Bringing Back the House Call: a Telemedicine Solution

New York Times feature article – Oct. 9, 2012

Science Times

The New York Times

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The Digital Doctor

In the old days — oh, about 10 years ago — few doctors used the Internet for anything but e-mail and research. "App" was a word used mainly by technology buffs, as in "killer app." And cellphones were useful but far from smart. Now digital technology — on phones and tablets, in electronic record keeping, and in a host of clinical innovations — is transforming medicine in virtually every way. Not the least of the changes is the shifting relationship between doctors and patients, particularly the new channels of communication opened up by social media. (The doctor will tweet you now.) In this special issue, we look at some of the many ways, for better and for worse, that medicine will never be the same.

Redefining Medicine With Apps And iPads

By KATIE HAFNER

SAN FRANCISCO — Dr. Alvin Rajkomar was doing rounds with his team at the University of California, San Francisco Medical Center when he came upon a puzzling case: a frail, elderly patient with a dangerously low sodium level.

As a third-year resident in internal medicine, Dr. Rajkomar was the senior member of the team, and the others looked to him for guidance. An infusion of saline was the answer, but the tricky part lay in the details. Concentration? Volume? Improper treatment could lead to brain swelling, seizures or even death.

Dr. Rajkomar had been on call for 14 hours and was exhausted, but the clinical uncertainty was "like a shot of adrenaline," he said. He reached into a deep pocket of his white coat and produced not a well-thumbed handbook but his iPhone.

With a tap on an app called MedCalc, he had enough answers within a minute to start the saline at precisely the right rate.

The history of medicine is defined by advances born of bioscience. But never before has it been driven to this degree by digital technology.

The proliferation of gadgets, apps and Web-based information has given clinicians — especially young ones like Dr. Rajkomar, who is 28 —

New ways to diagnose illness and treat patients.

a black bag of new tools: new ways to diagnose symptoms and treat patients, to obtain and share information, to think about what it means to be both a doctor and a patient.

And it has created something of a generational divide. Older doctors admire, even envy, their young colleagues' ease with new technology. But they worry that the human connections that lie at the core of medical practice are at risk of being lost.

"Just adding an app won't necessarily make people better doctors or more caring clinicians," said Dr. Paul E. Tang, chief innovation and technology officer of Palo Alto Medical Foundation in Palo Alto, Calif. "What we need to learn is how to use technology to be better, more humane professionals."

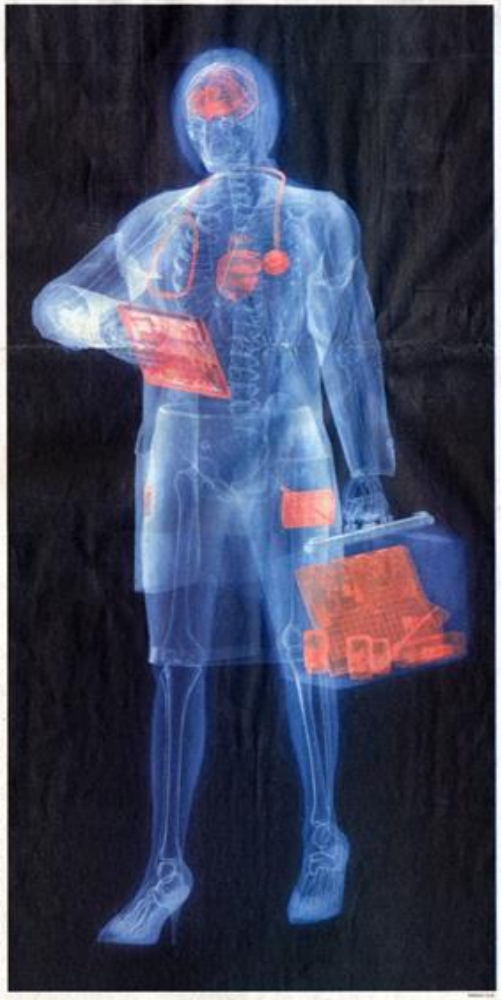
Dr. Paul A. Heineken, 66, a primary care physician, is a revered figure at the San Francisco V.A. Medical Center. He is part of a generation that shared longstanding assumptions about the way medicine is practiced. Physicians are the unambiguous source of medical knowledge; notes and orders are written in paper records while standing at the nurses' station; and X-rays are film placed on light boxes and viewed over a radiologist's shoulder.

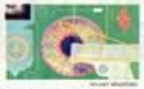
One recent morning, while leading trainees through the hospital's wards, Dr. Heineken faced the delicate task of every teacher of medicine — using the gravity ill to impart knowledge.

The team arrived at the room of a 86-year-old World War II veteran who was dying — a ghost of a man, his face etched with pain, the veins in his neck protruding from the pressure of his failing heart.

Dr. Heineken apologized for the intrusion, and the patient forced a smile. The doctor knelt at the bedside to perform the time-honored tradition of percussing the heart. "Do it like this," he said, placing his left hand over the man's heart, and tapping its middle finger with the

Continued on Page 2





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First Person: A doctor's bag, overflowing again.
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Doctors reach teenage patients with text messages.
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Pauline Chen, M.D., on sharing medical records with patients: nytimes.com/well
A video featuring two doctors with two very different approaches: nytimes.com/health

Redefining Medicine With Apps and iPads

From First Science Page

middle finger of his right.

One by one, each trainee took a turn. An X-ray or echocardiogram would do the job more accurately. But Dr. Heineken wanted the students to experience discovering an enlarged heart in a physical exam.

Dr. Heineken fills his teaching days with similar lessons, which can mean struggling upstream against a current of technology. Through his career, he has seen the advent of CT scans, ultrasounds, M.R.I.'s and countless new lab tests. He has watched peers turn their backs on patients while struggling with a new computer system, or rush patients through their appointments while forgetting the most fundamental tools — their eyes and ears.

For these reasons, he makes a point of requiring something old-fashioned of his trainees.

"I tell them that their first reflex should be to look at the patient, not the computer," Dr. Heineken said. And he tells the team to return to each patient's bedside at day's end. "I say, 'Don't go to a computer; go back to the room, sit down and listen to them. And don't look like you're in a hurry.'"

One reason for this, Dr. Heineken said, is to adjust treatment recommendations based on the patient's own priorities. "Any difficult clinical decision is made easier after discussing it with the patient," he said.

It is not that he opposes digital technology; Dr. Heineken has been using the Department of Veterans Affairs' computerized patient record system since it was introduced 15 years ago. Still, his cellphone is an old flip model, and his experience with text messaging is limited.

His first appointment one recent day was with Eric Conrad, a 65-year-old Vietnam veteran with severe emphysema. First came a conversation. Dr. Heineken had his patient sit on a chair next to his desk. Despondent, the patient looked down at his battered Reeboks, his breaths shallow and labored.

Dr. Heineken has been seeing Mr. Conrad since 1993, and since then, he said, "we've been fighting a saw-tooth battle with his weight."

In an instant, the computer generated a chart showing the jagged history of weight successfully gained, then lost. Dr. Heineken pivoted the computer screen so the patient could see a steady gain in recent months. "It's looking a lot better than it has," he said. Mr. Conrad's face brightened slightly.

Concerns about losing the tradition of hands-on care.

Then Dr. Heineken turned his back to the computer and sat so close to the patient that they were knee to knee. Mr. Conrad drilled his gaze into his physician's eyes, looking for answers.

It was not until Dr. Heineken was ready to listen to Mr. Conrad's lungs that he asked him to move to the examining table.

"I love him to death," Mr. Conrad said about Dr. Heineken. "He's right to the point, good news or bad news."

Thirty-eight years and a technological revolution separate Dr. Heineken from Dr. Rajkomar.

The son of an electrical engineer from Mauritius, Alvin Rajkomar grew up in Silicon Valley and taught himself to program at age 12. As an undergraduate at Harvard, he started out in physics but became hooked on medicine in Mauritius, where he spent a few days one summer shadowing his uncle, a physician at a community clinic.

"There were no fancy medications or procedures," he said. "Just the art of doctoring."

In 2009, in his third year of medical school at Columbia, he was among the first in the hospital to use an iPhone as a clinical tool. "Every time you looked something up you'd get scolded," he said. "At that point, people believed that if you had your phone out you weren't working."

Among the new crop of device-happy physicians, Dr. Rajkomar is now an elder statesman of sorts, showing trainees his favorite apps, along with shortcuts through the electronic medical record and computerized prescribing system.

He stores every clinical nugget he finds on an application called Evernote, an electronic filing cabinet. "I use Evernote as a second brain," he said. "I now have a small textbook of personalized, auto-indexed clinical pearls that I carry with me at all times on my iPhone."

Along with MedCalc, the clinical calculator, Dr. Rajkomar's phone has ePocrates, an app for looking up drug dosages and interactions; and Qx Calculate, which he uses to create risk profiles for his patients. His favorite technology is his electronic stethoscope, which amplifies heart sounds while canceling out ambient noise.

Not that he is indiscriminate in his use of technology. When he decided the electronic health record was taking too long to load on his iPad, he went back to taking notes by hand, on paper. But he is experimenting with writing by hand on a Samsung mini-tablet.

He is aware of the pitfalls of computerized records, particularly the "if the problem is X, then do Y" templates, which encourage a cut-and-paste approach to daily progress notes. While efficient, they can give rise to robotic bookkeeping without regard to how the patient is faring.

Tablet computers that are linked to electronic health records are making their way into the hands of medical trainees around the country. All internal-medicine residents at the University of Chicago and Johns Hopkins are given iPads; entering medical students at Stanford are given vouchers they can use to buy one.

A University of Chicago study this year in Archives of Internal Medicine found that residents with iPads were able to enter orders in a more timely manner, and a majority of residents perceived that the iPads improved their work efficiency. At the U.C.S.F. Medical Center, some physicians use iPads, and many use one of the hospital's computers on wheels.

Dr. Rajkomar's outpatient clinic is four miles west of the U.C.S.F. hospital, at the San Francisco V.A., where he works down the hall from Dr. Heineken.

Where Dr. Heineken is competent with the V.A.'s electronic health record system, Dr. Rajkomar is a virtuoso, a Vladimir Horowitz of the computer keyboard. He can keep his eyes fixed so steadily on the patient that the typing goes all but unnoticed.

As the conversation with the patient goes, so goes Dr. Rajkomar's interaction with the computer. Lab results? On the screen in a flash. A list of past and current medications and dosages? Voilà!

Yet he also knows when the computer needs to be set aside. During a visit, when a patient confided that his wife was taking his pain medication, Dr. Rajkomar excused himself and walked down the hall to consult with the pharmacist about a plan to keep that from happening.

Dr. Rajkomar knows he has a great deal to learn about being a physician, especially patients' social and psychological complexities.

