

ARIZONA *Telemedicine*



To contact us call
1-877-535-6166

 ARIZONA HEALTH
SCIENCES CENTER

 ARIZONA
TELEMEDICINE
PROGRAM

“Telemedicine saves hundreds of thousands of dollars in travel expenses for doctors, nurses and patients each year.”

Robert Kerr
Budget Analyst, Principal
Arizona Telemedicine Program

Advances in Telemedicine, Telehealth, mHealth and Connected Health

Testimonial Issue
2014

ARIZONA TELEMEDICINE PROGRAM



A publication of the Arizona Telemedicine Program



ARIZONA *Telemedicine*

Report

Table of Contents

A Great 20 Years.....	2
UAHN Telemedicine ‘Indispensable’ in Yuma’s Newborn ICU	4
For the Border City of Nogales, Arizona, Telemedicine Is ‘a Win-Win’	6
Tele-Infectious Diseases in Northern Arizona.....	8
<i>Vida!</i> : Providing Health and Wellness Information to Cancer Survivors and Health Care Professionals	10
Distance Learning: ‘A Real Plus’ for Rural Physicians.....	12
Institute for Advanced Telemedicine and Telehealth (T-Health Institute – Phoenix)	14
Bridging the Distance Between Patients and Mental Health Care.....	16
Revolutionized Burn Care	18
Care Beyond Walls and Wires	20
Saving the Sight of Native Americans	22
Telestroke: The Jack Porter Story	24
Mayo Clinic Telestroke Program	26
Banner Health Tele-eICU Program Improves Patient Care and Lower Costs ...	28
Telemedicine Sites	30



ARIZONA *Telemedicine*

TeleHealth.....mHealth.....Connected Health

It's been a great 20 years.



It was back in 1993 that Bob Burns – then a State Representative, now a Commissioner with the Arizona Corporation Commission - presented his immodest proposal to Jim Dalen, MD, Vice President for Health Sciences and Dean of the College of Medicine at the University of Arizona.

Burns' idea was to create a pilot telemedicine program, to try to expand health care options for people in rural Arizona. Dalen's response was an emphatic "Yes!" Ronald S. Weinstein, MD, was then head of the Department of Pathology, and already working in telepathology, a branch of telemedicine. When Dalen asked Weinstein if he would head up the project, the response was equally affirmative.

The Arizona Legislature provided the funds to start the Arizona Telemedicine Program (ATP) three years later, and has funded it every year since.

ATP went live in 1996 from its home base at the University of Arizona, via telecommunications links with the Mariposa Community Health Center in Nogales, Arizona, and the state Department of Corrections prison in Yuma.

Since then, the program has grown exponentially and stimulated the growth of many affiliated programs in Arizona. ATP's broadband network now connects to 160 sites in more than 70 Arizona communities. Number of cases handled: more than 1 million.

Now a patient in a remote community can benefit from immediate access to highly trained specialists who can diagnose the patient's cardiac or skin condition or stroke as rapidly – and as accurately – as if the patient and specialist were in the same room.

This report will give you a look at some of Arizona's outstanding telemedicine programs. For example:

- A tele-echocardiography system in Yuma Regional Medical Center's neonatal ICU, enabling rapid diagnosis of critical cardiac conditions in newborns. (Page 4)
- A nationally recognized distance-learning program for physicians, nurses and other health professionals. (Page 12)
- Flagstaff Medical Center's long-distance monitoring program for patients with congestive heart failure – including patients without electricity in their homes (Page 20).
- A teleophthalmology program for Native Americans that provides early detection and treatment for diabetic retinopathy, reducing medical costs for people who lose their sight (Page 22).
- The telestroke program started by the Mayo Clinic – Scottsdale and the Arizona Department of Health Services, which has equalized stroke care at small rural and larger urban hospitals (Page 26).
- The Banner Health electronic Intensive Care Unit, which links a two-way audio/

video monitoring system in every ICU patient room to a remote team of nurses and doctors who back up the ICU staff. (Page 28).

So many new ideas have been put into practice over the last 20 years, it amazes all of us who have been with the program since the early days.

The results have been all that we – and the Legislature – hoped for.

Governor Jan Brewer summed it up nicely on May 23, 2013, when she signed Senate Bill 1353, the Telemedicine Reimbursement Parity Act, which requires health insurers to cover many telemedicine services on par with clinic visits. The Arizona House and Senate passed the bill without a single "nay" vote. (Page 15)

"Telemedicine saves money," Governor Brewer said, "and it saves lives."

To that we can only add: It's been a great 20 years.

Robert "Bob" Burns
Co-founder, Arizona Telemedicine Program
Chair, Arizona Telemedicine Council

Ronald S. Weinstein, MD
Co-founder and Director

Arizona Telemedicine Program Staff



Gail Barker, PhD, MBA, Co-Director, Maricopa County; Kristine Erps, Associate Director, Administration; Mike Holcomb, Associate Director, Information Technology; Angette Holtrust, Administrative Associate; Bellal Joseph, MD, Associate Director, Telesurgery; Robert Kerr, Budget Analyst, Principal; Elizabeth Krupinski, PhD, Associate Director, Evaluation; Ana María López, MD, MPH, FACP, Medical Director; Janet Major, Associate Director, Facilities; Chris Martin, Assistant Director, T-Health Institute; Nancy Rowe, Associate Director, Outreach; Bonnie Schellenberg, Accounting Manager; Suzanne Sisley, MD, Associate Director, AZ COM-Phoenix; Tracy Skinner, Senior Event Coordinator; Mike Sotelo, Director, T-Health Institute; Phyllis Webster, Telemedicine Coordinator; Bruce Wildermuth, Network Administrator; Pete S. Yonsetto, Video Conferencing Administrator.

Telemedicine ‘Indispensable’ in Yuma’s Newborn ICU

Yuma Regional Medical Center has one of the top-ranked neonatal ICUs in Arizona. One reason is the Arizona Telemedicine Program, which helps the hospital fulfill its promise of “care close to home.”

Neonatologist Greg Warda, MD, arrived at Yuma Regional Medical Center 15 years ago as the hospital’s only neonatologist and medical director of its neonatal intensive care unit (ICU).

Back then, Dr. Warda’s most urgent challenge was determining when a sick baby could remain in the Yuma hospital or needed to be transported to a larger hospital where multiple specialists could oversee the baby’s care.

If a baby showed signs of congenital heart disease, for example, diagnosing the problem could take hours, even days. An echocardiogram would have to be done, but the hospital lacked technicians trained to do an “echo” on a newborn. That sometimes meant the study had to be repeated. In any case, the echocardiogram – either on paper or DVD – would have to be shipped to Tucson or Phoenix or San Diego to be read by a pediatric cardiologist.

It could take a week or 10 days to get a final diagnosis.

For the parents of the newborn, it was an agonizing process, often compounded by the need to transport their baby to a larger hospital 200 or more miles away. Families often were split apart. The father likely had to stay in Yuma to work. If the mother had a C-section, she might have to stay behind as well. And even if she could go, there was the problem of lodging, and being able to afford it.

“There were just all kinds of issues, for us and for the parents,” Dr. Warda recalls. “Fortunately, a lot of that has changed.”

The change came in 2006, – when Yuma Regional Medical Center signed a new contract with the Arizona Telemedicine Program.

That linked Dr. Warda and his team at Yuma Regional – which, since 2009, includes Nedal Machhor MD, the hospital’s second full-time neonatologist – to the pediatric cardiologists and other specialists at The University of Arizona Medical Center in Tucson.

Instead of having to ship a DVD, the echocardiogram can now be transmitted over the broadband telemedicine network. In most cases, Dr. Warda gets a definitive diagnosis almost immediately, or within the same day.

“We’ve had a number of cases where we would hear a (heart) murmur on a baby who was otherwise fine, only to find out that the baby had to be transported immediately,” Dr. Warda says. “And if we hadn’t been able to do that echo via telemedicine, we would have let the baby go home, and the baby would have come back to us in heart failure or, worse, the baby could have died.

