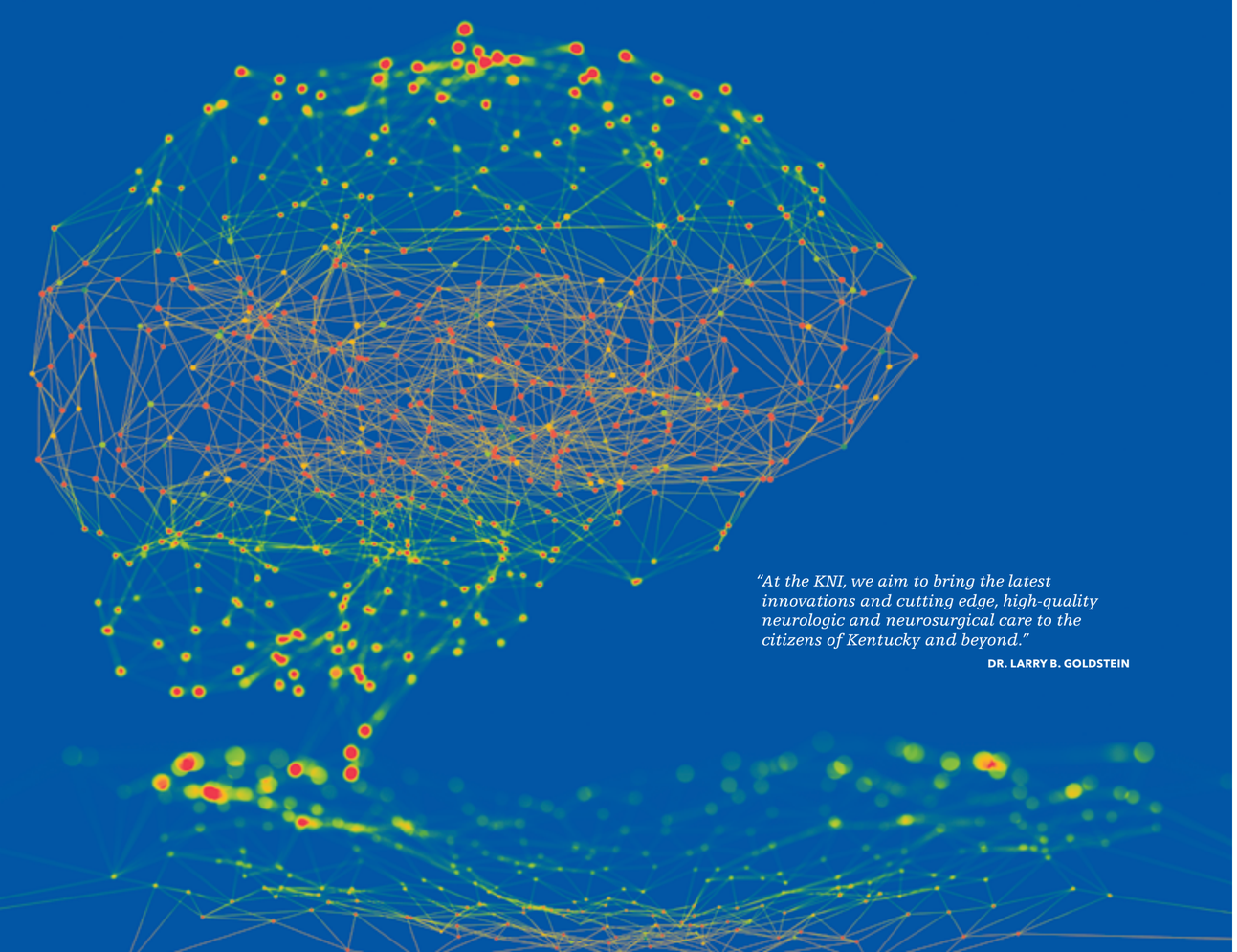
HealthCare
KENTUCKY NEUROSCIENCE INSTITUTE

INVESTING IN THE FUTURE

ANNUAL REPORT



"At the KNI, we aim to bring the latest innovations and cutting edge, high-quality neurologic and neurosurgical care to the citizens of Kentucky and beyond."

DR. LARRY B. GOLDSTEIN

TABLE OF **CONTENTS**

WORKING TOWARD **A HEALTHIER TOMORROW**

Everything we do at UK HealthCare's Kentucky Neuroscience Institute (KNI) is focused on building a healthier tomorrow for residents across Kentucky… and beyond. As the leaders of neurological and neurosurgical care for the Commonwealth, we provide the best possible comprehensive treatment of patients with complex neurological conditions and prioritize innovation and research to optimize care based on nearly real-time scientific breakthroughs.

What sets KNI apart from other institutions in the state and region is our access to cutting-edge treatments that are not widely available elsewhere. A seamless collaboration between neurology and neurosurgery teams, as well as collaborative work in clinical and translational science, ensures that our patients have access to the most advanced care.

Our high-quality clinical care isn't limited to our Lexington location, though. Via the UK HealthCare-Norton Healthcare-Stroke Care Network, VizAI hub-and-spoke hospitals, and multiple outreach clinics and clinical agreements, we collaborate closely with physicians and hospitals across the state to provide the right care in the right place at the right time.

Through our relentless commitment to research, we are able to discover new, innovative ways to treat neurological disease and provide state-of-the-art care for patients across the state. In fiscal year 2021, more than $78.3 million was awarded in extramural grants and contracts to support research in the neurosciences at the University of Kentucky.

In the pages that follow, you'll see how we continue to invest in the future of neurologic and neurosurgical care. From unprecedented improvements and new additions to our facilities, to new ways of recruiting, educating and improving work-life balance for our providers, we commit to continually solidify and expand the base from which we can build a healthier tomorrow. You'll see the faces of our clinicians and our scientists who are leading the charge. You'll read about an innovative imaging study designed to pinpoint seizure activity in the brain, and a uniquely structured clinic designed to better diagnose and treat children with neurodevelopmental disorders.

It's all thanks to our talented, dedicated doctors, nurses, researchers, lab technicians, pharmacists, social workers, and it's thanks to our partners in care, like you.

Together, we are propelling Kentucky toward a bright, healthy future.

Larry B. Goldstein, MD, FAHA, FANA, FAAN
Co-Director, UK Kentucky Neuroscience Institute
Chair, Department of Neurology

Linda Van Eldik, PHD
Co-Director, UK Kentucky Neuroscience Institute
Director, UK Sanders-Brown Center on Aging

Craig van Horne, MD, PHD
Chair, Department of Neurosurgery
Co-Director, UK Brain Restoration Center

"When people are engaged, passionate, and doing what they want to do, that translates into better patient care."

DR. CRAIG VAN HORNE

Dr. Ima Ebong leads diversity, equity and inclusion efforts within the UK Department of Neurology.

OUR MOST VALUED RESOURCE: OUR PEOPLE

KNI MAKES INVESTMENTS IN THE EDUCATION, TRAINING AND WELL-BEING OF FACULTY AND STAFF

The faculty and staff are the most valuable resource at the Kentucky Neuroscience Institute (KNI). Their expertise, knowledge, curiosity and thoughtfulness are evident every day as they improve patient outcomes and satisfaction, and change lives. Investing in the education, training and well-being of those who work at KNI is vital in order to serve a broad and challenging patient population with complex neurologic disorders.

Research and mentoring opportunities

Significant research and mentoring opportunities are crucial to attract and retain the best and brightest minds in the neurosciences. The KNI Clinical Research Organization, led by Dr. John Slevin, assists researchers in their efforts with financial management, regulatory support and personnel, and study coordinators. The university-wide Neuroscience Research Priority Area (NRPA) further supports neuroscience research through collaborative projects with a diverse group of investigators.With more than 320 faculty and trainees from nine colleges and 38 departments across the university, NRPA focuses on clinical and translational neuroscience research.

"We're an academic institution so it's essential that we take time to teach our residents and we take time to do research," said Dr. Craig van Horne, chairman of the Department of Neurosurgery. "We can carve out that time and make sure they have goals around research and teaching." Faculty are encouraged to build and develop their own programs. "We allow them to grow and expand, and we give them the support to do that," said van Horne.

Structured mentoring programs for neurologists and neurosurgeons are an essential part of faculty development. In the Department of Neurology, Dr. Gregory Jicha helped develop a program in which every faculty member has at least two more senior faculty mentors. They meet a minimum of twice a year to review goals, barriers and progress in achieving academic advancement. "We've been quite successful in moving faculty up the academic ladder by having this structured, organized approach. The mentees appreciate it," said Dr. Larry Goldstein, chairman of the Department of Neurology and co-director of KNI.

"As a mentor, I learn a lot from the mentees, so the benefit goes both ways. When people start to do it, they realize there's a lot to learn from what the younger people are doing if you have an open mind."

DR. CRAIG VAN HORNE

The Neurosurgery Department's mentoring program involves all levels. Senior faculty members mentor junior faculty, while both senior and junior faculty serve as mentors for residents. Senior residents also mentor the newer residents. "It's been a really positive experience," said van Horne. "As a mentor, I learn a lot from the mentees, so the benefit goes both ways. When people start to do it, they realize there's a lot to learn from what the younger people are doing if you have an open mind."

Physicians, APPs, nursing staff and more make up the array of healthcare workers providing the best neurological and neurosurgical care.

The importance of diversity

KNI has also embraced diversity, equity and inclusion (DEI) to address inequities faced by colleagues and patients. Initiatives include a commitment to recruit from underrepresented groups and ensure everyone thrives in an environment free from racism and bigotry.

A formal DEI curriculum was introduced to the neurology residency program by Dr. Ima Ebong, director of DEI for the Department of Neurology. The curriculum includes sessions, training and discussions to support a greater understanding of and commitment to underrepresented groups.

Another objective is to encourage young people from underrepresented groups to pursue careers in the neurosciences. That investment will help achieve a more diverse group of future physicians in the field, said van Horne. The UK BRAIN Summer Undergraduate Program fulfills that goal by targeting people from underserved populations who are interested in medicine or neurosurgery. As part of the program, participants get the chance to rotate with KNI physicians. KNI faculty also work with students participating in the UK START Program, which aims to diversify the STEM community. The program provides research training for underrepresented students from middle school through graduate school.

Cultivating a pool of neurology providers

Advanced Practice Providers (APPs) focus on primary care during their education and typically don't get much training in neurology. As director of APPs for the Department of Neurology, Julie A. Gurwell PhD, PA-C, interviews and hires APPs for the Department of Neurology. Gurwell, a professor of neurology, created an onboarding program for new hires on topics that include training in neuroanatomy, the neurological exam and neurological diseases.

Gurwell's program got the attention of Dr. Daniel Lee, KNI's adult ambulatory medical director. Lee approached Dr. Sibu P. Saha, medical director of the UK Physician Assistant Studies Program, and David Fahringer, PA, Academic Residency Program director. Through this collaboration, the UK PA Academic Residency program developed the curriculum into a PA neurology residency.

