Rusk Rehabilitation

TOP 10
IN U.S. NEWS & WORLD REPORT

37%
INCREASE IN OUTPATIENT VISITS

ADVANCING
VALUE BASED MEDICINE
Contents

1 MESSAGE FROM THE CHAIR

2 FACTS & FIGURES

4 NEW & NOTEWORTHY

8 TRANSLATIONAL CLINICAL CARE

9 Rehabilitation's Role in Value Based Medicine
12 Novel Treatment for Post-Stroke Muscle Stiffness
14 Rehabilitation Following Groundbreaking Face Transplant
16 Neuromodulation to Treat Shoulder Pain
18 Early Mobilization in the PICU
20 Brain Injury Research
23 Complex Case: NSTEMI Patient

24 ACADEMIC ACTIVITIES

29 LOCATIONS

30 LEADERSHIP
Dear Colleagues and Friends:

I am pleased to share with you the 2016 “Year in Review” from Rusk Rehabilitation. Our annual report highlights some of our team’s most significant achievements this year.

In today’s world of healthcare reform, we can’t talk about any kind of achievement without asking two questions. First, did we improve patient outcomes? Second, did we control costs? These two issues define the essence of value-based care. At Rusk, we are focusing all our efforts on increasing the value of the care we provide. Our goal is to achieve better outcomes while lowering total costs.

What are we doing to increase healthcare value? For one, we have helped pioneer a strategy that is delivering significant savings—early, intensive rehabilitation in critical care. Last year, our early mobilization initiative in the adult ICU reduced length of stay (LOS) and increased home discharge rates. In 2016, we expanded early mobilization to the pediatric ICU, where we look forward to achieving similar gains. We also took steps this year to ensure that ICU patients receive a physiatry consult early in their stay. This initiative has helped ensure that patients receive appropriate rehabilitation services more quickly. As a result, we have dramatically decreased LOS in acute rehabilitation while maintaining outcomes.

While we improve the way we deliver care, Rusk researchers are continuing to investigate new treatments. One major area of interest is stroke. In 2016, Rusk faculty demonstrated that a long-available drug therapy can effectively reduce muscle stiffness in post-stroke patients. Their research generated a great deal of interest, and we are working to disseminate this promising therapy to other institutions. Our investigators are also very active in the area of brain injury. This year, they developed several new tools for detecting and assessing brain injury and honed new strategies for delivering the most effective rehabilitative care to TBI patients.

I can’t conclude this note without mentioning a major milestone for NYU Langone Medical Center and a significant achievement for the entire rehabilitation team at Rusk. One year ago, the recipient of the most extensive face transplant to date was discharged from NYU Langone. After his surgery and in the months that followed, our physical and occupational therapists, speech language pathologists, and physiatrists worked tirelessly to help him achieve rehabilitation goals far beyond what most patients ever confront. This team’s work broke new ground in our field—and demonstrated the key role of rehabilitation in the healthcare system of the future.

I am very proud of the entire faculty and staff of Rusk Rehabilitation. It’s my firm belief that healthcare reform will not be as successful as it can be without the involvement of rehabilitation medicine. And the people I work with every day here at Rusk are the ones who are creating that success.

Thank you for your interest in our work. On behalf of all my colleagues, I look forward to the great things that every one of us in the field of rehabilitation medicine will achieve in the years to come.
Rusk Rehabilitation

**Clinical**

261,000+ 
OUTPATIENT VISITS 
a 37% increase compared with last year

2,100+ 
INPATIENT DISCHARGES

89 
CERTIFIED SPECIALIST PHYSICAL THERAPISTS 
accounting for 10% of all certified specialists in the state of New York

36 
CERTIFIED REHABILITATION REGISTERED NURSES (CRRN) 
including two CRRN-certified nurse managers

30,000+ 
DOWNLOADS OF RUSK INSIGHTS 
podcast via iTunes and other podcast apps

**Education and Research**

23 
PM&R CHAIRS 
around the U.S., both current and former, who have graduated from Rusk’s residency program

$6.5M 
TOTAL FUNDED RESEARCH

**Accolades**

TOP 10 
IN THE COUNTRY 
for rehabilitation in U.S. News & World Report’s “Best Hospitals” since the rankings began in 1989

AACVPR 
PROGRAM CERTIFICATION 
for Rusk’s Joan and Joel Smilow Cardiac Prevention and Rehabilitation Center

CARF 
ACCREDITATION 
granted in 2016 CIIRP, Pediatrics, Brain Injury, Stroke, and Limb Loss; Exemplary conformance in research and community outreach

3-YEAR 
CARF ACCREDITATION

Numbers represent FY16 (Sept 2015–Aug 2016) unless otherwise noted
IN THE NATION
BEST HOSPITALS

and nationally ranked in 12 specialties, including top 10 rankings in Orthopaedics, Geriatrics, Neurology & Neurosurgery, Rheumatology, Rehabilitation, Cardiology & Heart Surgery, and Urology. Nationally ranked in Cancer, Diabetes & Endocrinology, Ear, Nose & Throat, Gastroenterology & GI Surgery, and Pulmonology.

# 11
IN THE NATION
BEST MEDICAL SCHOOLS
FOR RESEARCH

and a leader in innovation in medical education, including accelerated pathways to the MD degree.

LEADER
IN QUALITY CARE AND PATIENT SAFETY

and recognized for superior performance as measured by Vizient’s nationwide 2016 Quality and Accountability Study.

NYU Langone Medical Center
New Clinical Programs, Education Initiatives, and Platforms for Experts

Rusk on the TED Stage

Holly A. Cohen, OTR/L, ATP, SCEM, CDRS, assistive technology program manager, has a passion for helping people with disabilities use technology to make their world more accessible. In 2016, she shared that passion at the prestigious TED Conference. This year’s event featured cultural leaders such as Al Gore and John Legend, and the audience included innovators like Bill Gates and Steven Spielberg. During her session, Cohen pointed out that there is one area of activity that people do not often think about in terms of accessibility—play. Cohen explained how she helps children and their families modify commercial toys using DIY tools such as 3D printers, laser cutters, and inexpensive electronics. For example, to play with a remote control car, a child must be able to work the controller. But what if she can’t use her hands?

Cohen described a 25-cent part that lets you add hundreds of different accessibility switches. What about more complex toys like video games? Cohen and a colleague adapted a PlayStation for a teen with muscular dystrophy who can move only his head and one finger. The key is to focus on abilities. “Build for what they can do,” she says, “not for what they can’t do.”
New Program Provides Intensive Speech Language Therapy for Stroke Survivors

In early 2017, Rusk is launching its Intensive Comprehensive Aphasia Program (ICAP), which offers concentrated speech therapy for stroke survivors. The program was developed by Mary R. Reilly, MS, CCC-SLP, director of speech language pathology, and Elizabeth E. Galletta, PhD, CCC-SLP, clinical research specialist. “Research in neuroplasticity has demonstrated that stroke survivors who have a language impairment can benefit from intensive therapy,” explains Dr. Galletta. “Our intensive three-week program uses a variety of evidence-based treatment approaches that directly target both the impairment itself and the activity of communicating.” Individual therapy sessions make use of modified Verb Network Strengthening Treatment (VNeST), an approach for promoting verb and sentence production in people with aphasia. Studies have shown that VNeST leads to clinically significant improvements in communication. Group therapy sessions incorporate Constraint-Induced Language Therapy (CILT) principles, which strengthen speech by systematically constraining the use of non-verbal communication during CILT sessions. The Rusk Rehabilitation ICAP also includes music group sessions, computerized treatment, counseling, and family education.

Education Keeps Pace with Rehabilitation Trends

As rehabilitation evolves, Rusk is introducing new education programs to prepare graduates for the future. In 2016, Rusk restructured its PM&R residency to include additional training in subacute rehabilitation. Residents now have the option to do a rotation at NYU Lutheran Augustana Center, a skilled nursing facility in Brooklyn. “A large percentage of our graduates will end up working in subacute rehabilitation,” says Alex Moroz, MD, associate professor of rehabilitation medicine and vice chair of education and training. “This rotation aligns their training with what they will actually encounter in practice.” Also this year, Rusk introduced a new physical therapy residency focused on acute care. According to Dr. Moroz, the initiative reflects the growing importance of early interventions delivered in the inpatient setting.

