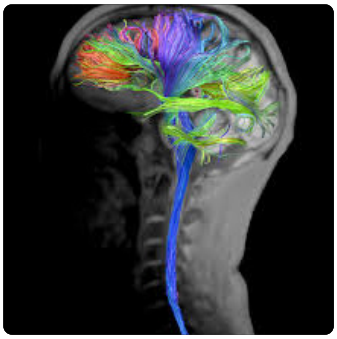
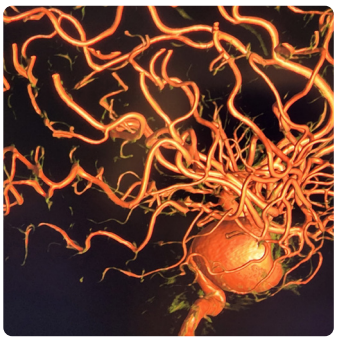
15TH ANNIVERSARY EDITION





Pickup Family Neurosciences Institute

Annual Report 2022

Compassionate Care, Clinical Excellence, Creative Intelligence

hoag.

Pickup Family
Neurosciences Institute

In his 1516 classic work "Utopia," the philosopher Thomas More describes ideal hospitals as well-supplied, where nurses are sympathetic, such that "...though nobody is forced to go there, practically everyone would rather be ill in hospitals than at home." The Covid pandemic negated that vision.

An article in the January 2023 *Economist* details failing health systems in the western world. Despite healthcare spending being at an all-time high, huge numbers of excess deaths are occurring ("excess" meaning above the expected baseline of deaths per capita). As the pandemic forced shutdowns, and induced fear of going to hospitals for needed care, Covid has left behind sicker populations. The disproportionate aging of the population, the insufficient access to primary care and the generosity of government-sponsored insurance such as Medicaid means that more come to increasingly strapped hospitals, and struggle to make it past the Emergency Department lobby.

Healthcare systems must compete for staff with other parts of the economy, so doctors, and nurses, wages must keep pace with market rates. Inflation raises supply costs, so expenses dramatically increase. Competition for staff, risk of burnout for those who do show up to short-staffed floors due to quarantines mandated by rigid anti-Covid measures, and further limited access to high-quality healthcare across the world made 2022, the year that this report analyzes, highly challenging.

Inimitably, Hoag and the Pickup Family Neurosciences Institute rose to this challenge. Our Institute's multi-specialty neurosciences clinic, now named the Lucy Curci Neurosciences Specialty Clinic thanks to a major gift by John Curci, grew by nearly 50% in outpatient visits. We also greatly expanded our Chronic Pain & Neuropathy Program and Salsbury Family Movement Disorders Program with the help of philanthropic support. Our Covid-fueled need for mental health programs led us to expand young adult outpatient services, adding to the pre-existing afterschool resiliency program for high schoolers (ASPIRE).

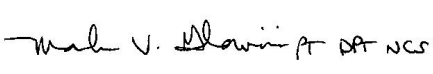
Our senior population clearly suffered during the lockdowns, both in physical and mental health. The Institute, as you will read in these pages, was fortunate to recruit world-class experts in memory and cognitive disorders, senior mood disorders, and neurodegenerative disease such as Parkinson's and other movement disorders. Dr. Aaron Ritter joined us from The Ruvo Institute for Memory at the Cleveland Clinic to head our Center for Integrative Brain Health as the Larkin Family Endowed Chair in Integrative Brain Health. We initiated a new collaboration with Hoag Medical Group to embed seniors' cognition and mental health services at the primary care points of service.

Our programs attracted many accolades. The Stroke Program achieved the Gold Plus (12 years running), Target Stroke Honor Role Elite award from the AHA, and saw over 1,000 patients at the Newport Beach campus and close to 250 at Irvine – making Hoag the second busiest stroke receiving facility in California. Our comprehensive stroke center saw and passed with flying colors the three-year re-accreditation for CMS by DNV. Our Epilepsy Program was again re-accredited by NAEC at the highest level, level IV. We added cutting-edge technology to our surgical suites, including the world's first augmented reality guidance procedures for minimally invasive spine surgery. We expanded the Fudge Family Acute Rehabilitation Center by 33%. We created a multi-disciplinary support group for our multiple sclerosis patients. Our research endeavors grew, including being awarded a phase 1 first in man vaccine trial for the prevention of Alzheimer's.

Speaking of spine, our national reputation took a leap forward with the recruitment of our new Associate Executive Medical Director of the Institute – Dr. Adam Kanter – from the University of Pittsburgh Medical Center, where he headed spine surgery. He and Dr. David Millett, our Chief of Neurology Services, are organizing a national brain and spine scientific symposium for August 2023. We also plan a 15th anniversary celebration of the Pickup Family Neurosciences Institute, so stay tuned! Overall, our aspiration for compassionate care, clinical excellence and creative intelligence was not deterred by the pandemic or its aftermath.

We thank everyone who reads our annual scorecard for their inspirational support, trust and advice.

Michael Brant-Zawadzki, MD, FACR
Senior Physician Executive, Hoag Hospital
Ron & Sandi Simon Executive Medical Director Endowed Chair
Pickup Family Neurosciences Institute, Hoag Memorial Hospital Presbyterian



Mark V. Glavinic, PT, DPT, NCS
Director, Rehabilitation Services

Kambria Hittelman, PsyD, MBA
Executive Director, Neurosciences and Neurobehavioral Health

Leslie Rosini, MSN, RN
Director, Neurosciences Ancillary Operations

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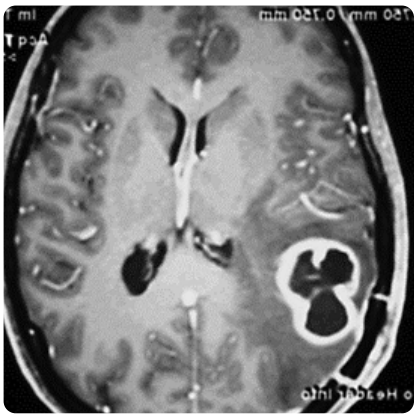

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Pickup Family Neurosciences Institute

This edition of the Hoag Pickup Family Neurosciences Institute Annual Report was made possible through a generous contribution from Mary Lynn & Rusty Turner.

Pickup Family Neurosciences Institute

In 2007, Hoag announced its fifth Center of Excellence. Shortly after, the Hoag Neurosciences Institute was created to document true excellence and reengineer the specialized care delivery model. Fifteen years on (as of this 2022 report), this first and unique comprehensive collaborative of neurosciences programs in Orange County – now named Hoag's Pickup Family Neurosciences Institute – offers a seamless spectrum of experts, the latest technology and dedicated facilities for treating individuals with disorders of the brain, mind and spine. Compassionate Care, Clinical Excellence, Creative Intelligence.

MISSION STATEMENT Provide an integrated, multidisciplinary team approach to disorders of the brain, spine and nerves using the best evidence-based clinical care, state-of-the-art technology and advanced clinical research, all focused on the individual patient need.

SCOPE Pickup Family Neurosciences Institute provides specialized services blended with a program-based approach, each program focused on a specific condition and measured by outcomes that matter to the patient. The Institute houses the following programs and services:

ESSENTIAL SERVICES

- Neurohospitalists
- Neuro Interventional Radiology
- NeuroRadiology
- Neurology
- Neurosurgery/Stereotactic & Rad Therapy
- Advanced Brain/Spine Unit/ NICU/ED/ORs
- Acute Rehabilitation
- Epilepsy Monitoring
- C&L Psychiatry
- Neuropathology
- Neurophysiology, EMG, IOM
- Neuropsychology
- Neuro-Rehabilitation
- Neuro-Oncology
- Pain Management
- Fundraising

PROGRAMS

- Stroke
- Addiction Medicine
- ASPIRE/Young Adult Mental Health
- Brain Tumor
- Chronic Pain & Neuropathy
- Epilepsy
- Multiple Sclerosis & Neuroimmunology
- Memory & Cognitive Disorders/OC Vital Brain Program
- Neurobehavioral Health
- Neuro-Spine Back Pain
- Parkinson's Disease & Movement Disorders
- Pituitary & Skull Base Tumor
- Sleep Health

Spearheading Pickup Family Neurosciences Institute is Hoag's multidisciplinary team of nationally recognized medical experts, who subspecialize in the fields of neurology, brain and spine neurosurgery, diagnostic and interventional neuroradiology, neuro-oncology, pain medicine, addiction medicine, psychiatry and neuropsychology. As Orange County's only community hospital with dedicated neurohospitalists, 24/7 subspecialized neurosurgery and interventional neuroradiology coverage, Hoag is equipped to immediately respond to any neurological emergency. This integrated, sub-specialized team of neuro clinicians and scientists is also actively involved in clinical research, testing new therapies, drugs and other medical advancements to better the lives of patients suffering from neurological conditions.

Hoag now has 22 endowed chairs (unique for a non-academic, community hospital), four of which are in the Pickup Family Neurosciences Institute.

Dr. Michael Brant-Zawadzki is the Ron & Sandi Simon Executive Medical Director Endowed Chair of Pickup Family Neurosciences Institute. Dr. William R. Shankle is the Judy & Richard Voltmer Endowed Chair in Memory and Cognitive Disorders and is a leader in our research in this area. Dr. Robert Louis is the Empower360 Endowed Chair in Skull Base and Minimally Invasive Neurosurgery. Dr. Aaron R. Ritter is the Larkin Family Endowed Chair in Integrative Brain Health. The remarkable generosity of our benefactors not only demonstrates the trust and support of our endeavors, but creates an aspirational level of accountability.

This report speaks to that accountability and highlights the performance of the Institute's major individual programs over the past calendar year.

Stroke Program

Overview

The Covid-19 pandemic significantly impacted the Stroke Program, as patients were afraid of coming to the hospital. This significantly decreased the volume of acute stroke emergencies treated in the Emergency Department (ED) in 2020, but by 2021 stroke volumes at Newport Beach had returned to pre-pandemic levels and increased by 23% at Hoag Irvine. In 2022, the program grew again with a 10% increase in patients at Newport Beach and 4% increase at Irvine. Over this period, our stroke team remained dedicated to excellence in stroke treatment. At the end of 2021, we were reviewed by the accrediting agency DNV. The reviewers did not find any deficiencies in our program despite the three-day intensive review, which is quite rare for a review of this type. In fact, the reviewers commented on the strength and maturity of the program, and our ability to continue to provide world-class care for stroke patients despite the challenges of the pandemic. In 2022, the surveyors returned for our annual review and provided us with the same accolades.

Hoag's comprehensive Stroke Program is led by fulltime neurohospitalists who specialize in advanced stroke management and intervention, and continue to develop best-practice care pathways for optimal outcomes. As a founding member of the designated Comprehensive Stroke Neurology Receiving Centers in Orange County, Hoag helped pioneer many of the specialized processes and methods to reverse stroke when possible and to optimize care for stroke patients. The ultimate outcome metric is the patient's ability to return to a self-sufficient life, an outcome we measure in every patient with a 90-day survey. Our results demonstrate self-sufficiency in 54% of our stroke survivors.

Our stroke rescue process starts immediately on the way to the ED with EMS communication and continues upon arrival with assessment of the patient and rapid triage for the most advanced treatment appropriate to the patient's condition, all coordinated by our neurologists and ED physician experts.

In place since January 2008 but continuously updated, the so-called "Code 20" process is like a Formula 1 pit crew. Upon a stroke patient's arrival at the ED, neurological assessment, lab testing and neuro imaging are done within 20 minutes, allowing best treatment delivery.

