



CoDE 2009–2010

Mayo Clinic Center for Innovation



Collaboration, co-creation, and innovation Mayo Clinic Center for Innovation

Center for Innovation (CFI), officially launched in June 2008, continues to help Mayo Clinic achieve its mission to transform the experience and delivery of health care. CFI's unique approach fuses design thinking with scientific methods in the primary objective of connecting, designing and enabling ideas that can transform the delivery and experience of health care for patients everywhere. CFI connects people inside and outside Mayo Clinic in ways that have never been attempted before, identifies opportunities and realizes solutions that will transform care delivery and experience, and facilitates and accelerates the pace of innovation across Mayo Clinic by making the invisible visible.

CoDE Innovation Funds

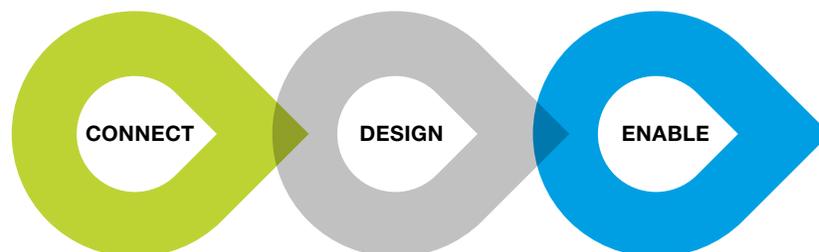
In 2009, the idea of Connect Design Enable Innovation Funds grew into a program that gained enterprise-wide attention. The CoDE Innovation Funds program offers internal grant opportunities to providers and allied health staff. Administered through CFI, CoDE projects can be pitched quickly. The approval process is swift. Fund recipients have one year to complete what they propose. CFI staff provides fund recipients with help as needed to inspire and enable them throughout the year.

The CoDE Innovation Funds program was developed by Terri J. Vrtiska, M.D., and promoted by Gianrico Farrugia, M.D., at that time, the physician leader for CFI's Culture and Competency of Innovation platform. The physicians see every application as "an inspiring reminder of our Mayo Clinic colleagues' innovative abilities and their commitment to providing the best care to every patient every day."

Co-creation works on many levels

Dr. Vrtiska notes: "We learn so much about the impact of co-creation at many levels through the CoDE experience. Because of the CoDE funding opportunity and CFI's support, Mayo employees have stated they feel empowered. Their ideas have been validated. They're confident that it's both safe and viable to test their ideas and they have the support to gather a team to help them succeed.

"For the CoDE team and for CFI staff, being a connector is extremely rewarding. As connectors, we have no individual agenda, but the funds awarded create a pulse of activity across the enterprise that connects people for the benefit of all.





“CoDE funding can also play a key role in furthering Mayo Clinic initiatives. By seeking ideas that address clearly identified needs, we can align CoDE projects with key Mayo priorities.”

In the Future

Important lessons, especially about process, were gleaned from both the successes and the not-yet-successful projects funded in 2009. In future:

- CFI will align future CoDE awards with Mayo strategic initiatives when possible by working with leaders to identify needs and applicants to address those needs.
- CFI will create partnerships in advance, engaging specific groups within Mayo early to alert them to the projects that will be funded and the support that will be needed.
- Some applicants can tell their stories clearly; others do not. CFI designers will work with future applicants to help them craft their stories.
- Instead of one set funding amount, future CoDE funds will be awarded on a scaled basis tailored to each proposal.

In 2009, CFI received 104 CoDE funding applications from across Mayo enterprise and awarded funds to 11 applicants. Their stories are inspiring examples of the wealth of innovative ideas staff at Mayo Clinic can generate and of what can be accomplished with funding and support. The first CoDE projects also provided many lessons that will be applied for future programs. The stories in this report capture both the great and not-yet-great successes of the CoDE funding program’s inaugural year.

Nicholas F. LaRusso, M.D.

Barbara Spurrier, M.H.A.

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Project Title: Stroke Telemedicine for Arizona Rural Residents and
Mayo Clinic Florida Regional Stroke Initiative

Proponents: Bart Demaerschalk, M.D. (Ariz.) and
David Miller, M.D. (Fla.)

Departments: Neurology (Ariz.) and Radiology (Fla.)

► **The robot doctor is in – and ready to help stroke patients**

Thanks to CoDE innovation dollars, Mayo Clinic robot doctors are improving care and reducing disability for stroke patients in community hospitals in Arizona and Florida.

These talking, seeing, rolling machines make it possible to remotely diagnose patients with stroke symptoms and determine who might benefit from prompt treatment with clot-dissolving medications (intravenous thrombolytics).

Each robot is topped with a talking head – a screen showing a live video connection with a Mayo Clinic neurologist. The specialist can position the robot to interact with the patient, family members and hospital staff. “It’s like we’re at the foot of the bed,” says Kevin Barrett, M.D., one of the participating neurologists in Florida.

Bart Demaerschalk, M.D., neurologist at Mayo Clinic’s campus in Arizona, says the new robots are a tool to bridge a gap in care. “Many community hospitals don’t have 24/7 neurology coverage,” says Dr. Demaerschalk.

When neurologists aren’t available, he says that risks are high for stroke patients. Thrombolysis significantly reduces the risk of stroke-related disability. To be effective, the therapy must be administered within three hours of the first symptoms. Without a neurologist on hand to evaluate a patient, the drugs often aren’t given. Studies have shown that less than 5 percent of eligible patients nationwide receive thrombolysis.

Two requests, similar objectives

Neurologists at Mayo Clinic in Arizona and Florida



Opportunity in Brief:

- + Robot doctors are providing Mayo Clinic neurologists with the ability to consult with patients in community hospitals across the country.
- + Local care providers can confidently care for their patients with the assurance of proper diagnosis and access to Mayo Clinic expertise.
- + Each day, participating Mayo Clinic neurologists are getting closer to their long-term goal: to create a national telestroke program.



separately submitted CoDE grant requests for telestroke services. They were awarded \$75,000 to share, with the caveat of collaboration. The two groups hadn't worked together and were at different stages.