“Telemedicine has saved so many babies.”

Dr. Daniela Lax heads the University of Arizona Health Network’s tele-echo program, which includes her and four other pediatric cardiologists. Another huge benefit of telemedicine, Dr. Lax says, is that the pediatric cardiologist is often available to view the echocardiogram while the technician is doing the study.

“That allows us to coach the technician, to tell them if we need a closer look, for example, and the result is that they are now very well trained to do excellent studies,” Dr. Lax says.

Each week, Dr. Lax’s group consults on four or five Yuma pediatric echocardiograms, she says. The doctors also spend a day and a half each month in Yuma, following up on babies and

children who were born with heart disease or defects.

While most of the cases referred to Dr. Lax and her colleagues involve newborns, the doctors see patients as old as 18, or older if the patient was born with congenital heart disease.

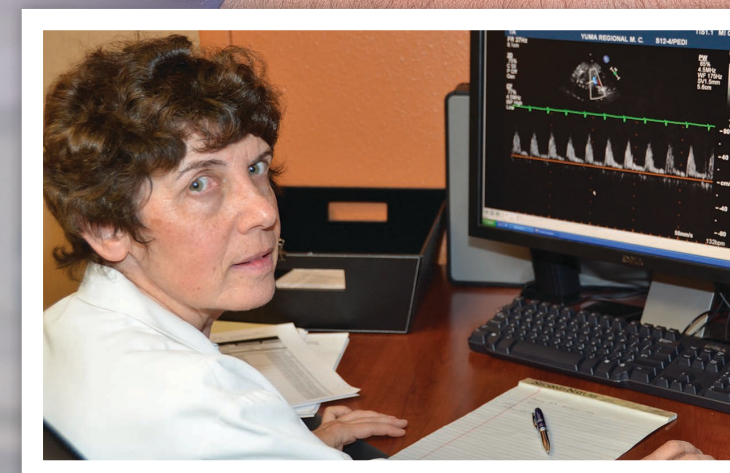
This collaborative effort resulted in the publication of a seminal article authored by Dr. Lax, Dr. Warda and colleagues. Published in 2012 in *Telemedicine and e-Health*, the leading telemedicine journal, it confirmed that neonatal echocardiograms viewed and interpreted via telemedicine are as accurate as echocardiograms recorded and shipped to the interpreting physician in another city. And both are “indispensable in the remote diagnosis of congenital heart disease.”

Dr. Warda expects telemedicine will continue to play a vital role in his newborn ICU, especially as the technology continues to evolve.

“I can’t say enough about the university cardiologists over in Tucson,” Dr. Warda adds. “They’ve all been wonderful. They’ve all made themselves as available to us as they can be. They have never hesitated to help us out.

“It’s also really nice just to be able to talk to them while the study is going on,” says Dr. Warda. “It builds up a camaraderie and a comfort zone when you can put a face to the name.

“The greater benefit is to the families,” Dr. Warda says. “They can be right there with their baby and get a diagnosis from the cardiologist in Tucson almost right away. And I can tell you, when you have a baby who’s sick, that means so much, instead of having to wait until tomorrow or the next day, or even longer to get an answer.”



Daniela Lax, MD
Pediatric Cardiologist
University of Arizona Health Network, Tucson, AZ

Gregory R. Warda, MD
Neonatologist
Yuma Regional Medical Center

For the Border City of Nogales, Arizona, Telemedicine Is a 'Win-Win'



Mariposa Community Health Center CEO Jim Welden, left, and Medical Director Eladio Pereira, MD

Mariposa Community Health Center got its start in 1980 as a small clinic in Nogales, Arizona. It has grown over the years to be the largest provider of medical, dental and community-based health promotion and disease prevention services on the Arizona-Mexico border.

And in 1997, the clinic expanded its reach by becoming the first clinical site to link to the Arizona Telemedicine Program.

The decision was not a no-brainer. For many Nogales families, going to see a doctor in Tucson, 60 miles away, was a fun family outing, with lunch and shopping on the side. But for many others, the transportation logistics were next to impossible. For them, telemedicine would be a godsend.

But there were questions about how well it would work.

"There were questions about security. How secure was the technology?" recalls Mariposa CEO Jim Welden, who has been with the clinic since 1980. "We explored that, and we also wondered how patients would experience this technology. Would they feel this was less than an in-person visit? It also meant having to coordinate the UA specialists' schedules with our primary care physicians' schedules."

Eladio Pereira, MD, an internist and Mariposa's medical director, remembers that doctors wondered if they could achieve comparable results with telemedicine. "The question was, do we need to be able to examine and touch the patient to make the right decision? At the same time, there was a lot of comment that this will help us move forward."

The final decision was pivotal. "It was really the first time that we had access for some of our patients to see specialists in Tucson," Mr. Welden says. "It was the first time we could meet the needs of some of our patients who couldn't get to Tucson."

A top priority has been connecting patients with University of Arizona rheumatologists, in part because of the longstanding shortage of rheumatologists in Arizona. More recently, Tucson community rheumatologists have joined the network.

"Rheumatology is a very challenging field," Dr. Pereira says, because many of the new drugs – called biological response modifiers – are

highly specialized, and carry significant risk, such as making patients more susceptible to infection. "Only an expert should prescribe them," Dr. Pereira says.

"Working with the UA and Tucson community doctors has been really, really helpful to us. We've been able to get our patients seen quickly. And that is so important, because we now know that the earlier you treat rheumatoid arthritis, the lower the risk of deformities.

"The relationship between primary care physician and specialist is significantly enhanced by the fact that they can see the patient at the same time," Dr. Pereira says.

"Also, we, the primary care physicians, have our limitations, and I think it's really healthy to bring that up in front of the patient," he says. "The patient realizes you are not an expert in everything, but you're seeking help for that patient's benefit."

Mr. Welden and Dr. Pereira will never forget one consult that had a surprise ending.

Ziad Shehab, MD, is a University of Arizona pediatric infectious-disease expert who has been caring for children with HIV and AIDS for 30 years. About 15 years ago, he consulted

with a Mariposa physician who was caring for a 5-year-old girl who was born with HIV. She and her family were living in Nogales, and traveling to Tucson to see a specialist was difficult.

At the end of his videoconference visit with the girl and her pediatrician, Dr. Shehab said to her, "I'm so sorry I can't give you a hug."

In response, the child walked over to the telemedicine monitor, with Dr. Shehab on its screen, and gave it a big hug.

The girl is now an adult – a tribute to the advances in HIV care, and to the importance of being able to be seen by a specialist, once the transportation barrier is removed.

Dr. Pereira and Mr. Welden agree that telemedicine is moving toward greater mobility, with smart phones, Skype and tablets having a larger role.

"We are moving toward doing consults with the patient at home," Mr. Welden says. "We have patient navigators who are out visiting patients in their homes, which is a big plus for someone who is elderly or chronically ill.

"But regardless of how the technology changes in the future, historically telemedicine has meant a lot to our providers and to the patients. It was absolutely a win-win."



Mariposa Community Health Center, Nogales, Arizona

TELE-INFECTIOUS DISEASE:

‘I Couldn’t Do This Without Telemedicine’

Steve McCrosky is a family nurse practitioner with 200 patients scattered across more than 60,000 square miles in northern Arizona. With his employer, North Country HealthCare, he created a program for patients with HIV and AIDS. Because North Country is on the Arizona Telemedicine Program telecommunications network, Mr. McCrosky can see patients via telemedicine or face to face, as often as they need to see him.

Steve McCrosky was 16 when the Centers for Disease Control and Prevention issued its first report of men dying from diseases that very few people had ever heard of. He graduated from high school in 1983, when the collection of illnesses had been named for human immunodeficiency virus, or HIV – the cause of acquired immune deficiency syndrome, also known as AIDS.