Megan Craft, PA-C, was the first graduate of the PA neurology residency. Craft earned her master's degree in physician assistant studies from the UK College of Health Sciences and chose to focus on neurology. During her neurology residency, she worked with attending physicians in a variety of clinics, including the general neurology, multiple sclerosis, neuromuscular medicine, epilepsy and headache clinics. "Megan was able to get experience in all the different subspecialties in neurology that we have to offer in the

"There is a very large gap nationally between the supply of neurologists and neurologic specialists. People have choices, and we want them to choose us and to stay here."

DR. LARRY GOLDSTEIN

department," said Gurwell. After graduating in September 2022, Craft now works in UK HealthCare's general neurology clinic.

Moving forward, the residency program will train two neurology PA residents per year. Increasing the pool of experienced advanced practice providers will help address the shortage of neurologists across the country and expand access to neurological care. "It's a financially efficient way to train and develop a pipeline of advanced practice providers for neurology," said Gurwell.

Supporting well-being

Dr. Zabeen Mahuwala chairs the Department of Neurology's Wellness and Resilience Committee, a group she formed to help combat burnout and support well-being among faculty and residents. Mahuwala, an associate professor of neurology, says a 2021 Medscape national survey showed neurologists have one of the highest burnout rates among physicians. Female neurologists are at higher risk than men due to their traditional role of caregiver.

"As neurologists, our work demands time with our patients," said Mahuwala. "We have long visits with patients, talking with them and examining them. And people who spend more time in direct patient care and outpatient clinics have a higher rate of burnout."

The committee's efforts have received positive feedback. In 2021 and 2022, the committee received the Sarah Bennett Holmes Award from the UK Women's Forum. They also earned a prestigious Women in Medicine booster award to explore burnout across the College of Medicine. Preliminary results from the committee's research showed higher emotional exhaustion campus-wide when compared to published group averages for other medical professionals and educators. Interestingly, said Mahuwala, those who engaged in physical and leisure activities experienced significantly lower burnout and significantly higher personal accomplishment.

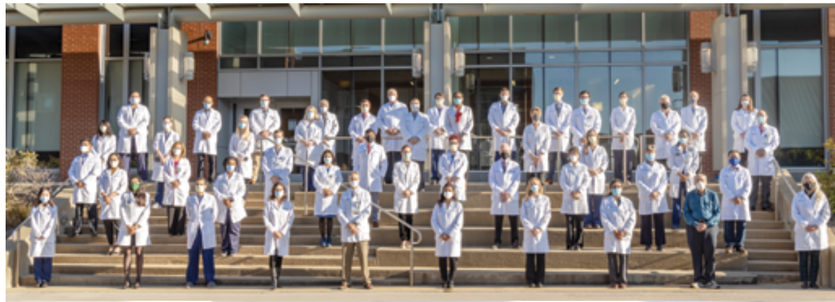
Using these findings, the committee organized a number of events, including hikes, virtual Zumba, virtual movie nights and cooking classes. Other wellness offerings have included acupuncture and massage provided by the UK Integrative Medicine & Health program. The Department of Neurology reported lower burnout in 2022 compared to other departments, suggesting the committee activities may have had a positive impact.

Work-life balance is hard for everyone, but particularly for doctors, said Mahuwala. Meaningful work and a supportive environment with a sense of community are two of the keys to combating burnout. Recognition of the problem is essential because stressed-out physicians are more likely to make mistakes or leave the profession altogether. The cost of losing one physician ranges from $500,000 to $1 million. "It is a systemic problem. Although one committee cannot solve it all, it is the start of a positive change," she said. "That's why national level awareness is needed, similar to the increased awareness around diversity."

Worthwhile efforts

Faculty, residents, APPs and staff are the backbone of KNI, and efforts to invest in them have a positive impact now and into the future, said Dr. Goldstein. "They're what make the whole system work. If we don't value them and invest in them and support them, they'll go somewhere else. There is a very large gap nationally between the supply of neurologists and neurologic specialists. People have choices, and we want them to choose us and to stay here. The way you do that is value their contributions and pay attention to what they do every day."

KNI is a great place for faculty and staff who want to have a collegial atmosphere and cooperative environment to work in, said van Horne. "We have a lot of opportunities for subspecialties within neurosurgery," he noted. "When you come here, you can really pursue what you want. When people are engaged, passionate, and doing what they want to do, that translates into better patient care."



Top Left: Nursing assistants are a vital part of the care team at KNI, working closely with the registered nurses and larger team.

Bottom Left: The epilepsy nursing team monitors patients under supervision in the newly expanded epilepsy monitoring units at KNI.

Top Right: Physicians at KNI lead the charge against neurological disease in Kentucky.

Engaging and educating a variety of neurological care providers is key to success at KNI.

BUILDING THE **FUTURE TODAY**

NEW FACILITIES EXPAND NEUROLOGICAL CARE FOR KENTUCKIANS

As demand for neurological care increases, so has the need for state-of-the-art facilities and technology. This investment in infrastructure at UK HealthCare's Kentucky Neuroscience Institute (KNI) is also an investment in the people of Kentucky; it is tangible proof of KNI's mission to offer comprehensive care and innovative treatments.

Four recent projects have increased both the number of patients KNI is able to care for and the range of services it offers. These projects are concrete examples of KNI's commitment to Kentucky today and well into the future.

A new neurological unit

A new inpatient unit dedicated to patients with complex neurological disorders opened in July 2022. With more than 66,000 square feet of space, the expansion – on the 5th floor of Pavilion A of the University of Kentucky Albert B. Chandler Hospital – provides enough space for all neurological inpatient services to be on one floor.

Neurology and neurosurgery faculty and staff contributed to the unique design and layout. "This new space is specifically dedicated to the care of patients with complex neurological disorders in an environment that also supports their families and friends," said Dr. Larry Goldstein, chairman of the UK College of Medicine's Department of Neurology and co-director of KNI.

The state-of-the-art space features 32 dedicated progressive care rooms and 20 intensive care rooms. Advanced epilepsy monitoring units (EMUs) use continuous video-electroencephalogram (EEG) monitoring technology to evaluate, diagnose and treat patients.

The new unit features a physical/occupational therapy gym and a radiology suite with portable CT scanner. The expansion also includes a comfortable lounge space for families and visitors, as well as flexible classroom, workroom and conference space for KNI team members.

Bright, open, warm and inviting spaces are a signature feature of a new inpatient floor dedicated to patients with complex neurological disease.

Expanding memory care

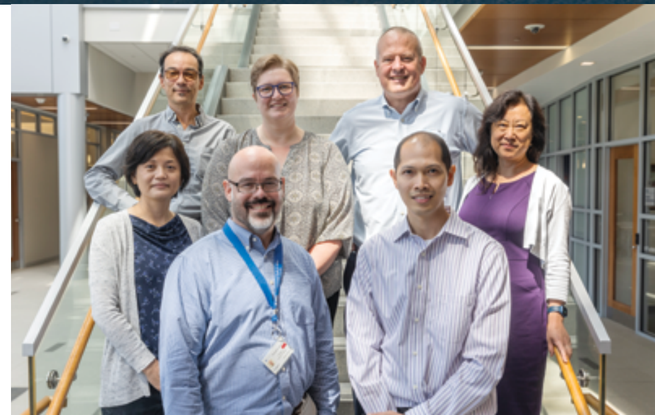
The Sanders-Brown Memory Clinic's new home provides a seamless, less stressful experience for patients. The one-stop shop for memory care and support opened at the end of 2021.

The expanded clinic space is critical to the internationally renowned UK Sanders-Brown Center on Aging's mission of advancing dementia research and patient care. Located on the UK HealthCare – Turfland campus, the 15,000-square-foot clinic more than doubles the capacity of the previous space. The clinic also includes:

- Co-located services, including cognitive testing, gait analysis, retinal analysis and EEG/EMG testing
- Dedicated space for social work consultations and patient education/resource rooms
- Separate general and extended waiting areas
- New telemedicine space
- Better parking and wayfinding
- Space for community programs

The expansion also allows the clinic to conduct more clinical trials and will improve the competitiveness of the UK Alzheimer's Disease Research Center when competing for rapidly expanding federal research funding on aging.

The new Sanders-Brown clinic location brings clinicians and scientists together in close proximity to translate clinical research for dementia patients in Kentucky.



Child-friendly neurology clinic

With the guidance of providers and staff, the new warm and friendly UK Child Neurology clinic opened at the Turfland campus in March 2021. The child neurology clinic has a private kid-friendly waiting room, along with a laboratory and MRI services right around the corner.

Even the design of the parking lot was configured with the safety of children in mind, especially those who need wheelchairs or walkers for mobile assistance.

"The new location is supported by state-of-the-art telecommunication capabilities, provides for easy access and will optimize the patient/family experience for children with neurological conditions," Dr. Goldstein said.

The extra space has also allowed the clinic to increase the number of clinical trials it offers. Additional faculty and advanced practice providers have been hired, along with a pediatric social worker, cognitive-behavioral therapists and genetic counselors.

From toddlers to teenagers, the new Child Neurology clinic location provides a comfortable and inviting space for children to relax before their appointments.

"The new location is supported by state-of-the-art telecommunication capabilities, provides for easy access and will optimize the patient/family experience for children with neurological conditions."

DR. LARRY GOLDSTEIN

Interventional radiology expansion

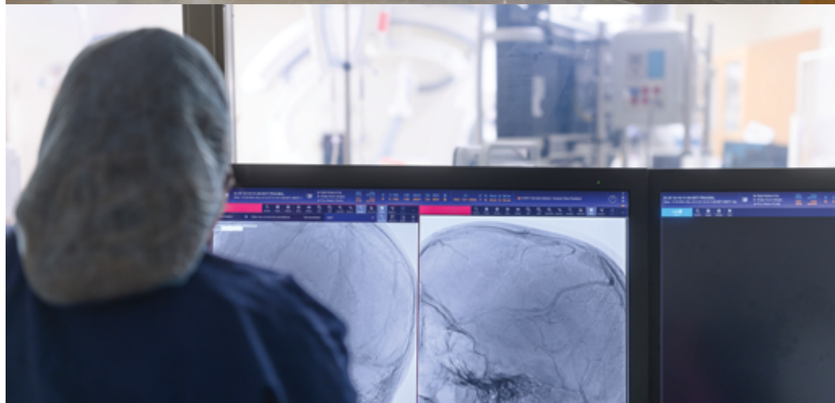
Demand for interventional procedures continues to grow as more people qualify for these less-invasive options. KNI recently opened a new Interventional Services facility to accommodate that growing demand. The newly renovated, 50,000-square-foot facility has room to grow in the coming years. It features:

- 46 new preparation and recovery rooms
- Nine procedure rooms
- State-of-the-art imaging
- Neurointerventional radiology
- Interventional radiology
- Interventional cardiovascular services

The facility, on the first floor of Pavilion A at UK Chandler Hospital, features a new lobby that provides a warm and comforting space for patients and their families.

