

ProMedica Neurosciences Institute

2023 ANNUAL REVIEW



When faced with a neurological condition, you want access to high-quality outpatient care close to home. That's why ProMedica and the University of Toledo College of Medicine and Life Sciences have teamed up to bring world-class neurosciences care to you.





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Letter from Leadership

Dear colleagues,

We are honored to present the ProMedica-University of Toledo College of Medicine and Life Sciences Neurosciences Review. This book is an overview of the work our health care providers perform at ProMedica Toledo Hospital, regional partner hospitals and the state-of-the-art outpatient Neurosciences Center. The affiliation between ProMedica Health System and the University of Toledo College of Medicine and Life Sciences (COMLS) has paved the way to deliver unparalleled, life-changing care to patients with neurological diseases, provide excellent education to the next generation of neuroscience experts, and positively impact the future of neurological specialties through leading and participating in cutting-edge research. From daily conferences between neurological subspecialties to weekly multidisciplinary case conferences, the Neurosciences Center is designed for collaborative patient-centered care. We know this model leads to better patient outcomes and satisfaction.

The past few years were unprecedented in the modern era of health care. The team of specialists at the Neurosciences Center proudly rose to face the challenges during and after the pandemic. We quickly implemented safety measures for our hospital services and clinics for patients and staff alike and significantly increased utilization of teleneurology to maintain easy access and continuity of care for our patients, both in clinic and hospital settings. You will see our rapid expansion of services and clinic volumes over the last few years reflecting our commitment to provide both safe and high-quality care to our patients.

We hope you enjoy the review of our services, available facilities, technologies and expertise. We look forward to serving your patients and collaborating with you in the near future.



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2023 Highlights

Care for Every Patient, Close to Home

ProMedica's Neurosciences Institute continues to provide the highest standard of care in the northwest Ohio and southeast Michigan region. Our goal is to connect patients to quality care according to their condition, close to home.

Highlights from the 2023 calendar years include:

- Expansion of teleneurology and telestroke services to 21 hospital sites across the region.
- Improved access with the opening of additional specialty clinics in regions.
- Added two neurologists and one advanced practice provider in 2023.
- Electroencephalogram (EEG) service is now available to all ProMedica regional hospitals with 24/7 coverage at ProMedica Toledo, Flower and Monroe Regional hospitals.
- Began numerous active clinical trials and research studies and coordinated national clinical trials with other medical centers.
- Obtained Level 3 Epilepsy Center Certification by the National Association of Epilepsy Centers.

Awarded and Recognized for Expert Stroke and Neurological Care

- Comprehensive Stroke Center for the eighth consecutive year.
- US News & World Report High Performing Hospital—Stroke Care.
- Get With the Guidelines Gold Plus.
- News & World Report High Performing Hospital—Back Surgery.
- Healthgrades Stroke Care Excellence Award.



By the Numbers

- 4,559 service line discharges.
- 2,613 neurosurgeries.
- 23,956 neurosurgery encounters.
- 82,585 neurology encounters.
- 2,918 spine care encounters.
- 9,518 neurophysiology tests.
- 226 outpatient infusion volume.
- 778 neuro endovascular procedures.
- 905 teleneurology consultations.
- 1,232 regional telestroke consultations.
- 3,938 regional stroke call volume.





Neurosciences Center

ProMedica and the University of Toledo College of Medicine and Life Sciences have teamed up to bring world-class neurosciences care to patients in northwest Ohio and southeast Michigan. Our two organizations bring together the best of clinical practice and academia to enhance access and continuity of care, while also furthering national research and education efforts.

Our multidisciplinary team practices together in one location to provide comprehensive, compassionate care to all patients with a neurological disorder. Patients have access to complete services including diagnostics, rehabilitation therapies, support groups, social work and research.

Our team of general and subspecialty trained neurologists includes:

- Nearly 40 specialized neuroscience physicians.
- Specially trained nurses.
- Advanced practice providers.
- Neurophysiology technicians.
- Physical therapists.
- Audiologists.

Our Facility

The three-story, 122,000-square-foot building on the north campus of ProMedica Toledo Hospital provides an easily accessible location with convenient parking and centralized registration. The modern architecture and design of the building reflects the innovation and creativity that will take place within its walls. The building also features a major art installation inspired by the neurosciences.

Specialty Services

Infusion Center

ProMedica Physicians Neurology opened its Multiple Sclerosis (MS) infusion center in March 2021. Patients are now able to come into an office that they are familiar with, sit comfortably, receive their infusion while knowing that the provider who oversees their care is on site in case anything is needed. In 2023, ProMedica completed 226 infusions, and is currently approved to administer:

- Tysabri.
- Ocrevus.
- IVIG.
- Soliris.
- Solu-Medrol.
- Leqembi.

Botox Clinic

At the chemodenervation/botulinum toxin/Botox clinic at the ProMedica Neurosciences Center, fellowship-trained specialists treat a diverse array of neurologic disorders and related conditions using botulinum toxins. Some of the most common indications include:

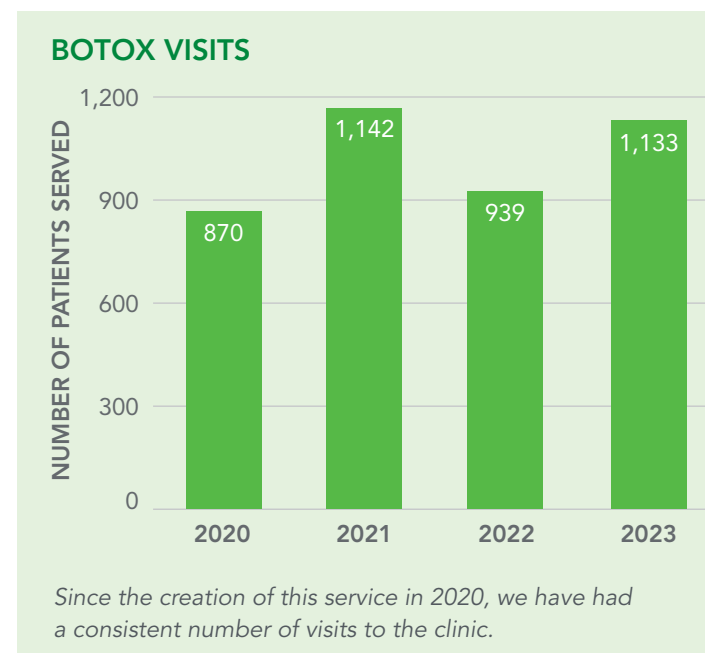
- Muscle spasticity (secondary to stroke, spinal cord injury, MS, cerebral palsy, etc.).
- Dystonia (cervical or neck dystonia oromandibular dystonia).
- Writer's cramp.
- Musician's dystonia.
- Foot dystonia.
- Blepharospasm.
- Chronic migraines that have not improved with typical preventive medications.

Botulinum toxins also provide a much-needed treatment strategy in some less common but still disabling conditions, such as:

- Drooling.
- TMJ syndrome that has failed typical medical and dental management options.
- Hyperhidrosis (excessive sweating).
- Spasmodic dysphonia due to vocal cord spasm/dystonia.



Specialists at the chemodenervation clinic have additional training in use of currently available needle guidance techniques, such as electromyogram (EMG), electrostimulation (e-STIM) and ultrasound. Where appropriate, these techniques are used individually or in combination to improve injection accuracy and safety.





Comprehensive Stroke Center

As the area's first Joint Commission Certified Comprehensive Stroke Center, ProMedica Toledo Hospital serves as the hub for the ProMedica Stroke Network, which includes support for 14 regional ProMedica sites and 21 area hospitals across northwest Ohio and southeast Michigan. ProMedica's stroke network helps ensure that patients have access to safe, evidence-based, high-quality stroke care.

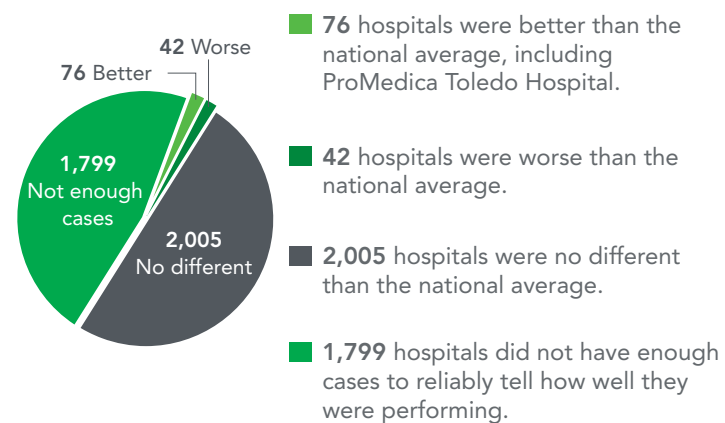
Our stroke specialists include:

- Vascular neurologists.
- Cerebrovascular surgeons.
- Endovascular neurointerventionalist.
- Nurses.
- Therapists.
- Support staff.

