



Neurology

2019 HIGHLIGHTS

Redefining Stroke Care

Establishing a new understanding of the root causes, pathologies, and mechanisms of stroke

→ [page 1](#)

Quality Drives Outcomes

A collaborative, data-driven approach to neurocritical quality improvement adherence

→ [page 3](#)

Targeting Headache Mechanisms

Cutting-edge studies focus on headache diagnosis, treatment, and therapy adherence

→ [page 5](#)

#7

In *U.S. News & World Report*

261

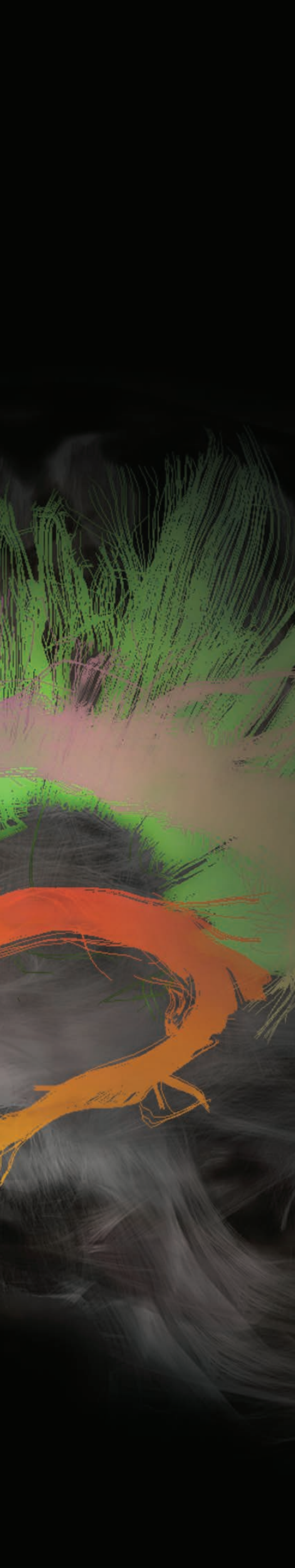
Neurology faculty

95K+

Outpatient visits in 2019

\$41.5M

In new and continuing grant funding



MESSAGE FROM THE CHAIR



STEVEN L. GALETTA, MD
Philip K. Moskowitz, MD Professor and Chair of Neurology
Professor of Neurology and Ophthalmology


Across our advances in neurological research and clinical care, we continue to engage in the pursuit of quality care to deliver the best possible outcomes for our patients.

The importance of quality is observed in our stroke care, as we seek to understand and prevent stroke in at-risk patients. We also see quality of life as a theme for our novel behavioral and therapeutic approaches to relieve patients from refractory headache and to expand applications for RS-tDCS for MS and other disorders.

Likewise, quality care is the shared endpoint of initiatives to eliminate complications during patients’ hospital stays and is part of our comprehensive simulation program to impart best practices to our residents.

As we continue to uncover transformative insights to treat a variety of neurological disorders, the shared pursuit of quality will continue to enhance our patients’ lives and their outcomes.



 Shadi Yaghi, MD
PHOTO: NYU LANGONE STAFF

Stroke Center Research Targets Shift to Personalized Prevention and Treatment

At NYU Langone Health’s Comprehensive Stroke Center, researchers are engaged in groundbreaking investigations across the spectrum of stroke care, deepening their understanding of the root causes, pathologies, and mechanisms to redefine quality in stroke care and prevention.

UNCOVERING CLUES FOR STROKE RISK STRATIFICATION

A central body of research led by Shadi Yaghi, MD, assistant professor of neurology, is elucidating stroke risk by revealing biomarkers associated with initial or subsequent strokes. “Although we’ve advanced the treatment of known risk factors such as hypertension, diabetes, and hyperlipidemia, stroke remains a leading cause of morbidity and mortality,” notes Dr. Yaghi. “Our research focuses on understanding the origins of stroke at a deeper, more nuanced level in order to better target prevention and treatment approaches to each patient.”

One line of research is applying advanced imaging to stratify risk in patients who have experienced a previous stroke. The research, funded by the American Heart Association and published in 2018 in the *Journal of Stroke and Cerebrovascular Diseases* and in 2019 in the *Journal of Cardiovascular Computed Tomography*, uses contrast-enhanced CT scans to examine the left atrial appendage’s structure, function, and propensity to clot. This chamber is the most common site of heart-related clots and is extremely difficult to visualize using a traditional echocardiogram.

“The gold standard for studying this chamber, a transesophageal echocardiogram, is invasive and costly,” explains Dr. Yaghi. “But the commonly used noninvasive echocardiogram just does not give us a good view of this chamber, where clots form in the heart.” The chest CT scan can provide thinly sliced views of the chamber’s morphology and volume as well as indicate the presence of clots. Dr. Yaghi points to recent clinical cases where his use of the scans identified clots unseen by a traditional chest echocardiogram, revealing both risk and opportunity for intervention in those patients. Ultimately, he hopes to utilize this novel imaging approach to identify at-risk patients and study the potential benefit of anticoagulant therapy to prevent recurrent stroke.

In related research, Dr. Yaghi is examining biomarkers through blood tests, electrocardiograms (EKGs), and CT scans to identify chamber dysfunction that could lead to further strokes in patients who have had a stroke of unknown cause. “Prior studies of aspirin versus novel anticoagulants have failed because stroke of unknown cause is actually a big wastebasket of possible etiologies,” explains Dr. Yaghi. “Our goal is to test anticoagulation therapy in just those patients with stroke of

unknown cause—and a marker of this chamber dysfunction—who might truly benefit.”

PERSONALIZING STENT TREATMENT TO PREVENT SECONDARY STROKES

A quarter of documented stroke cases are recurrent, and in patients with intracranial atherosclerosis, the risk of stroke is 25 to 30 percent within two years, even with aggressive medical treatment. Research by Dr. Yaghi hypothesizes that stenting may reduce recurrence risk more effectively than medical treatment in patients where intracranial narrowing and decreased blood flow are demonstrated first.

