Message from the Chair

Dear Colleagues,

As this New Year begins, I would like to welcome physicians and others to the Rehabilitation Medicine overview. Here I would like to highlight some of the exciting advances and innovations taking place in the Department of Rehabilitation Medicine and on our Comprehensive Acute Rehabilitation Unit (CARU)—but first a little history.

Since 1969, through the advocacy efforts of our first Rehabilitation Medicine Chair, John Ditunno, MD, Jefferson has been proactive in ensuring a multidisciplinary approach to rehabilitation medicine. We were one of the first to set aside rehab beds in an academic medical center and since have been leading the way in collaborating between those providing complex medical and surgical care and those administering rehabilitation services.

Today, we continue to provide function-oriented services within our acute inpatient rehabilitation unit, as well as within multiple post discharge settings. We have been consistently ranked as among the best hospitals in the nation for rehabilitation by U.S. News & World Report. We have achieved this through coordinated and continuous rehabilitation care and community support, reaching out to services of other regional rehabilitation providers when needed. Our goal has always been to provide comprehensive services which we manage through teams of rehabilitation professionals who focus on physical and mental health and physiologic function, with the ultimate target of returning patients to activities of daily living through integrated strategies.

Our Rehabilitation Unit physicians, therapists and nurses develop individualized treatment plans for each and every one of our patients. This is possible through specialized, novel therapies and technologies that patients could not receive anywhere else. Because of our integrated on-site services, interdisciplinary approach, and caring rehabilitation staff, we believe we provide the best services of other regional rehabilitation providers when needed. Our goal has always been to provide comprehensive services which we manage through teams of rehabilitation professionals who focus on physical and mental health and physiologic function, with the ultimate target of returning patients to activities of daily living through integrated strategies.

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Interdisciplinary Care Spared Patient a Risky Operation

It was apparent from the start that there was no simple solution for a 38-year-old gentleman, Mr. T., who was referred to Rehab Medicine by Jefferson’s Neurology Department for right hip and leg pain, which had bothered him for the past three years.

“This patient had already seen a neurologist, orthopedic surgeon, and pain specialist; had been prodded, poked, and scanned. He had tried medications, injections and physical therapy—all without success,” said Ralph Marino, MD, Director of Jefferson’s Regional Spinal Cord Injury Center of the Delaware Valley.

The patient mentioned to Dr. Marino that as a child he had his skull fused to his cervical spine due to a deformity at the top of the spine. He had done well until three years previously when he developed an infection in the back of his neck and had to have his fusion hardware removed. While he had always had some weakness on his left side, the pain and spasms on the right side began only after this most recent surgery.

Dr. Marino noted that the patient had spasms and weakness in the right arm and leg, while also complaining of hip and leg pain, and he knew that if there was a nerve problem, it had to be located in the head or neck. A recent specialized magnetic resonance imaging (MRI) of the patient showed that the cervical spinal cord was draped over the spine, which was flexed forward instead of in its normal backwards curvature, and was being pinched from behind by bone. Could this be the cause of the patient’s difficulties and could something be done about it? To determine this, Dr. Marino needed help from his colleagues. He presented the case at a weekly conference held on the Rehab Unit. The conference, attended by a multidisciplinary team of physiatrists, orthopedic and neurological spine surgeons and a neuroradiologist discussed some difficult traumatic and non-traumatic spine cases.

Mr. T.’s x-rays showed that the fusion was still solid—with no excess movement at the top of the spine. The MRI demonstrated that where the spinal cord was being pinched was so tight that no fluid could get in the front and little could get by in the back.

Solution Identified

“I can take out some of the bone to free up the spinal cord,” Joshua E. Heller, MD, a specialist in adult reconstructive spine neurosurgery, told the team. “However, I would need to go through the back of the patient’s mouth to get to the area causing the problem. This would be a very difficult procedure and dangerous for the patient, with a high risk of damaging the cord.”

A discussion ensued of treatment options for Mr. T. centering on searching for alternatives to major surgery. Since the patient’s main problem was spasticity and pain, a course of baclofen pills had been prescribed, which while helping the spasms, left him unable to tolerate the side effects.

“How about trying a baclofen pump?” Christina V. Oleson, MD, a Jefferson physiatrist asked. “That would give him the benefit of the medication without the side effects.” The patient readily agreed to try this as he was not eager to have another operation on his spine.

Dr. Marino conducted an intrathecal baclofen trial to see if putting baclofen into the spinal fluid would help. Since the trial was successful, Dr. Heller then inserted the baclofen pump under the skin of the abdomen. The patient was then admitted to the Rehab Unit for ongoing rehabilitation. While there, he made significant improvements in his mobility, with decreased pain and spasticity. The patient was pleased with the results and happy that he was spared a more invasive procedure.