"There is no better example of what the power of advanced medicine at UK HealthCare really means other than this new facility with its state-of-the-art technology, futuristic design and most importantly, a very caring, empathic and highly skilled staff and providers," said Dr. Driss Raissi, medical director for interventional services and the interventional radiology division chief. "Kentuckians will have access to world-class minimally invasive surgeries without having to leave the comfort of their home state."

State-of-the-art interventional radiology suites improve access to minimally invasive procedures for patients, which allow for ease of treatment, quicker recovery times, and improved outcomes.



A SYMPHONY **OF SUPPORT**

KNI HELPS TRUMPETER ADIEL NÁJERA RETURN TO HIS PASSION AFTER BATTLING SERIES OF STROKES

On a Sunday afternoon in April, Adiel Nájera's world turned upside down.

The 25-year-old University of Kentucky doctoral student knew something was wrong. Earlier that week, he'd experienced exhaustion, chest pains and trouble driving. On this spring weekend in 2022, he slept through his alarm and missed church, then found himself disoriented and barely able to move.

Weak and unable to leave his apartment, Adiel FaceTimed his parents, who quickly knew the situation was dire because of his slurred speech and confusion.

Hours later, his parents and brother were on a flight to Lexington, and Adiel was in a fight for his life.

'The biggest steps of my life'

Music – and trumpet in particular – are in Adiel's DNA. He's a Trumpet Performance major and his father, Paul, is a retired band director and trumpet player himself who still gives lessons to musicians. Adiel's brother, Johniel, is a Music Education major at Baylor University in the family's native Texas.

In early April, Paul and Johniel competed in The National Trumpet Competition in Delaware. Adiel surprised them by showing up unannounced to cheer them on, along with his competing UK colleagues.

Afterward, Adiel and the other UK students drove back to Lexington. That's when his symptoms began.

"They dropped me off at my apartment," Adiel said. "It's only two steps I have to take to get up on the level to my apartment, and I just remember those two steps feeling like the biggest steps of my life."

In the days that followed, Adiel grew more out of sorts.

On the Sunday he phoned his family, his father was so worried that he called Adiel's band director, Dr. Cody Birdwell, who – along with three of Adiel's classmates – hurried over to Adiel's apartment to check on him.

"My couch to my door was about five steps," Adiel said. "I was on FaceTime with my dad and he said, 'Go open the door now, son.' He was pretty forward about it, and I said, 'Yes sir." But I was still sitting there unable to stand up.

"My father almost called the police to just force their way in. It took all my willpower to get up and take those few steps to open the door. That's one of the last things I remember."

Soon after the door opened, Adiel's friends and band director rushed him to UK Good Samaritan Hospital.

'It looked like fireworks in his brain'

Doctors at Good Samaritan determined Adiel had experienced multiple strokes and sent him to UK HealthCare's Kentucky Neuroscience Institute. Adiel's parents and brother booked the first possible flight from Texas to Lexington.

Before Adiel underwent emergency brain surgery, his family was able to briefly visit him along with his priest.

"Having a priest there was important to us," said Paul, who feared his son might not make it out of surgery.

Paul recalls examining Adiel's CT scan.

"It looked like fireworks in his brain," Paul said. "It was a three-hour surgery, and it was the longest three hours of my life."

Adiel's family held vigil in the days that followed.

"I left at midnight every day and went to Adiel's apartment and pretended to sleep," Paul recalled. "I came back at six in the morning to relieve his mother and brother, then they went and pretended to sleep."

Rest and relief finally came when Adiel improved enough to be sent to Cardinal Hill Rehabilitation Hospital two weeks later. It took extraordinary work by Dr. David Dornbos and Adiel's neurosurgery team at the Kentucky Neuroscience Institute to get him to that point.

'He truly saved our son's life'

Adiel's most dangerous stroke occurred in his cerebellum, the part of the brain at the base of the skull that is important to movement, balance and motor function.

"The problem there is you get a lot of swelling, which starts to push on the brain stem," Dr. Dornbos said. "If we had done nothing, he probably would have passed away from it."

To relieve the pressure and give Adiel's brain room to swell and recover, Dr. Dornbos removed part of his skull — as well as chunks of dead brain tissue.

"After we got that bone off, the surgery went fine," Dr. Dornbos said. "He did really well with it."

A second procedure, involving the insertion of a catheter into an artery, was performed to prevent secondary strokes and plug a major clot in Adiel's arterial artery.

It's pretty uncommon for people in their 20s and 30s to suffer strokes, Dr. Dornbos said. But he and the other providers at Kentucky Neuroscience Institute have dealt with enough such cases that they're prepared to meet the moment when it occurs. Even if, as in Adiel's case, the cause of a stroke is unclear.

"We're a very high-volume referral center for vascular neurosurgery, so we get a lot of (experience)," Dr. Dornbos said. "You always have to be very conscientious about each individual patient. But when you do it that many times over and over again, you definitely have better outcomes."

Adiel (left) and Paul Nájera (right) enjoy the relief that has come from successful stroke surgery, rehab and a return to normal life for the musician.

Adiel's family is grateful for their experience.

"At the end of this surgery where they removed part of Adiel's brain, we had this amazing human being of a doctor come in and talk to us," said Adiel's mother, Johjania, of Dr. Dornbos. "He was so caring, yet so professional, so approachable and kind. It made a world of difference to us. The confidence that we knew he truly cared, it wasn't just a job.

"He truly saved our son's life," Johjania said. "His hands, his knowledge, his caring just saved him. And we're forever grateful."

Paul praised Dr. Dornbos and Adiel's healthcare team for their life-saving care, as well as their compassion toward the family at a frightening time.

"That man is my new hero." Paul said. "He tolerated my questions and was very gracious. I owe these people more than I can ever give them."

'He's a pretty remarkable guy'

Adiel has worked hard through occupational, speech and physical therapy to reach his pre-stroke level of motor and musical skills. It's been a frustrating road at times. But through dedicated practice with the help of his father, his brother, and UK trumpet professor Dr. Jason Dovel, Adiel's trumpet skills are improving every day. Dr. Dornbos says Adiel's family has played a major role in his rapid recovery.

"His family is awesome," Dr. Dornbos said. "He's a pretty remarkable guy, and he has really good family support. Those two things make a big difference."

Dr. Dornbos expects Adiel to make a near-complete recovery and says he's at fairly low risk for another stroke.

"When young people have strokes, it's kind of a blessing and a curse because their recovery tends to be better. Their brains are more adaptable," Dr. Dornbos said. "He's probably at a slightly higher risk of stroke than the general population, just because it's happened to him before. But he's not at tremendously higher risk."

'The best medicine'

Adiel performed his trumpet in a concert with the UK Wind Symphony just five months after an inexplicable series of strokes thrust him into the biggest challenge of his young life. Even more remarkably, this concert took place only three months after he was medically cleared to begin playing his instrument again. He's on course to earn his Doctorate of Musical Arts in Trumpet Performance, and he is determined to achieve his goal of teaching and playing trumpet professionally.

Adiel is forever grateful for all the treatment he's received from UK HealthCare. But his favorite therapy has been with him since birth.

"Music is indescribable," he said. "It's something past words and something past feelings. It's some of the best medicine in the world."

"I'm very grateful the doctors inpatient to outpatient were able to go with me and get me here. There are no words that can describe it, but it was beyond wonderful what they were able to do."

-ADIEL NÁJERA

Adiel (front) and Paul Nájera share a passion for music –particularly trumpet – as Adiel closes in on his doctoral degree in Trumpet Performance.

FIGHTING STROKE IN KENTUCKY THROUGH POWERFUL COLLABORATION

COVERDELL GRANT BRINGS PARTNERS TOGETHER TO REDUCE KENTUCKY'S STROKE RISKS AND DEATHS.

When the University of Kentucky and partners across the state were awarded a coveted Paul Coverdell National Acute Stroke Program Grant in 2021, the bar was set high for the collaboration that aims to reduce Kentucky's high rate of death and disability from stroke.

The group hit the ground running by creating the Kentucky Stroke Improvement Cooperative (KSIC) to provide collaborative leadership for the initiative, said Dr. Larry B. Goldstein, co-director of the Kentucky Neuroscience Institute, chairman of the UK Department of Neurology and principal investigator for the project.

"Although it is early in the process, we have identified eight strategies that will have the biggest impact in preventing stroke and in improving stroke care," Dr. Goldstein said. Each strategy is anchored by a workgroup that meets monthly to review goals and progress.

Stroke is the fifth leading cause of death in Kentucky, killing more than 2,000 residents each year, according to the Centers for Disease Control and Prevention (CDC), which oversees the Coverdell award. Thousands more in the Commonwealth have survived a stroke but deal with long-term disabilities. Stroke's contributing factors include hypertension, smoking, obesity, inactivity, poor diet and excessive alcohol use — health problems that exist at high levels in Kentucky.

The $1.8 million, three-year grant is named after Georgia Sen. Paul Coverdell, who died of a stroke while serving in Congress. It aims to:

- Coordinate and expand existing efforts to improve stroke-related health outcomes and reduce death rates
- Better educate the public about the causes of stroke and how to reduce their risk
- Work with providers to implement best practices for stroke care

The project is a partnership between the UK College of Medicine, UK HealthCare, the Kentucky Department for Public Health's Heart Disease and Stroke Prevention Program, the University of Louisville and a number of other state agencies and health organizations. It is administered through the Kentucky Regional Extension Center at UK, directed by Brent McKune.

"This is not something we could do on our own," Dr. Goldstein said. "This broad-based collaboration brings together experts in many areas, from UK's Kentucky Regional Extension Center to the Kentucky Board of Emergency Medical Services. We believe working together with those who have expertise in their areas will move us more quickly to finding solutions to the problem." Coverdell stroke grants have previously funded state health departments.

Gathering 'good data'

One of the Kentucky Stroke Improvement Cooperative's strategies is the identification of counties with the highest stroke mortality, as well as patients at the highest risk of stroke. Targeting these high-risk populations begins with ensuring protocols are in place at clinics and health systems to identify patients with hypertension, the single most important treatable stroke risk factor.

Crucial to the effort to reach those most underserved, and to efficiently manage the project, is the need for more data and the development of an integrated data management system. Statistics already reveal that Appalachian counties have a stroke mortality rate 8% higher than the rest of the state and 14% higher than the nation. Now researchers are digging into available county-level stroke mortality information to discover the pockets of population most affected and to develop ways to reach them.

"We believe working together with those who have expertise in their areas will move us more quickly to finding solutions to the problem."