"One patient fired me," he said, smiling as he added, "Dr. Heineken gets those patients."

With Telemedicine as Bridge, No Hospital Is an Island

By PAM BELLUCK

NANTUCKET, Mass. — When Sarah Cohen's acne drove her to visit a dermatologist in July, that's what she figured she'd be doing — visiting a dermatologist. But at the hospital on Nantucket, where her family spends summers, Ms. Cohen, 19, was perplexed.

"I thought I was going to see a regular doctor," she said, but instead she saw "this giant screen."

Suddenly, two doctors appeared on the video screen: dermatologists in Boston. A nurse in the room with Ms. Cohen held a magnifying camera to her face, and suggested she close her eyes.

Why? she wondered — then understood. The camera transmitted images of her face on screen, so the doctors could eyeball every bump and crater. "Oh my God, I thought I was going to cry," Ms. Cohen recalled. "Even if you've never seen that pimple before, it's there."

That, she realized, was the point. Technology, like these cameras and screens, is making it affordable and effective for doctors to examine patients without actually being there.

More hospitals and medical practices are adopting these techniques, finding they save money and for some patients work as well as flesh-and-blood visits.

"There has been a shift in the belief that telemedicine can only be used for rural areas to a belief that it can be used anywhere," said Dr. Peter Yellowlees, director of the health informatics program at the University of California, Davis, and a board member of the American Telemedicine Association. "Before, you had to make do with poor quality, or buy a very expensive system. Now, you can buy a $100 webcam and do high-quality videoconferencing."

Pam Belluck is a Times health and science reporter and author of "Island Practice" (PublicAffairs, 2012), about Dr. Lepore's experiences.

The technology is especially being embraced in professions like ophthalmology, psychiatry and dermatology, which face shortages of physicians. At Kaiser Permanente, dermatologists "sit in a suite in San Francisco" and tele-treat patients throughout Northern California, Dr. Yellowlees said. "It's much more efficient than having 20 hospitals, each with a dermatologist."

On Nantucket, an island 30 miles from the nearest spit of mainland, "telemedicine just makes a lot of sense," said Dr. Margot Hartmann, chief executive officer of Nantucket Cottage Hospital. "It allows us to meet the mission of the hospital better because we're offering more locally," and saves patients the cost and time of flying or ferrying off-island, then driving to Cape Cod or Boston hospitals.

The island may be small, but it has strikingly diverse medical needs. Its year-round population of about 10,000 balloons to 50,000 in the summer. And while it is famous for wealthy visitors, its year-rounders are much less affluent. They include immigrants from many countries, and range from businesspeople to scallopers.

Nantucket has all the ailments one would find anywhere, plus some exacerbated by island life: skin cancer, tick diseases, water accidents.

"Most people are within an hour of some major hospital," said Joanne Bushong, the hospital's outpatient clinical coordinator. Not Nantucket. "We're not practicing rural medicine; we're practicing island medicine."

Nantucket's hospital has a handful of year-round doctors. While mainland specialists do visit, fog or storms can keep them from getting there. And specialists cost money. The hospital, millions in the red in recent years and now needing $60 million to replace its outmoded 1957 building, must pay for the specialists' travel and lodging.

Telemedicine, done by doctors at Massachusetts General Hospital, saves some of those costs, and generates revenue because it means more tests are done on Nantucket. "If someone was going off-island to see a dermatologist, they would probably have their labs and X-rays done where that dermatologist was," Dr. Hartmann said.

Instead, tele-dermatology saves nearly $29,000 a year because two dermatologists now visit only four times a year, but appear on screen six times a month and see 1,100 patients a year. Previously, dermatologists visited monthly, and always had "100 people on the waiting list," Ms. Bushong said.

Nantucket also uses tele-radiology, having Boston radiologists, some specializing in certain body areas, read X-rays and scans. It has used tele-pediatrics twice, for a child in a car accident and one in diabetic crisis. Tele-stroke uses video neurologists to quickly determine if a patient's stroke type warrants a clot-busting drug, tPA, or if tPA could harm the patient.

Tele-endocrinology, for thyroid problems and diabetes, is starting. And Nantucket hopes to have video sessions for autistic children "so parents would not have to take kids with autism off-island, since it's hard to travel with them and it upsets them," Ms. Bushong said.

Dr. Hartmann envisions tele-rheumatology and tele-psychiatry, among other teles. Instead of screens in one exam room and the emergency room, "I would love to see every room telemedicine-capable," she said.

But there are limitations, nationally and or
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> Using video links to cut down costly in-person visits by specialists.

CARY HAZLEGROVE FOR THE NEW YORK TIMES

ONSCREEN Dr. Peter Schalock, a dermatologist in Boston, saw a patient at Nantucket Cottage Hospital, which lacks some specialists.

From Preceding Page

vides time between Boston and Nantucket, said he has learned to heed Dr. Lepore's insistence on fast, accurate tele-radiology readings because on Nantucket it is important to determine if patients can be treated there or must be flown to Boston.

Many patients appreciate that telemedicine saves them trips off-island, but not everyone likes it.

"There are some people who just flatly refuse, and I see them in person," said Dr. Peter Schalock, one of the two Mass General dermatologists who treat Nantucketers remotely. He said he has had to get used to diagnosing without feeling a patient's skin, relying on the nurse, Ms. Bushong, for that. "Somebody with 100 strange-looking moles, I can probably do in 10 or 15 minutes myself, when it might take half an hour with the camera. Definitely people with more interesting moles, I like to see myself."

Still, "we're pretty good at picking up what looks funky, to use a technical term," Dr. Schalock said. "I really feel like we're providing essentially the same quality care."

So, in August Dr. Schalock remotely diagnosed eczema in Aaron Balazs, 35, but saw him in person in September and increased his medication dosage and switched him from a cream to pills.

Mr. Balazs, stationed on Nantucket with the Coast Guard, was not expecting video doctoring, and said initially "it was sort of awkward." But he concluded "it's definitely beneficial for both parties."

By the time Ms. Cohen had her second session in August, this time with Dr. Schalock, she said, "I feel like it's the same thing" as an in-person visit. She had accepted the mega-magnifying camera by then.

"It kind of freaks out some people," Dr. Schalock said. "They say, 'Oh my God, I should have shaved my legs!' I'm not looking at the hair. I'm looking at the mole."

Telemedicine

The **Institute of Medicine** defines telemedicine as **"the use of electronic information and communications technologies to provide and support health care when distance separates the participants."**

Western Governor's Association Telemedicine Action Report 1995

"Western Governors are committed to improving access to and quality of health care for people living in the rural west."

Western Governor's Association Telemedicine Action Report 1995 - Barriers

- Infrastructure Planning & Development
- Telecommunications Regulation
- Reimbursement for Telemedicine Services
- Licensure & Credentialing
- Medical Malpractice Liability
- Confidentiality

