

A technological leader

Avera McKennan invests in technology to benefit patients, support physicians

BY DONNA FARRIS, AVERA MCKENNAN WRITER/EDITOR

Technological sophistication in the hands of expert medical teams has led Avera McKennan to become a regional health care leader – a position that’s maintained by adopting proven technologies that benefit patients and support physicians in providing the highest quality care.

“Avera is an early adopter of technology,” said Fred Slunecka, Avera McKennan regional president. While on the cutting edge, Avera does not consume valuable resources and energy trying to immediately adopt every new advancement. “There are organizations that absolutely want to be the first. We want to be toward the front, but not the first. We can be better stewards of our resources by being the first in the region to adopt a proven technology, rather than spending a lot of our dollars on unproven technology,” he said.

Yet in terms of technology, Avera McKennan has long been a local and area leader. “We have a very solid record of firsts. If we’re not first with a proven technology, we are quick to adopt it.”

In the 1970s, this hospital offered the first computer tomography (CT) scanning in the region. And 21 years ago, McKennan was first to offer life-saving Careflight air transport services.

Just recently Avera McKennan added the da Vinci® robotics surgical system with high-definition, three-dimensional vision – the latest robotics technology in the region.

Other technological firsts in the Sioux Empire region for Avera...

- First fixed MRI unit in the area in 1992
- First 3 Tesla MRI unit, and first super conductive open .7 Tesla MRI

- First digital mammography
- First cardiac CT and MRI testing
- First to perform virtual colonoscopy
- First eICU to connect to Critical Access Hospitals in rural settings
- First teleradiology Picture Archiving and Communication System (PACS)
- First in the region and state to offer photopheresis treatment
- First dedicated hospital to cardiac and vascular care with the opening of the Avera Heart Hospital of South Dakota in 2001



While many organizations around the country make purchasing decisions based strictly on return on investment, the primary consideration at Avera McKennan is patient need. “I call it the ‘mom’ factor. Would I want my mom to have access to this technology?” Slunecka said.

Powerful technology keeps Imaging Center on the cutting edge of diagnosis

Equipped with the latest in diagnostic imaging technology, Avera McKennan’s Imaging Center is on the cutting edge with powerful tools such as the VCT 64 Slice CT scanner which captures images at a rate faster than 150 per second, or 3 Tesla MRI with a magnetic field strength 60,000 times greater than the Earth’s pull. It’s a balancing act to stay on that edge, and yet not invest millions in technology that will not ultimately benefit patient care, said Keith Miller, director of Imaging Services at Avera McKennan.

“We have always been a leader in technology, and I think we do it with very wise financial stewardship. We don’t jump in to a new technology just to jump in. We involve logic and methodical reasoning in all of our decision-making,” Miller said.

Yet leaders remain poised to invest when they recognize a beneficial new technology. For example, Avera McKennan was first in the region to offer digital mammography, installed in December of 2005.

First to offer 3 Tesla MRI

Avera McKennan was the first and is the only facility in southeastern South Dakota and the tri-state region to offer 3 Tesla MRI. The power of this magnet allows for superior image quality. Because of its power, scan time is reduced by 40 to 50 percent for most procedures in comparison to 1.5 Tesla MRI.

Specially trained physicians and imaging technologists at Avera McKennan are using MRI for breast MRI and breast MRI biopsy – also the first in the region to offer this.

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“Breast MRI is able to delineate tissue better than any image modality,” Miller said, including digital mammography. “We don’t use it to screen every woman because it’s extremely expensive.” Rather, the technology is offered to women at high risk of developing breast cancer.

MRA, magnetic resonance angiography, can visualize vessels in the brain without having to inject dyes to highlight them as in conventional angiography. The Avera McKennan Imaging Center

just recently started offering MRI for the heart. “We are the first in the state to do this as well,” Miller said.

With the 3 Tesla MRI being a very versatile tool, training of physicians and technologists is just as important as the machine’s capability, Miller said. “It’s no good having a fancy machine with no one to run it or interpret the results.”

“Three Tesla MRI produces exceptional images of the brain, neurovascular system, spine and muscular-skeletal system,” Miller said. While a 1.5 Tesla machine is good, “the 3 Tesla offers a lot of different nuances of software that helps us to complete a better picture of what’s going on with the diagnosis.”