In addition, 2016 saw the launch of Rusk’s new fellowship in pediatric rehabilitation medicine. This two-year program is accredited by the Accreditation Council for Graduate Medical Education. It offers physicians a unique opportunity to obtain advanced training in pediatric rehabilitation in the inpatient, outpatient, and specialty settings.

CONTINUING EDUCATION: 2017 COURSES

→ February 4: Splinting for Stiffness: A Seminar on Mobilization Orthoses
→ February 24: 4th Annual Concussion Across the Spectrum of Injury: Case Studies and the Latest for Diagnosis and Management
→ March 11: The Rusk Complex Case Series: Rehabilitation Medicine and Management of the Patient with Heart Failure
→ March 27–April 1: 42nd Annual Comprehensive Review of Physical Medicine and Rehabilitation
→ May 20: Rusk Lumbar Spine Symposium: Translating Evidence into Clinical Practice

For more information go to med.nyu.edu/cme
Evidence shows that receiving feedback is essential to developing medical expertise. However, the feedback process can be daunting for both residents and faculty members. A new iPad app called PRIMES is facilitating this essential learning activity for PM&R residents at Rusk Rehabilitation.

PRIMES was developed by the NYU School of Medicine and recently adapted for the residency program. In the middle of each rotation, residents use the app to self-assess in domains such as diagnostic ability, patient management, procedural skill, and professionalism. Faculty mentors then provide their assessments. PRIMES matches the answers, highlighting areas of agreement and disagreement. “The app structures the feedback process and scaffolds it, making it easier for people to do,” says Dr. Moroz. “I think this tool will completely change the culture of asking for and giving feedback in our institution.”

Also this year, Rusk began transitioning residency education materials to the Brightspace learning management system. “The Brightspace platform allows us to put all our resident education content in one place,” Dr. Moroz says. “These are true education modules, with learning objectives, materials, assessments, and the ability to track completion. The system has been up for just a few months, but residents are already heavily using it.”
After Rehab, Smartphone App Keeps Patients on Track

Research shows that many heart attack patients, despite completing outpatient cardiac rehabilitation and learning a new heart-healthy lifestyle, revert to their former lifestyle within one year, increasing their risk of a second cardiac event. To help close this adherence gap, Rusk clinicians partnered with mobile tech experts at Moving Analytics to develop a smartphone app that keeps track of patients following their cardiac rehabilitation course. “The app lets patients record everything they do—diet, exercise, medications, weight, and blood pressure readings—so we can track their adherence to the newly prescribed lifestyle,” says Jonathan H. Whiteson, MD, assistant professor of rehabilitation medicine and vice chair of clinical operations.

Data from the app is transmitted to a dashboard monitored by cardiopulmonary specialists at Rusk. “The specialists watch for things like missed medications or a spike in blood pressure,” explains Tamara Bushnik, PhD, FACRM, associate professor of rehabilitation medicine and director of inter-hospital research and knowledge translation. “If one of these things happens, staff can send a message through the app and have a two-way conversation with the patient.”

The researchers are currently conducting a clinical trial to test the smartphone app against standard discharge instructions alone. Dr. Whiteson believes the app could become an important element in the rehabilitation toolbox. “It allows us to maintain contact with a population that is busy and tends to fall out of compliance with a heart-healthy lifestyle alone.

NYU LANGONE AFFILIATION WITH WINTHROP-UNIVERSITY HOSPITAL BRINGS EXPANDED AND ENHANCED HEALTHCARE NETWORKS TO LONG ISLAND

NYU Langone and Winthrop-University Hospital on Long Island have reached an agreement to affiliate the institutions’ extensive healthcare networks. NYU Langone, with more than 150 ambulatory sites throughout the region, will complement Winthrop-University Hospital’s main campus, multiple ambulatory sites and network of 66 faculty and community-based practices in more than 140 locations extending from eastern Long Island to Upper Manhattan.

The affiliation will further expand NYU Langone’s presence on Long Island, while enhancing Winthrop’s inpatient and outpatient services with improved access to NYU Langone’s wide range of medical and surgical specialties. “This agreement publicly confirms our confidence that an affiliation will allow both of our institutions to collaborate and share best practices to better meet the healthcare needs of the communities we serve,” says Robert I. Grossman, MD, the Saul J. Farber Dean and CEO of NYU Langone. Pending regulatory approval, the institutions are aiming to complete their affiliation in spring 2017.
Rehab Medicine
Leading a Changing Healthcare Landscape

ACROSS DISCIPLINES, RUSK REHABILITATION IS ESTABLISHING A CARE MODEL WHERE PM&R FINDS A KEY ROLE IN THE CHANGING LANDSCAPE OF HEALTHCARE. OUR PHYSIATRISTS AND CLINICAL TEAM ARE TAKING ON NYU LANGONE’S MOST COMPLEX CASES, FORGING NEW TREATMENT METHODS, AND LEADING INNOVATIVE VALUE-BASED MANAGEMENT PRACTICES.

Preeti Raghavan, MD
The ongoing transition from fee-for-service to value-based payment has created a new imperative for caregivers to ensure that healthcare spending is linked to quality, not quantity. At Rusk Rehabilitation, leaders are using a range of strategies to enhance care while improving cost efficiency.

“Cost in healthcare is obviously driven by things like service and device utilization, radiology use, and pharmacy spending,” says Jonathan H. Whiteson, MD, assistant professor of rehabilitation medicine and vice chair of clinical operations. “But a big issue is length of stay, because every day in the hospital is associated with significant cost.”

Over the last few years, Rusk care teams have used early intervention strategies to reduce length of stay (LOS) in several units. In 2016, they turned their focus to inpatient rehabilitation. There, data showed that the acute care hospital’s observed-to-expected (O/E) LOS for rehab patients was near 1.5. “To some degree this was understandable, since these patients were the sickest of the sick,” Dr. Whiteson says. “But based on our success with early intervention in other units, we knew there was an opportunity to improve.”

Hospital leaders began by setting an overall target ratio of 1.1 for O/E LOS for the acute care hospital’s inpatient rehabilitation patients. Led by Dr. Whiteson, Kate Parkin, PT, DPT, MA, clinical assistant professor of rehabilitation medicine and senior director of therapy services, and Katherine Hochman, MD, assistant professor of medicine, then analyzed acute rehab processes to understand what was extending patient stays. They identified three issues:

- First, acute care clinical teams were uncertain about which physiatrist to call for which patient. They often turned to the physician they knew best rather than the one who specialized in the particular area needed.
- Second, rehabilitation was often consulted very late in the patient’s acute stay, frequently the day before a planned discharge, which did not always give the clinician enough time to carry out an effective care plan.
- Third, patients were frequently admitted to the wrong rehabilitation unit based on the preference of the referring acute care team, versus the patient’s diagnosis and the accepting rehab unit’s specialty. The wrong patient on the wrong rehabilitation unit, in turn, blocked beds and patient flow—and extended the acute care hospital’s LOS.

“Rehabilitation medicine should consider itself central to the value-based care movement.”

—Jonathan Whiteson, MD
Once they identified the issues leading to service inefficiencies, Dr. Whiteson and his colleagues implemented several changes to address them, including:

**STANDARDIZED CONSULT ORDER.** “Previously, staff could order a physiatry consult in many ways—by phone, by email, through one of several EMR functions, or simply by grabbing a colleague’s elbow in the elevator,” Dr. Whiteson says. “We realized that we had to standardize this, so we developed a diagnosis-based consult request within our EMR.” The system uses 10 diagnostic categories, ranging from orthopaedic rehabilitation through hemorrhagic brain injury. “Now, for instance, the specialist in cardiopulmonary rehabilitation checks the cardiopulmonary consult list, and picks up only those patients referred under that diagnostic category.”

