2019 **NEUROSCIENCE** annual report *Aurora Health Care*®



table of contents

4 Neuroscience Overview

> **6** Neuro-Oncology

8 Movement Disorders

> **10** Concussion

> > **11** Epilepsy

12 Multiple Sclerosis

14 Neuro Ophthalmology

> **15** Spine

16 Neuropsychology

17 Neuro Critical Care

18 Neurological Disorders

20 Stroke and Cerebrovascular

> **24** Faculty Listing



NEUROSCIENCE SERVICE LINE

Aurora Neurosciences Innovation Institute

All of the available health care intelligence and predictive analytics suggest that many service lines are in a phase of contraction, while neuroscience represents double-digit growth opportunities. However, the same data sources clearly articulate the barriers to such growth being integration, technology enablement, complexity, and multidisciplinary service models. Aurora Health Care noted these barriers and committed to developing an unprecedented tech-enabled goods and services model. Aurora took the risk upon them and put the patient-physician relationship at the epicenter, leading to the creation and development of the Neuroscience Service Line and establishment of the Aurora Neuroscience Innovation Institute (ANII).

In response to the changing healthcare marketplace, ANII recognizes the need to remove the delivery silos of care. ANII set the goal of turning the patient into the primary stakeholder, establishing scope-constraint by enhancing patient ownership and

"Our difference isn't just our innovations, but our multidisciplinary teams working together to develop a comprehensive plan specifically designed just for you. This includes a collaborative group of caregivers committed to providing precision medicine that is adapted specifically for your unique needs."

making sure the right team member was providing the right care at the right time. This required breaking down silos, removing some of the encumbrances inherent in health care.

Like other medical disciplines, neuroscience is moving toward a performance-based market demanding increased specialization, which translates to patients often requiring multiple providers to meet their care needs. This market environment is driving the need for highly integrated systems of care where multi-disciplinary delivery models are reguired to deliver on guality, cost,

and risk-based metrics.

As organizations are now trying to formulate their concepts of clinical service lines. Aurora has made the successful transformation and is leading the way nationally in integrating the neurosciences health care delivery and is embodying the principle of the patient as the primary shareholder in a meritocratic-based delivery system. We look forward to cross-institutional partnerships where we collectively have to deliver care in a combined goods and services model that functions and thrives in the new realities while staying true to the core mission.

Awards and Recognitions









WISCONSIN COVERDELL STROKE PROGRAM







NEUROSCIENCE



Hospital Activity



NEUROIMAGING



■2016 **■**2017 **■**2018

BRAIN TUMORS AND NEURO-ONCOLOGY

A distinctive feature of the Aurora Neuroscience program is the truly multidisciplinary approach to brain tumor management used at every stage of treatment and diagnosis. We treat our patients as members of the care team, keeping them actively involved in all decision-making to ensure all questions and concerns are evaluated and taken into account.

Complex access and treatment algorithms have been developed to ensure that all patients, rimary and metastatic, are reviewed and considered by the Neuro-Oncology tumor conference team with comprehensive development of care plans. Through innovative approaches to care, the management of brain tumors at Aurora Health Care has evolved beyond just length of life, and has become fully invested in a patient's quality of life. We offer the best of the proven current treatment available today, while bringing the next generation of innovative chemo and surgical treatment applications to our commitment to precision medicine with innovative techniques that adapt to the individual patient.

EXPANDED ENDONASAL APPROACH (EEA)

The Expanded Endonasal Approach allows access to skull base tumors minimizing the complications that can be seen with open skull base surgery, which include infections associated with large scalp incisions and the side effects seen with brain retraction. Many patients undergoing EEA spend only one to two days in the hospital, and recovery time at home can be much shorter than for open skull base surgery.

MINIMALLY INVASIVE ROBOTIC TECHNIQUES

Deep brain tumors (subcortical),

areas of bleeding, and cysts that were once considered too risky to operate on by many are now often removed through a precise and patient-specific corridor with our unique, integrated surgical techniques. This minimally invasive technique offers patients hope for better surgical results, as well as improved long-term health outcomes. It also allows our patients to reach the goal of zero footprint, or no long-term complications as a result of their tumor or surgery.