In 2007, Mayo Clinic in Arizona joined a telestroke clinical trial. "We had three years of research under our belt and a comprehensive five-year plan ready to go," says Dr. Demaerschalk. They sought CoDE dollars to bring telestroke services to 35 rural hospitals in Arizona.

In Florida, the Neurology Department sought CoDE dollars to begin telestroke services with Parrish Medical Center, in Titusville, Fla., about 120 miles away from Mayo Clinic's Florida campus in Jacksonville.

"Collaborating with Arizona was instrumental in allowing us to avoid pitfalls in starting up," says David Miller, M.D., an interventional neuroradiologist leading the telestroke program in Florida.

Goals for both programs were to determine the best telestroke technology, streamline the physician-credentialing process and, most importantly, improve care for patients with stroke symptoms who don't have access to emergency neurology care.

The selected technology was remote-controlled robots. At Mayo Clinic, the physician sits at a computer workstation, equipped with a video camera, microphone, joystick and specialized software. This computer is linked to the Internet via a broadband connection. At the remote site, the robot contains a video camera and a microphone. The Mayo Clinic doctor can direct the camera to pan, tilt, or zoom to examine the patient.

Certified stroke center care

So far, seven robots are working in community

"The biggest surprise of this project was how easily patients and families accepted the robot doctors."

—David Miller, M.D., interventional neuroradiologist and leader of the Florida program

hospitals in Arizona, and about 500 patients have been evaluated. "About 25 percent of our patients have received thrombolysis," says Dr. Demaerschalk. "That's the same ratio as we see at Mayo Clinic. We've elevated the level of care to that of a certified stroke center."

At Parrish Medical Center in Florida, the robot doctor has seen more than 100 patients. The remote diagnostics process has proved highly accurate, says Dr. Demaerschalk. Analysis showed that diagnosis and treatment were correct 96 percent of the time.

Both campuses made progress in simplifying the physician credentialing process, allowing the Mayo Clinic neurologists to practice in the community hospital emergency departments. That step takes these neurologists closer to their longer-term goal: a national telestroke program.

Dr. Miller says that remote services like this one are the way of the future. "We have to learn to deliver the care we have with fewer resources," he says. "To get telestroke care started in Florida, this initial funding was crucial."

Already, Mayo Clinic is heading in new directions with telestroke care. Thanks to a gift from Missouri benefactor Wesley Remington, Mayo Clinic is assisting Heartland Regional Medical Center in St. Joseph's, Mo., with telestroke connections to rural hospitals in Missouri.

"We've done the prep work," says Dr. Demaerschalk. "Now we can take telestroke services elsewhere." ●

Connect

Two similar projects from Florida and Arizona were asked to combine efforts, connecting Mayo Clinic with community hospitals and patients.

Design

A new way to diagnose and deliver care and knowledge to stroke patients everywhere.

Enable

Community providers can now access Mayo Clinic expertise in stroke medicine, and provide a higher level of care with confidence.





Project Title: **Teledermatology: Outreach to State-wide PCPs & Dermatologists**

Proponent: **James Yiannias, M.D. (Ariz.)**

Department: **Dermatology**

► **Got a spot? Take a picture of it!**

James Yiannias, M.D., the chairman of the Dermatology Department at Mayo Clinic Phoenix/Scottsdale, loves to tell his patients who are worried that they have cancer, “Don’t worry, it’s nothing.” And thanks to a new device invented as part of the CoDE 2009 Project — a mobile teledermoscope — he’s able to say those words more than ever.

“So many patients have a black mole on their arm and they are scared to death in the doctor’s office,” Dr. Yiannias says. “Their primary care physician can now whip out a camera, take a photo and in five minutes say, ‘We have our answer; it’s perfectly harmless; off you go.’”

The device that makes that possible, truth be told, is an ordinary digital camera.

But the camera is deployed in an ingenious system devised by Dr. Yiannias and his team that saves patients a lot of time and agonizing worry. Only a few months ago, when patients at Mayo Clinic’s Thunderbird campus in Scottsdale asked their primary care physician about worrisome skin lesions, other appointments needed to be scheduled with a dermatologist at Mayo’s main Scottsdale clinic, six miles away. That appointment might have to be scheduled on the next day or even longer. Until then, the only thing a patient could do was worry, plus deal with all the scheduling hassles of making another trip on another day.

Quick diagnosis and no travel required

Now, instead of sending patients with questionable skin conditions across town to see a dermatologist, primary care doctors at Thunderbird simply reach for a digital camera.

Opportunity in Brief:

- + With a mobile teledermoscopy a simple digital camera helps ease patients’ concerns over skin abnormalities.
- + Speeding up access to dermatology expertise with a photo, a pager, and instant diagnosis opens up more time for face-to-face visits.
- + Skin abnormalities that are concerning can be quickly triaged for an in-person appointment.



Placing the camera directly on the patient's lesion, they snap a photo. Immediately, the image is sent by a wireless connection to the Scottsdale clinic, where one of the staff dermatologists, on call for just such inquiries, gets an alert on a beeper. Going to the nearest computer, the dermatologist calls up the photo and makes a quick triage decision — either “harmless,” “clearly worrisome,” or “somewhere in between.” In two-thirds of the cases, the answer is “harmless,” and the patient at Thunderbird is free to go. Average time elapsed from the patient's inquiry to diagnosis is under five minutes.

“This really helps the patient from having to waste time and resources,” Dr. Yiannias says. “We are bringing the expertise of a specialist to primary care doctors,” who in turn pass on the specialist's advice to patients, all in the course of one primary care visit. The “teledermatology” system is the first in the nation to offer patients such advice in real time, Dr. Yiannias says.