Mr. McCrosky was captivated by the medical and social implications of the growing epidemic. After high school, he enrolled at Northeastern University in Boston, where he received his nursing degree. In 1994, he headed west to San Francisco, where he witnessed the AIDS epidemic up close. He realized then that he wanted to be on the front lines of this unprecedented pandemic. In 2001, at the University of California, San Francisco, he completed training to be a family nurse practitioner.

A few years ago, Mr. McCrosky was living in Flagstaff and practicing family medicine in Winslow, Arizona, which borders on the Hopi and Navajo reservations. He asked his employer, North Country HealthCare – a Federally Qualified Health Center with clinics in Flagstaff and 13 other communities – if he could develop a program specifically for patients with HIV and AIDS. He wanted to divide his practice between telemedicine and in-person patient visits. North Country readily agreed.

His practice is now devoted to about 200 patients with HIV and AIDS. About half his time is spent seeing patients either in

North Country’s Flagstaff clinic or through its telemedicine connections. The other half of his time, he’s traveling to one or more of the North Country clinics located within the 60,000 square miles that make up northern Arizona – to places like Bullhead City on the western edge of Arizona and Show Low, 100 miles this side of New Mexico.

“Yes, telemedicine did feel weird at first. But it works. You get used to it. I think it’s the wave of the future.”
Patient

Every Wednesday, he drives south to Prescott, where he is medical director for Northland Cares, a non-profit HIV-AIDS support organization.

“I couldn’t do this without telemedicine,” Mr. McCrosky says.

Nor could his patients. Christopher Estudillo, a member of the Laguna tribe of western New Mexico, lives in Winslow. He walks six blocks from his house to the Winslow clinic, where he can have a virtual visit with Mr. McCrosky, or a face-to-face visit on the two days a year Mr. McCrosky visits the clinic. Mr. Estudillo’s other option is driving 60 miles to Flagstaff.

Another of Mr. McCrosky’s patients, who wants to be anonymous, was infected with HIV from a transfusion almost 30 years ago.

“Yes, it (telemedicine) did feel weird at first, like talking to a TV,” she says. “But it works. You get used to it. And it’s good for Steve to not have to drive all the way over here. I think telemedicine will become even more popular than it is now. I think it’s the wave of the future.”

She sees Mr. McCrosky every three months, more often if needed, either by telemedicine or in person at the North Country clinic in her hometown. She says two things keep her going: her strong faith, and Steve McCrosky.

“Steve is very upbeat,” she says. “He always has good things to say to me. He brings out the good in me.”



KEY
★ North Country Health Care Facilities

Steve McCrosky, FNP, with patient

CANCER SUPPORT GROUPS TELE-EDUCATION:

¡VIDA!™

Providing Health and Wellness Information to Cancer Survivors and Health Care Professionals

Survival is just one goal for cancer patients. These monthly multi-site video gatherings offer patients information in Spanish and English to help them live healthier, more fulfilling lives.

Kathie McHugh is a breast cancer survivor, grateful and proud to be seven years out from the day she was diagnosed.

She also likes to describe herself as “a very thirsty information seeker,” who feels her health and well-being have been greatly enhanced by monthly meetings of an educational program called *¡Vida!*.

¡Vida! – the name comes from the Spanish word for life – began with grant support from the Susan G. Komen Foundation in 2008.

“*¡Vida!* grew out of our work with breast cancer survivors who told us that they wanted information to help them not just survive, but to be healthy and live well,” says Ana Maria Lopez, MD, MPH, who is *¡Vida!* director, medical director of the Arizona Telemedicine Program, and a University of Arizona Cancer Center oncologist who specializes in breast cancer.

“As patients, they need and want to be well prepared to take charge of their health.”

Left to Right: *¡Vida!* volunteer Isela Macias, volunteer Kathie McHugh, *¡Vida!* program coordinator Bettina Hofacre, volunteer Virginia Aragon

Guided by a broad-based community advisory group, *¡Vida!* has been proactively addressing the information needs of patients and their families across the state of Arizona.

While *¡Vida!* originally began with a focus on breast cancer survivorship, the series has evolved to include topics related to lifestyle medicine, wellness, and advocacy, with the overarching goal of engaging Arizona’s citizens in their own health. Recent *¡Vida!* sessions have covered such varied topics as young women and cancer, medicinal plants of the Sonoran Desert, the Affordable Care Act and Medicaid expansion, and breathing techniques that lead to relaxation.

“As patients and their families have repeatedly informed us, the cure to the stress and anxiety that their illness brings is knowledge and information,” Dr. Lopez says.

The program offers monthly sessions developed for both patients and health-care professionals. The sessions are offered

to a local audience at the University of Arizona Health Sciences Center campus and University of Arizona Cancer Center in Tucson.

Each program is first offered to physicians and other health-care professionals, so they can be prepared to respond to questions from patients who attend the *¡Vida!* sessions. The sessions for professionals also offer continuing medical education credit.

All of the Arizona Telemedicine Program’s 160 statewide sites are able to connect to *¡Vida!* via the program’s telecommunications technology, which allows for fully interactive videoconferencing, or through UA Biomedical Communications, which facilitates real-time and delayed video-streaming.

All sessions are permanently stored, so patients and professionals can watch as many times as they want, at their convenience.

Both patients and health care professionals

say they appreciate the ease of learning through *¡Vida!*, as well as being able to interact by videoconferencing with the presenter. Patients say they feel better prepared to ask questions and learn more, and professionals say they feel better prepared to address patient concerns.

Acknowledging the diversity of Arizona communities, the patient series is offered twice on the same day: one session in English and one in Spanish.

“Over time, the groups began to connect, either lingering after one session or coming in early for the other,” Dr. Lopez says. “The groups could not always communicate effectively through language, but the participants found music to be the language that could bridge them. They began to play music in between the sessions and move and dance, in Tucson, in Nogales, in Payson, and in all participating sites across Arizona.

“I think of music as the universal language,” Dr. Lopez says. “Our participants now come together monthly to learn together and to celebrate health through movement!”

Ms. McHugh, who lives in Tucson, started attending *¡Vida!* meetings regularly in 2013, on the recommendation of a social worker who leads a support group that she attends. In addition to being a breast cancer survivor, she underwent surgery in May 2013 for what turned out to be a benign ovarian tumor – still, a frightening experience.

Last year, Ms. McHugh was asked to serve on the *¡Vida!* planning committee. “I was delighted to have a chance to ‘pay it forward’ to all the people who have saved my life,” she says. Ms. McHugh leads the dance breaks.

Ms. McHugh has gained more than information from *¡Vida!*. She and Isela Macias, another participant, were volunteering together on *¡Vida!* when they learned they are practically neighbors. Now they are close friends. “It is amazing,” Ms. McHugh says, “that the blessings that come from *¡Vida!* are so rich.”

DISTANCE LEARNING:

‘A Real Plus’ for Rural Physicians

The Arizona Telemedicine Program began offering distance learning in 1998, and continuing education credits in 2000. Rural physicians place high value on the courses, taught by researchers and clinicians.

The Arizona Telemedicine Program (ATP) is widely known as one of the top telemedicine programs in the country, improving health care in rural communities, saving lives, and lowering costs.

At the national level, the ATP is known as a leader in distance learning and continuing medical education programs developed to meet the needs of patients, physicians and other health professionals.

Starting in 1998 with offerings at eight charter sites, the programs are now available at 160 sites in 70 communities across Arizona, through videoconferencing and live and delayed web streaming.

Educational events are attended by physicians, nurses, dentists, therapists, emergency medical services personnel, and other health professionals.

Continuing medical education (CME) credits are awarded through the Office of Continuing Medical Education at the University of Arizona (UA) College of Medicine. Nursing continuing education credits are awarded through the University of Arizona Medical Center – University Campus or the UA College of Nursing.

With 30 percent of participants receiving continuing education credits, more than 13,000 credit hours have been awarded since 2000.