**TIMELY PHYSIATRY CONSULT REQUEST.** Calls for a physiatry consult from the acute care team as the patient was discharged to inpatient rehabilitation left little time to coordinate admission and care at Rusk, clearly contributing to prolonged length of stay. Dr. Whiteson explains, “From previous research, we knew that the earlier our rehabilitation therapists saw patients in acute care, the shorter those patients’ LOS. Our ICU early mobilization data indicated significant length of stay reduction with early involvement of the rehabilitation team.” Changing the culture to encourage consultation to the physiatrist much earlier in the patient’s stay has yielded significant results.

**16-HOUR TARGET FOR PHYSIATRY CONSULT COMPLETION.** Prior data often showed a wide lag from the time a physiatry consult was called to consult’s completion. Acute care hospital teams often waited for feedback from the physiatrist for discharge planning, and few consult reports contained specific details regarding the patient’s ongoing rehabilitation needs—information crucial for acute care teams to complete disposition planning and expedite care. To ensure patients saw a physiatrist as soon as possible, Rusk targeted completion of consults to a 16-hour window after the order was placed. “In addition, we specified that the consult has to be directive,” Dr. Whiteson said. “The physiatrist has to state clearly whether the patient is a candidate for inpatient rehab or can be discharged home with other rehabilitation recommendations.” This clear directive now helps the acute care team expeditiously plan the next step in the patient’s care.

**MULTIDISCIPLINARY DISCHARGE PLANNING.** To strengthen the discharge process, the Rusk team identified ways to more deeply involve rehabilitation specialists. “We added physical therapists to the morning huddle and to daily rounds on each acute care unit,” says Parkin. “Our standardized interdisciplinary rounds have helped ensure rehabilitation is involved in discharge decisions, and our goal as a team is to ensure that the right patient gets to the right bed at the right time.” To that end, processes were adjusted to ensure that every rehabilitation candidate is discharged to the correct rehab unit.

**EDUCATION AND CULTURE CHANGE.** To embed the newly created care and discharge processes systemically, rehabilitation leaders educated physicians and other interdisciplinary providers on the role of physiatry, the phases of rehabilitation, and the value of an early physiatrist consult. “We knew this was not only about changing practice to order a consult early, but actually changing the culture of our medical and surgical teams,” says Dr. Whiteson.
EARLY RESULTS: SHORTER LOS, HIGHER PATIENT SATISFACTION

These new consult processes were put in place during the first two months of 2016. Between February and March, the average time to completed physiatry consult decreased from 22.7 to 10.2 hours, with averages remaining under the 16-hour target in the months that followed. The earlier, more directive physiatrist consults have ensured that patients receive rehabilitation interventions more quickly—which, in turn, has had a significant impact on patient stays. As a result, between September 2015 and July 2016, O/E LOS in acute rehab declined from 1.47 to 1.15. In addition, efforts to ensure the practice of “the right patient on the right unit at the right time” has not only eliminated rehabilitation patients being treated on the wrong specialty Rusk unit, but has also enhanced bed availability at Rusk as well as patient flow and timely discharge of acute care patients.

The ultimate impact of the rehabilitation team’s early involvement with the entire rehabilitation team extends far beyond cost control. By both shortening stays and increasing home discharge rates, these interventions also help increase patient satisfaction—a key measure of quality under value-based payment.

Dr. Whiteson believes that these results demonstrate the key role of rehabilitation medicine in the new healthcare environment. “I think everyone in rehabilitation medicine should recognize how much we have to contribute in terms of coordinating care, leading care teams, and having the vision to identify new opportunities to enhance quality while minimizing costs,” he says. “Rehabilitation medicine should consider itself central to the value-based care movement.”

Jonathan Whiteson, MD, and Kate Parkin, PT, DPT, MA, with Fritz Francois, MD, Chief Medical Officer of NYU Langone
Muscle stiffness is a common aftereffect of stroke and other neurologic injuries. But is it caused directly by neuronal hyperactivity? A group of Rusk investigators recently proposed an alternative hypothesis—and a new treatment strategy—for muscle stiffness related to cerebral injury.

"For a long time, people have thought that something besides neuronal damage contributed to muscle stiffness, but we didn’t know what it was," says Preeti Raghavan, MD, assistant professor of rehabilitation medicine and vice chair of research. "What was hotly debated is whether a contracture begins to occur very early after the injury, or whether it results from later changes that take place in the muscles themselves and surrounding soft tissue."

About three years ago, Dr. Raghavan began discussing the problem with Antonio Stecco, MD, PhD, clinical instructor of rehabilitation medicine and an expert in fascial manipulation. "This type of friction massage is incredibly effective at restoring movement for people with musculoskeletal pain," Dr. Raghavan says. "We started to talk about what substances this massage could be releasing, and looked at the possibility that it was mechanically breaking up hyaluronic acid."

Hyaluronic acid is a non-sulfated, high-molecular-weight glycosaminoglycan that is abundant in the connective tissues surrounding muscle fibers. "It acts as a lubricant that allows muscle fibers to slide against each other during movement," Dr. Raghavan says. "But when hyaluronan is left to sit still and accumulate, it binds to itself and becomes extremely viscous. So instead of acting as a lubricant, it acts like a glue that binds muscles together and gives the perception of stiffness and increased resistance to movement." The researchers hypothesized that post-stroke muscle stiffness was caused by the accumulation of hyaluronic acid due to immobility. If so, then muscle stiffness could potentially be resolved by breaking up the hyaluronan chemically with the enzyme hyaluronidase.

CASE SERIES SHOWS DRAMATIC IMPROVEMENT

Dr. Raghavan and colleagues tested the hypothesis by injecting recombinant hyaluronidase into a series of 20 patients with moderately severe upper-limb muscle stiffness. The results were published in the July 2016 issue of *EBioMedicine*. "For most patients, resistance to passive movement decreased within a week, and those results were maintained at both one month and three months," she says. Modified Ashworth Scale scores were reduced significantly across the patient cohort. In addition, active range of motion improved at one and three months. "It’s typically thought that you are not likely to see much change in active motion in stroke patients after two or three years. So to get these changes in active motion and see them increase over time has been very exciting."

Hyaluronidase is a potential treatment not only for stroke patients, but also for individuals with neurologic conditions, such as cerebral palsy and traumatic brain injury. According to Dr. Raghavan, it can be used in conjunction with other treatments like intrathecal baclofen. However, hyaluronidase offers significant benefits over central nervous system depressants since it does not cause weakness, drowsiness, or cognitive impairment. Another benefit is that it can facilitate physical therapy. "Many times stroke patients have a hard time in therapy because their muscles are so stiff," Dr. Raghavan says. "What we have found is that by reducing the stiffness, therapy efforts are much more likely to yield benefits for patients."
Leveraging Technology to Aid Stroke Rehab

Rusk investigators are developing several technologies for pinpointing post-stroke deficits and targeting therapeutic interventions.

**MIRRORED MOTION BIMANUAL ARM TRAINER (BAT)**

The Mirrored Motion BAT combines a rowing simulation device with a videogame interface to help stroke victims regain arm function through "mirrored motion" therapy. In 2016, Preeti Raghavan, MD, and her colleagues launched three separate clinical trials focused on the use of Mirrored Motion BAT in acute rehabilitation, outpatient rehabilitation, and pediatric home-based rehabilitation.

**WIRELESS FEEDBACK WEARABLES**

Dr. Raghavan has also collaborated with researchers at the NYU Tandon School of Engineering to develop a mechatronic jacket and gloves for stroke rehabilitation therapy. The wearable devices record patient movements and transmit them wirelessly to a computer. A videogame interface provides the patient with highly personalized feedback during movement exercises. The goal is to enable patients to receive precision therapy at home. “Ultimately, the therapist will be able to teach movement strategies to patients in the clinic and then monitor them remotely with a smartphone,” Dr. Raghavan says. “Most importantly, the wearables allow patients to work on their rehabilitation remotely on their own time.”