In the last three months of 2010, about 25 Mayo Clinic primary care physicians, working with four Mayo dermatologists, used the teledermoscope system to provide about 70 patients such superfast diagnoses. Patient and provider feedback has been so positive that the teledermoscope team plans to push for the system to be moved from its present pilot stage into production at Mayo's other off-site primary campus, the Arrowhead Family Medicine Clinic in Glendale, about an hour's drive from Scottsdale.

Ultimately, Dr. Yiannias says, “Our goal is to be able to provide this technology and this service to any primary care provider outside of Mayo Clinic.” By working out the kinks and work flows of the system among the Scottsdale, Thunderbird and Arrowhead clinics, the teledermoscope system could ultimately become a Mayo-branded commercial product, Dr. Yiannias says.

“Our goal is to be able to provide this technology and this service to any primary care provider outside of Mayo Clinic.”

—James Yiannias, M.D., Mayo Clinic, Arizona

A new way to deliver care = time to see more

While such a system would be a net revenue producer for Mayo, the ultimate benefits would be a dramatic increase in satisfaction for patients. By rapidly dealing with those cases that don't need a specialist's care, the new system “opens up appointment access for patients who really need to come to dermatology,” Dr. Yiannias says. “That way the dermatologists, with ever-more-restrained resources, will be able to actually take care of more patients who need to be evaluated in person.”

The project got started when, about a year ago, Victor Trastek, M.D., the CEO of Mayo Clinic's Scottsdale campus, approached Dr. Yiannias with a challenge. Recalls Dr. Yiannias, “He said, ‘Jimmy, I'd really like you and your department this year to take on a project that will help modernize the delivery of health care. We've got a telestroke program, and they are working on teleradiology. What do you think about teledermatology?’ I said, ‘Let me give that some thought.’”

With the CoDE project's help, his thought is now reality. ●

Connect

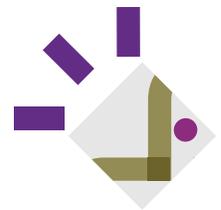
Technology can connect patients and their care providers for a fast opinion on skin abnormalities.

Design

Teledermatology is designing a new way for patients to access their care provider.

Enable

Low-tech and readily accessible devices like a digital camera can help patients when they have a concern and open up appointment times.





Project Title: YES – A Patient Locator Board/Dashboard

Proponents: David Klocke, M.D., and Vernon Smith, M.D.

Departments: Hospital Internal Medicine and Emergency Department

► **Eyes in the ER**

It would be hard to imagine anyplace more furiously busy, more humanly complex, and with higher life-and-death stakes than a hospital emergency room.

Enter Vernon Smith, M.D., a Mayo Clinic emergency room physician with a passionate sideline in computer programming. For the past six years, Dr. Smith has set himself the personal challenge of using computers to tame the complexity of the hospital emergency room for the benefit of doctors, nurses, other emergency room staff and, most of all, for Mayo Clinic patients.

Now, with the help of CoDE project funding from the Center for Innovation, Dr. Smith has upgraded an electronic patient information system in the Saint Marys Hospital Emergency Department. Doing much of the software programming and virtually all of the system designing himself, he has added enough new functionality and “feel” to basically reinvent the whole system, which is now used all day, everyday, throughout the Saint Marys Emergency Department.

The constantly-updated computer screens hang on the walls about every 15 feet throughout the department, giving everyone a real-time, at-a-glance overview of vital information on every patient being seen at a given time. And the story doesn't end there.

Once again with CoDE funding, Dr. Smith and partner, David Klocke, M.D., a Saint Marys hospital medicine specialist, have installed the system — the YES Patient Locator Boards — in six major hospital units at Saint Marys. And they have their eyes set on outfitting many more.

In addition, working with a computer programmer hired with CoDE funds, Drs. Smith and Klocke



Opportunity in Brief:

- + A new graphical information system providing physicians with a real-time, at-a-glance overview of vital information on every patient in the ER.
- + Receiving information in this manner helps physicians move resources quickly when needed.
- + The next step is to add connectivity to the YES board to automatically page physicians when their patients' vital signs dip into dangerous territory.



have added many useful new functions to the YES system.

These include the ability to see the vital statistics of every patient not only in the Emergency Department, but in every one of the hospital units where the YES board system is installed. This includes information such as whether individual patients are breathing with the help of a ventilator machine, or are receiving drugs to elevate their blood pressure.

“We’ve now got nearly complete situational awareness due to the YES boards,” Dr. Smith says, using the medical buzzword for technology that helps individual hospital staffers understand the bigger picture in which they operate. “If I’m the staff physician, I need to know what’s going on with patients in several geographical areas,” Dr. Klocke says. “The YES board helps me to see how sick patients are in other areas, to understand what my resources are, and if my staff needs to move. It’s being a general and understanding the whole battlefield.”

Roots with Mayo’s earliest innovator

The earliest patient locator system in the Saint Marys Emergency Department was invented by Henry Plummer, M.D., the legendary innovator who in Mayo Clinic’s early years designed the information systems that to this day undergird Mayo’s “integrated group practice” model.

The Plummer system was composed of colored electric light panels indicating such things as “room empty” or “patient waiting to see a doctor.” It was updated to a video screen system in the 1990s.

In 2005, Dr. Smith put his imprint on the system by putting all the data from the stand-alone video system onto a Web-based system. That allowed any computer screen with a Web connection to display all the available data.

“If I’m the staff physician, I need to know what’s going on with patients in several geographical areas. ... It’s being a general and understanding the whole battlefield.”

—David Klocke, M.D.

The next big step was to add patient information through the use of easy-to-understand icons. For example, patients on a ventilator are signified by an icon showing a pair of lungs, while patients on drugs to increase their blood pressure are signified by a heart surrounded by a C-clamp.

