

The Face of Neuroscience in the Intermountain West

A report to our patients, providers and the community



Treating people throughout the Intermountain West...

The Neurosciences Institute at Intermountain Medical Center in Murray, Utah, is a comprehensive program that treats all injuries and illnesses of the brain and spine.

Our patients come from all over the western United States, and our team of experts is committed to four principles of excellence:

1. Providing the best outcomes
2. Treating patients as individuals
3. Collaborating across specialties
4. Assuring costs are sustainable

If you are a referring physician, call us at 801.507.9800.

www.intermountainmedcenter.org/neurosciences

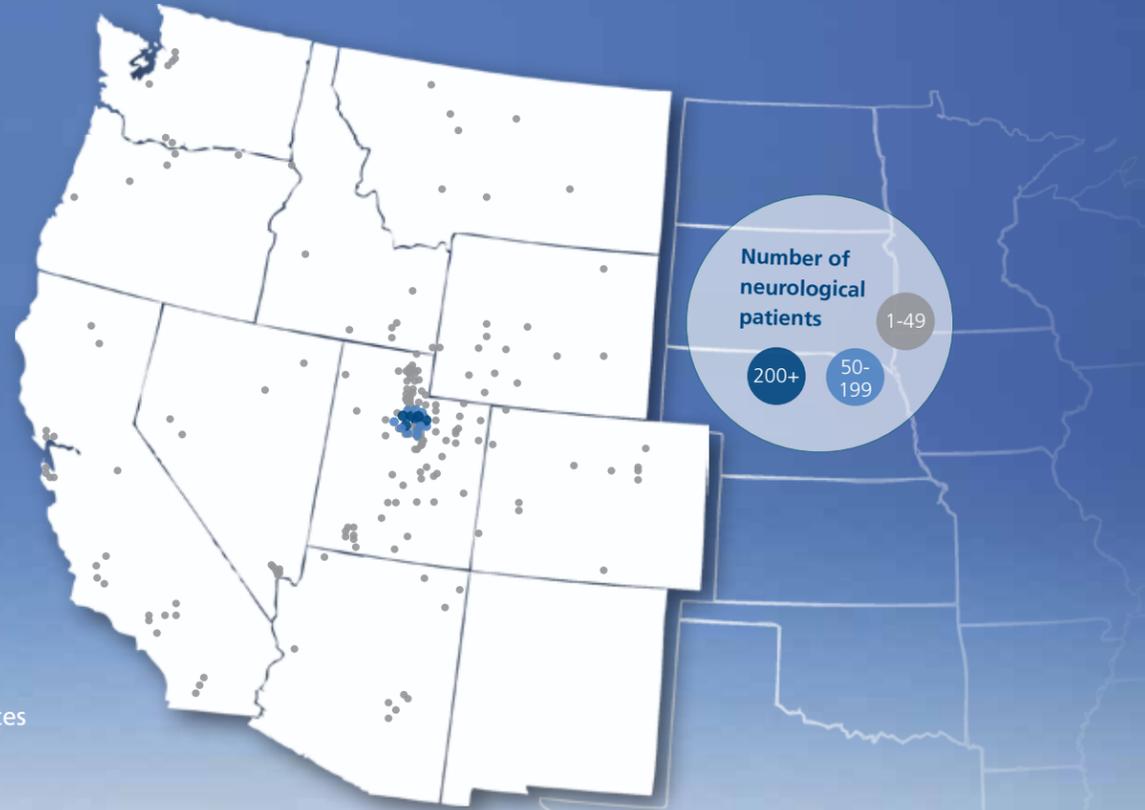


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A word from the medical director



Collaboration and compassion are keys to a comprehensive neurosciences program at Intermountain Medical Center

This report tells the story of the confluence of science and healing. When patients with neurological conditions come through our doors — whether someone who's suffering a stroke or acute back pain — we bring together the experts, the technology, and the proven processes to give patients the best chance for full recovery and the opportunity to get back to their healthy lives.

At the Neurosciences Institute at Intermountain Medical Center, we treat thousands of patients each year. Our goal is to always remember that each patient is an individual with hopes and fears as well as unique needs. In this report we share some of their stories, as well as the outcomes we're achieving in providing the highest quality care at a sustainable cost.

This report also tells the story of a vast team of talented clinicians — physicians from many specialties, nurses with advanced training, therapists, pharmacists — as well as support

staff, who come together every day at Intermountain Medical Center to care for individuals with a wide array of neurological conditions in a comprehensive, coordinated way. I want to thank the team who has worked tirelessly in recent years to develop the Neurosciences Institute.

We hope you enjoy reading this report and learning about the impact the Intermountain Medical Center Neurosciences Institute is having on thousands of patients — and our community.

Sincerely,

Mark Reichman, MD
Medical Director
Intermountain Medical Center Neurosciences Institute

“We bring together the experts, the technology, and the proven processes to give patients the best chance possible for full recovery and the opportunity to get back to their healthy lives.”

— *Mark Reichman, MD,*
Medical Director,
Neurosciences Institute

STROKE team's quick response results in a great outcome for a young woman

A 23-year old former collegiate soccer player suffered a stroke, but quickly received a clot-busting drug and made a full recovery

Summer 2013 got off to a great start for Ashley Irvin of St. George, Utah. She and her husband attended the Taylor Swift concert in Salt Lake City, and then were enjoying her father's barbecue the next day, when something went wrong.

She had just dished up a plate of food when an overwhelming sense of tiredness overcame her. She put her hand to her forehead and tried to figure out what was happening. Her mother could tell something was wrong with her 23-year-old daughter, who was a former collegiate soccer player. Her mother suspected Ashley was having a stroke, so she grabbed the phone and called 911.

Within minutes Ashley was at Intermountain Medical Center, and 18 minutes later a clot dissolving drug was administered. Ashley was sent to the angio suite, where a neuroradiologist attempted a thrombectomy to remove a blood clot. By the time the team got into her artery, the clot had been dissolved by the tPA.

Later that night, feeling finally returned to Ashley's right side. She spent five days in the hospital and was then discharged to home.

Ashley did some outpatient speech therapy, but was soon back to her normal daily routines, including attending classes at Dixie State University. In May 2014, Ashley graduated with a degree as a physical therapy associate, and said she looks forward to working with others who have experienced similar challenges.