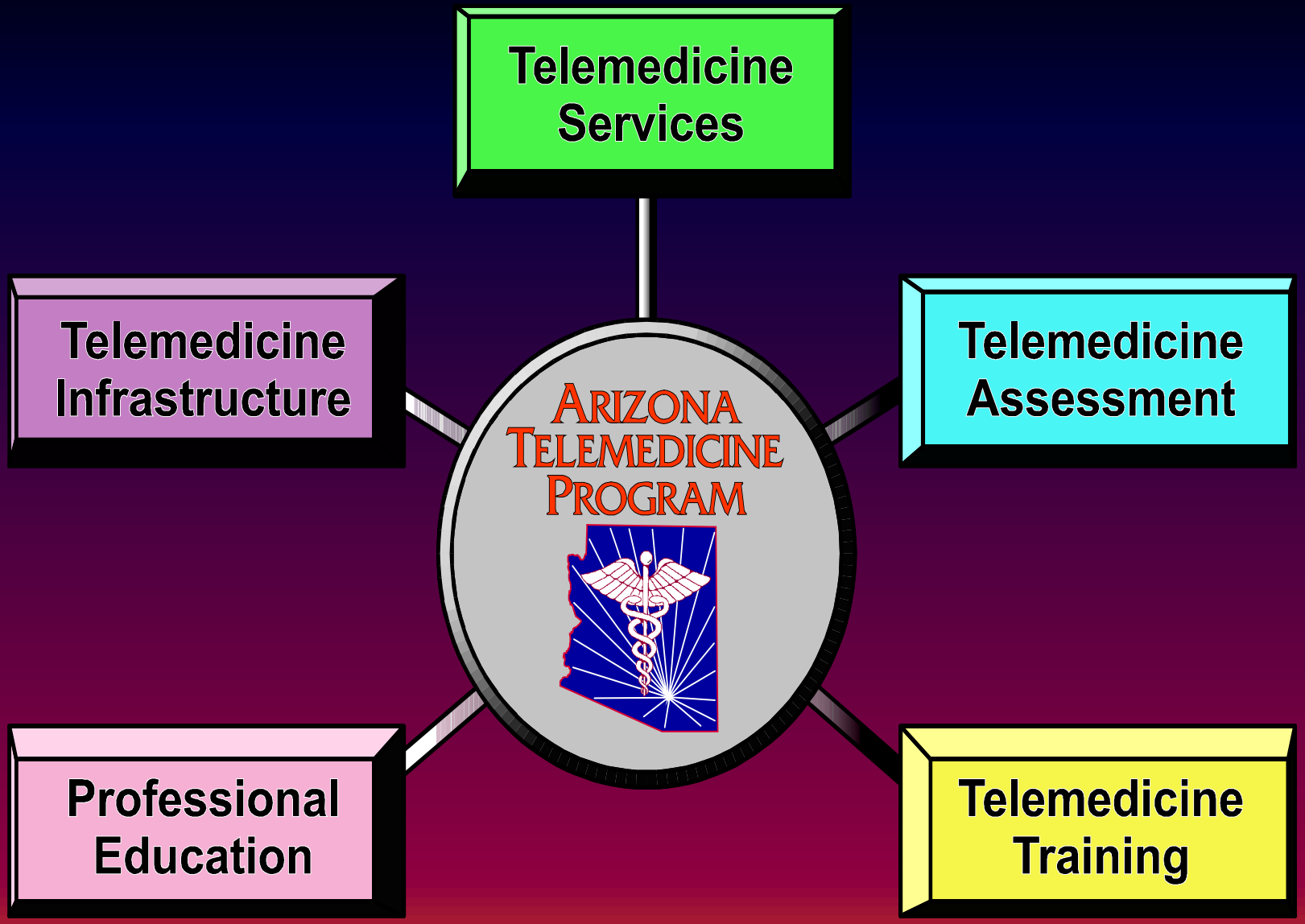
ARIZONA TELEMEDICINE PROGRAM

1996

ARIZONA TELEMEDICINE PROGRAM

Founded in 1996, funded by the Arizona State Legislature

>1.3 Million Cases



Arizona Telemedicine Council

AZ - Joint Legislative Budget Committee Quarterly Meetings since 1996

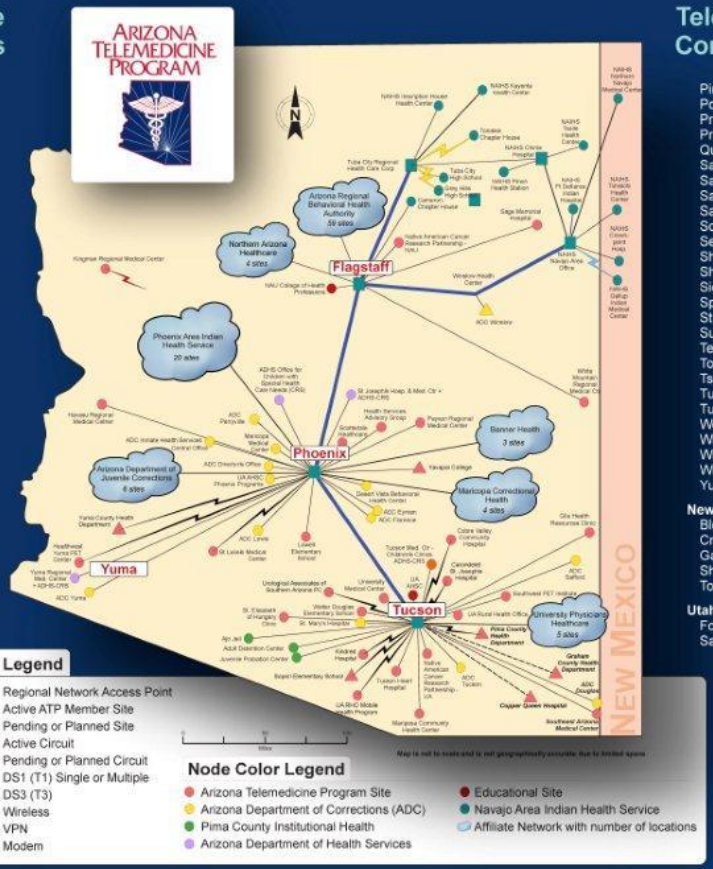
Arizona Telemedicine Program

Telemedicine Communities

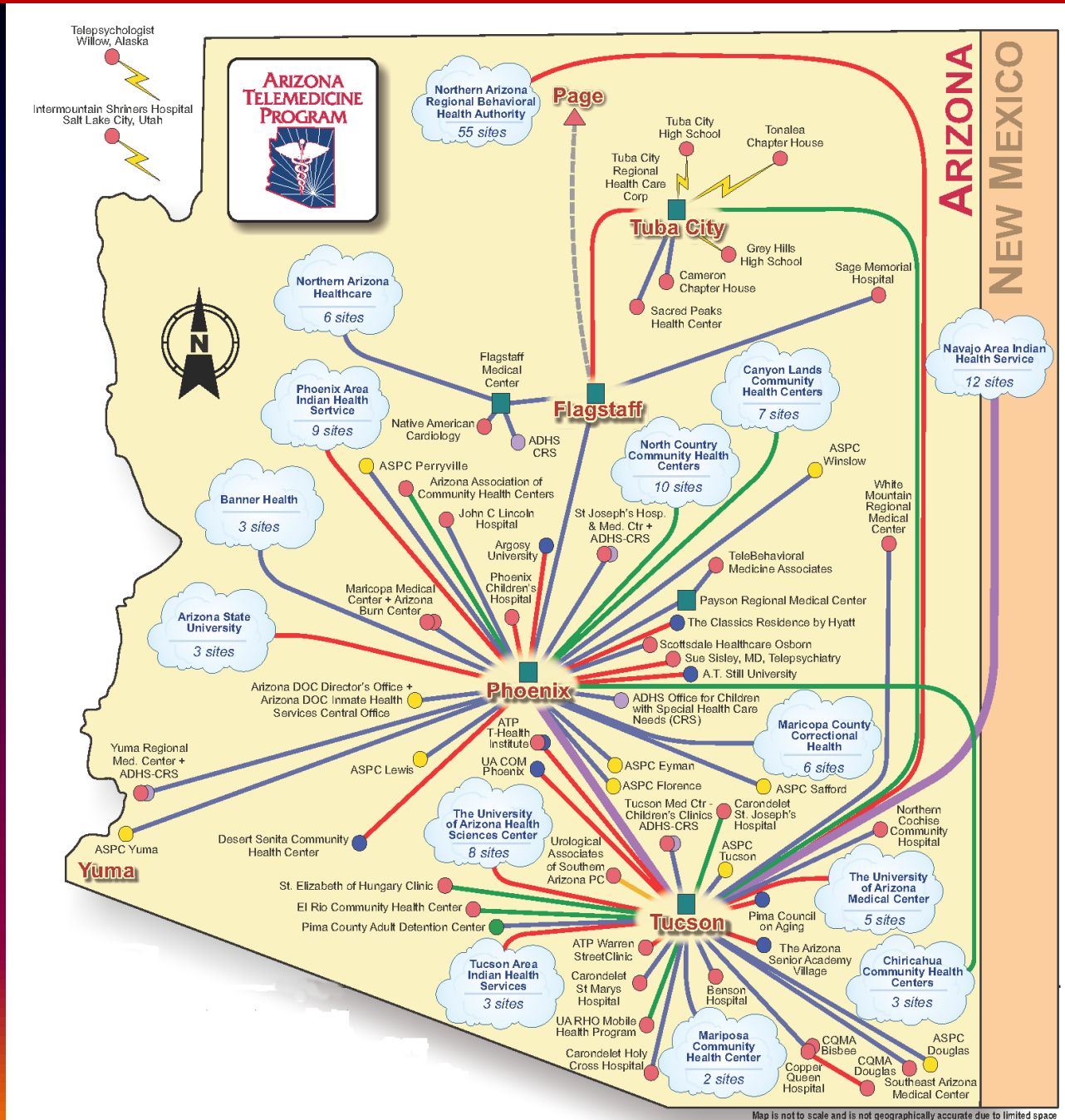
Arizona
- Ajo
- Amado
- Apache Junction
- Avondale
- Benson
- Bisbee
- Buckeye
- Bullhead City
- Cameron
- Casa Grande
- Chinle
- Cibecue
- Cottonwood
- Douglas
- Eloy
- Flagstaff
- Florence
- Fort Defiance
- Ganado
- Globe
- Goodyear
- Green Valley
- Holbrook
- Kayenta
- Kearny
- Kingman
- Lake Havasu City
- Laveen
- Marana
- Mesa
- Morenci
- Nogales
- Oracle
- Page
- Parker
- Payson
- Phoenix
- Pinon
- Polacca
- Prescott
- Prescott Valley
- Quartzite
- Sacaton
- Safford
- San Carlos
- San Luis
- Scottsdale
- Sells
- Shonto
- Show Low
- Sierra Vista
- Springerville
- St. Johns
- Supai
- Tempe
- Tonalea
- Tsaile
- Tuba City
- Tucson
- Wellton
- Whiteriver
- Window Rock
- Winslow
- Yuma

New Mexico
- Bloomfield
- Crownpoint
- Gallup
- Shiprock
- Tohatchi

Utah
- Fort Duchesne
- Salt Lake City



Arizona Telemedicine Network



Arizona Telemedicine Program

160+ Sites

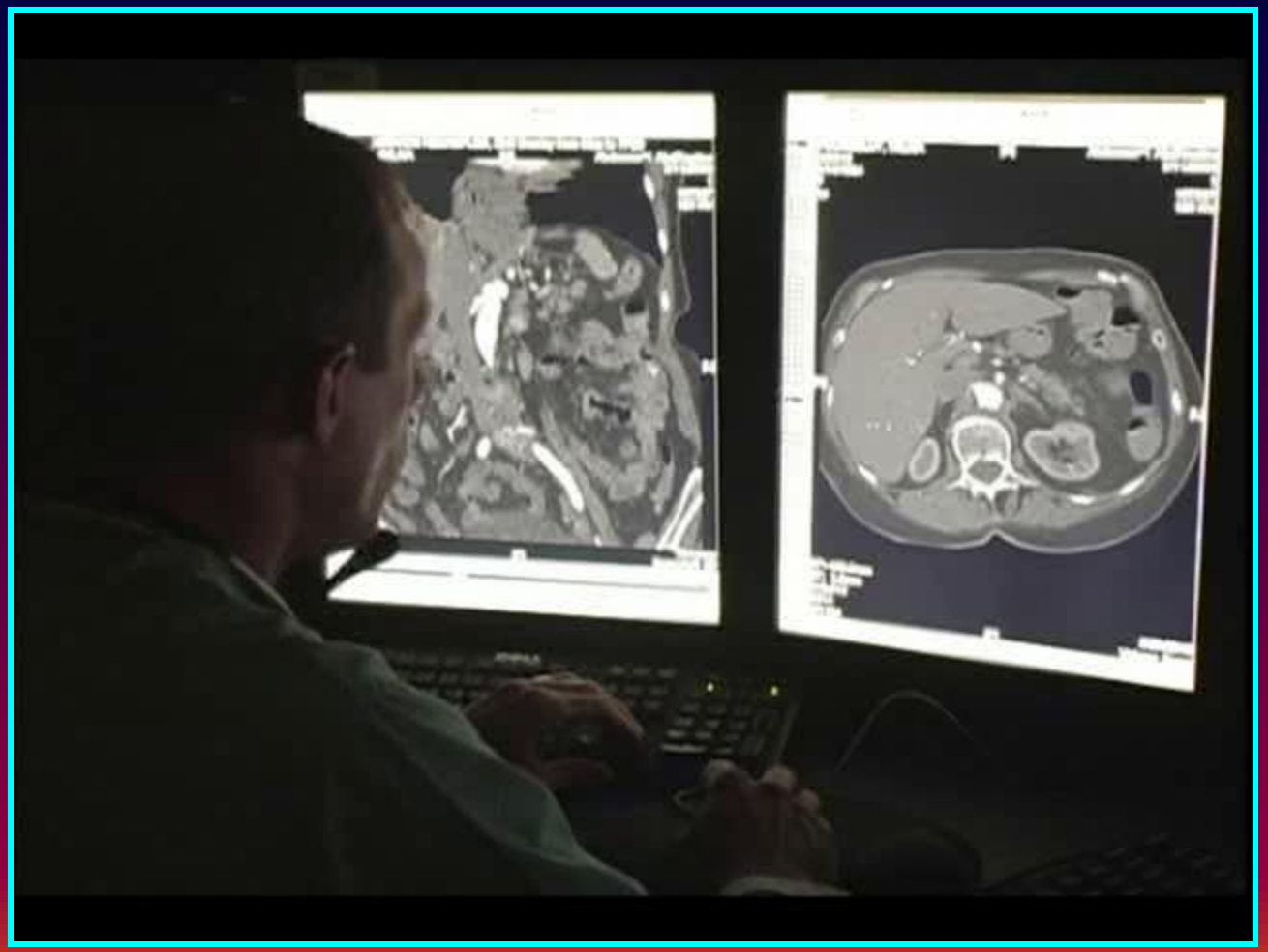
- Urban & rural hospitals
- Native American healthcare
- Prisons & jails
- Community health centers
- Schools
- Distance learning affiliates
- International Sites