The unique setting of the Rehab Unit within Thomas Jefferson University Hospitals and the close working relationship between the rehabilitation team and the spine surgeons helped maintain continuity of care across the outpatient, acute hospital, and rehabilitation settings for this patient. The physical and occupational therapists involved in the intrathecal baclofen trial were also the treating therapists on the rehabilitation unit.

Neurosurgeon, Dr. Heller, was readily available and could evaluate the patient as needed, such as when the patient developed a spinal headache during his first days in rehab. Dr. Heller addressed that side effect without causing any interruption in the patient’s rehab program. Through this collaborative effort, we were able to improve the patient’s quality of life and avoid a major high-risk operation.
Use of Neuromuscular Electrical Stimulation for the Treatment of Dysphagia

Three of Jefferson’s speech-language pathologists, Kara Mahany, MSCC-SLP, BCS-S, Gina Osomola, MA, CCC-SLP; and Kelly M. Salmon, CCC-SLP, BCS-S, CLT-LANA, are trained in the application and use of neuromuscular electrical stimulation (NMES), which is used for both dysphagia and oral-facial weakness. Patients on the Rehab Unit, along with outpatients with these disorders, have access to treatment using either the VitalStim® or Guardian® protocol, as deemed necessary by their speech-language pathologist. They have found that the comprehensive dysphagia treatment program has resulted in improved quality of life for most patients. Many individuals are able to achieve their swallowing goals and regain their ability to eat and drink at some level.

One of these outpatients, Mr. A., a 65-year-old male, diagnosed with stage IV base-of-tongue cancer, had been treated with bilateral neck dissection and an aggressive course of chemotherapy and radiation. Following treatment, he was dependent upon a percutaneous endoscopic gastrostomy (PEG) tube for all of his nutrition, hydration and medications. The patient went through a standard course of dysphagia therapy for four months without any significant improvements, as measured by a video fluoroscopic swallow study (VFSS). He continued to depend upon the PEG tube.

The patient was then referred to Jefferson’s Comprehensive Dysphagia Treatment Program where the NMES modality was instituted. He attended intensive outpatient therapy for a total of five months. As a result of intensive exercises, application of NMES, and the patient’s internal motivation to complete his program, he was able to resume eating and drinking a slightly modified diet of soft solids and thin liquids by mouth and was able to have his PEG tube removed.

Prior to initiation of the intensive dysphagia treatment program, Mr. A. was asked to fill out the Eating Assessment Tool (EAT-10) survey, a validated, 10-question patient survey that identifies the severity of the dysphagia and its impact on a patient’s quality of life. The highest possible score (40) indicates severe dysphagia and severely decreased quality of life, while a score of 0 shows that the patient is not experiencing any dysphagia and there is no impact on quality of life.

Prior to beginning the intensive dysphagia treatment program, Mr. A. rated the EAT-10 at 36/40 (90% impairment). At the time of discharge, he rated the EAT-10 at 10/40 (25% impairment). At discharge, Mr. A. was pleased and told his therapists, “I think it can help other patients, too, but you have to know the machine doesn’t do everything. You have to try and put the effort into it. You have to help yourself. Without this machine and this therapy, I don’t think I would have succeeded the way I did.”

The Need for Rehabilitation for Oncology Patients and Their Caregivers

A growing number of the 14 million Americans suffering from cancer who are treated annually will have functional changes due to either a primary effect or complication of their oncological process. Due to a growing population of oncology patients and improved survival statistics, rehabilitation medicine has seen a paradigm shift. Now, rehabilitation no longer focuses solely on survivorship, but incorporates family and patient goals into a comprehensive multidisciplinary treatment plan.

In the past, patients like Mrs. J. would have required an extended acute-care hospital stay to allow for time-intensive chemotherapeutic protocols and radiation therapy. For acute-care providers, these extended stays and possible readmissions after discharge due to medical co-morbidities may have negatively impacted the patient’s continuity of care and outcomes.

When an inpatient rehabilitation program, such as Jefferson’s, is well-integrated with an acute-care referral source, patients can transition to the rehabilitation setting more quickly than if they remain in an acute-care setting until they are medically cleared for discharge. In addition, they can continue with their concomitant oncological treatment.

In the case of Mrs. J., Kristofer Feeko, DO, Medical Director, CARU, noted that the patient was admitted to the Rehab Unit after spending a short course on Jefferson’s medical oncology unit. Upon admission to Rehab, Mrs. J. needed an overall moderate level of assistance (i.e., patient performs 25%−50% of functional activity) for her activities of daily living (ADL) and mobility. In her 11-day inpatient rehab stay, she made excellent progress by achieving a modified independent-to-supervision level (i.e., patient performs task independently with a device, to needs stand-by supervision for safety) for her overall level of ADL and mobility.