Sara Gibson, MD, a psychiatrist based in Flagstaff, and Dexter DeWitt, MD, a general practitioner in Payson, are two physicians who seldom miss an ATP distance-learning or CME opportunity.

“You don’t have to go anywhere. You can learn through your computer,” says Dr. Gibson, who is associate medical director of Northern Arizona Regional Behavioral Health Authority, which administers state funding for behavioral health care in Coconino, Apache, Navajo, Yavapai and

Mohave Counties. “Our telemedicine staff move me out of my clinical sessions and connect me to the CME.”

Dr. Gibson has been practicing psychiatry since 1988 and telepsychiatry since 1996. She cites a recent grand-rounds presentation by Charles Raison, MD, University of Arizona associate professor of psychiatry, whose research focuses on mind-body medicine and depression.

“We love to say that depression is caused by changes in our brain chemistry like serotonin and norepinephrine,” Dr. Gibson says. “What Dr. Raison was talking about is how inflammation may be a factor in causing depression. Things like not drinking, getting more exercise, fish oil capsules, and so on seem to calm down the body’s inflammatory response. Dr. Raison also presented a fascinating new concept: that hyperthermia seems to trigger the body’s anti-inflammatory response and so it seems to help with depression.”

“Listening to his talk has changed my thinking. That’s the kind of really exciting information that’s coming out of the UA. It’s wonderful to just be a student and learn.”

Dr. DeWitt started in pediatrics in 1973, was with the Air Force from 1978 to 1995, then returned to private practice and has lived in Payson since 1996 – the same year, he points out, that ATP began. In 2004, he switched from pediatrics to general practice. “I’ve been increasingly interested in adult medicine as I get older,” he says with a laugh.

“When (ATP) began offering distance learning, I took part in that right away,” Dr. DeWitt says. He used to drive to Phoenix Children’s Hospital to hear CME lectures, but now Payson Regional Medical Center is part of the ATP network.

“I’ve learned a lot about mind-body medicine, the latest therapies, different surgeries,” Dr. DeWitt says.

“There was an excellent lecture recently by a researcher in genetics. One of the things he talked about, that struck me as amazing, is that the mind can have an effect on cancer metastasis, through the immune response. It doesn’t metastasize as fast as it would, if you are thinking positively.”

“I’ve gained a lot of knowledge through these lectures. I think it’s a real plus for physicians like me, who live in rural areas but are always interested in receiving new information.”

ATP surveys sites annually about their educational needs and interests. One result is ATP Grand Rounds, a nearly monthly educational series whose content is guided by and delivered by ATP sites. “Chart Rounds” give clinicians the opportunity to ask questions of experts, in a format that protects patient confidentiality. This approach helps improve the care of the patient and the community.

ATP also can link to updates from federal and state agencies such as the U.S. Centers for Disease Control and Prevention, the Arizona Department of Health Services, the American Heart Association, and others, connecting sites to the content via videoconferencing.

Examples of distance learning include self-care classes for patients with diabetes in rural communities; grand rounds providing continuing education for doctors, nurses, and other health professionals across the state; and the *¡Vida!* cancer survivorship classes, offered in English and Spanish (see story on page 10).

In 2013, Ronald S. Weinstein, MD, ATP’s co-founder and director, was inducted into the U.S. Distance Learning Association Hall of Fame. It’s one of numerous awards the ATP has received in recognition of its innovation in patient and health-care professional education.



“I think these lectures are a real plus for physicians like me, who live in rural areas but are always interested in receiving new information.”
Dexter DeWitt, MD

Dr. Weinstein lectures to students in T-Health Institute – Phoenix and AHSC – Tucson (video screen lower left)

T-HEALTH INSTITUTE™

The T-Health Institute was established by the University of Arizona, in 2003, as a Phoenix division of the Tucson-headquartered Arizona Telemedicine Program. Located on the Phoenix Biomedical Campus in downtown Phoenix, T-Health's mission is to offer telemedicine and telehealth training programs and to create "next-generation" innovations in education and health-care delivery, especially those that leverage advances in medical informatics, wireless telecommunications, telemedicine/telehealth, simulation, and robotics. Ronald S. Weinstein, MD, is the founding director of the Arizona Telemedicine Program and executive director of its T-Health Institute.

The T-Health Institute's international award-winning T-Health Amphitheater was designed by Dr. Weinstein and former executive director of Biomedical Communications Richard McNeely. It serves as a University of Arizona College of Medicine "e-Classroom of the Future." Experimental education programs, including an innovative medical science curriculum for K-12 students and Interprofessional Education and Practice (IPEP) exercises, are tested in the T-Health Amphitheater. Staff at the T-Health Institute also are engaged in translational research on the development of a next generation of clinical decision support systems. The focus of interest is the acute management of traumatic brain injury and sudden cardiac death. This is in support of the Arizona Emergency Medicine Research Center – Phoenix.

Arizona Corporation Commissioner Burns, Arizona Senator Gail Griffin, Dr. Weinstein, Stuart Flynn, MD, dean of the UA College of Medicine – Phoenix and Steven Goldschmid MD, dean of the UA College of Medicine – Tucson watch as Governor Jan Brewer signs the Telemedicine Reimbursement Parity Act into law in the T-Health Amphitheater on the campus of the University of Arizona College of Medicine – Phoenix. This bill requires telemedicine services in rural areas of Arizona to be covered by health insurance. Beginning in 2015, insurers must cover services provided through telemedicine service programs if the insurers pay for those same services when they are provided in a traditional clinic or hospital setting.

Governor's ceremonial signing of Senate Bill 1353 in the T-Health Amphitheater on the University of Arizona College of Medicine – Phoenix campus.



T-Health Institute – a Division of the Arizona Telemedicine Program



The University of Arizona College of Medicine – Phoenix auditorium building housing the T-Health Institute

TELEPSYCHIATRY:

Bridging the Distance between Patients and Mental Health Care

The entire state of Arizona is a federally designated “Mental Health Care Health Professional Shortage Area.” The Arizona Telemedicine Program has succeeded in bridging the distance between patients in rural areas and the psychiatrists and other professionals from whom they receive psychotherapy and other mental health care. And, as one psychiatrist explains, telemedicine is a valuable asset even when patient and provider are both based in Phoenix – the nation’s sixth-largest city.

Sara Gibson, MD, is a



pioneer. A psychiatrist with Northern Arizona Regional Behavioral Health Authority (NARBHA) in Flagstaff, Dr. Gibson became the

first in Arizona to practice psychiatry via telemedicine.

Dr. Gibson had just returned to work from maternity leave. “I was covering Apache County, on the New Mexico border, where there are only two towns, St. Johns and Springerville,” she recalls. “Travel is always an issue – and it was even more so after the birth of my son. My husband is a physician who’s on call a lot. And so NARBHA approached me and said, ‘This is totally new for us, would you be willing to pilot this?’”

While other psychiatrists have resisted the option of seeing patients via videoconference, “that was a barrier I didn’t have,” Dr. Gibson says. “I was enthusiastic and willing to make it work.

“It’s still about getting the care to the patients, and sometimes that means trying different things. And this way, I can see two patients in the time it takes to drive three hours round-trip. And it dramatically increases compliance with appointments if you can be seen in your own community.”

Since Dr. Gibson first saw patients via video in 1996, NARBHA’s telepsychiatry network has hosted more than 120,000 doctor-patient sessions throughout northern Arizona.

Dr. Gibson has found telepsychiatry to work well for children age 4 and older. “Kids are just really comfortable with technology in a way their parents may not be,” she says. “I have a little stuffed toy Eeyore that I use to get their attention. And they play with me. They hide under

the desk. I can follow them around the room with my camera and see all I need to see. I can zoom in, zoom out, and run around the room with them.”

Dr. Gibson also has found that adults who have been abused or traumatized are often more comfortable with telemedicine than with face-to-face sessions.