STROKE 30-DAY MORTALITY RATE

National Average: 13.9% | ProMedica Toledo Hospital: 10.8%

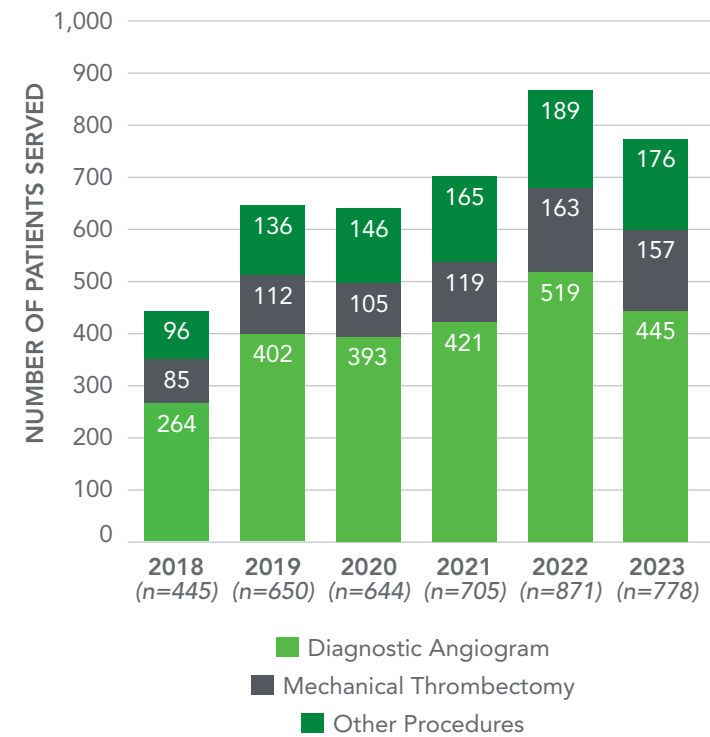
Out of **3,922** Hospitals in the United States



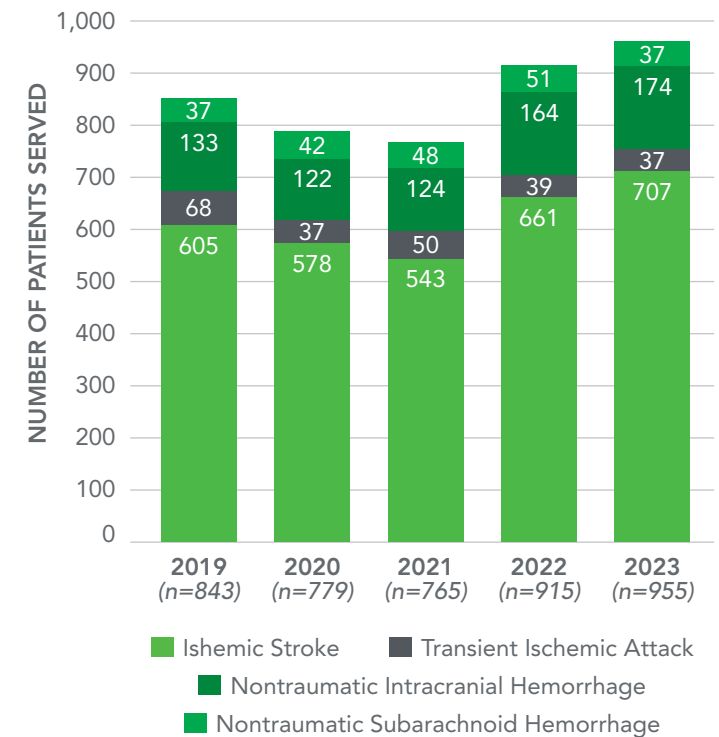
In 2023, ProMedica Toledo Hospital Stroke Team was named American Stroke Association's (a division of the American Heart Association) National Voter's Choice Hero in Stroke Hero Awards.

The ProMedica Toledo Hospital Stroke Team takes a holistic approach to stroke prevention and care. It raises awareness and money to support stroke patients with limited financial means through its BE FAST 5K Run/Walk. It led the implementation of a countywide EMS protocol that gets acute stroke patients to the hospital faster — and then successfully advocated for a statewide rollout. And it has sent team members as far away as Pakistan to teach interventionalists how to perform neuroendovascular procedures, demonstrating our local, regional, and global commitment to stroke care.

PROMEDICA TOLEDO HOSPITAL NEUROINTERVENTIONAL PROCEDURE VOLUME



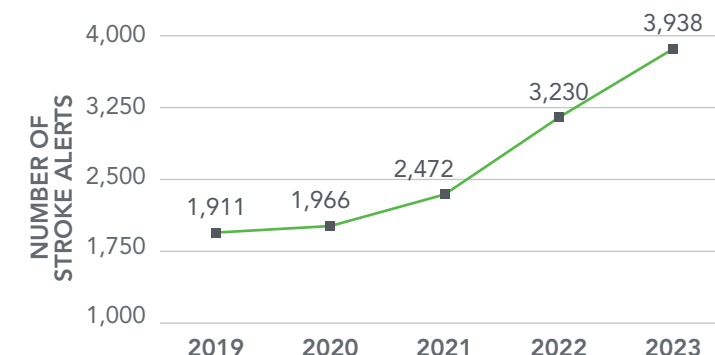
PROMEDICA TOLEDO HOSPITAL STROKE ADMISSION VOLUME



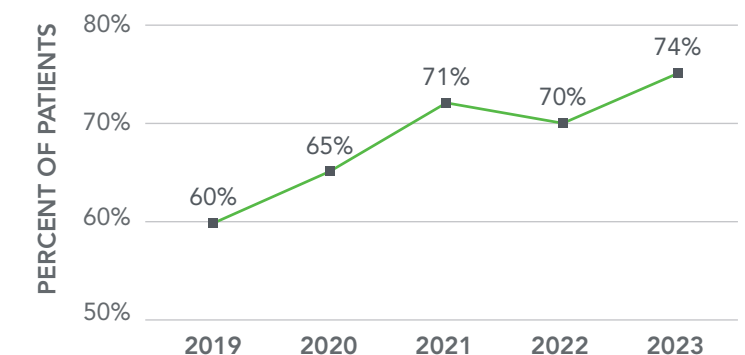
Telestroke Program

The center's telestroke network uses telemedicine to provide rural and suburban hospitals with immediate access to interventional stroke neurologists at ProMedica Toledo Hospital. Via a webcam, these specially trained physicians diagnose a stroke and collaborate with local emergency room staff to provide life-changing stroke assessments and interventions that can prevent permanent disability. In 2023, this program covers 21 hospitals in northwest Ohio and southeast Michigan, and continues to grow and serve our rural communities.

REGIONAL STROKE ALERTS



LOCALLY TREATED REGIONAL STROKE PATIENTS



Cerebrovascular Clinic

A team of experts offer treatment for complex cerebral vascular anomalies including:

- Brain aneurysms.
- Arteriovenous malformation.
- Cerebral and spinal vascular disorders.

Expertise includes:

- Endovascular coil embolization with balloon and stent remodeling.
- Flow diversion.
- Intracascular neck bridging.
- Complex cerebral and spinal arteriovenous malformations.
- Dural AV fistulas.
- Endovascular embolizations.
- Craniotomy and endovascular surgical options.
- Minimally invasive endovascular surgical techniques.

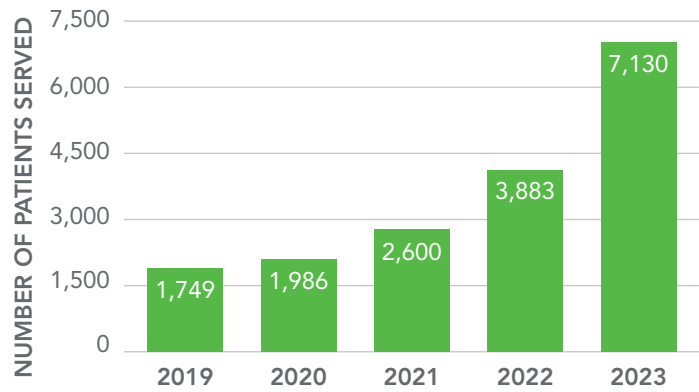
At ProMedica Neurosciences Institute, we specialize in the management and treatment of brain aneurysms and brain and spinal arteriovenous malformations (AVMs). Our team comprises experienced neurointerventionalists and neurosurgeons who leverage cutting-edge technology and advanced medical devices to deliver minimally invasive treatment options for cerebrovascular malformations.

Advanced Treatment Modalities

- State-of-the-Art Technology: We employ the latest advancements in neurointerventional technology, including stent-assisted neck modeling, flow diversion techniques, and intracascular devices, to manage complex brain aneurysms.
- Minimally Invasive Techniques: Our focus on minimally invasive procedures minimizes patient recovery time and enhances clinical outcomes.
- Clinical Research Access: Patients can participate in clinical research trials, providing early access to innovative treatments and devices before they are widely available.



STROKE OFFICE VISITS



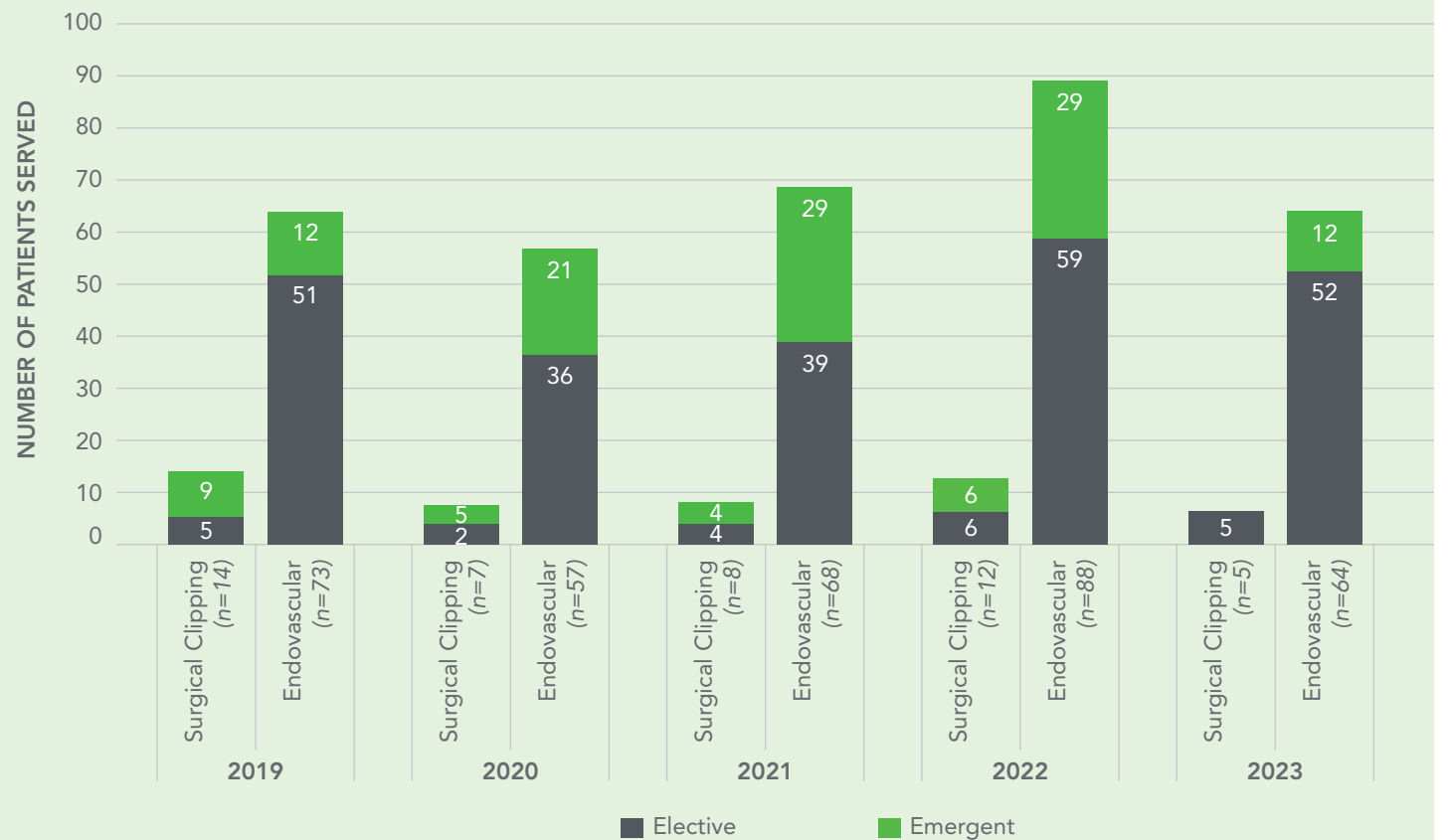
Individualized and Collaborative Care

- Customized Treatment Plans: We develop individualized treatment strategies tailored to each patient's specific clinical presentation.
- Multidisciplinary Case Conferences: Complex cases are reviewed in multidisciplinary conferences that include our specialists from vascular and interventional neurology, vascular neurosurgery, neuroradiology, and neurocritical care, ensuring a consensus-driven approach to treatment planning.
- Comprehensive Provider Feedback: We maintain continuous communication with referring providers, offering detailed feedback on treatment and long-term management plans.