MAPPING

An invaluable tool for Aurora's neurosurgeons, brain mapping depicts aspects of a tumor and surrounding healthy tissue with enhanced clarity rendered in a three-dimensional space. This imaging technology allows surgeons to preplan a patient-specific, real-time surgical pathway before a brain surgery procedure even begins—which translates into



Brain Tumor Distribution

2019 ESTIMATES

Brain and other nervous system

Source. American cancer society cancer statistics ceri

improved outcomes in the operating room and a faster recovery.

DYNAMIC NAVIGATION

Neurosurgeons use a GPS-like system that gives them real-time guidance deep within the brain.

High-definition optics allow neurosurgeons to differentiate tissue types with unprecedented clarity from above the surgical site. Being able to separate diseased tissue from healthy tissue makes it possible to successfully remove what would otherwise be considered inaccessible brain tumors, cysts or other growths difficult to see.

AUTOMATED RESECTION

Using a tool about the size of a pencil, neurosurgeons are able to remove tissue without injury to adjacent healthy brain matter.

This technique is another reason Aurora can offer treatment options for conditions, such as brain tumors, that were previously deemed too risky by many.

23,880 New cases

16,830

DIRECTED THERAPY OPTIONS

Neurosurgeons collect and preserve the brain tissue they remove in a sterile, closed-capture device for pathology, molecular, and genetic evaluation. These samples provide opportunities to develop personalized treatment regimens for every patient. This is a critical step in advancing treatment paradigms. The ability to capture, grow, and implant the tumor tissue into mice enables the team to study and develop new targets for treatment that are brought directly back to the patient in an individualized manner, epitomizing our commitment to precision medicine.

SURGICAL PROCEDURES

1,840 New cases

1,440 Deaths



"Aurora has performed more optical robotic brain surgery than anywhere in the world to date and was the first in the world to deploy a unique 3D brain mapping platform for patient care."

BRAIN TUMORS





Movement Disorders

Parkinson's disease may be part of your life, but it shouldn't define it. Eating breakfast. Writing your grocery list. Walking to the car. Driving to the store. Most of us do these activities without a second thought. But for a person with a movement disorder like Parkinson's disease, these simple things can be challenging—or even dangerous.

Parkinson's disease is a brain disorder that leads to shaking (tremors) and difficulty with walking, movement, and coordination. While there is no cure, treatments can reduce the symptoms and improve your quality of life. Diagnosing Parkinson's disease can be difficult, particularly in the early stages of the disease. Our team uses neurological exams, SPECT scans, and MRI to assist in diagnosis.



EASY STREET

Easy Street is a one-of-a-kind therapy environment and facility that provides a variety of real-world experiences to aid in the recovery of our patients, specifically those suffering from neurological and movement disorders. This facility includes a grocery store, barber shop, movie theater, bus, driving range, and apartments so our patients have a unique opportunity to be challenged both mentally and physically over curbs, ramps, and uneven surfaces before they face those obstacles in the communities we serve.

Easy Street allows for a truly multidisciplinary approach to care by creating an environment where physician, therapist, and other medical professionals come together to focus on one priority, helping your patient regain their highest functional level and re-enter the community.

PARKINSON'S SUPPORT

• Evidence-based exercise pro-

gram that follows an intensive

Big and Loud Clinic®

and specific protocol to provide maximal results

- Specialized treatment from certified therapists for Parkinson's disease
- This treatment has been linked with better outcomes compared to traditional therapy
- Patients learn how to move BIG and speak LOUD on a consistent basis
- Recalibrates the senses for automatic use of normal movement and voice
- Uses high effort and intensive treatment to improve everyday function

PD SELF SEMINAR

PD SELF is an eight-module course designed to help those recently diagnosed with Parkinson's disease and their care partners better manage living with the disease. The program uses the principle of self-efficacy, which is "the belief that we can achieve influence over the conditions that affect our lives."

The eight-session curriculum includes a series of learning lectures on various Parkinson's-specific topics, such as symptoms, exercise, and medication. It also focuses heavily on small-group interactions to share ideas and feedback for disease management and overcoming challenges. Finally, there is a large emphasis on goal setting throughout the program, empowering the participants to continually seek out and achieve reasonable goals.

