


IMPRESSIVE TECHNOLOGY housed in impressive architecture:
Mayo Clinic in Rochester, Minnesota.





Mayo Clinic and Siemens: Shaping the Future of Patient-Centric Healthcare Today

Patients often think that medicine has forgotten about them. They feel that treatment and diagnosis, however effective, often lack humanity. An example of how a patient-centric approach, innovative technology and successful cooperation between a vendor and a healthcare provider are bringing this element back into the healing equation.

By Susan Barrow

JERALD H. PIETAN, M.D.,
is Chair of the Department
of Radiology at Mayo Clinic,
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September 21, 2004, Jacksonville, Florida – The roster of doctors and scientists gathered at Mayo Clinic Jacksonville for the press conference the introduction of the Siemens MAGNETOM Espree Open Bore MRI system is an impressive one. Representatives from Siemens Medical Solutions and physicians from Mayo Clinic Jacksonville move through the crowd, talking animatedly about the cooperation that has resulted in the installation.

Walking through the clinic to the new home of MAGNETOM Espree, conversations reflect a sense of anticipation. Upon reaching the small space where two radiology technologists sit in front of computer screens, curtained windows at eye level, we gather around. Someone draws back the drapes and there is a small intake of breath from those whose long months of work is finally revealed, then a collective sigh not unlike the one heard thousands of times daily when family first views the new arrival in the hospital nursery.

This new introduction is the result of months of hard work and cooperation. Not to mention the first of its kind in the world.

In conventional magnetic resonance imaging, mere inches separate the gantry's ceiling from the nose of the patient, who must remain motionless while the walls almost touch him on both sides, the machine beeping and grinding its way to the final clear image. Clear image or not, some patients just can't do it.

Gary Doyle, radiology manager at St. Luke's Hospital, is one of those. He is, by his own description, everyone's favorite claustrophobic. He explains, "I have chronic back pain

and have been trying to have an lumbar study since 1982. It last about five minutes, and they have to pull me out. Add to that the fact that I'm a big guy, and I'm a technologist's nightmare." He's not alone. According to him, some patients literally bolt out of the machine before the process even begins. Dressed in T-shirt and jogging pants, Doyle walks into the room where the Siemens MAGNETOM Espree system is located, climbs onto the table and is fed into the machine. "I'm good," he calls out. "Plenty of room to breathe."

"The latest in technology is an integral part of good medicine."

Jerald H. Pietan, M.D.,
Chair of the Department
of Radiology, Mayo Clinic,
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"I AM A TECHNOLOGIST'S NIGHTMARE", says Gary Doyle. "I am claustrophobic and a big guy. With the MAGNETOM Espree I was able to make it through an MRI for the first time in my life."

MAGNETOM Espree – A Powerful, New Openness in MRI

MAGNETOM Espree, the first 1.5 Tesla Open Bore magnetic resonance imaging system in the world, is making its debut at the 90th Scientific Assembly of the **Radiology Society of North America (RSNA)** in Chicago, November 28, 2004.

With following features the MAGNETOM Espree provides an enhanced spectrum of applications to a broader circle of patients:

- compact magnet length of only 125 cm
- expanded 70 cm bore diameter
- 1.5 Tesla high-field power
- equipped with Tim (Total imaging matrix) technology
- design dimensions previously seen only in computed tomography systems

Thanks to its unique magnet design, the system offers more space for patients than any other conventional open system on the market.

For more than 60 percent of examinations, the patient's head remains outside the scanner – a significant benefit

to claustrophobic patients. And with a bore opening of 70 cm, it provides enough room for obese patients as well.

"All patients deserve the same access to high quality MRI technology. This imaging method is used in the diagnosis of and treatment planning for diseases of the musculoskeletal system, diabetes, as well as cardiac and vascular diseases – all of which affect obese patients," said Dr. Heinrich Kolem, Head of the Magnetic Resonance Group at Siemens Medical Solutions. "The open MRI systems previously on the market could not keep up with today's high-field standard for image quality.

The new MAGNETOM Espree MRI system is in a league of its own. It offers greater patient comfort and high-field quality diagnostic images."





PROFESSOR ERICH R. REINHARDT, president and CEO of Siemens Medical Solutions (left), and Dr. Jerald H. Pietan at the installation festivities of the new MAGNETOM Espree at Mayo Clinic, Jacksonville, Florida. MAGNETOM Espree is the first Open Bore MRI system in the world.

“Patients need to be the focus of all our efforts.”

