Clinical Applications

"11:10 AM to 11:50 AM"

January 27, 2020

Ronald S. Weinstein, M.D.

Director, Arizona Telemedicine Program

Co-Director Southwest Telehealth Resource Center

President-Emeritus, American Telemedicine Association

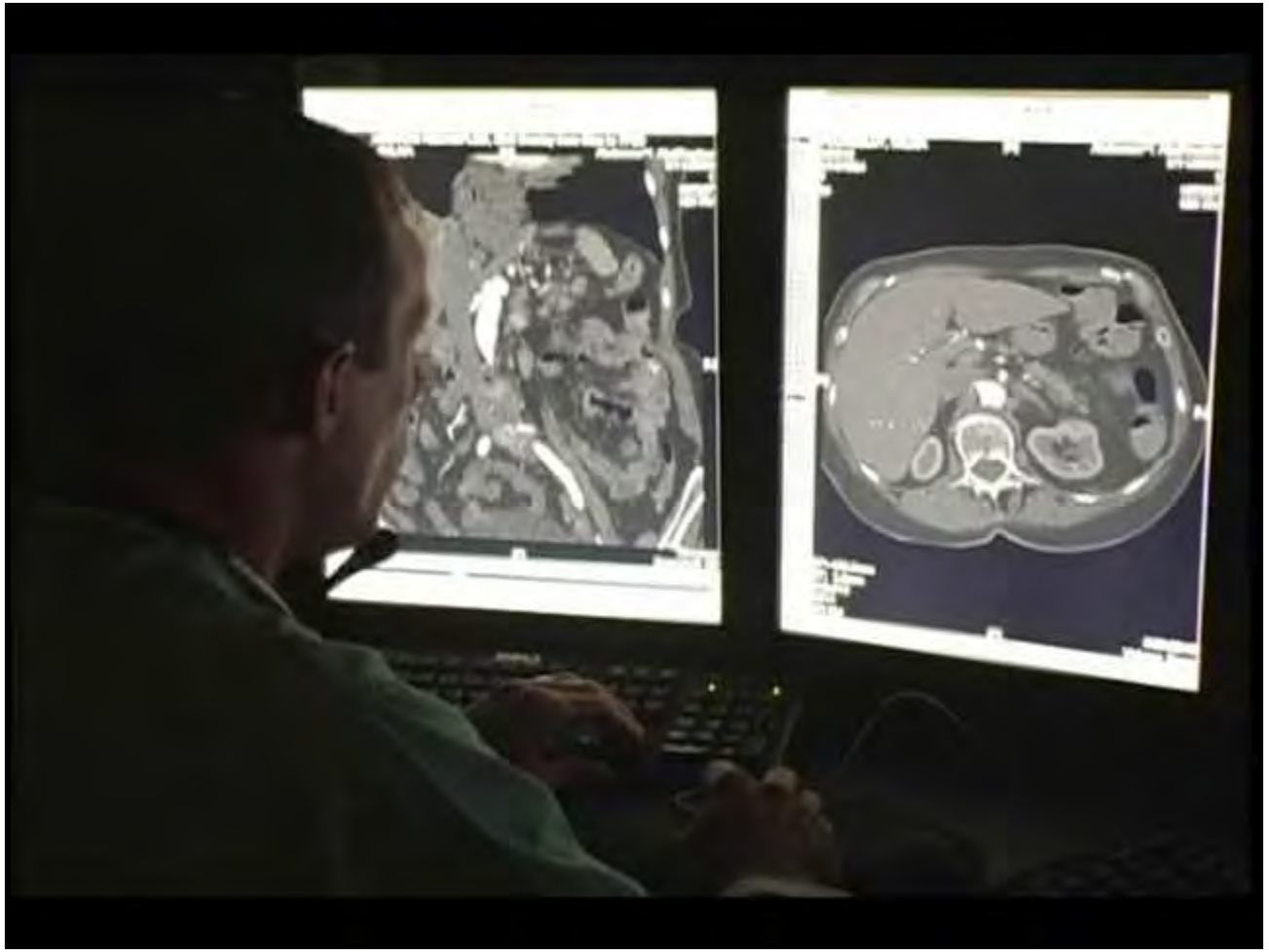
Warren Street Clinic
Arizona Telemedicine Program
Tucson, AZ