“I really believe that a telemedicine evaluation is equivalent to face-to-face,” Dr. Gibson says. “I don’t feel like I’m making compromises at all. I feel like I’m doing what’s best for the people I serve.”

“Telemedicine dramatically increases compliance with appointments if you can be seen in your own community.”

Sara Gibson, MD

Teri Dunn, LCSW, is a licensed clinical social worker based in Flagstaff. She has been working with behavioral health patients for 34 years – 12 of them with North Country HealthCare, a community health center through which she sees patients from across northern Arizona.



“I started working with telemedicine about three years ago, and in the beginning, I had some concerns,” Ms. Dunn says. “I’m not very good with technology, so I worried about feeling foolish and helpless. But I received really good training, and it’s very simple now.

“I also was not sure I could make a real connection with my patients without seeing them in person. I was afraid I would not be able to read their body language, that kind of stuff. But now, it feels like that’s not a problem either.”

Ms. Dunn sees patients four days a week – one day via telemedicine for patients who live a long distance from Flagstaff, and three days in her office, with patients who live in the Flagstaff area.

Two of her patients rejected the telemedicine option, she says. “Others just forget that they’re talking to a television screen. One patient even commented that the remote connection made it easier for her to talk about her alcohol problem, rather than being in the same room with me”.

Overall, Ms. Dunn says, telemedicine has made behavioral health sessions more convenient and more accessible for her patients in rural Arizona.

North Country HealthCare has clinics in 14 communities in northern Arizona, each with telemedicine links to the main clinic in Flagstaff.

“Just think, for example, what it’s like living in a remote place, without good transportation, and trying to get help for really severe anxiety, or any behavioral health problem,” Ms. Dunn says. “And you think about gas being the price that it is, what is the chance that someone on disability income or Social Security is going to come here from one of those remote communities?”

“Telemedicine is definitely working for these patients,” Ms. Dunn says. “More often than not, the patients feel like something good is happening here and it was worth doing this way”.

Sue Sisley, MD, has shown that telemedicine is a good option even for a physician based in the nation’s sixth-largest city.



After getting her medical degree from the University of Arizona College of Medicine in 1995, she completed a five-year residency in internal medicine and psychiatry at Good Samaritan Regional Medical Center in Phoenix.

She chose the dual specialties, she says, because “I saw early in my training how much mental health affects patients’ physical health.”

After her residency, she went into private practice with her mother, Hanna Sisley, MD, a family practitioner. The mother-daughter team shared an office in Maryvale.

The younger Dr. Sisley quickly discovered that, as much as she loved the practice of medicine, she grew weary of the time and paperwork required to work with Medicare, Medicaid, and all her patients’ private health plans.

So she set up a small office in her Scottsdale home, and outfitted it with telemedicine videoconferencing equipment, and dropped all insurance plans. Privately insured patients now pay out-of-pocket for appointments via telemedicine, usually during evening and weekend hours, since most of the patients work.

Her daytime practice is devoted to telemedicine sessions with patients of the state Department of Corrections, members of the San Carlos Apache Tribe in eastern Arizona, and others whose care is provided through Northern Arizona Regional Behavioral Health Authority.

“I have patients who live as far north as Page and Fredonia, and all the way south to Ajo,” Dr. Sisley says.

“Everything is done electronically,” she says. “I don’t even have paper in the office. It helps me to be really efficient. Since I don’t have to drive, I save two to three hours a day, and have time to see another six or more patients a day.

“That’s my favorite part of this. It gives me more time to be involved in community activities and volunteer work.”

Dr. Sisley also values the cross-cultural interaction she has with her Apache patients, who have taught her about traditional healing. “I never would have had the chance to work with such an array of patients,” she says, “without telemedicine.”



TELEBURN:

**In Flagstaff,
Telemedicine
Leads to
'Revolutionized'
Burn Care**

The terrorist attacks of September 11, 2001, inspired a nationwide effort to improve emergency care for burn patients. In Arizona, telemedicine turned that important concept into reality.

On the morning of September 11, 2001, the Arizona Burn Center in Phoenix was one of hundreds of hospitals scrambling to get ready for the thousands of people who would be pulled from the burning wreckage of the World Trade Center, in New York.

That was the hope. The reality, of course, is that almost none of the people who were at their desks or enjoying breakfast at "Windows on the World" restaurant ever had a chance of being saved.

But out of that awful day came the nation's realization that terrorist attacks and other tragedies were no longer confined to the rest of the world. They could happen right here, to us.

And from that came a call to action – from federal and state governments, the American Burn Association and others – to build a system that could handle thousands of burn patients whenever the need occurred.

In 2002, the Arizona Department of Health Services asked surgeon Daniel M. Caruso, MD, then director of the Arizona Burn Center at Maricopa Medical Center in downtown Phoenix, to come up with a plan to expand the state's capacity for burn patients. The Burn Center has 45 beds, three-fourths of which are usually in use.

The solution, Dr. Caruso and others recognized, was to connect his hospital to those in Tucson, Flagstaff, Yuma, and rural communities through the Arizona Telemedicine Program. The "spoke" hospitals were equipped with portable telemedicine units and, as a result, there are now 110 more burn beds statewide.

Dr. Caruso, now head of surgery at Maricopa Medical Center, explains how it works. "Let's say St. Mary's in Tucson gets 10 burn patients. The staff there can take 'Doc on a Stick' – a robotic device that transmits images of patients in outlying hospitals to the Burn Center – and I can do a one-on-one consult with the doctor at St. Mary's."

The benefits are profound. "We are located in the

middle of the state," Dr. Caruso says. "We've got a 1,500 – mile radius from where we can take patients – including California and New Mexico. Not all burn patients have to be transported to our center, but either way, we can see what's going on even before the helicopter arrives. We can help with supportive care, and get treatment started earlier."

Telemedicine helps determine which patients need to be transported to the Burn Center.

"A lot of patients still come to us who don't need to come here," Dr. Caruso says. "I can talk to the other doctor and in some cases we can determine that the patient can be treated locally, instead of bringing the patient to us by helicopter, which costs \$10,000 to \$20,000."

Dr. Caruso and the Burn Center's other surgeons have telemedicine on their home computers – desktop and laptop – so emergency physicians at outlying hospitals can count on 24/7 access to a burn specialist.

Flagstaff Medical Center consults with the Arizona Burn Center about once a month, on average.

"Having telemedicine available to us has just revolutionized things," says Kevin Conn, MD, one of the Flagstaff hospital's emergency physicians.

"In a couple of minutes the burn specialists at Arizona Burn Center can see our patient and recognize the severity of their injuries. Now the Burn Center surgeon can say, 'Yeah, that guy definitely needs to come down. Get him on a helicopter.' Or the surgeon can say, 'I need to see this patient in person, but if her pain is under control, she can wait to come down in a day or two.'"

For Dr. Conn, who has been with Flagstaff Medical Center for 12 years, "Burn telemedicine is a very welcome consultative service. Being able to turn on the screen and instantly have a burn surgeon looking at the patient delivers care in Flagstaff that you wouldn't have had before telemedicine."

"In some cases the patient can be treated locally, instead of bringing the patient to us by helicopter, which costs \$10,000 to \$20,000."
Daniel M. Caruso, MD,
Arizona Burn Center

Josh Knolhoff, MD, discusses a case with Daniel M. Caruso, MD, Arizona Burn Center at Maricopa Medical Center

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



More than 5 million people in the U.S. suffer from congestive 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 now get along for several months without having to be admitted to the hospital. His remarkable turnaround has resulted from an innovative program called Care Beyond Walls and Wires, a telemedicine-enabled home-monitoring program that has shown it can significantly improve the health of most patients living with congestive heart failure.

The program also is reducing emergency room visits and hospital admissions and readmissions, and decreasing the length of stay for those who still require hospital care.

“It’s phenomenal,” says Gigi Sorenson, a registered nurse and telehealth director for Flagstaff-based Northern Arizona Healthcare, which operates Care Beyond Walls and Wires in collaboration with Flagstaff Medical Center and Verde Valley Medical Center in Cottonwood.