Today - 55 Health Care Organizations

First Arizona Telemedicine Program Users Group Meeting (1997)

Telemedicine Services

Teleradiology



Telemedicine

Subspecialty Consultations

Anesthesiology
Cardiology
Dental
Dermatology
Endocrinology
Fam. & Comm. Med.
Gastroenterology
Genetics
Geriatrics
Hematology/Oncology
Hepatology
Infectious Disease
Integrative Medicine
Internal Medicine
Molecular Diagnostics
Nephrology
Neurology
Neurosurgery
Ob/Gyn
Ophthalmology
Orthopedics
Otorhinolaryngology
Pain Clinic
Pathology
Peds. Cardiology
Peds. Dermatology
Peds. Endocrinology
Peds. Gastroenterology
Peds. Hem/Onc
Peds. Infec. Disease
Peds. Nephrology
Peds. Neurology
Peds. Ophthalmology
Peds. Oral Surgery
Peds. Orthopedics
Peds. Psychiatry
Peds. Pulmonology
Peds. Rheumatology
Peds. Urology
Psychiatry
Radiology
Reprod/Infertility
Rheumatology
Sports Medicine
Surgery
Surgical Oncology
Transplantation
Toxicology
Urology
Vascular
Wound Management

The Provision of Medical Care

- Clinical care
- Evaluation/research
- Continuing education

Who are the Referring Clinicians?

- General
  - MD/DO/PhD/DDS
  - NP/PA

The Clinic Structure

- Hub Site
  - Medical Director
  - Site Coordinator
- Spoke Site
  - Medical Director
  - Site Coordinator
- Referring Clinicians

Scheduling: Real-Time and Store- Forward

- Teleclinic Appointment
- Ad Hoc Appointment

The Teleclinics

- Psychiatry
- Rheumatology
- Pain Clinic
- Cardiology
- Dermatology

Telemedicine Protocols

- Pulmonary
- Cardiology
- Neurology
- Musculoskeletal
- Psychiatry
- Dermatology
- General Medicine

How does a medical consultation become a telemedicine consultation?

Goals of Teleconsultation

- Increase access to specialty care
  - rheumatology
- Confirm diagnosis
  - polymyositis
- Assist in triage
  - cervical spine injury

What makes a good teleconsultation?

- Complete data
  - Avoid the incomplete consult!
- Diagnostic images
- Steps in review:
  - Site Coordinator
  - Medical Director
  - Specialist

Telemedicine Consultation

- Visual specialties
  - ie range of motion
- Technology provides images/sounds
  - echocardiography
- “The talk is the treatment”
  - telepsychiatry

Visual specialties

- Rheumatology
- Orthopedics
- Dermatology
- Neurology

The Joint Exam

Arizona Telemedicine Program

Southwest TRC Telehealth Resource Center

Teledermatology

Teledermatology

Teleneurology

Technology provides images/sounds

- Cardiology
- Pulmonary
- Otorhinolaryngology
- Retinal screening
- Colposcopy
- Radiology
- Pathology

Electronic Stethoscope

Tele-echocardiography

Otorhinolaryngology

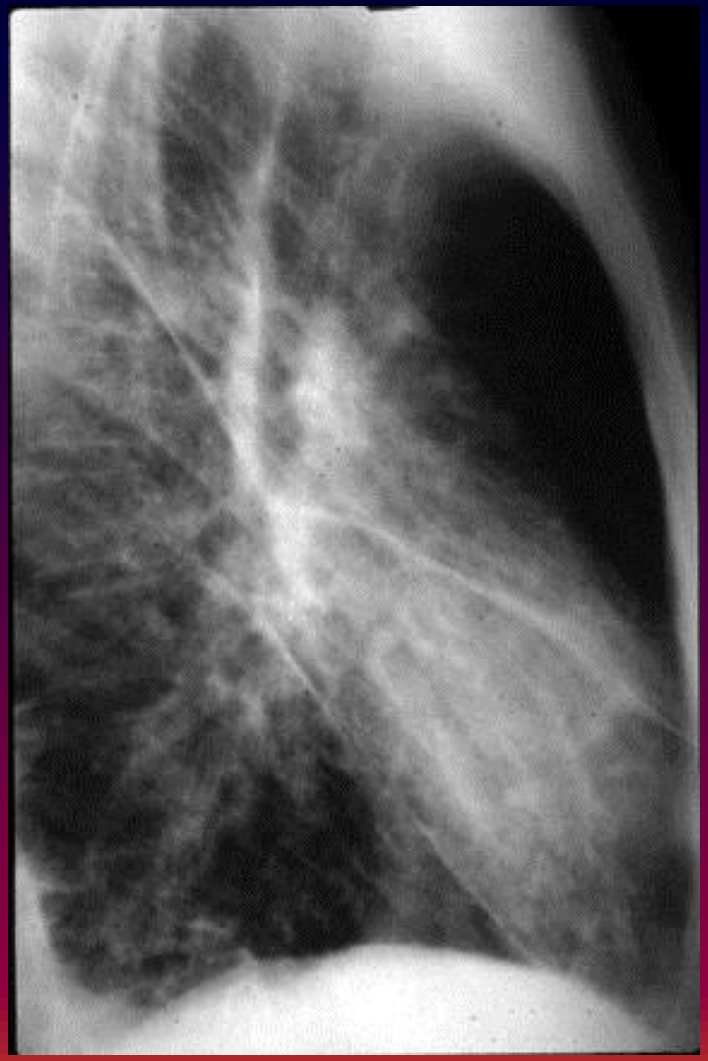
Arizona Telemedicine Program

Southwest TRC Telehealth Resource Center

Teleophthalmology

Teleophthalmology

Teleradiology



Fetal Ultrasound

Fetal Ultrasound

Telemammography

Telepathology

Arizona Telemedicine Program

Southwest TRC Telehealth Resource Center

“The talk is the treatment”

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

Arizona Telemedicine Program

Telehealth Resource Center

Telepsychiatry

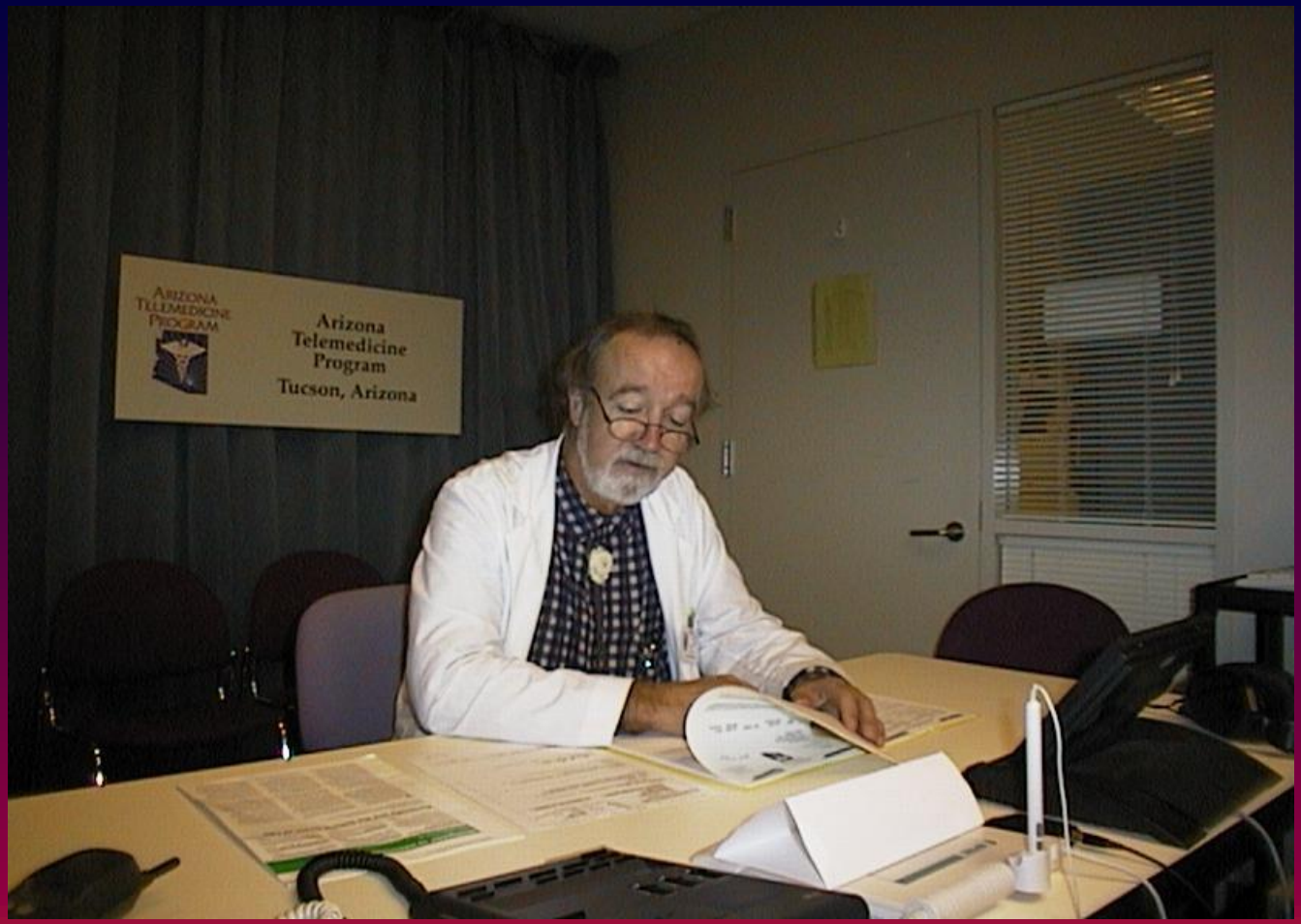
Telepsychiatry

Arizona Telemedicine Program

Southwest TRC Telehealth Resource Center

Cancer Genetic Counseling

Infectious Disease



Tele-Urgent Care

- **Teletrauma -**

  University of Arizona Health Network (multiple communities)

Telestroke

Mayo Clinic Telestroke Network (11 rural communities)