DR. LARRY B. GOLDSTEIN

One of the most significant hurdles the group is working on overcoming, Dr. Goldstein said, is linking patients and their data throughout a variety of healthcare systems, settings and services. "I am a data person. Without good data, we don't know if we are helping or hurting or if we are even in the areas that need us most," he said. "This seems like a trivial detail, but unless we have good data across the continuum of care, we cannot assess the impact of anything we do." The group is close to achieving a way to match patient records no matter the provider or location — from emergency medical pre-hospital providers to hospitals — through the use of a uniform identifier.

Leveraging existing networks

Strong relationships and involvement in the following networks have helped push the group's work forward:

- The UK/Norton Healthcare Stroke Care Network (SCN, the community-based stroke program in the region)
- The Kentucky Heart Disease and Stroke Prevention Task Force's Stroke Encounter Quality Improvement Project (SEQIP)
- The American Heart Association's Get With the Guidelines program

Among the goals are ensuring that hospitals, both in and out of the SCN, particularly those in areas with the highest mortality rates, follow the American Heart Association/American Stroke Association Get With the Guidelines – Stroke program, which promotes nationally recognized standards for the treatment of stroke patients. There is also support for hospitals seeking Joint Commission certification as either a comprehensive stroke center, a primary stroke center or as an acute stroke-ready hospital.

Workforce development is essential as well. From Emergency Medical Services workers to hospital providers, one of the grant workgroups is developing and implementing educational opportunities that improve evidence-based clinical knowledge for stroke care as well as build recognition in disparities of care.

"None of this would be possible if it weren't for the level of collaboration among all of the organizations," Dr. Goldstein said. "By working together, we are able to leverage and integrate programs that are already on the ground and get buy-in for new programs we may need. Our priority is to save lives and prevent disability and death."

"None of this would be possible if it weren't for the level of collaboration among all of the organizations."

DR. LARRY B. GOLDSTEIN

Members of the KNI stroke team work together to improve stroke outcomes across Kentucky.

NEMO TO THE RESCUE

A ONE-STOP SHOP FOR KIDS WITH NEURODEVELOPMENTAL ISSUES

Children with complex neurodevelopment problems commonly have many visits with multiple specialists only to experience delays in diagnosis or misdiagnosis. For their caregivers, navigating the healthcare system can be frustrating, stressful and expensive.

Thanks to the opening of UK HealthCare's Neurodevelopmental Evaluation and Management Optimization (NEMO) Clinic, families can now come to one convenient location where their children are assessed and treated by an entire team of experts.

"What would typically take 18 months or longer — with many physician appointments, visits with speech-language pathologists, occupational and physical therapists, psychologists and others — can be accomplished in one visit at the NEMO Clinic," said child neurologist Neil Toupin, MD, who is leading the clinic.

Dr. Toupin and his team see patients every Friday morning, completing evaluations and assessments, observing children at play and in their interactions with others, and listening to parents and caregivers. Visits usually include assessment testing individualized to the child. In its first year, the clinic utilized 21 different assessment tools, and genetic, behavioral and neurological tests.

"All of our patients have some degree of developmental disability. In the clinic, we are able to get a holistic picture," said Dr. Toupin. "A typical child neurology appointment might take 30 to 45 minutes. We spend an hour and a half to four hours with our patients."

The clinic works with children with Rett syndrome, Duchenne muscular dystrophy, congenital hypothyroidism, Sotos syndrome, cerebellar hypoplasia/atrophy, epilepsy, congenital myasthenic syndrome, cerebral palsy and strokes, and a host of other problems. Many patients are autistic, while others have conditions yet to be diagnosed.

When an office visit isn't enough

Dr. Toupin recalls a young boy with autism and muscular dystrophy who had been hospitalized multiple times in one year with unexplained exhaustion and severe pain. The family had sought second opinions yet still had no answers.

"We played with him for two hours. He ran himself ragged to the point where he finally laid down, grabbed his leg and started moaning. When I asked his mother how often this happened, she said it was a daily occurrence," said Dr. Toupin. "We determined he wasn't responding to pain early due to his autism. What he needed were activity breaks. We would never have seen this in a regular office visit."

Since his clinic appointment, the boy has been hospitalized only once because of this problem.

"There's no way you can care for these kids in a vacuum. Sometimes our recommendations may be more related to school, the home environment or community resources. We really are a one-stop, comprehensive care shop."

NEIL TOUPIN, MD

Neil Toupin, MD,
UK HealthCare Neurodevelopmental Evaluation and Management Optimization Clinic

Clinic also serves as hub to resources

Among the goals of the clinic are reducing healthcare utilization and improving outcomes. Its team approach, with specialized therapists, offers a broad perspective that results in creative solutions.

The kid-friendly space doesn't have exam rooms with beds or even traditional doctor's offices. Instead, it has a large gym with PT and OT equipment, including a rock wall, and two-way glass so the healthcare team may observe without overwhelming a child.

In addition to diagnosing and assessing the patient, the clinic helps families with many of the other barriers they face. A family navigator, patient service coordinator and patient relations assistant provide resources for school and education issues, assisting families with the forms necessary for state waivers and Supplemental Security Income. They include parents in therapy and provide extensive education, connecting them to appropriate support groups.

"There's no way you can care for these kids in a vacuum," explained Dr. Toupin. "Sometimes our recommendations may be more related to school, the home environment or community resources. We really are a one-stop, comprehensive care shop."

Dr. Toupin is encouraged by the response to the clinic, and heading into 2023, he hopes that the days and hours can be expanded to better address the needs of Kentucky's children.

Dr. Neil Toupin sees patients in a child-friendly space, conducive to observation of their natural behavior when placed in a stimulating environment.

FINDERS ALLIANCE IMPROVING EPILEPSY CARE THROUGH NEUROIMAGING

A team of University of Kentucky scientists and clinicians recently launched a new epilepsy study. The goal? By merging advanced neuroimaging technologies, they hope to obtain unique data that will ultimately lead to the improved management of drug-resistant epilepsy patients.

The project is being undertaken by the Functional Imaging for NeuroDiagnostics for Epilepsy and Resective Surgery (FINDERS) Alliance, a collaboration between neuroscientists, neurologists, neuroradiologists, physicists, neuropsychologists, neurosurgeons, engineers and others from UK's colleges of medicine, engineering and public health.

"The overall point of the study is to better localize where in the brain a seizure is happening," said FINDERS principal investigator Brian Gold, PhD, professor in the departments of neuroscience and radiology at the University of Kentucky College of Medicine.

Before FINDERS could bring patients into the mix, there was a significant amount of groundwork that was necessary, said Dr. Meriem Bensalem-Owen, co-principal investigator of FINDERS, professor of neurology and medical director of the Epilepsy Program at UK HealthCare.

"Research like this has never been done before in Kentucky," she said. "We had to search for and test equipment that would be compatible with an MRI, such as electrodes that would not heat up during imaging. Our workflow had to be established and we needed to write new protocols. We literally started from ground zero when compared to other UK COM Alliances."

"Research like this has never been done before in Kentucky."

DR. MERIEM BENSALEM-OWEN

Finding a new treatment option

Some 3.4 million Americans suffer from epilepsy. While surgery and medications help control seizures for many, one-third of all patients with epilepsy do not respond to medication. A subset of these patients who are drug resistant are at risk of injuries or even death from their seizures. For those patients in particular, finding a way to control their seizures has been problematic.

Dr. Gold explains, "Currently, it can be difficult for neurosurgeons to know exactly where to operate. With better information that we're getting through FINDERS about exactly where the seizure is in the brain, it will help with neurosurgical planning. The surgeon can resect the tissue that is causing the seizure and not other tissue that is still functioning normally."

Typically, physicians have used video-EEG and MRI to pinpoint the location of a seizure in the brain. Taking this concept to the next level, FINDERS members are studying the merger of EEG and fMRI for epilepsy evaluation in addition to newer imaging modalities. "Simultaneous and continuous EEG-fMRI scanning can determine the cerebral area showing changes in the fMRI signal in response to epileptiform discharges occurring in the EEG," explained Dr. Bensalem-Owens. "This technique requires an interdisciplinary collaboration."

She is working closely with co-principal investigator Brian Gold, PhD, professor, Department of Neuroscience; and neuroradiologist Flavius Raslau, MD, associate professor, Department of Radiology, who brings his expertise in neuroimaging to the team. In addition to the physicians and scientists on the project, specialized staff such as EEG technologists and nurses are vital to the study.

Inpatients in the adult Epilepsy Monitoring Unit, which is concentrating on the postictal state — the period after the seizure subsides – are the best candidates for the trial. Coordination between various team members and proximity to imaging equipment is key to performing the studies during this phase of a seizure.

"Usually these are patients we have already developed a connection with and they are eager to be part of something that might provide answers," said Dr. Bensalem-Owen. "They want to contribute."

Additional funding would help ensure that the trial can continue, a point not lost on Dr. Bensalem-Owen who feels the group's efforts could potentially impact patients across the nation. She also believes that the FINDERS Alliance is the impetus needed for other multidisciplinary projects to take off.

Above: Dr. Brian Gold, PhD, is the principal investigator leading the FINDERS alliance in new imaging strategies for epilepsy patients.

Left: Researchers work closely with the clinical team participating in FINDERS, relying on them to identify patients and get them to imaging while still in the postictal phase of a seizure.

A collaborative approach to care

The UK Kentucky Neuroscience Institute is accredited by the National Association of Epilepsy Centers (NAEC) as a level 4 center, able to offer the most advanced monitoring, testing and treatments for complex types of epilepsy. As such, the FINDERS Alliance is one of many moving parts of the robust program. Partnerships with organizations such as the Epilepsy Foundation of Kentuckiana, which provides education, support and outreach for patients and families, are also valuable.

With more than 260 NAEC epilepsy centers nationwide, KNI joined the Epilepsy Learning Healthcare System (ELHS) in 2022, becoming just one of 15 clinical NAEC member centers throughout the country. ELHS is a learning health system in which all stakeholders collaborate — clinicians, researchers, patients and their families, and nonprofit organizations. They design, implement and share the results of collaborative research and quality improvement efforts.

ELHS members are working on numerous initiatives including:

- Developing national quality measures
- Offering real-time data support and improved electronic data transfers
- Testing innovations that transform epilepsy care

"One of the most interesting things about ELHS is their philosophy that little changes will bring bigger changes and better patient outcomes. So, if we identify a problem and then try making a small change, we can see fairly quickly if it alters practices and outcomes," said Dr. Bensalem-Owen. "These partnerships, and collaborations like FINDERS, are very important because they keep us from getting stagnant. At the end of the day, it's not about one person's work. We can accomplish so much more for our patients when we pull together."

COLLABORATION FOR CURES

INTEGRATED RESEARCH ACCELERATES DEVELOPMENT OF INNOVATIVE TREATMENTS

With more than 600 samples (nearly 9,000 aliquots) in storage at the University of Kentucky's Neurobank, UK researchers are beginning to have access to biospecimens that could hold the key to breakthroughs in the diagnosis and treatment of several neurological conditions.