Arizona Telemedicine Program
60+ Applications

Major Categories of Services in General Usage

- Gap Services
- Urgent Services
- Mandated Services

Teleradiology – 1,400,000+ cases



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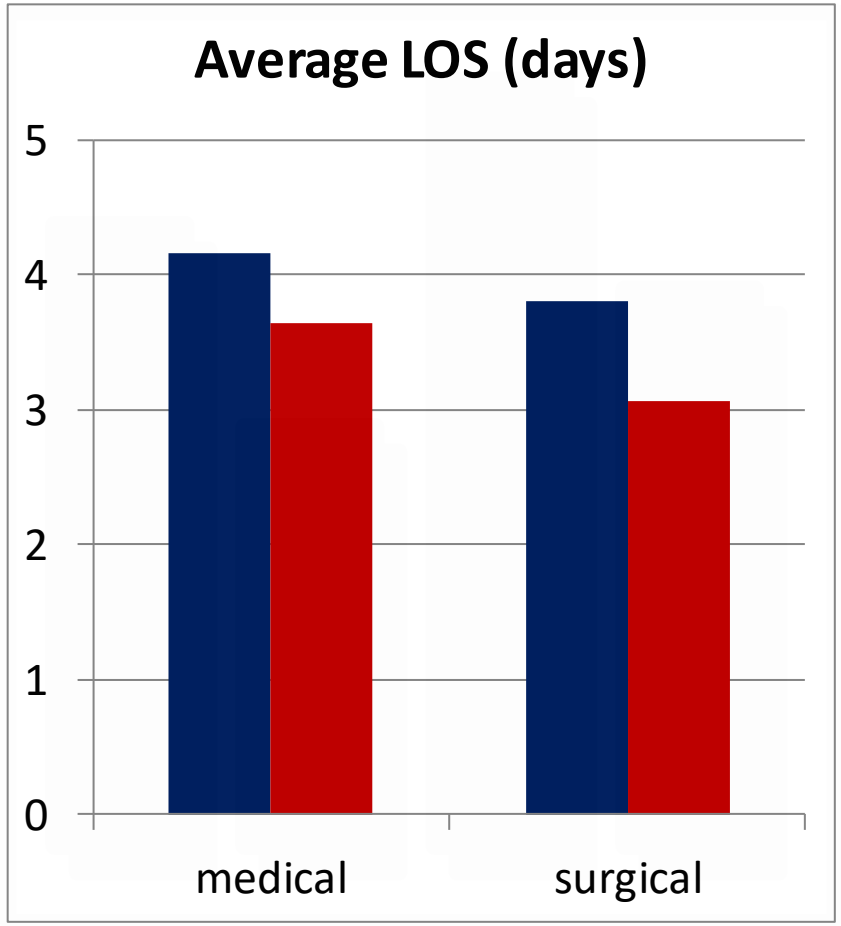
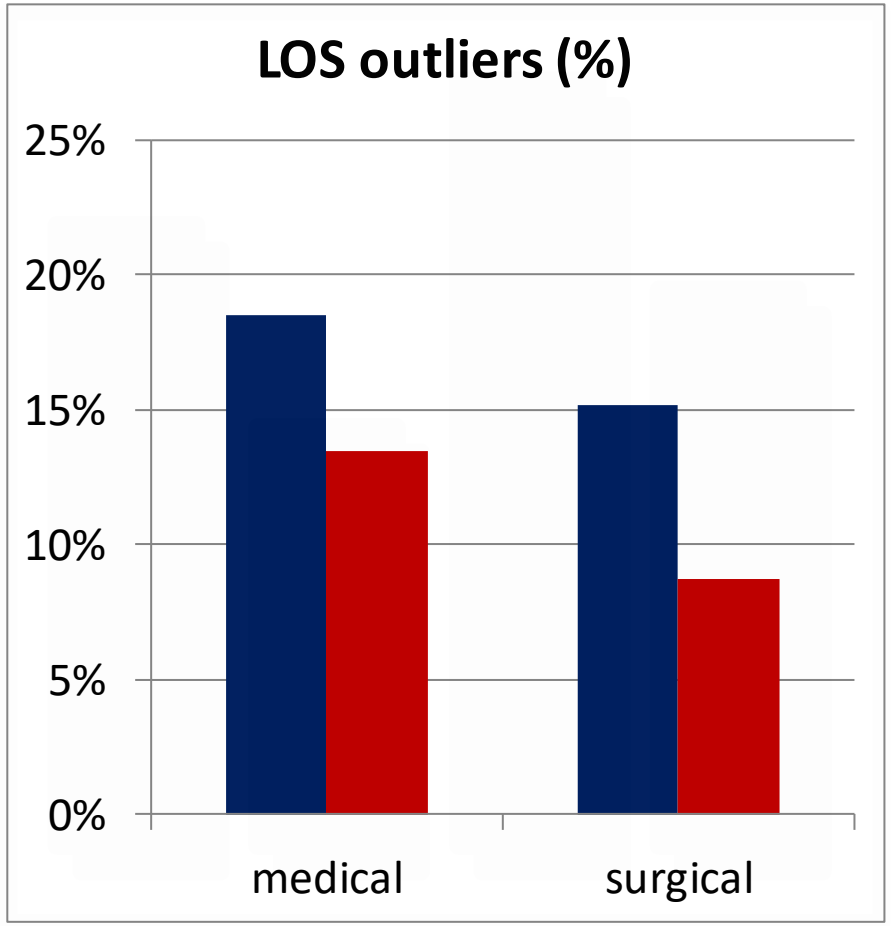
Electronic ICU