Mrs. J.’s rehab team consisted of the traditional interdisciplinary rehab team players, but she also received additional services from her medical oncologist, radiation oncologist, and palliative care and pastoral care teams. She continued to receive therapies upon discharge to maximize her level of function.

The goal for the oncology patient on the Rehab Unit is to maximize function while minimizing complications so as to reintroduce quality of life during the post-acute care period. This philosophy is best exemplified by a recent Rehab patient who said, “My oncologist added years to my life, but you all added life to my years that I still have left.”
Since treatment paradigms have changed and medication regimens have shifted, the potential for rehabilitation for a large number of cancer patients has increased, making way for the growth of the subspecialty of cancer rehabilitation.

Jefferson’s Rehab Unit has seen an increase in patients with cancer diagnoses over the past several years due in part to advances in treatment and more positive morbidity and mortality outcomes. This has resulted in tremendous opportunities for growth and development within the area of cancer rehabilitation – all to the benefit of the oncology patient. Jefferson’s acute oncological inpatient rehabilitation provides collaborative care with each patient’s entire oncology team. Rehabilitation specialists provide specialized services, including but not limited to, preventive, restorative, supportive and palliative care.

Jefferson is expertly staffed to accommodate the challenges that an oncological rehab patient presents. Those admitted to the inpatient unit are still able to receive concurrent chemotherapeutic interventions and radiation while participating in the required three hours of therapy daily. By providing oncology patients with an individualized rehabilitation program, patients are discharged to home at a higher level of functioning. This not only decreases hospital readmissions, but also improves the quality of life for the patient and the caregiver.

Combined Treatments Restore Quality of Life to a Gunshot Patient

When a gunshot wound to the neck left Mr. P., a 33-year-old taxi driver, unable to breathe, first responders knew Jefferson was the place to bring him. Upon arrival, the acute care team found that the bullet had transected the C2 vertebrae and the entire spinal canal, causing permanent C1 complete spinal cord injury, which would result in lifelong dependence on a ventilator for the patient. Following acute care stabilization involving placement of a tracheostomy and a percutaneous endoscopic gastrostomy (PEG), the patient began the long transition to rehabilitation.

In addition to the bullet injuring his neck, Mr. P. also suffered damage to some lower aspects of the spinal cord as well as his jaw. Four separate fractures in facial bones would make eating and even mouthing words next to impossible, but the ultimate repair would be in multiple stages.

With combined efforts of trauma surgery, oral maxillofacial surgery and ENT, the patient was transferred to Jefferson’s Rehab Unit on a ventilator, with the goal of eventually speaking, eating and learning how to direct his own care. A custom-sized tracheotomy tube was adjusted by one of the Jefferson’s pulmonologists to accommodate the altered anatomy of his neck that resulted from direct bullet damage. This measure allowed use of a valve for speaking.

Jefferson is fortunate to have Michael Weinstein, MD, Assistant Professor, Department of Surgery, to care for patients with the kinds of injuries that Mr. P. sustained. He is among the first surgeons in the United States to implant the NeuRx DPS™ in patients with spinal cord injuries who lack voluntary control of their diaphragms. The device provides electrical stimulation to muscle and nerves in the diaphragm. When the muscle is stimulated, the diaphragm contracts and creates a vacuum-like effect in the chest cavity that allows air to fill the upper and lower parts of the lungs. When this contraction eases, the air is expelled from the lungs – essentially the same as regular breathing.

Christina V. Oleson, MD, a physiatrist at Jefferson, worked closely with Oral Maxillofacial Surgery and the voice and swallow team to enable four separate jaw and facial repair procedures during Mr. P.’s rehabilitation stay on the Rehab Unit, without the need to transfer the patient for overnight observation in acute care. Speaking became easier with cuff management and ventilator adjustments, which allowed the patient to talk in complete sentences. Among the patient’s wishes was an overwhelming desire to get off the ventilator.

Ralph Marino, MD, was consulted to explore the use of a diaphragmatic pacer. After a noninvasive electromyography (EMG) of the diaphragm demonstrated damaged C3 nerve roots, surgeons from plastic and reconstructive surgery performed a nerve transposition. Several months of healing would still be needed before the definitive pacemaker could be placed.

The Department of Rehabilitation Psychology worked closely with Mr. P. during this difficult time to provide encouragement and facilitate positive thinking patterns.