Ms. Yazzie says Care Beyond Walls and Wires “is the best thing ever for me, and the best thing for my dad.” He has required only two hospital readmissions since enrolling in the program more than a year ago.

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 solar chargers.

“We have found that, number one, the tools and the technology are considered really cool. Grandkids love all the equipment, and help their grandparents understand it,” Ms. Sorenson says. “But it’s the relationships that we have been able to develop with these patients that matter most.

“Care Beyond Walls and Wires is the best thing ever for me, and the best thing for my dad.”

Rita Yazzie

“They know someone is watching out for them, and they will not even have to initiate a call if something needs attention. If a care coordinator sees a patient’s weight go up three pounds overnight, they will call the patient and ask, ‘How are you feeling today?’”

From Flagstaff Medical Center’s 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. The 16-month project got under way in December 2011.

“You could take part in the study if you lived in Flagstaff but had no family support,” Ms. Sorenson says. “Or you could live in Supai (at the bottom of the Grand Canyon) or on a mesa on the reservation. Our patients were Native American, Hispanic, and white, ranging in age from 31 to early 90s.”

Qualcomm funded the Care Beyond Walls and Wires pilot study. When it ended on April 1, 2013, Northern Arizona Healthcare took on the costs of continuing the program.

The monitoring kits cost around \$650, including the backpack, Ms. Sorenson says, and there are monthly cell phone charges.

“But it’s very much worth the investment,” she says. Not only are patients benefiting, but a new Medicare rule penalizes hospitals if patients with certain conditions, including congestive heart failure, are readmitted within 30 days of being discharged.

“And we have tremendous patient satisfaction. Patients 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.”

Saving the Sight of Native Americans



Diabetes Screening: Senior program manager viewing an eye retinal digital image

Diabetes is epidemic among Native Americans. But thousands now receive annual eye exams, reducing their risk of diabetes-related blindness, through the Indian Health Service's multi-state teleophthalmology program.

We know that diabetes is the leading cause of new blindness in working-age adults.

We know that it's more common among Native Americans than any other ethnic group.

We also know that only half of Native Americans get an annual eye exam, which is key to effective treatment of diabetic retinopathy, a disease that can eventually lead to blindness.

It's a public health crisis – and one that telemedicine has made great progress toward resolving.

"Telemedicine is pivotal for diabetic retinopathy," says Mark B. Horton, MD, director of the U.S. Indian Health Service's multi-state teleophthalmology program, a collaboration with the Joslin Diabetes Center in Boston.

Research has shown that 95 percent of the cases of blindness caused by diabetic retinopathy are preventable, if the disease is detected and treated promptly, Dr. Horton says.

Since 2000, teleophthalmology has made it possible for Dr. Horton to examine the eyes of more than 80,000 Native Americans with diabetes. His program started with 183 cases in 2000, and handled about 15,000 cases in 2013.

The teleophthalmology network connects Dr. Horton's Phoenix office to 86 Indian Health Service (IHS) clinics in Arizona and 23 other states.

For Native Americans and others who live in rural communities some distance from Tucson and Phoenix, getting to an eye

doctor is a logistical challenge, Dr. Horton says. In addition, "An eye exam is not at the top of their list of priorities, particularly since they are usually asymptomatic until the disease grows to advanced and less treatable stages.

"Now we can take the eye exam to patients wherever they may be," Dr. Horton says. He serves patients who live in Supai, at the bottom of the Grand Canyon, where exam equipment is delivered by helicopter, then flown back out again, and in the Eastern Aleutian Islands off the coast of Alaska.

According to the IHS Division of Diabetes Treatment and Prevention, teleophthalmology saves hundreds of millions of dollars a year in medical care and support services that would be required for people who go blind. For that reason, the IHS has made teleophthalmology mandatory at all its hospitals and larger health-care facilities.

"It's far cheaper to prevent and treat this disease than it is to treat the fallout of untreated disease," Dr. Horton explains.

"Telemedicine is pivotal for diabetic retinopathy."

Mark B. Horton, MD

"When a patient gets diagnosed with diabetic retinopathy, they tend to have other complications from diabetes as well.

"Teleophthalmology has the potential to have a profound effect on improving the quality of public health, and decreasing health care costs."



Mark B. Horton, MD

Not all health plans pay for teleophthalmology, Dr. Horton says, but AHCCCS, Arizona's Medicaid program for low-income individuals and families, was one of the first to get on board.

"AHCCCS recognized the value of this almost immediately," he says.

"But health care providers, and payers, tend to be very skeptical, and that's very frustrating for folks like me. But when you get right down to it, no human likes change. The only thing that likes changing is a wet baby."

Thanks to Telemedicine, Jack Porter is ‘One of the Lucky Ones’

Telemedicine connected Jack Porter in Bisbee to a stroke specialist at Mayo Clinic Hospital – Phoenix. For Porter, a life-threatening event turned into “a stroke of luck.”

Jack Porter isn't one to admit he had a stroke three years ago.

“I didn't have a stroke,” he will tell you. “I had a stroke of luck.”

Mr. Porter, who has lived in Bisbee since he was two weeks old, was unable to talk or move his left leg or left arm when he arrived at Copper Queen Community Hospital's

emergency room. Daniel Roe, MD, chief medical officer and director of emergency services and telemedicine at Copper Queen, ordered a CT scan that showed a clot forming on the right side

“It works. It saves people's lives.”

Jack Porter
Bisbee, Arizona

of Mr. Porter's brain.

But there was no neurologist at the hospital to advise what to do next. And that's what led to Mr. Porter's “stroke of luck.”

Dr. Roe was able to contact a stroke specialist at the Mayo Clinic Hospital in Phoenix, and transmit Mr. Porter's scan to the specialist via the Mayo Clinic telestroke network. A live audio-video telemedicine assessment swiftly followed. Based on what Dr. Roe told him about Mr. Porter's condition and what he saw on the clinical video examination and scan, the Mayo specialist recommended immediate treatment with an injectable “clot-busting” drug called TPA.

Within 15 minutes, Mr. Porter was able to get up off his ER bed and walk.

“It works. It saves people's lives,” Mr. Porter says of the Mayo Clinic telestroke network.

“Thanks to telemedicine, I was one of the lucky ones. I also have to thank our local emergency responders. They arrived within about a minute and a half of my call. The people at Copper Queen – without everybody working together, I wouldn't have been so lucky.”

In 2009, Copper Queen joined with hospitals in Douglas, Benson, Willcox, and Safford to form the Southern Arizona Telemedicine Alliance. With funding from UnitedHealthcare, telemedicine equipment was installed at each site, with the specific goal of improving stroke care for patients in those communities.

Dr. Roe describes Mr. Porter's experience as “a really dramatic rescue. Bisbee is a population of about 5,500, and we have a very nice set of internists and family practice physicians, but almost no specialists, and no neurologist.

“With telemedicine, we're able to bring specialists into the room with the patient,” Dr. Roe says. “It makes a dramatic difference in the options our patients have, and it really elevates the standard of care. We can make sure the level of care our patients get is equal to the care they would get in an urban location like Tucson or Phoenix.”

Mobile Health: Viewing a CT brain scan of a stroke patient on an iPad

TELESTROKE:

Mayo Clinic's Telestroke Program Equalizes Stroke Care throughout Arizona

Because of a chronic shortage of specialists in Arizona's rural communities, patients who suffered a stroke in Phoenix or Tucson used to be 10 times more likely to receive the best possible care, in a timely manner, than patients treated at rural hospitals. The Arizona Department of Health Services and Mayo Clinic – Phoenix, working with rural hospitals, have solved that problem.

In 2005, patients who were hospitalized with an ischemic stroke in Tucson or Phoenix were 10 times more likely to receive potentially disability-preventing or life-saving emergency medical care than patients treated at hospitals in rural Arizona.