**LOCATING THE BROKEN LINK BETWEEN EYE AND HAND MOVEMENT IN STROKE PATIENTS**

John-Ross (J.R.) Rizzo, MD, assistant professor of rehabilitation medicine and neurology, is using advanced technology to study eye-hand coordination in stroke patients. “Research has shown that when the eye and the hand work together, the eye informs the hand. But recent studies have also suggested that the hand actually informs the eye as well,” he says. “So there is a bidirectional flow of information between these systems.” In the Visuomotor Integration Laboratory at Rusk, Dr. Rizzo and colleagues use advanced motion capture systems to capture precise, simultaneous measurements of ocular motor and manual motor functions. Their data shows that in many stroke patients, the link between those two systems breaks down. “The technology is allowing us to objectively highlight where some of those breakdowns are,” he says. “Our hope is to characterize these deficits in fine detail, and create precise, patient-tailored therapeutic targets to help restore this link, all through novel biofeedback strategies.”

**CLINIC OPENED, CLINICAL TRIAL PLANNED**

In fall 2016, Rusk opened a hyaluronidase injection clinic, treating adult patients from across the United States. Dr. Raghavan and colleagues are currently planning a randomized, controlled clinical trial to demonstrate the efficacy of hyaluronidase for treating muscle stiffness due to neurologic injury.

“Our results so far show us that the immobilization that occurs as a consequence of a neurological injury is a major contributor to muscle stiffness,” says Dr. Raghavan. “The most exciting thing is that we now have a direct way to actually bring relief to patients.”
For firefighter Patrick Hardison of Mississippi, a 2001 accident—in which he became trapped under a collapsed roof and suffered disfiguring burns over most of his head—led to 70 grueling reconstructive procedures in the years that followed.

In 2015, his long cycle of surgeries was disrupted by a landmark, 26-hour transplant procedure led by Eduardo D. Rodriguez, MD, DDS, the Helen L. Kimmel Professor of Reconstructive Plastic Surgery, at NYU Langone Medical Center. Performing the most extensive face transplant ever, surgeons replaced Hardison’s entire face and scalp, including his lips, ears, and eyelids.

For rehabilitation providers at Rusk, the face transplant catalyzed the creation of a long and complex treatment plan that has challenged every conventional approach to post-transplant rehabilitation medicine. “We were involved in the planning with the face transplant team from the outset, and we were ready to address Patrick’s recovery as we would for patients following other extremely complicated procedures,” says Jeffrey M. Cohen, MD, clinical professor of rehabilitation medicine and director of medically complex rehabilitation. “However, his case was obviously incredibly unique and brought distinct challenges.”

AN EARLY PRIORITY: REANIMATING MUSCLES AND NERVES

During the procedure, surgeons attached a donor’s cranial and facial nerves to Hardison’s facial substructure. The complexity of transplanting entirely new facial nerves—the nerves needed to be adapted and trained to work for Hardison—necessitated muscle rehabilitation approaches above and beyond those employed for typical facial nerve trauma.

“We initially started with face reanimation, training his facial muscles to move and form expressions,” says Matina Balou, PhD, speech-language pathologist. “That involved stretching and massage exercises and motivating Patrick to perform even very slight movements of different facial muscles.” His face transplant was the first to include the muscles that control blinking, so eyelid movement presented additional unfamiliar territory. “We began by trying to get Patrick to open his eyelids as much as possible,” Dr. Balou says. Three days after surgery, Hardison finally blinked—for the first time in 14 years.

While the Rusk team addressed facial movement, they also focused on swallowing therapy as an early priority. “After surgery, Patrick’s pharyngeal muscles were very weak, so we spent a lot of time on swallowing maneuvers to help him clear his pharynx,” Dr. Balou says. She began by placing a drop of water at the very back of his throat, eliciting a swallow reflex and stimulating the pharyngeal muscles. “It was a very slow
process, but with a lot of work Patrick was able to swallow and transition from a feeding tube to a regular diet without restrictions within three months, which was much faster than we anticipated.”

**KEY ROLE FOR PHYSICAL AND OCCUPATIONAL THERAPY**

Meanwhile, Patrick progressed quickly through physical and occupational therapy. “What was really interesting about this case is that we didn’t have a benchmark timeline for rehabilitation,” said Megan Evangelist, MS, OTR/L, occupational therapy clinical specialist. Five days after his transplant, Hardison was measuring about half the hand grip strength of someone his age and gender. PT and OT staff worked with him six days a week. One month later, he was scoring within normal limits for hand grip strength and performing basic daily activities independently. According to Evangelist, personal determination was a deciding factor. “Patrick was highly motivated to participate in therapy,” she says. “It was pretty amazing to see how quickly he progressed.”

**ADDRESSING UNEXPECTED CHALLENGES**

Other milestones came more slowly than expected. “I thought that because Patrick did not have any speech impairment before the transplant, he would have a very smooth transition to speaking afterward,” Dr. Balou says. In reality, major deconditioning after more than a day of surgery left him with severe speech impairments at multiple levels.

“In terms of speech-language pathology, Patrick was different in many unexpected ways,” Dr. Balou says. One challenge was that his tongue weakness was asymmetrical, and the weakness shifted from left to right after a few weeks. To address this, Dr. Balou focused on strengthening Hardison’s tongue with a series of exercises that utilized a feedback device to measure the amount of force he exerted. “His tongue eventually became much stronger and with that strength, his speech was much more fluent.”

The procedure has been transformative in ways beyond its physical effects. “Patrick has realized so many milestones that we can see through his eyes,” Dr. Balou notes. “You can see how happy he is that no one notices his injuries anymore because he’s just a normal guy in the crowd.”
New Device Brings Neuromodulation Technology to Post-Stroke Shoulder Pain

For the many people who develop moderate-to-severe shoulder pain after suffering a stroke, treatment options have traditionally been limited.

“I’ve seen many of these patients over the years, and they’re quite challenging to treat,” says Charles Kim, MD, assistant professor of rehabilitation medicine and anesthesiology. “Frequently, the only recourse is pain medication, with its concurrent side effects like sleepiness, constipation, and addiction—so it’s a real trade-off.”

In 2016, Dr. Kim became one of the first physicians in the country to treat post-stroke hemiplegic shoulder pain with an implanted device called StimRouter, which was recently cleared by the FDA. “It’s based on neuromodulation technologies that have been around for decades,” he says. “The big difference with this device is that the technology has been miniaturized and is much less invasive.”

**SIGNIFICANT IMPROVEMENT IN PAIN MEASURES**

The implant is a thin, flexible electrode that resembles a short strand of spaghetti. During an outpatient procedure, a surgeon uses real-time image guidance to position the electrode near the axillary nerve. “It’s a very elegant procedure,” Dr. Kim says. “We use two small incisions that are maybe half to one centimeter each.”

The patient controls the stimulator with an external transmitter worn on an armband. When activated, an electrical current modulates the nerve signals involved in pain perception. “One of the great things about this device is that there is no implanted internal battery,” Dr. Kim explains. “The patient can stimulate the area for 30 to 60 minutes, and the pain relief will often last for several hours.”

**FOR PAIN PATIENTS, INTEGRATIVE CARE PROVIDES OPTIONS**

Rusk clinicians are committed to providing chronic pain sufferers the most effective treatments available. For many, that may be physical therapy or a high-tech implant like the StimRouter. For others, the best treatment plan may include alternative therapies such as acupuncture.

“We often see patients who have tried everything but nothing worked,” says Alex Moroz, MD, associate professor of rehabilitation medicine and vice chair for education at Rusk. “Sometimes acupuncture will help these patients. I look at it as one of the tools in our tool belt for chronic pain.”

Dr. Kim agrees. “There is a lot of interest in acupuncture and, especially with its use during the recent Olympics, in cupping,” he notes. “I use both with some patients, because they offer effective pain relief.”

