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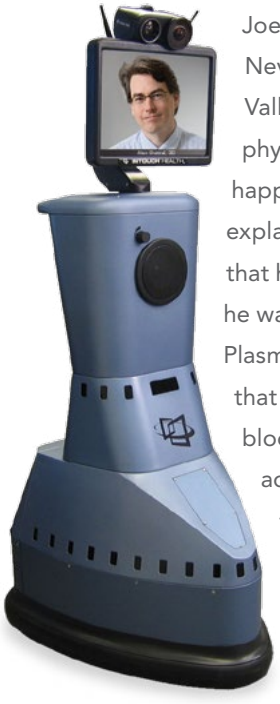
How Telemedicine Made the Difference for Nevada County Patient

For Joe Brown, crisis struck in late March while he was driving along scenic Highway 20 near his Nevada County home, with his wife beside him and his grandchildren in the backseat. "At first I thought my grandson was tickling me," he remembers. "I looked and saw an arm flopping in my lap—and then I realized that was *my* arm and I couldn't control it. I knew something bad was happening." Miraculously, Joe was able to pull over onto the side of the road. His wife turned to ask him what was wrong, but with one look she knew. "She saw my arm and my face and called 911."



Joe was taken by ambulance to Sierra Nevada Memorial Hospital (SNMH) in Grass Valley, where Emergency Department physicians and staff recognized what was happening. Joe was having a stroke. Doctors explained to 75-year-old Joe and his family that his CT scan and blood tests showed he was a good candidate for tPA (Tissue Plasminogen Activator), a thrombolytic agent that works by breaking up the clot-blocking blood flow to the brain. The tPA must be administered within a matter of hours of the onset of stroke symptoms. "We told the doctors we wanted to give the tPA a shot," Joe says. "The next thing I know, they wheel in R2D2!"

What appeared to Joe to be a high-tech machine from the movies was actually Ion, the name for Sierra Nevada's telemedicine robot. Ion (short for eye on you) connected Joe with the experts at the Mercy Neurological Institute, based in Sacramento, allowing him to be remotely examined and assessed by Mercy neurologist Alan Shatzel, MD. "The robot allows face-to-face communication," explains Dr. Shatzel. "I was able to see for myself how Mr. Brown

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The Mercy Telehealth Network Grows Larger...and Stay Tuned for More

From a single partner site (Mercy Hospital of Folsom) in 2008, the Mercy Telehealth Network has now expanded to a total of seven partner sites—Methodist Hospital, Sierra Nevada Memorial Hospital, St. Joseph's Medical Center in Stockton, NorthBay Medical Center, NorthBay VacaValley Hospital and Bakersfield Memorial Hospital.

Telehealth is the use of information and communication technology to deliver health services, expertise and information from a distance. It includes Web-based video applications and can be delivered real time or through store-and-forward technologies.

Telehealth is changing the way we think about health and provide healthcare.

Through the use of tele-neurology services via robot, our neurologists have provided tPA consult services to 109

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Assessing Sports-Related Concussions

Peter Skaff, MD

Among sports-related injuries, concussion is perhaps the most concerning, due to the risk of long-term impairment in cognitive function. To reduce this risk, familiarity with the symptoms and consequences of concussion along with improved sideline assessment of the injured athlete are necessary. Only then can a safe return to sports participation, when appropriate, be reasonably assured.

The first step is recognition of the injury. Simply put, a concussion is a trauma-induced change in mental status, either with or without a loss of consciousness, though most sports-related concussions occur without loss of consciousness. Other symptoms include headache, dazed facial expression, disorientation, slowed mentation, slurred speech, incoordination, emotional lability, impaired memory, dizziness and nausea or vomiting. These symptoms should be familiar to all medical professionals involved in the assessment of injured athletes.

The recently published practice parameter for the management of concussion in sports from the American Academy of Neurology (AAN) describes three grades of concussion:

Grade 1: No loss of consciousness. Transient confusion with symptoms lasting less than 15 minutes. This is colloquially referred to as having one's "bell rung."

Grade 2: No loss of consciousness. Transient confusion with symptoms lasting longer than 15 minutes. Persistent symptoms for more than 60 minutes warrant medical evaluation and observation.

Grade 3: Any loss of consciousness, either brief (seconds) or prolonged (minutes). Transportation to the nearest emergency department by ambulance is indicated if there is persistent unconsciousness, or if worrisome signs are detected on sideline examination.