In addition to the Saint Marys Emergency Department, the YES boards are now installed on two units in the hospital’s Mary Brigh wing, on three floors in the hospital’s Domitilla wing, and on the pediatric unit in the Francis wing. As long as they are near a computer, doctors and other staffers can now see virtually all of the critical information available on every patient roomed on those units.

Another new function on the YES board shows the availability of all of Mayo Clinic’s 43 CT and MRI scanning machines. At a glance, physicians or schedulers can tell which of those machines has a long wait time and which ones are open immediately. That kind of real-time information saves clinic staff scheduling headaches, and saves patients hours and hours of wait times.

The next step? Drs. Smith and Klocke hope to teach the YES board system to alert doctors, through a beep on their pagers, if a patient’s vital signs dip into dangerous territory.

“That would be connecting the loop,” Dr. Klocke says. “That’s where the real payoff is. We’re at the point where we need a ‘yes’ from the institution to go forward with the ‘YES.’” ●

Connect

Access to ER patients’ status helps provide prompt, real-time interventions.

Design

A new system to help care providers monitor patients with at-a-glance graphical icons.

Enable

Monitoring ER patients allows physicians to provide resources to those patients with the greatest need.





Project Title: **Electronic Outreach for
Dementia Behavior Management**

Proponent: **Glenn Smith, Ph.D.**

Department: **Psychology**

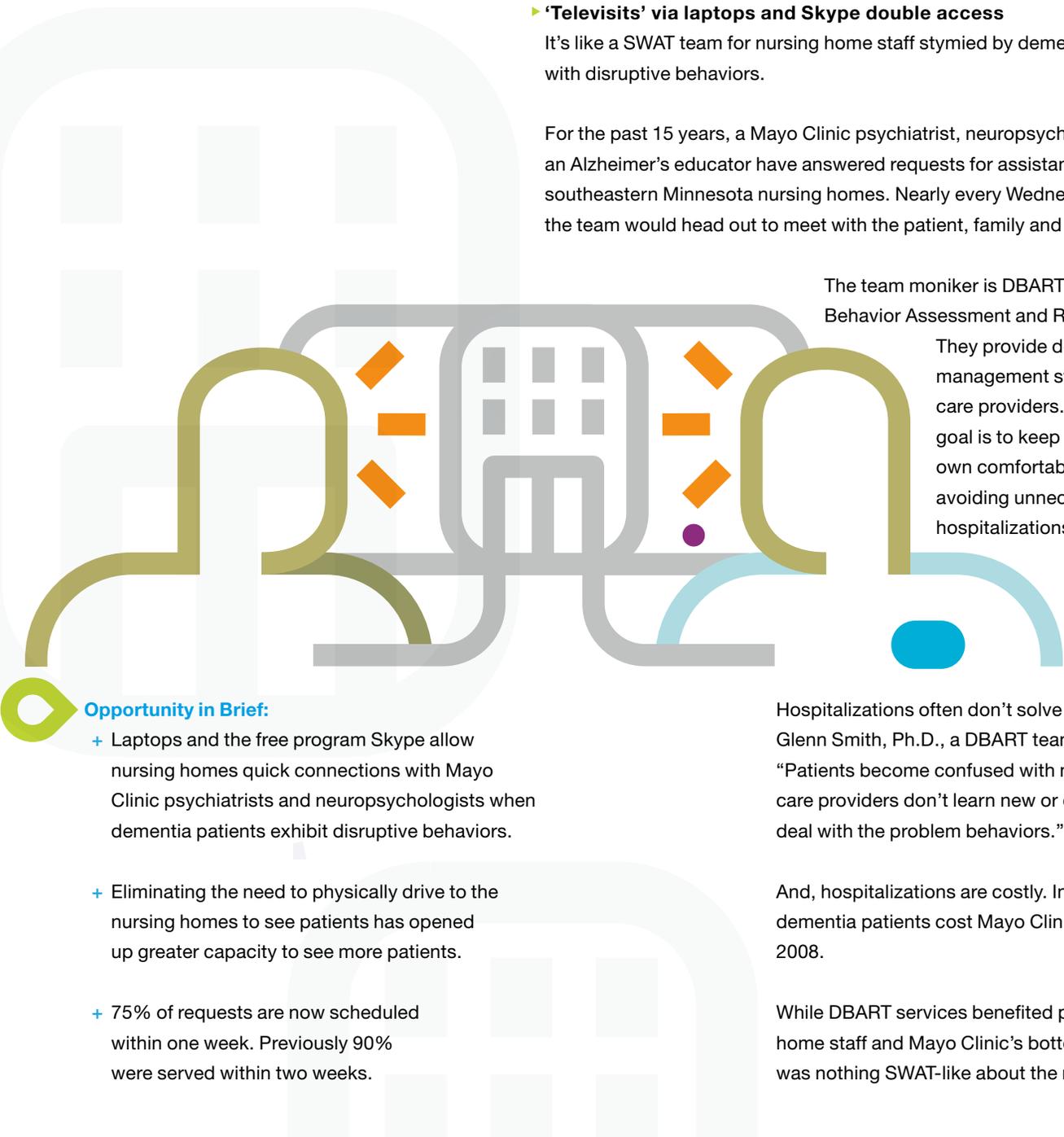
▶ **‘Televisits’ via laptops and Skype double access**

It’s like a SWAT team for nursing home staff stymied by dementia patients with disruptive behaviors.

For the past 15 years, a Mayo Clinic psychiatrist, neuropsychologist and an Alzheimer’s educator have answered requests for assistance from southeastern Minnesota nursing homes. Nearly every Wednesday afternoon, the team would head out to meet with the patient, family and care providers.

The team moniker is DBART — Dementia Behavior Assessment and Response Team.

They provide dementia behavior management strategies to care providers. Their ultimate goal is to keep patients in their own comfortable environment, avoiding unnecessary hospitalizations.