The Neurobank is one of the initiatives of UK's Neuroscience Research Priority Area (NRPA), a collaborative involving faculty and trainees from nine UK colleges. Together, investigators from different labs are learning more about everything from the causes of movement disorders and Alzheimer's disease to how limb regeneration that exists in some animals may lead to regenerative capabilities in humans.

The Department of Neurology has greatly increased the university's research capacity with the creation of the KNI Clinical Research Organization (CRO), which provides management, guidance and support for neuroscience clinical trials. Currently, the CRO has some 33 clinical trials in progress with industry, government and foundation support.

NRPA gives broad-based support for neuroscience

In FY 2021, the NRPA received $78.3 million in funding. In 2022, awards to investigators affiliated with the NRPA have included:

- A $20.5 million P01 grant from the National Institute on Aging of the National Institutes of Health to the Sanders-Brown Center on Aging for research on the role of astrocytes in Alzheimer's diseases and other forms of dementia
- A $3.6 million RO1 award for "Blood-Brain Barrier Repair in Alzheimer's Disease with Epilepsy," led by Anika Hartz, PhD, and Bjoern Bauer, PhD
- A National Science Foundation $1.5 million S-STEM grant to provide scholarships to undergraduate students majoring in biology or neuroscience

"Our guiding strategy from the start was to provide broad-based support for neuroscience across campus. With more than 340 faculty and trainees from 36 departments and nine colleges performing research in the neurosciences, the sum is better than its parts," said Dr. Larry B. Goldstein, co-director of the Kentucky Neuroscience Institute and chairman of the UK Department of Neurology. He and Linda Van Eldik, PhD, who is also the director of the Sanders-Brown Center on Aging, are co-directors of the NRPA.

Neuroscience was named a Research Priority Area by UK in 2019. Since that time, it has increased academic productivity; organized an annual clinical-translational research symposium; supported research in neurotrauma, stroke, neurodegenerative diseases, epilepsy and other areas; funded pilot studies; and developed collaborative group programs.

"Research is increasingly showing the relationship between sleep problems and chronic health issues, including conditions such as obesity, diabetes, Alzheimer's and stroke."

DR. LARRY B. GOLDSTEIN

STAR (Sleep, Timing, and Rhythms Collaborative) is one of the current collaborative groups and is led by co-directors Sridhar Sunderam, PhD, College of Engineering, Biomedical Engineering, and Marilyn Duncan, PhD, College of Medicine, Neuroscience. The group, which includes investigators from the College of Medicine, College of Engineering, and College of Arts and Sciences, is integrating its efforts by forming a cohesive hub.

"Research is increasingly showing the relationship between sleep problems and chronic health issues, including conditions such as obesity, diabetes, Alzheimer's and stroke," Dr. Goldstein said. "One of our goals in the NRPA is to tackle the health issues most impacting Kentucky's residents."

Pilot grants support teams in developing preliminary data necessary for applications for extramural funding in cutting-edge research across basic, translational and clinical neurosciences. Among the pilot grants are:

- Early Career Investigator Pilot Grants: Two, $25,000 one-year grants to support early and new career faculty
- Equipment Grants: Grants of up to $100,000 for new instrumentation or to upgrade existing instrumentation. Matching funds in certain cases are also available, such as the Substance Use Research Priority Area, which recognizes overlapping research interests and collaboration.

The Neurobank, under the direction of Tritia Yamasaki, MD, PhD, is building the resources necessary to support multiple translational neuroscience research projects for clinical and basic science researchers.

Recently, a biostatistician, Christopher McLouth, PhD, joined the program. In addition to serving as a co-investigator on several studies, he provides statistical analysis, guidance in study design and support to other researchers.

The NRPA also supports mini-fellowships for faculty, a program that allows researchers to travel to other labs around the country to learn, teach and collaborate. While the mini-fellowship program was temporarily halted due to COVID-19 restrictions, there are plans to revive it soon, Dr. Goldstein said.

In addition to undergraduate, graduate and faculty education, the NRPA is also nurturing the next generation of scientists by providing opportunities for area high school students to become involved in STEM projects.

Dr. Larry B. Goldstein, co-director of the Kentucky Neuroscience Institute and chairman of the UK Department of Neurology

Special programs with Frederick Douglass High School and Bryan Station High School, both in Lexington, encourage careers in science and healthcare, and provide underrepresented youth with opportunities that have often been difficult for them to access in the past. The program involves faculty and trainees from the Diversity, Equity and Inclusion program from the Department of Neurology and from the Department of Neuroscience.

"You plant seeds in the formative years, water them, fertilize them and eventually some of them become young scholars committed to the neurosciences," said Dr. Goldstein.

CRO growth increases trials, opportunities for clinicians

John Slevin, MD, vice chair for research in the Department of Neurology, is responsible for the administration of the CRO. Like Dr. Goldstein, he shares both a passion for investigation and a desire to support young talent — in this case, junior faculty members with an interest in both clinical research and clinical care.

"The focus on clinical research is just one component of mentoring," said Dr. Slevin. "The program is structured to help young faculty achieve tenure and national/international recognition. There is ample room for clinical and translational research in subspecialties."

The CRO has experienced steady growth since its creation in 2016, he said, adding new trials yearly and, this year, nearly doubling its physical footprint. The expansion in space came about after a series of unfortunate events during the summer that included a flood in the basement where the CRO is housed.

"What began as a travesty led to us determining how best to accommodate all of the people working in the CRO who were already working on top of each other," said Dr. Slevin. "The space we now have allows us to bring everyone together in one central location on campus. It is much more conducive to running the program because we have sufficient space for everyone, can connect with each other quickly, and have all of our active research files with us instead of in boxes in various locations."

With the goal of being a center for the rapid deployment of trials, the CRO staff of 17 includes clinical research nurses, clinical coordinators and regulatory personnel. Among its activities are:

- A translational, investigator-initiated series of studies unique to UK, evaluating the effect on both movement and cognition of implanting peripheral nerve grafts during deep brain stimulator neurosurgery in participants with Parkinson's Disease (PD), led by principal investigator (PI) Craig van Horne, MD, PhD
- PD and other movement disorder investigations, including the National Institutes of Health-financed "RELIANCE: Web-based Automated Imaging Differentiation of Parkinsonism," led by site PI John Slevin, MD
- UK ALS (Lou Gehrig's disease) Treatment Center of Excellence conducting multicenter therapeutic industry-sponsored trials under the Healey ALS Platform led by site PI Edward Kasarskis, MD, PhD
- Pediatric migraine investigations, including "A Study of Lasmiditan (LY573144) Treatment in Children Aged 6 to 17 with Migraine," led by site PI Sharoon Qaiser, MD
- Epilepsy and multiple sclerosis studies, including "A Phase 3, Randomized, Open-Label Study to Evaluate the Efficacy and Safety of AMZ002, Compared to Vigabatrin, in the Treatment of Infantile Spasms," led by site PI Gulam Khan, MD
- Myasthenia gravis trials, including "ALXN2050-MG-201: A Phase 2, Randomized, Double-Blind, Placebo-Controlled Multicenter Study to Evaluate the Efficacy and Safety of ALXN2050 in Adult Participants with Generalized Myasthenia Gravis," led by site PI Zabeen Mahuwala, MD

"It's really a very exciting time to be involved in clinical trials in the neurosciences. The opportunities the CRO offers may not be readily available to patients and their providers in private practice," said Dr. Slevin. "We are heavily invested in the academic aspects of being a clinical department of the university."

Right: Ann Stowe, PhD – with a research interest in stroke, notably in post-stroke plasticity and in neuroinflammation brain injury and repair – is an integral part of KNI's neuroscience research priority area at UK.

EDUCATING TOMORROW'S **NEUROSCIENCE LEADERS**

The Kentucky Neuroscience Institute and University of Kentucky College of Medicine are dedicated to training the next generation of neurological care providers and ensuring that the current generation has access to the latest educational opportunities.

Neurology residency

The UK College of Medicine Department of Neurology is proud of a long tradition of excellence in neurology training that was started in the 1960s by the department's founder, Dr. David B. Clark, with a mission to produce the best clinical, research and academic neurologists.

Child neurology residency

The child neurology program is unconventional in its integration of the adult and child experiences. The incoming PGY-3 residents begin their training on the child neurology service. Child neurology has its own inpatient service in UK HealthCare's Kentucky Children's Hospital as well as seeing pediatric patients in consultation in the children's hospital and in the pediatric and neonatal intensive care units.

Neurosurgery residency

The goal is to provide an education in the theoretical and technical aspects of neurological surgery so that residents will be equipped for either clinical practice or academic neurosurgery.

Neurology fellowships

The UK Department of Neurology offers multiple advanced fellowship training programs in the following specialties: neuropsychology, epilepsy, geriatric neurology, headache, movement disorders and vascular neurology. Each program is tailored to the needs of fellows of that particular subspecialty.

Neurosurgery fellowship

The UK neurosurgery fellowship program offers opportunities for learning while caring for very complex patients in the Bluegrass Region. Each fellowship is designed as a unique educational program, meant to complement the residency training program. Current surgery fellowships are available in endovascular, spine deformity, and stereotactic and functional surgery.

Continuing medical education

Not only does UK offer educational opportunities for students, residents and fellows, the university offers continuing medical educational (CME) opportunities for fully licensed physicians. There are many opportunities to acquire CME credits either from attending the grand rounds or various conferences.

Neuroscience programs

In addition to advanced clinical education, the UK College of Medicine provides research and training opportunities in neuroscience, ranging from molecular and cellular neurobiology to neuroimaging, from understanding basic neuroscience to investigating mechanisms and treatments of central nervous system disorders due to aging, injury, and disease.

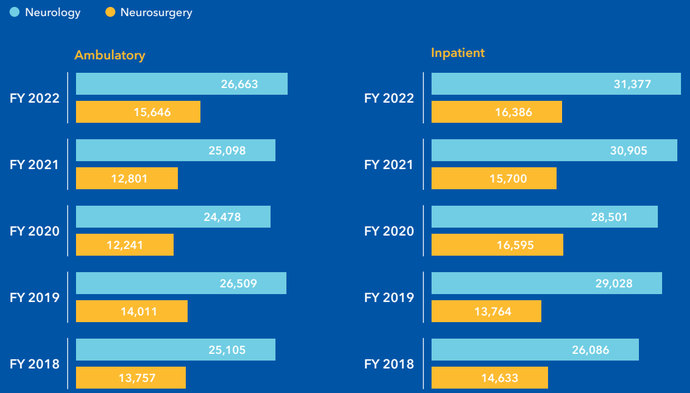
Right: Trainees in the Spinal Cord and Brain Injury Research Center work to advance functional repair of the injured spinal cord and brain through basic and clinical research.

KNI SNAPSHOTS

With the goal of creating a healthier Kentucky, the UK Kentucky Neuroscience Institute (KNI) is the preeminent destination for neurological and neurosurgical care in the Commonwealth. KNI is committed to providing superior care, based on leading-edge research that addresses a multitude of neurological needs. This annual report not only celebrates but drives the spirit behind the providers, clinicians and additional staff of KNI.