Stroke Program: 949-764-6066

Stroke Program Volumes
Figure 1. Hoag Hospital Newport Beach Volumes

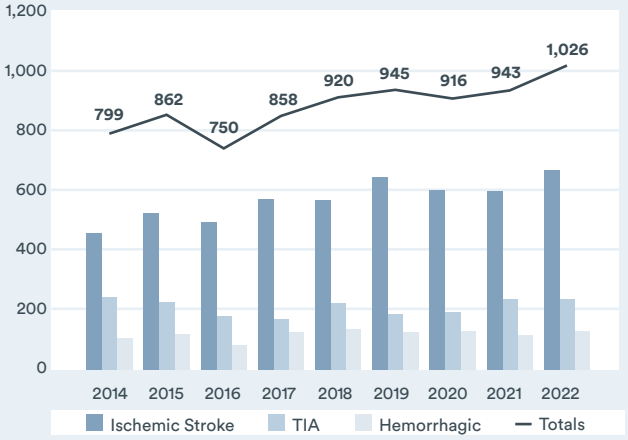


Figure 2. Hoag Hospital Irvine Volumes

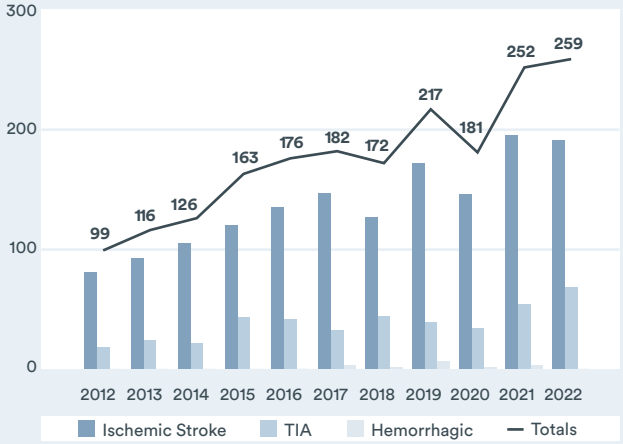


Figure 3. Types of Strokes Treated at HHI & HHNB combined in 2021

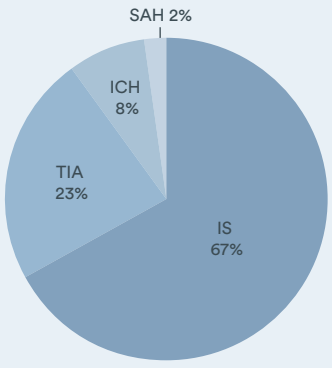


Table 1. Hoag Newport Beach

Gold "Get with the Guidelines" Stroke Core Measures

	2019	2020	2021	2022
IVtPA arrive by 3.5 hours, treat by 4.5 hours	94.0%	96.5%	93.3%	92.4%
Early antithrombotics	98.7%	99.5%	99.5%	97.6%
VTE prophylaxis	99.8%	99.4%	99.0%	99.2%
Antithrombotics on discharge	100.0%	99.8%	100.0%	100.0%
Anticoagulation for Afib/flutter	99.1%	98.2%	100.0%	99.2%
Smoking cessation	100.0%	100.0%	98.3%	100.0%
Intensive statin therapy on discharge	99.2%	98.9%	99.7%	99.1%

Gold Plus "Get with the Guidelines" Stroke Quality Measures

	2019	2020	2021	2022
Dysphagia screen	92.7%	90.2%	89.6%	92.9%
LDL documented	99.8%	100.0%	99.9%	99.5%
Stroke education	99.8%	99.8%	99.7%	99.1%
NIHSS reported	100.0%	100.0%	99.5%	97.3%
Rehab considered	99.8%	100.0%	100.0%	100.0%
Time to IV tPA - 60 minutes or less	94.6%	95.9%	96.0%	94.1%
Time to IV tPA - 45 minutes or less	63.3%	73.7%	89.7%	83.3%
Time to IV tPA - 30 minutes or less	N/A	16.7%	14.7%	8.3%
Door to device (first pass)	N/A	57.6%	51.0%	67.9%

Table 2. Hoag Irvine

Gold "Get with the Guidelines" Stroke Core Measures

	2019	2020	2021	2022
IVtPA arrive by 3.5 hours, treat by 4.5 hours	100.0%	88.9%	90.0%	100.0%
Early antithrombotics	100.0%	100.0%	100.0%	99.0%
VTE prophylaxis	95.6%	98.4%	98.8%	98.0%
Antithrombotics on discharge	99.4%	100.0%	100.0%	99.5%
Anticoagulation for Afib/flutter	100.0%	100.0%	100.0%	100.0%
Smoking cessation	100.0%	100.0%	100.0%	100.0%
Intensive statin therapy on discharge	99.4%	99.2%	99.5%	97.0%

Gold Plus "Get with the Guidelines" Stroke Quality Measures

	2019	2020	2021	2022
Dysphagia screen	86.7%	92.4%	86.3%	86.1%
LDL documented	100.0%	99.3%	99.5%	100.0%
Stroke education	99.2%	98.3%	100.0%	99.4%
NIHSS reported	99.0%	100.0%	97.5%	93.2%
Rehab considered	99.2%	100.0%	100.0%	100.0%
Time to IV tPA - 60 minutes or less	100.0%	100.0%	100.0%	77.8%
Time to IV tPA - 45 minutes or less	33.3%	100.0%	75.0%	66.7%
Time to IV tPA - 30 minutes or less	N/A	N/A	0.0%	0.0%
Door to device (first pass)	N/A	N/A	100.0%	50.0%

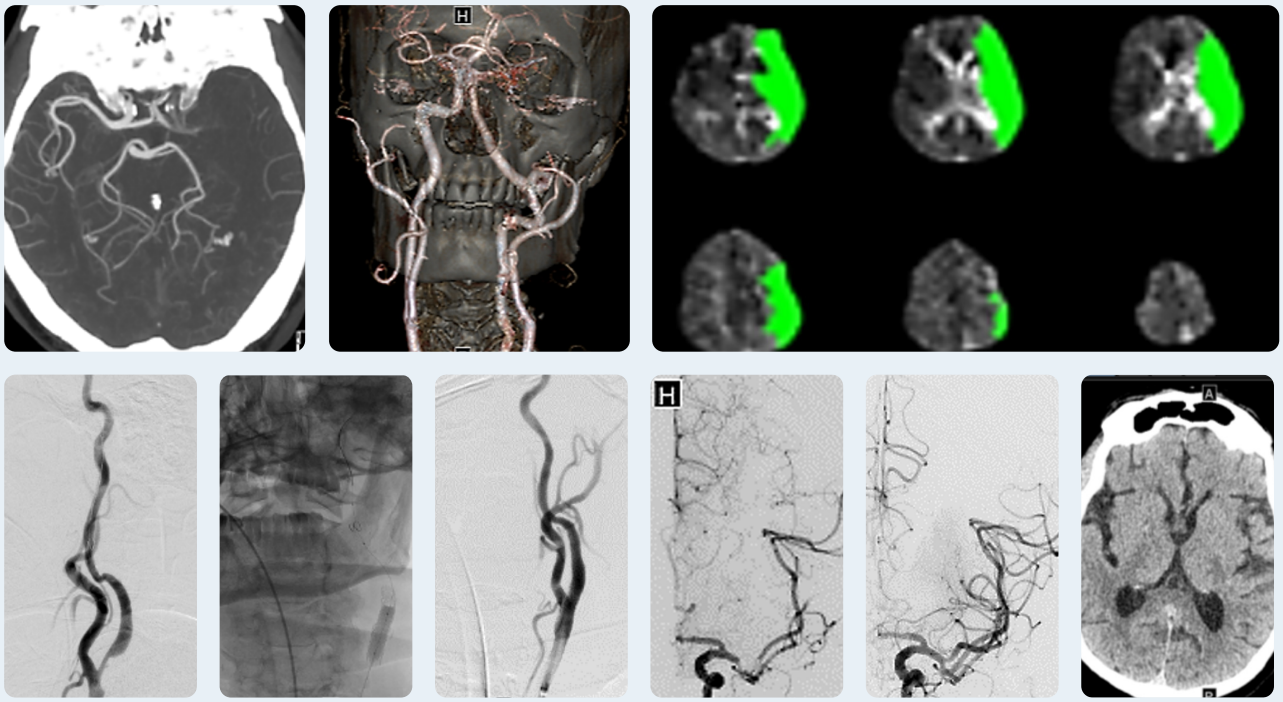
This Code 20 process is also used for the rare hospital inpatient who suffers a stroke during their admission for a different diagnosis. The Rapid Response Team has helped identify 26 new strokes for inpatients with 42% of these meeting criteria and receiving emergency stroke treatments.

Evidence-based use of clot-busting drugs "Code TPA", as well as endovascular mechanical intervention – "thrombectomy for large vessel occlusion strokes" or "Code LVO" – optimizes the chances for stroke reversal. Our team has the longest experience with endovascular stroke rescue in Orange County. Since May 2021, we have been performing interventional thrombectomy "Code LVO" at Hoag Irvine with the same expert teams as Hoag Newport Beach.

Stroke patients are cared for in the Neurosciences Intensive Care Unit or the Stroke Unit on our 41-bed Advanced Brain and Spine floor at Newport Beach. At Irvine, stroke patients are cared for in the Critical Care Unit or stroke unit located on the 5th floor Telemetry Unit.

Hoag Hospital Newport Beach and Hoag Hospital Irvine

Male, 73, acute right paralysis, speech loss; stroke rescue.



Upper row: CT angiogram shows absence of left middle cerebral trunks; 3D CT shows missing left internal carotid artery in neck; perfusion CT shows green zone of left hemisphere at risk of permanent damage.

Lower row: Catheter angiogram shows 95% occlusive narrowing at origin of left internal carotid; spot film shows balloon dilation and stent placement; restoration of caliber; intracranial angiogram shows several distal emboli; post thrombectomy angiogram shows removal of emboli; final CT shows salvaged, normal brain.

Figure 4. Thrombolytic Treatments: Combined Hoag Hospital Newport Beach & Hoag Hospital Irvine

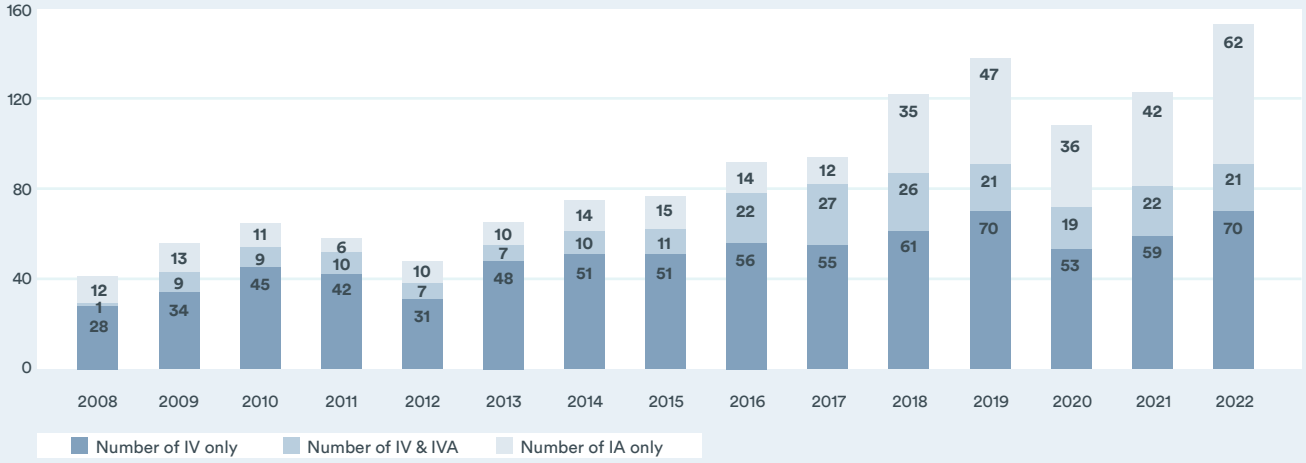


Table 3. Hoag Hospital Newport Beach & Hoag Hospital Irvine mRS results for all ischemic strokes

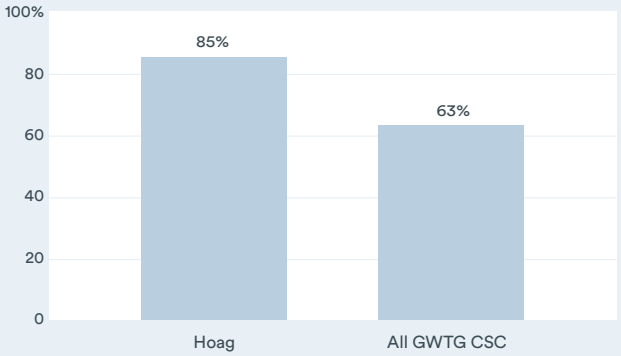
Patients with mRS=0 or 1 at 30 days (%)
85% (715/839) reached by phone at 30 days

	Sample	Yes	%
2022	713	307	43%

Patients with mRS=0 or 1 at 90 days (%)
86% (350/409) reached by phone at 90 days

	Sample	Yes	%
2022	348	189	54%

Figure 5. IV thrombolytic patients with favorable outcomes (mRS 0-2) at 90 days



98% of all IV thrombolytic (IV tPA or TNK) patients were reached at 90 days.

