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Cutting Edge Technology

ZeroG®

Barrow Neuro-Rehabilitation recently introduced the Aretech ZeroG® Gait and Balance System to the neuro population to elevate the high quality of care provided to patients. This robotic partial body-weight support system, on an overhead track, is used for gait training, balance and functional activities, sit-to-stand maneuvers, and even stairs. Because of its ability to physically support the patient, it promotes early gait training, allowing the therapist to focus on therapeutic intervention instead of physically holding the person for safety. The robotic trolley can be set to follow the patient's free movement along the track, in a limited area, or be locked statically. The Barrow Neuro-Rehabilitation Center is one of two programs in the United States which has the track system extended over a set of stairs for training and practice.

The ZeroG® has a variety of features that assist the therapist in providing challenging and gradable tasks to help the patient recover from their deficits. These features include:

- **Advanced Fall Protection**

Falls are prevented via one of the velocity-dependence or vertical height translation criteria set by the therapist to meet the needs of the session. When the criteria are met, a fall is detected and the device locks the vertical movement of the rope and the horizontal movement of the trolley, preventing the patient from falling. The device can track the number of potential falls in the session.

- **TRiP (Training Responses in Postural Rehabilitation)**

This applies therapist-controlled perturbations of varying strengths in either stationary or ambulatory activities to help patients learn how to recover from a loss of balance.

- **Session Reporting**

Training data from each session is stored in a secure database.

- **Interactive Gaming**

There are a couple of interactive games to challenge patients.

HoloLens 2

Barrow Neuro-Rehabilitation has added The HoloLens 2 to its repertoire of therapy technology. This device has



Cutting Edge Technology continued

proven to be an intervention modality for the neuro-rehabilitation population. As it is augmented reality (AR), it puts the holograms in the patient's environment and helps to eliminate the vestibular issues of virtual reality (VR). It allows the therapist to set up a wide variety of interventions to meet the rehab needs of the patient. Certain apps allow for more customization of the environment and then can target the tasks needed for therapy.

The therapists use it under physician-guided care for a variety of reasons such as visual scanning and tracking, active movement of the upper extremity, balance and functional mobility, cognitive and perceptual tasks as well as functional endurance activities. The HoloLens 2 provides a new way for therapeutic intervention while increasing a patient's motivation and achieving more responses during each session. To see a virtual demonstration, click on the video below.

Cracking the Neural Codes

Developing new ways to treat movement and sensation in millions of people living with paralysis.

One approach uses brain implants for high-fidelity control of paralyzed limbs. The other employs noninvasive wearable technology that provides less precise control, but has the benefit of not requiring brain surgery.

For more on how Barrow Neurological Institute is working with a group of neuroscientists and engineers to test the technology with individuals with spinal cord injuries and those recovering from stroke, see the link below.

<https://spectrum.ieee.org/biomedical/bionics/brain-implants-and-wearables-let-paralyzed-people-move-again>

Barrow has two of the nine Certified Level 3 Ekso Bionics Trainers



Fun Fact

The Ekso robotic continues to elevate the quality of physical therapy provided at Barrow Neuro-Rehabilitation. The magnitude of impact on the person served and family member is evident on the patient's face when standing for the first time with the assistance of the Ekso.

100% of the core staff at Barrow Neuro-Rehabilitation is competent to incorporate the Ekso into the therapy sessions. The education and training of this technology is of great importance to our program so every individual who meets the criteria for its use, has the opportunity to gain the benefit of the assisted gait training.

Ekso Bionics has a total of nine Certified Level 3 Trainers across the United States, who can train other staff within the organization and because of the commitment to our employees in education for competence, Barrow has two of the nine Certified Level 3 Trainers.

Human Interest Stories

My Experience at Barrow's Inpatient Neuro-Rehab Center

By Brendan Mayer

In August 2021, I traveled with my wife from San Diego to the Barrow Neurological Institute in Phoenix for a delicate brain stem tumor surgery with Dr. Michael Lawton. This was after being diagnosed, suddenly and without warning in March when I awakened to an inability to move the left side of my body. The neurosurgeons I first consulted with in San Diego told me the tumor was inoperable. Thankfully, I met another neurosurgeon who connected me with Dr. Lawton, one of two surgeons in the country who confidently knew how to help me. So we traveled to Phoenix never having heard of Barrow but trusting God that this was the miracle I needed.



The surgery was flawless, following which, the surgical team recommended the Barrow inpatient rehabilitation program to continue my recovery. Being eager to return home to my three daughters, I was resistant at first, but the Barrow team ultimately convinced me that I would benefit

from the program. Realizing that there was no comparable neuro-rehab program near my home, I agreed to stay.