The following pages recount the milestones for 2022, which include "snapshots" that provide insight at a glance into how KNI is improving care across the state and conducting research that has the potential to impact the nation.

Total Neuroscience Institute Patient Visits

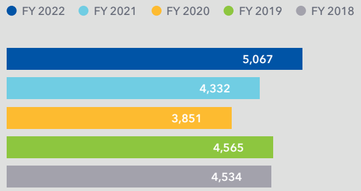


Data

5,067

Outpatient Visits in FY 2022

Headache Outpatient Visits by Fiscal Year



MIGRAINES **BE GONE**

KNI SERVES KENTUCKIANS WITH RECURRING HEADACHES

Headaches affect millions of men, women and children each year, but only 4% of those experiencing severe, recurring headaches – known as migraines – seek medical care from headache specialists, according to the Migraine Research Foundation.

But chronic and frequent headaches do not have to be left untreated. The Kentucky Neuroscience Institute's (KNI) Headache Program offers specialized care and highly trained physicians who focus on evaluation and headache management.

Specialists

1 Board-certified Adult Headache Specialist

1 Board-certified Pediatric Headache Specialist

1 Neurologist with special interest in Headache and Sleep Disorders

1 Neuro-Opthalmologist with interest in IIH and Headache

1 Interventional Neuroradiologist with special training in CSF leaks and Vascular Imaging

4 APPs

1 Adult and 1 Pediatric Nurse who specialize in taking care of complex headache populations

Conditions

The neurologists specializing in headaches at KNI use a multidisciplinary approach to diagnose and treat headaches while providing education, preventing the onset of headaches and offering symptom relief. KNI offers treatment for:

- Chronic migraine headaches
- Cluster headaches
- Refractory Headaches

Treatments

Dependent upon the condition, KNI offers pharmacological intervention including infusions, nerve blocks, Botox injections; consideration of devices and minimally invasive treatments; and in rare cases, neurosurgical intervention.

Unique to KNI, collaborative partners include:

- Interventional Pain
- Interventional Neuroradiology
- Orofacial Pain
- Neuro-Ophthalmology
- ENT
- Plastic Surgery
- Neurosurgery
- Cardiology

The UK difference

KNI offers access to UK Specialty Pharmacy and its pharmacists who specialize in modern therapeutics.

As the only active fellowship training program in the region, KNI trains the next generation of clinicians to meet the challenge of delivering complex care.

Research

Clinical research on innovative drugs and devices

One of very few sites evaluating a PFO closure device in the treatment of migraine with aura

Participation in patient outcomes research to evaluate different therapies for children and adolescents with headaches

EPILEPSY PROGRAM **RECOGNIZED NATIONALLY**

KNI TEAM ADVANCING EPILEPSY CARE AT HOME AND ACROSS THE NATION

Kentucky Neuroscience Institute's Epilepsy Program provides specialized care to children, adolescents and adults living with epilepsy. The KNI team is trained to help those living with seizures follow a personalized treatment plan to manage their specific needs.

As a Level 4 National Association of Epilepsy Centers (NAEC) accredited center, KNI offers the most advanced monitoring, testing and treatments for complex types of epilepsy. The multidisciplinary team and epileptologists at KNI are experts in treating those with drug-resistant epilepsy or uncontrolled seizures.

Specialists

- 7 Adult and 2 Pediatric Epileptologists and Neurophysiologists
- 1 Dedicated Neurosurgeon
- 1 Neuropsychologist
- 1 Dedicated Neuroradiologist
- Dedicated registered EEG technologists
- Epilepsy-trained EMU staff
- Faculty and staff holding appointments on national boards, foundations and other entities directing advancement in epilepsy care nationwide

The UK difference

- Recent expansion of adult epilepsy monitoring unit (EMU) from 6 beds to 12, making it the largest EMU in Kentucky
- Dedicated 3-bed pediatric EMU to provide monitoring and care in a child-friendly environment
- Long-term video-EEG monitoring in the EMU, ICU, outpatient and inpatient EEGs as well as ambulatory video-EEG studies
- Special diagnostics such as Wada, Ictal SPECT studies, intraoperative monitoring and fMR
- 24/7 EEG coverage
- Active surgical program with phase II intracranial monitoring
- Multidisciplinary conferences to discuss complex epilepsy cases

Research

- Active multidisciplinary team funded by National Institutes of Health to find therapeutic strategies that resolve neurovascular inflammation and repair blood-brain barrier dysfunction in epilepsy
- Neurodiagnostic alliance working to bring advanced neuroimaging techniques into use in the clinic. These will improve localization of seizures, diagnosis, and treatment options through the development of new brain imaging methods (see page 20).
- Interdisciplinary team to research how changes in brain metabolism affect and are affected by disease
- Active work through the Clinical Research Organization to participate in clinical research trials and studies, ensuring patients have access to the most advanced treatment options

Awards and accreditations

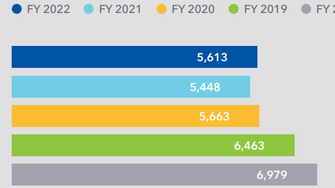
- NAEC Level 4 Epilepsy Center
- ABRET LTM/ EMU accreditation
- ABRET Electroencephalography Lab accreditation

Data

5,613

Outpatient Visits in FY 2022*

Epilepsy & Neuromuscular Outpatient Visits by Fiscal Year*



*Epilepsy & Neuromuscular Outpatient Visits reflect combined statistics

RETURNING CONTROL TO PATIENTS WITH NEUROMUSCULAR DISEASE

When nerves fail to function well, a person's control over their entire body can be affected, causing a variety of symptoms ranging from muscle weakness, to loss of sensation and balance, to chronic pain. Neuromuscular disorders, which are diseases of the peripheral nervous system, are challenging to diagnose and treat, and often leave patients feeling helpless in their healing.

The UK HealthCare Neuromuscular Disorders team specializes in addressing these diseases. Specifically, they diagnose and treat conditions affecting the peripheral nerves, muscles, the autonomic nervous system, the nerve-muscle junction and the spinal cord.

Specialists

- 2 Neuromuscular fellowship-trained MDs
- 2 Neurophysiology fellowship-trained MDs
- 1 dedicated ALS-specific MD, PhD
- 5 Electromyographers
- 2 Dedicated EMG technicians
- Nurses; physical, occupational and speech therapists; social workers and support staff trained to care for those living with neuromuscular disorders and ALS

Conditions

- Amyotrophic lateral sclerosis (ALS) or Motor neuron diseases (MNDs)
- Muscle disorders including myopathy and muscular dystrophy
- Peripheral neuropathy and nerve injuries/compressions
- Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP)
- Guillain-Barré syndrome (GBS or AIDP)
- Myasthenia gravis (MG)
- Rarer conditions including periodic paralysis, Stiff-person syndrome (SPS), Myotonia

The UK difference

- Comprehensive and advanced diagnostics including electromyography (EMG including single-fiber EMG), neuromuscular ultrasound, and nerve/muscle biopsies to determine etiologies of neuromuscular disorders
- Only ALS Association Certified Treatment Center of Excellence in Kentucky
- ABPN neuromuscular subspecialty-certified providers
- EMG "bootcamp" training to ensure highest quality diagnostic testing

Research

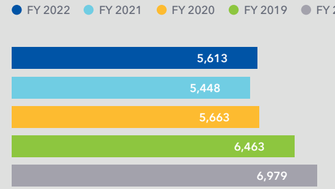
- Over 10 currently active clinical trials, allowing patients access to the latest medical therapies before they are widely available
- Investigator-initiated original research studies on the pathophysiology and impact of various neuromuscular disorders
- Dedicated ALS research team, working to understand familial ALS, disease causation and progression, and striving to improve longevity and quality of life in ALS patients

Data

5,613

Outpatient Visits in FY 2022*

Neuromuscular & Epilepsy Outpatient Visits by Fiscal Year*



*Neuromuscular & Epilepsy Outpatient Visits reflect combined statistics

THE SPINE **SPECIALSTS**

PATIENTS BENEFIT FROM KNI'S COLLABORATIVE APPROACH

The complexities of spinal surgery demand advanced technology and a medical team with diverse expertise. The neurosurgeons at Kentucky Neuroscience Institute (KNI) offer patients an advanced multidisciplinary approach to spine care. From spinal aging, tumors and injuries to less-common ailments such as scoliosis, KNI's experienced physicians work hard to ensure that all patients receive high-quality, highly personalized care.

Specialists

6 Spine Neurosurgeons

7 APPs

2 Registered Nurses

Physical and Occupational Therapists dedicated to supporting spine patients

Conditions

Surgeons with the program are trained to treat a variety of spinal disorders:

- Disc removal
- Cervical disc herniation
- Gliomas (including astrocytoma, oligodendroglioma, ependymoma, and ganglioglioma)
- High cranial cervical junction instability
- Neurofibromas
- Schwannomas (neuromas)
- Scoliosis
- Spinal cord herniation
- Spinal synovial or ganglion cysts
- Spine deformities
- Spine fractures and other spine injuries
- Spinal stenosis
- Spine tumors

Procedures

KNI surgeons are trained in the most complex procedures, allowing patients access to the latest potential treatment for whatever spinal condition they may have. Common procedures performed are as follows:

- Vertebral augmentation with balloon kyphoplasty
- Tumor ablation
- Minimally invasive spine fusion
- Cervical total disc replacement
- Cervical laminoplasty
- Complex reconstructive surgery

The UK difference

Close collaboration with experts from UK Orthopaedic Surgery & Sports Medicine, allowing access to nonsurgical treatment options for patients who may benefit from a more conservative approach

Minimally invasive surgical techniques that cause less harm to surrounding bones and tissue, leading to less pain and faster recovery times for patients

Team approach among neurosurgeons, vascular surgeons and ICU physicians to make even the most complicated surgeries as safe as possible

Spinal navigation equipment used to make surgery safer and more precise, often limiting the amount of surgery necessary to treat a problem

Research

KNI neurosurgeons benefit from a close partnership with the researchers and clinicians of the UK Spinal Cord and Brain Injury Research Center, focusing on advances in the following areas:

Treatments to minimize damage and promote repair mechanisms following spinal cord or brain injury

Strategies to promote neuronal regeneration, including gene therapy

Mechanisms involved in axon guidance and myelination

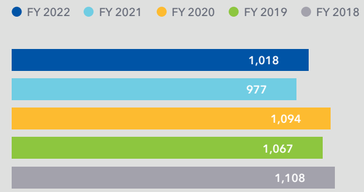
Implementation of advanced control systems for functional neuromuscular stimulation

Data

1,018

Outpatient Visits in FY 2022

Spine Outpatient Visits by Fiscal Year



SOLVING THE BIGGEST NEUROLOGICAL PROBLEMS

FOR THE LITTLEST PATIENTS

A child's neurological system is complex. And problems that arise in the brain or nervous system during childhood can cause serious complications and developmental delays. Age does not impact significance of care, so a child's neurological system also requires advanced, high-quality levels of care and treatment. That's where the Child Neurology team at UK HealthCare's Kentucky Neuroscience Institute (KNI) can make a difference.