Opportunity in Brief:

- + Laptops and the free program Skype allow nursing homes quick connections with Mayo Clinic psychiatrists and neuropsychologists when dementia patients exhibit disruptive behaviors.
- + Eliminating the need to physically drive to the nursing homes to see patients has opened up greater capacity to see more patients.
- + 75% of requests are now scheduled within one week. Previously 90% were served within two weeks.

Hospitalizations often don’t solve problems, says Glenn Smith, Ph.D., a DBART team member. “Patients become confused with moving, and the care providers don’t learn new or different ways to deal with the problem behaviors.”

And, hospitalizations are costly. Inpatient care for dementia patients cost Mayo Clinic \$4.5 million in 2008.

While DBART services benefited patients, nursing home staff and Mayo Clinic’s bottom line, there was nothing SWAT-like about the response time.



“We would see one to two patients a week,” says Dr. Smith, noting that drive times were up to an hour one way. Often, care centers waited two weeks for a consultation. Waits of four to six weeks weren’t unusual.

The DBART sought CoDE funding to develop more efficient ways to deliver care.

42 nursing homes and patient confidentiality

Using a \$25,000 CoDE grant, the team investigated a variety of teleconferencing technologies to connect Mayo Clinic with 42 regional nursing homes. There were several challenges.

“We wanted to avoid purchasing equipment that wouldn’t be used much,” says Dr. Smith. Most facilities request consultations once or twice a year. And, patient confidentiality needed to be honored.

The solution: “Televisits” using Apple laptop computers and Skype, a free software application that allows voice and video connections via the Internet. Four laptops were purchased. “Our solution was to buy less and make more use of FedEx,” says Dr. Smith.

Now, when a consultation request comes in, a laptop is shipped out to the nursing home on Friday. The connection is tested on Tuesday. Televisits are done on Wednesday. Skype connections are considered as secure as a telephone call and don’t compromise patient confidentiality.

The televisits are conducted much the same way as face-to-face meetings. Mayo Clinic team members ask the patient, family members and staff about the patient’s history, current situation and difficult behavior. Then, the Mayo team and staff members discuss solutions. The session typically lasts 90 minutes.

“Our solution was to buy less and make more use of FedEx.”

— Glenn Smith, Ph.D.

Lisa Oelkers, director of social services and residential housing manager at St. Brigid’s at Hi-Park, a care center in Red Wing, Minn., says she misses the personal aspect of having a team visit, but “I don’t see any negatives to this approach.”

And a huge advantage is timeliness. “There were times we had to wait six weeks for a consultation,” she says. Previously, Oelkers says the DBART came to St. Brigid’s about three times a year. “I would foresee that we’ll double that number now that access is easier,” she says. The care center recently purchased an Apple laptop so equipment shipments aren’t needed.

Quicker response times

Dr. Smith reports that televisits have improved access and reduced wait times. Prior to starting the teleconferences, the DBART averaged 5.3 consultations a month. Now, capacity is about 11 consults a month.

Wait times have been reduced, with 75 percent of requests scheduled within one week. Previously, 90 percent were served within two weeks.

Initial results indicate that program efficacy is similar, whether the session is a televisit or in person. Typically, the number of disruptive behavior incidents drops from almost daily to once or twice a week. DBART will continue to visit Rochester facilities in person to evaluate and compare the two approaches. ●

Connect

Mayo Clinic psychiatrists and neuropsychologists can televisit to community nursing homes, providing expertise when needed.

Design

We have opened up access in a meaningful way for community nursing care providers.

Enable

Access is now easier and faster, freeing up more time to see new patients.





Project Title: Teleconsultation for Surgical Pathology

Proponent: Paul Kurtin, M.D.

Department: Anatomic Pathology

► **Teleconsultation in surgical pathology: a new opportunity**

Today, people watch television programs such as CSI and assume that pathology is related to autopsies and forensic analyses that help determine the causes of deaths. But, this is only a small part of the overall scope of what pathologists do. More often, they are asked by surgeons and other physicians to make diagnoses based on the microscopic evaluation of biopsy samples that have been removed from patients. Mayo Clinic physicians and surgeons request pathologists to analyze hundreds of samples every day from virtually all parts of the body.

A typical example would be a woman with an abnormality suspicious for breast cancer that was discovered during a routine mammography. Following a biopsy of the abnormal region, the surgeon sends the breast tissue specimen to a pathology laboratory where a small slice is placed on a glass slide and viewed under a microscope. A pathologist studies the slide and determines whether the tissue sample represents cancer or a benign breast disease.

Working beyond Mayo Clinic's practice

Mayo's Department of Laboratory Medicine and Pathology also provides diagnostic consultations for difficult cases for pathologists all over the world. Typically, these pathologists request help for an abnormality they do not understand or have never seen before. External pathologists send questions about the case together with the patient's clinical history, the microscope slides and a portion of the biopsy specimen embedded in a paraffin block.

The Mayo pathologist considers the history, looks at the slides and, in most instances, reaches a diagnosis, which is then communicated to the referring pathologist. However, sometimes the diagnosis is not completely clear from the review of the slides. In these situations, additional testing may be needed.

The most common additional test is a battery of immunoperoxidase stains. Thin slices of the tissue embedded in the paraffin block



Opportunity in Brief:

- + Immunoperoxidase stains help identify cell characteristics that cannot be observed through routine microscopic evaluation. New technology now allows high-fidelity scans of the slide allowing it to be sent electronically.
- + Immunoperoxidase stains are sent to pathologists electronically.
- + With the reduction of time, it could be quickly determined if the scans were not usable and the referring physician could request a consult with a Mayo Clinic pathologist.



are placed on microscope slides where they are reacted with antibodies. This process helps identify tumor and other cell characteristics that cannot be observed through routine microscopic evaluation. Mayo's immunoperoxidase stain lab has a menu of hundreds of different immunoperoxidase stains, each of which can help make very specific diagnoses or, in the case of cancers, identify potential therapeutic targets on the cancer cells.