“Prior research, such as the SAMMPRIS trial, was halted because it targeted all patients with arterial stenting, without consideration of individual risk and benefit—and stenting is always likely to harm a subsection of patients,” notes Dr. Yaghi. “My research shows the importance of first understanding each stroke’s specific underlying mechanisms when developing a prevention approach.”

Dr. Yaghi is submitting a grant application to the National Institutes of Health (NIH) to conduct a large

multicenter study to accurately identify the subpopulation of patients with intracranial atherosclerosis for whom medical treatment is likely to fail. It is with these patients that the safety and efficacy of stenting would be tested. “If we are able to confirm that stenting patients whose blood flow is diminished reduces their risk, it will become a new standard of care,” adds Dr. Yaghi.

QUANTIFYING STROKE REHABILITATION BY DEFINING DOSAGE

Separate NIH-funded center research is aimed at enhancing motor recovery following stroke. One study, led by Heidi Schambra, MD, assistant professor of neurology and rehabilitation medicine, will elucidate the role of the brain’s motor pathways in

facilitating post-stroke recovery. Using transcranial magnetic stimulation and structural MRI, Dr. Schambra’s team is investigating how a primordial pathway, the cortico-reticulospinal tract (CReST), may facilitate motor recovery as an alternative descending motor pathway when the corticospinal tract is damaged by stroke. The team expects to reveal associations among changes in strength, motor control, motor synergies, and changes to CReST. “The idea is that this pathway could be targeted with interventions such as brain stimulation to accelerate motor recovery and reduce disability,” notes Dr. Schambra.

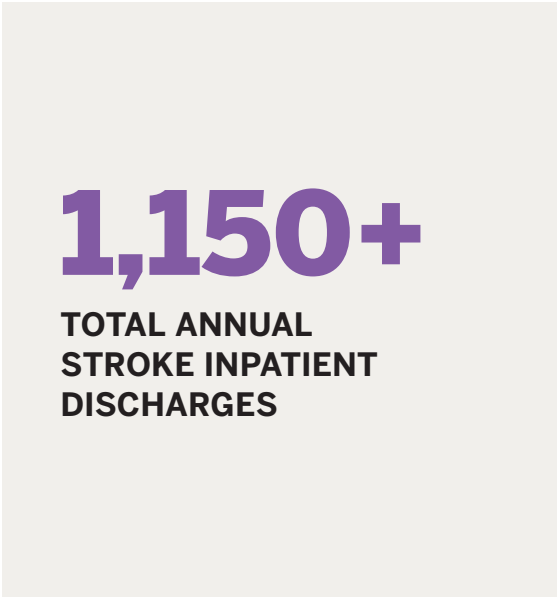
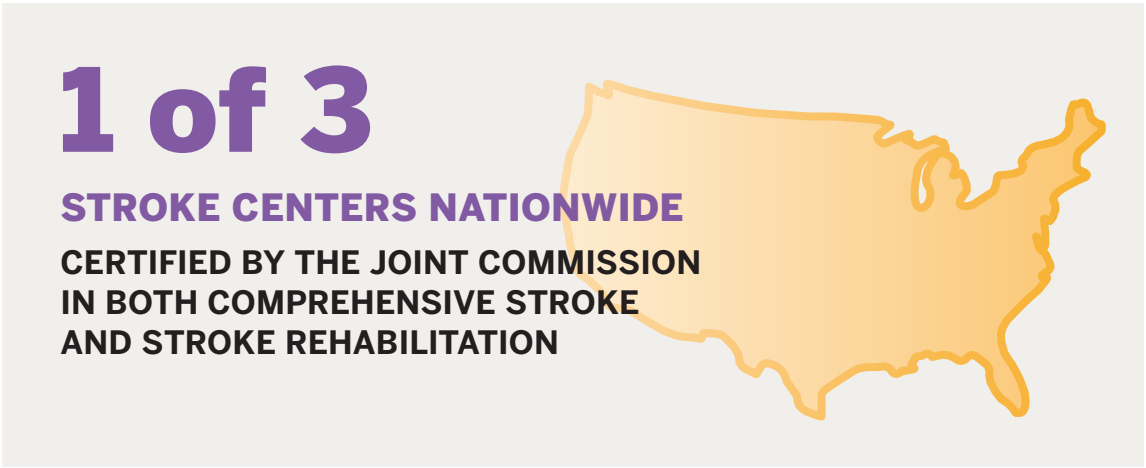
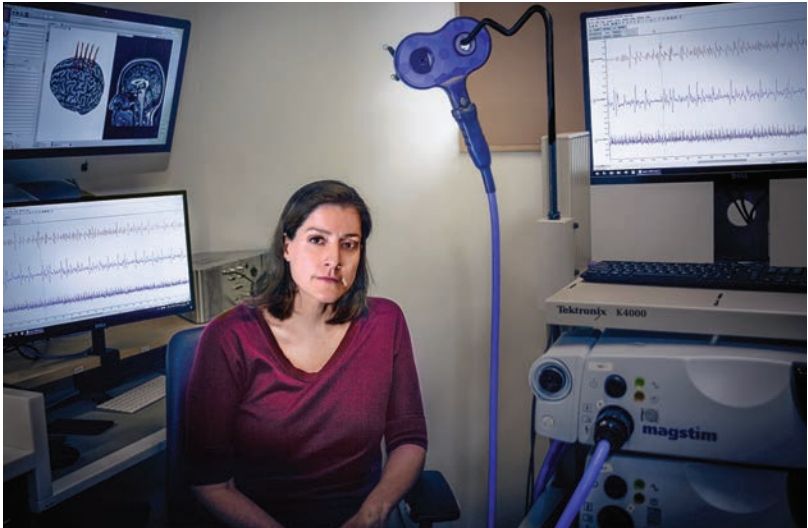
Another ongoing study is aimed at quantifying rehabilitation dosing to better align dosing with motor recovery targets. Although animal studies have demonstrated robust upper-extremity motor recovery with early, high doses of functional training following stroke, the optimal dose remains undiscovered in humans. Dr. Schambra and colleagues are developing a tool integrating wearable sensors that will measure both the number of functional movements during rehabilitation and the motor response to interventions. Machine learning algorithms developed with the NYU Center for Data Science

quantify functional movements in typical rehabilitation activities that add up to a dose. “The challenge in stroke rehabilitation is that we use a ‘black box’ approach, without consistency across therapists and institutions or understanding of what constitutes an aggressive intervention,” notes Dr. Schambra. “We want to build scientific rigor into rehabilitation research with the precision of medication dosing, so we can give patients the intervention level known to be effective.”