“Urgent Services”

iCare BGMC MedSurg LOS



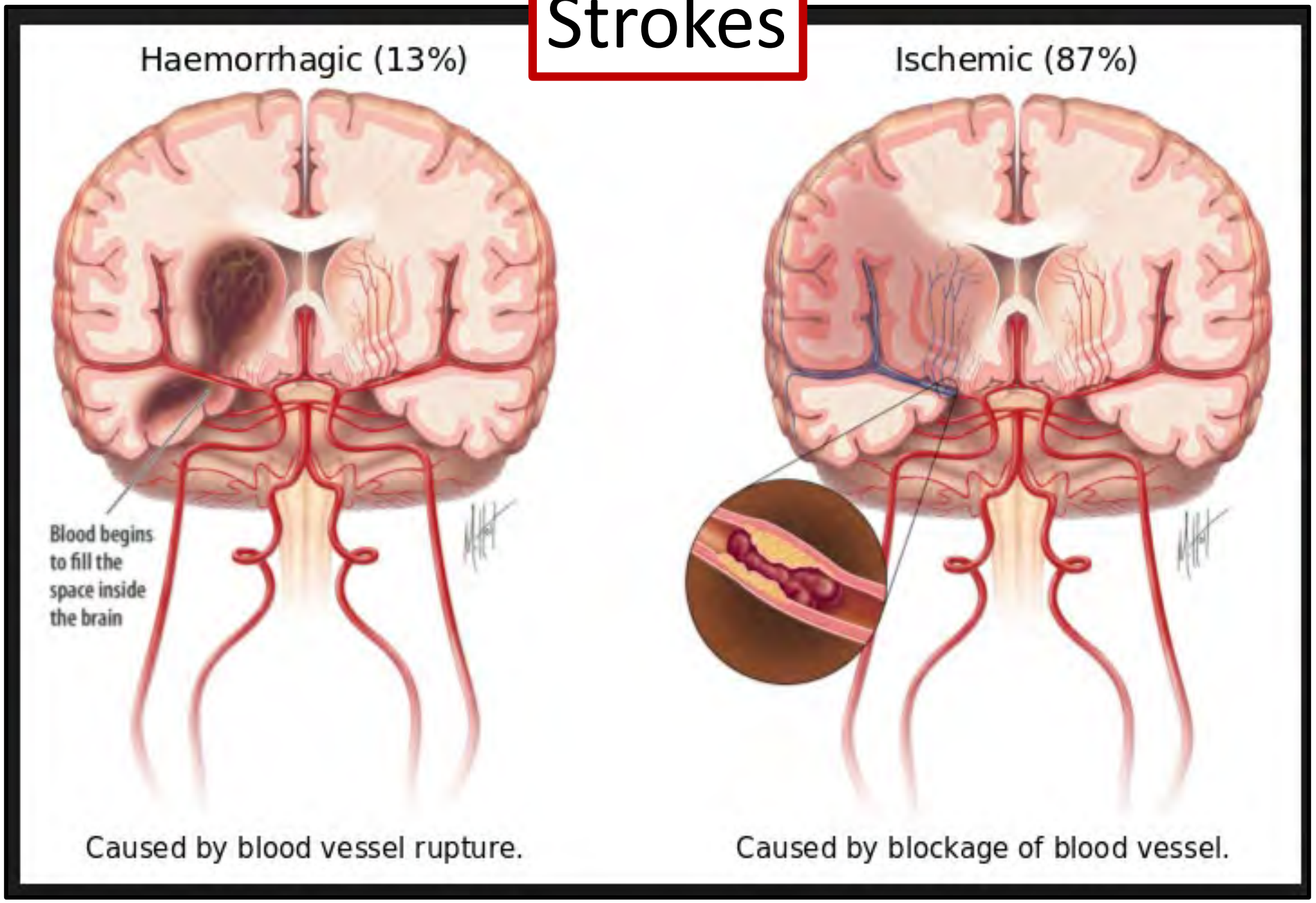


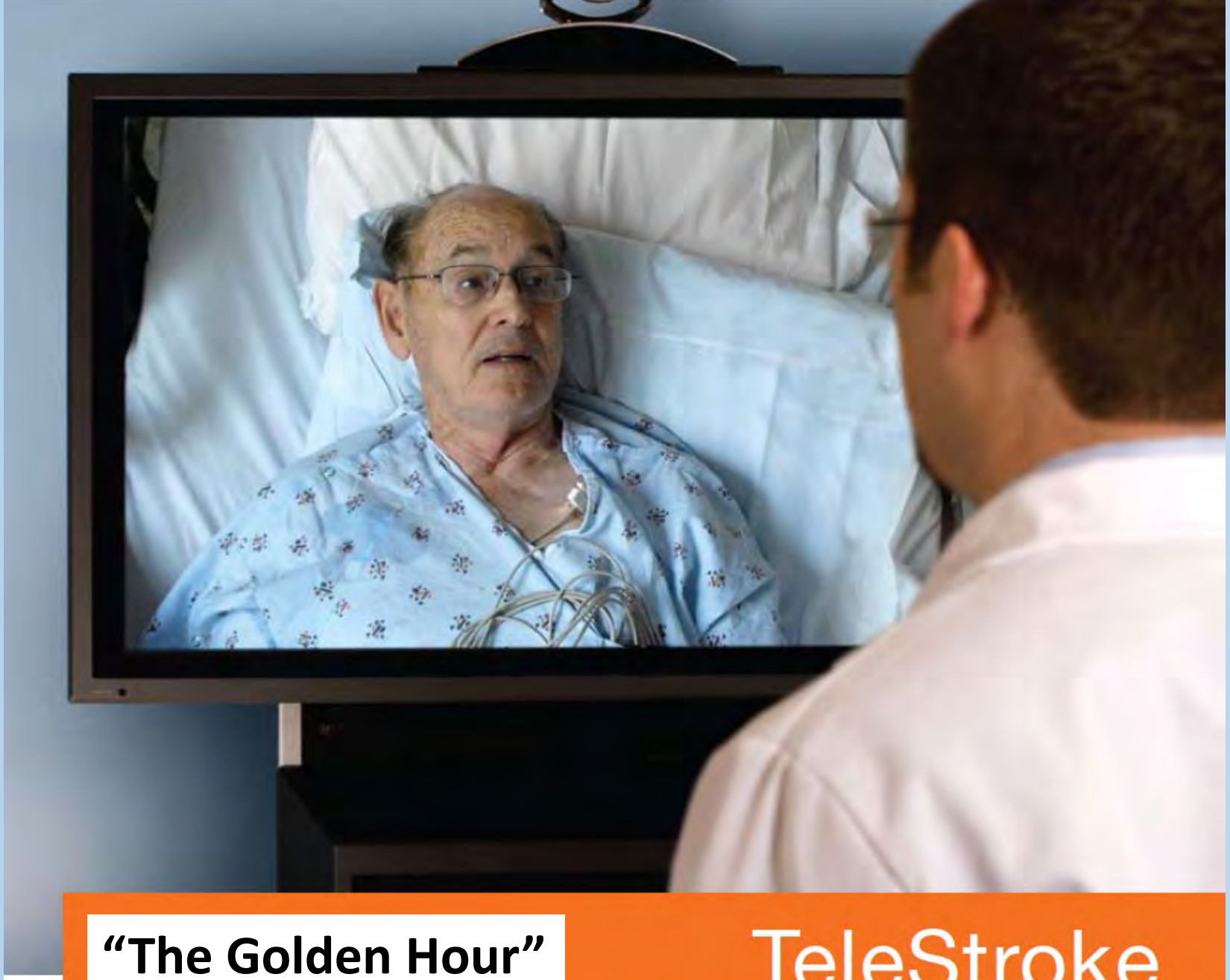
Pre (2008)

Post (2010)

Courtesy of Debbie Dahl, E.E
Banner Health

Strokes





“The Golden Hour”

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.

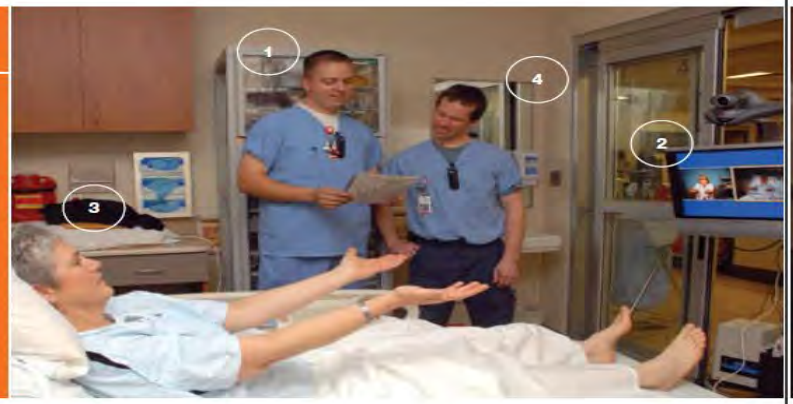
Keep stroke patients close to home.