85% of the ischemic stroke patients who were treated with IV tPA or TNK were self -sufficient at 90 days.

This is in the top 10th percentile of favorable outcomes in the nation when compared with the AHA Get With the Guidelines (GWTG) Comprehensive Stroke Centers.

The physicians and nurses in these units are all experienced in advanced stroke care. This includes pathways for ischemic and hemorrhagic strokes, including subarachnoid hemorrhage due to aneurysmal rupture. Neurosurgeons, neuro-interventional radiologists and neurohospitalists work as a team with our critical care physicians. In addition, Hoag has expertise in preventative aneurysm treatment using image-guided micro-interventional techniques.

Hoag continues to be certified by DNV as a Comprehensive Stroke Center at Hoag Newport Beach and as a Primary Stroke Center at Hoag Irvine.

Hoag has been awarded the Stroke Gold PLUS Performance Achievement Award by the American Stroke Association for 13 years in a row. In 2022, Hoag achieved the Target Stroke Honor Roll Elite Award and the new Target Stroke Honor Roll Advanced Therapy Award by the American Heart Association/American Stroke Association. This new award recognizes the accomplishment of rapid thrombectomy treatment as measured by the Door to Device Times of 90 minutes or less in 50% or more of all thrombectomy cases.

Hoag has dramatically increased the rate at which IV tPA is administered to all acute ischemic stroke patients – up from 2% a decade ago to 17% currently. Of the patients arriving in the ED meeting the criteria for the drug, 100% of patients received treatment. At 90 days, 85% of Hoag's stroke patients who received IV tPA returned to a self-sufficient lifestyle. Our Physical Rehabilitation service, including the Fudge Family Acute Rehabilitation Center, is also key to our superior outcomes.

Team

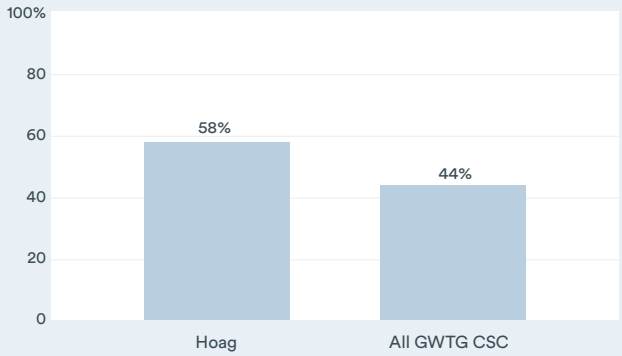
Hoag's Stroke Program is led by David Brown, MD, a neurologist and fellowship-trained stroke and cerebro-vascular disease specialist, and a neurohospitalist. Dr. Brown oversees a dedicated, multidisciplinary acute stroke team that provides comprehensive care to stroke patients and meets regularly for process improvement. The stroke program manager is Deb Mastrolia, RN. Deb is certified with the American Board of Neuroscience Nursing for both neuroscience nursing (CNRN) and stroke nursing (SCRN) along with the American Association of Critical Care nursing (CCRN-K) specialty. She has worked with Dr. Brown to develop and certify the multidisciplinary stroke team. She also consults as a program reviewer for stroke-certifying agencies.

The stroke nurse navigator is Victoria Tomczak, RN, SCRN. She works collaboratively with the multidisciplinary team to oversee the patients' and caregiver's needs and manage quality. She meets with the patients and families to assess individual needs for treatment, prevention and education.

Functional Outcomes

Every stroke patient is called at 30 days post discharge to evaluate their functional outcome using a well-validated tool: the Modified Rankin Scale (mRS). A score of 0 – 2 reflects a self-sufficient status. In addition, a telephone interview is performed to provide valuable teaching regarding neurology follow-up appointments, medications, risk factor modification, stroke symptom identification and the need to call 911 for any recurring signs of stroke. Hoag continues to have the highest volume of ischemic stroke patients in Orange County.

Figure 6. Patients with favorable outcomes (mRS 0-2) at 90 days that met criteria to be treated with IV thrombolytic, IA thrombectomy or IV & IA combined



94% of all IV thrombolytic (IV tPA or TNK) patients were reached at 90 days.

58% of the ischemic stroke patients who were treated with IV thrombolytic, IV thrombolytic and IA thrombectomy combine or IA thrombectomy alone were self-sufficient at 90 days.

This is in the top 10th percentile of favorable outcomes in the nation when compared with the AHA Get With the Guidelines (GWTG) Comprehensive Stroke Centers.

Support & Education

Since Covid, the Hoag Stroke Support Group meets monthly in a virtual setting, as does the Hoag Brain Aneurysm & AVM Support Group. There is an educational presentation along with Q&A facilitated by the stroke nurse navigator. The meetings are attended by survivors and their families and friends.

Community outreach is provided through educational presentations by Dr. Brown, Deb Mastrolia and Victoria Tomczak via Hoag Health livestream. In 2022 we also were able to provide in-person stroke education at community health fairs. The focus is on the warning signs and symptoms of a stroke, stroke prevention and current treatments.

Beth McIntyre serves as the neuroscience data coordinator. Beth's role has been instrumental in assisting with compilation of the large volume of data collected for the Stroke Program.

Research

INTERVENTIONAL NEURORADIOLOGY HUMANITARIAN USE DEVICES (HUDS)

Dr. Michael Brant-Zawadzki, Principal Investigator: Boston Scientific Target Neuroform™ Microdelivery Stent System and Neuroform EZ Stent System for Cerebral Aneurysm (H020002)

Dr. Wallace Peck, Principal Investigator: Stryker Corporation Wingspan™ Stent System with Gateway™ PTA Balloon Catheter for Cerebral Aneurysm (H050001)

Dr. David Brown, Principal Investigator NIH/StrokeNet. "ASPIRE: Anticoagulation in Intracerebral Hemorrhage (ICH) Survivors for Stroke Prevention and Recovery". The primary goal of the study is to determine if apixaban is superior to aspirin for prevention of the composite outcome of any stroke (hemorrhagic or ischemic) or death from any cause in patients with recent ICH and AF. The secondary goal is to determine if apixaban, compared with aspirin, results in better functional outcomes as measured by the modified Rankin Scale.

Pickup Family Neurosciences Institute in the news

Newport Beach Independent

Hoag Hospital in Newport Beach Receives Awards for Stroke Care

by Newport Indy Staff – June 28, 2022

Hoag Memorial Hospital Presbyterian in Newport Beach has received the American Heart Association and American Stroke Association's Get With The Guidelines Stroke GOLD PLUS Quality Achievement Awards for its hospitals in Newport Beach and Irvine. The comprehensive Stroke Program of the Pickup Family Neurosciences Institute coordinates stroke care at both Hoag hospitals, each of which also received Target: Stroke Honor Roll Elite designation.

Additionally, the Newport Beach hospital received Advanced Therapy recognition.

This is the 13th straight year Hoag has received GOLD PLUS stroke awards, the sixth year for the Target: Stroke Honor Roll Elite and the second year for Advanced Therapy acknowledging Hoag's comprehensive, patient-centered program.

Hoag was recognized for its commitment to ensuring patients receive the most appropriate diagnosis and treatment according to research-based guidelines founded on the latest scientific evidence and recommendations. This commitment to leading-class care is one reason Hoag is the highest-volume stroke center in Orange County and the 10th busiest in California, according to the Department of Health Care Access and Information.

"Stroke care is advancing rapidly and this award demonstrates Hoag's commitment to delivering advanced stroke treatments quickly and safely to provide the best possible outcomes for our patients," said Michael Brant-Zawadzki, M.D., F.A.C.R., senior physician executive and the Ron & Sandi Simon Executive Medical Director Endowed Chair of the Pickup Family Neurosciences Institute. "Hoag Stroke Program's multidisciplinary team is highly skilled and ready 24/7 to evaluate and successfully treat patients within an hour of arrival at the hospital. We are seeing lives saved and quality of life preserved in unprecedented numbers compared to much of the nation."

To qualify for GOLD PLUS stroke awards, hospitals must meet a range of quality achievement measures for a set period. These measures include evaluation of the proper use of medications

and other stroke treatments aligned with the most up-to-date, evidence-based guidelines with the goal of speeding recovery and reducing death and disability for stroke patients. Before discharge, patients receive education on managing their health, as well as other care transition interventions.

Target: Stroke Honor Roll Elite hospitals must meet quality measures developed to reduce the time between the patient's arrival at the hospital and treatment with the clot-buster tissue plasminogen activator (tPA), the only drug approved by the U.S. Food and Drug Administration to treat ischemic stroke. Hospitals recognized with Target: Stroke Honor Roll Advanced Therapy designation meet door-to-device times in at least 50% of applicable patients within 90 minutes for direct arriving and within 60 minutes for emergency transport.

Hoag is consistently ranked among the best hospitals in the nation by U.S. News & World Report, which rated Hoag's stroke services as high performing. Hoag Hospital Newport Beach is also certified as a Comprehensive Stroke Center.

Visit www.hoag.org for more information.

Interventional Neuroradiology Service

Overview

Endovascular, minimally invasive intervention for stroke rescue, treatment of cerebral aneurysms, vascular malformations, and other neurovascular conditions is an essential, indispensable service within the high-functioning Pickup Family Neurosciences Institute.

Expert clinicians and proceduralists armed with the most advanced technology and highly tailored facilities are the key components to this service at Hoag.

Hoag is home to the latest generation of 3D digital subtraction angiography equipment, yielding the highest resolution angiograms at the lowest radiation doses to the patient. In addition, the most up-to-date post-processing software on these machines allows for 3-dimensional reconstructions, which enable visualization of vascular anatomy and pathology such as aneurysms and arteriovenous malformations. This greatly facilitates planning and guidance of minimally invasive, image-guided, catheter-based treatments most often utilized for life-saving stroke rescue, and other conditions such as aneurysm coiling, arteriovenous malformation (AVM) embolization, stenting, dural arteriovenous fistula treatment and chronic subdural hematoma embolization.

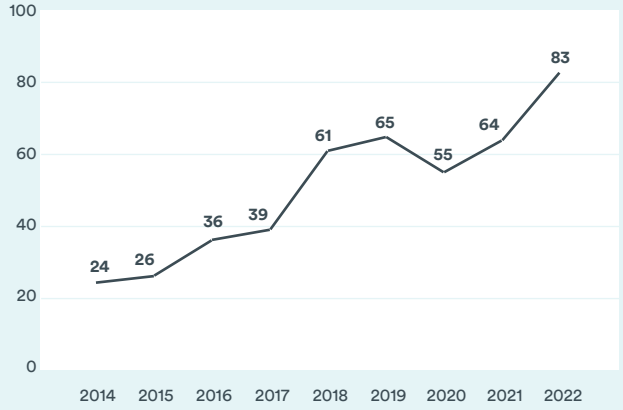
The Pickup Family Neurosciences Institute's dedicated full-time neurointerventional radiologists provide 24-hour-a-day, 365-day-a-year staffing for stroke care, an essential part of Hoag's Comprehensive Stroke Center certification. With a combined 30+ years of experience in Orange County in the treatment of strokes, aneurysms and AVMs, Hoag neurointerventionalists use the latest endovascular techniques and devices.