Utah's leading stroke center

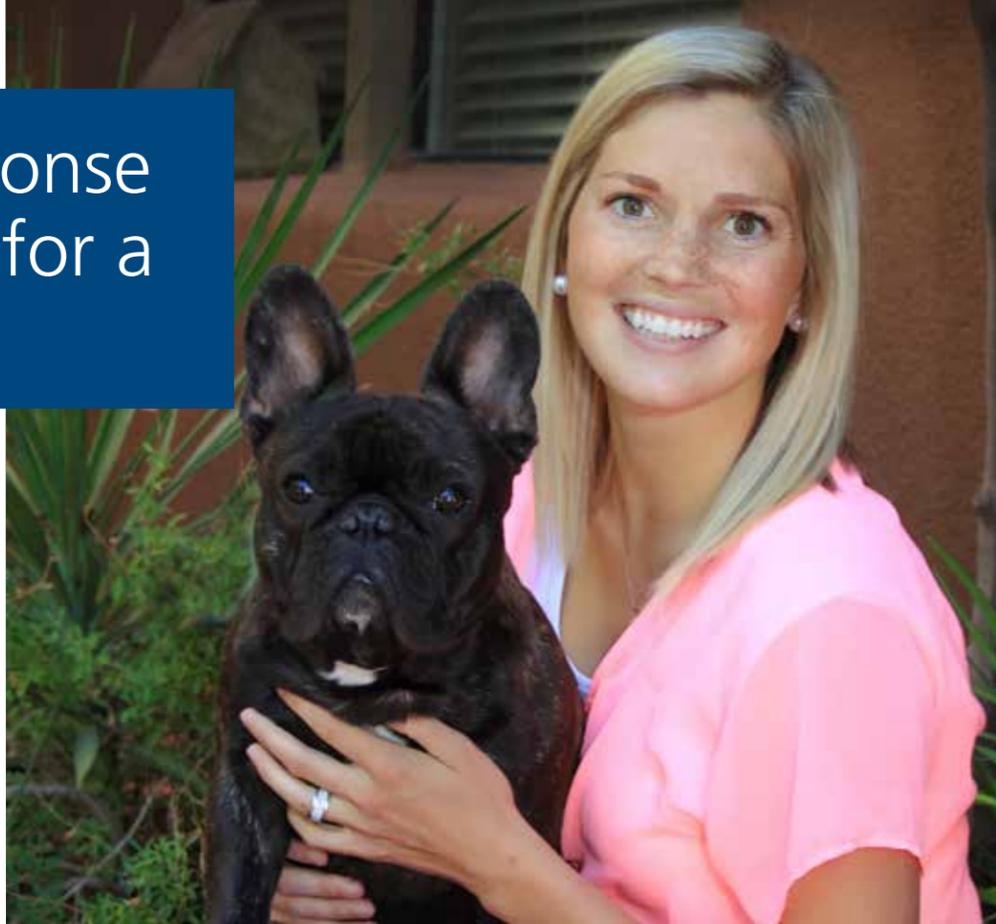
Nearly one in every five Utahn who suffers a stroke is treated at Intermountain Medical Center, and no other hospital in the state sees more stroke patients. In 2013, 740 stroke patients received care here. Certified by the Joint Commission as a Primary Stroke Center, Intermountain Medical Center has some of the best outcome measures for stroke patients in the nation.

For patients with ischemic stroke, the best predictors of a good outcome are how early and often tPA is given. The national standard, often called door-to-needle time, is to administer IV tPA within a 60 minute window 50 percent of the time. In 2013, Intermountain Medical Center's door-to-needle time

averaged 48 minutes, and 78 percent of eligible stroke patients received IV tPA within the 60-minute window.

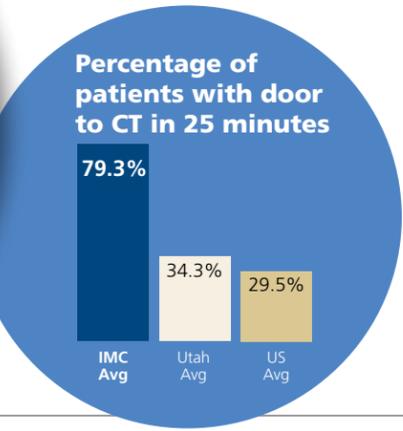
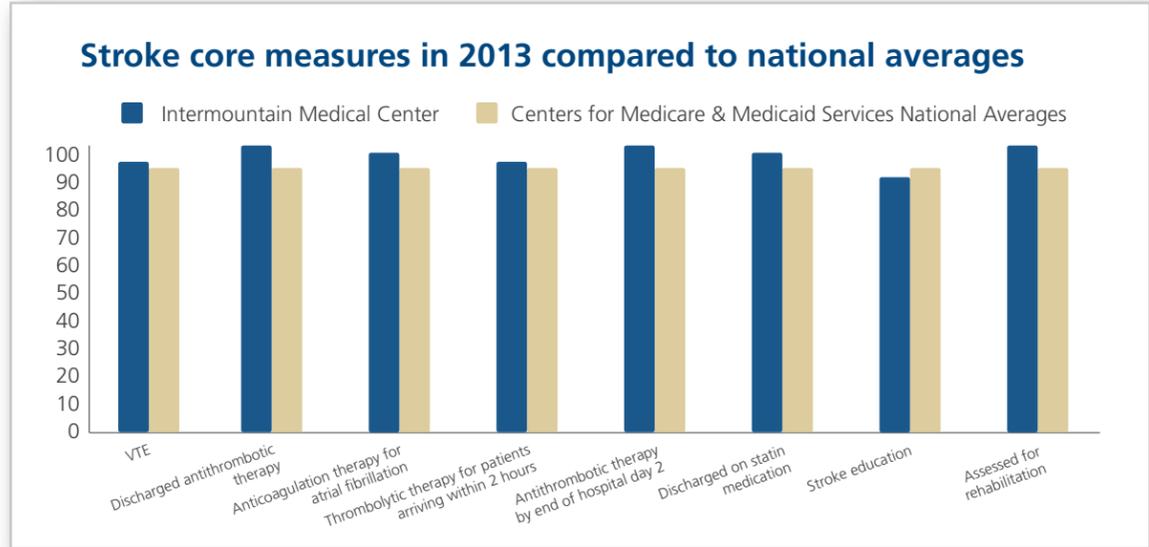
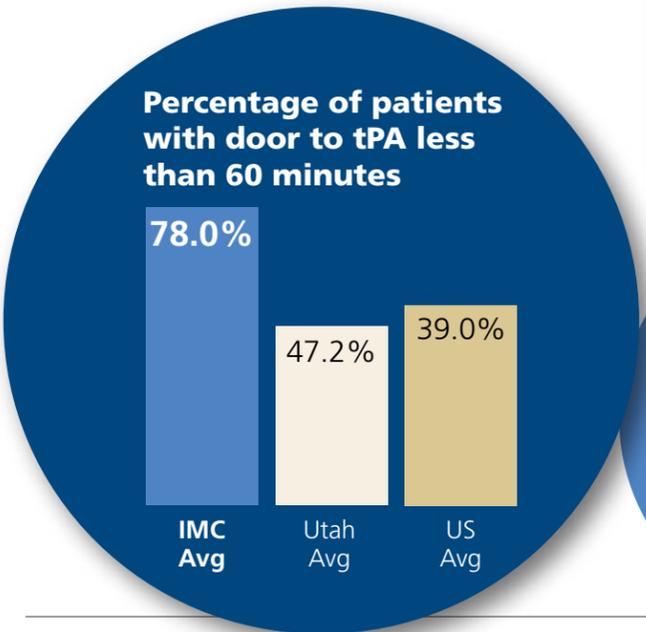
This success is largely due to our veteran group of neurologists and the Emergency Department's processes. Intermountain Medical Center has a trained stroke response team that's mobilized any time a suspected stroke patient arrives.