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

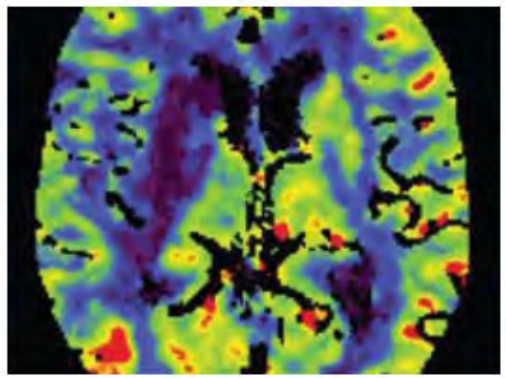
C. Exam given via TeleStroke system to evaluate presence or severity of stroke

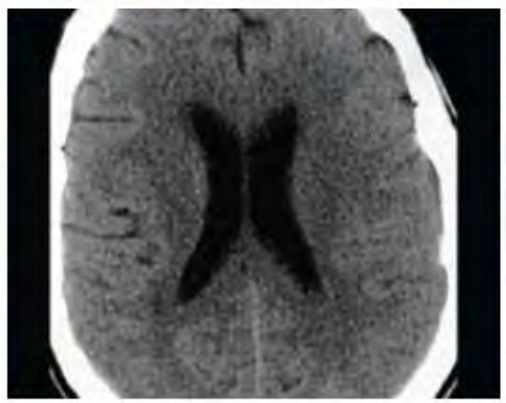
D. Consultation with community hospital on best treatment plan for patient

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.





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.

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

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

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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**

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.)**

Stroke
Journal of the American Heart 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;
doi: 10.1161/STROKEAHA.112.669325
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Print ISSN: 0039-2499. Online ISSN: 1524-4628

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

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

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).**

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- **Connected Health**
- **Direct-to-Consumer**

Connected Health/Mobile Health

https://ihealthlabs.com/wireless-scales/ihealth-core/

Images intended as examples of technology and not as an endorsement of companies or products.

TELE-HOME HEALTH CARE:

'Care Beyond Walls and Wires' Enhances Life for Patients with Congestive Heart Failure

More than 5 million people in the U.S. suffer from congestie heart failure (CHF), according to the Centers for Disease Control and Prevention (CDC). The annual cost is estimated at more than $32 billion in health care services, medications, and lost earnings, the CDC says. Northern Arizona Healthcare's "Care Beyond Walls and Wires" can improve CHF patients' health and reduce health care costs.

Woody Smith and his daughter, Rita Yazzie, used to drive as often as twice a month from their home on the Navajo Reservation to Flagstaff Medical Center, nearly two hours away. Mr. Smith is living with congestive heart failure, with symptoms so severe he required frequent hospitalizations.

But Mr. Smith can no
months without ha
the hospital. His
has resulted fro
called Care Bey
telemedicine-en
program that ha
improve the hea
with congestive

The program als
room visits and
readmissions, a
stay for those w

"It's phenomena
registered nurse
for Flagstaff-bas
Healthcare, whi
Walls and Wires
Flagstaff Medica
Medical Center

Ms. Yazzie says
Wires "is the be
best thing for my
two hospital readm
the program more tha

And at 90, Mr. Smith has been able to return to his favorite activity: riding his horse.

Care Beyond Walls and Wires provides patients with a backpack containing the equipment they need to check their blood pressure, measure their oxygen level, and check their weight daily; the latter because patients with CHF can gain and drop weight suddenly. The data are automatically transferred to a smart phone that transmits the information to Northern Arizona Healthcare's care coordination office, which provides the smart phone, monitoring equipment and backpack to every patient enrolled in Care Beyond Walls and Wires.

Some of the program's patients have no electricity at home, so they also are given

> *"Care Beyond Walls and Wires is the best thing ever for me, and the best thing for my dad."*
>
> Rita Yazzie

perspective, the idea for Care Beyond Walls and Wires originated with the National Institutes of Health Office of Public and Private Partnerships, which was looking for better ways to monitor patients with CHF who live in rural areas. The goal was to provide better care while keeping the patients out of the hospital, thus reducing health-care costs.

The San Diego telecommunications company Qualcomm was chosen to lead the project, with Maryland-based Zephyr Technology and Verizon providing software, smart phones and remote-monitoring hardware.

Northern Arizona Healthcare agreed to conduct a pilot project involving 50 patients. ect got under way in

the study if you lived amily support," Ms. could live in Supai and Canyon) or on on. Our patients Hispanic, and white, to early 90s."

Care Beyond Walls hen it ended on Arizona Healthcare tinuing the program.

around $650, Ms. Sorenson says, ell phone charges.

h the investment," atients benefiting, penalizes hospitals onditions, including are readmitted discharged.

endous patient atients like the feeling that they have more control over their health," Ms. Sorenson says. "We couldn't have asked for anything more. It's a global win."