New technology changes the process

New scanning technology now can make a very high-resolution digital image from the tissue on the microscopic slide. This image can be sent anywhere almost instantaneously via the Internet where it can be viewed on a computer screen rather than through a microscope. A plan to initiate a prototype of this was initially submitted for funding by a former researcher who planned to involve a number of external pathologists. The team re-scoped the project in a way that could help referring pathologists with their problem diagnoses and also would help Mayo pathologists gain hands-on experience with the new slide scanner, which has been installed in Rochester.

"To ensure that this new technology would truly be as effective as first thought," says Paul Kurtin, M.D., a member of the team, "we proposed leveraging the capacity and depth of our immunoperoxidase stain laboratory to provide enhanced immunoperoxidase stain offerings to outside pathologists. This new proposal was generously funded by the Center for Innovation in lieu of the original one, and we used the money to lease the scanner."

The concept of the revised project

The question to answer: Would it be feasible for a referring pathologist to send us paraffin-embedded tissue samples from their difficult cases for immunoperoxidase stains that Mayo would perform in our laboratory?

"This project will give Mayo pathologists hands-on experiences with new technology and we can use excess capacity of the digital image scanner to work on additional new telepathology applications in the department."

— Paul Kurtin, M.D.

"We would do the stains," says Dr. Kurtin, "then use the new technology to make digital scans of the immunoperoxidase stained slides and send the digital images to the referring pathologist."

One of three things could then happen when the referring pathologist received the Mayo report:

1. The stains would allow the referring pathologist to make a diagnosis and the case would be complete.
2. The referring pathologist could conclude that additional stains were necessary to reach a conclusion and order them from Mayo.
3. If the referring pathologist still could not reach a definite diagnosis, then a consult with a Mayo pathologist could be requested.

An internal trial before external application

"Initial market and financial analyses determined that this service would be widely used and financially successful," says Dr. Kurtin. "However, we wanted to be sure that internal operations, the quality of the digital images produced, and internal computer systems were optimal before offering this service outside Mayo. So, the prototype project is being done in collaboration with Thomas Colby, M.D., and the Department of Pathology at Mayo Clinic Arizona. We get their slides, do the stains, scan the slides here and send the images back to Scottsdale via our intranet." ●

Connect

Using technology to scan, send and interpret tissue samples quickly connects pathologists.

Design

Referring pathologists are piloting new ways to share slides electronically.

Enable

Additional consultation with referring pathologists is faster.





Project Title: Evolution of the Curb-side Consult using
Social Networks in the Radiology Electronic Environment

Proponent: Brian Bartholmai, M.D.

Department: Radiology

- ▶ A “scoop” sounds like something cold that’s served at Dairy Queen, or something hot, torn from today’s news. But in Mayo Clinic’s Department of Radiology, a “scoop” is completely different: A note handed from a radiologist to a technologist who runs an MRI or other electronic imaging device, giving customized instructions for handling individual patients.

A handwritten scoop system worked well when Mayo had only a few scanners, and radiologists and technologists sat next to each other at every machine. Today, though, scores of imaging scanners are scattered across Mayo’s large campus; because radiologists can now read scanned images displayed on any Mayo computer, they, too, are scattered geographically.

But if a radiologist is several blocks away, how will that radiologist’s scoops, which ensure individualized patient care, get delivered to the technologists who administer the scans?

Brian Bartholmai, M.D., a Mayo radiologist with a passion for innovation, had a brainstorm and came up with a solution: “e-Scoops.” If scanner images can be read anywhere on a computer, he asked, why not send scoops from anywhere via computers, too?

Supported by a 2009 CoDE grant, Dr. Bartholmai and four colleagues designed the computer program e-Scoops to allow radiologists to send quick e-messages giving personalized instructions for every patient receiving a scan.

As useful as it is, e-Scoops is only one small part of Dr. Bartholmai’s overall CoDE-funded project: To create an online portal that closes the many



Opportunity in Brief:

- + A “scoop” or note, handed from a radiologist giving customized instructions for handling individual patients, can be delivered electronically, regardless of geography.
- + E-Scoops, social networks and customizable home pages can help share the knowledge through an online resource.



critical “information gaps” that are created when a medical center gets as large, complex, and spread out as Mayo Clinic.

“You can’t rely on geographic proximity to do collaborative patient care with Mayo’s present size”, says Dr. Bartholmai.

If all goes to plan, the online portal designed by Dr. Bartholmai’s team, called RADAR, will one day soon become the home page used by Mayo Clinic’s Radiology Department. The RADAR home page will be personalized, similar to “My Yahoo” and “iGoogle” pages. The home page will allow each person to pick applications specifically useful to them, while featuring prominent space for department news such as staff appointments, meeting notices, new quality and safety policies, among others.

A battery of customized features such as e-Scoops, customized resource links and social networking applications is the heart of the system. Altogether, they form an online resource designed to support person-to-person conversation and to simplify the often overwhelming task of juggling dozens of online health care data banks, displays, links and applications.

Another RADAR application designed with CoDE funding and featured on the home page is “Buzz.” Similar to e-Scoops, Buzz facilitates team medical practice even when team members are separated by time and place. Using Buzz, a radiologist with a question about, say, interpreting a puzzling MRI scan can post a request for help from any radiology team member who has specialized knowledge about that kind of scan.

The RADAR feature contains customized social networking tools for Mayo’s Radiology Department, including Wikis, blogs and discussion forums. Using these tools, Radiology Department

“We are trying to simplify and aggregate. We need such tools at our fingertips to do our jobs, collaborate with colleges and get access to knowledge without having to go through 15 different systems.”

— Brian Bartholmai, M.D.

staffers can participate in “curbside consults” — informal, spur-of-the-moment chats — with each other to share new information, ask questions and solve problems.