We continue to be recognized – since 2008 – as the leader in Orange County for the treatment of stroke, consistently achieving documented successful outcomes for patients (see data in the Stroke Program section). Hoag neurointerventionalists are also available for outpatient appointments and consultations in Hoag's multispecialty clinic and regularly attend Hoag's quarterly Brain Aneurysm and AVM Support Group meetings.

Interventional Neuroradiology volume continues to increase and patients continue to have exceptional outcomes. Because of the success at the Newport Beach campus, the team has expanded to provide acute stroke thrombectomy procedures in the Cath Lab at Hoag Hospital Irvine. In 2022, we experienced our busiest year thus far with a 24% increase in total stroke thrombectomies and a 68% increase in aneurysm treatments.

Neuroradiology: 949-764-6066

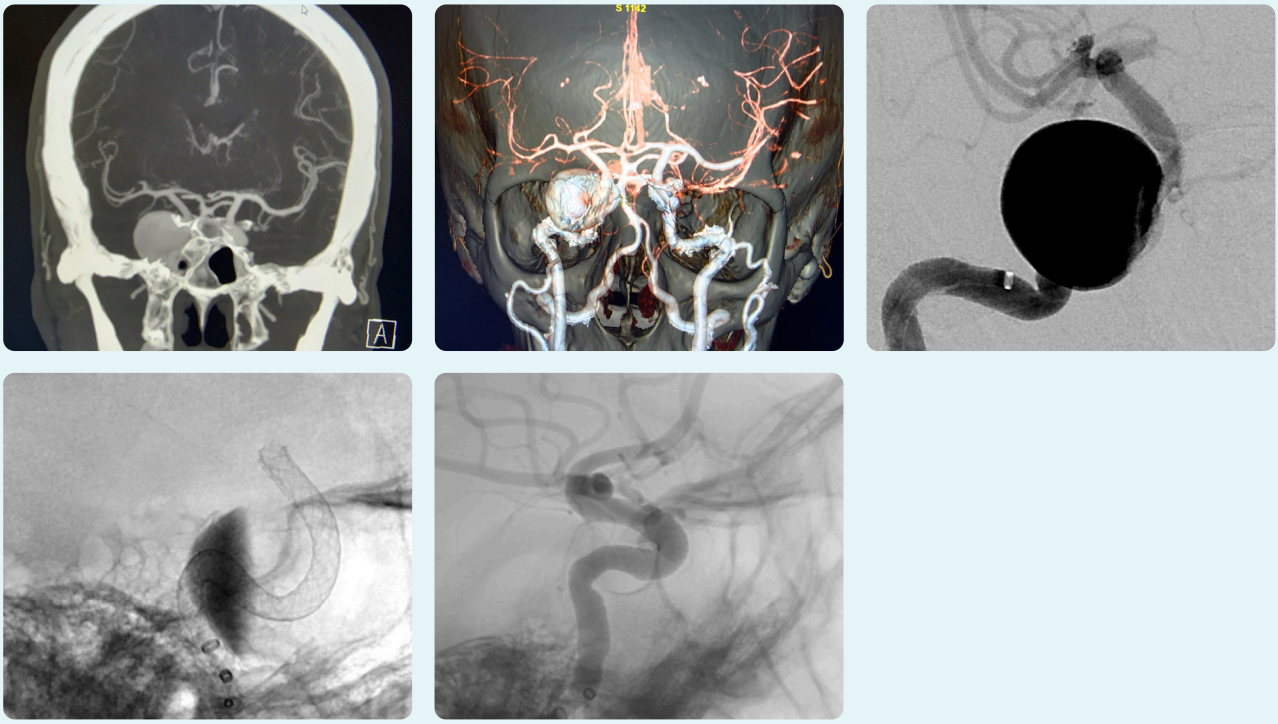
Acute Ischemic Stroke Thrombectomy Cases



	2017	2018	2019	2020	2021	2022
Aneurysms Treated	19	34	40	34	28	47
Aneurysm Coiling	19	29	18	19	15	24
– unruptured	10	11	12	6	7	9
– ruptured	8	15	6	12	8	15
– surgical repair	1	3	0	1	0	0
WEB Device	-	-	9	5	5	6
Pipeline/Surpass/Fred	-	5	13	10	8	17
Thrombectomy	39	61	65	55	62	77
Diagnostic Angiogram	55	78	78	80	105	93
AVM	-	-	-	-	-	1
MMA Embolizations			1	4	5	19
Other	11	37	19	38	19	28
Total Cases	124	210	203	211	219	265

Team

The Interventional Neuroradiology team is led by Drs. Christopher Baker and Avinash Mesipam, along with a dedicated team of four other interventional radiologists, seven technicians, and 19 nursing staff at the Newport Beach location, as well as seven technicians and seven nursing staff at Hoag Hospital Irvine.



Top row: CT angiogram shows giant aneurysm off the right cavernous carotid artery; 3D CT angiogram depicts the aneurysm and all the normal major intracranial vessels; catheter angiogram shows the giant aneurysm with wide mouth of the carotid artery.

Lower row: Select spot films of angiogram showing deployment of a diverting sleeve, preventing filling of the aneurysm-stasis of contrast within; last frame of final angiogram shows restored artery, aneurysm obliterated.

Brain Tumor Program

Introduction

Despite the impact of the Covid pandemic, our community need for expert management of brain tumors went unabated – the number of patients at Pickup Family Neurosciences Institute seeking our care for brain tumors increased as did Hoag's percentage of neuro-oncology patients compared to other health systems. Referring physicians and patients in the community recognize that our multidisciplinary team's advanced expertise and wealth of resources, including the most modern surgical suites equipped with advanced augmented reality (AR)-guided surgical and nonsurgical capabilities, greatly impacts outcomes. This includes three types of stereotactic-focused radiation therapy, radiosurgery allowing single-sitting tumor eradication. The team's compassionate care is greatly facilitated by a dedicated clinical nurse navigator. All of these factors greatly impact outcomes, longevity, and the patient experience. In addition, we offer the latest clinical trial and Gamma Knife leading-edge options for Glioblastoma, with one of the highest national survival rates for this difficult disease.

Incidence & Prevalence

According to the National Cancer Institute, approximately 24,000 adults were diagnosed with a primary malignant brain tumor in 2020.[1] Metastatic brain tumors are significantly more common and will affect as many as 200,000 people in the U.S. and the incidence of brain metastasis in patients. Annually, approximately 13,000 individuals in the U.S. will require surgery for pituitary tumors; fewer than 1% of these are malignant.[2] The incidence of glioblastoma is 1 in 33,000.

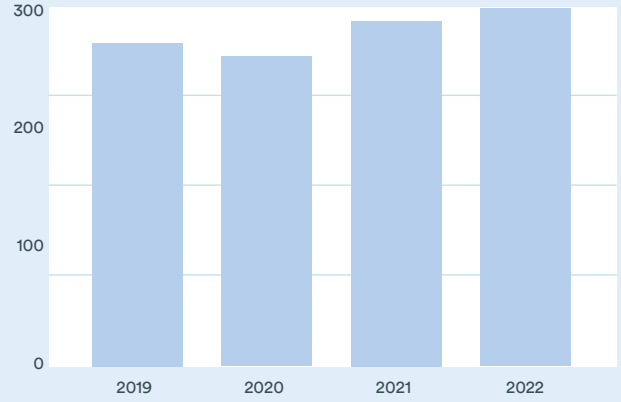
Overview

The Brain Tumor Program at the Pickup Family Neurosciences Institute provides the entire continuum of care for all patients with primary and metastatic brain tumors in partnership with the Hoag Family Cancer Institute for seamless care.

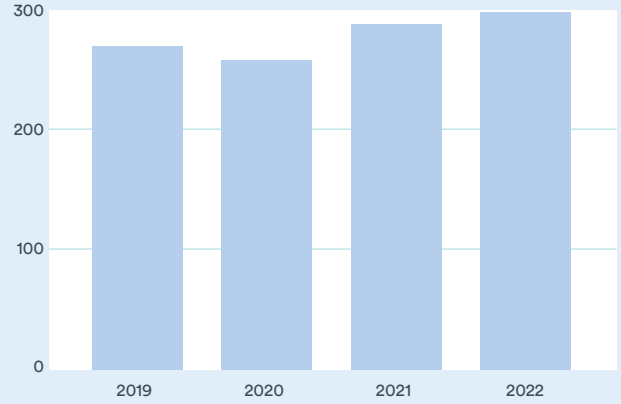
The Brain Tumor Program aligns neurosurgeons, ENT surgeons, neurologists, neuro-ophthalmologists, neuro-oncologists, radiation oncologists and physicists, neuro-radiologists, pathologists, geneticists and endocrinologists in a truly comprehensive, multidisciplinary approach with a weekly Neuro-Oncology Tumor Board review to provide consensus on the best evidence-based care.

Brain Tumor Program: 949-722-6237

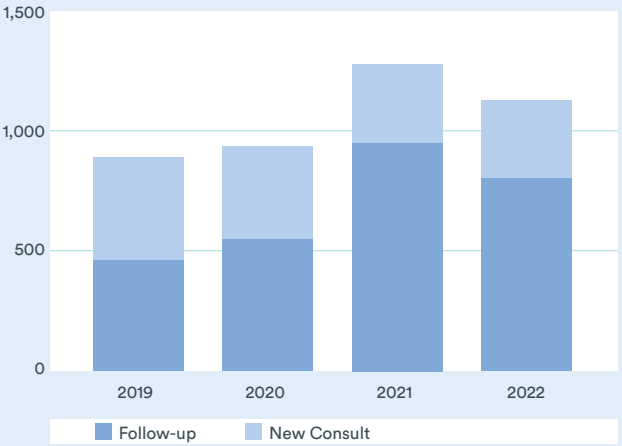
Neuro-Oncology (Brain) Surgical Volume



Gamma Knife Surgery Volume



Neuro-Oncology Clinic Volume



Pickup Family Neurosciences Institute is truly at the forefront of technological advances in the areas of neurodiagnostics, non-invasive stereotactic radiosurgery and minimally invasive brain surgery. Our unwavering commitment to providing the best care possible to our patients has led to the acquisition of the county's only PET-MRI scanner, the unique combination of Visualase Laser Ablation, Gamma Knife, and ViewRay instruments and the use of virtual reality-guided "scalpel free" brain surgery. Our subspecialized neuro-oncologists and nurse practitioners partner with our oncologists and clinical nurse navigator to oversee the trajectory and continuum of care for our patients. We offer the latest clinical research trials overseen by our dedicated neuro-oncologists to assist in managing the wide spectrum of all malignancies, including the deadliest of primary brain tumors, glioblastoma.

Our top priority is to apply truly compassionate care, clinical excellence and creative intelligence for one of the most daunting health challenges an individual and their family may face: care beyond compare.

[1] Surveillance, Epidemiology, and End Results Program of the National Cancer Institute, https://seer.cancer.gov/statfacts/html/brain.html.
[2] Cancer.net, The American Society of Clinical Oncology (ASCO).

Team

The Brain Tumor Program is led by Medical Director Christopher Duma, MD, FACS, a board-certified neurosurgeon fellowship trained in stereotactic and functional neurosurgery and a fellow of the American College of Surgeons. Robert Louis, MD, FAANS, who is board-certified in neurosurgery and fellowship trained in complex cranial surgery and minimally invasive skull base and pituitary surgery, leads Hoag's Pituitary & Skull Base Surgery Program. Vik Mehta, MD, a fellowship-trained neurosurgeon specializing in the surgical treatment of complex brain tumors, performs minimally invasive laser ablation for primary and metastatic brain tumors and leads the Epilepsy Program for tumors and other lesions that cause seizures.