FUNCTIONAL NEUROSURGERY

Aurora Health Care launched our functional neurosurgery program with capabilities in both epilepsy and movement disorders surgery led by a specialist from one of the best functional training programs in the country. Our program focuses to not only surgically treat epilepsy and movement disorder patients (Parkinson's disease, essential tremor, dystonia, etc.) who have exhausted other options, but also do it in a manner that has the highest level of safety with the least invasive approach, including laser ablation for epilepsy and asleep deep brain stimulator (DBS) placement.

Aurora performs nearly **7,000** baseline concussion tests to student athletes throughout the state of WI annually.

There are between an estimated **1.6** and **3.8 million** sports-related concussions in the U.S. every year, leading the CDC to conclude that sports concussions have reached an epidemic level.

CONCUSSION

According to the Centers for Disease Control (CDC), an estimated 300,000 people under the age of 19 are treated in hospital emergency rooms for concussions related to sports and recreation activities every year. This number is doubled over reports 10 years prior, due in large part to the increased focus on the identification of and need for immediate treatment for concussion. This is good news, considering 90% of most diagnosed concussions do not involve a loss of consciousness (LOC). Prior to recent awareness, this lack of LOC led many parents and coaches to brush off any substantial hits or collisions as requiring medical attention.

Aurora takes concussion care seriously and has been a proven leader in concussion assessment, treatment, education and prevention. Aurora is the top employer of athletic trainers in the state of Wisconsin. By providing these front-line prevention resources, Aurora's athletic trainers ensure baseline tests are administered properly, contact techniques are being safely instructed, and student athletes and parents are appropriately educated to assure that all safeguard elements are in place for all high-risk activities.

In the event of a head injury, athletic trainers have certification and state licensure that assures evidence-based practice of proper concussion management. Over 70 Aurora athletic trainers across the state provide on-field assessment using researched protocols and follow the National Athletic Trainers Association position statement on management of sport concussion.

Aurora's athletic trainers work with a complete team of dedicated health professionals, including pediatricians, orthopedic surgeons, neuropsychologists, neurologists, family practice physicians, and physical therapists to reassure proper return to play.

CONCUSSION VISITS



·····EPILEPSY





According to the Epilepsy Foundation, epilepsy is the 4th most common neurological condition. Every year, 48 new people of every 100,000 will be diagnosed with epilepsy, which means that 1 in every 26 people will develop epilepsy sometime throughout their life. Current statistics show that in the United States, there are roughly 2.2 million people diagnosed with and being treated for epilepsy and seizures.

At Aurora, a seizure evaluation consists of a detailed discussion of your symptoms, a comprehensive neurologic examination and diagnostic testing. Basic testing includes an EEG, or brainwave test, to see if we can capture a seizure or see footprints of seizure activity. We may also get an MRI of your brain to see if there is an abnormality or malformation that can cause seizures. Our expert neurologists can help you manage these debilitating occurrences— regardless of their source—so you can lead an independent, productive life. We'll start by determining whether you have generalized-onset or partial-onset seizures and then develop a seizure treatment and management plan that's right for you.

EPILEPSY MONITORING UNIT

Patients whose seizures can't be controlled with medications and those who may be candidates for epilepsy surgery are often scheduled for long-term epilepsy monitoring in one of our Epilepsy Monitoring Units. Information from the study is used to determine if surgery is a viable treatment or if other options should be considered.



DIAGNOSTICS

ABRET LAB ACCREDITATION

The Laboratory Accreditation Board of ABRET has granted the EEG Laboratory at Aurora St. Luke's Medical Center a five-year accreditation. This award is based on an evaluation of the technical quality of the EEGs performed in this lab and on a review of specific policies from the Policy and Procedure Manual. The lab has been commended on their desire to promote excellence and competency in the department which has had a positive influence. There are only 181 accredited labs in the country and Aurora has five of them .