Professor Erich R. Reinhardt, CEO and president of Siemens Medical Solutions

Doyle, the patient, is now at the center of the MAGNETOM Espree and feeling fine. This kind of treatment is only part of the reason people come from all over the world to Mayo Clinic.

Jerald H. Pietan, M.D., Chair of the Department of Radiology at Mayo Jacksonville, says, “as the delivery of healthcare becomes more and more complex, all too frequently the patient seems to be left out of the equation. Technological advances, cost efficiency and a competitive stance often seem to be the driving factors. Though intentions may be good, the patient gets lost. At Mayo, that’s never the case, for here, the patient pilots everything.”

Patients Come First

According to Pietan, the latest in technology is an integral part of good medicine, but in order for it to do its job, it requires broad minds and people who are sensitive to the needs of others. Medicine, science, technology and even economics must have a solid base of human values. The development of

MAGNETOM Espree is the latest of what Pietan views as patient-centric care from every angle. “Our relationship with Siemens began in 1994, when we were looking at digitalizing our radiology practice. Over time, that association has developed into an ongoing partnership of mutual benefit. We both realized early on that we had common visions and common goals.”

Erich R. Reinhardt, Ph.D., president and CEO of Siemens Medical Solutions, believes that the patients’ interest need to be at the center of all activities. “Many patients simply don’t get this feeling,” he says. Patients need to be the focus of all our efforts. We continually need to ask ourselves: which products, which IT solutions, and which services can we develop to help improve workflow in a patient-centric healthcare system. Siemens believes that innovation must improve workflow efficiency, increase the quality of care and reduce the cost of such care. Because of this, Pietan has found them exceptionally receptive to new ideas and different methodologies.



WORKFLOW SPECIALISTS: “Their jobs used to be radiology recording,” says Pat Lemme, Director of Radiology Systems and Support Services at Mayo Clinic, Jacksonville, Florida. “Now they monitor the entire workflow of our department.”

Once a year, physicians from Mayo travel to Germany to meet with Siemens engineers who develop imaging technology. Pietan explains, “We spend three to four days in very heavy meetings. They show us what they have, we say, ‘That’s a great idea’, or we make suggestions that will result in more of what we need. The exchange of information allows them to develop and refine the technology toward our specific needs. We, in turn,

gain a greater understanding of the possibilities available to us.”

“Over the years,” he says, “we have watched Siemens evolve into a company in which collaboration and exchange of information are fundamental to what they do, both internally and externally. They are innovative in their thinking as well as in their technology, and that fact has made an enormous difference on both sides of the equation.”

A Better Mousetrap

Until now, none of Mayo’s radiology sites have ever had an open magnet. “We knew there were patients unable to have a successful MRI, due to issues of size or claustrophobia”, says Pietan, “a high percentage of the people we see are overweight, and many need sedation to undergo an MRI, which means they have to stay longer.” Mayo appreciated that open MRI systems addressed those personal patient issues, but felt the performance of the models on the market to be unsatisfactory. “The magnetic field was weaker, and as a result, the images were inferior,” states Pietan. “The challenge was to find someone who could not only redefine the personal space of the traditional MRI, but also give us images of quality equal to the closed models.”

They turned to Siemens, and it was no surprise when they accepted the challenge and ran with it.

An Open Idea Whose Time Had Come

MAGNETOM Espree Open Bore MRI is the best of both worlds, boasting the powerful 1.5T field strength of the closed model, with a full one foot (30 cm) of head room. Thanks to the remarkably short 125 cm magnet, over 60 percent of typical clinical applications can be performed with the patient’s head outside of the Open Bore; for those whose heads are inside, there are 12 additional inches of nose-to-ceiling space.

The time it takes to complete the exam with MAGNETOM Espree is cut in half, as the need for patient repositioning and coil changes is completely avoided. All this, while providing

up to four times more signal-to-noise (SNR) compared to conventional open MRI's for superior image quality, even in the periphery. And, contrast for viewing the secondary and tertiary vessels is excellent.

The combination of Tim (Total imaging matrix) technology, the special matrix coils, a very wide bore, and a super short magnet results in patient comfort without forfeit of imaging quality. "We have produced," says Heinrich Kolem, Ph.D., head of Siemens' Magnetic Resonance Group, "an MRI that produces images of the highest quality that can be used in the diagnosis of and treatment planning for diseases of the musculoskeletal system, diabetes and cardiac and vascular diseases. "MAGNETOM Espree is in a league of its own, offering greater patient comfort with no sacrifice."