A FOCUS ON PREVENTION AND OUTCOMES

Across center research, a shared focus leads the field of stroke prevention and care toward individualized methods that can deliver better outcomes. “We’re using modalities that aren’t routinely used in innovative ways to try to understand the true cause of the stroke, and focusing only on targeted treatment rather than the shotgun, one-treatment-for-all approach,” notes Dr. Yaghi.

↓
Heidi Schambra, MD
PHOTO: NYU LANGONE STAFF



Redefining Quality Stroke Care, Protocol by Protocol

Driven by a shared quest for stroke care quality, center clinicians across NYU Langone continually work to communicate and align treatment protocols. Real-time patient cases and outcomes metrics inform their projects, with the goal of enhancing treatment approaches.

“The story behind our care quality can be found in the focused attention we put behind our processes,” notes Koto Ishida, MD, associate professor of neurology, director of stroke service, and medical director of the Center for Stroke and Neurovascular Diseases. “Whether it’s building redundancy into our systems, examining door-to-needle time for IV alteplase, or aligning our stroke order sets, continuous improvement in our protocols translates to excellent outcomes for our patients.”

Enhancing protocols also means leveraging the inherent multidisciplinary nature of stroke care, ensuring that processes are optimized within each subspecialty—from the availability of 24/7 neurointensive care coverage to expedited radiology protocols. Clinical research takes shape in a similarly multidisciplinary way, with stroke studies led by investigators in cardiology, neurosurgery, radiology, and rehabilitation medicine, in addition to neurology. “Through multiple lenses and avenues, we’re all constantly seeking to uncover the best options for our stroke patients, even if they’re the more resource-intensive options,” concludes Dr. Ishida.

Koto Ishida, MD
PHOTO: NYU LANGONE STAFF



An Emphasis on Quality Measures Yields New Milestones in Neurocritical Care Outcomes

With a comprehensive approach to quality improvement, physicians in NYU Langone’s Division of Neurocritical Care bring a renewed focus on outcomes excellence and complication reduction in the most neurologically vulnerable patients.

APPLYING RESEARCH RIGOR TO REDUCE ADVERSE EVENTS

Several neurocritical care quality initiatives have evolved into NYU Langone-led research projects established to prevent typical hospital-associated adverse events such as pneumonia, urinary tract infections (UTIs), deep vein thrombosis (DVT), and pressure ulcers. Aligned with NYU Langone’s zero-harm goal, these research-based initiatives have led to changes in standards of care—and measurable reductions of risk across adverse events.

In the case of *C. difficile* infection—a leading cause of hospital morbidity—a review of prophylactic antibiotic use following external ventricular drain (EVD) placement found that outcomes improved and *C. difficile* infection declined when antibiotics were not administered. Similarly, in a review of 58 patients following noninstrumented spinal surgery that was published in 2018 in *Neurohospitalist*, discontinuation of prophylactic antibiotics was not associated with a

significant increase in surgical site infections. “If you look in the literature, EVD infection rates can be anywhere from 5 to 33 percent, and we’ve gone over 18 months without a single infection,” notes Aaron S. Lord, MD, assistant professor of neurology and neurosurgery and chief of neurology at NYU Langone Hospital—Brooklyn. “This is the result of a multidisciplinary focus on protocols throughout neurology and neurosurgery and a testament to the quality of our nursing care.”

Similarly, the division has mobilized to prevent central line-associated bloodstream infections (CLABSI) by identifying high-risk patients and conducting a nursing boot camp to promote CLABSI prevention best practices. Changes in protocol have also helped to reduce ventriculostomy-related infections and catheter-associated UTIs. The new UTI protocol, in which urine is screened for bacteria before culture, has reduced the misdiagnosis of bladder colonization across NYU Langone locations.

The reduction of these and other adverse events has contributed to improvement in overall hospital quality measures such as readmissions and mortality. The division has reduced its readmissions rate to 5.3 percent while maintaining a low overall observed-to-expected mortality rate of 0.3 percent against a target of 0.6 percent. “Remarkably, these improvements have been achieved even as the complexity of our patient population, measured by our case mix index, has risen significantly,” notes Dr. Lord.

ALIGNING DATA AND CULTURE TO STREAMLINE CARE AND DRIVE CHANGE

Several of these neurology-focused quality care initiatives emerged through the institutional adoption of high-reliability organization (HRO) principles. These include weekly HRO rounds in the Neuroscience Intensive Care Unit (NSICU), during which a multidisciplinary care team reviews

key quality metrics and safety events. This collaborative, data-driven approach fosters real-time prevention, increases collective accountability, and incubates the development of quality improvement measures across the unit. In the case of patient falls—a common risk for neurocritical patients—HRO rounds have focused on the development of nuanced prevention strategies. Examples include bed alarms, family education concerning safe mobility, and information-sharing concerning fall risk factors.