KNI's providers—board certified in pediatrics, neurology and child neurology—have access to leading-edge care for the diagnosis, evaluation, management and treatment of pediatric neurologic conditions.

Specialists

8 Child Neurologists

3 APPs

1 Dedicated Pharmacist

Dedicated support staff including nurses, patient coordinators, medical assistants and a social worker to care for children and their families

Conditions treated

KNI treats a comprehensive set of conditions affecting children, including but not limited to:

- Brain injury
- Brain tumor
- Cerebral palsy
- Concussion
- Developmental disorders
- Headaches
- Hypoxic brain injuries
- Muscle weakness (myopathy)
- Neurofibromatosis
- Neurological problems of neonates in conjunction with UK Neonatology
- Neuromuscular disorders
- Seizures
- Stroke
- Tics
- Tourette's disorder
- Tuberous sclerosis

The UK difference

Access to and treatment by UK HealthCare's Comprehensive Stroke Center, ensuring young stroke patients have access to the top level of stroke care

Dedicated child-neurology-trained epileptologists and 3 epilepsy-monitoring rooms housed in Kentucky Children's Hospital so young patients can be monitored, diagnosed and treated in a child-friendly environment

Advanced treatment, such as new genetic treatments currently available for some children with spinal muscular atrophy

Close collaboration with DanceBlue Kentucky Children's Hospital Hematology/Oncology Clinic, a multidisciplinary clinic that includes neurosurgery and pediatric hematology-oncology, treating primary and secondary brain tumors in children

The only multidisciplinary headache clinic in the region focused on children, teenagers and young adults ages 25 and younger

Neurodevelopmental clinic comprised of a child neurologist, speech-language pathologists, occupational and physical therapists, psychologists and more – reducing a typically months-long process of diagnosing developmental disorders into a single-day visit (see page 18)

Close collaboration with the Office for Children with Special Health Care Needs to make advanced neurological care accessible and affordable to families in Eastern Kentucky

Child neurology inpatient unit embedded in the Kentucky Children's Hospital (KCH) and a dedicated child-neurology outpatient clinic space, allowing kids and families to seek care in a warm, welcoming, child-friendly environment

Close work with KCH child life specialists, helping children master the challenging situations associated with illness and positively cope with anxiety from treatments

Research

Ongoing work with Clinical Research Organization on new drugs and devices

Participation in patient outcomes research to help determine best therapies and treatments in all areas of child neurology

Particular areas of focus include:

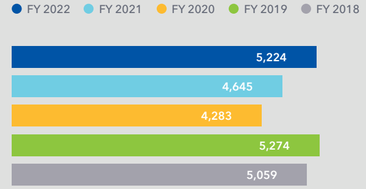
- New therapies for childhood migraine
- New therapies for epilepsy in childhood
- Outcomes for persons with Down syndrome
- Molecular characterization of pediatric brain tumors
- Organization of services for children with autism and related disorders

Data

5,224

Outpatient Visits in FY 2022

Child Neurology Outpatient Visits by Fiscal Year



EXPERT MS CARE AT UK HEALTHCARE

A TEAM OF SPECIALISTS COVERS THE CONDITION FROM ALL ANGLES

One of the most common neurological conditions in the United States, multiple sclerosis (MS) affects more than 5,000 people in Kentucky and southeast Indiana, according to the National MS Society. Because MS impacts the brain, optic nerves and spinal cord, having a team of specialists on hand to address the unique challenges of MS is critical when it comes to patient care.

And the Multiple Sclerosis and Neuroimmunology program at the Kentucky Neuroscience Institute at UK HealthCare is equipped with the experts necessary to manage the complete spectrum of MS-related complications.

Specialists

- 1 MS fellowship-trained MD, PhD
- 1 Neuro-ophthalmologist
- 1 Neuropsychologist
- Pharmacists trained to manage and educate patients on medication and infusion
- Physical and Occupational therapists

Conditions

Clinicians with the program are trained to manage a variety of neuroimmunologic disorders in addition to MS:

- All MS subtypes, including progressive, relapsing-remitting and secondary progressive
- Acute disseminated encephalomyelitis (ADEM)
- Neuromyelitis optica spectrum disorder
- Pediatric MS and related disorders
- Sarcoidosis
- Transverse myelitis
- Other autoimmune diseases of the central nervous system

The UK difference

- Designation as a Center for Comprehensive Care by the National MS Society, recognizing that KNI upholds the highest standards for care
- Facilities equipped with sophisticated radiological and physiological testing technology to diagnose and monitor disease progression
- Experts in cognitive neurology and ophthalmology, pharmacy and neuropsychology, all trained to manage the unique needs of MS patients
- On-site infusion center delivering the most effective infusion therapies to our patients
- Occupational and physical therapists who have special training in MS and are dedicated to improving mobility and quality of life

Research

Active participation in numerous clinical trials through the Clinical Research Organization

Ongoing translational research in the following arenas:

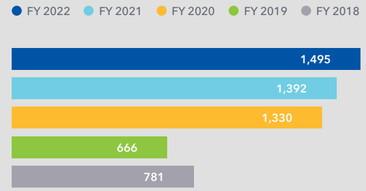
- Estimation of prevalence of autoimmune diseases using EHR data (collaborative study with Autoimmune Registry, NIH, Harvard and USC researchers)
- Quantifying anterior visual pathway disorders
- Diagnostic considerations in optic neuritis, a 10-year analytical study
- Diagnosis and treatment of MS in minorities (collaborative study with VCU and UVA)

Data

1,495

Outpatient Visits in FY 2022

Multiple Sclerosis Outpatient Visits by Fiscal Year



UNDERSTANDING BRAIN-BEHAVIOR RELATIONSHIPS **TO DIRECT THE BEST CARE**

Conditions you cannot see, such as those impacting the way you think and/or the way you absorb and process information, can be the most difficult to understand and diagnose. The experts with the neuropsychology program at the Kentucky Neuroscience Institute can help.

When treating physicians and allied health providers need complex differential diagnostic questions answered, they can count on KNI's team of neuropsychologists. UK HealthCare's neuropsychology division includes world-renowned academic clinicians with research appointments in the Sanders-Brown Center on Aging, one of the world's leading centers on the science of aging.

Neurocognitive testing, also known as neuropsychological testing, is a comprehensive evaluation of the patient's cognitive function by specific neurologic domains, (i.e., memory, attention, problem solving, language, visuospatial, processing speed, motor, and emotion.) The neurocognitive diagnostic service team is trained to perform these evaluations to help diagnose cognitive deficits that may have resulted from several causes, including neurodegenerative disorders such as dementia, stroke, Parkinson's disease, cancer, epilepsy and traumatic brain injury. Once a proper diagnosis has been determined, the neuropsychologists can provide higher levels of patient care with an individualized treatment plan.

Specialists

4 PhD faculty members, specializing in Neuropsychology

2 Neuropsychology fellows

3 Dedicated Pscyhometrists

The UK difference

Comprehensive neurodiagnostic testing, including cognitive and behavioral evaluation, memory assessment for dementia, cognitive testing pre- and post-brain surgery, evaluation of cognition after stroke, and assessment after injury

Consultative integration within 24 UK HealthCare service lines and clinical programs

Consultation service for 56 external regional hospitals and specialty practices across Kentucky, Ohio, West Virginia and Tennessee

Faculty holding positions on regional, national and international boards and organizations, ensuring that UK is at the forefront of neuro-diagnostic service, breakthrough science, and process and protocol creation

Conditions consulted

The program has broad experience with conditions and treatments such as (but not limited to):

- Adult and pediatric oncology
- Adult and pediatric trauma
- ALS
- Brain injury
- Dementia syndromes
- Epilepsy & seizures
- Encephalitis
- General neurology
- General neurosurgery
- Hydrocephalus
- LVAD implantation
- Meningitis
- Movement disorders
- Multiple sclerosis
- Plastic surgery (craniofacial trauma)
- Rheumatology
- Solid organ transplant
- Stroke
- Toxin exposure

Research

Glueck Lab: neurobehavioral research lab focused on exploring novel interventions to aid in recovery for individuals with mild cognitive impairment due to traumatic brain injury

Sponsorship by multiple agencies of the National Institutes of Health, Department of Defense, Department of Education, clinical trials and foundation grants

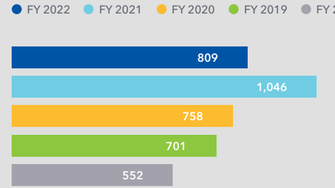
Individual faculty research interest in neurodegenerative disease, Alzheimer's disease and related dementias, acquired brain injury, global health and sustainability, neurobehavioral performances, neurogastronomy and chemosensory disorders, neuromodulation technology, and neurotoxicology

Data

809

Outpatient Visits in FY 2022

Neuropsychology Outpatient Visits by Fiscal Year



COLLABORATIVE CARE PRODUCES GREATER RESULTS

The UK Memory Disorders Program and the Sanders-Brown Center on Aging join forces to provide the latest in dementia care.

Started by Dr. William Markesbery in 1969, the UK Memory Disorders Program has been a foundational clinic leading national and international efforts for early diagnosis and treatment for 53 years. The clinic has been fully integrated with the internationally renowned Sanders-Brown Center on Aging (SBCoA), since its inception in 1979 as a center for excellence in research, care, and treatment for Alzheimer's and related dementias. This collaboration between research and clinical care gives patients access to the most advanced treatments and therapies, often before they're widely available on the market.

In 1985, SBCoA was recognized and funded as one of the first of 10 Alzheimer's Disease Centers by the National Institute on Aging. The program continues to offer state-of-the-art biomarker diagnostic capabilities, including: sophisticated 3 Tesla MRI with a focus on cerebrovascular disease, molecular PET imaging, spinal fluid testing and a wealth of experience in the new blood testing platforms for Alzheimer's disease and related dementias that are coming into clinical practice today.