The most ambitious RADAR program, still under development, will scan all information posted on the system’s social network and message sites, sifting through to find useful patterns and items that it will then analyze, verify and store for future use.

“The questions of how do you know what you know, and how do you know what’s true, and what do you trust — those problems have been around for thousands of years,” he says.

The RADAR system is now largely built and ready for a test run with a selected subgroup within the Radiology Department. The pilot is behind schedule due to staffing setbacks but remains on track.

In the meantime, getting RADAR designed, built and ready for the pilot has yielded some useful insights into the innovation process, Dr. Bartholmai says.

“Innovation is hard,” he says. “It takes focus, time, drive and investigation, prototyping and failure and re-prototyping. You can’t do innovation on the side.” ●

Connect

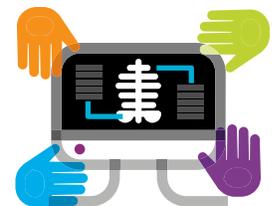
Radiology staff collaborates faster, regardless of proximity or geography.

Design

A system prototype that enables the sharing of knowledge.

Enable

Technology and social media tools enable staff to connect and provide the best collaborative care.





Project Title: Pressure Ulcer Prevention Bed

Proponent: Jeff Bell

Department: Illustration and Design

► **Pressure Ulcer Prevention Bed**

Pressure ulcers are a common and challenging patient care problem in today's hospitals. Thousands of patients experience this breakdown of their skin, and nearly 30,000 die annually from complications related to these bedsores in the United States alone. For years, health care providers have sought solutions to this painful condition that develops when sustained pressure cuts off circulation to the skin. But what if pressure ulcers actually could be prevented?

Could technology help prevent pressure ulcers?

Jeff Bell, the principal innovator and proponent of this project, was a part of the Clinical Practice Committee Innovation Work Group in 2005 when they were charged with selecting a patient-care-related challenge that could benefit from an intranet-based idea-capture and management system.

When Bell learned that one of the issues being considered was pressure ulcers, he was surprised it was on the list. Bell, who is not a care provider, was unaware that this condition still plagued hospitals.

"Nursing Administrator Jackie Attlesey-Pries helped me understand the medicine behind pressure ulcers," says Bell. Then the wheels of innovation had begun turning in Bell's head.



Opportunity in Brief:

- + Patient can develop pressure ulcers when sustained pressure cuts off circulation to the skin.
- + Pressure ulcers plague hospitals today with nearly 30,000 patients dying annually of complications related to pressure ulcers.
- + An artist and designer who heard of this problem found inspiration in a frying pan.

Can a frying pan reveal a solution?

Like so many innovations in the world, a possible solution to this problem came in a very ordinary act: preparing breakfast. One morning, as Bell was fixing eggs for his children, he gently angled the slightly concave frying pan to spread the butter outward from the center to cover the bottom of the pan.

As he watched the butter move evenly across the pan, he began to wonder if there was a way to move a bed surface gently, in some sort of tilting horizontal concentric circles, to slowly but constantly redistribute the weight of a patient's body over time. Clearly this was a question for a mechanical engineer.



A bumpy start

For four years Bell never forgot the story about pressure ulcers. Bell's background is as an artist and designer, and by day he is the Section Head of the Department of Illustration and Design. In 2009 Bell learned of grants being offered by Mayo's Center for Innovation and on the last day of the application process – in a moment of inspiration recalling the problem of pressure ulcers – he applied for a grant. When the 2009 winners were announced, his project was among them.

But Bell was challenged to find the right people to help him move the idea beyond the vaguest of theories. The solution seemed to lie somewhere in the realm of sophisticated hospital bed design. "I was willing to talk to anyone who would listen," says Bell of the early months after receiving the grant.

That's when Dan O'Neil was named the project manager by the Center for Innovation, and an engineering firm was engaged to design a prototype bed that could gently alter the constant pressure that was the source of the ulcers. "Things really started to happen once Dan was dedicated to the project," says Bell.

Establishing the parameters of success and how to measure them became a complicated but exciting trial-and-error process. Bell tapped into some of the relationships he had built along the way. Ann Tescher, Ph.D., C.N.S., had done work with pressure ulcers in wheelchair-bound patients, and her insights were invaluable, says Bell.

A full-body pressure mat, bought off the shelf, allowed measurement of patient contact with the bed surface. A computer was connected to the mat that let the team enter data for movement of the mattress on an X and Y axis. This allowed the team to control movement of the bed surface at precise angles to map the effects on the body as it lies motionless.

"Nursing Administrator Jackie Attlesey-Pries helped me understand the medicine behind pressure ulcers."

— Jeff Bell

Is success on the horizon?

With the prototype bed engineered and a laptop computer attached to adjust its movement and read its outcomes, the team is now preparing a test with 20 healthy, normal subjects. Using 15 different surface positions to assess the varying degrees of relief brought to patient pressure points, the team will learn if its theory will stand up in practice.

- Is there a specific therapeutic benefit to patients?
- Are there particular patients who benefit from this more than others?
- Will nursing care in units with this technology become more efficient? Become safer for patients and nurses who currently must regularly move patients?
- Is there a point when the movement of the surface becomes counterproductive? What is that?

These and other questions will be answered in early 2011 as the testing of this prototype moves ahead. This method of testing will add to the body of knowledge that seeks to answer the question: Can pressure ulcers be prevented? ●

Connect

New ideas may not always find a way to be prototyped. CoDE gives everyone at Mayo a voice.

Design

Allied health staff have inspiring ideas that may lead to the design of new solutions for patient care.

Enable

When roadblocks arise on a project, CFI can facilitate by bringing others in.