Diagnostics

Hoag subspecialized pathologists provide full expertise for intraoperative evaluation and diagnosis of all tumors. Additionally, Hoag is one of the first facilities in the country to implement a new intraoperative laser Raman spectrum analysis technology (from Invenio Imaging) for rapid intraoperative diagnosis of brain tumors, shortening surgery and optimizing full resection. Tumor molecular genomic profiling is completed on all patients with gliomas and other cancer diagnoses to help clinicians select the most precise and patient-specific targeted treatment. All cases with their bioinformatics analyses are presented for discussion at the weekly Neuro-Oncology Tumor Board, for multidisciplinary collaborative choice of best treatment options.

The full range of advanced imaging options are available to patients with brain, pituitary and skull base tumors through Hoag Radiology and Interventional Radiology. Hoag is the first hospital on the West Coast to routinely offer PET-MRI to patients. The revolutionary hybrid imaging technique is utilized for patients with brain tumors who have had surgery or radiation to evaluate and differentiate between necrosis of tumor versus recurrent disease. PET-MRI offers significant advantages over MRI alone in the differentiation of tumor recurrence and post-therapy changes. Functional MRI, blood-flow analysis and spectroscopy is also available to help guide resection, with augmented reality precision neurosurgical preoperative and intraoperative guidance.

Treatment

SURGERY

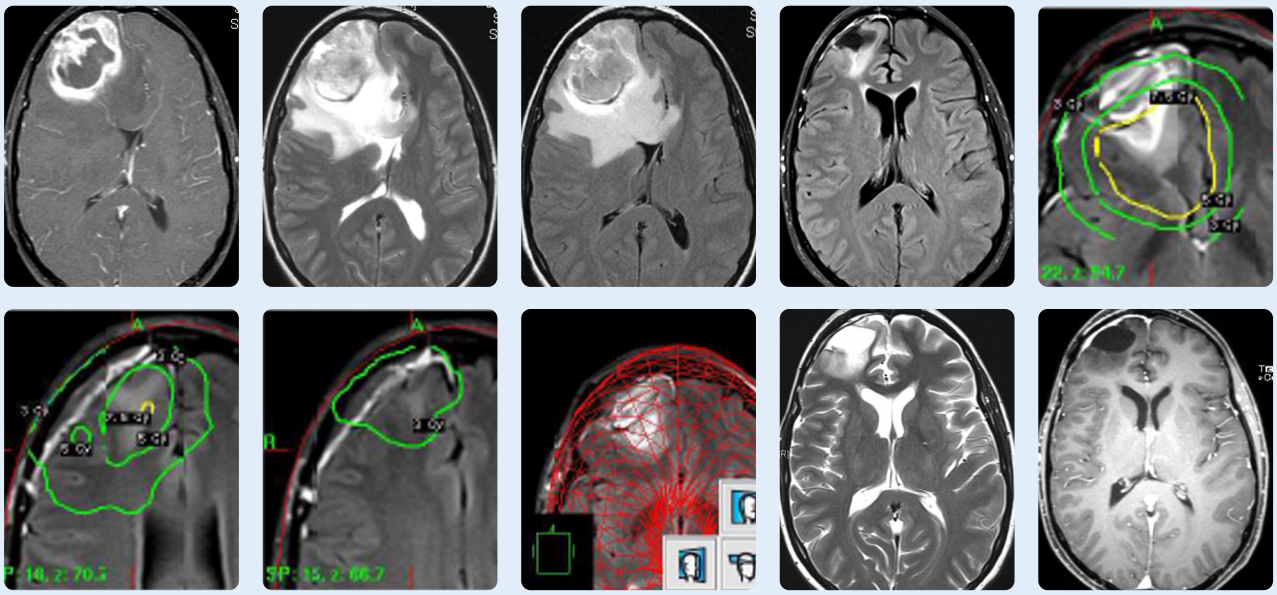
Hoag's neurosurgeons employ AR image-guided preoperative surgical planning as well as intraoperative navigational equipment to minimize impact on parts of the brain critical for motor, sensory, speech, visual and memory functions. The team also specializes in awake craniotomy and functional cortical and subcortical mapping.

Whenever possible, Hoag's neurosurgeons use minimally invasive surgical techniques employing some of the most advanced technology available including biomedical electronics, sophisticated neuronavigation systems, neuroendoscopic equipment and microsurgical tools. The majority of pituitary and skull base surgeries at Hoag are done through tiny incisions or utilizing naturally occurring orifices such as the nostrils.

MINIMALLY INVASIVE LASER ABLATION

Minimally invasive laser ablation is now FDA approved for treatment of brain tumors and radiation necrosis. Our neurosurgeons have been offering this approach since 2015 for patients with tumors deep in the brain or for patients who are not good candidates for long, invasive open brain surgery. This minimally invasive approach is done through an approximately 2 mm incision. A small laser fiber about the thickness of a guitar string cord is passed into the tumor and, using real-time MRI guidance, brain tumors can be

Glioblastoma, treated with surgery and Gamma Knife leading-edge sterotactic radiation; long-term survivor.



Upper row: Shows initial picture of tumor before and after surgery, followed by treatment maps.

Lower row: Shows the top of treated field, color composite, and post treatment MRI demonstrating no residual tumor, just the post treatment field.

internally ablated (by heat) instantly. This FDA-approved approach for brain tumors offers optimal safety and efficacy for selected patients. Fewer than two dozen hospitals in the United States perform this therapy.

NEURO-ONCOLOGY CLINIC

The Hoag Neuro-Oncology Clinic provides state-of-the-art treatment for patients with cancers of the brain and central nervous system. Neuro-oncologists Santosh Kesari, MD, and Jose Carrillo, MD, provide expert care for patients who are diagnosed with malignant brain tumors and monitor our patients for any neurologic complications from cancer or cancer therapies. The latest clinical research trials are vetted through this practice.

TUMOR BOARD

The Hoag Neuro-Oncology Tumor Board is designed for all practitioners to present and discuss patient cases and results in a consensus for optimal, evidence-based care. It is attended by neurosurgeons, ENT surgeons, neurologists, neuro-ophthalmologists, neuro-oncologists, radiation oncologists, neuro-radiologists, pathologists, endocrinologists and the specialized nurse navigator.

The Neuro-Oncology Tumor Board is held weekly in person and via video conferencing at Hoag Family Cancer Institute Newport Beach. In addition to in-person we have moved our Tumor Board virtually for all multidisciplinary staff to attend.

To submit a case for the Neuro-Oncology Tumor Board, contact Brain, Skull Base & Pituitary Tumors Nurse Navigator Jennifer Lozano, BSN, RN at 949-764-6656 or Jennifer.Lozano@hoag.org, or Rosana Figueroa at 949-764-7044 or TumorBoard@hoag.org.

RADIATION ONCOLOGY

Hoag offers many radiosurgery options for the treatment of brain tumors – Gamma Knife Radiosurgery, TomoTherapy® and ViewRay – ensuring each patient receives the most appropriate and effective treatment for their unique case. Hoag's Radiation Oncology team includes Drs. Brian Kim, Kevin Lin, Peter Chen, Craig Cox and Shane Lloyd.

Hoag is one of the country's few sites to offer the ViewRay MRIdian system. This combination of an MRI scanner and a LINAC radiation machine is the first to offer MR-guided adaptive radiotherapy. In this new paradigm of treatment, tumors and surrounding soft tissue structures can be visualized with full MR clarity, including small but critical

CNS structures such as the optic chiasm. Next, the radiation plan can be adapted to match the exact conditions of the day. Finally, a patient's internal anatomy can be monitored during treatment in real time with MRI. These unique capabilities allow for the delivery of radiation therapy with unprecedented precision and safety, and are particularly suited for focused, high-dose treatment forms of stereotactic brain radiation.

Hoag's Gamma Knife® Perfexion is the most advanced radiosurgical device available, targeting brain tumors with half a millimeter accuracy. An expanded and specialized treatment area in Hoag's Marilyn Herbert Hausman Advanced Technology Pavilion optimizes the patient experience. Hoag's Gamma Knife team is led by Dr. Christopher Duma, who began the program at Hoag in 1997. After 25 years and 6,000 patients treated, this represents one of the largest volumes/experiences in the world.

Clinical Research

Through Hoag Family Cancer Institute's Developmental Therapeutics and Oncology Research Program, led by Carlos Becerra, MD, patients have access to clinical trials not typically offered at community hospitals.

We also contribute to scientific activities through conference presentations and journal publications including the following article contributing to the better understanding of Gamma Knife radiosurgery procedures for recurrent trigeminal neuralgia:

Gupta M, Sagi V, Mittal A, Yekula A, Hawkins D, Shimizu J, Duddleston PJ, Thomas K, Goetsch SJ, Alksne JF, Hodgens DW, Ott K, Shimizu KT, Duma C, Ben-Haim S. Results of three or more Gamma Knife radiosurgery procedures for recurrent trigeminal neuralgia. J Neurosurg. 2021;135(6):1789-1798.

For a list of available clinical trials at Hoag, go to hoag.org/clinicaltrials.

Screening & High-Risk Services

It is estimated that up to 10% of all brain tumors (malignant and benign) occur because of a hereditary syndrome. In contrast to other hereditary cancer conditions, those involving brain tumors/brain cancer almost always involve more than a single tumor diagnosis. Conditions involving hereditary brain tumors include: Li Fraumeni syndrome, Lynch syndrome, familial adenomatous polyposis, neurofibromatosis types 1 and 2, Cowden syndrome, von Hippel-Lindau and tuberous sclerosis. Hoag Family Cancer Institute's Hereditary Cancer Program offers genetic counseling and genetic testing.

Support & Education

In a time of inconsistency during the Covid-19 pandemic, we have been able to provide consistency to our patients and community members through our virtual support group offerings. Hoag Family Cancer Institute's range of integrated cancer support services helps patients address the emotional, physical, spiritual, social and financial challenges that accompany a cancer diagnosis. Hoag's Brain Tumor Support Group offers education and support for anyone diagnosed with a primary brain tumor or metastatic disease. The Brain Tumor Support Group is led by the program's specialized nurse navigator, Jennifer Lozano, BSN, RN, along with licensed social worker, Josephina Kim, MSW; together they optimize support for both patients and their families. The support group meets via Zoom on the third Wednesday of the month at 3 p.m. The program's clinical nurse navigator is a vital member of the team, providing guidance and navigation to patients with brain, pituitary and skull base tumors throughout their treatment.

Brain tumor educational classes are also provided quarterly by Jennifer Lozano to our Hoag nursing staff to keep them up-to-date and well trained in the areas involving brain tumors.

Pituitary & Skull Base Tumor Program

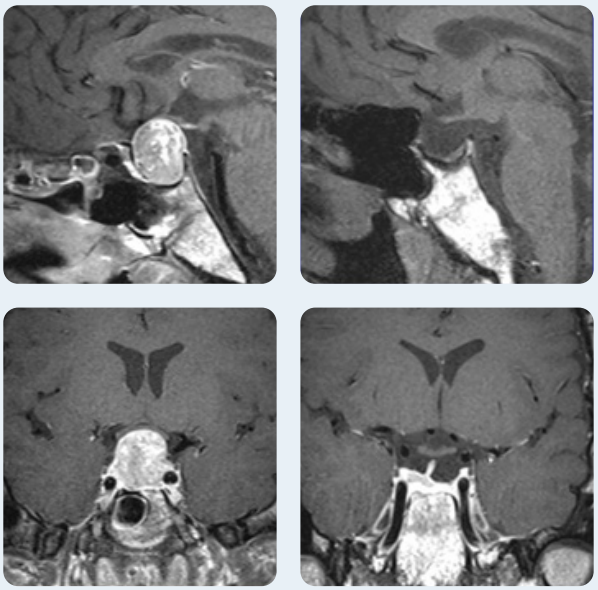
Overview

The Pituitary & Skull Base Tumor Program of Pickup Family Neurosciences Institute (PFNI) aligns neurosurgeons, otolaryngologists, neurologists, neuro-ophthalmologists, neuroradiologists and endocrinologists around the care of patients with pituitary tumors and other neoplasms of the intricate skull base region. The latter includes meningiomas, craniopharyngiomas, schwannomas, epidermoid tumors and other invasive tumors that affect this portion of the anatomy. While most tumors in this region are benign, they often cause symptoms and are technically challenging to remove due to involvement of critical structures.