In 2013, 55 percent of our patients were discharged to home (with or without outpatient therapy). That compares to a national average of 40 percent.



Intermountain Medical Center offers the only Neurocritical Care Unit in the state that's staffed 24/7 by neurointensivists who are trained to manage patients with strokes and other major neurological challenges.

Intermountain Medical Center is also beginning a telestroke program to support outlying hospitals in diagnosing and treating stroke patients.



BE FAST! CALL 911!

- B**alance: Is there a sudden loss of balance or coordination?
- F**ace: Does one side of your face droop?
- A**rms: Does one arm drift downward?
- S**peech: Are the words slurred? Is speech confused?
- T**ime: When was the person last seen looking or acting normally?

Intermountain enhanced the National Stroke Association standards adding in important deficits in balance and eyes.

"The outcomes of stroke patients nationwide continue to improve, and since we treat more stroke patients than any hospital in Utah, we have a great opportunity to positively impact the lives of thousands of people in our region."

– Robert Hoesch, MD, Medical Director, Stroke Services





Surgery helps a Payson man corral **EPILEPTIC** seizures

After three years of constant anxiety, Eric Garcia is returning to normal life and is finally seizure-free

For Eric Garcia of Payson, Utah, 2013 may well be remembered as the year he went seizure-free.

The 25-year-old spent three years dealing with the constant anxiety that at any moment he might have a seizure. When he suffered his first seizure in 2010, he was all by himself.

“After that I was terrified when I got the feeling a seizure was about to happen. I didn’t want to be alone,” he said. The anxiety about having a seizure significantly impacted how he lived his life.

The seizures started after a brain injury in 2010. Eric was working on the roof of a building in Lehi when he fell two stories and sustained a skull fracture. He spent weeks in the hospital and underwent several surgeries. A couple of months later, after he was home, the seizures began.

About a year later, with no success in controlling the seizures, Eric saw Tawnya Constantino, MD, an epileptologist at Intermountain Medical Center. Her treatment began by trying different epilepsy medications. Eric soon gained confidence in Dr. Constantino. “She’s good at reading personalities,” Eric said. “She knew how to approach my treatment plan.”

After several tests to identify the seizure focus and evaluate memory and language abilities, Dr. Constantino and her team determined Eric was a likely candidate for epilepsy surgery,



in which a small portion of the brain that was causing the seizures could be removed. Soon he was admitted for a two-part procedure under the direction of Joel MacDonald, MD.

The first step was to have EEG electrodes surgically implanted on the surface of his brain. He then spent several days in the ICU being monitored. Then he underwent surgery where a small portion of his right front lobe and a larger portion of his right temporal lobe were removed. After just two more days in the hospital he returned home.

“Making the decision to go through with the surgery wasn’t easy for me,” he said. “But I’m so glad I did.”

Today Eric is back to the things he loves. He’s working part-time on his grandfather’s farm in Spanish Fork. He and his girlfriend, Lacey, love to play volleyball with friends on the shores of Utah Lake. Eric likes to ride his horse, work on his mom’s old pick-up truck, (his current project is to replace the fuel pump), and travel to Las Vegas. His immediate plans are to find a full-time job and start a family.

Though Eric deals with some short-term memory loss, life is returning to normal and he’s learned to take things in stride. “It is what it is,” he said.

Epileptologist duo helps patients manage seizures

Untreated, epilepsy can be a debilitating condition for patients who face the prospect of constant seizures. Four years ago, Intermountain Medical Center opened one of the only comprehensive epilepsy centers in the Intermountain West.

The center is now run by two board-certified epileptologists as well as two nurse practitioners and includes an outpatient clinic, a six-bed inpatient seizure monitoring unit, and a program to monitor patients in both newborn and adult intensive care units.

Today the center is recognized and certified as a top-level program by the National Association of Epilepsy Centers. “The remarkable growth of the epilepsy program is a clear testament to the growing understanding of the importance and value of specialized epilepsy care,” said Tawnya Constantino, MD,

“The remarkable growth of the epilepsy program is a clear testament to the growing understanding of the importance and value of specialized epilepsy care.”

– Tawnya Constantino, MD, Medical Director, Epilepsy Services



medical director of Epilepsy Services. “While many patients’ seizure activity can be well-managed by medications, our epileptologists work closely with the neurosurgeons when surgery is indicated.”

The epilepsy monitoring unit has the capability to care for up to seven patients who need inpatient continuous video-EEG monitoring thanks to our fully trained neurology nurses and round-the-clock EEG techs.

The program has seen a huge increase in video-EEG monitoring for patients in the ICU who are in status epilepticus, a life-threatening condition where the brain is in a state of persistent seizures.

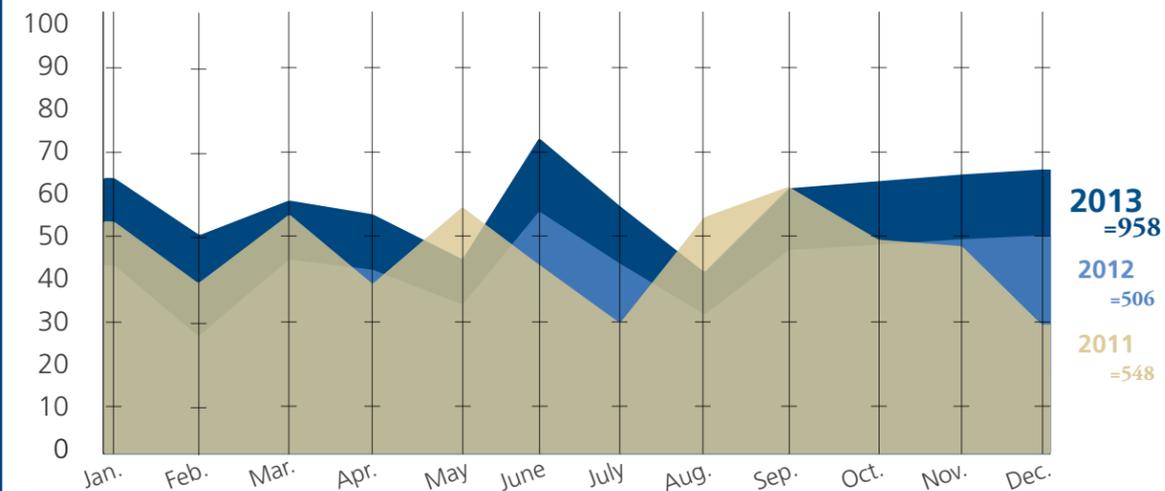
Vagal nerve stimulator therapy remains an important treatment tool for patients with medically intractable epilepsy. With several new anticonvulsant medications released in the past year as well as the approval

by the State of Utah for cannabidiol oil, patients can be certain they have access to the most therapies available.

Epilepsy surgery evaluations are an important option for patients that medication doesn’t work on. Intermountain Medical Center is actively working toward becoming a major site for neuropace brain stimulator implants as well.