MULTIPLE SCLEROSIS

Multiple sclerosis is an unpredictable, often disabling disease of the central nervous system that disrupts the flow of information within the brain, and between the brain and body. Symptoms vary from person to person and range from numbness and tingling, to walking difficulties, fatigue, dizziness, pain, depression, blindness and paralysis. The progress, severity and specific symptoms of MS in any one person cannot vet be predicted, but advances in research and treatment are leading to better understanding and moving us closer to a world free of MS. Most people with MS are diagnosed between the ages of 20 and 50, with at least two to three times more women than men being diagnosed with the disease. MS affects more than 2.3 million worldwide.

Genetic factors and exposure to certain viruses are thought to be involved in the development of multiple sclerosis. No two people have the exact same effects, which can make diagnosing MS difficult at times.

Aurora's expert neurologists work with patients to determine the best way to slow or stop the destruction of the nerves' protective coating. The right treatment can significantly reduce symptoms and prevent them from becoming disabling. We'll help you cope by giving you access to the latest in MS research and treatment options.





National Multiple Sclerosis Society

AURORA HEALTH CARE SYSTEM RECOGNIZED AS A CENTER FOR COMPREHENSIVE MS CARE BY THE NATIONAL MULTIPLE SCLEROSIS SOCIETY



Patient Distribution

- Multiple Sclerosis
- Spinal Cord Disease
- Demyelinating Disease
- Acute Myelitis
- Neuromyelitis Optica



MS Outpatient Visits

Collaboration with:

- Neurology
- Neuropsychology
- Occupational Therapy
- Physical Therapy
- Speech and Language Pathology

We believe in comprehensive care that treats the whole patient, including your spiritual, physical, and emotional medical needs. In addition, we can help you manage symptoms like cognitive deficits, swallowing and speech issues, bladder or bowel difficulties, spasticity, fatigue, depression, stress, tremors, and weakness.

PROVIDING LEADERSHIP IN MS CARE

Aurora Health Care System is a leading provider of care for people living with MS and has been officially recognized as a Center for Comprehensive MS Care through the National Multiple Sclerosis Society's Partners in MS Care program. This formal recognition honors our commitment to providing exceptional, coordinated MS care and a continuing partnership with the Society to address the challenges of people affected by MS.

The Society's Partners in MS Care program recognizes committed providers whose practices support the Society's initiative of affordable access to high quality MS healthcare for everyone living with MS – regardless of geography, disease progression, and other disparities.

"We are so proud to partner with Aurora Health Care System to enhance coordinated, comprehensive care for the people who live with MS in the greater Milwaukee and Waukesha metropolitan area," said Wisconsin Market President, Colleen Kalt. "Aurora Health Care System has demonstrated extraordinary leadership in MS care, making a tremendous impact on people affected by MS in our community," Colleen Kalt continued.



NEURO-OPHTHALMOLOGY

American Academy of Ophthalmology Achievement Award physician department that specializes in neurosurgical and orbital disorders.

Our neuro-ophthalmology services provide patients with the best medical evaluation available by thoroughly discussing options to make the best possible treatment decisions to achieve health care goals and quality of life.

Our team treats the full spectrum of oculoplastic and neuro-ophthalmic disorders including surgery for eyelid abnormalities and skin cancers, eye socket tumors, reconstruction, and treatments for tearing or dry eye problems.

CONDITIONS TREATED INCLUDE:

- Anisocoria
- Anterior Ischemic Optic Neuropathy (AION)
- Double Vision
- Drusen
- Eyelid Myokymia
- Hemifacial Spasm
- Horner Syndrome
- Homonymous Hemianopia
- Idiopathic Intracranial Hypertension
- Microvascular Cranial Nerve Palsy
- Migraine
- Myasthenia Gravis
- Optic Nerve Sheath Meningioma
- Optic Neuritis
- Photophobia
- Pituitary Tumor
- Progressive Supranuclear Palsy
- Tearing
- Thyroid Eye Disease
- Transient Visual Loss

PATIENT DISTRIBUTION



- Eyelid Lesion
- Lid Reconstruction
- Levator Muscle Repair
- Orbitalcranial
- Lacrimal Surgery
- Lacrimal Surgery

Treatments for neuroophthalmic disorders include:

- Eye muscle surgery
- Optic nerve fenestration
- BOTOX[®] for eyelid spasms
- Eyelid surgery

Partnering with neurosurgeons and otolaryngologists, our **neuro-ophthalmology specialists** treat neurosurgical/ orbital disorders that require a multidisciplinary approach



SPINE

COMPLETE MANAGEMENT FOR SPINE CONDITIONS

In most cases, back pain can be managed conservatively and without surgery. The Aurora Spine Program provides treatments that will help provide a solution to back pain and get patients back to an active life.