Expertise and Innovation

Our neurointerventionalists and neurosurgeons are dedicated to providing comprehensive, patient-centered care. We utilize a collaborative approach to diagnosis and treatment, ensuring that each patient receives the most effective and advanced care available. Our commitment to utilizing the latest technologies and innovative treatments positions us at the forefront of cerebrovascular care. For referrals or consultations regarding brain aneurysms and AVMs, contact ProMedica Neurosciences Institute.

BRAIN ANEURYSM TREATMENT VOLUMES



The Comprehensive Epilepsy Program

The Comprehensive Epilepsy Program provides expertise in diagnosis and management of all forms of epilepsy. The program provides advanced treatments using both medical and surgical approaches for a large number of patients with epilepsy, with specialized services for patients with:

- New onset or intractable seizures.
- The elderly.
- Women with epilepsy.
- Those with mental or physical disabilities.

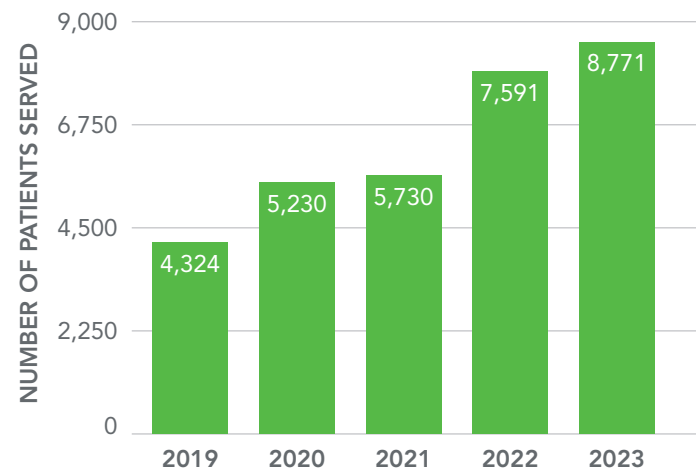
The team of board-certified epileptologists provides care to adults and children with epilepsy. The Comprehensive Epilepsy Program also supports a strong research component, including investigational drug research studies and clinical research programs. Education and scholarship are also emphasized; undergraduate- and graduate-program trainees actively participate at regional, national, and international meetings.



Clinical Epilepsy Program

The epilepsy clinic offers comprehensive evaluation by board-certified epileptologists for patients who experience seizures. More than 5,000 patients with epilepsy are currently registered within the ProMedica Health System in northwest Ohio and southeast Michigan. It is one of the most common diagnoses associated with inpatient neurology admissions and outpatient clinics.

EPILEPSY OFFICE VISITS



Clinical Neurophysiology Laboratory

A network of six hospitals within ProMedica have remote electroencephalogram (EEG) coverage through the epilepsy and clinical neurophysiology team with 24/7 call coverage for ProMedica Toledo, Flower and Monroe Regional hospitals. Studies are performed and interpreted for all age groups, including neonates. Exponential growth in patients being evaluated has been noted in spite of pandemic-related issues noted nationally. More than 20 trained technologists service these facilities and studies are interpreted by fellowship-trained and board-certified neurophysiologists. The neurophysiology laboratory at the Neurosciences Center and the Toledo Hospital offer:

- Magnetic resonance imaging (MRI) imaging facilities.
- Electroencephalogram (EEG).
- Video electroencephalogram (vEEG).
- Ambulatory EEG studies with 24/7 inpatient coverage available.

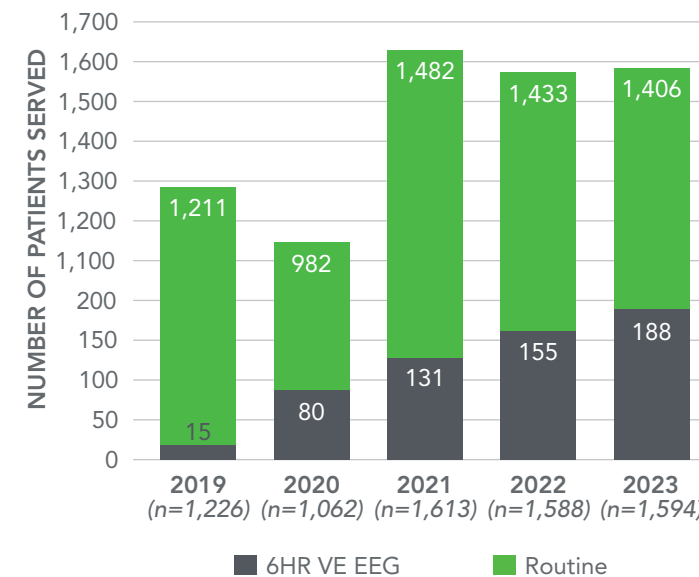
The first successful temporal lobe resection surgery for intractable epilepsy was performed in 2021 at ProMedica Toledo Hospital. Patients interested in research opportunities may also inquire about innovative *and* new treatment options, including Phase 3 clinical trials.

Functional Neurosurgery

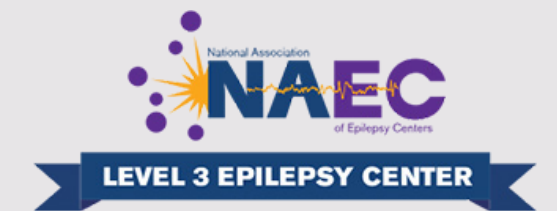
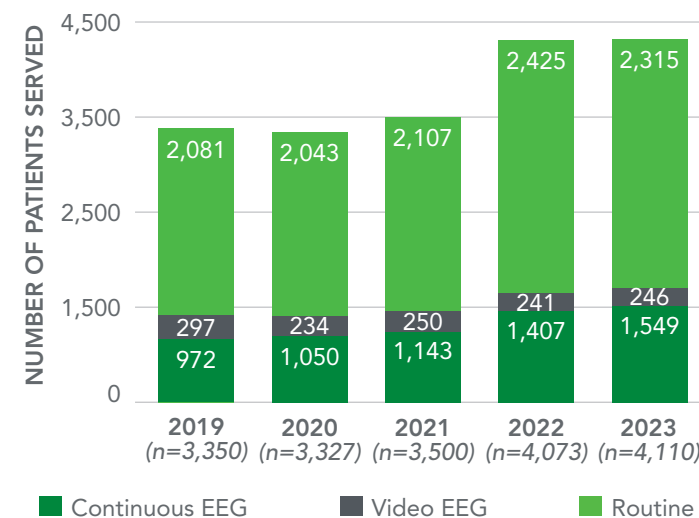
As part of the epilepsy treatment team, functional neurosurgery works closely with the epileptologist at the Neurosciences Center to formulate individualized surgical treatment plans for people who suffer from epilepsy. Each patient's plan is discussed in a multidisciplinary meeting with experts in epileptology, neuroradiology, neuropsychiatry and neurosurgery. The epileptologists and neurosurgeon see patients together in clinic using a patient-centered care model. The team offers advanced surgical treatment options for patients with medically refractory epilepsy, including intracranial EEG monitoring, resection or disconnection surgery, and neuromodulation with vagal nerve stimulation.

The epilepsy team plans to expand the treatment options for patients who are not candidates for resection surgery by introducing responsive neurostimulation to Toledo. This neuromodulation technology uses continuous monitoring of neural activity to guide focused electrical stimulation of various brain structures. Responsive neurostimulation offers an opportunity to reduce the frequency and severity of seizures for patients who were previously not candidates for surgical therapy.

NEUROSCIENCES CENTER YEARLY EEG VOLUME



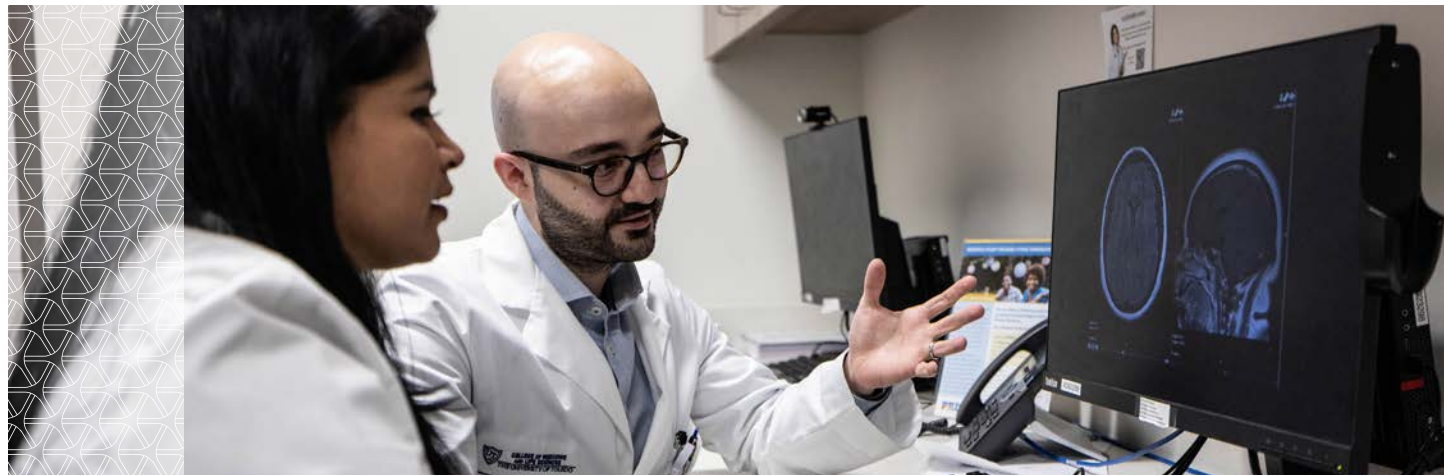
PROMEDICA TOLEDO HOSPITAL YEARLY EEG VOLUME



ProMedica Toledo Hospital is now a Level 3 Epilepsy Center designated by the National Association of Epilepsy Centers (NAEC).