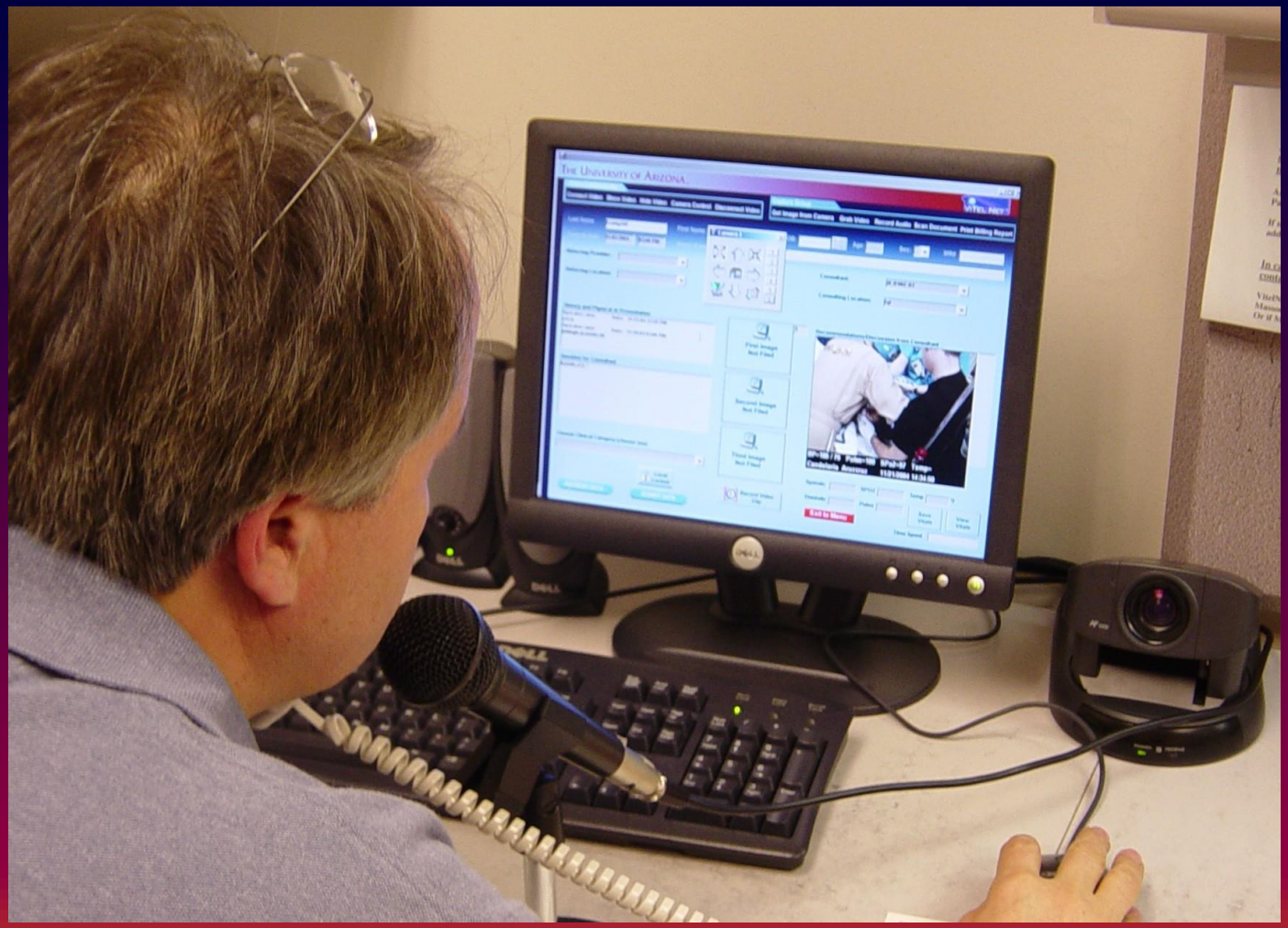
- **Teleburn**

  Arizona Burn Center (Maricopa Medical Center – 12 Sites)

- **eICU (electronic Intensive Care Units)**

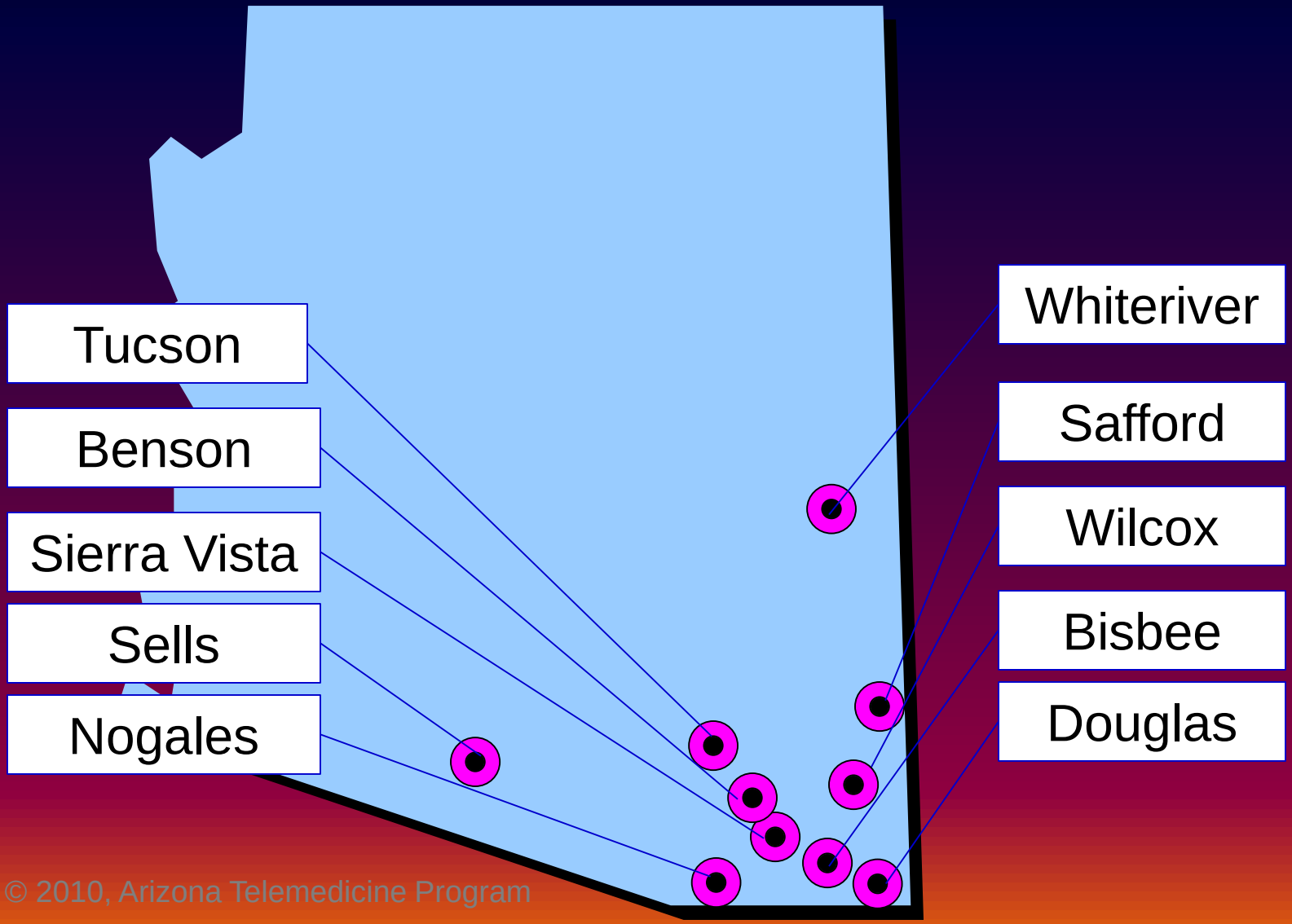
  Banner Health eICU Network (7 Banner hospitals)

Teletrauma



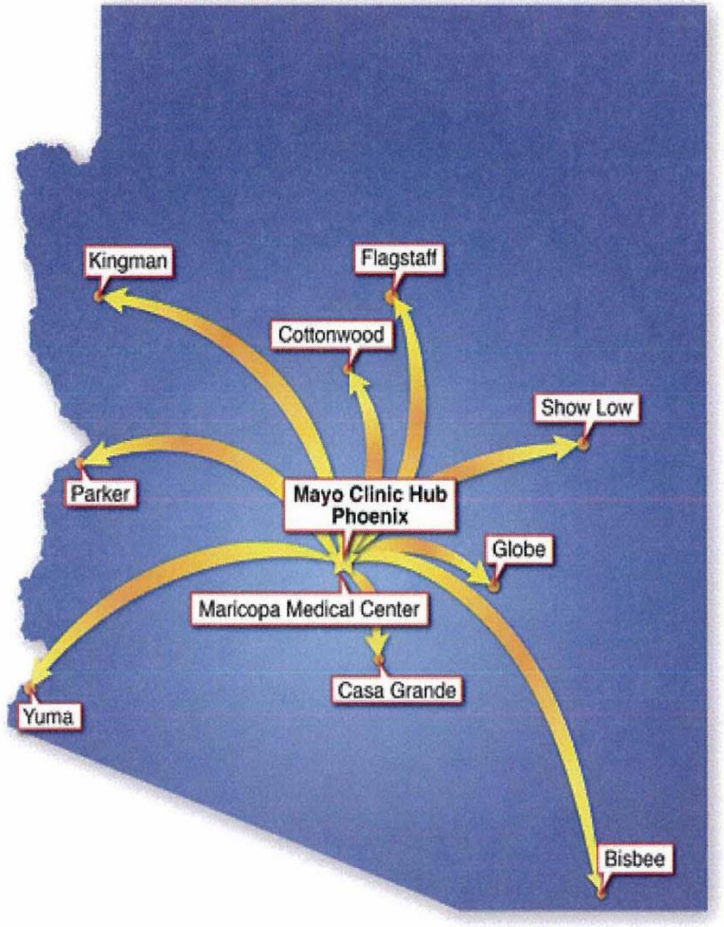
Over Crowded Roll Over Vehicles Smuggling Illegal Immigrants:
41 people in a pick up truck

Southern Arizona Teletrauma & Telepresence Program (SATT)