With one call you'll be connected to our team of experts led by a spine nurse navigator that guides patients through every step of the diagnosis and treatment process.

Aurora Spine is part of an integrated health system that treats not just the spine, but the patient as a whole person. Combining medical history, lifestyle, and patient desire, we seek treatment options that work best for each individual patient.

80000

Treatment options might include the following:

- Physical therapy
- Spine surgery
- Pain management
- Integrative therapy
- Chiropractic

Four out of every five Americans struggle with neck or back pain due to an accident, injury, or just everyday wear and tear. This is pain that often makes it hard to enjoy work and hobbies.

Aurora spine care is a comprehensive approach for a full range of spinal conditions, including injuries, degenerative conditions, spinal fractures, and tumors.

We offer the most advanced spine care available for back pain and neck problems, and are recognized as innovators in the region. We were the first to use minimally invasive spinal fusion and artificial disc replacement to treat degenerative disc disease. In addition, we offer complete management for spine conditions—everything from common low back pain and disc problems to spinal injuries and tumors. Our treatments include minimally invasive surgery, spinal reconstruction, and fusion procedures.

Aurora's comprehensive spine program makes it easier for you to get back to the things that matter most. With a care coordinator to guide your care, you'll be connected to an integrated team of specialists all working together on your personalized treatment plan.

SPINE RELATED CLINIC VISITS



NEURO-PSYCHOLOGY



We specialize in:

- Neuropsychological evaluation
- Inpatient consultation

Service areas include:

- Neuro-oncology
- TBI
- Stroke
- Dementia
- Parkinson's disease
- MS
- Epilepsy
- Other medical and mental health conditions that may impact cognition.



Our team provides evidence-based, holistic, and therapeutic approaches to neuropsychological evaluation that are individually-centered and culturally sensitive. We strive to create a supportive, collaborative assessment process whereby patients and their families learn about cognitive functioning and strategies to manage cognitive/cognitive-behavioral difficulties in everyday living.

Neuropsychology focuses on understanding patients' cognitive and functional abilities as they relate to the brain. Common abilities assessed include general intellect, attention, memory, language, visual spatial skills, and executive functions. A patient's emotional, behavioral, social, and when relevant, academic functioning is also assessed. Neuropsychologists diagnose a range of brain-based disorders across the life span, from preschool-aged children with developmental disabilities to adults with question of dementia. Evaluations can also help to determine how neurological conditions such as concussion, epilepsy, brain tumor, and multiple sclerosis are affecting daily functioning. Following an evaluation, neuropsychologists provide education to the patient and family, and generate recommendations to help improve the patient's quality of life.

In addition to outpatient services, neuropsychology serves as part of the ANII multidisciplinary team to provide comprehensive clinical care in a hospital based setting. Neuropsychologists perform preand post-surgical evaluations, help determine prognosis and risk for cognitive morbidity following a range of medical interventions, conduct intracortid sodium amytal procedures (Wada tests) to determine memory lateralization prior to epilepsy surgery, and assist with intraoperative cognitive monitoring. Neuropsychologists often follow patients with hydrocephalus, brain tumors, and other neurological conditions as they undergo prolonged treatment (i.e., spinal taps, shunting, radiation, chemotherapy) to assess for possible cognitive change over time.

In addition to keeping up with the most advanced, evidence-based practices, our neuropsychologists conduct original grant-funded research and participate in interdisciplinary clinical research headed by the Aurora Research Institute and the Aurora Neurosciences Innovation Institute.



NEURO CRITICAL CARE

Inside our Neuro ICU, our patients receive care around the clock and are closely monitored by expertly-trained specialists.

Our neuro critical care team is unique in that they actively treat and oversee an entire patient population instead of simply performing consultative work. In addition, they work in day-to-day collaboration with our neurology, neurosurgery, and endovascular teams for a truly comprehensive approach to critical patient care.