Given their effectiveness, these alternative approaches also have a role in research, education, and training. Research led by Barbara Siminovich-Blok, ND, MS, LAc, NCCAOM Dpl, includes a study that looks to determine the effects of acupuncture on improving cognitive performance in individuals who have experienced a left-sided cerebrovascular accident and to clarify the mechanism of improvement via functional brain imaging. For residents, Rusk collaborates with the Tri-State College of Acupuncture to offer a unique acupuncture training track that can lead to credits toward licensure in acupuncture.
Early results are encouraging. "One longtime patient has endured constant shoulder pain since his stroke 10 years ago, because he preferred to deal with it over the side effects of pain medications," says Dr. Kim. Shortly after receiving the StimRouter, the patient reported a pain improvement of about 70 percent. “Another patient suffered from intractable pain for years in spite of her pain medications,” he says. “After we implanted the device, she experienced about 90 percent improvement.”

POTENTIAL FOR WIDE APPLICATION

The initial indication for the neuromodulation device is post-stroke shoulder pain, but according to Dr. Kim, the device offers many possibilities. “The design is a real breakthrough, so the uses will undoubtedly expand to include other chronic pain conditions,” he says. “It could potentially relieve pain anywhere there's a nerve, so the number of indications is almost infinite.”
NYU Langone is one of a handful of hospitals pioneering early mobilization initiatives for pediatric critical care patients. After a 2014 Rusk pilot program in the adult ICU reduced overall length of stay by 30 percent and more than doubled the home discharge rate, early mobilization protocols were introduced into the pediatric ICU (PICU).

In 2016, Rusk doubled down on this approach: A quality improvement team launched an effort to increase the percentage of PICU patients who are mobilized within recommended time frames—18 hours post-ICU admission for non-ventilated patients, and 48 hours for patients on mechanical ventilation.

“This was a multipronged initiative,” says Jodi Herbsman, PT, DPT, program manager of acute care rehabilitation therapy services. “We updated the PICU admission order set to include activity orders, implemented an algorithm to identify children eligible for early mobility, educated patients and families on the benefits of early mobilization, and trained staff on how to safely mobilize critically ill patients.”

Between fall 2015 and summer 2016, the percentage of PICU patients mobilized within the recommended time frame increased from 60 percent to 85 percent. At the same time, the average time to mobilization decreased from 20 hours to 10 hours, and there were no safety incidents associated with mobilizing these patients.

Renat Sukhov, MD, medical director of pediatric rehabilitation, believes that early mobilization is important for all PICU patients, including children with complex inherited muscle disorders. “Even patients with severe neuromuscular disorders can benefit from timely and early interventions during their PICU stay,” he says. “We aim to provide these patients with a high-quality, goal-oriented, and family-centered structured rehabilitation continuum of care from PICU onward.”

**EARLY REHABILITATION ENABLES RECOVERY IN COMPLEX CASE**

In one example, early mobilization proved effective in a recent case involving a four-year-old girl with a neuromuscular disease of unknown etiology, loosely defined as neuromyotonia. In 2015, the patient was hospitalized with severe pneumonia. She developed severe respiratory compromise and was ventilator-dependent for an extended period. In addition, she was diagnosed with tracheal stenosis requiring laryngotracheal reconstruction.

The patient spent about six weeks in the PICU as a result of her primary condition, and she declined significantly in functional abilities. Early rehabilitation interventions began while she was still intubated. Bedside, physical, and occupational therapy interventions included sitting and standing while mechanically ventilated. Early speech therapy focused on communication, and she was able to use specialized devices to allow her to communicate with family, visitors, and the medical team.

In March 2016, the patient was admitted to pediatric inpatient rehabilitation. The multidimensional nature of her condition and functional inabilities stemming from both her primary neuromuscular conditions and the negative effects of her prolonged hospitalization...
and surgeries required a coordinated approach led by a pediatric physiatrist. As a result, the four-year-old patient made significant progress medically, physically, functionally, and psychologically, and managed to walk out of the rehab unit at discharge and be reintegrated to her home and preschool environment.

“The challenge of a severe neuromuscular disorder and the necessity for rehabilitative teamwork were critical,” Dr. Sukhov says. “Timely goal-oriented, disease-specific early rehabilitation interventions allow seamless transition home and add quality to their lives, providing necessary structure for the patient and hope for their families at a time of severe distress.”
New Strategies to Detect, Track, and Treat Brain Injury

Patients with moderate to severe traumatic brain injury (TBI) can face life-altering disabilities. But even people who suffer mild TBI/concussion may experience chronic problems in physical and cognitive function. At Rusk, researchers are collaborating across disciplines to develop innovative strategies for diagnosing, tracking, and treating TBI.

**NEW REFERENCE DATA HONES MMPI TO ASSESS MILD TBI**

Rehabilitation psychologists use the Minnesota Multiphasic Personality Inventory (MMPI) to assess the psychopathology of patients with concussion. Yet many of the physical and cognitive sequelae of mild TBI produce MMPI scale elevations that can lead to misinterpretation. Corrective factors have been suggested, but the real solution is to obtain reference group data specific to this patient population. At Rusk, researchers administered MMPI tests to 200 outpatients with uncomplicated mild TBI. The data establishes a comparison sample that can help define the typical MMPI-2 profile for concussion patients. “By getting normative data for this population, we hope to help rehabilitation psychologists better identify individuals with unexpected scale elevations,” says Amanda Childs, PhD, psychology postdoctoral fellow. “That will help us identify patients who could benefit from additional interventions.”

**POST-TBI EMOTIONS: FROM SUBJECTIVE MEASURES TO PHYSIOLOGICAL MARKERS**

Many people with TBI experience emotional impairments, such as mood swings, anxiety, irritability, and depression. “Emotional problems in TBI are suboptimally diagnosed in many clinical settings,” says Prin Amorapanth, MD, PhD, instructor of rehabilitation medicine. “The problem is that current clinical measures rely heavily on subjective complaints.” To uncover more objective physiologic markers of post-TBI emotional impairment, Dr. Amorapanth and colleagues recently conducted research focused on the autonomic nervous system. In the study, patients with chronic TBI and healthy control subjects were shown clips of emotion-provoking movie scenes; for example, to elicit fear, subjects viewed a scene from *The Silence of the Lambs*. During the test, the research team recorded heart-rate variability to measure activity of the sympathetic nervous system, and respiratory activity to generate measures of sympathetic and parasympathetic nervous system activity. The results showed that TBI patients had a markedly decreased sympathetic nervous system activity in response to amusing stimuli and a markedly increased sympathetic nervous system activity to sad stimuli. “Our study shows that TBI patients process emotions differently from a physiological standpoint and in ways that do not correspond with their subjective experience of emotion,” Dr. Amorapanth says. “If we could use physiological markers to characterize these emotional changes objectively, we could better diagnose these changes and identify more effective treatments.”
EDUCATION EFFORT SEeks TO OVERCOME CULTURAL DISPARITIES IN TBI CARE

Rusk Rehabilitation is one of 16 centers nationwide designated as Traumatic Brain Injury Model Systems (TBIMS) of care. As part of this government-funded program, investigators at Rusk are midway through a multiyear project to design inpatient education materials for TBI patients from culturally diverse backgrounds. In the project’s first phase, researchers contacted patients six months after discharge to assess their barriers to receiving follow-up care. “In many cases, we found that patients faced personal barriers directly related to their TBI,” says Tamara Bushnik, PhD, FACRM, associate professor of rehabilitation medicine and director of inter-hospital research and knowledge translation. In the current phase of the project, patients view two educational videos, available in English or Spanish, in the days before discharge: one video that provides basic information about brain injury, and the other with information on discharge, medications, and follow-up care. The study is underway at Bellevue Hospital, which serves one of New York City’s most ethnically diverse populations. “The patients at Bellevue often lack social support, which we know is so crucial for good outcomes after TBI,” Dr. Bushnik says. “Our research here could really shed light on ways inpatient rehabilitation could change in many hospitals in the years ahead.”