“HRO rounds focus on transparency of information and accountability across our team—and provide insight into metrics beyond each clinician’s individual patient population,” says Ariane K. Lewis, MD, associate professor of neurology and neurosurgery and director of the Division of Neurocritical Care. “Every week, we’re reviewing the unit’s number of falls and infections, learning from each other’s cases, and, most importantly, discussing prevention strategies as a cohesive team.”

Institution-wide education efforts also include early identification of unexpected stroke symptoms such as sleepiness, and engagement of the stroke team to evaluate such patients on an urgent basis with the goal of preventing more serious strokes.

Alignment of practice patterns with evidence-based protocols has helped standardize care for optimal outcomes across the unit’s core neurological procedures. For instance, when a

review of EVD placement revealed some variability—which has been associated with an increased risk of infection—the team’s collective review resulted in the implementation of a standardized dressing across the division’s campuses, subsequently reducing the observed infection rate. “We’ve worked to align practices so that when a patient comes in with

a particular neurological condition, that patient’s physicians and nurses all know exactly what the care plan is going to be,” adds Dr. Lewis.

Such alignment demands intentional emphasis on institutional culture focused on streamlining coordination across campuses and ensuring that workflows and tools properly account for those factors that impact quality. Physician documentation, for example, was recently updated to account for a wider range of complications in an increasingly complex patient population. That documentation is shared across all NYU Langone hospitals, as are HRO-promoting resources such as the Departmental Quality Committee, which reviews readmission, mortality, and adverse events data for key metrics and prevention opportunities.

“We are working to have a culture in which residents, nurses, and physicians are all equally focused on quality and speak up when they see something that’s not right,” says Dr. Lord. “That is how we’ve gotten to the point where a patient can expect the same quality neurological care no matter where they present in the NYU Langone network.”

CONSISTENCY IN THE CONTEXT OF POOR PROGNOSIS

In cases of poor prognosis or end of life, it’s especially important to provide ethical care and appropriate, effective communication with family members, and the division’s policies reflect this

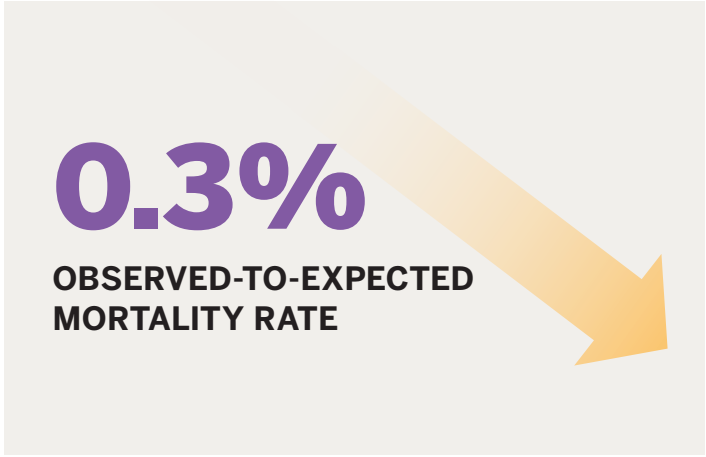
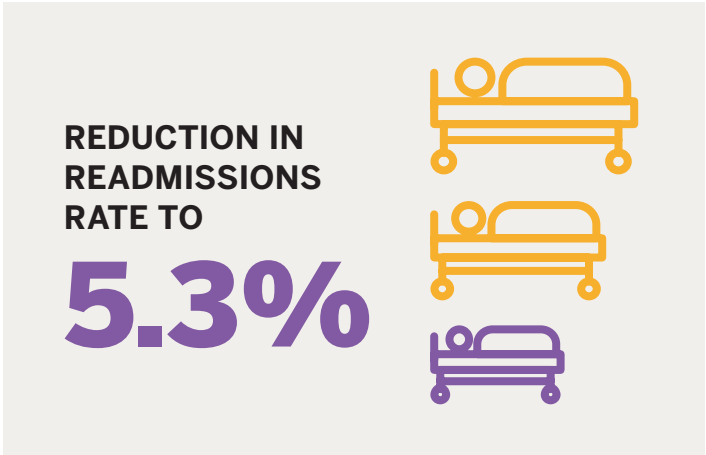
approach. Dr. Lewis and her team have conducted a careful review of the institutional protocol around brain death, clarifying the policy in a way that accounts for family or religious objections to neurologic criteria used to declare death. “Management of these objections is variable, and in some cases, it has been highly controversial,” explains Dr. Lewis. “We are one of the few health systems that have taken an in-depth look at this issue and articulated how we handle objections.”

Similarly, a Case Review Escalation Support Team (CREST) was created to support providers in navigating the ethical use of interventions. Dr. Lewis represents neurology as a member of the multidisciplinary team that helps facilitate decision-making about complex cases across the institution. When physicians and a family discuss a question of whether to insert a gastric feeding tube in a patient with severe stroke, for example, the case may be escalated for review by the CREST team.

Across these quality improvement efforts, notes Dr. Lewis, is a desire to recognize the potential for issues and stay ahead of them with an evidence-based strategic plan. “If you’re figuring out how to fix an issue in the moment, it could already be too late,” she says. “When you have an awareness of its potential and are prepared to deal with it, you can deliver care in a way that balances sensitivity and quality medicine.”



Ariane K. Lewis, MD, and Aaron S. Lord, MD
PHOTO: NYU LANGONE STAFF



Research and Expertise Combine to Advance Headache Awareness, Expand Adoption of Quality Care

Headache specialists at NYU Langone are engaged in cutting-edge studies designed to advance the diagnosis, treatment, and therapy adherence for headache. A range of active clinical trials are targeting the expanded adoption of approved, evidence-based prevention approaches, while others are testing the efficacy of novel drugs and behavioral treatment strategies to prevent and treat even the most severe and refractory headaches.

ELIMINATING BARRIERS TO BEHAVIORAL THERAPIES

One body of research from NYU Langone’s Division of Headache targets migraine prevention. A major focus is the use of Level A, evidence-based treatment approaches combining medication and behavioral options, such as cognitive behavioral therapy, biofeedback, and progressive muscle relaxation (PMR) therapy. Despite their proven long-term benefits, these therapies are underused, for reasons including access issues and prohibitive costs.