Today, patients in rural Arizona have at least as good a chance of receiving the best possible treatment – a “clot-busting” drug called TPA (for Tissue Plasminogen Activator) – compared with some stroke patients in the state's two largest cities.

The change came about because of the Telestroke Program at the Mayo Clinic – Phoenix.

The two visionary physicians who developed the program are Bart M. Demaerschalk, MD, professor of neurology and director of the telestroke and teleneurology programs at Mayo Clinic, and Ben Bobrow, MD, professor of emergency medicine at the University of Arizona College of Medicine – Phoenix, and medical director of the Bureau of Emergency Medicine Services and Trauma System for the Arizona Department of Health Services (ADHS).

In 2005, with funding from ADHS, Drs. Demaerschalk and Bobrow surveyed 37 hospitals outside of Phoenix and Tucson, and learned that only one had round-the-clock neurology coverage. The rest had only spotty neurology coverage – or none at all.

They also visited established telestroke programs at the University of California, San Diego (UCSD), and the University of Utah, learning how they developed their services, including how they measured quality of care.

Their next step, in 2007, was to get Mayo involved in a UCSD study. Called the STRoKE DOC Trial, it compared telemedicine

consults to telephone consults for patients admitted to emergency rooms with symptoms of stroke. STRoKE DOC was funded by the National Institutes of Health, with ADHS covering the costs of Mayo's participation.

In 2009, encouraged by what they were seeing, Drs. Demaerschalk and Bobrow next obtained additional ADHS funding for their own research, a three-year study called STARR – Stroke Telemedicine for Arizona Rural Residents. This time, all patients were managed through telemedicine consults with Dr. Demaerschalk and other stroke experts at Mayo.

“We see telemedicine as an important opportunity to improve patient care.”

Bart M. Demaerschalk, MD

With Mayo Clinic – Phoenix as the stroke telemedicine “hub,” the STARR study expanded to include Bisbee's Copper Queen Community Hospital, followed by other rural hospitals in Cottonwood, Parker, Flagstaff, Tuba City, Show Low, Globe, Kingman, Casa Grande and Yuma, as well as Maricopa Medical Center in downtown Phoenix. The study wrapped up in 2012; final data are being analyzed and a summary manuscript is being written.

As STARR was nearing completion, Drs. Demaerschalk and Bobrow began working with their telestroke colleagues to reach their ultimate goal – to take Mayo's telestroke program from a research program to a non-profit, sustainable business.

“It took a year and 25 individuals to construct the 80-page business plan,” Dr. Demaerschalk says, “and not a single community partner was lost in that transition. I think that reflects the quality of the program, and the strength of the relationships that were built in the process.”

In its first two years, Mayo's telestroke program evaluated 50 stroke patients. That number has now grown to 1,500 or more annually. The quality metrics – including lives saved and numbers of stroke patients who avoid permanent disability – are now as good at the state's rural hospitals as they are in Tucson and Phoenix.

“We have also reduced the need for medical transport,” Dr. Demaerschalk says. “Before telestroke, 90 percent of rural patients experiencing stroke were transported by ground or air ambulance to Tucson or Phoenix. And now that transport rate has dropped to well below 30 percent.”

“That means patients and their families can enjoy the community support that otherwise might be fractured or lost or difficult to maintain, because of geography and time.”

Doctors, hospitals, and health care insurers also win, Dr. Demaerschalk says. Doctors, because they may be reluctant to tackle emergency stroke care without the support of a consulting neurologist. Hospitals, because they can retain their patients and not lose revenue. Insurers, because their overall rehabilitation and long-term care costs are reduced.

Dr. Demaerschalk considers telestroke “one of the poster children for telemedicine. It's better care, it's convenient, it's expert care where it otherwise wouldn't exist, and with better outcomes, and it costs less money. It's a rare gem.”

Bart M. Demaerschalk, MD
Director of the telestroke and teleneurology program, Mayo Clinic

eICU Shortens Hospital Stays, Improves Patients' Quality of Life

Banner Health eICU™ system has shortened patients' ICU stays while saving \$68 million in health care costs. 'We have the opportunity to change the way health care is delivered,' Banner says.



At Banner Health's iCare™ operations center, in Mesa, Arizona, Alice Sneed, RN, checks in with a nurse and patient at Banner Hospital

Every hospital intensive care unit has its moments of high drama, but this one was especially dramatic.

An ICU nurse at North Colorado Medical Center in Greeley, Colorado, checked in on one of her patients, who was on a ventilator and whose vital signs all looked fine. But the nurse had a feeling something was wrong. She contacted the Banner doctor who also was monitoring the patient from more than 800 miles away.

Banner's eICU™ operations center, known as iCare™, located in Mesa, Arizona, monitors Banner Health's ICU patients in 20 Banner hospitals across five states. Twenty-four hours a day, seven days a week, physicians and nurses in iCare monitor patients in 430 ICU beds – not replacing the nurses and physicians at the patients' bedsides, but backing them up.

Together, the bedside nurse at Colorado Medical Center and the eICU doctor began assessing the patient. Stat lab tests and X-rays were ordered.

Suddenly, the patient started to crash. The X-ray arrived, showing a tension pneumothorax – the lung was leaking air into the chest cavity, resulting in compression of vessels returning blood to the heart, which can be fatal if not treated immediately. A hands-on physician was needed, but there were two codes in the emergency department and three surgical cases in process. The only available physician was a family medicine resident, on his first day in the ICU.

The eICU doctor talked the resident through the steps of relieving the pressure by inserting a large needle into the chest. The patient immediately began to breathe easier and his oxygen saturation moved out of the danger zone. When the surgeon finished her OR case, she came down and inserted a chest tube.

"The patient's vital signs returned to normal and he was discharged two days later," says Deborah Dahl, Banner's vice president for patient care innovation. She oversees Banner's telemedicine operations.

"This is an example of why I love coming to work in the morning," Ms. Dahl says. "We not only have the opportunity to change the way health care is delivered, and at Banner Health, we are taking full advantage of that opportunity."

Beginning in February 2006, Banner was one of the early adopters of Philips eICU technology. Combining the eICU technology with Banner clinicians and standardized processes has made a difference in patients' lives.

"We have the opportunity to change the way health care is delivered."

Deborah Dahl,
Banner Vice President

Over the past two years, Banner's ICU mortality rates have been among the lowest in the country, Ms. Dahl says. In 2012, ICU actual length of stay was 20,000 fewer days than predicted based on patient acuity, and total hospital days were reduced by 49,000. Costs avoided totaled more than \$68 million.

Each of Banner's ICU rooms is equipped with a fixed, two-way audio-video system. The bedside monitor sends real-time, continuous vital signs to the Philips system, while the electronic medical record interface sends lab results, medication orders, and other pertinent information from the bedside to iCare.

In Banner's iCare control room, the team of physicians and RNs works 12-hour shifts. The eICU technology can recognize possible adverse trends and alert the iCare team member who is monitoring that patient. For example, if a patient's heart rate goes up from 70 to 74 to 78, that's within normal limits. "But the eICU system says 'Hmmm. The heart rate is drifting up, the blood pressure is drifting down, there may be something going on here,'" Ms. Dahl explains. The system does a rapid analysis

and alerts the nurse or physician that there may be a problem.

"We're looking for anything that might be a potential problem, so we can intervene before it becomes a major problem," says Mary Cartner, an iCare nurse.

She can use her camera to get a close-up view of a patient and make an assessment. She also can assist the bedside nurse with routine things like verifying the name on the wristband and making sure it matches the information on a blood bag. She can look in-depth at a single patient's information or scan information from a block of patients.

Bhavish Shah, MD, a critical-care specialist who spends one week a month in iCare – the rest of the time he's in his home state of New Hampshire – considers iCare state of the art.