THERAPEUTIC IMPROVEMENTS OBSERVED YEARS AFTER TBI

Although most people with moderate to severe TBI recover through cognitive rest, about 20 percent experience persistent symptoms, such as dizziness, headache, insomnia, and difficulty concentrating. These patients often face a discouraging Catch-22. “First they are told to take a leave from work and refrain from physical activities,” says Joseph Adams, PT, DPT, NCS, senior physical therapist. “Then, after four or five months of persistent symptoms, they are told that they’re outside
the initial window of recovery.” Adams and colleagues asked whether these patients could benefit from rehabilitation even months or years after their initial injury. In their study, patients at an average of 12 months post-injury took part in vestibular rehabilitation. Before therapy, only 50 percent of patients were able to work at least part-time; after therapy, that rate increased to 92 percent. In addition, the full-time work rate went from 15 percent to 50 percent. Adams theorizes that late rehabilitation helps patients counteract avoidance behaviors. “By giving patients a graded approach to start moving their head and participating in light aerobic exercise again, they are empowered to return to life activities they thought they were unable to do.”

**EYE MOVEMENT STUDY YIELDS NEW CONCUSSION BIOMARKERS**

Rusk Rehabilitation specialists recently partnered with colleagues in the Department of Neurology to create a digitized version of the King-Devick test, a rapid number-naming test used to detect concussion. They found that chronic concussion patients take an average of 10 seconds longer than healthy individuals to complete the test. To determine whether concussion patients also exhibit slower eye movements, the research group applied their testing methodology to patients with post-concussion syndrome. Using advanced high-resolution video technology, they measured the sequence of quick eye movements (saccades) and intermittent pauses or rests (intersaccadic intervals) that typically characterize eye control associated with reading. “When we looked at kinematics—eye movement velocity and acceleration—we did not see a significant difference between concussion patients and healthy patients,” says John-Ross (J.R.) Rizzo, MD, assistant professor of rehabilitation medicine and neurology. Instead, the group made three novel discoveries. “First, we found that the pauses between eye movements—the intersaccadic intervals—are longer for concussion patients,” he continues. “Second, we found that their eye movements are dysmetric, meaning a little off target. And third, concussion patients tend to make more eye movements when they’re completing the task.” Dr. Rizzo believes these findings provide a new tool for measuring mild TBI and tracking recovery. “We now have the ability to quantitatively analyze specific metrics that are, in essence, behavioral biomarkers.”

3,300+ **PATIENTS**

have received care at NYU Langone’s multidisciplinary Concussion Center since it launched in 2013

↑ Janet Rucker, MD, and J.R. Rizzo, MD, using eye-tracking technology to study concussion
With Early Interdisciplinary Rehabilitation, a NSTEMI Patient Navigates His Complex Recovery

Rehabilitation medicine plays a key role in achieving good outcomes for medically complex patients—not only in supporting their recovery, but also in identifying complications before they become further problems.

PRESENTATION
In one recent case, the patient, a 72-year-old man from the Bronx, New York, presented to Tisch Hospital with accelerating exertional angina. He was diagnosed with non-ST segment elevation myocardial infarction (NSTEMI) and after cardiac catheterization underwent a quadruple coronary artery bypass graft.

The patient's postoperative course was prolonged and very complicated, according to his physician, Jonathan H. Whiteson, MD, assistant professor of rehabilitation medicine and vice chair of clinical operations. Problems included acute blood loss anemia, gastrointestinal bleeding, hypervolemia, and hypotensive episodes as part of cardiogenic shock, and rapid atrial fibrillation, all contributing to his critical state. Due to persistent respiratory failure and dysphagia, the patient received a tracheostomy and a PEG tube.

Over the course of several weeks in the ICU, the patient developed symptoms of critical illness myopathy and displayed significant functional deficits. "This level of critical care medicine understandably focuses on survival by all means, but that often means missing troubling warning signs—notably progressive physical weakness—that can lead to significant functional challenges during recovery," says Dr. Whiteson.

To address the problem of delirium in critical care, Rusk physicians reintroduce sleep-wake cycles for the patient and work with the intensive care team to limit medications that may cause confusion. Says Dr. Whiteson, "part of this involves limiting sedation, so we encourage the intensive care team to give the patient a 'sedation vacation.' That means the patient is kept awake during the day to take part in physical therapy."

RESULTS AND POST-DISCHARGE PLAN
After seven weeks in critical care, the patient transitioned to inpatient rehabilitation. There, he received comprehensive cardiopulmonary rehabilitation services, including physical and occupational therapy and speech-language pathology. The Rusk team addressed his profound critical illness; myopathy-related weakness; balance, transfer, and gait issues; speech and swallowing function; personal care; and psychological barriers to recovery. Rusk Rehabilitation nurses were essential in the monitoring and management of his variable cardiovascular and respiratory parameters, and in supporting and reinforcing his functional gains during the arduous rehabilitative process.

Following 17 days in acute rehab, the patient was discharged home without a tracheostomy, walking without an assistive device, and performing ADLs with supervision. For this patient, the early involvement of the rehabilitation team helped avoid the potentially devastating consequences of a prolonged postoperative recovery.

"We are trying to move critical care from a 'survival culture' to a 'thriving culture' that helps patients get through the hospital episode faster and with fewer issues," says Dr. Whiteson.
Academic Activities

Publications


Diab M, Pouls PJ, Grant EC, Mirchandani M, Baikos J. Gait analysis after bilateral quadriceps tendon rupture in a patient who elected to be conservatively managed: A case report. PM&R. 2016; Conference (93rd).


Elwood D, Hall G, Felix J. Spreading the word: Using podcasting to advance scientific knowledge across the spectrum of PM&R. PM&R. 2016; Conference.


Li X, Black M, Xia S, Zhan C, Bertisch HC, Branch CA, Delisle LE. Subcortical structural alterations impact language processing in individuals with schizophrenia and those at high genetic risk. Schizophrenia Research. 2015; 169: 76–82.


RUSK REHABILITATION 2016 / NYU LANGONE MEDICAL CENTER

Matjejovsky I. Stroke-related ataxia: the effect of coordination and balance training on a patient with acute cerebellar stroke

Newkirk M, Ramirez J. The effect of prolonged bed rest in acute care on a healthy 28 y/o female with multiple traumas due to a motor vehicle accident

APTA NEXT CONFERENCE & EXPOSITION

AMERICAN PSYCHOLOGICAL ASSOCIATION ANNIVERSARY CONVENTION
Avitia M, Delflase E, Pagisisky M, Cross K, Knupp T. Differences in errors between students with language and reading disabilities

Wolfson J, Shreck E, Cercy S. Association between cognitive functioning and treatment adherence in primary care

AMERICAN SPEECH HEARING ASSOCIATION ANNUAL MEETING
De Claro L. Improving discharge planning from an acute neuroscience rehabilitation unit using a structured teaching approach

Durkin A. The impact of visual impairments on orientation & memory following brain injury

Haddad A. Insomnia & aphasia recovery in a severe TBI

Houck K, D’sa I. Feel your food: an intense sensory-motor feeding program

Schmidt J, Rabinowitz L. Type of stroke & language recovery during acute inpatient rehabilitation stay

Schmidt J, Rabinowitz L. Gender & language recovery during acute inpatient rehabilitation stay

Schmidt J, Rabinowitz L. Type of stroke & language recovery during acute inpatient rehabilitation stay

Singleton-Coyne M, Burns S. Role of speech-language pathologists in developing models of education for neuro-ontology patients

ASSOCIATION OF REHABILITATION NURSES CONFERENCE
De Claro L. Improving discharge planning from an acute neuroscience rehabilitation unit using a structured teaching approach

INTERNATIONAL CONGRESS OF PARKINSON’S DISEASE AND MOVEMENT DISORDERS ANNUAL MEETING
McCabe DL, Bonn AD, Stafford RS, Dumer A, Scopris KA, Spielman J, Blind R, Raming LG, Borod JC. Facial expressivity in Parkinson’s disease (PD) via an examination of smiling behavior: preliminary findings

INTERNATIONAL NEUROPSYCHOLOGICAL SOCIETY ANNUAL MEETING
Lee YSC, Matsuzawa Y, Creighton J, Fraser F, Glubo H, Kingsley K, Marks B, Trubetskaya O, Langenbahn DM. Does psychoeducation promote recovery for patients with persistent concussion symptoms?