Interdisciplinary Approach is Key to Comprehensive Rehabilitation with a Patient with a Ventricular Assist Device

Mr. S., a 58-year-old male, arrived at Jefferson with a history of advanced heart failure. He experienced several extended and increasing inpatient admissions as his disease progressed. Mr. S.’s shortness of breath and lower extremity edema limited his mobility at home. Despite oral and intravenous medications within the home setting, Mr. S.’s symptoms worsened to the point where he was unable to get out of bed most days due to fatigue and a fear of falling.

On his most recent hospital admission, a left ventricular assist device (VAD) was surgically implanted to improve Mr. S.’s health. The VAD, an internal mechanical pump that assists a weakened heart, has a drive line that connects the pump from the heart to an external controller and power system.
Postoperatively, Mr. S. exhibited decreased arousal/attention, lower extremity weakness and needed assistance to walk and complete his activities of daily living. In addition, his activity tolerance was low as he had become increasingly sedentary prior to admission.

While in the hospital, the acute care medical and rehab team recommended that Mr. S. be referred to the Inpatient Rehab Unit to help him progress toward his independent, prior level of function. On the Rehab Unit Mr. S. and his family received comprehensive education on managing his new device in the home setting.

It was approximately two weeks post-VAD placement, when Mr. S. was moved to the Rehab Unit. Upon initial therapy evaluations, he was only able to perform 50 percent of the effort to complete most mobility and ADLs. He demonstrated impairments in memory and attention and exhibited difficulty coping with the new responsibilities of caring for the VAD. This patient received comprehensive services from a team of skilled professionals on the rehab unit, including the following disciplines: Rehab Nursing, Physical Medicine and Rehabilitation, Physical Therapy, Occupational Therapy, Speech Language Pathology, Recreation Therapy, Rehabilitation Psychology and Social Work (see diagram on pg. 6).

In addition, staff from the Heart Failure Team, Mechanical Circulatory Support Team, and Palliative Care Team collaborated with the rehab team to address the status of the VAD and Mr. S.'s medical status. The availability of immediate laboratory work and imaging allowed identification and resolution of medical issues without the need to discharge Mr. S. from the Rehab Unit back to the acute care hospital.

When he was discharged, Mr. S. improved to an independent level utilizing modified mobility strategies, assistive devices and adaptive equipment recommended by the interdisciplinary team. Mr. S. achieved an independent level for ambulation, stair negotiation, transfers and ADL. The patient and his wife stated that they felt “well-prepared” regarding the physical management of the VAD system, emergency procedures and follow-up care needs.

As the number of patients suffering from heart failure in the United States grows, Thomas Jefferson University Hospital’s Rehab Unit has experienced growth in admissions of patients with a primary diagnosis of VAD, as well as a variety of diagnoses that include complications post-VAD placement. Extensive education, exercise, and lifestyle modifications are key factors for successful mobility and function after VAD placement, which patients find at Jefferson. Some VAD recipients require an inpatient rehabilitation stay prior to returning home to address functional impairments and to maximize independence and patient/caregiver training.

**A Coordinated Approach**

Since 2009, the Rehab Unit has admitted over 35 patients with a VAD. The average length of stay for these patients is around 14 days. Jefferson’s Rehab Unit, in conjunction with Thomas Jefferson University’s Mechanical Circulatory Support Program, is currently collaborating on several research endeavors.

Because the Unit is physically located within Thomas Jefferson University Hospital, patients have many healthcare resources readily available to them in the medical and physical management of their recovery. Patients receive input from the Mechanical Circulatory Support and Cardiology teams, and clinicians have 24-hour access to imaging technologies and lab for blood work. Medical and specialty consults are available on an as-needed basis. Patients with advanced heart failure can often develop medical complications, and our collaboration with the full medical team and facilities allows us to provide a quick, coordinated response to any acute medical problems that might occur.

Throughout their rehab stay, patients and caregivers receive extensive education regarding the management of the VAD system, as well as functional training to transition from hospital life to home life. Our inpatient, interactive education system, GetWellNetwork®, provides video clips on the purpose, management and maintenance of the VAD system. Patients can watch these videos as many times as needed to feel comfortable with the VAD system. Patients also receive one-on-one education by nurses and therapists while watching these programs to ensure their understanding of the video content.

The Mechanical Circulatory Support Team provides extensive training on the mechanical features and incision care involved with VAD implantation. Our interdisciplinary team undergoes training and yearly competencies to ensure that they are providing the highest level of care and remain up to date with changing technology.

The main goal during an inpatient rehabilitation stay is to progress the patient to home with maximal independence. Each plan of care is tailored to the individual needs and specific goals of that patient.