“These are proven, safe therapies that in some cases have demonstrated greater cost effectiveness compared to medications, but patients aren’t utilizing them, often due to the time it takes to visit a therapist and learn the skills,” notes Mia T. Minen, MD, MPH, assistant professor of neurology and population health. “We wanted to create a scalable, accessible form of behavioral therapy.”

With accessibility and ease of use as a central focus, Dr. Minen’s team developed a smartphone app, RELAXaHEAD, which features an electronic headache diary and integrated analytics to deliver PMR therapy and track patient adherence. In a pioneering, single-arm study of 51 patients, published in June 2019 in *npj Digital Medicine*, researchers

saw a mean month-over-month reduction of two headache days in frequent app users. Additional, ongoing studies are investigating the app’s use in other clinical settings, such as the emergency department (ED), to uncover how best to enhance user engagement and maximize the app’s prevention efficacy.

EXPANDING EFFECTIVE HEADACHE TREATMENT OPTIONS FOR CHILDREN AND ADULTS

At the same time, other clinical investigations are focused on expanding available treatment agents. One, a stage III trial of calcitonin gene-related peptide (CGRP) antagonists, examines the effectiveness of intravenous infusion as a delivery method for this new class of medications developed specifically for migraine. Another trial is examining the use of a neuro-stimulation device in adolescent patients ages 12 to 17. The device, which is already approved by the U.S. Food and Drug Administration for adult patients, offers a nonmedical treatment option targeting acute migraine pain signaling in the brain with smartphone-controlled electronic frequency.

Recruitment of adolescent subjects for the trial coincides with the addition of Valentina Popova, MD, as New York City’s only pediatric and adolescent headache specialist. “The needs of the pediatric and adolescent communities are very different from the needs of adults in the context of headache,” says Thomas Berk, MD, clinical assistant professor of neurology. “In this population specifically, it’s a priority to find nonmedical treatments through this and other studies.”

Additional drug and device trials and retrospective studies are ongoing, targeting specific headache subtypes, such as menstrual migraine, vestibular migraine, and concussion-related headaches, as well as specific outcomes based on medication usage.

ESTABLISHING CONSISTENCY IN CLINICAL CARE

At the broader clinical care level, researchers are working to expand adoption of best practices and guidelines—many developed at NYU Langone—both within and

beyond the health system. One such study involved a chart review of headache-specific care offered by two NYU Langone urgent care sites, which patients seeking evaluation and treatment of migraine are increasingly using as an alternative to the ED.

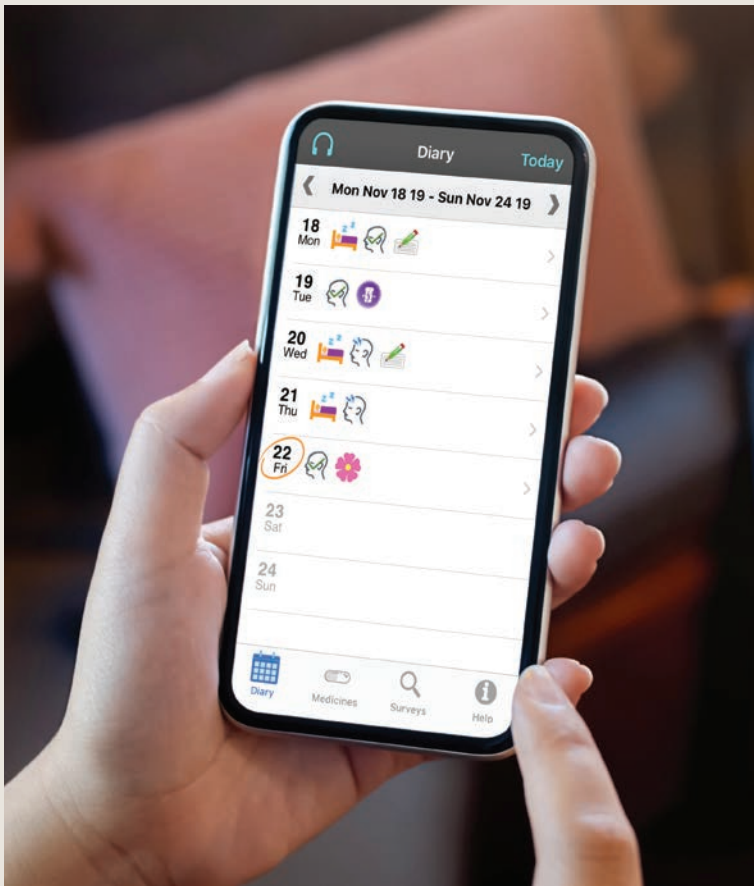
“We found that most patients presenting at these urgent care locations had episodic, acute migraine and were not undergoing regular migraine care with an NYU Langone physician,” notes Dr. Minen. “The study identified opportunities to further standardize quality migraine care and ensure that the sites’ pharmacies are appropriately stocked with acute migraine medications.”

Similar research, undertaken in partnership with the New York City Department of Health and Mental Hygiene, analyzed presentations of migraine among 10,240 patients at 67 urgent care centers across the city—confirming both a high rate of use by patients with acute migraine and the need for standardization of care.

“As these centers increasingly offer a desirable ED alternative for patients seeking migraine care, it’s vital to continue to examine their protocols to ensure these patients receive the highest-quality care as treatments evolve,” concludes Dr. Minen.

ELIMINATING MISCONCEPTIONS BY EQUIPPING PHYSICIANS FOR QUALITY MIGRAINE CARE

The gap in patient access to quality migraine care leads to both misdiagnosis and misconceptions—even undue stigma—around migraine symptoms and severity. NYU Langone headache specialists are at the forefront of education efforts to both increase the availability of sub-specialty headache care as well as equip neurologists, primary care physicians, and other specialists to recognize migraine and provide high-quality care.