Due to its progress and the new therapies it offers, the Intermountain Comprehensive Epilepsy Program is well-situated to provide excellent and well-rounded epilepsy services far into the future.

Intermountain Medical Center inpatient Electroencephalographies (CEEG/VEEG) in 2013 compared to past years



An EEG is a test that detects electrical activity in the brain using small, flat metal discs that are attached to the scalp.

In addition to diagnosing epilepsy, an EEG can also diagnose other brain disorders.

Thanks to the **NEURORADIOLOGY** team, a Holladay man lives to walk his daughter down the aisle

Al Buxton suffered a stroke, had a thrombectomy, but still does most of the things he loves to do

Al Buxton looked very handsome and had a big smile on his face as he walked his daughter, Cindy, down the aisle at her wedding last August. The scene held special meaning for the Buxton family, since Al had suffered a massive stroke five years earlier.

If it hadn’t been for the neuroradiology team at Intermountain Medical Center, who performed a thrombectomy to remove the massive clot, Al likely wouldn’t have been there for his daughter’s wedding.

His wife, Lois, remembers clearly the day he suffered the stroke. He’d just returned to his home in the Holladay area from a trip to Costco. He was sitting at the table and started to slump, then fell. Lois called 911 and he was rushed to the Emergency Department at Intermountain Medical Center. After the stroke was diagnosed, he was soon taken to the angio suite, where Peter Schloesser, MD, inserted a catheter into Al’s femoral artery and threaded it up into the brain where, he was able to mechanically retrieve the blood clot.

Al, now 84, is able to do most of the things he loves, although his speech is still affected. He enjoys regular golf outings with friends, reading the newspaper, taking care of the roses and tomatoes in his small garden, watching University of Utah football and basketball on TV, and spending time with Lois. Lois said Al is very helpful around the house and always makes the coffee first thing in the morning. In fact that was the first thing he did the day after he came home from the hospital. He also occasionally cooks breakfast, a task he mastered while serving as an army cook in the Korean War.

Reflecting back on Cindy’s wedding and the fact that Al was there, Lois said, “We were so excited. I was just happy for Cindy. I know Al can do anything. He wasn’t going to let this pull him down.”

Neuroradiology plays a key role in diagnosing neurological conditions

Intermountain Medical Center’s team of neuroradiologists plays an important role in diagnosing and treating a number of neurological conditions.

The neuroradiologists are involved in imaging, which is used to diagnose stroke, understand the extent of traumatic brain injury,



“In addition to saving lives, our goal as diagnostic and interventional radiologists at Intermountain Medical Center is to restore, as much as possible, the patient’s quality of life following a neurovascular event.”

– John Jacobs, MD, Medical Director, Neuroradiology



or even identify the cause of back pain or other spinal disorders.

In the Emergency Department, time is of the essence in treating strokes. Our neuroradiologists help nearly 80 percent of suspected stroke patients receive a CT scan in less than 25 minutes.

In addition, our neuroradiologists are interventionalists who have access to the latest technology that’s needed to treat a variety of conditions.

One of the more common procedures is mechanical thrombectomy to treat ischemic strokes caused by blood clots. Using fluoroscopy-guided imaging, the interventional radiologists are able to insert a catheter into the artery, retrieve the clot, and restore blood flow. The physicians also routinely place tPA, a clot-dissolving drug, into the arteries, which can be highly effective in restoring blood flow as well.

For hemorrhagic strokes, our interventional radiologists are able to use embolization, often incorporating tiny coils to stop bleeding. These procedures are sometimes done in tandem with neurosurgery.

Another area of expertise is carotid artery stenting, in which a small wire mesh is placed in a carotid artery that’s narrowed due to atherosclerotic disease.

MRIs, CT scans, and Endovascular procedures performed in 2013 at Intermountain Medical center

MRIs

10,694

CT Scans

12,659

Endovascular Procedures

- 21 Intracranial embolizations
- 8 Extracranial embolizations
- 25 Neuro stents
- 26 Mechanical thrombectomy/cath-directed intra-arterial tPA
- 1 Intracranial percutaneous transluminal angioplasty
- 41 Non-lytic infusions
- 231 Non-intervention procedures

The NEURO REHAB team accompanies a college student on a three-month Guillain Barre journey



Greg is currently studying at Salt Lake Community College. After graduating, he plans to attend law school or become a history teacher.

he stayed for more than two months, re-learning how to walk, write, and do other activities of daily life. His goal was to be able to walk out of the hospital, something he did accomplish with the aid of forearm crutches.

“I’d say I’m 97 percent better,” Greg said. He still deals with some balance issues and has some neuropathy in his feet.

He spent several weeks in a Neuro Rehabilitation Outpatient Therapy Center associated with Intermountain Medical Center and was able to qualify to get his driver’s license back.

In four days, Greg went from healthy and active to not being able to walk due to Guillain Barre syndrome

On Dec. 7, 2012, Greg Burrow, a 24-year-old from Taylorsville, Utah, had classes at Salt Lake Community College and was anticipating his next shift at the Copper Onion Restaurant.

It was a typical Wednesday, but one thing was different that morning — his hands and feet felt a bit numb.

He thought a good workout at the gym, where he was a regular, would take care of that. But after he got home from the gym he felt worse and couldn’t sleep that night. He assumed he was getting sick, so he took it easy the next day.

By Friday, he could hardly walk. He went to his doctor, who encouraged him to go to the Emergency Department.

After an extensive work up in the ED, his doctor asked a neurologist to evaluate Greg. Within minutes, she’d diagnosed him as having Guillain Barre syndrome — a condition in which the insulation of the nerves is attacked by the immune system.

Greg was admitted to Intermountain Medical Center. Two days later he couldn’t hold himself up on a walker. He said it was unbelievable to go from totally healthy to hardly able to care for himself in five days.

He was admitted initially to the 14th floor, the Neuro Medical Unit, and ultimately to the Neurocritical Care Unit for his progressive weakness. Fortunately, with appropriate medical therapy, his condition stabilized.

Once stabilized, Greg was then admitted to the Neuro Rehabilitation Unit, where



Part of Greg’s rehabilitation was learning how to stand and walk again using a special wheelchair.

Hitting the Books Again

Now Greg is back in school full-time at Salt Lake Community College, with plans to eventually go to law school. He also has a job as a dispatcher with Granite School District and works out with a personal trainer. A few weeks ago he completed a six-mile hike to Lake Blanche in Big Cottonwood Canyon.

This experience has caused him to shift his priorities. Whereas school wasn’t a big deal in the past, he now takes it very seriously. Last semester he earned a 4.0 GPA. “The person I am now is totally different than the person I was.”

“Continuity of care is a big part of our rehabilitation program. Since most of our patients come to us from within our hospital and then receive outpatient therapy services through Intermountain programs, we are better able to coordinate their care.”