Clearly More Than Visual Clarity

The relationship between Mayo and Siemens isn't confined just to imaging technology – workflow issues that continue to lead to a higher level of service for the patient were and are also crucial in the cooperation.

In 1994, Mayo Jacksonville launched a move toward automated radiology practice (ARP), with an eye toward developing an electronic network that would connect its current hospital (St. Luke's), its primary-care practices and over 200 clinical consultants.

They became a Beta site for Siemens, and since that time, the two have collaborated in various ways, including education. "We work together to improve both the technical and clinical side of medicine," says Pietan. "For instance, it's difficult to hire engineers and technical people who really understand the work, so we (i.e. Siemens and Mayo) split the cost to have two master's level graduate students from the University of North Florida here with us."

When a woman rushes into the room, he introduces her as Patti Lemme, Director of Radiology Systems and Support Services, and his "right-hand man". Both smile, and Lemme picks up the conversation. "The point of ARP was to eliminate the hard copy film



EVERYTHING IS DIGITAL: Workflow moves rapidly from examination request through imaging, processing, reporting, distribution and archiving.

as well as transition to a change in practice that involved physicians, nurses, staff and all support," she says.

Continuous Progress

She explains that in order for the evolution to be successful, flawless interconnection with the Automated Clinical Practice (ACP), whose implementation was completed in 1996, the picture archiving and communications system (PACS) and the previously established radiology information system (RIS) was crucial. "A faster, better and more efficient system like this doesn't occur overnight, but rather develops in stages," says Lemme, guiding us through the labyrinth of hallways to the reception desk, where patients are being checked in. "We wanted to achieve a conversion that worked for our people and referring physicians, and felt seamless to the patient." In 2003, Mayo Clinic/St. Luke's Hospital radiology performed 139,976 diagnostic exams, and a combined 118,120 of CT, MRI, nuclear medicine, and ultrasound images. Most of those exams were prescheduled and pre-ordered, and from the moment the patient

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Pat Lemme, Director of Radiology Systems and Support Services, Mayo Clinic, Jacksonville, Florida

»We want to reduce the stress of illness on every level.«

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checked in, a bar code on the order identified him/her. “That bar code,” Lemme explains, referring to the unique accession number, “is the key to everything. Patient exam, diagnosis, procedure, results and images are associated with it, following the patient from start to finish.”

Moving to the reading room where exam areas surround the central core, there is a clear absence of light boxes. “We’re past that stage,” she says. “The short version is this. Everything is digital. All examinations are done in the surrounding rooms. The digital test units take the exams as they are finished and send them to the PACS QC workstations, where the technologists review and check every one for quality and constancy before the patient leaves the examination room.”

Lemme explains that results are then routed to the PACS archive and sent to the reading room, where they are electronically available to radiologists from any of the workstations. The rooms where the results are routed and interpreted are according to subspecialty – musculoskeletal, heart, brain, etc. After the radiologist reviews the image and makes a final report, it is electronically distributed to the physicians and/or stored.

“Typical turnaround times used to be around four hours. Now it’s minutes,” she states.

Optimized Workflow Improves Patient Care

Lemme says productivity has increased in every way. We pass a woman and she stops to introduce her. After exchanging a few words, she goes down another corridor. When we inquire about her profession, Lemme explains, “Her job description is radiology recorder, but with this change from

analog to digital, she and her colleagues have broadened their sets of skills and taken on a great deal more responsibility. Altering the workflow has eliminated the need for additional staff with practice growth, but actually made them more marketable – and more satisfied. They have become accountable for more than simply transcribing, and have risen to the challenge. Being in charge of the flow of all reports is no small task, but they’ve welcomed the change. Both the technical and clinical side of patient care has been nothing but positive.”

Pietan agrees, saying “When waiting is involved, the entire system gets bogged down. A workflow that moves rapidly from examination request through imaging, processing, reporting and distribution does more than simply make our jobs easier, it improves patient care on a very basic level. “People arrive here from all over the world, and most of them are very sick. Coming back a second day for the results of a CT or any other exam means either another trip or an additional overnight stay. Offering patients and their physicians instant access to information is another way of putting the patient first. We want to minimize the stress of illness on every level.”

Pietan believes that while most companies start by thinking in terms of technology, then translating those ideas to people, Siemens’ direction is different. “Siemens,” he says, “considers the patient right from the conception of the idea, carrying that philosophy all through the process; as the technology is being built, it’s as though a virtual patient is right there in the room. It’s form following function. Even after completion, they look toward improvement. We have had that in common with them from the start. Always,



DESIGNED WITH THE PATIENT experience in mind:
the entrance environment of Mayo Clinic, Rochester, Minnesota.