The program focuses on combining the latest advanced and emerging technology with minimally invasive techniques to offer the best possible outcomes to patients with these rare and complex tumors. The majority of these surgeries are done through tiny incisions or using naturally occurring orifices such as the nostrils.

Since 2014, the Pituitary & Skull Base Tumor Program has seen dramatic growth under the direction of Robert Louis, MD, FAANS. In the years since the program's inception, a total of 614 minimally invasive surgeries for tumor removal have been completed at PFNI. This rapid growth in case volume speaks to the demand for this subspecialty of minimally invasive neurosurgery in Orange County, and the trust that patients with these tumors have placed in our hands. While case volumes by themselves are a great measure of growth, what matters most is the effect on patient outcomes. Numerous studies have demonstrated that surgeons and centers with more experience and which perform higher numbers of these complex cases have higher success rates and lower rates of complications. Indeed, a significant minority of the cases treated in our program are repeat surgeries for inadequate treatment from other facilities.

As a result, PFNI at Hoag is establishing itself as the only Center of Excellence for Pituitary Surgery in Orange County. The five years of surgical outcome data, including remission and complication rates, are meeting or exceeding nationally established standards for pituitary surgery. As such, Hoag has become a quaternary referral center for pituitary and skull base and tumors.



Preoperative (pictured above left) and postoperative (above right) appearance of a giant pituitary adenoma – sagittal and coronal views. Transnasal stereotactically guided approach, without need for opening skull.

Technological Advances – Precision Neurosurgery

Since 2015, minimally invasive neurosurgery has been guided using the Surgical Navigation Advanced Platform (SNAP) by Surgical Theater. This giant leap forward for planning and performing brain surgery is a system developed and based on flight simulator technology for F-16 fighter jets. It allows for virtual reality (VR) 360-degree reconstruction, planning, rehearsal and navigation for complex neurosurgical procedures. By performing a VR "fly-through" on each case, our surgeons are literally able to practice an operation in 3D before ever picking up the scalpel.

The tool optimizes minimally invasive approaches, with smaller incisions, fewer complications and better overall outcomes. In fact, several studies have demonstrated superior outcomes with surgeons who first rehearse using VR. It has also been shown that preoperative rehearsal can lead to a change in the surgical plan nearly 25% of the time. In the five years since Surgical Theater was introduced, more

Pituitary & Skull Base Tumor Program: 949-764-6066

than 2,000 neurosurgical cases have been performed at PFNI using this innovative technology. Owed to the profound success of this technology in neurosurgery, in 2019 Hoag expanded the availability to all surgical specialties in an enterprisewide deployment. In modern practice, 360-degree VR models are used throughout the patient care continuum; from preoperative planning and patient engagement to surgical rehearsal to intraoperative 3D navigation.

Building upon the same platform, in 2017, EndoSNAP was introduced at Hoag. This provides the additional capabilities of augmented reality for endoscopic cases. The split screen view provided by the EndoSNAP gives the surgeon a "heads-up display" and allows for pinpoint accuracy and improved visualization of critical structures. Dr. Louis has been at the forefront of the development and implementation of VR and augmented reality guidance for neurosurgery and beyond.

In 2019, the availability of augmented reality (AR) expanded beyond endoscopic surgery to include microscopic surgery as well. With the development of SyncAR, Hoag became the first in the world to pilot and deploy neurosurgical augmented reality with advanced ocular injection. This technology represents a significant leap forward over traditional navigation systems as it provides constant feedback on relevant anatomy and critical structures, while allowing the surgeon to maintain focus on the operative field.

Team

The Pituitary & Skull Base Tumor Program is led by Robert Louis, MD, FAANS, the Empower360 Endowed Chair in Skull Base and Minimally Invasive Neurosurgery. Dr. Louis is an internationally renowned expert in endoscopic and minimally invasive treatment of benign and malignant brain tumors, sellar, parasellar and skull base tumors. Dr. Louis' unique background includes two fellowships in Complex Cranial Surgery and Minimally Invasive Skull Base and Pituitary Surgery.

Timothy Kelley, MD, is the ENT surgeon and partners with Dr. Louis for many of these complex cases. His particular expertise lies in endoscopic sinus and skull base surgery.

The multidisciplinary team also includes endocrinologists, neuro-radiologists, neuro-ophthalmologists, neurologists, pathologists and neuro-oncologists.

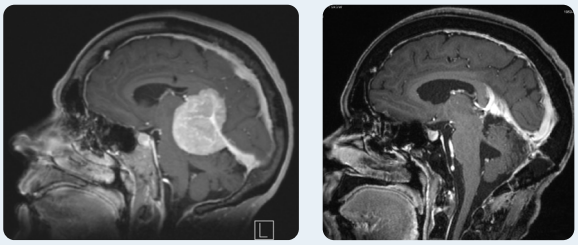
> "The technology of the future is now at Hoag."
>
> Hoag is not only visualizing the future of medicine, but quite literally shaping it.

The nurse navigator for the program is Jennifer Lozano, BSN, RN, who helps offer support and guidance through the complex and often confusing journey from diagnosis to cure.

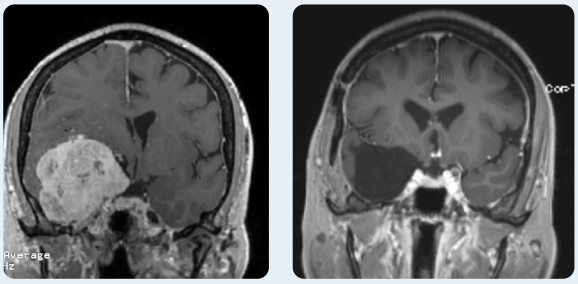
Experiential Reality Center at Hoag

Hoag's Pickup Family Neurosciences Institute is not only visualizing the future of medicine, but quite literally shaping it. With the launch of the Center for Advanced Visualization and Immersive Therapeutics, Hoag is researching, developing – and now offering patients access to – Experiential Reality (XR) technology, a field that includes VR, AR and mixed reality. The center, located within Hoag's PFNI Newport Beach campus, takes this leadership position to new heights. The center includes three dedicated spaces to research, develop and implement XR. In the Innovation Lab, doctors and engineers work side-by-side to develop the newest XR technology. The Therapy Treatment Room is open to all Hoag physicians, ranging from neurologists to psychologists to cardiologists, whose patients may benefit from XR treatments.

The third space in our program is the Experiential Theater, in which patients and their family members can "fly-through" a doctor's surgical plan to see exactly what the surgeon is planning before undergoing a procedure. This helps patients and their families better understand what they will experience."Patients who have preoperative 'fly-throughs' have not only better patient experiences, but better patient reported outcomes because of the lower risk of anxiety and more thorough preparation," Dr. Louis said. "This solves a longstanding problem within medicine, namely that patients do not understand traditional medical images." The theater is also used for clinical training, community education and multidisciplinary team collaboration on cases to optimize patient outcomes.



Tentorial meningioma prior to surgery. No remnant tumor three years after minimally invasive surgery and Gamma Knife stereotactic radiation.



Right spenoidal skull base giant meningioma pre- and post-complete surgical resection.

Hoag physicians have been working with engineers to enhance and develop several XR innovations. Hoag's surgeons are pioneering 3D modeling and VR tools to "rehearse" complex surgeries, not only in the brain but other organs as well, to reduce the time and risk associated with the procedures. And this past year, Hoag introduced expectant mothers to their developing babies using NurtureVR, a VR platform that pregnant women can use to watch their babies grow, receive prenatal education and manage their pain.

Surgical Outcomes

Composed of pituitary adenoma, craniopharyngioma, Rathke's Cleft Cysts, meningioma, schwannoma, metastases, epidermoid, dermoid, hemangioma, hemangioblastoma, SNUC and olfactory neuroblastoma.

Conference Presentations

XR in Brain Surgery: Solving Current Problems
AWE USA 2021 Santa Clara, CA
November 11, 2021

Solving Problems in Neurosurgery
Israeli Neurosurgical Society Meeting.
May 19, 2021. Israel.

Host Live Web Event
Hoag Advances in Clinical Virtual Reality Conference
October 1, 2021

Can VR/AR Be the Ultimate Precision Tool in Brain Surgery?
Interface Summit Web Event from INTERFACE Health
December 2021

Enhanced Navigation with Synchronized Augmented Reality Platform for Microsurgical Tumor Resection Procedures
CNS/AANS Tumor Section Symposium, 2021

Journal Publications

Louis RG, Cagigas J, Brant-Zawadzki M, Ricks M. Response to Letter to Editor: Impact of Neurosurgical Consultation with 360-Degree Virtual Reality Technology on Patient Engagement and Satisfaction. Neurosurgery Open 2021; 2(2); okab010.

Anthony D, Louis RG, Shekhtman Y, Steineke T, Frempong-Boadu A, Steinberg GK. Patient-Specific Virtual Reality Technology for Complex Neurosurgical Cases: Technical Note and Multicenter Case Series. Journal of Neurosurgery: Case Lessons 2021.

Louis RG, Steinberg GK, Duma C, Britz G, Mehta V, Pace J, Selman W, Jean WC. Early Experience with Virtual and Synchronized Augmented Reality Platform for Preoperative Planning and Intraoperative Navigation: A Case Series. Operative Neurosurgery 2021.

Yanni DS, Burak OM, Louis RG, Shekhtman Y, Iyer RR, Boddapati V, Iyer A, Patel PD, Jani R, Cummock M, Herur-Rama A, Dang PN, Goldstein IM, Brant-Zawadzki M, Steineke T, Lenke LG. Real-Time Navigation Guidance with Intraoperative CT Imaging for Pedicle Screw Placement Using an Augmented Reality Head-Mounted Display: A Proof-of-Concept Study. Neurosurgical Focus 2021.

Surgical Theater 3D Virtual reality tumor surgery planning in the OR.

Spine Center Programs

Overview

Hoag Spine Center hosts a multidisciplinary team that includes pain-management and acute-rehabilitation specialists, physical and occupational therapists, dieticians, and preeminent board-certified neurosurgeons who share a treatment philosophy focused on a conservative, preventative approach. These nationally renowned specialists provide the latest in holistic and inclusive care-management options to treat a range of spinal conditions including low back pain, spinal stenosis, spinal deformities, spinal tumors, as well as scoliosis in adults. The team emphasizes obtaining an accurate diagnosis, with subspecialized neuroradiologists armed with the most advanced MRI and CT techniques. Conservative measures are prioritized before approaching surgical options.

Should surgery be required, the team utilizes an evidence-based, comprehensive approach to prepare patients in the preoperative phase, and manage their inpatient and postoperative care with the goal of providing an enhanced patient experience and optimized patient outcomes. Our Hoag Spine Center neurosurgeons specialize in the latest minimally invasive techniques, which leads to more precise surgeries, lower infection rates and less blood loss, while avoiding unnecessary damage to healthy surrounding tissues.

Hoag's overall neurosurgery program, including Spinal Fusion, was ranked high performing by *U.S. News & World Report 2022*. Our neurosurgeons collaborate and incorporate innovative spine diagnostic technology may use surgical navigation or robotics to provide the best possible outcomes for patients. Our techniques are made as minimally invasive as possible in our nationally unique operating suite outfitted with augmented reality (AR) precision guidance. Hoag recently became the first hospital on the West Coast to offer an advanced, minimally invasive robotic navigation platform for spine surgery. The Mazor X Stealth™ combines 3D preoperative planning tools and analytics with intraoperative trajectory precision to provide surgeons with comprehensive information on the best approach and visualization of the target before the surgery starts. This new technology allows surgeons ultimate precision and efficiency, reducing the need for X-rays and minimizing pain and recovery time after surgery.

Dr. Burak Ozgur, director, Hoag Spine Center and Dr. Adam Kanter, chief of neurosurgery, Hoag Specialty Clinic.