Lessons learned in 2009

Not every project runs like clockwork

The Center for Innovation (CFI) provides the opportunity to explore great ideas that may or may not be ready for implementation. CFI grant recipients can test implementation without full-scale funding, staffing, or infrastructure investment. Here is a recap of the lessons learned from three projects that received CoDE innovation grant funding but didn't progress quite as expected in 2009. ●

Project Title: Exploring Transplant Reimbursable
Models of Care at a Distance

Proponent: Michael Morrey

Department: Administrative Services

► Transplant reimbursable models streamline care at a distance

This project proposed post-transplant continuity of care to reduce health care costs, unnecessary office visits and unnecessary follow-up tests, and provide patient information through an online service.

The goal

Mayo Clinic performs 160–180 kidney transplants each year. Transplant patients then have blood drawn and tested for markers of rejection every two to three months, usually at their local laboratory. “Mayo Clinic acts as care provider for life to patients who receive a transplant here,” says Michael Morrey, principal investigator for the project. “So the issue is, how do we do a better job of managing the lifelong reporting process for more than 5,000 patients?”

Mayo uses Labtalk, a telephone-based program, to record patient reports. Labtalk is problematic because:

- Health Policy and Administration (HPA) guidelines won't allow results to be left in voice mail. Patients become frustrated if they're forced to play phone tag.
- Nurses using Labtalk spend an average of 1.5 minutes recording a few seconds of data.
- Labtalk tracks all values and flags all unusual results, even though those results may be normal for transplant patients.

“Our goal was to drive our patients to a secure Web connection where only critical values that are directly related appear,” says Morrey. “The plan saves 2.8 full-time employees, nurses whose time could go to high-risk patients. That's a great quality component.”



Unexpected challenges

The necessary technology was already available for provider use, so the project team focused on changes the technology required for patient use. Other logistical challenges, however, became daunting.

“We were running in circles,” says Morrey. “The primary lesson I learned was that CFI should work with IT to develop a system that streamlines the technology for beta testing these projects.”

Morrey notes that the program likely will be implemented someday. “We have new ideas to move forward.” ●

Project Title: Video Call Light

Proponent: Eric Cleveland

Department: Nursing

▶ **Video call light platform engages patients more efficiently**

This project proposed enabling all members of the health care team to engage with hospital patients via video to assess patient needs and deliver the necessary care and resources in the most direct manner possible.

The goal

The right person, right job, full scope (RRF) nursing team initiative developed this idea to help communications flow more effectively between nurse and patient. Eric Cleveland, principal investigator for the project, notes, “The question was: Can we do something different with how the nurse ‘enters’ the patient’s room?”

Some areas of the Department of Cardiology already used flat screens that would allow patients to see the nurse’s face. Its patients, nurses and physicians were comfortable with monitoring and being monitored. The team selected this venue for testing.

As with the transplant project, the technology was available. The team originally hoped to leverage the cable and display infrastructure that was already in the rooms. The focus was on changes necessary for this implementation.

The immediate result, however, was delay. The tool the team was trying to develop became too complex for the technology they planned to use. The camera technology wasn’t sophisticated enough. Initially technological advances seemed feasible in a six- to seven-month time frame. When engineering, consulting, and maintenance were factored in, however, costs skyrocketed. “We began the search for other projects we could build on,” says Cleveland. →





Unexpected solutions

A representative from one of Mayo's technology vendors suggested a solution: Why not work with the videophones the nurses already use? The Wi-Fi-based technology was already part of a broader, mobile strategy to help prioritize projects for nurses. It could be used by patients to view their schedule for the day, choose menus, identify staff caring for them daily — and summon nurses when needed.

"Our only real nonsuccess was that the project didn't meet its timeline," says Cleveland. "We're just starting over, in some regards. The environment's done. Now we can involve the nurses to test. Then we can modify and implement the technology." The project is scheduled to begin active testing in 2011. ●

Project Title: Is it Gluteal cleft or Midline "butt ox":
The Specimen Labeling Assistant

Proponents: Schuyler Sanderson, M.D., and Carrie Trower

Department: Anatomic Pathology

► Specimen labeling assistant ensures accuracy

The project proposed a system to pull information from the consented surgical procedure, cross-reference it with the surgeon's data, and provide an accurate label to improve processing efficiency and increase patient satisfaction.

The goal

Schuyler Sanderson, M.D., of the Department of Laboratory Medicine and Pathology and principal innovator for the project, is determined to address the importance of surgical specimen accuracy and the need to reduce labeling errors. "This problem will be solved because, one way or another, it will continue to be a problem until it is resolved," says Dr. Sanderson.

This project, like the others, expected to build on existing technology to achieve its goal within its one-year time frame. The Division of Gastroenterology already uses a radio frequency identifier (RFID) system to prevent specimen labeling errors. The process avoids rekeying and has eliminated nearly 90 percent of errors since its introduction.



Unexpected challenges

Candie McKay notes, “As project manager, I look for pitfalls. Anticipated pitfalls can be avoided. This project, however, faced many unique challenges. We learned valuable lessons from them all.”

McKay, who managed another project that involved both RFID and the vendor the surgical specimen labeling project planned to employ, was recruited for this project in March 2009. “The project would have benefitted from having an official physician-user champion from its inception,” says McKay. “Dr. Sanderson works in the lab. Surgeons are too busy to promote this agenda independently. We’re reconstructing what should have happened so that the project can continue, if possible.”

RFID-based labeling for surgical specimens may be advanced through the NursePlus system, which would eliminate the current vendor from the equation, notes McKay.

Not every idea is great right now

All three of these projects encountered some barriers in their journey and struggled with timing and technology. CFI CoDE grants apply for one year only, so any delay may affect the success of the project. Success, however, is often built on a series of setbacks. These three projects all anticipate eventual success, with a little more time.

The lessons CFI has learned in our first year also influenced the program for our current 2010-2011 funding grants. CFI made changes to the CoDE funding program — opening the application process earlier, creating a more flexible funding mechanism, and adding Mayo Clinic leadership to the review process. We are excited to hear the stories that will emerge from the next wave of CoDE projects. At the Center for Innovation we are always inspired by the past, and innovating for the future. ●





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