According to the AAN guidelines, all athletes experiencing a concussion require an on-field or sideline evaluation including testing of mental status (e.g. orientation, concentration, memory), provocative testing (e.g. brief sprint, push-ups), and neurological testing (e.g. pupillary assessment, coordination, balance). For Grade 1 concussions only, the athlete may return to play if symptoms completely resolve and the sideline evaluation is normal both at rest

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Assessing Sports-Related Concussions, continued from page 2

and then with exertion. A second Grade 1 concussion on the same day warrants withdrawal from participation for at least one week. Similarly, for Grades 2 and 3, a minimum of one week until return to play is recommended.

Longer periods of non-participation are recommended if there are multiple Grade 2 or 3 concussions, if the loss of consciousness in a Grade 3 concussion is prolonged, or if symptoms are elicited with exertion, even if the athlete is asymptomatic at rest. Physician assessment, including neurological examination, should be performed at the end of the asymptomatic, non-participation period, to determine safety to return to sports activities. If there is any return of symptoms, a longer period of non-participation is indicated. When worrisome signs are present or when post-concussive symptoms worsen or persist without exertion for longer than one week, neuroimaging with CT or MRI is recommended.

The Centers for Disease Control and Prevention estimates that approximately 3 million sports-related concussions occur annually, and that next to motor vehicle collisions, sporting activities are the most common cause of concussion in individuals aged 15–24. Though use of appropriate gear and adherence to sporting rules may reduce the occurrence of concussions, preventing all concussions is not possible. With this in mind, it is of paramount importance that sports-related concussions be recognized and that appropriate measures are taken to reduce the risk of re-injury and long-term sequelae.

For more information, please see the AAN Practice Parameter on Management of Concussion in Sports at *http://www.aan.com/professionals/practice/guidelines/pda/Concussion_sports.pdf.*

If you have comments or questions for Dr. Skaff, please e-mail us at mercyneuro@chw.edu.

Baseball Implements New Disabled List

Before the Major League Baseball season began on March 31, owners and players agreed to establish a seven-day disabled list that will be used for players who have suffered concussions, enabling teams to maintain a full roster without jeopardizing the health of those whose symptoms have yet to clear up.

Since symptoms for some concussions can often subside in five to seven days, teams and players have been reluctant to use the 15-day disabled list, the list traditionally used for baseball-related injuries.

Eight major league players went on the disabled list with concussions last season.

In recent years, two major-league players, catcher and four-time Gold Glove winner Mike Matheny (San Francisco Giants) and nine-year major leaguer Corey Koskie (Milwaukee Brewers) retired because they didn't sufficiently recover from concussions they suffered in 2006.

Upcoming Events:

JOIN US MONTHLY FOR NEURO GRAND ROUNDS

Mercy General Hospital
First Thursday of each month at 12:30 p.m.

Mercy San Juan Medical Center
First Friday of each month at 12:30 p.m.

Questions or program suggestions can be directed to Candy Collins, CHW CME Office, at 916.733.6334.

FREE CME OPPORTUNITY FOR MEDICAL STAFF

Epilepsy Case Conference 6:00–7:00 p.m.
Typically the fourth Tuesday bi-monthly
Mercy General Hospital North Auditorium: May 31; July 26; Sept. 27; Oct. 25

Neuroscience tPA Conference 6:00–7:00 p.m.
Neurocritical Care Conference 7:00–8:00 p.m.
Third Tuesday of every month
Mercy General Hospital North Auditorium: June 21; Aug. 16; Oct. 18
Mercy San Juan, Suite 145: May 17; July 19; Sept. 20; Nov. 15

Please contact Ann Engwer at 962-8751 or Ann.Engwer@chw.edu with any questions.

Mercy Specialists Unite to Change Life of MS Patient

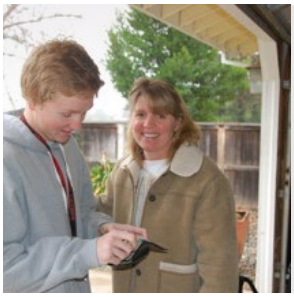
Karen Zezoff had been living with Multiple Sclerosis (MS) for more than 20 years. But in the past couple years, things had begun to change. Her mobility was decreasing dramatically, causing her to have difficulty performing routine household tasks and to fear falling. When it came time for her routine check-up earlier this year at the Mercy MS Center with neurologist Dr. John Schafer, she knew she needed help.

Dr. Schafer says Karen, 48, had arrived at a stage familiar to many MS patients. "MS is a disease that often afflicts young, active, working adults," he explains. "They are busy living their lives while their physical capabilities are gradually declining… Suddenly their deficits become overwhelming and they're not sure how to cope. It can be a frightening situation."