Computer tomography, or CT, scans are faster and less expensive than MRI, and so are often the first line of approach unless doctors know MRI is a better first choice, Miller said. The 64-slice CT scanner completes whole body scans in 10 seconds or less and is capable of three-dimensional images.

The sooner a stroke patient is diagnosed, the more brain function can be saved with appropriate treatment. And so the CT scanner is the destination of all patients who present at Avera McKennan with stroke symptoms, within minutes of their arrival.

Where is technology headed?

Miller expects CT technology to move to 256 slice, which would be a “virtual reality” walk inside the anatomy.

With MRI, Miller said there are stronger fields available of up to 11 Tesla. But such machines are so powerful that patients have blacked out. So until research devises a way to manage that aspect of the technology, he expects 3 Tesla will be the strongest magnet used at Avera McKennan. The related software, however, will continue to evolve to make images clearer and the exam faster.

Other key imaging technology at Avera McKennan includes Dexascan for osteoporosis detection, 3-D and 4-D ultrasound, and .7 Tesla superconductive open MRI for claustrophobic and bariatric patients. Miller said Avera McKennan has the full spectrum of imaging technology, making it rare that any patient would need to be referred elsewhere for imaging.

As opposed to the “exploratory surgery” of yesteryear, diagnostic imaging provides a quicker accurate diagnosis in less invasive ways. “Everything is always moving toward getting the information as fast as possible,” Miller said.

“Sometimes, an addition of new technology will lose money,” he said. For example, digital mammography is more expensive to offer than traditional mammography, yet insurance reimbursements may not make up the difference. However, patients benefit in that 15 to 28 percent more cancers are detected in younger women and in women with dense breasts. Also, digital mammography cuts the radiation dose patients receive by up to 50 percent.

The other very important consideration is whether or not physicians request the technology. “One reason we have the reputation for great clinical care is that we support our physicians with the technology they need to carry out best practices,” Slunecka said.

A critical balance lies between state-of-the-art equipment, and knowledgeable, experienced medical teams. “Great organizations require great hardware and great software. One really supports the other,” Slunecka said. Software is the human component – professionals willing to gain the necessary training and expertise. Hardware is facilities and equipment.

Because technology is ever advancing, planning for updates is constant. “We have a five-year capital plan, and we try to anticipate when new technology will be ready,” Slunecka said. To this end, hospital leaders stay on top of the latest literature, attend conferences, set priorities and plan accordingly.

The plan may call for expansion of existing technology. For example, the da Vinci® robotics system is now used for prostate and gynecological surgeries. In the future, it will likely have applications in other specialties. Older technologies may take on new uses. An example is ultrasound, now being used in intensive care to determine if feeding or breathing tubes are properly placed.

Wireless technology will enhance use of existing technology. Wireless digital

radiography is already at work in the Emergency Department. Images can be captured on a wireless unit and sent directly for the physician to view on a computer monitor in seconds rather than minutes.

An emphasis in the future will be on labor saving computer technology, such as the automatic tracking of patient status and vital signs. Equipment is already capable of such tracking – what's needed

is integration with the hospital's computer system. A step toward that end is the Avera HealthCARE™ electronic medical records system, recently implemented at Avera McKennan and soon to be implemented in clinics.

Barcodes and radio-frequency identification (RFID) chips could help track medication, supplies and equipment, so there's never a misplaced wheelchair or gurney. Such labor saving

measures could free up nurses to spend more time doing what they do best – caring for patients.

"All this computerization exists. The next wave will be integrating it into the hospital computer system," Slunecka said.



The latest in cancer treatments, right here at Avera



Cancer patients who need the latest technology in radiation therapy need look no further than Avera, where technologies such as breast brachytherapy, image-guided radiotherapy and X-Knife radiosurgery are available.

"These are the hot topics in radiation therapy," said Dr. Kathleen Schneekloth, radiation oncologist with Medical X-Ray Center. "There's nothing out there that is on the cutting edge that we don't offer here."

Avera is the first and only cancer treatment center in the region to offer breast brachytherapy, which has been available through Medical X-Ray Center at the Avera Cancer Institute since it was approved by the FDA in 2002.