It is the only Epilepsy Center accredited by NAEC in Northwest Ohio. Our Epilepsy Center is committed to providing the best possible care to patients with seizure disorders.

Patients with difficult to diagnose and/or difficult to treat seizures may be admitted to Toledo Hospital for continuous EEG monitoring. This allows the epileptologist to further characterize the seizure, and to localize the seizure assisting with optimizing treatment options. Inpatient EEG monitoring is a pertinent diagnostic tool in patients with difficult to treat epilepsy and allows for discussion of surgical treatment techniques.



Memory Care and Neuropsychology Testing

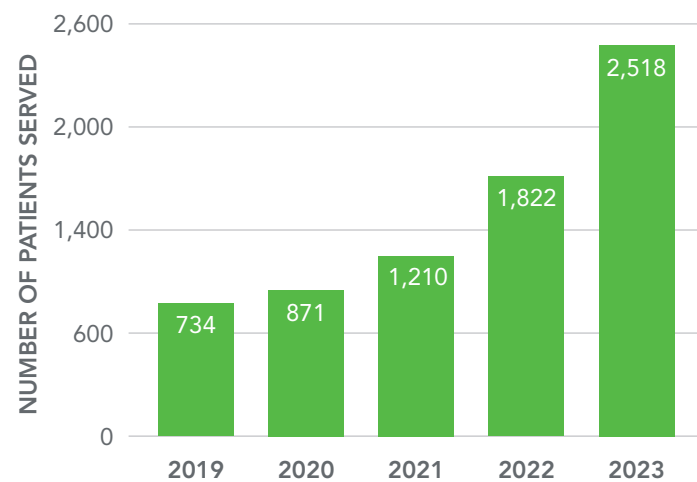
ProMedica's memory care services are fully dedicated and designed to cater to the needs of individuals living with memory loss. Patients with memory or other cognitive issues, dementia, and related disorders such as Alzheimer's disease are assessed and managed with onsite neuropsychological testing from a clinical neuropsychologist*.

The goal of undergoing neuropsychological evaluation is to determine an individual's current strengths and weaknesses in thinking skills, and to determine whether this pattern indicates a neurological, medical or neurodevelopmental disorder. If a disorder is determined, the neuropsychologist provides a diagnosis and explains it to the patient and family. The neuropsychologist then provides the individual and family with information about prognosis and details that will increase understanding of the individual's strengths and weaknesses and how best to help.

The evaluation allows the neuropsychologist to:

- Recommend necessary additional examinations or treatments.
- Suggest appropriate living situations.
- Determine to what extent the patient requires supervision.
- Identify the patient's capacity for making decisions.
- Assess the patient's level of involvement in employment or schooling, and offer recommendations on appropriate accommodations in the work or school environment.

MEMORY LOSS OFFICE VISITS



Memory loss visits hit an all-time high in 2021 and have continued to bring value to the northwest Ohio and southeast Michigan communities.

ProMedica Neurosciences has added Leqembi to the infusion center. Leqembi was recently granted full FDA approval for the treatment of Alzheimer's disease after being shown to moderately slow cognitive and functional decline early in the disease process. Our group of cognitive neurologists have developed diagnostic pathways to identify patients that may qualify for the drug. The drug is administered in our infusion center just a few rooms away from our cognitive neurology team.

Movement Disorders

The movement disorders team is comprised of movement disorder specialists who have additional training in Parkinson's disease and other movement disorders. Based at the Neurosciences Center, the team is equipped with the latest technology and medications with the capability to continually practice procedures and evaluate potential new treatments through clinical and translational research. The Neurosciences Center is equipped with the latest technologies and medications, with the capability to continually practice procedures and evaluate potential new treatments through clinical and translational research.

Technology that is used in daily practice includes:

- Deep brain stimulation implantation and programming by the only fellowship-trained movement disorder specialists in northwest Ohio.
- Chemodenervation for movement disorders and spasticity.
- Clinical and translational research.
- In-person and video clinic visits.

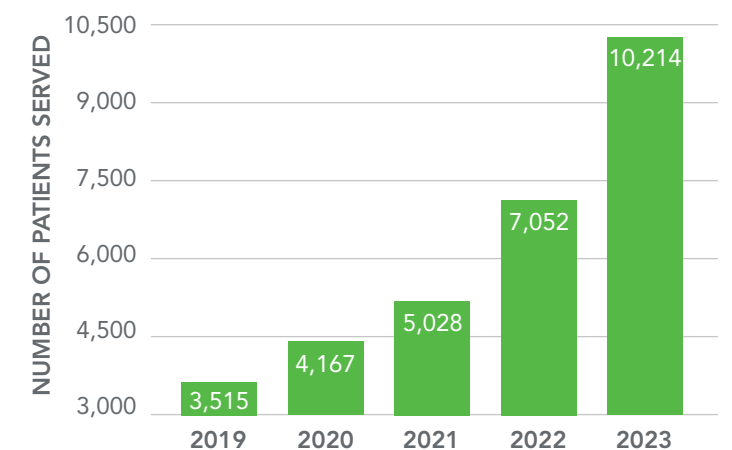
The movement disorder team treats patients with all types of movement disorders including:

- Parkinson's disease.
- Huntington's disease.
- Essential tremor.
- Tardive dyskinesia.
- Atypical parkinsonism.
- Lewy body dementia.
- Ataxias.
- Dystonia.

The Movement Disorder team is also active in several ongoing research studies at national and local levels. Some of these studies include:

- Investigating new Parkinson's disease drugs.
- Exploring the use of functional MRI and other new technologies in Parkinson's disease patients.
- Active clinical and translational research projects.

MOVEMENT OFFICE VISITS



Visits to the movement office have continuously increased every year since 2019.

Deep Brain Stimulation Program

Deep brain stimulation (DBS) is a method of treatment that involves implanting electrodes within certain areas of the brain to block involuntary movements in patients with motion disorders. The ProMedica DBS team offers a unique multidisciplinary, patient-centered experience to address motion disorders. **From identification of surgical candidates and initial evaluations, to surgery and long-term follow-up, the DBS team provides local surgical treatment for movement disorder patients, such as those experiencing Parkinson's disease, essential tremor and dystonia.**

As part of its initiative, the DBS team has pioneered a multidisciplinary clinic where potential DBS candidates are evaluated by a movement disorder specialist, a neurosurgeon, physical therapist and social worker in one visit. If the patient is approved, surgery would be performed by the neurosurgeon. Patients then follow up in the same multidisciplinary clinic to have their DBS system checked, turned on, and programmed. ProMedica offers the only program in northwest Ohio of its kind.

Multiple Sclerosis and Neuroimmunology Clinic

The Multiple Sclerosis (MS) and Neuroimmunology Clinic is staffed by faculty with 25 years of experience, whose other specialties include urology and neuropsychology. An onsite infusion center is available for patients requiring infusions of medications for immunological disorders. Additional technology available at the MS and Neuroimmunology Clinic is:

- MRI of the central nervous system.
- Neurophysiology (EMG/NCS, evoked potential studies, EEG).
- Lumbar puncture.
- Spasticity clinic.
- Neurosurgery clinic.

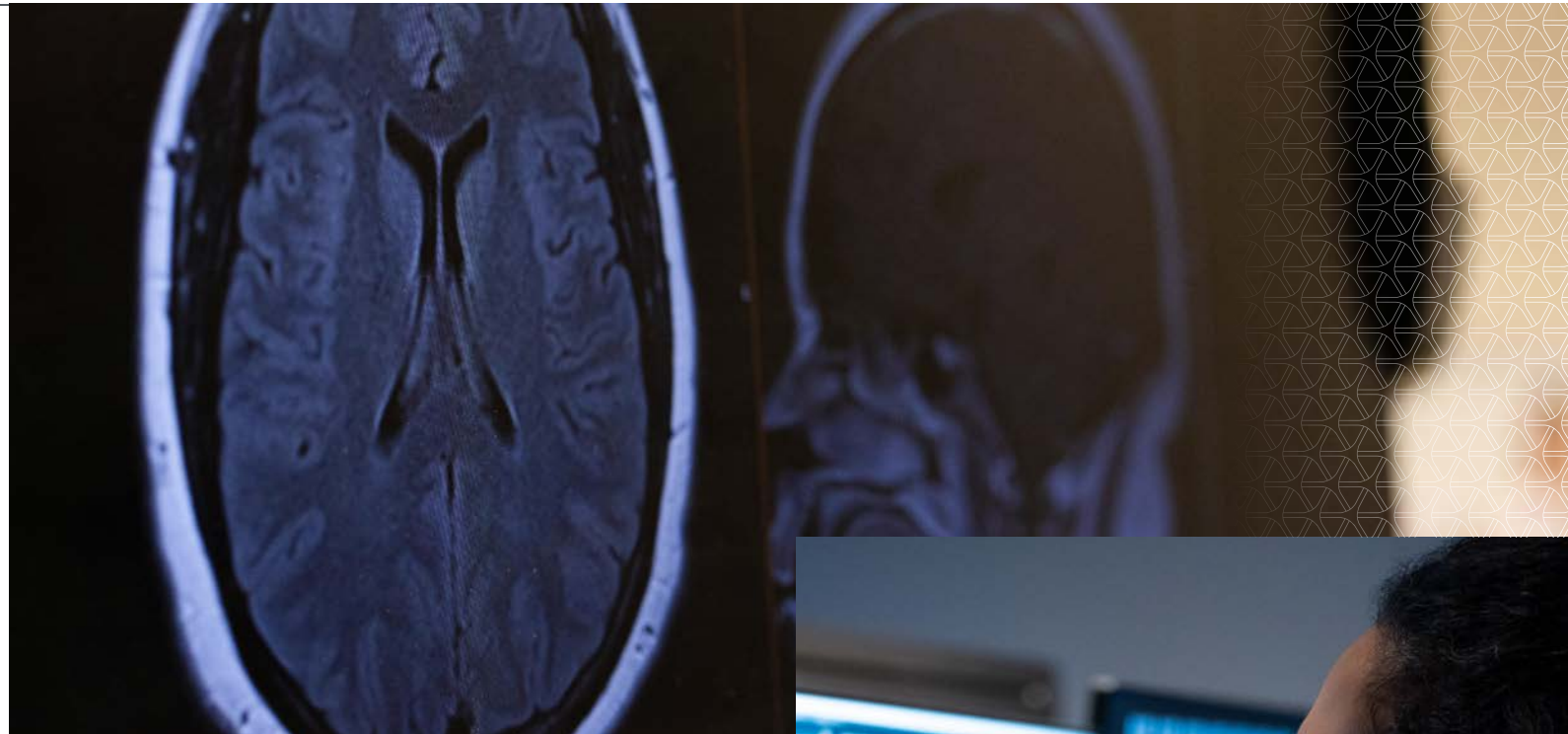
As a member of the Consortium of Multiple Sclerosis Centers (CMSC), the MS and Neuroimmunology Clinic provides the highest quality multidisciplinary care for multiple sclerosis and other central nervous system autoimmune diseases such as Neuromyelitis Optica Spectrum Disorder (NMOSD) and Myelin Oligodendrocyte Glycoprotein Antibody-Associated Disease (MOGAD).

