

Comprehensive neuroscience care

Avera Neuroscience Institute offers a wide continuum of services

BY DONNA FARRIS, AVERA MCKENNAN WRITER/EDITOR



Concept of Care

To care for the most complex system of the body, the region's largest team of experts provides the region's widest continuum of care through the Avera Neuroscience Institute.

Rather than being a specific building or location, the Avera Neuroscience Institute is a “concept of care,” said Mary Jones, director of Neuroscience at Avera McKennan.

Neuroscience is comprised of a multidisciplinary team specializing in neurology, trauma, neurosurgery, neuroradiology, psychiatry and emergency medicine. It's a growing emphasis at Avera McKennan for a number of reasons, said Julie Benz, assistant vice president for Orthopedics, Neuroscience and Rehabilitation at Avera McKennan.

“With our aging population, we have more people suffering from stroke – our Number 1 diagnosis in Neuroscience,” Benz said. A leading risk factor for stroke is Type 2 diabetes – a growing epidemic in society with 12 million diabetics nationwide. Younger patients also need expert neurological care, for example, in the case of head injury or spinal cord injuries suffered in accidents.

Neuroscience care covers a wide spectrum of disorders, including stroke, headaches, Alzheimer's disease and dementia, brain tumors, spinal conditions, and neurological diseases such as epilepsy, multiple sclerosis and Parkinson's disease.

Expert team

“Our Neuroscience team is the premier in the region, and our neurologists and neurosurgeons have really driven the innovations of our Neuroscience Institute,” Benz said.

This includes a team of three neurosurgeons, seven neurologists, three psychiatrists specializing in rehabilitation and five neuroradiologists. While all neurologists see general neurology cases, their special interest areas include movement disorders, electro-diagnostics, stroke, headache/migraines, multiple sclerosis, and amyotrophic lateral sclerosis (ALS). As needed, other specialists enter into neurological care, including oncologists and pain specialists.

“Our neuroscience specialists are extremely knowledgeable and patient focused, resulting in great outcomes,” Benz said.

At weekly multidisciplinary case conferences, physicians present their most complex cases, discussing diagnosis, clinical care and treatment options – all for the purpose of integrating patient care and improving patient outcomes.

“This is an incredible merging and collaboration of very skillful, knowledgeable physicians,” Benz said. Much more than a “second opinion,” this gives patients the benefit of having the region's most highly-qualified and experienced experts consult on their case, Jones said.

The Avera Neuroscience Institute brings together and coordinates everything involved in neurological care: Prevention strategies, diagnosis, treatment, management, surgery, rehab and follow-up care.

State-of-the-art diagnostics

The Avera Neuroscience Institute features the region's most cutting-edge diagnostic tools, giving physicians and patients the answers they need quickly.

This includes the 3.0 Tesla high definition MRI imaging – the first and only of its kind in the region. With a magnetic field strength that's 60,000 times greater than the Earth's pull, it's the most powerful MRI technology available for clinical use, leading to faster diagnosis and treatment for a wide range of conditions, including multiple sclerosis, cancer, or other diseases of musculoskeletal system.

Patients presenting with stroke symptoms at Avera McKennan go immediately for imaging in the VCT 64 Slice CT scanner, which captures images at a rate faster than 150 per second. The goal is to confirm a diagnosis and begin life-saving therapy within 45 minutes of the patient's arrival and within the first three hours after the onset of symptoms when possible.

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The Avera Neuroscience Institute offers the region's only Autonomic Testing Lab and Balance Center. "So many different symptoms can arise from malfunction of the nervous system, and these diagnostic tools provide physicians and patients with the answers they need to determine the best therapy," said Dr. Todd Zimprich, neurologist with Neurology Associates and developer of Avera McKennan's Autonomic Testing Lab.

The best of care

Many neurological conditions are treated on an ongoing basis through evidence-based clinical and outpatient therapies. But for patients who must be hospitalized, Avera McKennan is developing a 26-bed unit on 2 East dedicated solely to neurological care. This includes a 10-bed acute unit to allow for a smooth transition from intensive care.

While rehabilitation is a separate admission, many patients go directly to rehab from acute hospital care. The neuroscience unit's close proximity to rehab will allow for integration of rehab care as early as possible. "We will be able to start interventions earlier than ever before," Benz said.

The unit will be staffed with nurses either certified in their specialty or working toward certification. "These nurses know the issues, complications and protocols common in neurological patients," said Dr. William Rossing, neurologist with Neurology Associates. "This allows us to streamline care, provide a better care experience and improve outcomes."

Benz said the growth and development of the Avera Neuroscience Institute has accelerated in the past two years, with the assembling of the largest neurological team in the region. Outlying communities are served by a number of outreach clinics.

"It's an exciting opportunity for us to make a difference for our patients, because we have the technology and the expertise to offer the full continuum of neurological care," Benz said. "What we do here is cutting edge."