Our neuro critical care team features:

- 27-bed Neuro ICU
- Significant neuro monitoring
 - 24 hr. EEG, ICP, EVD
 - 24 hr. IN-HOUSE intensivist coverage
 - Fellowship-trained neuro-

critical care physicians

- All Neuro ICU nurses are NIH-certified and specially neuro-trained
- 24/7 Neurosurgery coverage with backup
- 24/7 Endovascular neurology/ interventional neuroradiology coverage

TERTIARY ACCESS PROGRAM

Connecting physicians to physicians to expedite patient transfer Our goal is to find better treatment options that result in better patient outcomes. Aurora Health Care can facilitate admission of patients who need immediate attention for stroke or cerebral hemorrhage, including connection to our Neuro Intensive Care Units.

The Tertiary Access Program con-

nects experts by phone, internet, and mobile technologies. It allows physicians to work with real people (hospitalists, intensivists, or specialists), exchange information, access e-ICU care, and expedite patient transfers. The TAP's dedicated critical caretrained nurses connect physicians directly to the appropriate clinical personnel, creating a streamlined transfer process that results in superior quality and service for our patients. TAP connects transferring physicians to admitting physicians for direct communication, contacts appropriate ancillary hospital staff to expedite admitting processes, and follows up with the transferring physician on admission status and closes communication loop by sending discharge summary to referring physician.

3,965 transfers were made in **2018** through the TAP system

991 were neuroscience-related (25%)

NEUROLOGICAL DISORDERS

Chronic headaches. Degenerative neurological disorders. Persistent muscle pain. At Aurora, we understand that medical issues like these require experienced, compassionate care. Our multidisciplinary team will identify the source of your neurological condition with state-of-the-art diagnostic services and provide treatment tailored to your needs and goals.

Our team works to diagnosis and treat the following neurological disorders:

- Alzheimer's disease and other cognitive disorders
- Epilepsy and seizures
- Multiple sclerosis
- Parkinson's disease and movement disorders
- Stroke
- Headaches and migraines
- Neuromuscular disorders
- Neurodegenerative diseases

Dysautonomia

Recent NINDS data reports that over 70 million people worldwide have been diagnosed with varying forms of dysautonomia and confirms that it affects any age, gender or race. Although there usually is no cure, advanced treatments are being used every day to help patients better combat the dysfunction of their ANS. The largest issue that physicians face is the difficulty associated with actually diagnosing the condition, as it can mask itself as a number of other neurological disorders.

The Dysautonomia Center at Aurora Health Care is one of only two centers in Wisconsin offering specialized diagnostic testing and treatment for people with complex ANS disorders. Our multidisciplinary team approach includes medical experts in neurology, cardiac electro-physiology, psychology, gastroenterology, rehabilitation, nutrition, integrative medicine, genetics and more. Our team focuses on identifying the root causes of dysautonomia and participates in clinical trials to determine the most Our neurology team is part of a **family** of services that includes the latest diagnostic technology and proven physical rehabilitation services. Our neurologists **lead** and participate in clinical trials to bring our patients the next generation of treatments.

effective treatments and improve the quality of life for patients with this condition.

Headaches and Migraines

Headache is our most common form of pain and a major reason cited for days missed at work or school as well as visits to the doctor.

When headaches occur three or more times a month, preventive treatment is usually recommended. Migraine treatment is aimed at relieving symptoms and preventing additional attacks. Drug therapy, biofeedback training, stress reduction, and elimination of certain foods from the diet are the most common methods of preventing and controlling migraine and other vascular headaches. Physicians may suggest using analgesics, nonsteroidal anti-inflammatory drugs, or antidepressants to treat a tension-type headache that is not associated with a disease. Treatment options for cluster headaches include medication, non-invasive vagus nerve stimulation, and oxygen therapy.

With headache-certified physicians leading the program, Aurora is committed to the multidisciplinary and collaborative treatment approach to headaches and migraines.