The clinic features an on-site MRI scanner, infusion center, Botox clinic, neurophysiology lab and clinic, vestibular lab, neurosurgery clinic and an MS-trained physical and occupational therapy team. Thanks to these features, we are able to provide a centralized care experience to all of our patients.

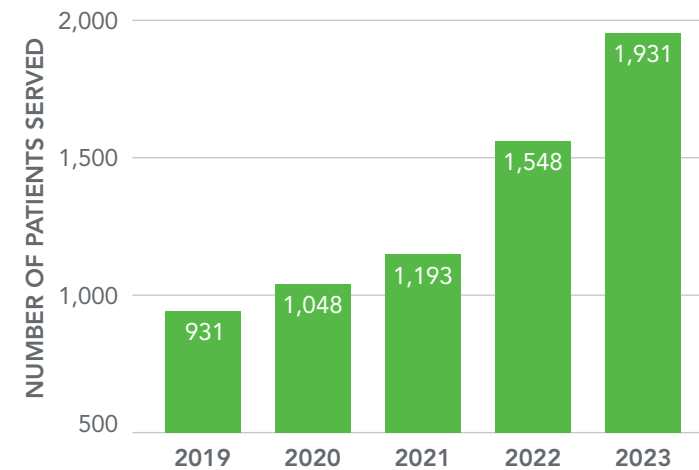
The clinic also works closely with the ProMedica pharmacy team to ensure patients receive get the proper medication safely and promptly.

Support group sessions are also offered to patients. They are run by ProMedica social workers in collaboration with the National MS Society, Ohio Chapter.

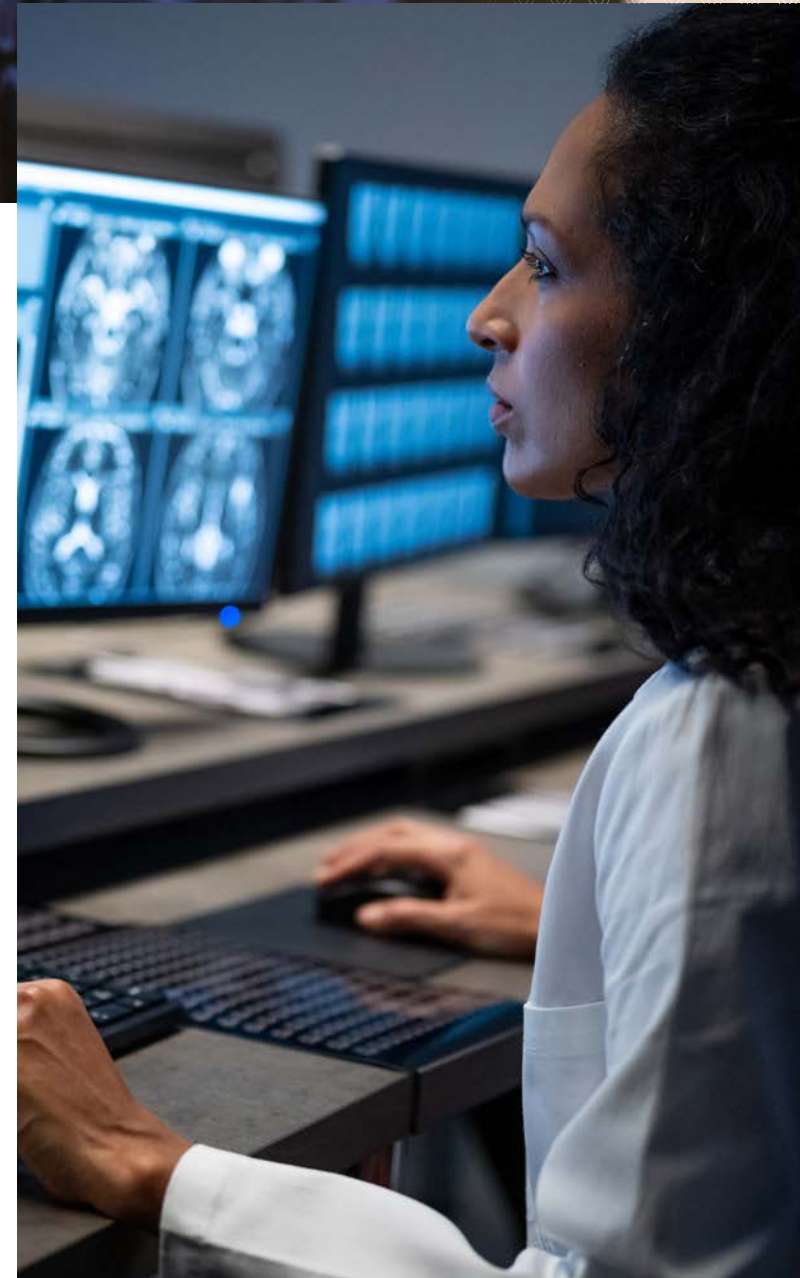
The team is also committed to training medical students and neurology residents by giving lectures/ didactics and educating through grand rounds. During their training, medical students and neurology residents rotate at the clinic frequently, providing the opportunity for them to see a wide variety of MS/ neuroimmunology patients.



MULTIPLE SCLEROSIS



The Multiple Sclerosis and Neuroimmunology Clinic has increased the number of patients served each year since 2019, reaching 1,931 patients in 2023.



Headache Clinic

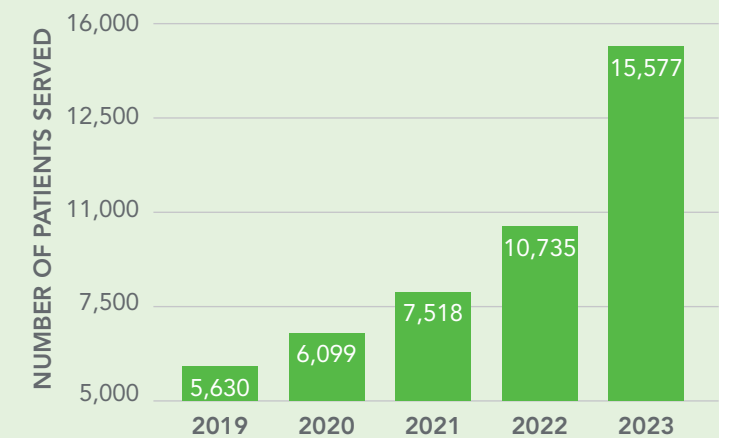
The headache team offers a comprehensive approach to headache evaluation. The team works to diagnose and treat primary and secondary headache disorders, atypical head and facial pain and sees many patients who experience:

- Migraines.
- Tension-type headaches.
- Rare autonomic neuralgias.
- Idiopathic intracranial hypertension.
- Facial, neck and shoulder pain.
- Post traumatic pain.

Additionally, the team of headache specialists helps special patient populations, such as women during pregnancy, who require safe headache management. The team has an extensive knowledge of different headache types and different treatment approaches. These are a few treatment options in which the team specializes:

- Medicines.
- Botox therapy.
- Occipital nerve blocks.
- Neurostimulation devices.

OFFICE VISITS – MIGRAINES AND HEADACHES



Our Headache Clinic has increased patient volumes by over 275% since 2019.

Vestibular

This neurology subspecialty provides comprehensive care for individuals with dizziness, vertigo and imbalance. These common clinical symptoms are often caused by peripheral and central neurological disorders involving the vestibular, oculomotor and cerebellar systems that normally control the perception of motion and stabilizations of gaze and posture. A variety of neurological conditions that may be diagnosed and treated include:

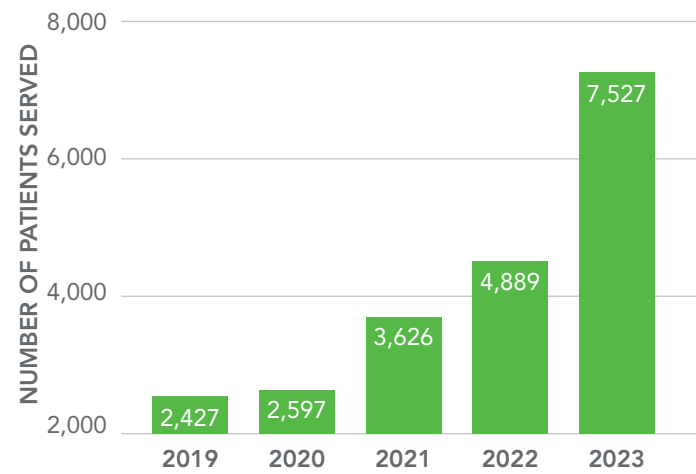
- Benign positional vertigo.
- Peripheral vestibular neuropathies.
- Vestibular migraine.
- Cerebral vascular disease.
- Many central neurodegenerative diseases.