High-tech neurosurgeries are easier, safer for patients

Advanced technology allows neurosurgeons to operate on complex nerve tissue in the brain and spine with greater ease and safety than ever before, said Dr. Michael Puumala, neurosurgeon with Avera Neurosurgery.

"We have the same availability to technology here as virtually anywhere in the country," Dr. Puumala said.

One example is microsurgery on the brain, spine and spinal cord. Powerful microscopes give surgeons a magnified view of small, delicate structures, as they use specialized micro-instruments to tease out very small abnormalities. "In neurosurgery, 1 to 2 millimeters is a pretty significant difference. We're often dealing with trying to separate structures in even less space," Dr. Puumala said.

Image-guided stereotactic brain surgery gives surgeons added precision in order to expose less brain tissue to the trauma of surgery. A special MRI scan taken before surgery is mapped onto the patient's head. Using a computer monitor, surgeons then navigate using image guidance in real time, as a digitizing camera senses the position of surgical instruments. This allows surgeons to see exactly where the lesion or tumor is, and stay in safe areas and away from the "elegant" parts of the brain.

"Parts of the brain are pretty quiet. They can be removed and not impair function. Other parts in the elegant cortex serve a very specific and important function, such as speech, movement or vision," Dr. Puumala said. "This technology allows us to come

right down on a tumor, with smaller incisions and less trauma to the patient."

Support services, such as interoperative monitoring and angiograms add to that precision.

The latest spinal technology and hardware are also available for minimally invasive spinal surgeries that typically result in shorter recovery times. "Once again,

technology makes spinal surgeries easier on the patient," Dr. Puumala said. "While not everyone with back pain requires surgery, there are patients who can be helped." Before new methods of fixation such as screws and implants, spinal surgery patients had to spend extended periods of time in bedrest or wearing a body cast.

One of the latest advancements in cervical spine surgery is disk arthroplasty – replacement of a degenerated disk with an artificial mobile disk that acts as natural disk, just as an artificial joint acts as a joint. "It will make this type of surgery that much easier in the future," Dr. Puumala said.

While the nervous system is the most complex system in the body, neurosurgery is not in itself significantly more complex than other types of surgery. However, unlike other body tissue, nerve tissue cannot be repaired, so there is simply no room for error, Dr. Puumala said.

"The complexity comes in trying to make the correct diagnosis, and deliver the correct treatment. The body's nervous system, while complex, is hard-wired. We as physicians use our knowledge of that wiring to figure out where the problem is, and our experience to figure out the best way to treat it."



Testing the body's 'autopilot' system

The body's autonomic nervous system quietly operates unnoticed – until something goes wrong. Then, the Avera Neuroscience Institute's Autonomic Testing Laboratory is there to help physicians learn



exactly what's behind unexplained symptoms, so that needed treatment can begin.

"The autonomic nervous system is that system which controls functions that we don't think about – functions

that are usually on 'autopilot,'" said Dr. Todd Zimprich, neurologist with Neurology Associates and medical director of the Autonomics Testing Lab.

The lab is the only one of its kind in the region. Comparable labs are rare apart from large urban medical centers. Dr. Zimprich trained in a similar lab at Mayo Clinic, and brought the idea to Avera McKennan in 2005, using the very same protocols and equipment.

The autonomic nervous system can malfunction due to many different disorders, yet it's difficult to know that the malfunction is the cause of patient's symptoms, Dr. Zimprich said. "The first step is to try to give the patient an answer for their symptoms. Once we have that answer, we can often invoke treatment." Other times, a malfunction of the autonomic nervous system might be just a clue to another underlying cause.

A benefit to patients is preventing them from going

from specialist to specialist, unable to find an answer, Dr. Zimprich said. The lab can help diagnose the reason behind unexplained symptoms such as pain, spells, paresthesia, generalized fatigue, fainting or tingling.

An example is small fiber neuropathy. Peripheral neuropathy causes symptoms such as balance difficulty, tingling, weakness and pain, and can usually be diagnosed using standard electrical tests such as electromyography (EMG). In small fiber neuropathy, however, patients may have all the symptoms, but standard electrical tests show that everything is normal. "The only way to diagnose it is the autonomic test," Dr. Zimprich said.

Tests are non-invasive and comfortable for patients. Technology includes equipment that collects and measures the quantity of sweat, and the time it takes the body to produce it. Another device takes a continual measurement of heart rate and blood pressure. This is different than typical blood pressure reading, which is a picture of a moment in time. "This is more like a movie, telling us what heart rate and blood pressure are doing over time."

A tilt table measures the body's responses in different positions, and the change that occurs when going from a horizontal to vertical position, for example.

Rather than a typical symptom-based evaluation, the Autonomic Testing Lab provides an objective evaluation that can help pinpoint the reason behind symptoms that can't be explained by standard tests or procedures, Dr. Zimprich said.

New center keeps patients on balance

Dizziness, balance problems and falls are the Number 1 reason for doctor visits among people age 75 and older, and balance disorders affect 20 percent of Americans between the ages of 65 and 75. Typically, doctors explore one component of the balance system at a time – sending patients to different specialists until a correct diagnosis is made.