↑ The RELAXaHEAD app guides patients through progressive muscle relaxation exercises and enables them to record daily headache occurrences in an electronic diary. PHOTO: DR. MIA MINEN AND GETTY IMAGES



↑
Lawrence C. Newman, MD
PHOTO: KARSTEN MORAN

Physician education often takes the form of close multidisciplinary collaboration, as referrals within the NYU Langone network reflect the nuanced diagnosis and treatment approach needed to manage headache, which is associated with more than 300 medical conditions. “There’s a lot of interplay across specialties as patients are evaluated, not only due to overlap with other neurological conditions, but because so many secondary conditions—from Lyme disease to TMJ dysfunction—can ultimately be discovered at the root of a patient’s headaches,” notes Lawrence C. Newman, MD, professor of neurology and director of the Division of Headache.

A prospective study in development proposes a population-based approach to evaluate the impact of migraine education on outcomes, focusing on NYU Langone employees who experience migraine. An employee education campaign will disseminate information about symptom

management and migraine treatment, while a clinician lecture series will educate primary care physicians regarding available medications and neurology referral. Those clinicians can then be identified within the health system as trained in headache management. Researchers will assess whether patients experience less absenteeism and better outcomes.

“If we’re able to validate that an employee education approach can lead to better-quality diagnosis and care, it could eventually be applied within other organizations and help to reduce employer misconceptions around migraine,” adds Dr. Newman. “Extending migraine care starts with expanding awareness and equipping more clinicians to care for headache patients—and the workplace could offer a platform to achieve that.”

Disclosure: In her study, Dr. Minen is using intellectual property co-owned by NYU Langone and IRODY. If the research is successful, NYU Langone and IRODY may benefit from the outcome.

In Neurology Resident Education, Curriculum Expands to Encompass the Realities of Patient Care

Residents in NYU Langone’s Department of Neurology are sharpening their professionalism and interpersonal communication skills as part of an innovative program that utilizes planned simulation scenarios. The goal is to help the residents prepare for a wide range of clinical situations as well as interactions with patients, families, and colleagues. Teaching interpersonal skills alongside concrete clinical skills is part of the department’s innovative efforts to enhance future clinicians’ capacity to deliver high-quality patient care.

INTEGRATING PHYSICIAN PROFESSIONALISM WITHIN NEUROLOGICAL TRAINING

Exceptional physician professionalism and communication skills have been linked in prior research to improved medical outcomes and higher treatment adherence, as well as higher patient satisfaction and retention. Although such skills are espoused as core competencies for trainees by the Association of American Medical Colleges and the Accreditation Council for Graduate Medical Education, these governing organizations do not provide specific guidance on evidence-based approaches to build these more amorphous skills among residents.

To fill the gap, leaders in the Department of Neurology looked to the simulation center—long used in resident education to convey clinical skills such as acute stroke management, lumbar puncture, and direct ophthalmoscopy—to provide a structured, standardized environment

exposing all residents to scenarios demanding key professional skills. “The qualities that help a physician succeed are emphasized in medical school but drop off in residency as the focus turns to the specific clinical skills required by a specialty,” says Arielle M. Kurzweil, MD, assistant

professor of neurology and director of the Neurology Residency Program. “We wanted to apply the technology and resources we have within the simulation center to create a customized curriculum that would develop residents’ professionalism and communication skills.”

“With simulation, we are able to standardize every resident’s exposure to situations they will eventually encounter within the rigors of real-world clinical care.”

Arielle M. Kurzweil, MD



Arielle M. Kurzweil, MD
PHOTO: NYU LANGONE STAFF

STANDARDIZING CLINICAL SCENARIOS THROUGH SIMULATION

The curriculum applies objective structured clinical examinations (OSCEs)—simulated scenarios enacted by actors dubbed standardized professionals—across a range of scenarios that could be encountered within neurological practice. In the simulations, the resident interacts with a standardized professional playing the role of a patient, a family member, or a medical colleague in 10-minute, predetermined scenarios and then receives immediate, direct feedback from an observing faculty member based on tenets of effective communication and professionalism.

“Within the course of medical practice, there are so many variables at play—we can’t guarantee that every resident will obtain sufficient experience delivering a difficult diagnosis or in other specific communication challenges,” notes Dr. Kurzweil. “With simulation, we are able to standardize every resident’s exposure to situations they will eventually encounter within the rigors of real-world clinical care.”

The OSCEs are segmented by levels of training, with four discrete scenarios for junior residents at the beginning of

their training and four more complex scenarios for senior residents with more experience. Junior residents encounter a co-resident who is depressed and using alcohol; walk through a transition of care to other residents amid distractions; navigate a conversation with a colleague who challenges the suggested management of a patient; and convince a stroke patient to consent to tissue plasminogen activator (tPA) treatment. Senior residents create a treatment plan for a patient injured by a medical error made by another service; deliver a difficult diagnosis of psychogenic seizures; present a poor neurological prognosis to a cardiac patient’s family; and provide a medical student with constructive feedback.

A paper documenting the department’s use of simulation in teaching and assessing communication and professionalism in neurology was co-authored by Dr. Kurzweil and accepted for publication in *Neurology*. The paper, also presented at the 2019 American Academy of Neurology (AAN) meeting, reports positive benefits of the OSCEs as reflected in a survey of residents regarding the program’s effectiveness. “As we continue to implement the OSCEs in resident training, we will seek to gather data on how they translate

into enhanced patient care quality,” says Dr. Kurzweil. “Anecdotally, we do know that residents have reported directly utilizing skills they developed during the OSCEs within their clinical rotations.”