BY THE **NUMBERS**

Movement			2017	2018	
Disorders	Outpatient Visits		4,612	6,251	
		Ma			
Marining		2016	2017	2018	
Sclerosis	Outpatient Visits	2,820	2,756	3,352	
		2016	2017	2018	
Epilepsy	Emergency Department	2,148	2,188	2,114	
	Inpatient Visits	773	733	691	
	Outpatient Visits	1,328	1,432	2,919	
		M H			
		2016	2017	2018	
Peripheral Nerve	Emergency Department	1,087	1,241	1,445	
	Inpatient Visits	36	36	19	
	Outpatient Visits	11,341	13,884	14,110	
	ABSI IF	4D			
		2016	2017	2018	
Hydrocephalus	Inpatient Department	32	31	21	
	Outpatient Visits	510	798	634	
		and a	2		
Headaches		2016	2017	2018	
	Emergency Department	8,922	9,044	9,104	
	Outpatient Visits	4,542	4,438	5,333	
		2016	2017	2018	
Alzheimer's	Emergency Department	171	160	167	
	Inpatient Visits	65	52	58	
	Outpatient Visits	365	375	518	
			NI.		



STROKE & CEREBROVASCULAR

The incidence of stroke is still on the rise and continues to be the leading cause of long-term disability in the United States. Furthermore, the prevalence of stroke in younger adults and even children has increased, leading to focused efforts on not only the management of stroke risk factors, but also the education of the population to identify stroke symptoms and seek treatment sooner.

To maintain our status as a leader in cutting-edge stroke treatments and protocols, Aurora Health Care has established evidence-based guidelines at all sites for all types of stroke patients to ensure that best clinical practice is followed to maximize recovery, manage complications, and prevent long-term deficits for our patients. In addition to that, highly functional and specialty-trained teams have been constructed to guide the stroke patient through every step of the diagnosis and treatment process including neuroscience nurse practitioners, physician assistants, nurse navigators, and trained stroke responders. Coupled with an extensive team of stroke, cerebrovascular, endovascular, and critical care neurologists, stroke patents at Aurora are cared for by the highest level of medical professionals available.

Stroke Distribution



10,338 strokes

2018 State of Wisconsin

Stroke kills someone in the US

every 4 minutes

2,160 strokes 2018 Aurora Healthcare

Stroke is the leading cause of long-term disability

COMPREHENSIVE STROKE CENTERS

Aurora BayCare Medical Center Gold Plus, Target Stroke Honor Roll Elite Plus

Aurora St. Luke's Medical Center Gold Plus, Target Stroke Honor Roll Elite Plus

PRIMARY STROKE CENTERS

Aurora Medical Center Manitowoc County Silver Plus

Aurora Medical Center Oshkosh Gold Plus, Target Stroke Honor Roll Elite Plus

Aurora Sheboygan Memorial Medical Center Gold Plus, Target Stroke Honor Roll Elite Plus

Aurora Medical Center Summit Target Stroke Honor Roll Elite

Aurora Medical Center Grafton Gold Plus, Target Stroke Honor Roll Aurora St. Luke's Southshore Gold Plus, Target Stroke Honor Roll Elite Plus

Aurora Sinai Medical Center Gold Plus, Target Stroke Honor Roll

Aurora West Allis Medical Center Gold Plus

Aurora Memorial Hospital of Burlington Gold Plus

Aurora Medical Center Kenosha Gold Plus

Aurora Lakeland Medical Center Gold Plus, Target Stroke Honor Roll Elite Plus

ACUTE STROKE READY CENTERS

Aurora Medical Center Washington County

A stroke is an emergency. Every minute counts.

B.E. F.A.S.T

BALANCE: Sudden loss of balance or coordination

EYES: Sudden change in vision; loss of vision, blurry vision or double vision

FACE: Facial droop, uneven smile

ARMS: Arm or leg weakness or numbness

SPEECH: Slurred speech, trouble speaking, trouble understanding speech

TERRIBLE HEADACHE: Sudden onset of a terrible headache

Call 911. Get to the hospital immediately. **Have the ambulance take** you to the nearest hospital with a certified stroke center.

STROKE TREATMENTS & ADVANCEMENTS

Neuroendovascular Intervention

Our expert physicians at Aurora St. Luke's Medical Center and Aurora BayCare Medical Center perform the very latest procedures using first-in-class minimally invasive technology. Our innovative treatments are designed to save lives and minimize disability. Hightech, less-invasive procedures also have the benefit of shorter hospital stays and easier recovery periods.