Recognizing that Karen needed physical and emotional support, Dr. Schafer contacted Mercy Inpatient Acute Rehab, recently recognized as one of the best in its field, receiving accreditation from the Commission on Accreditation of Rehabilitation Facilities (CARF). While the majority of Mercy MS Center patients receive therapy as outpatients (typically at Mercy Rehabilitation in Roseville or Outpatient Rehab at Mercy General Hospital), therapy in an inpatient, acute care setting can be a very effective option for some. "Through inpatient care, patients are able to receive therapy from a broad spectrum of specialists in a focused and intense environment," explains Dr. Albert Hwang, Mercy physical medicine specialist. "It's like therapy boot camp. We provide intensive, comprehensive rehabilitation therapy that is very hard to find in one place."

For a week, Karen received intensive physical, occupational, speech and neuro-psychological therapy, as well as visits from a social worker and case manager. For Karen, the time was enlightening. "I realized I had to change the way I think completely," Karen explains. "Before being in acute rehab, I thought I was being lazy if I didn't stay active and push past the fatigue and the pain. But my therapists taught me that when you have MS you have to rest. Pushing my muscles was only making them weaker."

For years, Karen, who works teaching English to adults, had refused to use her walker while at home. Her Mercy therapists taught her that by relying on walls and furniture to steady her, she was not only expending too much energy, she was also leaving herself at risk for falls. "We really focused on helping Karen find the right tools to increase her mobility and to improve her safety," Dr. Hwang says.



Karen Zezoff, right, with her son David, is safer and more independent at home using the skills she learned during her stay at Mercy General's Acute Rehab unit.

Dr. Schafer points to Mercy's exceptional rehab services as one of the many benefits available to the 500-plus patients who are treated at the Mercy MS Center. "Our patients have access to a certified MS nurse, as well as incredible services at Mercy Imaging, Mercy Outpatient Rehab, Mercy Inpatient Rehab, and all the sub-specialists that MS patients often need, such as urologists and ophthalmologists," he says. The Mercy MS Center offers area MS patients integrated care that is unparalleled in the area. In fact, it is the only such center in Northern California to receive certification from the National Multiple Sclerosis Society as an "Official Partner in MS Care."

For Karen, the interdisciplinary nature of Mercy's MS care has had real-life benefits. "My rehab experience has truly changed my life," she says. "I feel like I have gained back some independence. I didn't want my life to change and I didn't want to have to give up my job. They taught me the habits I need to keep living my life.

If you have comments or questions, please e-mail us at mercyneuro@chw.edu.

Effective Intervention Can Lower aSAH Fatality Rates

Alex Nee, MD

Aneurysmal subarachnoid hemorrhage (aSAH) accounts for 85% of all non-traumatic subarachnoid hemorrhages. It is a neurological emergency with potentially devastating consequences. The fatality rate has historically hovered near 50%, and one in eight patients die before reaching the hospital. Of those who survive, nearly half will have long-term functional impairment.

The classic presentation of aSAH is an acute, thunder-clap headache, often described as the "worst headache of my life." Rapid and accurate diagnosis of aSAH is crucial as rebleeding occurs in approximately 5–17% of patients in the first 72 hours after the onset of symptoms, and is frequently fatal. A non-contrast head CT is often sufficient to detect the presence of SAH, although lumbar puncture may be needed if clinical suspicion is high despite negative CT findings.

Emergent placement of an external ventricular drain is required to treat acute hydrocephalus.

After the diagnosis of SAH is made, CT angiography or catheter angiography is required to detect the presence of aneurysms. Once identified, surgical clipping or endovascular coiling will provide the definitive treatment for the aneurysms. Multiple factors, including age, aneurysm location and morphology, influence the choice of treatment, but timely aneurysm protection, regardless the method, is the key in ensuring the patient's survival.

The disease process of aSAH is highly dynamic and it affects multiple organ systems.

Neurologically, aSAH may lead to both acute and delayed development of hydrocephalus, which results in acute intracranial pressure elevation and depressed level of consciousness. If left untreated, herniation syndrome and death will occur. Emergent placement of an external ventricular drain is required to treat acute hydrocephalus. Delayed cerebral ischemia and stroke occur in 20–30% of patients as a consequence of cerebral vasospasm. Transcranial Doppler is used to monitor the velocity of cerebral artery blood flow, which serves as a surrogate to cerebral vasospasm. Concurrent "Triple H Therapy"—**H**ypertension, **H**ypervolemia and **H**emodilution—reduces the risk of delayed cerebral ischemia from vasospasm. Lastly, seizures may occur in up to 35% of patients following aSAH and should be treated aggressively.