MAYO CLINIC

Stroke telemedicine network at Mayo Clinic in Arizona

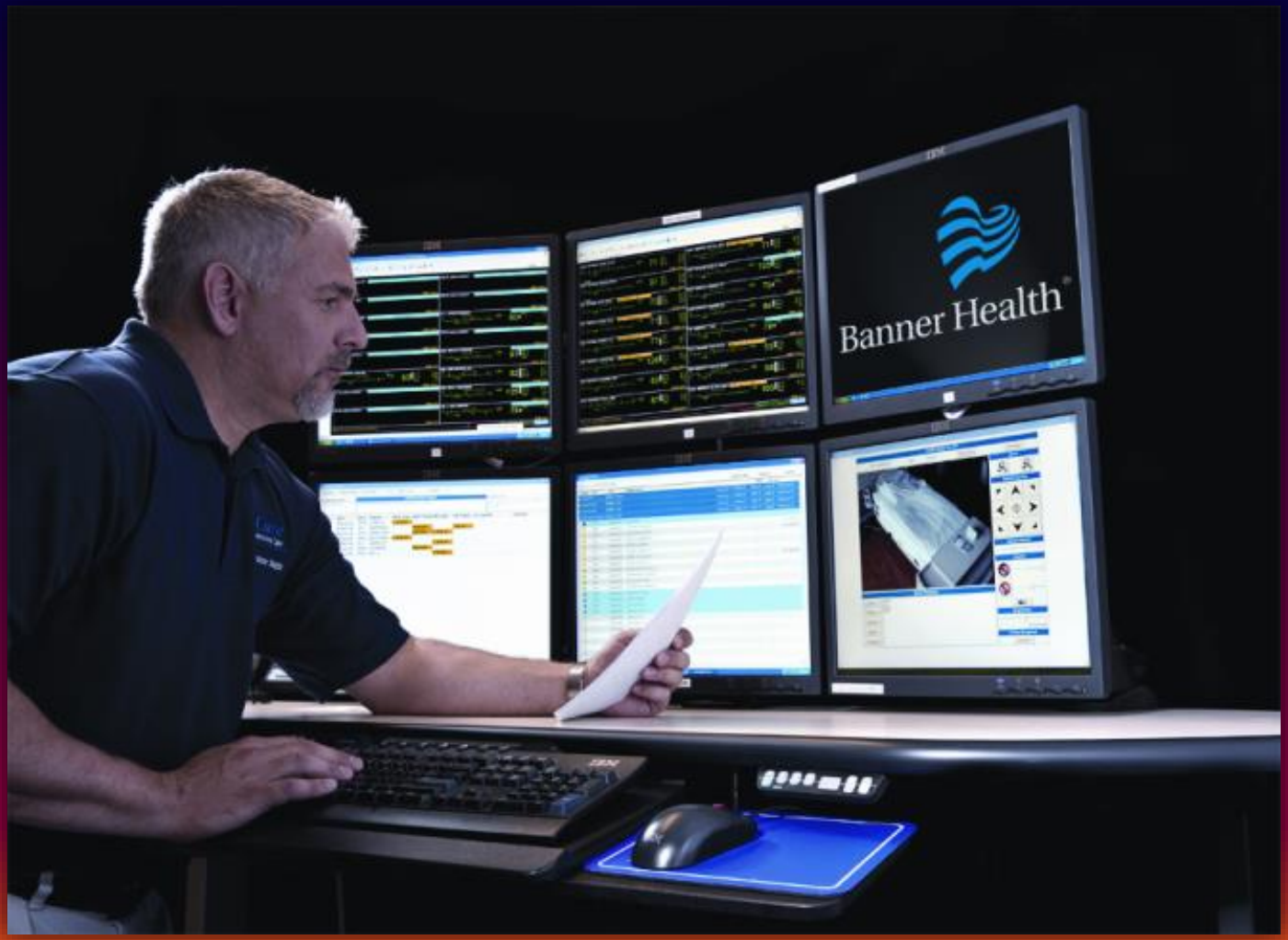


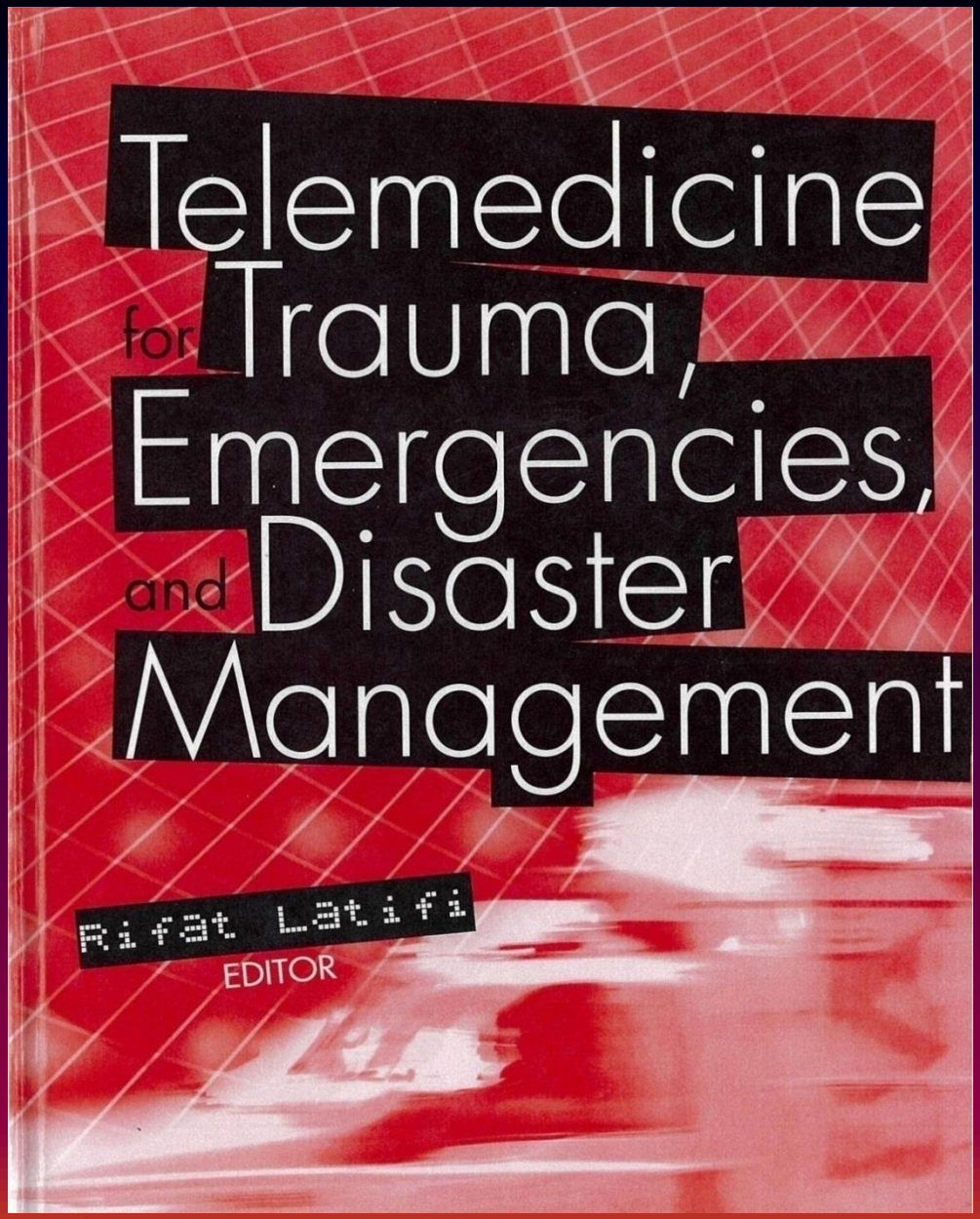
Mayo Clinic in Phoenix, Ariz., serves as the hub for several remote locations in a stroke telemedicine network.

Teleburn
Maricopa Medical Center Burn Unit

eICU (7 Banner Hospital Network)

Banner Health "Electronic Intensive Care Unit"





Tele-urgent care

Teletrauma
Telestroke
Teleburn
eICUs

Health Care System

- Teleconsultation system in:
  - Hospital
  - Community health center
  - Office practice
  - The Home

Home Health Care Applications

- Wound care
- Post-operative care
- Pre-organ transplantation
- Physical therapy

Arizona Telemedicine Program

Tele-Home Health

Wound Management

Tele-Home Health

Blood Glucose Monitor

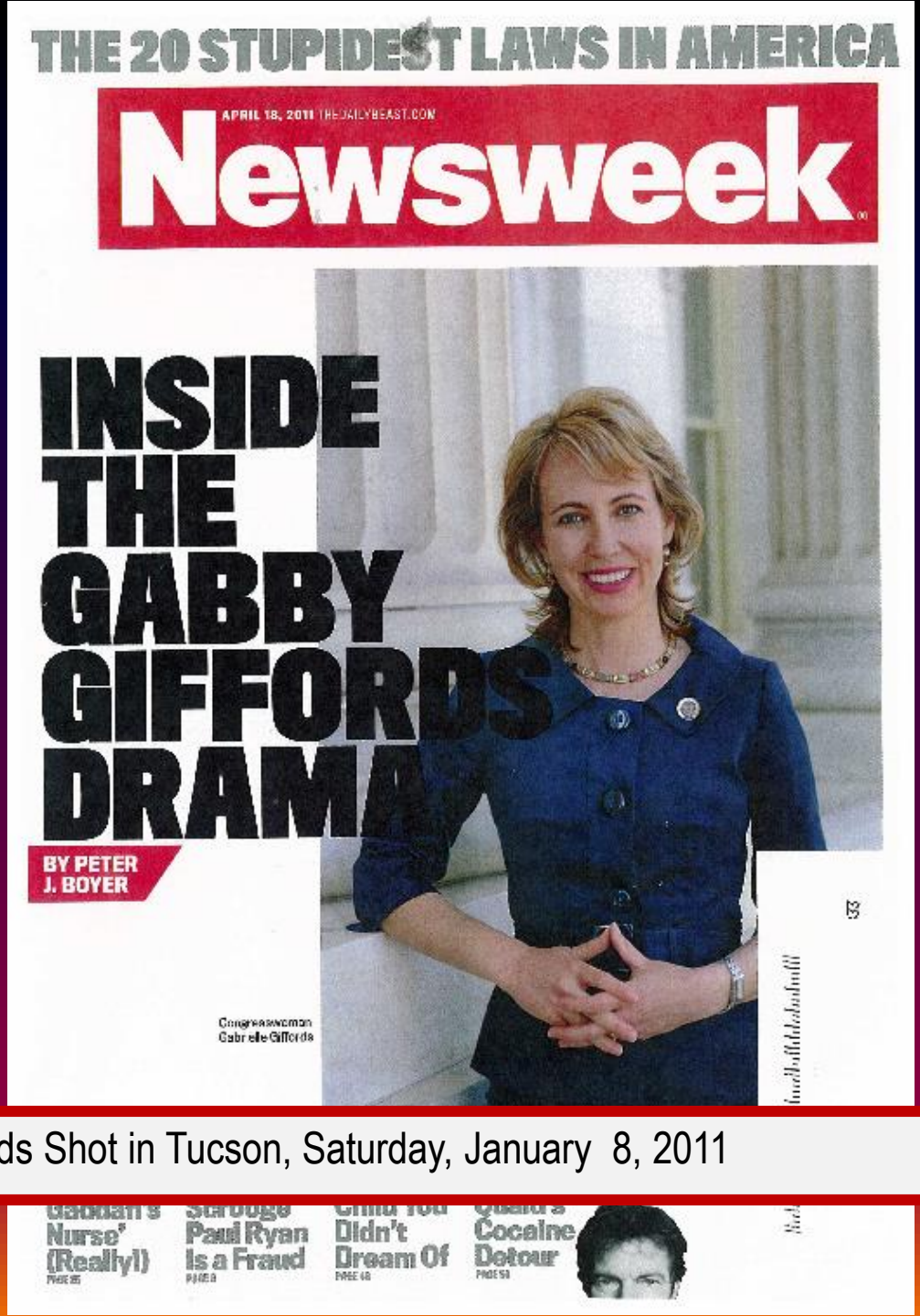
Central Nurses Station

… waiting for a donor heart

Telemedicine Services

Telepresence

Preparedness



Rep. Giffords Shot in Tucson, Saturday, January 8, 2011

Gifford Incident
Saturday, January 8, 2011

- Tucson Shooting of Rep. Gabrielle Gifford
- 6 Dead
- 12 Wounded
- Level I Trauma Center at University Medical Center in Tucson