September 23, 2004, Mayo Clinic Rochester – While driving from St. Paul/Minnesota to Rochester, the home of the first Mayo Clinic, I experience a flat tire. I pull over and look around. All I can see are endless fields of corn, but no sign of a building. I hardly step out of the car when a truck pulls over. A man gets out and within ten minutes, the spare is on and I'm ready to hit the road. "Where you headed?" he asks. Mayo, I tell him. His expression changes to one of gravity and I realize he thinks I'm going there as a patient. No, I tell him, I'm doing a story. He's relieved for me and as he heads back to his truck, turns to say, "although, if you were sick, no better place in the world to be. They got it all."



! MAYO ROCHESTER is the home of SOMATOM Sensation 64, the fastest CT in the world.

»Physicians need to focus on the patient, not the bottom line.«

James Potter, Head of Medical Ventures for Radiology, Mayo Clinic, Rochester, Minnesota

the patient comes first. As a result, our partnership always leads to good for the people we serve.”

Rochester in Minnesota is a Mayo city. Planted squarely in the middle of miles of flat-as-a-board farmland, the clinic occupies approximately 15 million square feet, its 72 buildings connected by its own underground hallway system. Since its inception in 1889, the facility has treated over 1.44 million outpatients, comprising 80 percent of those who come here. On a typical day, 544 CT scans are performed.

This is a good home for the SOMATOM Sensation 64 computed tomography system, developed by Siemens Medical Solutions. It is the first of its kind in the United States and the focal technology of Mayo’s new CT Clinical Innovation Center (CIC), a cooperation with Siemens.

Fast, Clear, Accurate and Amazing

SOMATOM Sensation 64’s ability to acquire images of the smallest intracranial, pulmo-

nary, mesenteric and peripheral vessels in less than 10 seconds sets a new benchmark in imaging quality. Its 64 slices per rotation give unprecedented sub-millimeter volume coverage and the world’s fastest gantry rotation time at 0.33 seconds. Clarity isn’t sacrificed for speed. With a spatial resolution of below 0.4 mm, it delivers the industry’s highest isotropic resolution and enables optimal image quality in cardiac, neurology and body imaging applications. Joel Fletcher, M.D., assistant professor of radiology and co-director of the CIC, says, “Because of the vastly improved spatial resolution and speed, we can image smaller structures, construct the imaging planes that correspond to human anatomy rather than a CT gantry and image dynamic processes not measured before.”

Early detection and quantitation of disease, improving imaging care for difficult-to-image patients (such as pediatric or obese patients), and reducing radiation dose while maintaining image quality are the focal interests of the CIC. The patient receives no more radiation than absolutely necessary, as the scanner

makes the measurement and adjusts accordingly. And because it's so quick, the amount of contrast necessary is greatly reduced. SOMATOM Sensation 64 offers, as one radiology technologist puts it, "more options than we knew what to do with. Every day we find a function that comes in perfectly useful. A clear example of sophisticated, well thought-through technology. We love it."

Lots and lots of patients have been scanned. There is to be a ribbon cutting in the afternoon, the official unveiling of the new technology, but the real excitement buzzes around the noon staff meeting. It's lunchtime, but the room is full, some of the physicians in scrubs, carrying sandwiches they'll eat while being introduced to the new CT and to the CIC.

An Ideal Marriage Of Minds

The affiliation of Mayo and Siemens has advanced beyond medical machinery to a major commitment of shared clinical and research resources. Cynthia McCollough, Ph.D., associate professor of radiologic medical physics, and co-director of the CIC, is a woman whose enthusiasm is evident when she steps to the podium to speak. She and Fletcher head up the CIC and today's presentation is the introduction of the role it will play in Mayo's ongoing mission of providing the best in patient care.

Mayo, McCollough begins, has a very long history of innovation. "We retain a leading role in CT imaging," she says. "Our volume has been in double digit growth for over five years now, and although the technology is also evolving at an exponential rate, in order to take advantage of it, we needed more dedicated research built into our infrastructure."

Siemens has been moving the imaging bar higher and higher for years and was the logical choice of partner in such a venture. McCollough explains, "A structure in which clinicians and researchers work together to advance CT imaging and post-processing techniques for use in patient care fits the model of Siemens' own infrastructure. We've had numerous opportunities to work with them in other ways and are always



JAMES POTTER (ABOVE) AND PAUL LINDELL, M.D. (BELOW) firmly believe that everything begins and ends with the patient.