– David Ryser, MD, Medical Director, Neuro Rehabilitation



Rehabilitation team specializes in treating neurologic patients

Intermountain Medical Center’s Neuro Rehabilitation Unit offers a great option for neuro patients who need intensive and integrated inpatient rehabilitation therapy before leaving the hospital.

Eighty-five percent of unit patients have a neurological diagnosis, a percentage much higher than other rehabilitation centers in the region. Given the specialization of the unit, patients tend to have higher medical acuities. The center is CARF-accredited and the nursing and therapy staff have a higher level of specialty certification in neurologic conditions than other units in the state.

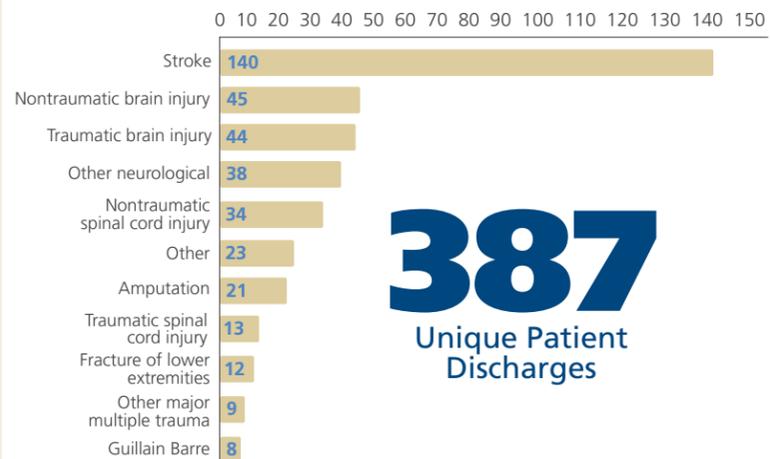
One key to success is interdisciplinary conferences where each patient’s care is coordinated and reviewed.

The unit treats patients with a variety of neurological illnesses and conditions, including stroke, traumatic brain injury, spinal cord injury, neuropathy, and Guillain Barre.

In addition, the Neurosciences Institute also has an outpatient clinic at Intermountain Medical Center and an outpatient therapy service at TOSH — The Orthopedic Speciality Hospital located one mile south of Intermountain Medical Center. The physicians who manage rehabilitation inpatients also see those patients in the Neurosciences Clinic at Intermountain Medical Center and hold monthly coordination conferences with the outpatient therapy team.

The Neuro Rehabilitation Unit has a long productive history of clinical research through partnerships with a variety of researchers both within and outside Intermountain Healthcare. Overall, our neuro rehabilitation patients have been the subjects for more than 40 peer-reviewed journal articles during our 25 year history.

Type/number of patients who were discharged from the Neuro Rehab Unit in 2013



Intermountain Medical Center Neuro Therapy Services provides outpatient rehabilitation for a variety of neurological disorders. Our team of specialized therapists works to help patients regain their independence and highest possible functionality at home, work, school, and in the community. Our team of physical, occupational, and speech therapists and neuropsychologists meets regularly to coordinate the treatment plan for each patient. We have expertise in treating:

- Stroke
- Brain injury
- Spinal cord injury
- Peripheral nerve injury and neuropathy
- Parkinson’s disease
- Multiple Sclerosis
- Dysphagia (swallowing disorders)
- Tumors: brain, spinal cord, etc.
- Amputation
- Heart transplant and LVAD replacement
- Trauma with overlying neurological injury
- Extreme deconditioning due to heart, lung, or other problems
- Other conditions include: Guillain Barre, Lou Gehrig’s Disease, and Alzheimer’s



NEUROCRITICAL CARE team helps a young yoga instructor beat the odds of an aneurysm

Natalie Van Wagoner — mother, wife, and yoga instructor — suffered a life threatening ruptured aneurysm at the age of 29

Chris Van Wagoner sat in the Emergency Department at Intermountain Medical Center the day after Christmas, trying to absorb what was going on.

The medical team had just told him his 29-year-old wife, Natalie, had suffered a subarachnoid hemorrhage from a ruptured aneurysm, and they weren't sure she'd make it through the night. They were performing a procedure to relieve the pressure on her brain and were preparing her for surgery.

The day before had been full of family time, enjoying apple turnovers and hot chocolate, watching their 2-year-old daughter open her presents. And that morning, Chris had been excited about a new job offer that would take the family to Seattle.

Earlier that afternoon, Chris had spoken with Natalie on the phone as she was driving to the studio in Lehi, Utah, where she taught Bikram (high-intensity) yoga classes. The former model and certified college volleyball referee was the epitome of health. Now she lay in a surgery suite, her future uncertain.

During the five-and-a-half hour brain surgery, Chris found

solace in the reassurance of hospital staff who'd told him his wife was in the hands of one of the most seasoned neurosurgeons in the region, Mark Reichman, MD. There was relief when the surgery was over and Chris was told it had gone well. But that was just the beginning of a very long waiting game.

Natalie was taken to the Neurocritical Care Unit, where she spent nearly three weeks under the care of a team of neurointensivists and nurses with advanced neurological training. According to Chris, it wasn't until about a month



after Natalie's admission to the hospital that the medical team felt confident that she'd survive her ordeal. Chris describes that month as "sitting on pins and needles wondering what was going to happen."

By mid-January, Natalie was well enough to be transferred to the rehabilitation center at Intermountain Medical Center, where she spent nearly three months going through physical and occupational therapy. And finally on April 8, she was able to return home with her husband and daughter.

Her healing journey continues. She loves spending time with their daughter, though still needs help caring for her. And some residual double vision prevents her from driving. Though his career changes have been put on hold for now, Chris is grateful for the neurosciences program at Intermountain Medical Center. "We had the best people in the area working on Natalie and using all the innovations that had been made available to help her out."

Neurointensivists provide round-the-clock care in Neurocritical Care Unit

One day recently, a nurse informed Katherine Thomas, MD, medical director of the Neurocritical Care Unit at Intermountain Medical Center, that one of her patients had gone from speaking to being difficult to rouse in a short period. After performing a neurological exam, Dr. Thomas ordered a CT scan, which showed swelling in the brain. She was then able to provide an intravenous medication to prevent a serious brain injury leading to death or disability.

Dr. Thomas and her four partners provide 24/7 faculty-level coverage for the Neurocritical Care Unit, a service not available at any other hospital in Utah and available in few other hospitals nationwide. She and the other neurointensivists treat critically ill patients with stroke, intracranial hemorrhage, subarachnoid hemorrhage, traumatic brain injury, brain tumors, uncontrolled seizures, neuromuscular disorders, and central nervous system infections.

The success of neurocritical care is rooted in its multidisciplinary approach. The team relies heavily on the advanced training of the nursing staff, who conduct frequent neurological evaluations to detect subtle changes in brain function. The intensivists work closely with neurosurgeons and interventional neuroradiologists to provide comprehensive care for their patients. Multidisciplinary rounds, a daily meeting involving the intensivist, advanced-practice clinicians, nursing, social work, case management, and therapy services, ensure that a care plan is clearly delineated for each patient every day.