McCabe DL, Merker RM. Perceived value and feasibility of centralized scoring and research databases in the field of neuropsychology

NATIONAL REHABILITATION ASSOCIATION ANNUAL TRAINING CONFERENCE
Kvaternik K, Laster B, Lindsey R, Tran A. A case study of on the job interventions to maintain employment

NEW YORK ACADEMY OF SCIENCES SYMPOSIUM ON SURGERY AND COGNITION: DELIRIUM, COGNITIVE DECLINE, AND OPPORTUNITIES TO PROTECT THE BRAIN
Langer KG, Jimenez AC. Unexpected cognitive difficulty is an important problem in the rehabilitation of the post-surgical patient

NEW YORK STATE SPEECH HEARING LANGUAGE ASSOCIATION
Dobranski N. Aphasia in an English second language learner

Kane A, Schieber A. Feeding tube weaning for children with congenital cardiac anomalies

Tan T, Danziger K, Kane A. Progression of speaking valve tolerance in a child with craniofacial disorder

THE OBESITY SOCIETY ANNUAL MEETING
Childs A, Cervoni C, Loizos M, Swencionis C, Wylie-Rosett J. Frequency of use and perceived helpfulness of cognitive and behavioral coping strategies in a weight-loss intervention study

SOCIETY FOR ACUPUNCTURE RESEARCH
Siminovich-blok. B. Treating connective tissue disorders with acupuncture: the case for Ehlers-Danlos Syndrome

SOCIETY FOR NEUROSCIENCE
Bilaloglu S, Chakrabartty S, Lu Y, Yousefi A, Raghavan P. Plasticity in corticocontrol signals to muscles in pianists with overuse injury with peripheral behavioral intervention


Yousefi A, Bilaloglu S, Rizzo JR, Lu Y, Raghavan P. Gaze pattern differences inform hand posture to object shape during reach-to-grasp

SOCIETY FOR BEHAVIORAL MEDICINE ANNUAL MEETING

WORLD CONGRESS OF NEUROREHABILITATION

Raghavan P, Shalwala M, Lu Y, Stecco A. Human recombinant hyaluronidase injections for upper limb spasticity

Presentations

22ND ANNUAL INTERDISCIPLINARY STROKE COURSE
Raghavan P. Selecting the right treatment at the right time for the right person for restoration of arm and hand function post stroke

AMERICAN ACADEMY OF PHYSICAL MEDICINE & REHABILITATION

Balou M, Bartels M, Cohen J, O’Young B, Young M. Rehabilitation following organ transplantation: what EVERY physiatrist must know

Bansal A, Cohen J, Edelstein J, Moroz A. Pathological gait: an interactive workshop

Bernard K, Kim C, Portugal S, Sackenheim K. Spine center surprises: unusual diagnoses presenting as typical spine syndromes

Caballes E, Stokes W. Knee and shoulder surgery: why or why not refer?

Fusco H, Levine J. Neuropharmacology in TBI: what we know and what we don’t

Khan S, Parkin K, Whiteson J. Physical medicine and rehabilitation as a driving force of value based medicine

Sweeney G, Whiteson J. Cardiac rehabilitation exemplifies the role of PM&R in value-based medicine: growth opportunities for medically-complex cardiac rehabilitation programs

AMERICAN BOARD OF REHABILITATION PSYCHOLOGY AND AMERICAN PSYCHOLOGICAL ASSOCIATION DIVISION OF REHABILITATION PSYCHOLOGY ANNUAL CONFERENCE
Bertzis H. Problem orientation, mood, and related constructs in cognitive rehabilitation

Childs A, Rath JF, Barr WR, Bicker JH. MMPI profiles of outpatients with mild traumatic brain injury: what’s the norm?

Cho YS. Way finding when lost in the community: a help-seeking approach


Litke DR, McAndrew LM, Rath JF. Gulf War illness clinical trial: adapting problem solving and emotional self-regulation interventions for veterans with complex medical illness
Academic Activities

Presentations (cont.)

Rath JF. Problem solving and emotional self-regulation approaches in outpatient cognitive rehabilitation: the evidence base, impact and extensions

AMERICAN CONGRESS OF REHABILITATION MEDICINE ANNUAL CONFERENCE 2015
Kingsley K, Hayner-Kolokowsky S, Vakil E, Constantinidou F. Cognitive reserve in healthy aging and long-term outcomes for individuals with brain injury
Smith-Wexler L. Disordered eating, weight, and physical activity concerns in rehabilitation outpatients with acquired brain injury

AMERICAN CONGRESS OF REHABILITATION MEDICINE ANNUAL CONFERENCE 2016
Blum S, Voss J. Neuroplasticity of cognitive recovery after acquired brain injury
Childs A. MMPI profiles of adults with mild traumatic brain injury: what’s the norm?
Cicerone K, Dawson D, Langenbahn D, Yi A. Cognitive rehabilitation training
Mollayeva T, Bushnik T, Colantonio A. Fatigue, impaired alertness and daytime sleepiness in traumatic brain injury
Page T, Monti M, Blum S. Leveraging neural mechanisms to promote plasticity during neurorehabilitation of patients in states of disorders of consciousness after severe brain injury
Raghavan P. Leveraging Principles of Plasticity to Optimize Neurorehabilitation. Upper limb motor recovery post-stroke: is there a way forward?

AMERICAN OCCUPATIONAL THERAPY ASSOCIATION NATIONAL CONFERENCE
Castle K, Flaherty R. Topographical orientation skills: the path to community return
Colen H. Addressing the needs of a progressive neurologic diagnosis through technology use
Geller D, Capasso N, Dicembri A, Feld-Blazman R, Vanlew S. Functional upper extremity levels (FUEL): a hierarchical classification tool for the neurological upper extremity
Waskiewicz M, Martori E, Sproul M. Interdisciplinary collaboration: OT’s role in effectively treating concussion patients

AMERICAN PHYSICAL THERAPY ASSOCIATION (APTA) COMBINED SECTIONS MEETING
Concoran J. Taught leadership 201: advanced leadership development

APTA NEXT CONFERENCE & EXPOSITION
Brown E, Evangelist M, Fischer M, Joseph K, Harb J. Deviating from the path: a roadmap for navigating delirium

AMERICAN PSYCHOLOGICAL ASSOCIATION ANNUAL CONVENTION
Avitia M, Pagirsky M. Patterns of errors made by children with SLD versus ADHD

AMERICAN SOCIETY OF NEURORADIOLOGY ANNUAL MEETING

AMERICAN SPEECH HEARING ASSOCIATION ANNUAL MEETING
Brown E, Fischer M, Evangelist M, DELIRIUM: prevention, identification, and intervention by rehab therapists
Kazachkov M, Tan T, Ashbaugh A. Pulmonary complications of aspiration and diagnostic techniques

ASIAN-AMERICAN PSYCHOLOGICAL ASSOCIATION CONVENTION
Lee YSC. Amplifying leadership and building community: AAPA Leadership Fellows share their stories

ASOCIACION HISPANOAMERICANA DE ACUPUNTURA
Siminovich-blok B. Acupuncture for acute traumatic brain injury

BRAIN INJURY ASSOCIATION OF DELAWARE ANNUAL MEETING
Connor FB, Stewart T. Welcome home, now what?