Plans for the Avera Neuroscience Institute's new Balance Center entail an innovative approach to identify,

manage and treat balance disorders all in one comprehensive center. Slated to open the winter of 2008-2009 the Balance Center will be the only one of its kind in the area.

The Balance Center combines the specialties of otolaryngology (ear, nose and throat), neurology, physiatry and audiology. "There can be a multitude of reasons for balance complications and dizziness: an ear, nose and throat disorder, peripheral neuropathy, stroke, or

degenerative conditions such as Parkinson's disease or multiple sclerosis," said Dr. William Rossing, neurologist with Neurology Associates, who led development of the Balance Center along with Dr. Kenneth Scott of Midwest Ear, Nose and Throat.

"This service is a comprehensive solution for complex, multifactorial balance problems," Dr. Rossing said. Patients will receive complete diagnostic, evaluative, and therapy services in one location.

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– DR. WILLIAM ROSSING, NEUROLOGIST

Balance disorders are a significant risk factor for falls in the elderly. "For people in their latter years, falls are a significant cause of death and restriction of daily activities," Dr. Rossing said. Diagnosing, treating and/or managing balance difficulties can help prevent dangerous falls before they happen. In fact, 30 to 40 percent of falls can be prevented.

The Balance Center's clinical approach includes conventional diagnostic procedures and objective assessments of a

patient's balance impairment and limitations.

Advanced technology in the Balance Center includes videonystagmography (VNG), which determines if an inner ear disease may be causing a balance or dizziness problem. Using sophisticated computer technology, VNG testing measures small eye movements which can be triggered by balance disorders originating in the inner ear. Another diagnostic tool is the EquiTest® System, which tests balance control and postural

stability through technology known as Computerized Dynamic Posturography (CDP). The system evaluates balance and posture on a stable or unstable support surface, or in a stable or dynamic visual environment.

Many balance disorders can be treated on-site, or managed through physical and occupational therapy. Or, patients with symptoms stemming from another treatable disorder are referred to the correct specialist.



Cutting edge stroke care

TREATING ALL STROKE PATIENTS WITH THE RIGHT MEDICATION WITHIN THE RIGHT TIME FRAME IS THE PRIMARY GOAL OF THE AVERA MCKENNAN STROKE CENTER.

A wider goal is to help ensure that everyone in the outlying region, as well as the state, has the same access to life-saving, brain-saving treatment as residents of Sioux Falls have, said Dr. William Rossing, neurologist with Neurology Associates and medical director of the Avera McKennan Stroke Center.

"Our stroke program has been an overall collaborative effort to develop a pathway for acute stroke care, as well as to streamline guidelines for appropriate care and management," Dr. Rossing said.

In 2005, Avera McKennan's Stroke Center became the first Joint Commission certified stroke center in the region, and recently was the first to gain recertification.

"Certification is a high bar to achieve," Dr. Rossing said. "An even higher bar is recertification after two years. At that point, you really have to be able to walk the walk and talk the talk."

Nationwide, there are 750,000 strokes per year and up to 30 percent of stroke patients may die due to their stroke. It is the third leading cause of death in the United States.

TPA (tissue-plasminogen activator), a powerful thrombolytic or anti-clot medication, is the only FDA-approved medication for stroke. The greatest benefits of the medication are seen within a three-hour window after stroke symptoms begin. Treatment lessens brain damage due to stroke, and helps improve recovery.

However, only about 3 percent of stroke patients nationwide receive this therapy within the critical three-hour timeframe.



At Avera McKennan, patients with stroke symptoms are assessed in the Emergency Department. They are immediately sent for CT scanning to confirm the diagnosis. The goal is for stroke patients to receive TPA therapy within

45 minutes of their arrival. Stroke patients are then transferred to ICU for 24 hours, then to Avera McKennan's Neuroscience unit for a three- to five-day stay. Depending on the progress of their recovery and condition, patients go either to rehab, a skilled nursing facility, home or other care situation. Educating patients about stroke risk factors and symptoms of TIA (transient ischemic attack) and stroke is key to preventing further damage due to another stroke.

The successful stroke protocol at Avera McKennan is being applied throughout the Avera system.

"We're now progressing toward a system-wide approach for TPA therapy in referring satellite hospitals and a transfer mechanism for patients who need care at a tertiary hospital," Dr. Rossing said.

Dr. Rossing also has been appointed to a state task force working toward a state stroke protocol which would be followed at all hospitals in South Dakota. "So a patient who has a stroke in Philip, South Dakota, would have the same access to life-saving care as a patient who has a stroke in Sioux Falls."

"CERTIFICATION IS A HIGH BAR TO ACHIEVE. AN EVEN HIGHER BAR IS RECERTIFICATION."
— DR. WILLIAM ROSSING, MEDICAL DIRECTOR, AVERA MCKENNAN STROKE CENTER