One week after the surgery, I was transferred to the Barrow Neuro-Rehabilitation Center where I spent the next ten days. Having dealt with this since March, I had developed severe left-sided weakness and had been in a wheelchair for months. From day one, the Barrow team of physical therapists, occupational therapists, and speech therapists pushed me to new milestones and achievements. The technology available, such as the exoskeleton and the Zero-G harness, allowed me to make rapid progress and gain confidence that I would walk again. The team of therapists were encouraging and positive and always pushed me to do what they knew I was capable of accomplishing.

Although exhausting, the intensive rehabilitation was exactly what I needed. After months of alternating between a bed and a wheelchair, the Barrow team had me walking with a walker within days—and later a cane. The OTs also greatly improved my hand strength and arm mobility; in fact my grip strength increased fourfold in my 10 days in neuro-rehab. They even had me try aquatic therapy to prepare me to surprise my family with a pool day on my return!

When I returned to my family after three weeks in Phoenix, they were astounded to see me walk through the door, having been in a wheelchair for months previously. My three daughters began to cry seeing their daddy the way they remembered him.

Even though my rehabilitation is not complete, the Barrow therapists gave me the confidence that I will eventually make a full recovery. I am so grateful to God for leading me to Barrow and for the amazing team of physicians and therapists who take on what seems to be the impossible every day. ■

Soccer Player Finds a New Normal

Rafael sustained a traumatic brain injury on September 25, 2021, as the goalkeeper for Grand Canyon University soccer team. He collided with an opponent's knee during a save and became immediately unconscious. The game was called as the first responders removed him from the field. "I was told that the accident brought a crowd of over 2,000, including my mother, to silence." The results from the MRIs were severe as the brain had undergone moderate sheering, obvious damage to his frontal lobe and significant hemorrhaging throughout other areas of his brain. He surprised the medical team with his ability to walk and talk early in his recovery. "He is very fortunate to have made such a remarkable recovery

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Human Interest Stories continued



“He is very fortunate to have made such a remarkable recovery after sustaining such severe damage to his brain.”

—Christina Kwasnica, MD

after sustaining such severe damage to his brain.” Dr. Christina Kwasnica, Medical Director of Barrow Neuro-Rehabilitation, remarked. He was released from Barrow Neuro-Rehabilitation with one week of rest at home, prior to starting in the outpatient setting, Barrow Bridge Program.

“I was not only able to reach a comfort level of returning to school and be physically active without fear, I was also challenged to navigate this hardship emotionally.” It became evident that he was not going to be allowed to continue playing soccer, indefinitely; something that had been the focus of most of his young life. Instead, he was directed on exploring other passions in life which helped him adjust to the “new normal”. The success of the physical, cognitive and emotional aspects of his recovery, he contributes to the kind, sincere, and caring professionals he met along the way.

Awake Mapping

A team of acute care Speech Pathologists have ventured into the operating room in an exciting role of assisting Dr. Nader Sanai with brain mapping and awake craniotomy patients. Brain mapping is considered the gold standard for the identification and preservation of critical brain areas, such as those important for language and motor function. When a portion of a brain tumor or lesion has been determined to be near a critical area, brain mapping allows a neurosurgeon to locate the precise areas of the brain that are important for certain functions and then avoid them during removal of the tumor. In this way a neurosurgeon is able to resect as much of the tumor as possible, lowering the risks of damage to important functions.

In 2018, Dr. Nader Sanai requested the Speech Pathology team become involved with these patients given their expertise in areas of speech and language. When patients present to BNI with tumors in critical “eloquent” brain areas, our Speech Pathologists evaluate the patient preoperatively to help determine whether the patient is a candidate for awake mapping and which types of tasks would best capture a patient’s language during mapping. Then the SLPs will directly work with the patients intraoperatively to present a series of tasks to test if the electrical stimulation applied by the neurosurgeon affects neurological function. In this way, SLPs are contributing greatly to the preservation of language and subsequently the quality of life for our brain tumor patients.

Education Update

Barrow Neuro-Rehabilitation Services Welcomes the Barrow Physical Therapy Neurologic Residency Program

Barrow Physical Therapy Neurologic Residency is a 12-month program providing residents with a variety of clinical and didactic experiences across the Barrow rehabilitation services continuum. Our mission is to develop highly skilled physical therapists who utilize evidence-based practice and innovative technology to enhance the quality of care for patients with neurological deficits.

The PT residents will engage in all aspects of client management in a variety of clinical settings. They will be immersed in an interdisciplinary environment with mentoring clinicians who practice at the peak of excellence and embody the organization's core values of dignity, collaboration, justice, stewardship, and excellence through clinical practice and research. The combination of receiving mentored clinical experience, and working within a dynamic interdisciplinary team during on-site learning, will ensure the evolution of autonomous, advanced clinicians of neurological physical therapy and develop the readiness for the Neurologic Board Certification Exam.