Because of the growth of the Neurosciences Institute and the increase in its volume of neurocritical care patients, the 12-bed Neurocritical Care Unit will expand in the next couple of years. The neurointensivists, in collaboration with the neurohospitalists, neurosurgeons, and the Intermountain Stroke Program, will soon begin enrolling patients in several national multicenter clinical trials. With this expansion, and in light of the growing academic interests of the unit, the Neurocritical Care Unit will be unique in the Intermountain West.



"In neurocritical care, we have the privilege of accompanying patients and their families through trying times. Our multidisciplinary approach integrates cutting edge clinical neuroscience and places patients and their families in a central role on our team."

— *Katherine Thomas, MD, Medical Director, Neurocritical Care*



NEUROSURGEONS implant a device that changes a businessman's life

Deep brain stimulation offers hope and relief to Parkinson's patients like Reggie Welles

The next time you pass a semi-truck on the highway, there's a good chance the technology created by Reggie Welles and his company helped train the person behind the wheel.

Reggie is the visionary leader behind Murray-based AST, which specializes in creating training simulation units for truck drivers, Highway Patrol troopers, student drivers, and other vehicle operators. Though he's very comfortable with technology and trained as an aeronautical engineer, Reggie was faced with the decision several months ago of whether to trust state-of-the-art brain technology to manage his Parkinson's, which was quickly becoming debilitating despite the medications he was using.

Reggie had heard about deep brain stimulation, or DBS, in which neurosurgeons implant electrical leads into the brain. Those leads are then connected to a small device called a neurostimulator placed in the patient's chest, which gives off electrical pulses that correct the misfirings in the brain that cause Parkinson's symptoms.

Several things influenced Reggie's decision to consider DBS. "It wasn't just about me," Reggie said. "Besides increasing my dependency on family members for assistance, my obligations as CEO of the company touched many lives. My clients and co-



workers deserved my full attention. The only viable option was to find some way to take back control of my body."

Though DBS has been used successfully to treat thousands of Parkinson's patients nationwide, Reggie was hesitant. The thought of surgeons drilling into his skull nearly scared him out of having the procedure. But after meeting with the

neurosciences team at Intermountain Medical Center and neurosurgeon Peter Maughan, MD, in particular, Reggie decided to proceed.

Care from an effective team helped Reggie return to the life he loves. The procedure took place in two parts. His first surgery was on August 9, then two weeks later he had the second operation. Since having the device placed, Reggie has also been working closely with his neurologist, Evan Black, MD, and Kenyon Fausett, a representative from the device manufacturer, to make minor adjustments to the DBS device. "This team worked very well together," Reggie said. "I wasn't just a patient, I was a member of the neuro-adaptation team."

Within four months, Reggie had regained a lot of function and was back to the activities he loves. The Parkinson symptoms that were wreaking havoc in his life are largely gone or under control. "I now have the ability to expand my bandwidth of support," he said, referring to his ability to be more functional at home and at work.

He adds with a smile, "I still can't play the piano." But he has returned to his favorite hobby — building radio-controlled model aircraft from scratch, which he put on hold when his Parkinson's overrode his ability for precise hand movements.

DBS is a specialized procedure that can effectively treat many patients who suffer from Parkinson's, tremors, or other movement disorders, according to Dr. Maughan. "I'm pleased our neurosciences team, along with Joel MacDonald, MD, has



embraced this technique," he said. "Hundreds of individuals in our community suffer from the effects of Parkinson's and other movement disorders. Deep brain stimulation is a proven technique for helping to relieve and manage the symptoms they face. I'm seeing patients whose lives have been dramatically improved through this procedure."

The neurosciences team at Intermountain Medical Center began performing DBS procedures earlier last year, after the hospital purchased specialized equipment for the operating room and physicians received specialized training on the DBS procedure.

Neurosurgeons are able to treat the full spectrum of brain and spine complications

Ask the team at Intermountain Medical Center to describe the neurosurgery program here and one word is sure to be repeated: comprehensive.

According to Mark Reichman, MD, medical director of Neurosciences Institute and neurosurgery, Intermountain Medical Center has the specialists and technology to handle virtually every brain or spine condition imaginable — from tumors to aneurysms to complex spinal cases. A specially trained neurosurgery OR team combined with six board-certified neurosurgeons and the state's only Neurocritical Care Unit staffed 24/7 with neurointensivists, contributes to excellent outcomes for neurosurgery patients.

Intermountain Medical Center is also home to one of the few gamma knives in the Intermountain West, which offers a great alternative for radiosurgery treatment of tumors.

Common neurosurgical procedures performed at Intermountain Medical Center

Trauma surgery

- Brain trauma
- Spine trauma

Comprehensive spine surgery

- Herniated disk
- Degenerative disk
- Scoliosis
- Spine tumors, spinal cord tumors

Comprehensive intracranial surgery

- Tumor surgery
 - Gliomas
 - Meningiomas
 - Intraventricular tumors
 - Pituitary tumors
 - Acoustic neuroma

Cerebrovascular surgery

- Aneurysm
- Arterial venous malformations
- Stroke

Functional surgery

- Seizures, epilepsy
- Deep brain stimulation
- Vagal nerve stimulators

Cranial nerve microvascular decompression

- Trigeminal neuralgia
- Hemifacial spasm

Chiari decompression

Ventriculoperitoneal shunt

Peripheral nerve surgery

- Carpal tunnel release
- Ulnar nerve decompression
- Brachial plexus

"Our vision at Intermountain Medical Center is to provide the best possible neurosurgical techniques and best outcomes with reduced hospital stays and decreased costs in providing that care."

— **Mark Reichman, MD,**
*Neurosurgeon,
Medical Director,
Neurosciences Institute*





SPINE SURGERY gets a grateful grandfather back to playing with his grandson

For Shane Hunsaker, surgery offered instant relief from his numbness and pain

Being in an operating room is nothing out of the ordinary for Shane Hunsaker. He works as a neuromonitorist and assists neurosurgeons as they perform delicate nerve and spinal procedures.

Little did he realize, however, that toward the end of 2013, he'd be visiting the operating room, but this time as the patient rather than part of the team.

Over a period of a few weeks, Shane started noticing he couldn't move his right leg as well as his left. He was also experiencing some numbness in his right arm and noticed his lifting strength had deteriorated. He asked one of the neurosurgeons he worked with about his symptoms and was encouraged to get an appointment with a neurologist.

"Because of the pain, one of the things I lost was the strength to pick up my grandson," Shane said. "That really took its toll and made me pretty sad, especially when he would tug at my pant leg and start to cry."

When Shane saw neurologist Robert Hoesch, MD, an MRI was ordered. The scan showed severe spinal cord compression at four levels in his cervical spine, including C 3 to 4, C 4 to 5, C 5 to 6, and C 6 to 7. There was also severe spinal cord compression and swelling at all of these levels, which triggered his symptoms.

Shane was soon scheduled for surgery to repair the disks.

"When I woke up in recovery on the 14th floor, the pain and numbness were gone," he said. "It was a totally amazing feeling waking up with no numbness and pain and realizing my strength had returned."