Also, our innovative spine team performed the first spinal fusion surgery utilizing the recently FDA-cleared augmented reality (SyncAR®) surgical navigator for Spine, co-developed by neurosurgeons from Hoag's Pickup Family Neurosciences Institute and medical visualization platform leader Surgical Theater, the only one of its kind in Orange County. SyncAR for Spine utilizes 3D virtual reconstructions of CT and MRI images to enable detailed visualization of anatomic structures, as well as the surgical tools and hardware. The data-rich hologram produces a reconstruction of the spine to assist surgeons in making detailed, preplanned surgical decisions down to the millimeter. Using multiple displays within the AR goggles, 3D real-time feedback maximizes the accuracy of surgical precision and hardware placement.

Our spine surgical cases continued to maintain pre-pandemic volumes in 2022 with over 700 surgeries performed. We have also utilized our Hoag Irvine Ambulatory Surgery Center to expand options for those who meet the criteria for outpatient cervical and lumbar surgery. We saw continued growth in patients seeking our care with a 25% increase in calls and emails. These were

> "It was clear that Dr. Ozgur was in it to serve people, and that was really important to me. I felt like this is someone who cared about others and was going to take every case, including mine, at an individual personal level."
>
> *– Eric Noble, patient*

Hoag Spine Center: 949-764-1411

Figure 1. Spine Surgery Annual Total at Hoag Hospital Newport Beach

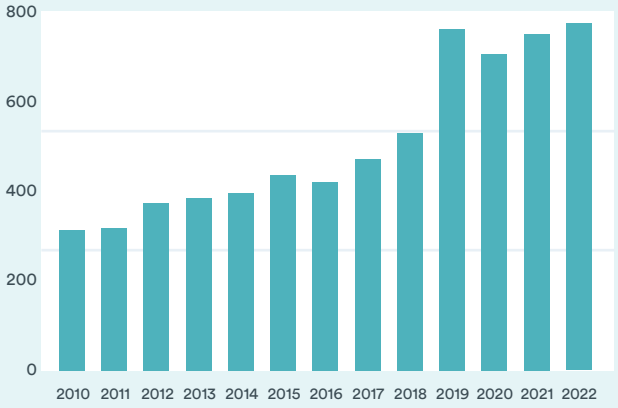
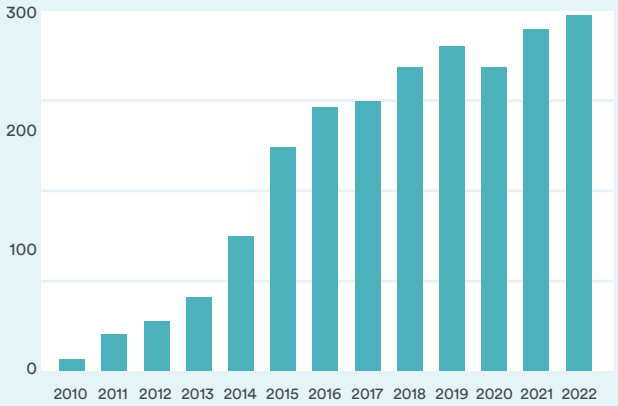


Figure 2. Minimally Invasive Spine Surgery Annual Totals at Hoag Hospital Newport Beach



"Our promise has always been to provide the latest in holistic and inclusive spine care right here in Orange County. Our broad range of nationally renowned specialists support each patient's full journey without the need to jump directly to a surgical solution."

– Burak Ozgur, MD, FAANS
Director, Hoag Spine Center

Dr. Burak Ozgur demonstrating use of spine surgical robotics.

triaged appropriately by our spine navigator to ensure each patient received the proper guidance and treatment.

Hoag Spine Center was proud to announce that Dr. Adam Kanter has joined the spine team as associate executive medical director of the Pickup Family Neurosciences Institute. He is the outgoing chair of the American Association of Neurological Surgeons/Congress of Neurological Surgeons section on disorders of the spine and peripheral nerves, and current president of the Society for Minimally Invasive Spine Surgery. Dr. Kanter has authored numerous publications in his areas of expertise – minimally invasive spine surgery including lateral-based approaches to the spine, complex spine surgery, artificial disc replacement and spinal-cord regeneration.

The quality of our program is tracked by ongoing patient-reported outcomes and detailed analysis of readmissions, lengths of stay and complications. This set of metrics has shown that our spine surgeons decreased our patients' disabilities and pain when comparing preoperative to postoperative results related to spine surgeries. We saw an even bigger decrease in disability and pain, and an increase in physical function, related to our lumbar spine surgeries.

Comprehensive Approach

We share a treatment philosophy focused on a conservative, preventative approach. Following are the resources we currently offer within the Hoag Spine Center. The goal of utilizing these services is to explore all conservative treatment options before resorting to surgery as well as assure an effective surgical recovery in patients requiring a surgical procedure.

NUTRITION

We offer nutrition services for patients pre- and post-op to optimize patient outcomes and promote better wound healing, assuring patient satisfaction. Hoag also offers excellent diabetic educators and an Education Center for patients with poorly controlled diabetes. Additionally, Hoag offers a well-regarded bariatric program that can help with weight loss and provide the option for weight-loss surgery (for appropriately selected patients), as weight control impacts back pain and health is improved through weight loss and proper nutrition.

PAIN MANAGEMENT

Hoag currently has a multidisciplinary Chronic Pain & Neuropathy Program intersecting with the Hoag Spine Center, providing patients who suffer from chronic back pain with alternative methods such as nerve stimulators and epidural injections. This provides patients further alternatives to surgery.

PHYSICAL MEDICINE AND REHAB SPECIALISTS

The Hoag Spine Center refers patients to physicians specializing in physical medicine and rehabilitation, if needed, and other experts who provide comprehensive spine-wellness services including acupuncture, chiropractic and alternative minimally invasive methods such as nerve blocks, epidural and trigger-point injections. This spectrum of options allows patients a holistic approach to managing spinal pain.

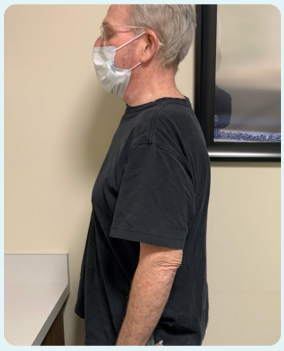
WHEN SURGERY IS REQUIRED, PATIENT-CENTERED ANESTHESIA

For patients who have a complex medical history, the program provides an anesthesiologist for thorough preoperative evaluations. The doctor will weigh the risks and benefits of different options for anesthesia and make the appropriate recommendations. Such preoperative engagement ensures that the surgery goes according to plan, with minimal complications and cancellations.

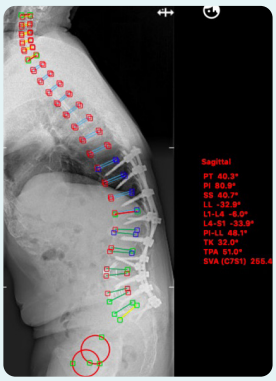
PSYCHIATRY

There is growing awareness of how mental health affects all aspects of care, including recovery and healing. We offer psychiatric consultation before surgery to assess the patient's emotional well-being. Chronic pain overlaps greatly with mental health issues. Addressing this preoperatively can contribute to good outcomes and allows the surgeon to see if the patient is emotionally equipped to handle the surgery process and continue to do well postoperatively.

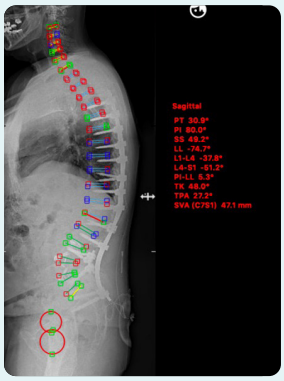
Preoperative photograph of patient with scoliosis and kyphosis, standing chronically leaning forward and unbalanced.



Postoperative photograph of patient after surgical correction, standing more erect with better overall balance.



Preoperative image demonstrating spine deformity, imbalance and digital correction planning.



Postoperative image demonstrating surgical spine deformity correction and improved balance.

4-level minimally invasive cervical spine fusion with interbody cage disc replacement.

Pickup Family Neurosciences Institute in the news

OrthoSpineNews.

First SyncAR for Spine Surgery in the World Performed at Hoag

by Chris J. Stewart – December 7, 2022

NEWPORT BEACH, Calif., Dec. 7, 2022 /PRNewswire/ — Hoag's innovative spine team has performed the first spinal fusion surgery utilizing the recently FDA-cleared augmented reality (SyncAR) surgical navigator for Spine, co-developed by neurosurgeons from Hoag's Pickup Family Neurosciences Institute and medical visualization platform leader Surgical Theater.

SyncAR for Spine utilizes 3D virtual reconstructions of CT and MRI images to enable detailed visualization of anatomic structures as well as the surgical tools and hardware. The data-rich hologram produces a life-like reconstruction of the spine to assist surgeons in making detailed preplanned surgical decisions down to the millimeter. Using multiple displays within the AR goggles, 3D real-time feedback maximizes the accuracy of surgical precision and hardware placement.

Hoag's neurosurgeons have already studied and published the benefits of SyncAR technology in the lab, demonstrating an improved accuracy of >99% for screw placement in the spine. SyncAR for Spine subsequently received FDA clearance in September 2022 paving the way for its utilization in the operating room to help real people.

"Integrating augmented reality into the operating room has the potential to improve surgical precision and patient outcomes at hospitals around the world," said Burak Ozgur, M.D., director of Hoag's Spine Center at the Pickup Family Neurosciences Institute, and one of the surgeons who performed the recent SyncAR for Spine procedure.

"SyncAR for Spine is allowing not only enhanced navigation in the operating room, it is enabling more enlightening and informed preoperative conversations with our patients. They put on the goggles and get to see their own anatomy, and the pathology, with their own eyes. It's truly empowering," said Adam Kanter, M.D., associate executive medical director of the Pickup Family Neurosciences Institute, who assisted Dr. Ozgur during the first SyncAR for Spine patient.

Hoag's comprehensive Spine Center is a recognized leader and provider of the most advanced non-operative and minimally invasive treatment options available. Hoag's board-certified, fellowship-trained spine experts provide personalized patient-centered care that enables them to achieve some of the best clinical outcomes in the nation.

"Much of the discussion of surgical innovation centers around the next hardware iteration," said Daniel Yanni, M.D., F.A.A.N.S., vice chair of the division of neurosurgery, who worked closely with Robert Louis, M.D., chief of neurosurgery and the Empower360 Endowed Chair in Skull Base and Minimally Invasive Neurosurgery, to develop the AR software. "Few people think, 'How do we change surgical execution?' It takes a hospital as forward-thinking as Hoag to advance the way surgery is conducted."

Dr. Louis agreed, saying the speed at which Hoag's expert neurosurgeons were able to develop expertise in and deploy this cutting-edge technology in the operating room can only happen at a hospital as nimble and innovative as Hoag.

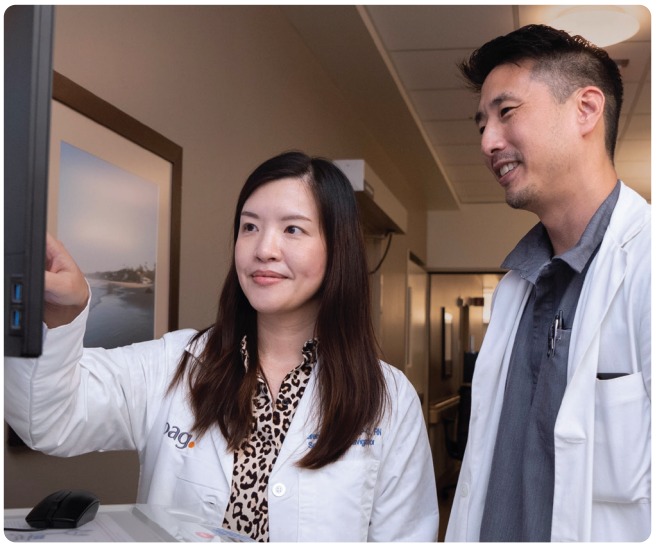
"In an academic setting, the speed of evolution would be much slower," said Dr. Louis. "We are leaps and bounds ahead in terms of both the development and deployment of advanced technologies. We are thrilled to bring this technology to our community and beyond."