For more information visit our website at:

<https://www.barrowneuro.org/for-physicians-researchers/education/neuroscience-residency-programs/physical-therapy-neurologic-residency/>

Symposium Opportunity with the Experts

For the second year, Barrow Neuro-Rehabilitation hosted the Acquired Brain Injury and Spinal Cord Injury Symposium virtually. The attendance was from across the nation and speakers presented from Maryland, Florida, Ohio and Australia.

Save the Date!

Acquired Brain Injury and
Spinal Cord Injury Symposium

October 8-9, 2022

For more information regarding registration and information as the symposium is being developed, login into [BarrowNeuro.org](https://www.barrowneuro.org).

Meet Our First Resident

Katherine Asher, PT, DPT

Creighton University Physical Therapy Program Graduate

Katherine began the residency program June 28, 2021, and is expected to graduate June 16, 2022.

“When I initially decided to do the residency in my final year of physical therapy school, I was excited about the opportunity to learn more about the neurologic population. Never did I imagine that I would have the experience that I have received over the past eight months at Barrow as their first neurologic physical therapy resident. My first four months were spent in acute care, working in the ICU and on the neurologic telemetry floors, followed by four months in inpatient rehabilitation.

As one of the premier locations for neurology and neurosurgery in the country, I have been exposed to a wide variety of diagnoses, including some of the most rare diagnoses, across the continuum of care and have been working alongside some of the most passionate, knowledgeable physical therapists in the field along the way. While I am assigned one primary mentor during my rotations, I am surrounded by other therapists who are eager to teach and learn with me. I participate in weekly mentorship sessions, supplemental education and maintain a full caseload.

I have also had the opportunity to participate in stroke team rounds with the neurology fellows, and have observed surgery performed by some of the top neurosurgeons in the country.

I will complete my residency in June 2022 after I complete rotations in our Outpatient Neuro-Rehabilitation and our speciality movement disorders clinic. I am incredibly grateful to have had this opportunity to learn from my colleagues and the many patients I have interacted with in my time thus far and look forward to using these skills to provide the best care possible to my patients moving forward in my career.”

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Education Update continued

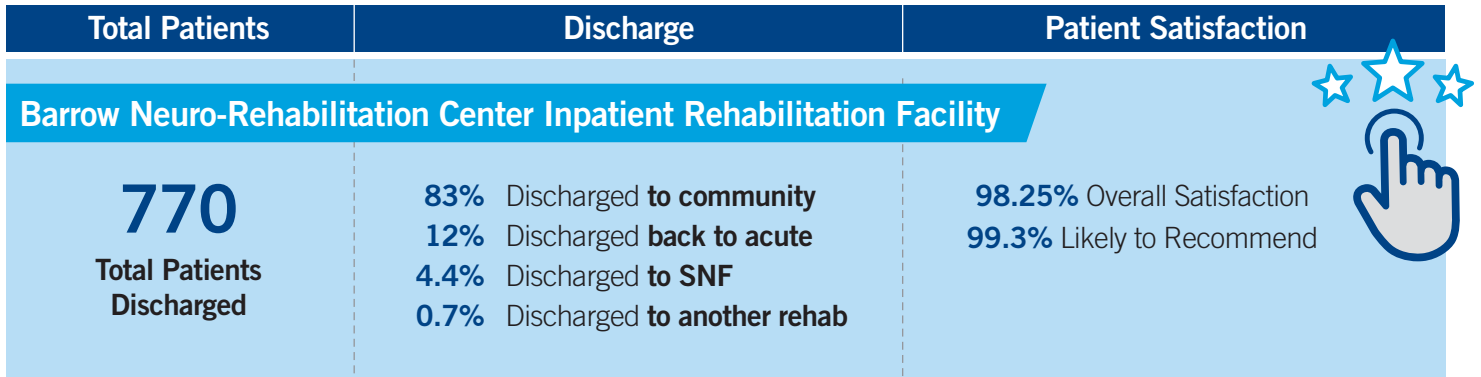
Dr. Matthias Linke, Board Certified in SCI and Medical Director for SCI at Barrow Neuro-Rehabilitation presented a poster at the International Spinal Cord Society Meeting in October, along with Jack Anger, MS, CCC-SLP and Yezan Hassan, BS, BSHS, BA.

The title of the poster is “A Case of Repeated Respiratory Failure Resulting from Esophageal Dysmotility in a Tetraplegic.”

In the care of patients with spinal cord injuries (SCI), little is understood on the neurological impact on swallowing. One reason is that those with SCIs may have reduced or absent sensory innervation – masking subjective complaints such as pain or pressure. Research has suggested that esophageal dysmotility in the SCI community may be more abundant than previously thought. This case highlights such an example.

Please click on the poster to see the poster presentation including discussion in detail.

Rehabilitation Services Programs Overview and Outcomes - Calendar Year 2021



Outpatient Neuro-Rehabilitation Services



Center for Transitional Neuro-Rehabilitation (CTN)