He realizes he was fortunate. With his his spinal cord compressed and undiagnosed, a simple wrestling match with his son, or a minor car accident could have paralyzed him for life.



"Given the high prevalence of back problems among the population, Intermountain Medical Center is committed to keeping the cost of spine care at a sustainable level."

– Brian Olenslager, MD, Medical Director, Spine Program



Spine procedures performed in 2013 at Intermountain Medical Center

Outpatient Spine Injections

1,631

Back Surgeries

1,036

Trauma Back Surgeries

81

“The surgery has changed everything,” he said. “I only took two weeks off of work and almost have 100 percent of my mobility back. The surgery helped me change my outlook. I can golf, I can fish, and I can finally pick up my grandson and do all the things he wants to do. This surgery has given me my life back.”

Spine program provides array of options for patients with back pain

When patients are dealing with back problems, the physiatrists at Intermountain Medical Center can play a key role in quarterbacking their care. Bren Blackham, MD, and Brian Olenlager, MD, have worked with a team of specialists to establish a comprehensive spine program at the hospital, which can treat the entire spectrum of back conditions, from the minor to the complex.

After evaluating patients, the physiatrists will determine the most appropriate course of treatment. That may include a referral to physical therapy, conservative care, non-opiate medication management, injections, or urgent referrals to a spine surgeon if appropriate.

Dr. Blackham appreciates the proximity of his office to both the physical therapy clinic and the surgeons. It makes it easy for him to collaborate with his colleagues as he cares for his patients.

Intermountain Medical Center has a team of neuroradiologists who read all images of their patients. Dr. Blackham and his partner also read the films for their patients and sometimes pick up on subtleties because they're familiar with each patient's unique situation. This allows patients to view the imaging and the pathology that may be causing their symptoms.

The physical therapists at Intermountain Medical Center have extensive experience with spine injury/pain and are McKenzie certified.

The physiatrists can perform a number of interventions, including spinal and joint injections.

The neurosurgeons and orthopedic surgeons treat the following conditions:

- Lumbar disc repair
- Implantation of stimulators and pain pumps
- Spinal cord trauma surgery
- Scoliosis surgery

The spine program is also developing close alignments with nutritionists and pain psychologists to help patients.

Given the prevalence of back problems among Utahns, Intermountain Medical Center is also committed to keeping the cost of spine care sustainable. According to 2013 Medicare data, the average cost of a spinal fusion at Intermountain Medical Center is 47 to 56 percent less than at comparable hospitals in the Salt Lake area.



A head injury takes its toll on a former legislator until a **CONCUSSION** team intervenes



A patient lives in a mental fog due to an undiagnosed brain injury following a car accident

Trisha Beck spent much of 2013 in a mental fog, but for several months she didn't know why.

It started in November 2012, when she was rear-ended while at a stop light. After the paramedics checked her out at the scene, her daughter-in-law, a nurse, took her to a nearby emergency department, where she was later released believing she'd sustained a bad whiplash.

Over the next few months, however, she could tell something was still not right. Normally a highly organized person, Trisha had a hard time keeping up with her busy schedule. She often felt disoriented and couldn't think straight. She dealt with a non-stop low grade nausea, her right arm seemed to be getting weaker, and she had a tremendous amount of pain in her neck. Despite her discomfort, she couldn't tolerate pain medication so she had to just deal with the pain.

At the same time, her physical therapist, who had heard Trisha speak at a town hall meeting a few years prior, noticed her speech patterns weren't the same as before. He encouraged her to seek additional medical help. Friends and family were also worried something wasn't right.

Years earlier, while in the Utah State Legislature, she'd been recruited by a local traumatic brain injury group to be their spokesperson because of the advocacy work she'd done for people with disabilities — a passion of hers given she has a son with

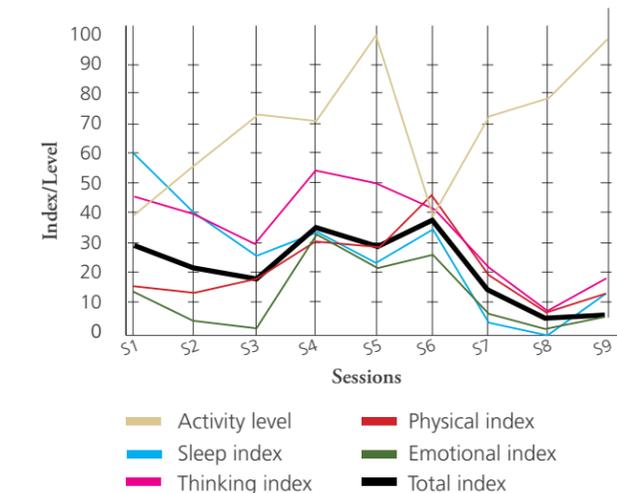
multiple disabilities. While serving in this role, she'd become familiar with the signs and symptoms of brain injury. Now years later, that knowledge came to mind and convinced her she was dealing with some sort of brain injury herself.

After getting through her daughter's wedding, she scheduled appointments with a neurosurgeon and a neuropsychologist. After a full MRI scan, they found she had a shattered cervical disk, which was causing the neck pain and the weakness in her arm, and she soon had surgery. Doctors also found she'd suffered a concussion in the car accident, which left untreated impacted her life significantly.

Toward the end of summer, she spent several weeks vacationing at Bear Lake, where she was able to rest, unplug from the demands of daily life, and allow her brain to heal.

Now nearly a year later, after working with Parley Williams, MD, and Jon Pertab, PhD, in the Concussion Clinic at Intermountain Medical Center, Trisha is returning to her regular activities. “The Concussion Clinic team at Intermountain Medical Center became my saving factor.” She recently returned from her son's wedding in Texas, which was a stark contrast to her daughter's wedding a year before. Next on her agenda: participating in the Spudman, a triathlon in Burley, Idaho, with several of her children and extended family members.

Symptom index and activity level plot for Trisha Beck

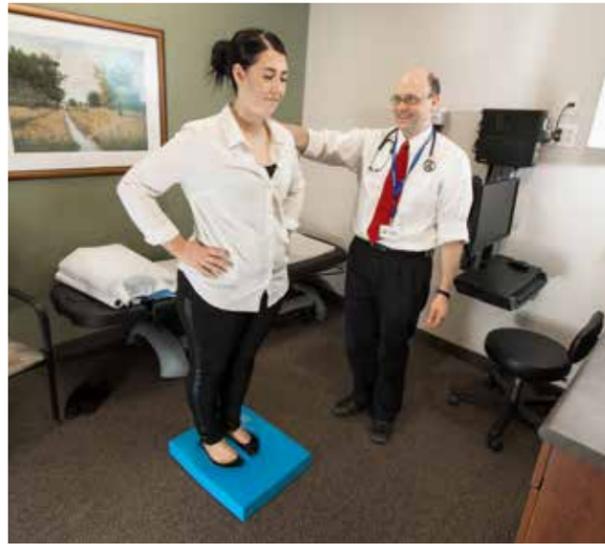


The index score gives a quick visual of the functioning level of a patient in each area on the concussion checklist.