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- Gap Services
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- Mandated Services

- **Connected Health**
- **Direct-to-Consumer**

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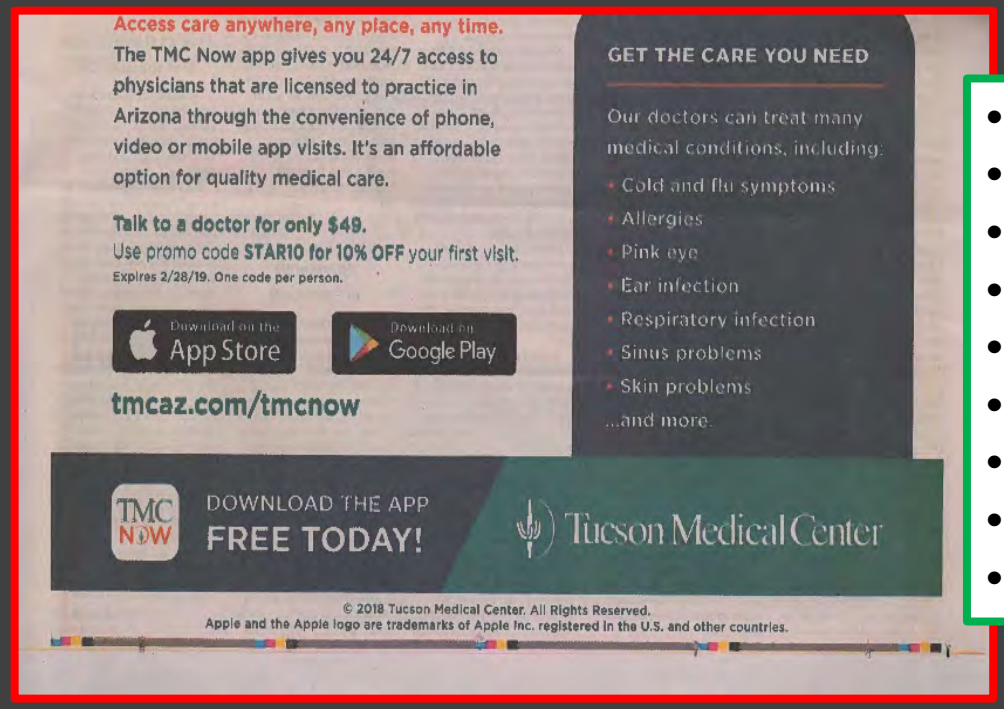
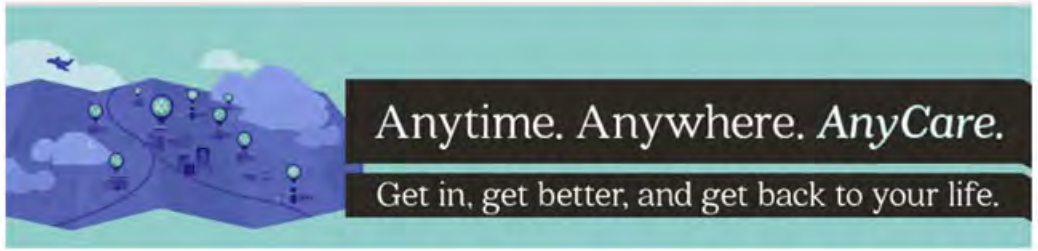
Tucson Daily Star
January 6, 2019



- **GET GREAT CARE YOU NEED**
- Cold & flu symptoms
- Allergies
- Pink eye
- Ear infections
- Respiratory infection
- Sinus problems
- Skin problems
- … and more

NORTHWEST HEALTHCARE
Northwest Medical Center | Oro Valley Hospital



VirtualHealthConnect

See A Doctor Anytime, From Anywhere.

- No appointment necessary
- $49 or less per visit
- Doctor visits via your smartphone, tablet or computer
- Get a diagnosis and treatment recommendation, including a prescription* if needed
- Safe, secure, and confidential

Why Use VirtualHealthConnect?

See A Doctor From Anywhere
Use your smartphone, tablet, or desktop computer to visit with a doctor face-to-face.

Doctors Available 24/7
Our doctors are always on. See a doctor on your schedule, 24/7/365.

No Appointments Necessary
Once you set up your free account, just log on, choose a provider and start your visit.

Local Prescriptions
If a prescription is necessary, one will be called into the pharmacy of your choice.

Your Privacy Is Our Priority
Rest easy. We keep your information and health records safe and secure.

Because You Want Care Fast
With VirtualHealthConnect, you're finished with your visit before you'd normally get to the waiting room.