The Vestibular Neurology Program at the Neurosciences Center is the only service of its kind available in northwest Ohio.

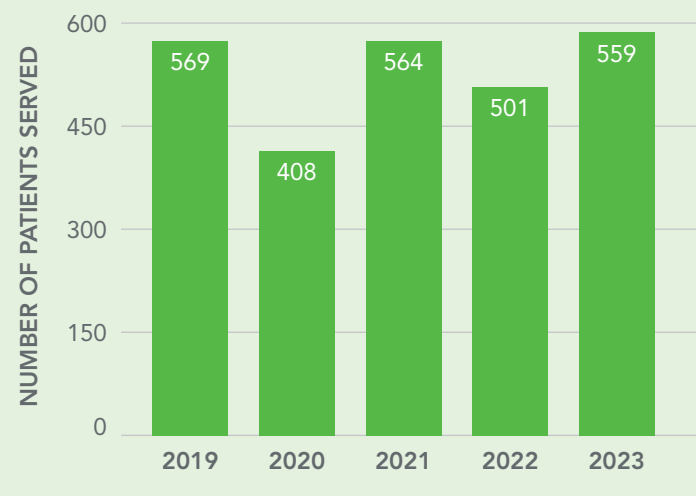
This program includes:

- A dizziness clinic, where patients are treated who experience dizziness and balance issues.
- A vestibular laboratory, where patients receive special testing for their dizziness and balance problems and require:
 - Auditory and Vestibular Evoked Potentials (AEP and cVEMP).
 - Videonystagmogram (VNG).
 - Rotary chair (RC).
 - Computerized dynamic posturography and sensory organization test (CDP-SOT).

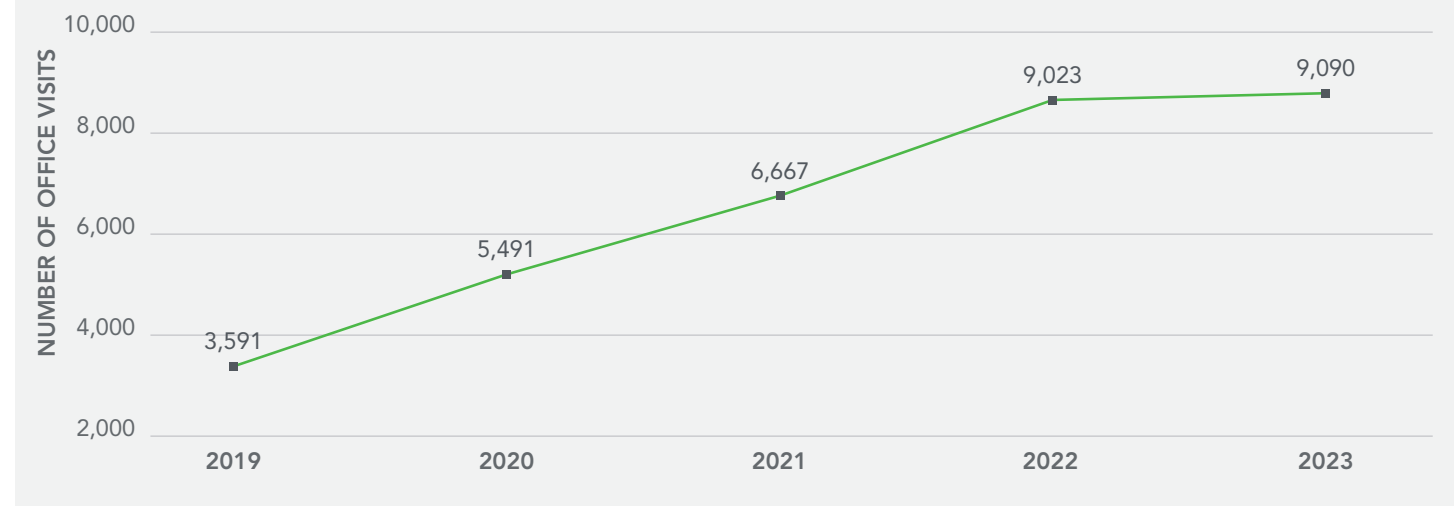
VESTIBULAR OFFICE VISITS



VESTIBULAR TESTS



2023 PEDIATRIC NEURO OFFICE VISITS



Pediatric Neurology

The pediatric neurology team provides comprehensive care for children with a wide range of disabilities. The team works closely with maternal fetal medicine and begins close monitoring before children are born. Housed at the Russell J. Ebeid Hospital, the team provides care within:

- Neonatal ICU.
- Pediatric ICUs.
- Emergency medicine.
- Inpatient services.

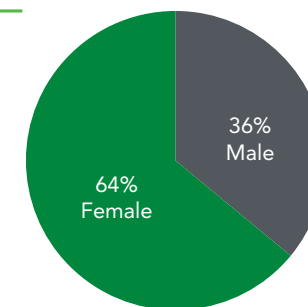
The team treats patients with the following conditions:

- New onset seizures.
- Intractable epilepsies.
- Surgical epilepsies.
- Headache.
- Migraine.
- ADHD.
- Developmental delays.
- Autism.
- Tuberous sclerosis.
- Neurofibromatosis.
- Sturge-Weber syndrome.
- Lennox-Gastaut syndrome.
- Metabolic epilepsy.
- Dravet syndrome.
- Genetic epilepsies.
- Autoimmune conditions like multiple sclerosis (MS), acute disseminated encephalomyelitis (ADEM), Friedreich's ataxia.

Seizures
Average Age

8

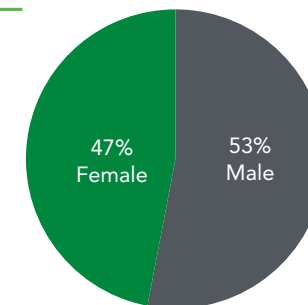
Age range from 0 - 18



Headaches
Average Age

13

Age range from 2 - 18



Services that the pediatric neurology team provides include:

- Outpatient and inpatient video EEG monitoring.
- Imaging from ultrasound, CT scan and MRI of brain and spine.
- Nuclear medicine testing.
- Visual evoked potentials.
- Brainstem auditory evoked potential (BAER).
- Somatosensory evoke potentials.

In 2023, the most commonly treated conditions were seizures and headaches. The average age that seizures presented in patients was age 8, and the average age for headaches was age 13.



Neurosurgery

ProMedica's experienced neurosurgery team brings a long-standing history of quality care and expertise in the diagnosis and surgical treatment of brain and spine conditions. As part of ProMedica Neurosciences Institute, ProMedica Toledo Hospital connects patients to the latest neurosurgery technologies, treatments, resources and experts. The team utilizes the latest navigation technology with tractography to remove brain tumors from eloquent anatomic locations.

Minimally invasive technology is also available to remove blood clots from deep anatomic locations with little to no injury to surrounding brain tissue.

Many of the board-certified neurosurgeons are also fellowship-trained in:

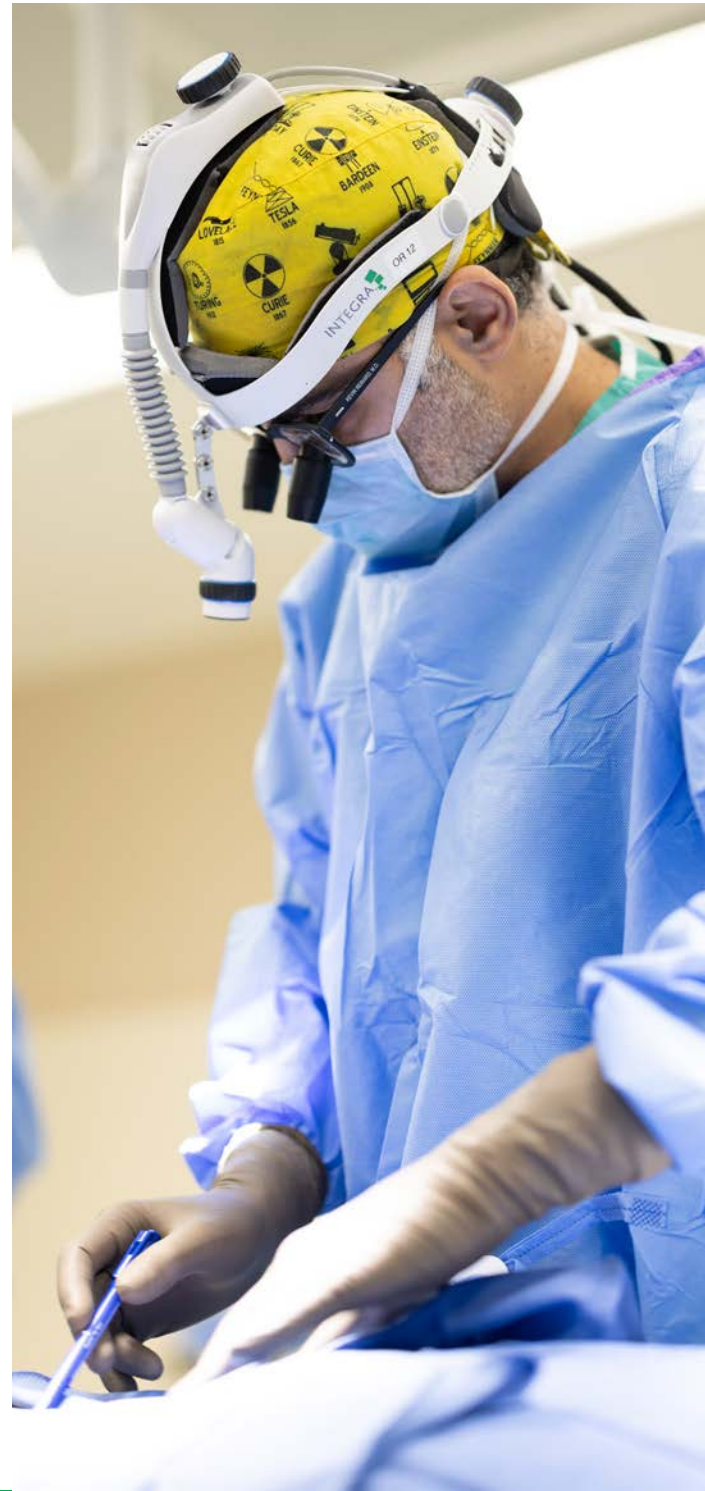
- Cerebrovascular/skull base surgery.
- Neuro-oncology.
- Functional neurosurgery.
- Epilepsy surgery.
- Pediatric neurosurgery.