The index ranges between 0 and 100. The higher the number the more severe the symptoms.

“Concussions are often an invisible disease and many concussion patients have their symptoms overlooked. We want them and their families to know there’s help, and we can help make their recovery a reality.”

– Parley Williams, MD, Medical Director, Concussion Clinic



Concussion program embraces team approach for treating head injuries

Parley Williams, MD, is glad the public is hearing more about concussions. In his time as a physiatrist at Intermountain Medical Center’s Neurosciences Institute, he’s seen too many situations where individuals have suffered a concussion, and have waited weeks before seeking care. Untreated concussions have played a role in individuals losing jobs, flunking out of college, or even getting divorced.

Dr. Williams, who specializes in treating non-sports concussions, prefers to see patients a week or two after a head injury, if symptoms persist. Those symptoms include headaches, sleep problems, dizziness, balance problems, nausea, fatigue, trouble concentrating, memory problems, personality or emotional changes, vision difficulties, and difficulty returning to work or school. One of the myths he frequently

encounters is the notion that if a person didn’t lose consciousness after a blow to the head, they likely didn’t suffer a concussion. As a result, many concussions go untreated or are identified after they cause other problems.

The patients he treats typically have been injured in car accidents, work-related incidents, ground-level falls, assaults, or recreational activities. Once he’s diagnosed a patient with a concussion, Dr. Williams works to educate them about the nature of their injury and prognosis then provide them with tools to manage their condition.

A common tool he uses is behavior modification to avoid mental agitation and over-stimulation. That includes things like helping patients develop regular daily routines and sleep patterns.

One important aspect of treatment is helping individuals develop a plan for reintegrating into their jobs and the community. For example, if he was treating a patient who works in a manufacturing plant, he’d make sure the individual could safely return to operating heavy machinery. This process can be difficult for many patients and presents challenges that are unique to each job environment. Dr. Williams helps his patients navigate a safe path back to work and other activities.

The Concussion Clinic is unique because of Dr. Williams and his ongoing experience treating the full spectrum of traumatic brain injuries, from the most mild concussion to the most severe traumatic brain injury with permanent neurologic deficits.

Dr. Williams feels the most important principle of concussion recovery is ongoing collaboration among the concussion team, including physical, occupational, and speech therapists, neuropsychologists, audiologists, and physicians.

“Concussions are often an invisible disease and many concussion patients have their symptoms overlooked,” Dr. Williams said. “We want them and their families to know there’s help, and we can help make their recovery a reality.”

NEUROPSYCHOLOGY: An untapped resource for many cognitively impaired patients



Testing is the key to understanding neurological disfunctions for neuro patients

According to Becky Bailey, PhD, lead neuropsychologist at Intermountain Medical Center, there are many patients who are recovering from neurological illness or brain injury who are missing out on the benefits neuropsychological care can offer.

And sometimes, patients aren’t referred until they’re facing serious life situations, when they’re unable to manage daily living activities, medical treatment recommendations, finances, or driving. These individuals are often unaware of their deficits because of their brain changes, and their medical providers may not notice these issues in casual conversation.

Dr. Bailey and her five colleagues are located in the Neurosciences Clinic at Intermountain Medical Center. They’re able to diagnose neuropsychological problems as well as cognitive strengths and limitations and help patients manage their deficits by tapping into a variety of resources. Their goal is to maximize patients’ cognitive and emotional recovery to help them achieve pre-injury or pre-illness status or to maintain independent function for a longer period of time.

The neuropsychologists commonly work with patients who are suffering from dementia, stroke, multiple sclerosis, brain cancer, Parkinson’s, seizures, and head injuries including concussions. They also see a number of patients who have neurological issues related to heart or cardiovascular problems.

Patients referred to the neuropsychology program typically go through a battery of tests to assess a variety of cognitive functions, including sensory/motor, attention, visual-spatial, language, memory, complex problem-solving, and emotional well-being. These evaluations can take two to eight hours, depending on the purpose, and include interviews, paper and pencil tests, computer-administered measures, problem-solving tasks, puzzles, and other tactile exercises.

Dr. Bailey describes it as getting a whole picture of the person and determining what their needs and challenges are.

Once a patient is assessed, a neuropsychologist works to create a treatment plan. Often the neuropsychologists get involved in assisting with special accommodations at the patient’s workplace or at school. In conjunction with the treating physician, patients may be referred for physical, occupational, or speech therapy, pain management, psychotherapy for adjustment to disability or illness, psychiatry for medication management, or other specialists to further evaluate problems discovered during the testing process. The neuropsychologists may continue to see the patient to help them adjust to issues that accompany their condition.

“Healthcare providers will be significantly challenged in the coming years to meet the needs of an increasing number of aging patients who have cognitive changes.”

– Becky Bailey, PhD, Team Lead, Neuropsychology



The **NEURO MEDICAL UNIT** assists patients in confronting the realities of life-changing illness



Specialty unit is an advantage for neurological patients and their new life challenges

Neurologist, Libby Sunderman, MD, PhD, remembers caring for neuro patients before the Neuro Medical Unit opened on the 14th floor at Intermountain Medical Center five years ago.

At that time, patients would be cared for on various floors, and care wasn't as coordinated. Now there's a tremendous amount of coordination of care for neurologic patients. She's part of a team of neurohospitalists who provide coverage for patients on the 14th floor. In addition to the physician specialists, the nurse practitioners and nursing staff have all received specialized training in caring for neuro patients. One of the things they focus on is regular neuro assessments.

According to Dr. Sunderman, the 14th floor has truly become a multidisciplinary team. Besides the physicians and nurses, the team includes nutritionists, social workers, case managers, EEG technicians, and psychiatrists. "The unit is so team-oriented, it's unbelievable," she said.

She describes the floor as the place where neuro patients and their families often first confront the reality of their condition. "These are life-changing, often disabling conditions, career-ending injuries," she said. She and her team are tasked with helping these patients and their families understand what the future may hold. After the heroic, life-saving actions in the Emergency Department, "reality hits on this floor," she said.

On the 14th floor, the staff refer to the patient population as falling into the one-third rule. One third of the patients fully recover. One third will partially recover, and the last third won't recover at all. Understanding this perspective has helped the team take a proactive approach to patient education.

Dr. Sunderman is also seeing two interesting trends: first is that neurological issues, such as stroke, are occurring in younger and younger patients. The second is an increase in neurologic illness as the population in Utah ages.

The 14th floor team focuses on adopting evidence-based practices to improve the care they provide. Dr. Sunderman is very interested in research. She recently led an effort to improve communication with patients by changing the timing and approach used by physicians in rounding. She's hopeful such efforts are improving the experience of all the patients on the unit.

"Our multidisciplinary approach gives us an edge in being current with medical advancements and giving good advice. The advice we give is relevant and personalized."

– Libby Sunderman, MD, PhD, Medical Director, Neuro Medical Unit