ASSOCIATE PROFESSOR of Radiologic Physics, Cynthia McCollough, Ph.D., proudly presents images acquired with SOMATOM Sensation 64.

their disposal." In turn, Siemens benefits from the opportunity to develop and refine their imaging technologies with a partner who serves as a model for medical practice throughout the world.

A slide show gives a point-by-point visual of how the CIC will work with each of the departments, as well as demonstrates the clinical value of SOMATOM Sensation 64; it is precise and useful, even telling the physicians how to sign up to access and/or learn to use the new technology.

Money Isn't Everything

Even as a non-clinician, I am left slack-jawed. James Potter, Senior Manager, Office of Technology Commercialization, tells me I am not alone. Potter describes himself as the man who ensures that Mayo physicians can stay away from the "money side" side of medicine. "My job is putting together resources such as Siemens' and Mayo's," says Potter, smiling, "so that humanity and money can coexist and it's not ugly."

He explains, "Physicians need to focus on the patient, not the bottom line. Here, money doesn't drive them. We have doctors that could go someplace else and make a whole lot more a year, but they don't. Why? Because we offer something more important to them – the ability to really practice medicine. We give them the time. We give them the resources. No doctor is ever told to limit her or his time with a patient and move on to the next. Research is not done in a vacuum, but created because of patient problems. Everything begins and ends with the patient."

Because of this philosophy, Mayo chooses its partners carefully. Potter states, "I've been working with Siemens since 1988 and I'll be frank. I think that their vision best fits Mayo's vision of healthcare. When we were contemplating the CIC, I picked up the phone and called them. It was the only call I had to make. They understood immediately and climbed aboard with both feet."

And he adds: "When they make a commitment, we know that it will be honored. From that point on, whatever our goals, they'll help us get there. No browbeating. No wheeling

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Cynthia McCollough, Ph.D.,
Associate Professor of
Radiologic Physics, Mayo Clinic,
Rochester, Minnesota

impressed at every level with their customer service."

Perhaps more importantly, Mayo and Siemens share a similar corporate culture. She explains, "We believe that to achieve excellence in medicine, there must be medical leadership at the top. Siemens reasons that in order to create innovative technology, it is important to have scientists in key positions. The combination of their very strong technology leadership along with their commitment to improving patient care makes them an excellent match for us."

The partnership with Siemens provides more than access to the state-of-the-art SOMATOM Sensation 64; it includes both substantial technical support and dedicated research support. McCollough explains that doctors who are doing 20 to 40 scans a day don't have time to slow down and try something new. "This whole project", she says, "is about seeing that radiology and the departments with whom we collaborate have more tools and time at

or dealing. From the start, they are on your side, a member of your team."

Siemens Medical's CEO Erich R. Reinhardt sees the partnership with Mayo as one that will benefit everyone, most importantly, the patient. He says, "Our technology is successful because it is focussed on improving workflow in a patient-centric healthcare system. A combination of Mayo's clinical expertise our trendsetting innovations and a combined interest to optimize processes will produce real solutions to help improve healthcare efficiency."

Potter tells a story that clearly demonstrates the ideal link between technology and humanity. "I happened to be in the room when Joel Fletcher had a patient ready to be scanned on SOMATOM Sensation 64," he remembers. "The man was obese and thought to have a tumor, but nothing had shown up on the 16-slice scanner. Joel was so frustrated. He was sure there was something there, but since he couldn't locate it, they thought they were going to have to perform surgery to find it. "The patient goes through, and bingo! There it was. The expression on Joel's face said it all. He was beaming like a kid, saying, "There it is! We found it!"

"That", says Potter, "is how medicine should be."

Author: Susan Barrow is a free-lance writer based in Jacksonville, Florida.



JOEL FLETCHER, Assistant Professor of Radiology at Mayo Clinic, Rochester, Minnesota (left), explains the benefits of the research partnership Mayo-Siemens in the course of which the brand-new SOMATOM Sensation 64 was inaugurated.



ON OCTOBER 19, 2004, Mayo Clinic's president and CEO Denis A. Cortese, M.D. (sitting on left), and Siemens Medical Solutions' president and CEO Erich R. Reinhardt, Ph.D. (sitting on right), signed a Memorandum of Understanding (MoU) to work together in developing new solutions to ensure the availability and affordability of quality healthcare worldwide. The MoU lays the initial foundation for a deep and long-lasting relationship that creates real, tangible benefits for patients.