ESTABLISHING SKILLS BEFORE THEY’RE IN DEMAND

The simulation curriculum to foster professional skills is one element of a focused department effort to deliver the most comprehensive, well-rounded experience possible in neurology education—encompassing both clinical knowledge and patient interaction skills needed to deliver high-quality neurological care. Other initiatives include a “boot camp” for incoming adult and pediatric neurology and neuropsychiatry residents, which replaces the first week of clinical duties with intensive didactics covering neuroanatomy, neurologic examination, neuro-radiology, lumbar puncture, and neurologic emergencies. The week concludes with a case-based review, followed by a self-assessment for residents to report their comfort with prospective practice of clinical neurology. An abstract on the

approach was also presented at the 2019 AAN meeting.

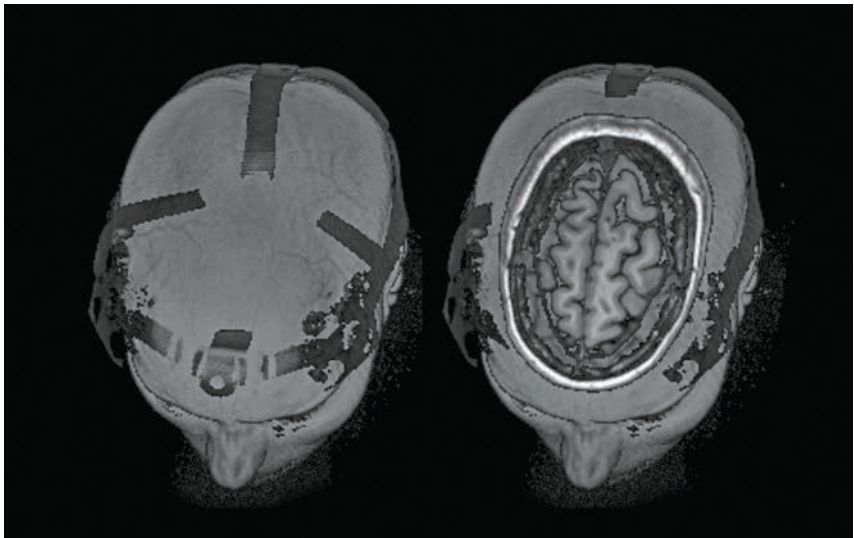
“The goal of these efforts is to establish both basic neurologic skills and best practices in those softer humanistic skills so that residents are ultimately prepared for the wide-ranging scenarios that arise in patient care,” concludes Dr. Kurzweil. “We surveyed our faculty to determine whether residents seem to be more prepared to hit the wards and take care of patients, and overwhelmingly, the answer is yes.”

Pioneering Remote Transcranial Direct Current Stimulation Protocol Builds Evidence of Efficacy in MS, Other Disorders

A growing number of studies from the NYU Langone Multiple Sclerosis Comprehensive Care Center support the benefits of remotely supervised transcranial direct current stimulation (RS-tDCS) in reducing symptoms and improving rehabilitation outcomes for patients with multiple sclerosis (MS), Parkinson’s, and other conditions.

The new research builds on ground-breaking studies demonstrating the efficacy of RS-tDCS in reducing MS-associated fatigue and enhancing complex attention and response variability among MS patients. The telerehabilitation protocol, developed at NYU Langone, delivers the therapeutic potential of tDCS through at-home treatment connecting electrodes on the scalp with center experts over HIPAA-compliant live video conference. Despite the extensive safety record and indications in the literature demonstrating benefits, due to the challenges of scientific rigor—accruing a reliable sample size and repeat clinic visits in a population with limited mobility—tDCS is not yet available for clinical implementation.

“Our remotely supervised tDCS protocol is designed to deliver that rigor and accumulate quantitative evidence for tDCS benefits within patients’ homes,” explains Leigh E. Charvet, PhD, associate professor of neurology, who leads the MS-related tDCS research. One trial, funded by the National MS Society, aims to validate the benefits of RS-tDCS on MS fatigue as a primary outcome, and cognitive functioning as a secondary outcome, in at-home stimulation paired with cognitive training. Another study, funded by the Department of Defense, combines RS-tDCS on the motor cortex with occupational therapy to investigate potential benefits for hand function. Separately, research presented at the 35th Congress of the European Committee for Treatment and



Simultaneous tDCS and MRI are used to capture the brain’s response to tDCS in real time in order to identify predictors and markers of treatment response.
PHOTO: DR. LEIGH E. CHARVET

Research in Multiple Sclerosis found a strong, cumulative effect of tDCS on gait function in 34 patients with MS across repeated in-clinic treatment sessions.

To enhance the treatment’s clinical value, a National Institutes of Health-funded study is examining the neural mechanisms of tDCS to identify optimal protocols via variation in response. Participants undergo a baseline scan, then repeated scans with tDCS administered. Initial imaging studies suggest that MS fatigue correlates with decreased cerebral blood flow and neuronal reactivity. Meanwhile, in partnership with the NYU Langone Virtual Health Team,

Center clinicians are integrating RS-tDCS visits into the full suite of digital tools offered within the NYU Langone Health app, to expand the availability and benefits of tDCS to a larger clinical population through innovative care.



For more on this story and other topics, visit nyulangone.org/neurology2019



CENTER CLINICIANS
HAVE DELIVERED
4,000+
RS-TDCS TREATMENTS
FOR TELEREHABILITATION TO DATE

Selected Publications

Agarwal S, Cutting S, Mac Grory B, Burton T, Jayaraman M, McTaggart R, Reznik M, Scher E, Chang AD, Frontera J, Lord A, Rostanski S, Ishida K, Torres J, Furie K, Yaghi S. Redefining early neurological improvement after reperfusion therapy in stroke. *Journal of Stroke and Cerebrovascular Diseases*. February 2020; 29(2): 104526.

de Havenon A, Joyce E, Yaghi S, Ansari S, Delic A, Taussky P, Alexander M, Tirschwell D, Grandhi R. End-of-treatment intracerebral and ventricular hemorrhage volume predicts outcome: a secondary analysis of MISTIE III. *Stroke*. December 17, 2019.