Specialists

2 MD, PhDs and 4 APPs trained in and dedicated to memory disorders

Shared team of neuropsychologists, geriatricians, pharmacists, social workers, occupational and physical therapists who can augment care recommendations and develop comprehensive treatment plans

Over 30 research engagement specialists, medical team staff, psychometrists, and coordinators

National recognition and leadership

Founding member of the International Working Group on the diagnosis of Alzheimer's disease

Founding member of the Society for Frontotemporal Dementia

Engagement on the Executive, Steering, and Ethics Committees for the NIH/NIA National Alzheimer Clinical Trials Consortium

Leaders Engaged in Alzheimer's Disease (LEAD-ASG), Empower the Patient and Caregiver Study Group, Alzheimer's Study Group, Senate Subcommittee on Alzheimer's Disease, Washington, DC

Faculty presented Presidential Award for Lifetime Achievement, greater Cincinnati and Northern Kentucky Alzheimer's Association chapter, Cincinnati, OH

Steering committee membership for the National Alzheimer's Disease Neuroimaging Initiative (ADNI)

Conditions

The Memory Disorders Program at UK is not just for Alzheimer's disease, but for all conditions throughout the lifespan that are associated with cognitive and behavioral changes

SBCoA evaluates and treats over 30 conditions relating to various dementias, encephalopathies, encephalitis, and many rare cognitive disorders

Services are appropriate for those at risk for future cognitive or behavioral decline on the basis of family history, genetics, and/or prior brain injury

Experimental treatment options

Over 16 years' experience with new disease-modifying therapies that are just entering the clinical space now

The KNI Memory Disorders and SBCoA is a leading site moving forward over 130 new therapies approved by FDA for experimental use:

- Vaccines and treatments to prevent Alzheimer's disease
- Infusions to remove Alzheimer's proteins from the brain
- Anti-inflammatory medicines to slow or stop brain injury from cognitive disease
- Medicines that target Dementia with Lewy Bodies and Parkinson's disease dementia
- New medicines to treat "hardening of the arteries," now classified as Vascular Cognitive Impairment and Dementia
- Treatments to help with the behavioral and psychiatric symptoms of dementia that are a major problem as disease progresses
- Medicines that are designed to improve synaptic transmission, helping nerve cells talk to one another so the brain can function in a better way
- Treatments designed to change the abnormal shape of dementia proteins and modify the genetic risks that lead to dementia

Coverage area

While the KNI Memory Disorders Clinic serves as the leading memory and aging care center in the Commonwealth, the clinic population and referrals come from other healthcare facilities across the nation.

The nearest centers of excellence can be found in Chicago; St. Louis; Indianapolis IN; Atlanta; Raleigh, NC. This creates an environment where the KNI clinic serves a central role in providing memory care in the southeast and central United States.

Referrals from California to Oregon to South Dakota to Pennsylvania to Massachusetts to New York to South Carolina to Florida are routine in the clinic.

Rural telemedicine clinic

The Rural Telemedicine Clinic in operation since 2005.

Designed to care for those with memory or other thinking problems in their own communities across the Commonwealth.

Over 3,000 Kentuckians have taken advantage of this clinic, receiving state-of-the-art care in their own local communities.

The clinic operates weekly in a dedicated time slot to make sure access is always available.

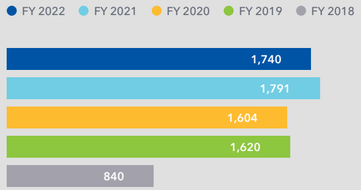
A Rural Caregiver Education Program accompanies this clinic, providing caregiver support and education. The team of clinicians and experienced social workers can help those in rural KY navigate the major issues they face as their loved ones develop memory problems and eventually progress to dementia.

Data

1,740

Outpatient Visits in FY 2022

Cognitive Disorders Outpatient Visits by Fiscal Year



FORWARD MOVEMENT

KNI'S MOVEMENT DISORDERS CLINIC PROVIDES PATIENTS WITH SPECIALIZED CARE

The Kentucky Neuroscience Institute has a comprehensive clinical Movement Disorders Program strongly integrated with its University of Kentucky Parkinson's Disease Research Center of Excellence and the Lexington Veterans Administration Parkinson's Disease Consortium Center.

Specialists

- 4 Fellowship-Trained MDs
- 1 Functional Neurosurgeon
- 3 Dedicated APPs
- 1 Neuropsychologist
- Dedicated clinical research staff

VAMC affiliate

Two UK HealthCare movement disorders specialists staff the Lexington VA Medical Center's Parkinson's Disease Consortium Clinic that also includes speech therapists and a Clinical Research Coordinator. This clinic provides both care for Veterans, including access to DBS and Duopa, and training for Neurology residents.

Conditions

We provide treatment for:

- Hypokinetic Movement Disorders
- Parkinson's disease
- Parkinsonism-plus syndromes
- Stiff-person syndrome
- Huntington's disease and other forms of chorea
- Essential or familial tremor
- Physiological tremor
- Drug-induced tremors, and tremors of metabolic and medical illnesses
- Rubral tremor
- Tremors seen in cerebellar disorders

Treatment

- EMG-guided botulinum toxin injections for movement disorders
- Deep Brain Stimulation (DBS) evaluation, surgery and programming
- Duopa enteral suspension (closely integrated with a single gastroenterologist placing all PEG/Js)

Research

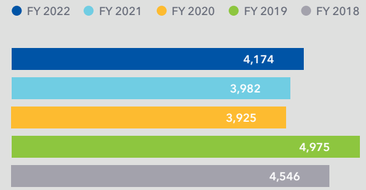
- At any given time, the program has a portfolio of 10-15 multi-center industry-, government- and foundation-sponsored clinical trials
- The Yamasaki wet lab studies alpha synuclein seeding in PD and parkinsonian syndromes
- Close collaboration with the UK Brain Restoration Center and the UK Parkinson's Disease Research Center of Excellence KNI studies the effect of autologous sural nerve graft implantations into *Substantia nigra* concurrent with DBS placement, as a means to slow the course of PD
- In collaboration with the UK College of Health Sciences, studies utilizing gait sensors are evaluating the effects of medication and patient perception of gait stability in PD and Parkinson syndromes
- Multiple neuroscientists in the UK Parkinson's Disease Research Center of Excellence, engage in basic research of Parkinson's disease, Huntington's disease and other neurodegenerative diseases, and closely integrate with the Movement Disorder physicians in translational research

Data

4,174

Outpatient Visits in FY 2022

Movement Disorders Outpatient Visits by Fiscal Year



TAKING STROKE **HEAD ON**

KNI SERVES AS A COMPREHENSIVE CENTER FOR STROKE CARE

Over 2,300 Kentuckians died of stroke in 2020 (the most recent year for which CDC data is available). Not only is it a leading cause of death in the Commonwealth, those who survive often face a lifetime of disability.

At UK HealthCare's Kentucky Neuroscience Institute (KNI), the team is on a mission to provide the highest level of stroke care possible while turning those statistics around.

Specialists

- 7 Stroke Neurologists and 1 Stroke Fellow
- 3 Neurointerventionalists (2 Neurosurgeons and 1 Interventional Neuroradiologist)
- 3 Open Cerebrovascular Neurosurgeons
- 4 Neuropsychologists
- 1 Stroke Neurology Fellow and 2 Endovascular Fellows who take stroke calls
- 24/7 in-house neurocritical care
- 24/7 in-house stroke neurology team
- Neuroscience-dedicated physical, occupational and speech therapy

The UK difference

- To retain Comprehensive Stroke Center designation, KNI has to meet stringent protocols for the treatment of strokes and show that they are capable of treating the most complicated strokes 24/7
- Provides all advanced neuroimaging technologies (all MRI sequences including spectroscopy and tractography, CT, CT perfusion, angiography, ultrasound, transcranial Doppler, TTE, TEE, cardiac MRI)
- Neurointerventional radiology and cerebrovascular neurosurgery available 24/7
- Multiple program oversight and quality improvement teams
- Only ACGME-accredited vascular neurology fellowship in Kentucky
- Acts as hub hospital for Via.ai sites throughout Kentucky, streamlining care coordination between hospitals and ensuring patients get the appropriate care

Research

- Engaged in more than 25 clinical research trials in stroke and cerebrovascular disease, including multicenter randomized trials
- Awarded the prestigious Coverdell Grant, aimed at optimizing stroke prevention among those at high risk and improving care and outcomes for stroke patients throughout Kentucky (see page 16)
- Translational projects with the Center for Advanced Translational Stroke Science
- Includes first tissue bank collecting brain blood and clots in acute stroke patients
- One of the only institutions in the world currently augmenting thrombectomy with investigational neuro-protective drug therapy

Awards

- Joint Commission Comprehensive Stroke Center
- Rated as High Performing in Stroke by US News & World Report for 2022/2023

Results and outcomes

Based on Vizient data for calendar year 2022, UK HealthCare has a substantially higher case mix index, indicating more complicated patients with more comorbidities, and yet KNI retains a lower mortality index as compared to other similar hospitals.

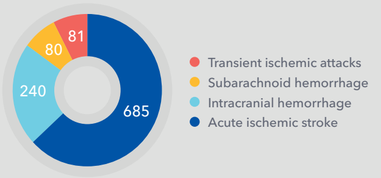
Data

2,083

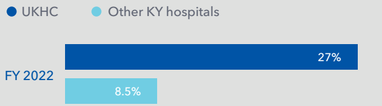
Outpatient Visits in FY 2022

*This Get With The Guidelines® Aggregate Data report was generated using the Quintiles PMT® system. Copy or distribution of the Get With The Guidelines® Aggregate Data is prohibited without the prior written consent of the American Heart Association and Quintiles.

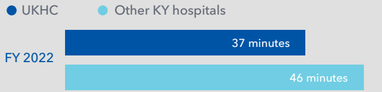
Stroke Patients by Type of Stroke FY 2022*



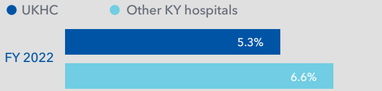
Percent of Patients with Acute Intervention FY 2022*



Mean door-to-needle time FY 2022 (lower is better):*



Hemorrhagic transformation percentage FY 2022 (lower is better):*



AWARDS & **ACCREDITATIONS**

The Kentucky Neuroscience Institute offers the most advanced and robust set of specialty care in the state. We're the only hospital in the area maintaining the standards required to receive the highest accreditations available in all of the following areas of care: stroke, epilepsy, ALS and multiple sclerosis. No matter the condition, we can help overcome it.

BEST REGIONAL HOSPITALS
U.S.News & WORLD REPORT
BLUEGRASS REGION
RECOGNIZED IN 13 TYPES OF CARE
2022-23

HIGH PERFORMING HOSPITALS
U.S.News & WORLD REPORT
2022-23
STROKE

National Association NAEC of Epilepsy Centers
LEVEL 4 EPILEPSY CENTER

American Heart Association
American Stroke Association
CERTIFICATION
Meets standards for
Comprehensive Stroke Center

MS
Center for Comprehensive MS Care

ALS ASSOCIATION
CERTIFIED TREATMENT CENTER OF EXCELLENCE

Through private support, the UK Kentucky Neuroscience Institute can fully realize its potential as a state-of-the-art, comprehensive academic center. Philanthropy enables our physicians, nurses and researchers to do what they do even better - make a difference in the care of not only Kentuckians but in individuals around the world. If you are interested in helping make an impact in the lives of those affected by neurological disease or trauma, contact:

UK HealthCare
Office of Philanthropy
P.O. Box 34184
Lexington, KY 40588
Phone: 859-323-6306

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