Talk to a Provider

Tucson, AZ

Northern Arizona Healthcare

How to give | Find a provider | Contact us

Care & Services | Your Visit | Join Our Team | Education | Who We Are | News & Events

Looking for NAH physicians, locations etc... Type here. | Search

When you don't want to wait to feel better

BeWellNow, Northern Arizona Healthcare and PathfinderHealth's virtual urgent care service, is a faster, easier way to see a doctor. BeWellNow lets you talk with a doctor from the comfort of your own home or on-the-go. It's easy to use, free to enroll and the cost is just $49 per visit.

BeWellNow offers:

- Unlimited video visits with doctors from the comfort of your smartphone, tablet or computer
- Peace of mind with a doctor "on call" 24/7 to provide quality care to you and your family
- Prescriptions, referrals, and more

You can use BeWellNow any time, day or night. It's perfect when your doctor's office is closed; when you're too sick or busy to see someone in person; or even when you're traveling.

Sign up now:

1. Download the BeWellNow app or sign up on the website:

Download on the App Store

GET IT ON Google Play

www.NAHBeWellNow.com

Flagstaff, AZ

Direct-to-Consumer Telehealth

United HealthCare Virtual Visits

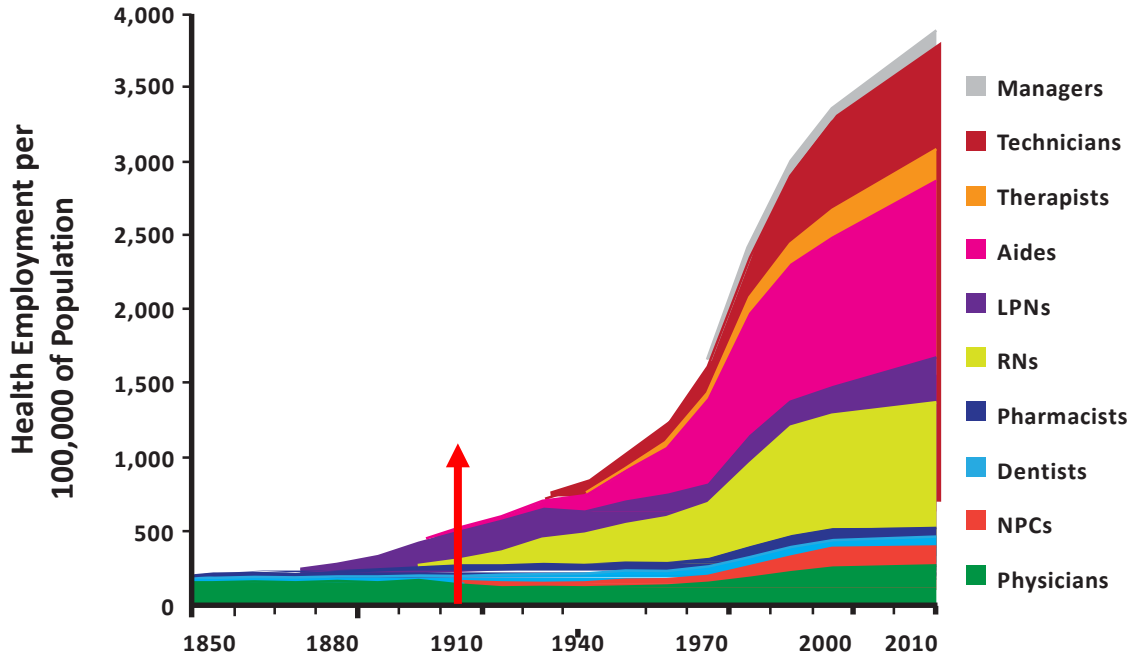
https://www.youtube.com/watch?v=gnVmHZRSOnQ

Direct-to-Consumer Telemedicine

American Well

https://www.youtube.com/watch?v=sBryMAxi5tE

Physicians, Non-physician Clinicians,



Adapted from Kendix and Getzen, and the Bureau of Labor Statistics

Mayo Clinic - Telestroke

Yuma NICU Tele-echo-cardiology

Banner eICU program

Diabetes retinal screen

Flagstaff Navajo/
CHF Program

Administrative VC

Telecardiology

Tele-infectious
disease - AIDS

Breast Cancer
“Virtual” Survivor Groups

ARIZONA TELEMEDICINE PROGRAM

SOUTHWEST TELEHEALTH RESOURCE CENTER TRC

Show Low, Arizona
November 8, 2019

ARIZONA TELEMEDICINE PROGRAM

SOUTHWEST TELEHEALTH RESOURCE CENTER TRC

Fredda Kremes, Director Clinical Projects and Carolyn Jacobs, Chief Nursing Officer