Pre-Transfer Clinical Video Conferencing

University of Arizona and University of Texas


Telemedicine

Telepresence


A TELEMEDICINE PROGRAM
RON WEINSTEIN
PANAMA
00:34:54


SOUTHWEST
CRITICAL
SOUTHWEST
515

Memorial on front lawn, University Medical Center Tucson, Arizona

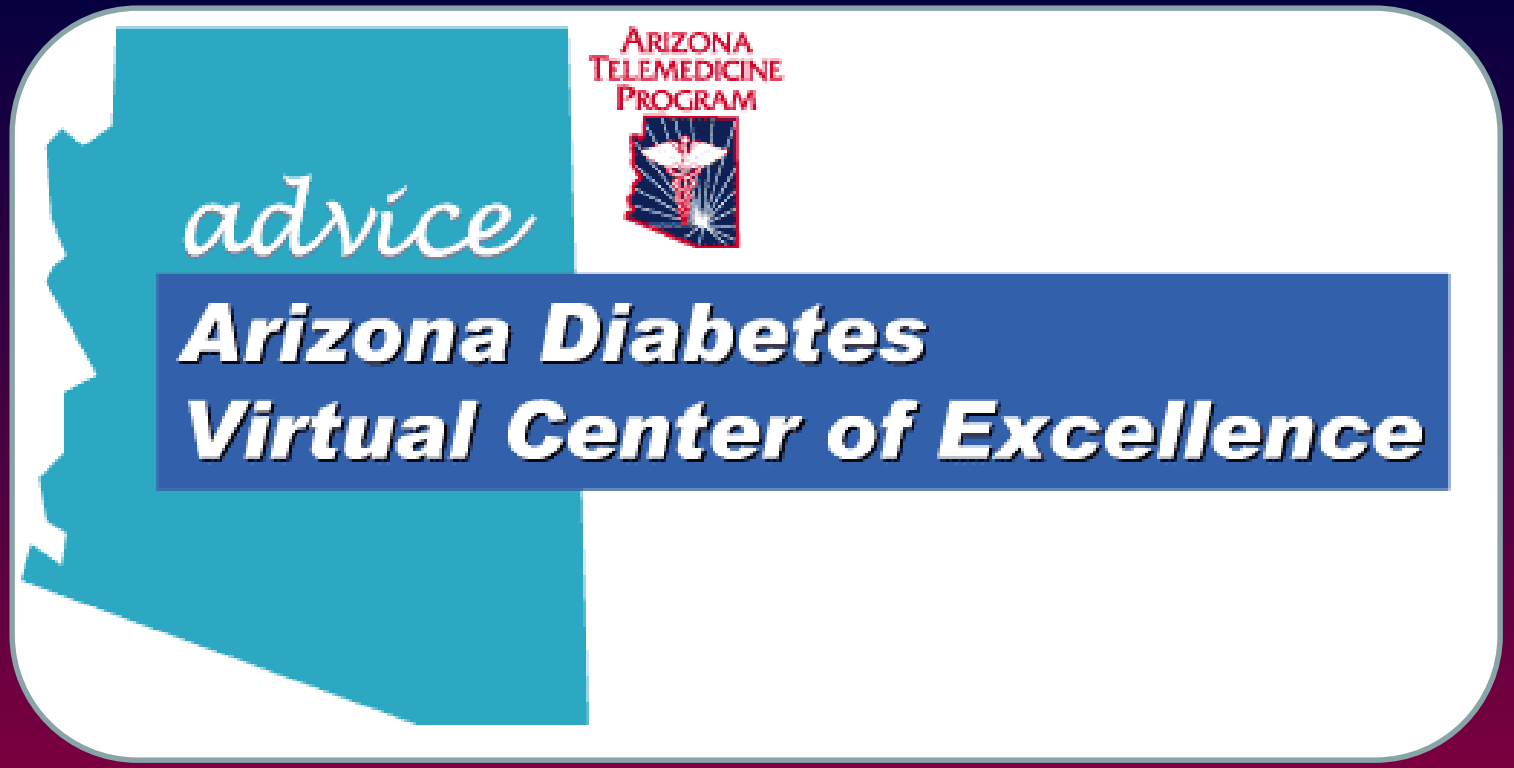
Newest Health Care Tool

Medical Self-monitoring

Diabetes Monitoring

- 8 Megapixel Camera (60% more pixels than previous iPhone)
- New advanced optic lens to enhance shape and light
- Face detection
- 1080p Video Recording
- iOS5
- SIRI voice activation
- Dual core chip – more power, less battery usage

Chronic Disease Management



Diabetes Classes to Amado via POTS (phone lines)

Sopori Elementary School
Amado

St. Elizabeth of Hungary Clinic
Tucson

Diabetes Monitoring

- **8 Megapixel Camera (60% more pixels than previous iPhone)**
- **New advanced optic lens to enhance shape and light**
- **Face detection**
- **1080p Video Recording**
- **iOS5**
- **SIRI voice activation**
- **Dual core chip – more power, less battery usage**

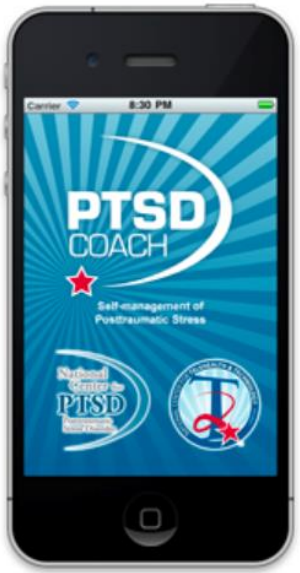
Public SECTION
Information on Trauma and PTSD
Veterans, General Public & Family

Mobile App: PTSD Coach

PTSD Coach mobile app wins FCC award for helping people use technology to manage PTSD symptoms.

The PTSD Coach app can help you learn about and manage symptoms that commonly occur after trauma. Features include:

- Reliable information on PTSD and treatments that work.
- Tools for screening and tracking your symptoms.
- Convenient, easy-to-use skills to help you handle stress symptoms.
- Direct links to support and help.
- Always with you when you need it.



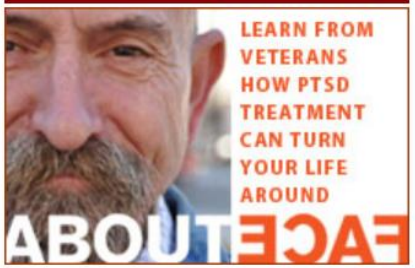
Download the mobile app

Free PTSD Coach download from:
iTunes (iOS)* and Google Play (Android)*

SHARE THIS PAGE

Search PTSD Site
1 Choose Section
Public
2 Enter Term and Search
SEARCH
Advanced Search

Where to Get Help for PTSD




3:46 PM
PTSD Coach
Home
Learn
Assess
Manage
Find Support
Learn
Self Assessment
Manage Symptoms
Find Support
Setup

Telemedicine Training

Telemedicine Training

Arizona Telemedicine Program
Venues

- **Tucson** - AHSL & Telemedicine Clinics
- **Phoenix** - T-Health Amphitheater & TM Clinics
- **Regional** - Southwest TRC, Webinars, eLearning

ATP Telemedicine Training Center

Arizona Health Science Center

Tucson, Arizona


THE UNIVERSITY OF ARIZONA
ARIZONA TELEMEDICINE PROGRAM
Hot Links
Clinical Services
Network
TANDBERG
Panasonic

T-Health Amphitheater, Phoenix

ATP Telemedicine Training Center

ARIZONA TELEMEDICINE PROGRAM

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This conference is designed to give a broad overview of a variety of telemedicine topics to include:

- Clinical services
- Telecommunications and infrastucture development/operations
- Distance education
- Evaluation
- Business aspects
- Equipment demonstration

TRACK 2 - Telemedicine Applications:

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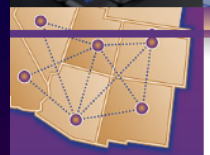
SOUTHWEST TRC TELEHEALTH RESOURCE CENTER



SWTRC Services

- Full-Day Training Programs
- Online Learning Modules
- Help Desk
- Technical Assistance
- Tools & Templates
- Program Development
- Business Models
- Evaluation
- Best Practices
- Clinical Operations
- Sustainability
- Equipment Recommendations
- Program Operation

Online Education: Video Library

TAKE SURVEY

Click here to take our quick survey and receive a user name and password to access the videos below. Then click on the title to start the video.
If you already have your username and password, click here to login.

Telemedicine and Telehealth Overview
The history, progression and current uses of telemedicine and telehealth.

Clinical Applications Overview
Clinical services (real-time and store-forward) that have been amenable to telemedicine consultation and how these services can help underserved areas.

Telecardiology
Definition of telecardiology services, requirements to provide this service, and current applications.

Teledermatology
Definition of teledermatology services, requirements to provide this service, and current applications.

Telenursing
How telenursing can help close the nursing shortage gap. Case studies are presented and outcome results are discussed.

Telepathology
Definition of telepathology services, requirements to provide this service, and current applications.

Telepsychiatry
Definition of telepsychiatry services, requirements to provide this service, and current applications.

Teleradiology
Definition of teleradiology services, requirements to provide this service, and current applications.

Teletrauma
Definition of teletrauma services, requirements to provide this service, and current applications.

Case Referral Process
Go through the steps required to set up, carry out and complete a clinical telemedicine referral.

Training Tips
How to set up a telemedicine/telehealth conference training program. Organizing a conference over distance is different than on-site conference management. Includes tips for success.

Training Telepresenters
How to develop good distance communication skills and conduct a telemedicine/telehealth

Distance Education
The role of tele-education in continuing medical education for various healthcare professionals and the necessary components to set up such a program.