Brachytherapy itself has been used to shrink tumors for 100 years. It is derived from a Greek term, "brachio,"

meaning short, as treatment is conducted with a radiation source at a very short distance.

The application for breast brachytherapy, however, is new and requires specialized equipment. The treatment is for a select group of patients who have early-stage breast cancer, which is surgically treated by a lumpectomy. For these patients, brachytherapy has been found to be 99 to 100 percent effective in preventing a recurrence of cancer in five years after diagnosis.

After a lumpectomy, a single balloon catheter is inserted into the cavity created by the surgical removal of the tumor, where it stays through the duration of treatment, which is typically only five days. During the actual treatment, the catheter is attached to a computer controlled

machine which is programmed to deliver a radioactive seed into the balloon portion of the device, where it emits radiation from within the breast.

"There are very few side effects," Dr. Schneekloth said. "It's very tailored, very localized radiation treatment."

Aside from being an effective treatment, it's also convenient for women who work or who live at a distance from Sioux Falls. Treatment takes place over five consecutive days, instead of the six- to seven-week course of conventional radiation therapy. Brachytherapy is available for other types of cancer, such as prostate.

Image-guided radiotherapy is another advancement in cancer care offered at Avera. "This technique makes the delivery of radiation even more precise by imaging the target just before radiation is delivered," Dr. Schneekloth said. It involves imaging technology such as CT scanning and ultrasound.

Also being offered at Avera is radiosurgery, also known as X-Knife. This "surgery" is non-invasive and does not use a scalpel, but rather uses the invisible blade of radiation to deliver a very precise dose to a small target, either in the brain or elsewhere in the body.

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Surgical robotics lead to faster recovery

No longer the stuff of futuristic science fiction, robotics are a technologically-advanced reality in surgery that allows patients to have shorter hospital stays, lose less blood, experience less pain and get back to work sooner.

Surgeons at Avera McKennan are now doing procedures such as prostatectomies, hysterectomies and other gynecological surgeries using the da Vinci® S HD Surgical System, which integrates three-dimensional, high-definition video and robotic technology to virtually extend the surgeon's eyes and hands for minimally-invasive procedures. The da Vinci® S with 3D HD vision is the most advanced platform for minimally invasive surgery available today. Avera McKennan is the first and only facility in South Dakota to have this new high-definition version of robotic surgery equipment.

"Everything in surgery is moving toward being minimally invasive," said Dr. Luis Rojas, gynecologic oncologist at Avera Cancer Institute. "There are clear patient benefits with robotics." Among them are shorter recovery time, less blood loss, reduced trauma to the body, lowered risk of infection, less pain, less scarring and a shorter length of stay in the hospital.

Average length of stay for a conventional hysterectomy is five days, with four to six weeks recovery time at home. With robotics hysterectomies, women are staying in the hospital overnight, and going back to work within a week or two.

While no surgical procedure is without risk, studies show that robotic surgery, in comparison to conventional or laparoscopic surgery, decreases blood loss by 60 percent and the risk of surgery-related injuries by up to 70 percent, Dr. Rojas said.

Many of the same benefits are true for men who undergo robotic prostatectomies. A prostatectomy is a common surgical procedure – surgical removal the prostate gland – when a man has been diagnosed with early-stage prostate cancer.

Prostate cancer is the most frequently diagnosed cancer in men. It's estimated that in 2007, more than 218,000 new cases of prostate cancer will be diagnosed. "With PSAs (prostate specific antigen screens) we can detect it very early, giving us the option of doing some of these newer procedures," said Dr. David Rosinsky of Urology Specialists Chartered in Sioux Falls, one of several urologists trained to perform these procedures at Avera McKennan. This year, 65 percent of all prostatectomies in the nation will be done using a da Vinci system, according to company information.

Instead of the traditional open procedure, which requires an incision from below the naval down to the groin area, the patient has a few small incisions or operating ports – 1 to 2 centimeters in size – across the abdomen for the insertion of robotic arms.

"The main advantage to the patient will be a shorter hospital stay and quicker recovery. The person who undergoes the robotic procedure will feel back to their normal selves months sooner than with the open technique," Dr. Rosinsky said.