CANCER AND CAREERS NATIONAL CONFERENCE ON WORK & CANCER
Blacker D. Vocational rehab: improving your work ability

CRITICAL CARE REHAB CONFERENCE
Evangelist M, Gartenberg A. A toolkit for developing an occupational therapy program in the ICU

INTERNATIONAL LYME AND ASSOCIATED DISEASE SOCIETY ANNUAL EUROPEAN CONFERENCE
Shea L. Plenary session moderator

INTERNATIONAL LYME AND ASSOCIATED DISEASE SOCIETY ANNUAL SCIENTIFIC SESSION
Shea L. Pediatric neuropsychiatric Lyme/tick-borne diseases (session moderator)

INTERNATIONAL STROKE CONFERENCE
Raghavan P. Young stroke: changing the way we view stroke care in America—personalized rehabilitation for post-stroke relearning

MASSACHUSETTS GENERAL HOSPITAL—SPaulding REHABILITATION HOSPITAL
Shea L. Neuropsychology and Lyme Disease (grand rounds)

MUSICAres HEALTHy ESSENTIALS PRESENTS VOCAL HEALTH
Grunwald L, Gherson S, Kim D, Redler B. This is your voice on anxiety in New York

NATIONAL REHABILITATION ASSOCIATION ANNUAL TRAINING CONFERENCE
Donrose L, Kvaternik K. Say goodbye to online job search: new strategies for 2016

NEuro- AND MIND SCIENCES CONFERENCE
Starshina A, Kucukboyaci NE. Brains and bodies: reading bodily movements as signs of brain pathology

NEW YORK STATE SPEECH HEARING LANGUAGE ASSOCIATION
Brown E, Fischer M, Evangelist M. DELIRIUM: prevention, identification & intervention by rehab therapists

NORTH AMERICAN BRAIN INJURY SOCIETY ANNUAL CONFERENCE
Lee YSC. Feasibility of group intervention for concussed patients in the early stage of recovery

REHABILITATION MEDICINE DEPARTMENT, GOETHENBURG UNIVERSITY, SWEDEN
Langenbahn D. Evidence-based treatment of hemispatial neglect and social communication

TECHNOLOGY FOR SUSTAINABLE MANAGEMENT OF DISABILITY
Raghavan P. Imagining the possible: digital innovation, community, health and rehabilitation medicine

WORLD STROKE CONGRESS
Raghavan P. Creating an enriched rehabilitation environment in a low-resource setting
Locations

1. Ambulatory Care Center
   240 East 38th Street, New York, NY

2. NYU Langone Medical Center Main Campus
   550 First Avenue, New York, NY

3. Hospital for Joint Diseases
   301 East 17th Street, New York, NY

4. NYU Langone Levit Medical (two locations)
   4a. 1300 Avenue P, Brooklyn, NY
   4b. 1902 86th Street, Brooklyn, NY

5. Columbus Medical
   97-85 Queens Boulevard, Queens, NY

6. Center for Musculoskeletal Care
   333 East 38th Street, New York, NY

7. Preston Robert Tisch Center for Men’s Health
   555 Madison Avenue, New York, NY

8. Joan H. Tisch Center for Women’s Health
   207 East 84th Street, New York, NY

9. NYU Lutheran Medical Center
   150 55th Street, Brooklyn, NY

10. NYU Lutheran Rehabilitation (four locations)
    10a. 5008 7th Avenue, Brooklyn, NY
    10b. 9000 Shore Road, East Building, Lower Level
         Brooklyn, NY
    10c. 5610 Second Avenue, Brooklyn, NY
    10d. 230 60th Street, Brooklyn, NY

11. NYU Lutheran Augustana Center for Extended Care and Rehabilitation
    5434 2nd Avenue, Brooklyn, NY

For more information about our locations, visit nyulangone.org/locations
Leadership

Senior Leadership

Steven R. Flanagan, MD
Howard A. Rusk Professor of Rehabilitation Medicine
Professor of Pathology
Chair of the Department of Rehabilitation Medicine
Medical Director, Rusk Rehabilitation
steven.flanagan@nyumc.org

David A. Dibner, MPH, FACHE
Senior Vice President for HJD Hospital Operations and Musculoskeletal Strategic Area

Alex Moroz, MD
Associate Professor of Rehabilitation Medicine
Vice Chair for Clinical Affairs

Kate Parkin, PT, DPT, MA
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Director, Brain Injury

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Medical Director, Tension Myoneural Syndrome (TMS) and Mind-Body Medicine

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Renat Sukhov, MD
Associate Professor of Rehabilitation Medicine
Associate Medical Director, Pediatric Rehabilitation Service

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Vice President, Nursing, Hospital for Joint Diseases

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Clinical Director of Nursing Rehabilitation

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Amit Bansal, DO
Louis Dizon, MD
Jason Fritzhand, MD
Jason Freeman, DO
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Robert Kaylakov, MD
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Vladimir Ochefater, MD
Nanwai A. Pak, MD
Salvador E. Portugal, DO
Sofiya Prilik, MD
Kimberly Ann Sackheim, DO
Naheed A. Van de Walle, MD

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Vice President of Neurology and Rehabilitation, NYU Lutheran

John R. Corcoran, DPT
Clinical Assistant Professor of Rehabilitation Medicine
Site Director, Tisch Hospital

Ora Ezrachi, PhD
Clinical Assistant Professor of Rehabilitation Medicine
Director, Outcomes Management

Safia Khan, MS, MPA
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Owen Kieran, MD
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Director of Rehabilitation Medicine, Bellevue Hospital Center

Robert J. Lindsey, MA, CRC, LMHC
Director, Vocational Rehabilitation

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Mary R. Reilly, MS, CCC-SLP
Clinical Director, Speech Language Pathology

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Director, Rehabilitation Compliance

Joseph Ricker, PhD, ABPP
Professor of Rehabilitation Medicine and Psychiatry
Director, Rusk Psychology

Nicole Sasson, MD
Clinical Associate Professor of Rehabilitation Medicine
Director of Rehabilitation Medicine, Veteran Affairs-New York Harbor Healthcare System

Angela M. Stolfi, DPT
Clinical Instructor
Clinical Director, Physical Therapy
Site Director for Ambulatory Services

Maria Cristina Tafurt, MA, OTR/L, ABD
Clinical Assistant Professor of Rehabilitation Medicine
Site Director, Hospital for Joint Diseases

Monica Tietsworth
Department Administrator

Steve F. Vanlew, MS, OTR/L
Clinical Director, Occupational Therapy

Research Leadership

Tamara Bushnik, PhD, FACRM
Associate Professor of Rehabilitation Medicine
Director, Inter-Hospital Research and Knowledge Translation

Preeti Raghavan, MD
Assistant Professor of Rehabilitation Medicine
Vice Chair of Research

John-Ross Rizzo, MD
Assistant Professor of Rehabilitation Medicine
Director, Visuomotor Integration Laboratory (VMIL)
Director, Technology Translation in Medicine Laboratory (TTML)
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Development and Learning

NYU Langone By the Numbers*

<table>
<thead>
<tr>
<th>Category</th>
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<tbody>
<tr>
<td>Beds</td>
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<td>Operating Rooms</td>
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<td>Patient Discharges</td>
<td>68,602</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>3,850,000</td>
</tr>
<tr>
<td>Births</td>
<td>9,649</td>
</tr>
<tr>
<td>Physicians</td>
<td>3,584</td>
</tr>
<tr>
<td>Nurses</td>
<td>4,899</td>
</tr>
<tr>
<td>MD Candidates</td>
<td>574</td>
</tr>
<tr>
<td>MD/PhD Candidates</td>
<td>80</td>
</tr>
<tr>
<td>PhD Candidates</td>
<td>233</td>
</tr>
<tr>
<td>Postdoctoral Fellows</td>
<td>397</td>
</tr>
<tr>
<td>Residents and Fellows</td>
<td>1,472</td>
</tr>
<tr>
<td>Original Research Papers**</td>
<td>4,381</td>
</tr>
<tr>
<td>Square Feet of Research Space</td>
<td>550,500</td>
</tr>
<tr>
<td>NIH Funding</td>
<td>$334M</td>
</tr>
<tr>
<td>Total Grant Revenue</td>
<td>$328M</td>
</tr>
</tbody>
</table>

*Numbers represent FY16 (Sept 2015–Aug 2016) and include NYU Lutheran
**Calendar year 2015