Evaluation
The importance of evaluation in telemedicine/telehealth and how it relates to acquiring and organizing data about the program that can be used to obtain funding for increased sustainability.

Business
Sources of funding for telemedicine/telehealth programs, the business model developed and used by the Arizona Telemedicine Program, and paths towards sustainability and business planning.

Facility Design
Go through the steps required to set up a telemedicine/telehealth facility, including placement of the equipment, lighting, wall color, etc.

Video and Data Communication
Basic introduction to networking and data communications. Description of the Internet, local area networks, Ethernet, wireless communications and communication modes (e.g., Internet, satellite, wireless), including the advantages and disadvantages of each as they relate to telemedicine/telehealth.

Telemedicine/Telehealth Network
Basics of how a telemedicine/telehealth network is set up and the roles of various pieces of equipment: CODECs, MCUs, computer applications (e.g., videoconferencing, Skype), video bridges, gatekeepers, and communication protocols (e.g., H.239).

Culture, Etiquette & Technology
The impact of technology on social interaction and the universal rules of good manners and technology.

Information Services
The best Internet-based information resources available to healthcare professionals and consumers, as identified by university-based librarians.

Challenges & Barriers
The challenges and barriers to implementing a successful telemedicine/telehealth program and lessons learned from successful programs.

Workshops and Webinars

SOUTHWEST TELEHEALTH RESOURCE CENTER TRC

T-HEALTH

¡VIDA!

TEACH TEC

Collaborating Across Borders CABIII 2011

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Strategic Planning

Telehealth Issues & Opportunities

New drivers creating need for virtual care models (ACO, PPACA, etc.)

Physicians shortages – and increased numbers of patients entering the system

Consumer demands for more convenient health care services

"Killer" applications

A- Gap services; B-Urgent services; C-Mandated services

***m*Health, *e*Health, wireless, implantable**

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2013 Telehealth Issues & Opportunities

- **“Killer” applications**

  A- Gap services; B-Urgent services; C-Mandated services

A- Gap Services – (i.e., teleradiology)

B- Urgent Services – (i.e., telestroke)

C- Mandated Services – (i.e., prison telemedicine)

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:

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.

Safety First!

Before you start exploring, please read the Important Safety Information.

Download Full Prescribing Information

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).**


Commercialization
TeleStroke
Supporting Community Hospitals

Stroke

is the third leading cause of death in the United States and the leading cause of adult disability.

Approximately 795,000 strokes occur each year, and delays in diagnosis contribute to the mortality and disability associated with stroke.

TeleStroke

supports community hospitals by providing:

- 24-hour on-call stroke specialist
- Emergency department acute stroke consultation
- Bedside follow-up (depending on site needs)
- Stroke follow-up appointments (depending on site needs)

WHEN STROKE BEGINS, EVERY SECOND COUNTS

Stroke is a medical emergency that requires early assessment and early treatment. Rapid identification of acute stroke patients enables the timely administration of effective and appropriate stroke therapies that can improve patient outcomes. It also allows for initiation and coordination of strategies to prevent stroke progression, recurrent stroke, and common complications.

and transportation barriers with reliable technology that allows immediate access to stroke experts who can provide consultation with on-site providers to manage acute stroke as needed.

Keep stroke patients close to home.

With TeleStroke, community hospitals can provide stroke care to

HOW TELESTROKE WORKS

COMMUNITY HOSPITAL

1. Doctor reviews patients status, determining need for stroke evaluation
2. Telestroke mobile unit brought in to patient
3. Patient speaks directly to the TeleStroke doctor and follows examination instructions
4. If necessary, hopital staff prepares patient for AirMed transport

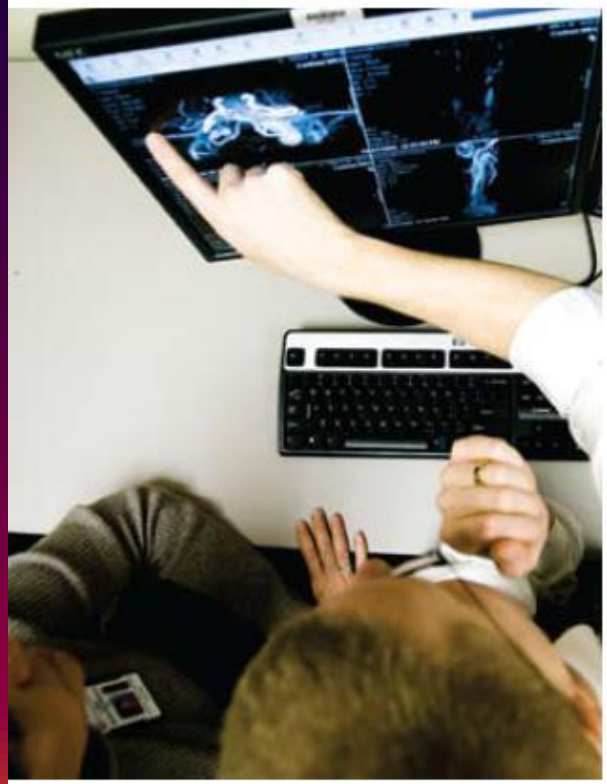
TELESTROKE DOCTOR

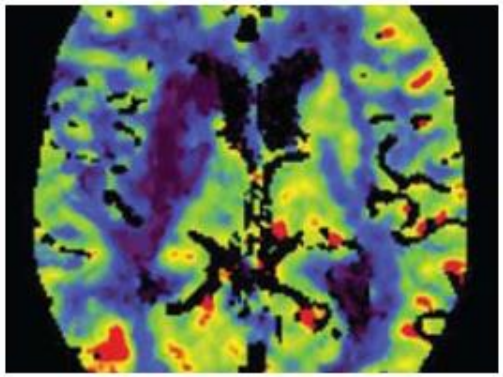
- A. 24-7 on-call TeleStroke doctor receives call or page
- B. Doctor begins video conferencing and evaluates patient data
- C. Exam given via TeleStroke system to evaluate presence or severity of stroke
- D. Consultation with community hospital on best treatment plan for patient

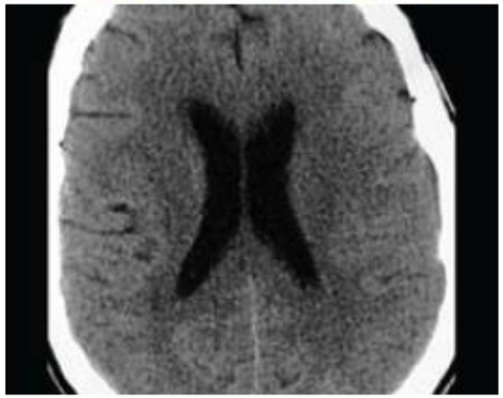
Reduced Costs

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.







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

STROKE Journal 2012; 43:3271-3277

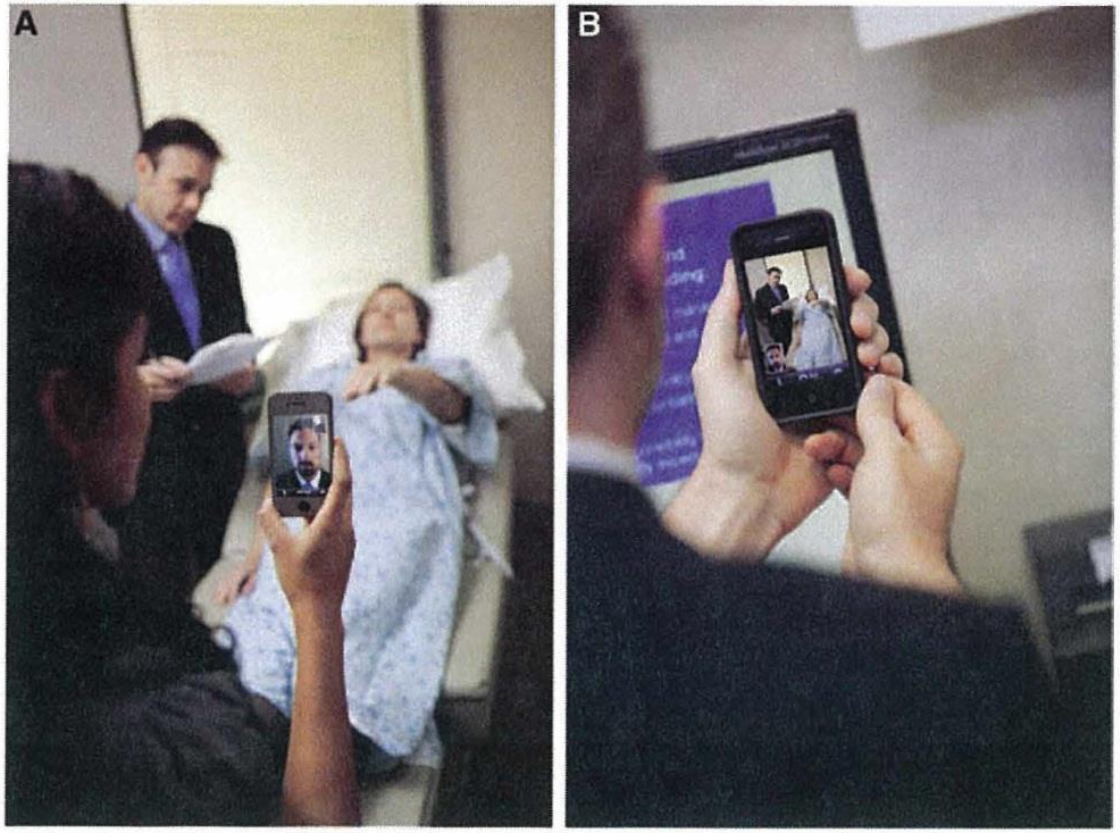


Figure 1. A, Photograph depicting the bedside National Institutes of Health Stroke Scale (NIHSS) assessment scenario. **B,** Photograph depicting the remote NIHSS assessment scenario. Photographs portray Mayo Clinic employees, not patients. Dr Vargas (**A**) and Dr Demaerschalk (**B**) are the bedside and remote neurologists, respectively. Ms Vegunta is the medical aide and Ms Psket (medical practice secretary) volunteered to portray the part of the patient with stroke. Photographs by Mayo Clinic Media Support Services Photography.

National Institutes of Health Stroke Scale (NIHSS) Assessment Scenario

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.)**

Sustainability Issues

- “Meaningful use”
- Reimbursement
- Credentialing
- Interstate medical licensure
- Telecommunications costs
- Equipment obsolescence

Cross-Cultural Issues

Limitations

Virtual Reality Palpation

The Future is Now!

ARIZONA TELEMEDICINE PROGRAM

Thank you

Ana Maria Lopez, MD, MPH, FACP

alopez@uacc.arizona.edu