Respiratory failure is commonly encountered in aSAH patients. This may be due to neurological factors such as failure of airway protection resulting in aspiration as well as pulmonary factors including neurogenic pulmonary edema, due to sympathetic surge after the initial bleed. Early tracheostomy should be considered in patients expected to require prolonged mechanical ventilation.

Cardiac complications, including hemodynamic instability and cardiac arrhythmia are frequently encountered in patients following aSAH. Tako Tsubo cardiomyopathy, a syndrome of transient global left ventricular dysfunction, has been well described in aSAH. Because the cardiac complications are generally secondary to the aSAH and not manifestations of primary coronary artery pathology, routine cardiac catheterization as well as treatment with anticoagulation and blood pressure lowering should be avoided to prevent causing secondary neurological injury.

The acute treatment of aSAH requires an understanding and appreciation of both the neurological and the systemic issues. With the advent of effective aneurysm securing intervention and the intensive management to prevent secondary neurological injury, the once very high fatality rate has improved to less than 30%.

If you have comments or questions for Dr. Nee, please e-mail us at mercyneuro@chw.edu.

Alex Nee, MD

A Minimally Invasive Approach to Lumbar Spinal Stenosis

Hamidreza Aliabadi, MD

Lumbar stenosis refers to narrowing of the spinal canal or neural foramina in the lumbar spine. It is caused by degenerative changes in the spine. The same phenomenon can occur in the cervical spine and less frequently in the thoracic spine. There are two forms of spinal stenosis—primary, or congenital, and secondary, or acquired. Acquired stenosis is much more common and may develop in those with underlying congenital stenosis. Generally, patients become symptomatic after the age of 50 with the development of degenerative changes, such as enlargement of the spinal joints, thickening of the spinal ligaments or formation of bony spurs. Bulging and herniation of discs are contributing factors. Foraminal narrowing and degenerative instability of the spine play a significant role in stenosis and its clinical sequela. Compression of the intervertebral disc with degeneration of the disc further shortens the spinal column, causing the posterior spinal canal ligaments to buckle with resultant compression of the cauda equina, foraminal nerve roots or thecal sac.

Patients often ask what causes the degenerative changes resulting in their pain. Physiologic stresses on the lumbar spine with aging leads to bony growth at the superior and inferior margins of the vertebral body. Posterior osteophytes can lead to profound narrowing of the spinal canal diameter and significant lateral recess stenosis. Superior articular facet hypertrophy further reduces the diameter of the lateral recess causing nerve root impingement. Degenerative changes leading to synovial cyst formation at the facets can cause further stenosis. These bony changes are similar to those seen elsewhere in the body, such as the hip joints or knees.

The standard surgical treatment for lumbar stenosis includes decompressive laminectomy and foraminotomy often at multiple levels. Elderly patients may have multiple medical comorbidities including cardiac, pulmonary or renal disease. Also, general anesthesia is typically needed and significant blood loss is possible. As a result, the complication rate of surgical decompression, including mortality, increases dramatically after the age of 80. Deep venous thrombosis and infections such as pneumonia, and pulmonary atelectasis may occur. Additionally, the traditional approach may cause postoperative pain and difficulty with ambulation.

Consequently, less invasive surgical treatments have gained popularity. Bilateral decompression by way of a unilateral minimally invasive approach preserves the posterior elements and minimizes perioperative morbidity and postoperative pain, due in part to minimized paraspinal muscle dissection. Patients undergoing this procedure were found to have better outcomes.

A retrospective case series showed that minimally invasive decompression for lumbar spinal stenosis consistently resulted in shorter hospital stays, minimal requirements for postoperative narcotics and analgesia, and a low rate of readmission and complications. Average age of patients was 74 years, average intraoperative blood loss was 92mL and average hospital length of stay was 1.2 days. Forty-two patients (19%) required no oral or parenteral narcotic pain medications in the immediate postoperative period.

In a prospective study to compare the safety and outcome of unilateral and bilateral laminotomy with laminectomy, 127 consecutive patients with 207 levels of lumbar stenosis without herniated discs or instability were randomized to three treatment groups: 1) bilateral laminotomy, 2) unilateral laminotomy and 3) laminectomy. The authors concluded that bilateral and unilateral laminotomy allowed adequate and safe decompression of lumbar stenosis, resulted in a highly significant reduction of symptoms and disability, and improved health-related quality of life. Outcome after unilateral laminotomy was comparable with that after laminectomy.