ARIZONA TELEMEDICINE PROGRAM

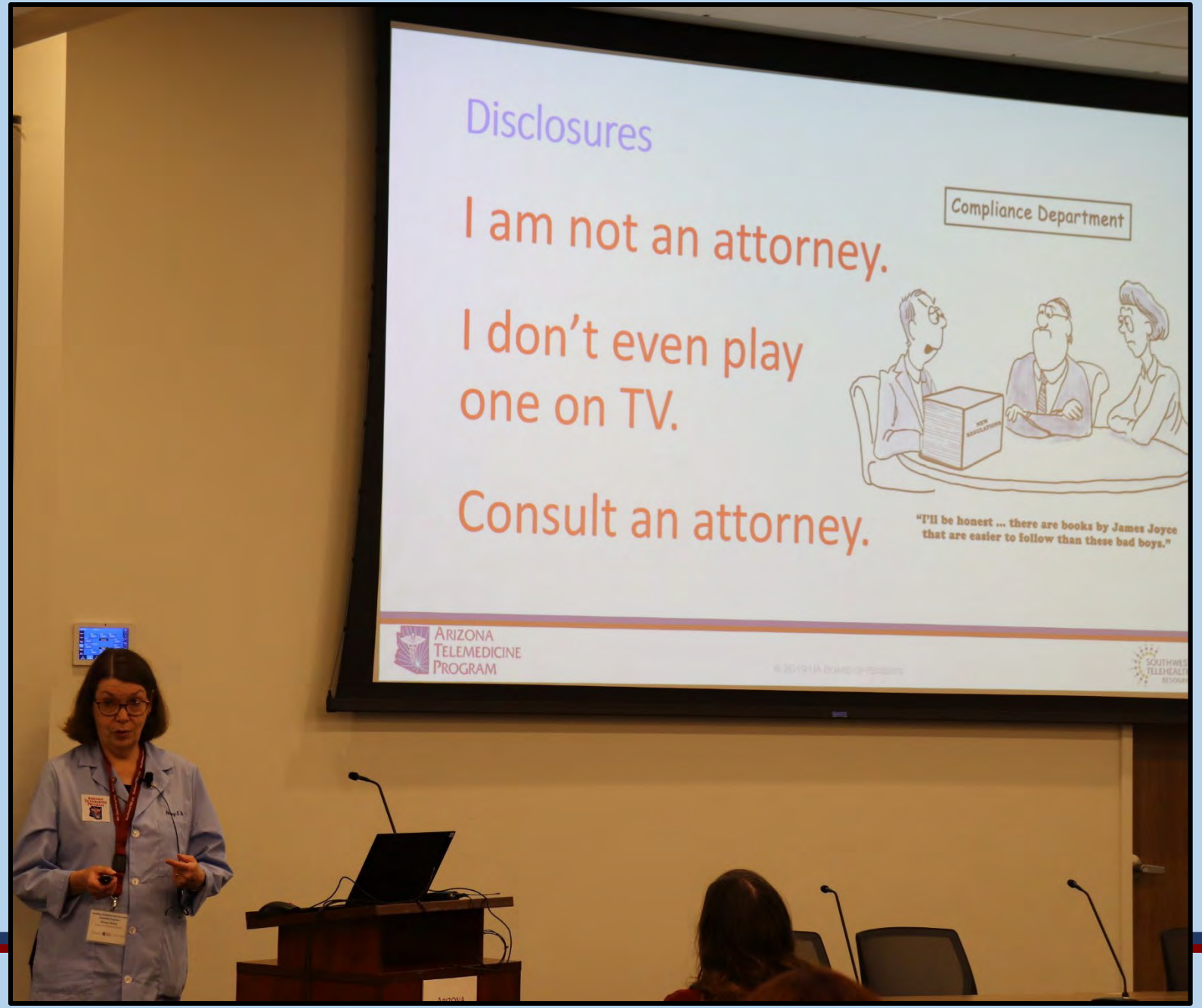
SOUTHWEST TELEHEALTH RESOURCE CENTER TRC

Local Telemedicine Experts in Pain Management & TeleDialysis

Dax Trujillo, MD, Outpatient Pain Services Department Chair

Matthew Gembala, MD, MPH(video)
Arizona Kidney Disease & Hypertension Center

ARIZONA TELEMEDICINE PROGRAM



Paige Gray, CPCS
"Telehealth Credentialing Challenges

Reimbursement Roundtable

Elizabeth Krupinksi, PhD, (moderator), Kristi Iannuccci, L'Don Sawyer, TMC Healthcare and Carol Yarbrough, Consultant

Facility Tour with Kristi Iannucci, Network Director, IT Supervisor

ARIZONA TELEMEDICINE PROGRAM

SOUTHWEST TRC TELEHEALTH RESOURCE · CENTER™

Congratulations to Fredda Kermes
Director of Clinical Projects, Telemedicine and Professional Development

Show Low, AZ, November 8, 2019

Thank you!

Questions?

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rweinstein@telemedicine.arizona.edu