What is a Large Vessel Occlusion Detection

- SNO Scale SPEECH, NEGLECT, GAZE
- Simple scale with a high sensitivity and acceptable specificity to identify LVO
- Utilized in Milwaukee County EMS triage protocol

Advances in Stroke Care

DAWN and DEFUSE 3 Thrombectomy Trials

- Findings: Beneficial to provide reperfusion therapy to patients up to 24 hours of last known well time. Prior to this, it was limited to just 6 hours.
 - Intervention Eligibility Determinants:
 - Stroke severity (High NIHSS)
 - Functional independence prior to stroke
 - Vascular imaging criteria
 - Improved outcomes:
 - For every two patients treated, studies show one will achieve functional independence

NEUROENDOVASCULAR PROCEDURES



2018 TREATMENT RATES



MEDIAN IV t-PA DTN MINUTES



Aurora Medical Group



Ali H. Alrefai, MD Neurology, Movement Disorders



Akram H. Dastagir, MD Neurology, Neuroimmunology Director, Multiple Sclerosis



George C. Bobustuc, MD Neurology, Neuro-Oncology Director, Neuro-Oncology, St. Luke's



Rose M. Dotson, MD Neurology, Neuromuscular Director, Autonomic Lab & Stroke Program, Grafton



Aaron H. Bubolz, DO Neurology, Headache & Migraine



Kathleen Elverman, PhD Neuropsychology



Juanita Celix, MD Neurosurgery



Jessica Chapin, MD Neuropsychology



Kate Essad, MD Neurology, Sports Neurology Director, Concussion



Taylor Finseth, MD Neurology, Movement Disorders



Joseph Cunningham, PhD Neuropsychology



Emilie Franchow, PhD Neuropsychology



Melanie B. Fukui, MD Radiology, Neuroradiology



Kathryn D. Gaines, DO Neurology, Movement Disorders



Mhd Kher Heder, MD Neurology, Epilepsy & Neuromuscular



Walter Jacobsen, DO Neurosurgery, Spine Co-Director, Spine



Frank Gallo, PhD Neuropsychology, Pediatric



Jonathan E. Jennings, MD Radiology, Neuroradiology



Robert Goldman, MD Neurology



Junaid Kalia, MD Neurology, Stroke & Neuro Critical Care



Waldo Guerrero, MD Neurology, Vascular & Interventional Neurology



Sany T. Khabbaz, MD Neurology, Neurophysiology



Tobias Kaemmerer, PhD Neuropsychology

Aurora Medical Group



Sammy Khalili, MD, MSc, FRCSC Otolaryngology, Rhinology & Skull Base



Lorri J. Lobeck, MD Neurology, Multiple Sclerosis



Asadullah Khan, MD Neurology, Neuro-Oncology



Wilson H. Luy Tan, MD Neurology



Ikram Khan, MD Neurology, Epilepsy & Sleep Medicine



Eric F. Maas, MD Neurology, Multiple Sclerosis Director, Neurology



Edward Kovnar, MD Neurology, Pediatrics



Jorge Marquez de Leon, MD Neurology



Bhavani Kura, MD Neurosurgery



Isaac Melguizo-Gavilanes, MD Neurology, Neuro-Oncology



Michael I. Levin, MD Neurology, Electromyography



James L. Napier, Jr., MD Neurology



Kessarin Panichpisal, MD Neurology, Vascular & Interventional Neurology



Eric Potts, MD Neurology



Richard A. Rovin, MD Neurosurgery Clinical Research Director, ANII

Nichelle Rothong, PhD

Neuropsychology



Darryl Prince, MD Neurology



Rehan Sajjad, MD, FACP Neurology, Stroke and Neuro Critical Care Director, Stroke Program, St. Luke's



Ajaz M. Qhavi, MD Neurology, Neurophysiology



Steven A. Sandstrom, MD Neurology, Neurophysiology



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DATA SOURCES:

American Academy of Pediatrics American Board of Registration of Electroencephalographic and Evoked Potential Technologists American Brain Tumor Registry American Cancer Society American College of Radiology American Heart Association American Stroke Association Aurora Health Care



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