The current literature, therefore, provides evidence of decreased blood loss, decreased post-operative pain and decreased hospital stay with minimally invasive approaches for the treatment of lumbar stenosis. These benefits may translate into decreased morbidity and hospital-acquired complications for our patients.

For references or questions for Dr. Aliabadi, please e-mail us at mercyneuro@chw.edu.

Hamidreza Aliabadi, MD

How Telemedicine Made the Difference for Nevada County Patient, continued from page 1

was functioning. With the assistance of the on-site nurse, I could perform certain neurological assessments, take a patient history and monitor his vital signs, all while communicating directly with him and his family members."

Joe says that face-to-face communication helped him and his family feel comfortable and confident in his treatment. "Even though it wasn't Dr. Shatzel's hands performing the exams, he was the one directing my care. It was amazing. He could have been anywhere in the world and because of that technology, he was able to save my life."

Joe's tPA therapy started, with Dr. Shatzel watching via Ion the robot, within an hour of his arrival in the Sierra Nevada Emergency Department. In telemedicine cases like Joe's, timing is even more critical and takes a web of teamwork, spanning the region. "It starts with the local EMS providers getting the patients to the ED quickly, then the ED team takes over and has to make the quick decision to activate the stroke alert, which activates the robot and the remote physician."

Joe said he was still receiving the tPA intravenous drip when he and his nurse realized it was working. "My nose itched and without thinking, I reached up and scratched it. *With my left hand!* We knew then it was working." In fact, Joe's recovery was so successful that within days he was released from Sierra Nevada. "I feel great. My friends can't believe I had a stroke just days ago," he laughs. "I'm an old man who fought technology for years. Now, I owe my life to it!"

The physicians and staff at SNMH describe Joe's recovery as gratifying. "The treatment we were able to provide, with the help of the telemedicine program and Dr. Shatzel, didn't just improve his immediate situation, it preserved his lifestyle and his ability to work and enjoy his grandchildren," explains Katheryn Kray, RN, SNMH stroke program coordinator. "For us, that is success."

Dr. Shatzel says cases like this illustrate the dramatic impact the Mercy Neurological Institute is having on our region—even in remote areas. "Most rural emergency departments see only a few patients a year who may be candidates for tPA therapy," Dr. Shatzel explains. "Here in Sacramento, my colleagues and I can see up to three, four, even five cases a day. So being able to share our cumulative experience and expertise in a face-to-face manner at the bedside is an invaluable service to these outlying communities."

If you have questions or comments, please e-mail us at mercyneuro@chw.edu.

The Mercy Telehealth Network Grows Larger…and Stay Tuned for More, continued from page 1

patients. Forty percent of these patients received tPA thanks to the time-saving technology.

In December 2008, the Mercy Neurological Institute formed the Mercy Telehealth Network using $500,000 in philanthropic funding from the Elliott Homes Foundation. Each year, the program continues to grow in partner sites and number of lives touched through the use of the rapid neurologic assessment performed by the neurologists using the robot technology.

This year looks to be an exciting year of growth. Jim Roxburgh, RN, MPA, has been brought on board as the program manager to support the current services and assist with program expansion. Mercy is on track to provide 109 tele-neurology consults this year, equaling all of the previous years' totals combined!

The Mercy Telehealth Network expects to add more partner site hospitals this year and plans to expand tele-service specialties to include MS, perinatology and thoracic/oncology services. Through another generous grant from the Elliott Homes Foundation, we're exploring adding robotic technology to EMS critical care responding vehicles that support Mercy Hospital of Folsom.

For more information about the Mercy Telehealth Network, please contact us at (916) 962-8894 or go to mercysacramento.org/telehealth.

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MERCY NEUROLOGICAL INSTITUTE OF GREATER SACRAMENTO

JOIN US FOR DINNER AND AN ACCREDITED CME OPPORTUNITY

May 18, 2011, 5 to 8:30 p.m.

FEATURED PRESENTATIONS:

"The Changing World of Diagnosis and Management of MS"
John Schafer, MD, Medical Director, Mercy MS Center

"Headache Management: Where to Start?"
Marc Lenaerts, MD, FAHS, Headache Specialist

"New Frontiers in Brain Aneurysm Treatment"
George Luh, MD, Interventional Neuroradiology

Sheraton Grand Sacramento
1230 J Street
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Parking vouchers will be provided at the event for the parking garage on the corner of 13th & J Streets.

RSVP BY MAY 10
To reserve your space, visit **mercyneuro.org/cme** or call 916.851.2167.

INSIGHTS & INNOVATIONS 2011

An accredited CME opportunity for primary and specialty physicians about important advancements in neurological care