The Neurosurgery team also utilizes the latest spinal navigation technology to ensure accurate spinal instrumentation and hardware placement. **Electrophysiological and neuro-monitoring is available to the surgeons intra-operatively for real-time neurological monitoring during surgery in order to minimize neurological injury and provide excellent functional outcome.**

Pediatric Neurosurgery

Pediatric neurosurgery is committed to providing exceptional care tailored to the unique needs of its youngest patients. With fellowship-trained pediatric neurosurgeons on staff, the team is adept at treating a range of congenital and acquired conditions such as hydrocephalus, Chiari malformations, brain tumors and spinal conditions. Collaboration with pediatricians, anesthesiologists specialized in pediatrics, and other pediatric subspecialists ensures comprehensive care from diagnosis through to postoperative recovery and rehabilitation.

By capitalizing on advanced technologies, multidisciplinary collaboration and specialized training, ProMedica's neurosurgery department aims to remain at the forefront of spinal, skull base and pediatric neurosurgical care. Children with all types of neurological disorders are evaluated in this facility, with testing available on site.



Spine Clinic

When patients don't know where to turn for spine pain, getting the right help can feel overwhelming. ProMedica Spine Clinic is available to test, diagnose and recommend treatment to help ease pain.

With clinics in Toledo at the ProMedica Neurosciences Center and in Perrysburg at Levis Commons, patients can find spine care close to home.

Assessments are open to anyone who is having back or neck pain, and:

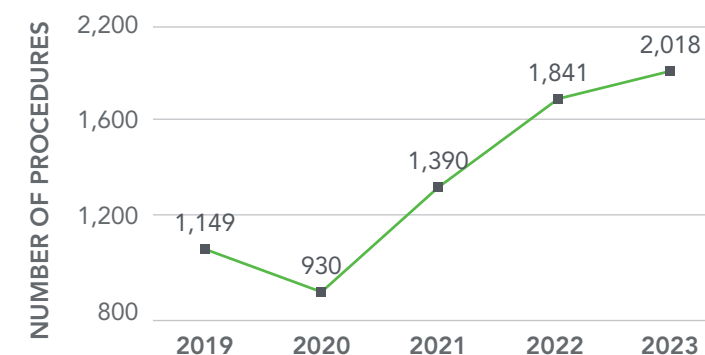
- No referrals are needed and no prior work-up or testing is necessary.
- Patients with old or new injuries in any pain level are welcome.
- Patients who are already being treated or want a second opinion are welcome.

At the ProMedica Spine Clinic, patients receive prompt access to a convenient, comprehensive evaluation of their back, neck pain or spine pain. The Spine Clinic team of specialty-trained nurse practitioners may order and interpret appropriate diagnostic studies (e.g., X-rays, MRI, CT, EMGs) to begin a customized care plan. The team will then recommend a comprehensive, focused spine treatment plan, choosing from a variety of conservative and surgical options, depending on the patient's needs. The team then refers the patient to experts to begin the course of treatment.

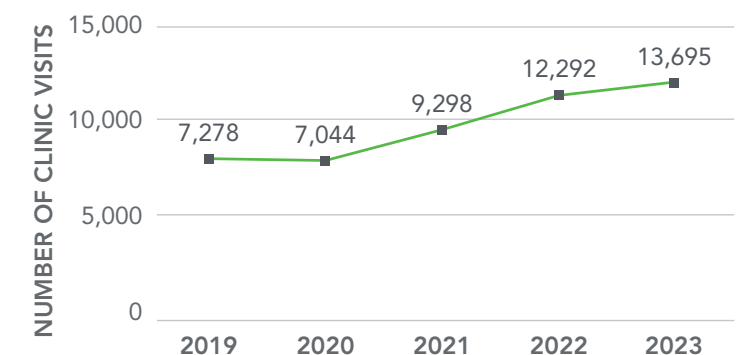
Symptoms and Treatments

- Discectomy.
- Disc replacement.
- Kyphoplasty.
- Laminectomy.
- Minimally invasive spine surgery.
- Robotic spine surgery.
- Sacroiliac (SI) Joint Fusion.
- Spinal cord stimulation.
- Spinal fusion.
- Spinal reconstruction.
- Vertebroplasty.
- Spinal deformities.
- Scoliosis.
- Kyphosis.
- Cervical and lumbar disc herniations.
- Traumatic spinal fractures.
- Chiari malformations.
- Nerve injuries and nerve tumors.
- Radiculopathy.
- Spinal stenosis.
- Cervical dystonia.
- Sacroiliac joint pain.
- Spondylolisthesis.
- Trigeminal neuralgia.
- Spinal infections.

SPINAL PROCEDURES



NEUROSURGERY CLINIC VISITS





Neuromuscular

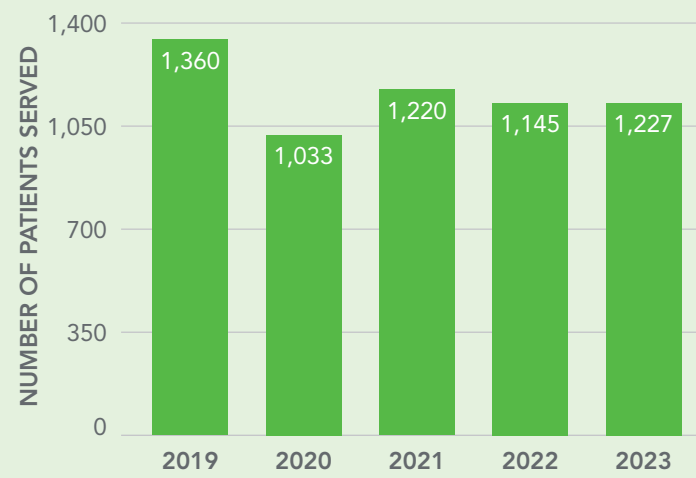
Board-certified, fellowship-trained neuromuscular subspecialists treat patients with rare, complicated conditions that are difficult to diagnose, as well as all major categories of neuromuscular disorders, which include:

- Muscular dystrophy.
- Inflammatory muscle disease.
- Amyotrophic lateral sclerosis (ALS).
- Peripheral neuropathy and myasthenia gravis.

The neuromuscular team provides an electromyography (EMG) laboratory staffed by experienced and board-certified EMG technologists. Other diagnostic procedures relevant to this field include:

- Nerve, muscle and skin biopsy.
- Genetic testing.
- Nerve and muscle imaging.
- Immunologic testing.
- Therapeutic modalities.
- Pharmacologic therapies.
- Immunomodulatory therapies (immunosuppressive drugs, plasmapheresis, and IVIg).
- Rehabilitation of neuromuscular disorders.

ELECTROMYOGRAPHY (EMG)



The neuromuscular team of specialists treats patients with neuromuscular disorders who qualify for the following outpatient therapies, all available within the Neurosciences Center:

- Physical.
- Occupational.
- Speech.

The neuromuscular team is actively involved in education of neurology residents and medical students. In addition to giving lectures on various neuromuscular topics at the University of Toledo Medical College and affiliated hospitals, the division provides comprehensive training in EMG and nerve conduction studies for neurology residents during a one-month rotation. It is also possible for residents from other interested specialties to arrange a rotation in the EMG laboratory.

Neurology Sleep Clinic

The Neurology Sleep Clinic is part of a broader neurology practice. Patients experiencing sleep disorders paired with other neurological problems receive a comprehensive and integrated care within one office. ProMedica's on-site continuous positive airway pressure (CPAP) data download facility works in collaboration with the University of Toledo Medical Center Sleep Clinic. Facilities for various types of sleep studies are easily available at multiple ProMedica sleep labs located across northwest Ohio and southeast Michigan.

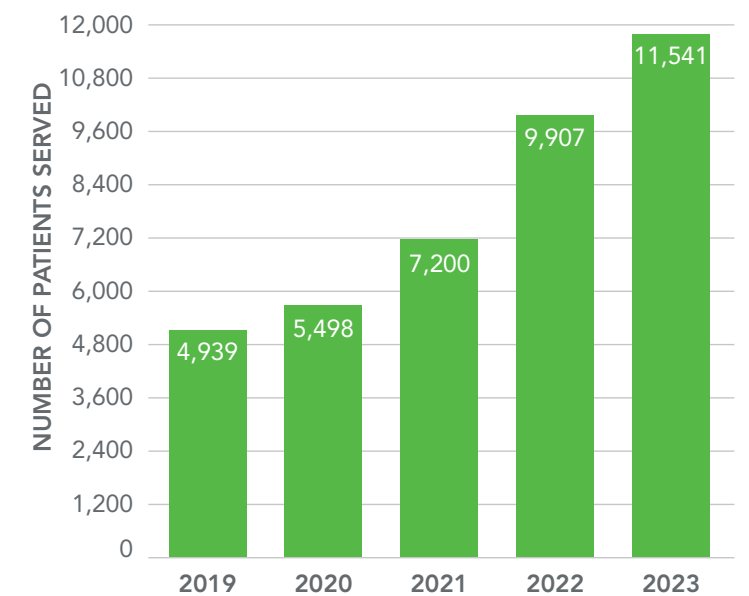
The Neurology Sleep Clinic caters to patients with common sleep disorders such as:

- Sleep apnea.
- Excessive daytime sleepiness.
- Restless leg syndrome.
- Insomnia.

The Sleep Clinic specifically treats patients who suffer from sleep problems that may contribute to, or result from, other neurological disorders, which include:

- Stroke.
- Headaches.
- Epilepsy.
- Dementia.
- Parkinson's disease.

SLEEP



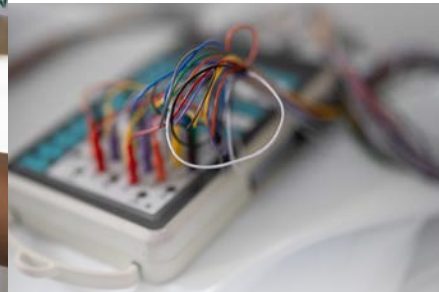
Patient visits to the Neurology Sleep Clinic have increased at a steady rate over the past five years.

Neurocritical Care

With the opening of ProMedica's Generations Tower in 2019, stroke patients and families have access to private, updated rooms with nursing staff specifically trained in caring for people with complex neurologic conditions. Specialists collaborate to provide dedicated care in the neurological intensive care unit to critically ill patients with primary neurological emergencies, and to patients with other organ system failure that has been complicated by neurological failure.