Lewis A, Lin J, James H, Hill TC, Sen R, Pacione D. Discontinuation of postoperative prophylactic antibiotics after noninstrumented spinal surgery: results of a quality improvement project. *The Neurohospitalist*. July 1, 2018; 8(3): 129–134.

Minen MT, Adhikari S, Seng EK, Berk T, Jinich S, Powers SW, Lipton RB. Smartphone-based migraine behavioral therapy: a single-arm study with assessment of mental health predictors. *npj Digital Medicine*. June 4, 2019; 2(46).

Minen MT, Zhou K, Miller L. A brief look at urgent care visits for migraine: the care received and ideas to guide migraine care in this proliferating medical setting. *Headache: The Journal of Head and Face Pain*. December 4, 2019; epub ahead of print.

Parnandi A, Uddin J, Nilsen DM, Schambra HM. The pragmatic classification of upper extremity motion in neurological patients: a primer. *Frontiers in Neurology*. September 18, 2019; 10(996).

Schambra HM, Xu J, Branscheidt M, Lindquist M, Uddin J, Steiner L, Hertler B, Kim N, Berard J, Harran MD, Cortes JC, Kitago T, Luft A, Krakauer JW, Celnik PA. Differential poststroke motor recovery in an arm versus hand muscle in the absence of motor evoked potentials. *Neurorehabilitation and Neural Repair*. July 2019; 33(7): 568–580.

Shaw MT, Best P, Frontario A, Charvet LE. Telerehabilitation benefits patients with multiple sclerosis in an urban setting. *Journal of Telemedicine and Telecare*. July 15, 2019.

Valentine D, Kurzweil A, Zabar S, Lewis A. Objective structured clinical exams (OSCE) are a feasible method of teaching how to discuss a nonepileptic seizure diagnosis. *Epilepsy & Behavior*. November 1, 2019; 100(106526).

Yaghi S, Chang AD, Akiki R, Collins S, Novack T, Hemendinger M, Schomer A, Mac Grory B, Cutting S, Burton T, Song C, Poppas A, McTaggart R, Jayaraman M, Merkler A, Kamel H, Elkind MSV, Furie K, Atalay MK. The left atrial appendage morphology is associated with embolic stroke subtypes using a simple classification system: A proof of concept study. *Journal of Cardiovascular Computed Tomography*. April 16, 2019; epub ahead of print.

Yaghi S, Chang AD, Hung P, Mac Grory B, Collins S, Gupta A, Reynolds J, Finn CB, Hemendinger M, Cutting SM, McTaggart RA, Jayaraman M, Leasure A, Sansing L, Panda N, Song C, Chu A, Merkler A, Gialdini G, Sheth KN, Kamel H, Elkind MSV, Greer D, Furie K, Atalay M. Left atrial appendage morphology and embolic stroke of undetermined source: a cross-sectional multicenter pilot study. *Journal of Stroke and Cerebrovascular Diseases*. June 2018; 27(6): 1497–1501.

Awards & Recognition

Thomas Berk, MD, was named an Emerging Leader by the American Headache Society.

Sun-Hoo Foo, MD, received the lifetime achievement award from the Coalition of Asian-American IPA.

Jacqueline A. French, MD, was named chief medical and innovation officer of the Epilepsy Foundation.

Daniel Friedman, MD, was awarded the Dreifuss-Penry Epilepsy Award from the American Academy of Neurology.

Un Jung Kang, MD, was appointed section editor for Neurodegeneration and Repair in *Experimental Neurology*.

Lauren B. Krupp, MD, was appointed to the executive board of International Women in Multiple Sclerosis network (iWiMS).

Arielle M. Kurzweil, MD, was awarded the A.B. Baker Teacher Recognition Award from the American Academy of Neurology.

Arjun V. Masurkar, MD, PhD, was appointed to the editorial advisory board of the *Journal of Neuro-Ophthalmology* and was appointed to a three-year term on the Alzheimer’s Association’s International Research Grant Program (IRGP) Council.

Jose Alberto Palma Carazo, MD, PhD, received the Felicia Axelrod Investigator Award from the American Autonomic Society.

Heidi Schambra, MD, was appointed to the strategic planning committee of the American Society for Neurorehabilitation as well as the Stroke Rehabilitation, Prevention, and Recovery Committee of the American Heart Association’s Stroke Council.

ABOUT NYU LANGONE HEALTH

Leader in Quality

NYU Langone has achieved top rankings by Vizient, and is the only full-service health system in New York City with an “A” Leapfrog safety grade and a CMS 5-star rating in 2020. These accolades are reflective of a shared culture of quality that permeates our growing network, now inclusive of NYU Winthrop Hospital and its ambulatory sites on Long Island. All of our sites are held to the highest quality standards set at an institutional level.



#9 in the Nation

Ranked ninth by *U.S. News and World Report* for both Best Hospitals and Best Medical Schools (Research)



Transforming Medical Education

To address some of today’s most pressing issues in medical education such as physician shortages, debt burden, and lack of diversity, we have introduced accelerated pathways to the MD degree and full-tuition scholarships regardless of need or merit at the recently renamed **NYU Grossman School of Medicine** and the new primary-care focused **NYU Long Island School of Medicine**.

An abstract, painterly illustration of a human head in profile, facing right. The hair is dark and textured. The face is highlighted with vibrant green and yellow brushstrokes, particularly around the eye and cheek area. A thick, orange-red band is painted across the forehead, resembling a headband or a medical bandage. The background is dark and textured with green and yellow brushstrokes.

A shared pursuit of
quality is central to the
transformative research
and clinical care
advancements of our
faculty. Groundbreaking
investigations **redefine
stroke care and prevention**,
an emphasis on quality
propels **a culture of
outcomes excellence**, and
expertise combines to
target the root of headache.

Read More