"In the hospital, I can follow 10 patients a day," Dr. Shah says. "Here I can follow 400. In iCare, my role is to respond to requests for help from the bedside, look for adverse trends and intervene before those adverse trends become adverse outcomes and assure that every patient is receiving the evidence-based practices they need."

Banner Health has recently expanded its telemedicine capabilities to include non-critical inpatients at two of its hospitals, Banner Gateway Medical Center in Gilbert and Banner Ironwood Medical Center in Queen Creek. Banner also now provides in-home services for patients living in the northwest Phoenix area with multiple chronic conditions and a history of repeated hospitalizations.

"Five percent of the population accounts for more than 50 percent of the health-care costs in the U.S.," Ms. Dahl says. "No one has ever said, 'I wish I could spend more time as a hospital patient.' We're working to improve our patients' quality of life, while reducing hospital visits and lowering the cost of health care. Although it's early in the program, we're pleased with the results."

Telemedicine Sites ➔



Telemedicine Sites

- Argosy University
- Arizona Association of Community Health Centers
- Arizona Burn Center
- Arizona Department of Health Services: Children's Rehabilitative Services, UnitedHealthcare District Medical Group, Yuma Regional Outpatient Clinic
- Arizona State University College of Nursing
- Arizona State University College of Social Work: Phoenix, Tucson
- Arizona Telemedicine Program: T-Health Institute, Warren Street Clinic
- A.T. Still University
- Banner Health: Desert Medical Center, Estrella Medical Center, Good Samaritan Medical Center
- Benson Hospital
- Canyonlands Healthcare
- Carondelet Health Network: St. Joseph's Hospital - The Villa, St. Mary's Hospital
- Catholic Community Services of Southern Arizona: St. Elizabeth's Health Center
- Copper Queen Hospital
- Copper Queen Medical Associates: Bisbee, Douglas
- Corizon Health: Arizona State Prison Complexes: Douglas, Eyman, Florence, Lewis, Perryville, Safford, Tucson, Winslow, Yuma
- Desert Senita Community Health Center
- Dignity Health: St. Joseph's Hospital and Medical Center
- Gila Health Resources
- Intermountain Shriners Hospital
- John C Lincoln Hospital
- La Paz Regional Hospital
- Maricopa Medical Center
- Mariposa Community Health Center: Mariposa Nogales, Patagonia Family Center
- Mount Graham Regional Medical Center
- North Country Healthcare: Ash Fork, Bullhead City, Flagstaff, Grand Canyon, Holbrook, Kingman, Lake Havasu City, Payson, Round Valley, Seligman, Show Low, St. Johns, Williams, Winslow
- Northern Arizona Healthcare: Flagstaff Medical Center, Verde Valley Medical Center
- Northern Arizona Regional Behavioral Health Authority,* Flagstaff: AZ Council of Human Services Providers, Phoenix; Arizona State Hospital; Child & Family Support Services - Flagstaff, Prescott Valley, Tempe, Tucson; Community Counseling Centers - Holbrook, Lakeside, Show Low, Snowflake, Winslow; Community Provider of Enrichment Services - Flagstaff, Casa Grande; Encompass Health Services - Page, Fredonia, Littlefield; Gila River RBHA - Sacaton; Hopi Guidance Center - Second Mesa; Hualapai Health Department - Peach Springs; Little Colorado Behavioral Health Centers - Springerville, St. Johns; Mohave Mental Health Clinic - Bullhead City, Kingman, Lake Havasu City; Navajo Nation RBHA - Window Rock; SequelCare of Arizona - Prescott, Tempe; Southwest Behavioral Health Services - Apache Junction, Bullhead City, Flagstaff, Kingman, Lake Havasu City, Payson, Phoenix, Prescott Valley; The Guidance Center - Flagstaff, Supai, Williams; Verde Valley Guidance Clinic - Cottonwood; West Yavapai Guidance Clinic - Prescott, Prescott Valley; White Mountain Apache RBHA - Whiteriver
- Northern Cochise Community Hospital
- Payson Regional Medical Center
- Phoenix Area Indian Health Service: Fort Yuma, Hopi Health Care Center, Parker Indian Hospital, Phoenix Area Office, Phoenix Indian Medical Center, San Carlos Service Unit, Southern Bands Health Center, Whiteriver Service Unit
- Phoenix Children's Hospital
- Pima Council on Aging
- Pima County: Adult Detention Center, Tuberculosis Clinic
- Regional Center for Border Health
- Sage Memorial Hospital
- Scottsdale Healthcare Osborn
- Southeast Arizona Medical Center
- Southern Arizona Veterans Administration Health Care System
- Sue Sisley, M.D.
- Sun Life Family Health Center
- Tele-Behavioral Medicine Associates: Payson
- Tohono O'odham Nursing Care Authority: Archie Hendricks, Sr. Skilled Nursing Facility
- Tuba City Regional Health Care Corporation: Cameron Chapter House, Grey Hills High School, Sacred Peaks Health Center, Tonalea Chapter House, Tuba City High School, Tuba City Regional Health Care
- Tucson Area Indian Health Service: San Xavier, Sells Hospital
- Tucson Medical Center
- University of Arizona Health Network: Alvernon Clinic, Medical Imaging, Psychiatry, South Campus, University Campus
- University of Arizona: Arizona Health Sciences Center; Center on Aging; AZ Colleges of Medicine - Phoenix and Tucson; AZ College of Nursing; AZ Colleges of Pharmacy - Phoenix and Tucson; Mel and Enid Zuckerman College of Public Health
- Urological Associates of Southern Arizona PC
- White Mountain Regional Medical Center
- Yuma Regional Medical Center

*Northern Arizona Regional Behavioral Health Authority (NARBHA) oversees behavioral health programs in Coconino, Navajo, Yavapai, Apache and Mohave counties. Funds for behavioral health services are provided through a contract with the Arizona Department of Health Services/Division of Behavioral Health Services and AHCCCS.

“Telemedicine saves lives, reduces health-care costs, improves access to medical services in both rural and urban settings, is helpful in managing chronic diseases, has important roles in disease prevention through patient education and wellness-monitoring programs, and has improved the quality of life for hundreds of thousands of people.”

Arizona Telemedicine Program

ARIZONA *Telemedicine*

COMMUNITIES



ARIZONA

- Arizona
- Ajo
- Ash Fork
- Benson
- Bisbee
- Buckeye
- Bullhead City
- Cameron
- Casa Grande
- Cottonwood
- Douglas
- Flagstaff
- Florence
- Fredonia
- Ganado
- Goodyear
- Grand Canyon
- Holbrook
- Kingman
- Lake Havasu City
- Littlefield
- Mesa
- Morenci
- Nogales
- Page
- Parker
- Patagonia
- Payson
- Peach Springs
- Phoenix
- Pinetop-Lakeside
- Polacca
- Prescott
- Prescott Valley
- Sacaton
- Safford
- San Carlos
- San Luis
- Scottsdale
- Second Mesa
- Seligman
- Sells
- Show Low
- Snowflake
- Somerton
- Springerville
- St. Johns
- Supai
- Tempe
- Tonalea
- Tuba City
- Tucson
- Whiteriver
- Willcox
- Williams
- Window Rock
- Winslow
- Yuma

- Alaska
- Willow
- California
- Winterhaven
- Nevada
- Elko
- Utah
- Salt Lake City



ATP
Member
List

Map is not to scale and is not geographically accurate due to limited space

Legend

- Regional Network Access Point
- Active ATP Member Site (see "Node Color Legend")
- ▲ Pending or Planned Site
- Active Circuit
- - - Pending or Planned Circuit
- DS1 (T1) Single or Multiple
- Other
- VPN
- ⚡ Wireless

Node Color Legend

- Arizona Telemedicine Program Site
- Corizon Health, Arizona State Prison Complex (ASPC)
- Arizona Burn Disaster Network
- Arizona Department of Health Services Children's Rehabilitative Services (CRS)
- Educational Site
- North Country Healthcare sites
- ☁ Affiliate Network with number of locations