT) scan or other diagnostic imaging method sensitive for the presence of hemorrhage (see CONTRAINDICATIONS in the full prescribing information).
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Commercialization
TeleStroke
Supporting Community Hospitals
ARIZONA TELEMEDICINE PROGRAM
SOUTHWEST TELEHEALTH RESOURCE CENTER TRC

Reduced Costs

The efficient use of available health care resources is of paramount concern for all health care centers. 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.

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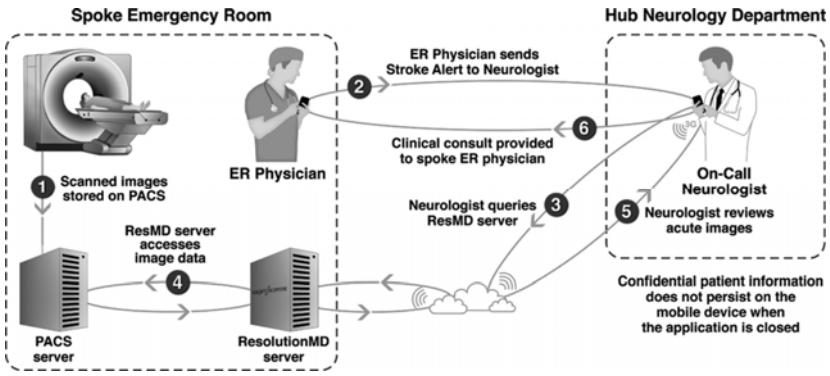
SOUTHWEST TELEHEALTH RESOURCE CENTER TRC

ResolutionMD mobile infrastructure and algorithm.



Demaerschalk B M et al. Stroke 2012;43:3098-3101

American Heart Association
Learn and Live

ResolutionMD mobile.

Demaerschalk B M et al. Stroke 2012;43:3098-3101

American Heart Association
Learn and Live

Conclusions

- Telestroke is cost-effective (cost-savings)
- Telestroke by smartphone is possible

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

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Arizona Telemedicine Burn & Disaster Program

- Courtesy of
- John & Lynn Schaper
- Maricopa Regional Medical Center
- Phoenix, Arizona

Arizona Burn Center

- Only Nationally Verified Burn Center in Arizona
- 45 Burn Beds – total 19 ICU Beds
- Surge Capacity of 30 Burn Patients
- 2nd Largest Burn Center (by volume) in U.S.
- Telemedicine "Hub" for Burn/Disaster.
- Telemedicine available 24/7

Courtesy of John and Lynn Schaper

AZ Burn Center's Cart

Courtesy of John and Lynn Schaper

Burn Center Nurses' Station

Courtesy of John and Lynn Schaper

Vigilant Guard State Drill

- 11 Hospitals using Telemedicine at various times.
- Every hospital successfully connected, some several times.
- Three separate pieces of telemedicine equipment used simultaneously.
- Multiple patients seen
- Dr. had far-end camera control

Courtesy of John and Lynn Schaper

Collaborative

- ADHS
- ATP
- MIHS
- Arizona Burn Center
- All the participating hospitals and their emergency coordinators.

Courtesy of John and Lynn Schaper

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Thank you!

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rweinstein@telemedicine.arizona.edu