High-tech solutions benefit Avera's youngest patients



Specialized equipment for neonatal care is leading to improved clinical outcomes for Avera's tiniest patients.

An example is the Giraffe® OmniBed, in use in Avera Children's Hospital's Level III Neonatal Intensive Care Unit. Premature infants lack the body fat necessary to maintain their body temperatures. Their skin is very thin – almost translucent – and its moisture evaporates very quickly. These babies are also vulnerable to illness and infection.

The OmniBed serves an isolette (or incubator), radiant warmer and crib all in one. It provides essential heat to maintain a normal body temperature in either an open or closed position. The open position allows access to the baby for care, while the closed position reduces noise and keeps the baby's environment stable. The Giraffe® bed also provides humidity, up to 100 percent, which reduces water loss from skin.

The push of a button converts the bed from an incubator to an open bed warmer. A rotating mattress gives caregivers access to a baby from all sides, and a built-in X-ray cassette tray, internal bed tilt and scale minimize the need to move the infant.

Other life-saving NICU technology includes high-frequency ventilation and nitric oxide therapy to enhance lung function of premature infants.

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- DR. LUIS ROJAS, GYNECOLOGIC ONCOLOGIST AND SURGEON

The equipment is a two-part device. The patient side cart used for the actual surgery has four robotic arms. One holds a camera, the other three control miniaturized surgical instruments. Robotic arms can move in more angles than the human wrist, providing for increased precision. The surgeon works at a separate console to the side of the patient, looking through an eyepiece to see magnified, 3-D imaging with real depth perception. The surgeon controls robotic devices through finger holds. "Every movement you make is transferred to the device in the patient," Dr. Rosinsky said.

At the same time, robotic and computer technologies scale, filter and translate the surgeon's hand movements into precise micro-movements of the surgical instruments. Robotics equipment doesn't replace human surgeons – rather it enhances their ability to perform complex minimally-invasive surgery. The robotics equipment cannot be programmed or make decisions on its own to perform any surgical maneuver without the surgeon's input.

"The visuals are so great – it's like doing microsurgery. I can see tissue planes, blood vessels and nerves that I can't see in an open patient," Dr. Rojas said. Robotic technology has the capability of filtering out human imperfections and involuntary movements. Also, the robot's ratio of movement is one to three. For every 3 centimeters a surgeon's hand moves, the robotic arm moves 1 centimeter. "That precision translates into less trauma for the patient, and a better recovery," he said. "My goal is to do as much as I can minimally invasively," Dr. Rojas said.

There are many other possible applications in the future, such as cardiothoracic surgery for heart bypass. "We're just scratching the surface," Dr. Rosinsky said.



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For older children, breakthrough technology is reducing the pain and stress of multiple needle sticks in locating veins. Site-Rite® Ultrasound visualizes vessels and guides needle placement, and the VeinViewer by Luminetx™ uses infrared light to image hemoglobin in red blood cells, projecting accurate, real-time images onto the skin as to where veins are located. This specialized equipment is especially helpful when trying to start an IV or draw blood from children, making it easier to locate often hard-to-find little veins.

Technology provides new and better ways to diagnose neurological disorders

Avera Neuroscience Institute, an integrated system dedicated to the care of the brain, spine and nervous system, is home to the region's only Autonomic Testing Lab, which provides tools to find answers to previously unexplained symptoms.

The Autonomic Nervous System is the part of the central nervous system that controls the body's involuntary functions, such as regulation of blood pressure; heart rate; temperature; sweating; and bowel, bladder and sexual function. Lightheadedness, weakness, unexplained pain and generalized fatigue are just a few symptoms of autonomic dysfunction.

Autonomic testing combines physician expertise and sophisticated medical equipment to provide a more in-depth look at autonomic nerves than traditional methods of testing, and therefore can diagnose symptoms that would otherwise be unexplainable.

Cardiac and vascular care

The Avera Heart Hospital of South Dakota is ranked No. 1 in South Dakota for overall cardiac services, cardiac surgery, cardiology and cardiac interventions.

Advanced facilities include three catheterization labs providing cardiac, electrophysiology and vascular services; three state-of-the-art surgical suites; a 64-slice CT scanner offering carotid, coronary and abdominal angiograms; as well as the latest surgical and interventional procedures.