Some of the technology available within Neurocritical Care is:

- 24-hour continuous and quantitative electroencephalography (EEG).
- Pupillometry.
- Various ultrasound modalities.
- Invasive intracranial pressure monitoring devices.
- 24-hour advanced invasive and non-invasive neuroimaging.
- 16-bed neuro intensive care units.
- Portable CT scanner.
- New neuro-interventional lab.
- 24-hour MRI service.



The neurocritical care team consists of:

- Neurology and neurocritical care fellowship-trained neurointensivists.
- Board-certified neurointensivists trained in neurology and neurocritical care.
- Neurocritical care board-certified stroke and endovascular physicians.
- Neurocritical care board-certified anesthesia critical care physicians. Neurology and neurocritical care fellowship-trained physicians.
- Board-certified neurointensivists from a broad range of medical backgrounds.



Brain Tumors

The Brain Tumor team offers a full spectrum of treatment, including:

- Resection of brain tumors, both primary tumors and metastatic lesions.
- Collaboration with the oncology service line to ensure patients receive the latest treatment options, including novel therapeutics and access to clinical trials.
- A radiation oncologist who utilizes the latest technology for focused radiation, which allows for the targeting of lesions or tumors in inoperable locations.
- Intracarotid sodium amobarbital procedure (Wada testing).
- The latest tractography technology, enabling brain surgeons to map critical pathways in the brain, allowing for the removal of tumors in eloquent areas of the brain.
- Endoscopic surgery that allows for the removal of tumors in speech and motor command centers while the patient is awake and fully interactive on the operating room table.
- Protocols that have been developed with the anesthesia team, allowing for safe performance of awake craniotomies for tumor resection.

- BrightMatter™. This innovative solution combines advanced imaging, planning, navigation and robotics to assist surgeons with complex brain and spine surgeries.
- Functional magnetic resonance imaging (fMRI).





Total Rehab Neurology Therapy

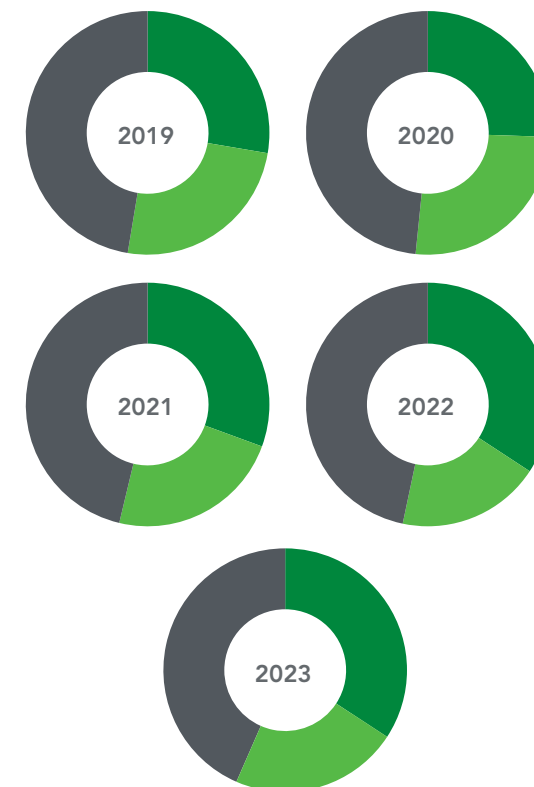
Total Rehab Neurology provides comprehensive treatment for patients who have been diagnosed with neurological diseases and disorders. Specialists provide 1:1 patient care for 60 minutes, for each ordered discipline. The neurology therapy site offers occupational, physical and speech therapies. Each therapist holds additional trainings and/or certifications in order to operate specialized equipment, including:

- Ekso Bionics EksoNR Robotic Exoskeleton for gait training.
- Arjo Maxi Sky Ceiling Lift, which is used for patients who are non-weight bearing.
- Universal Mobility Coach system to aid with transitional movements.
- The Dynavision board for visual and scanning impairments.
- Ekso Bionics EksoUE for upper extremity weakness.

In addition to its equipment, the Total Rehab Neurology staff holds many years of neurological experience and is trained and certified to provide diverse, specialized programs and treatment. These include:

- Balance and dizziness program (vestibular rehab).
- Augmentative and alternative communication (AAC) intervention.
- Swallowing, cognitive rehab and language (aphasia) treatment.
- PROMPT (PROMPTs for Restructuring Oral Muscular Phonetic Targets) intervention for motor speech disorders (apraxia) using tactile cueing.
- Stuttering intervention.
- Parkinson's care, specifically LSVT LOUD (speech therapy) and LSVT BIG (PT/OT).
- Visual Perceptual retaining.
- Intervention for COVID long hauler symptoms.
- Saebo orthoses certification/training.

THERAPY VISITS



	2019	2020	2021	2022	2023
Physical	2,945	2,527	2,939	2,784	2,706
Speech	1,720	1,333	1,944	2,041	2,211
Occupational	1,551	1,362	1,471	1,138	1,275
Total	6,216	5,222	6,354	5,963	6,192

■ Physical ■ Speech ■ Occupational



Residency/Fellowship

ProMedica offers neurology residency to five residents in each of its four-year programs. These 20 residents are actively involved in the research that contributes to the posters, abstracts and publications:

Academic Year '22 – '23

- Abstracts/poster presentations: 58
- Book chapters: 1

Fellowships

- Movement disorders: 1 fellow per year
- Neurophysiology: 1 fellow
- Vascular: 2 fellows per year
- Neuro intervention: 2 fellows per year

35 Peer Reviewed Publications

Educational Opportunities

Cerebrovascular Case Conference

The weekly neurovascular case conference is a multidisciplinary review of complex cerebrovascular cases, as well as a review of evidence-based medicine and research behind treatment decisions.

Grand Rounds is a weekly conference presented by both local and national speakers. It provides CME credit and covers various neurology topics including cutting-edge research, basic science topics and women and diversity in the subspecialty of neurology.

Neurology Clinical Conference

Friday clinical case conference identifies rapid change in all neurologic subspecialty practices. It requires physicians to be current on disease processes that they may encounter during routine practice, but are managed more frequently by neurologists in a different subspecialty. The approach to challenging cases in different subspecialties is discussed; evidence-based and cost-effective patient care are also provided. This format of presentation is a live faculty-led case discussion with Q&A that will best enable experts to address the professional practice gaps.

Epilepsy Case Conference

EEG faculty and a CNP fellow attend and present interesting cases. Educationally, the goals are to not only figure the best pre-surgical testing (invasive EEG, imaging and neuropsychological testing) that best suits a patient, but to improve:

- Identification of epilepsy patients who may potentially benefit from epilepsy surgery.
- Pre-surgical testing and surgical management of epilepsy.
- Surgical treatment of epilepsy, which is now a standard form of treatment intended to instill skills for identifying epilepsy patients who may potentially benefit from epilepsy surgery.

Journal Club

The neurology journal club supports resident growth in the area of practice-based learning and improvement. This core competency requires residents to demonstrate the ability to:

- Investigate and evaluate their care of patients.
- Appraise and assimilate scientific evidence.
- Continuously improve patient care based on constant self-evaluation and lifelong learning.



Each journal club is led by an attending physician who selects two articles along with two resident presenters. Residents present their summary of an assigned article, outlining the key findings and methods. Presentations are followed by audience participation in a discussion, to include faculty, residents, fellows, medical students and staff.

Research Studies

ProMedica Neurosciences is committed to participating in cutting edge clinical research allowing patients access to treatments options otherwise not available. The Stroke Program has consistently been a top enroller in large international clinical research trials for improving stroke care. From treatment to recovery, we are committed to enhancing treatment options for neurologic patients through clinical research.

Cerebrovascular research studies: 18

Parkinson's disease research studies: 7

Epilepsy research studies: 3

Huntington's disease research studies: 3



Social Worker

The Neurosciences Center offers an on-site social worker, who provides overall support and guidance to the center's staff in meeting patient needs and addressing patient barriers related to transportation, medication, insurance, housing, utilities and other supportive services and resources. The social worker provides:

- Support to patients and caregivers who present with distress and need support and assistance in the home.
- Education on Medicaid/Medicare.
- Long-term care planning.
- Veterans assistance.
- In-person, brief, mental health support and risk assessment.
- Crisis intervention and referrals.
- Assessment and reporting of suspected abuse or neglect of children, aging population and those with developmental disabilities.
- Assistance in maintaining Bureau of Medical Handicap Services.
- Guidance in patient paperwork completion, as appropriate.
- Follow-up to support engagement of referrals.
- Development, implementation and facilitation of patient support groups.
- Networking with community providers and resources to build relationships.
- Resource base to assist in meeting patient needs.

Neurology Care Navigator

Neurology care navigators work with the patient to provide seamless care throughout the health care journey by creating and meeting health care goals, organizing health care services and guiding patients through the health care system. By teaching the patient self-care, a care navigator builds patient confidence, therefore increasing their ability to navigate the health care system and lower chances of stroke, hospitalization and ER visits. The care navigator manages a patient's health condition by:

- Guiding the patient through treatment plans and medication regimens.
- Focusing on preventative health needs.
- Reducing avoidable emergency room visits and hospitalizations.
- Minimizing unnecessary expenses related to patient care.

Neurology care navigators review the *After Visit Summary* to ensure patients:

- Take their medications.
- Receive the proper follow-up appointments and arrangements for home care.
- Attend outpatient therapies or testing as ordered.
- Follow activity restrictions.

Neurology care navigator provides education on:

- Stroke symptoms.
- Medications.
- Smoking cessation.
- Modifiable and non-modifiable risk factors of stroke.
- The importance of a healthy diet, exercise and monitoring of blood pressures and blood sugars and fall prevention.

Neurology care navigator addresses any issues with:

- Depression.
- Transportation limitations.
- Financial concerns for housing, utilities, medications, insurance and food insecurities.



Support Groups

The ProMedica Neurosciences Institute offers monthly support groups for patients and their families. Monthly stroke support groups create an opportunity for stroke survivors, caregivers and families to share their experiences with one another, receive guidance from clinical stroke specialists and connect with community resources.

Support groups include:

- Adult chronic illness.
- Stroke.
- Multiple Sclerosis.



ACADEMIC AFFILIATION



**COLLEGE OF MEDICINE
AND LIFE SCIENCES**
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