Dr. Kanter, who spent his previous 15 years in academia at UPMC concurs, "I spent over a decade trying to bring advanced equipment such as robotics and augmented reality to Pittsburgh. At Hoag, it's all already here! Bringing innovative technology into the community is part of the culture at Hoag, we are imagining and creating the future of spine surgery right here in Orange County."

The patient is recovering well, and many more patients will benefit from the technology going forward.

SyncAR for Spine enhanced view could result in more efficient surgeries, streamlined surgical planning, less exposure to X-rays and optimal surgical precision. It also enables training of existing and future spine surgeons while deploying Hoag's technological capabilities to hospitals anywhere.

For his part, Dr. Ozgur is thrilled that this homegrown technological innovation elevates the entire field of neurosurgery.



Clinical Nurse Navigator Lauren Kim, MSN, NP-C, RN, collaborating with care team to provide compassionate, patient-centered care with a comprehensive approach.

> "Dr. Jankowski really understands and promotes the philosophy of patient-centered care. His confidence is very reassuring. I am extremely grateful to Dr. Jankowski and his medical assistant for their outstanding patient care."
>
> *– Melanie Loscutov, patient*

Educational Opportunities

Our program leaders not only focus on patient care, but also on the education and development of hospital staff directly involved in patient care. The Hoag Spine Center offers educational opportunities for healthcare staff within Hoag that cover various topics related to the spine.

We conduct regular spine case conferences and spine grand rounds. Spine case conferences are learning opportunities for nurses, APPs, physicians, neurosurgeons and physical therapists. These two activities alternate monthly and provide CEU and CME credits for those who attend.

Team

NEUROSURGEONS

Dr. Burak Ozgur
Director, Hoag Spine Center

Dr. Adam Kanter
Chief of Neurosurgery, Hoag Specialty Clinic

Dr. Pawel Jankowski
Dr. Robert Louis
Dr. Vivek Mehta
Dr. Daniel Yanni

PHYSICAL MEDICINE AND REHABILITATION PHYSICIANS

Dr. Keyvan Esmaeili
Dr. Christopher Marker

PAIN MANAGEMENT PHYSICIANS

Dr. Alfred Beshai
Dr. James Kim
Dr. Aaron Przybysz
Dr. Shawn Zardouz

NEUROSURGERY ADVANCED PRACTICE PROVIDERS

Carly Bower, NP
Gina Duel, PA-C
Janneinne Le, PA-C
Suzanne Pach, NP
Vanessa Stowasser, NP
Kelly Watkins, NP

SPINE CARE NAVIGATORS

Lauren Kim, MSN, NP-C, RN
Alissa Matthews

EXECUTIVE DIRECTOR

Kelly Reynolds, MHA

PHYSICAL THERAPY

Stacie Yamasaki, DPT

Movement Disorders/Parkinson's Program

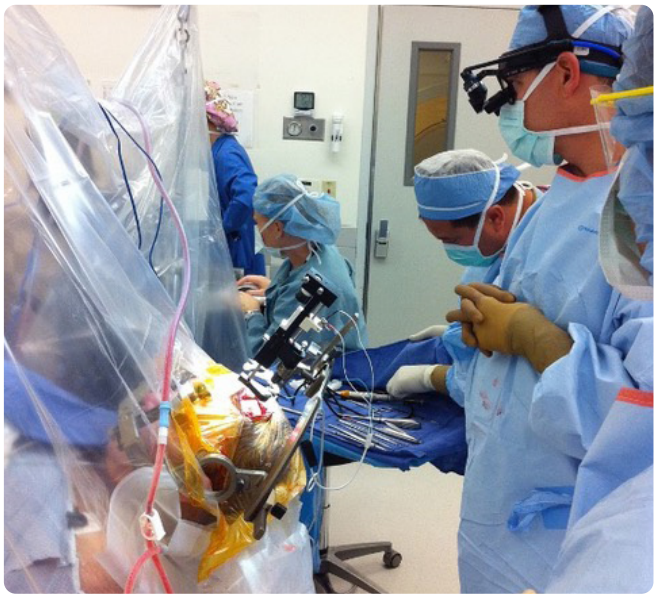
Overview

As part of the Pickup Family Neuroscience Institute, the Salsbury Family Movement Disorders Program has continued to focus on providing expert, compassionate and consistent care. Since its inception in 1994, the program has dramatically grown with the generous philanthropic donation of the Salsbury family and has continued to evolve to meet the needs of an ever-growing patient population. Hoag's Movement Disorders clinic served approximately 3,855 patients. In 2022, 6,739 new patients were cared for in the clinic. The movement disorder physicians collectively consulted 1,435 new patients at the Newport Beach location alone. Of those visits, 413 were diagnoses with movement disorders.

The Salsbury Family Movement Disorders Program offers a multidisciplinary approach to disease management through the collaboration of team members, processes and many adjunct services provided by Hoag. The focus remains on the program's ability to provide expert, specialized patient evaluation, holistic care, education, advanced medical and surgical therapy and clinical research. The program under the directorship of Dr. Saulena Shafer includes four fellowship-trained movement disorder neurologists, two functionally trained neurosurgeons, physician assistants, nurse practitioners, nurse navigation, neuropsychology services and neuro-rehabilitation services. Our physician services are offered in clinics located in Newport Beach, Huntington Beach, Tustin, Alisa Viejo and Irvine. Telemedicine has ensured routine and new access to care during the continued Covid pandemic which continued to threaten access to care.

The program offers care and treatment of all patients with movement disorders, the most predominant of these diseases being Parkinson's disease. The program also serves patients diagnosed with Dystonia, Essential Tremor, Progressive Supra-Nuclear Palsy, Multiple System Atrophy, Corticobasal Degeneration, Lewy Body Disease, Huntington's disease, and various gait disorders.

Managing chronic movement disorders requires care that needs to be accessible, consistent and meaningful. The relationships between all clinicians in the program and the patients served are defined by a long-term commitment, and the program's goal is to ensure that the outcomes of the comprehensive care provided allow patients to achieve their highest level of independence, while being consistently supported to maintain a good quality of life.



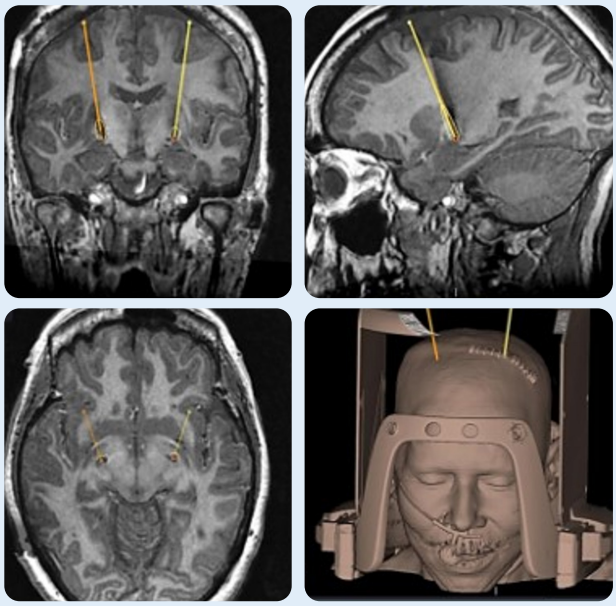
Dr. Christopher Duma using the stereotactic device to perform Deep Brain Stimulation surgery.

The nuclear DATscan and other specialized neuro imaging provide the latest diagnostic technology for accurate diagnosis. The program's neurosurgeons have the greatest experience with Deep Brain Stimulation (DBS) surgery available in California, and the thorough assessment process for that surgery is patient-specific. Additional services and treatment options offered at Hoag which augment and compliment the care our movement disorders patients receive include physical, occupational and speech therapy, Parkinson's exercise classes, a driver rehabilitation program, neuropsychiatry, acute rehabilitation services, Duopa™ therapy, home health services, educational classes on Parkinson's, support groups, nutritional consultations and case management.

Incidence and Prevalence

Parkinson's disease (PD) continues to be the second most common neurodegenerative disorder. Each year across California and the United States the incidence is rising. It is estimated that in Orange County alone, approximately 10,000 people are diagnosed with PD. Most patients diagnosed with PD or a movement disorder are diagnosed later in life. As the population of older adults in the U.S.

Movement Disorders Program: 949-764-6066



Preoperative stereotactic planning laid over successful postoperative bilateral deep brain stimulator electrode placement. MRI: Selected coronal, axial and sagittal slices from 3D acquisition of patient's brain scanned with stereotactic frame in place. This allows accurate positioning of tip into the selected target (in this case Globus Pallidus Interna) for the symptoms of stiffness and rigidity in a Parkinson's patient.

"While I was not too enthusiastic, I did a lot of research on DBS and decided to proceed with the surgery. From the start, the Hoag Neurology staff were extremely helpful in answering my questions and refreshingly patient. They behaved in a professional manner and visibly cared about my welfare and treatment. The results of the DBS procedure have been very positive.

Prior to making my decision on DBS, I interviewed several former patients who had PD. The best quote was from one former patient of Hoag's: 'The future is my friend again!'"

– Deep Brain Stimulation patient at Hoag

continues to expand rapidly, so too does the number of older adults diagnosed with Parkinson's. An estimated 1.2 million people in the U.S. could be living with PD by 2030 and the number of younger adults diagnosed with PD also continues to rise. Approximately 20-40% of patients with PD also have dementia. The Movement Disorders program collaborates with Hoag's Memory & Cognitive Disorders Program to recognize this growing population and provide early detection and coordinated care. It remains an imperative that the program continues to provide access to specialized care and expand to meet the demands of these growing populations in an effort to mitigate the effects of disease burden.

Deep Brain Stimulation Surgery

The Salsbury Family Movement Disorders Program at Hoag has a robust surgical component led by Dr. Christopher Duma, who brought DBS surgery to Hoag in 1998, when it was first FDA approved in the U.S. Both Dr. Duma and Dr. Alexander Taghva are trained in functional and stereotactic neurosurgery. The program has a comprehensive protocol for patients undergoing DBS surgery. This includes neurology consultation, UPDRS evaluation and filming patient function off and on medications, extensive neuropsychological testing, and physical therapy evaluation. Additionally, the multidisciplinary team meets to discuss patient candidacy and plan of care. At this time, DBS surgery offers the best procedural treatment outcomes for patients. While focused ultrasound promises help to patients with essential tremor (ET), DBS surgery treats patients with ET and PD with well-documented successful outcomes. DBS also continues to evolve with the latest advancements looking to improve outcomes. Both asleep and awake surgery options are offered at Hoag and, in 2022, a total of 88 DBS surgeries, including generator replacements, were performed on 50 patients. The program partners with many neurologists within the community who refer their patients to Hoag for thorough workup and DBS surgery.

In addition to DBS surgery, Hoag can offer patients Duopa Therapy™. Duopa Therapy in select patients provides a continuous dose of medication to the patient via an external medication pump and a tube inserted into the jejunum.

Community Events

In 2022, Hoag resumed monthly patient education sessions in a virtual format. The classes included “Introduction to Parkinson’s Disease,” “Advanced Parkinson’s Disease,” and “Introduction to Deep Brain Stimulation Surgery.” With three classes held every month, the patients and their families within the community were offered an opportunity to interface with a neurologist to glean information and have their questions addressed. In addition, Hoag offered a Care Partners Support class, and when a full group was not available, the nurse navigator was able to offer one-on-one support to the care partners.

Hoag sponsored and participated in two prominent community events: The SoCal Ride for Parkinson’s, which saw approximately 355 participants, each raising $200 toward Parkinson’s research through the Michael J. Fox Foundation. Hoag had a team of riders that we hope will grow in 2023 in support of this worthy cause. Hoag sponsored the Parkinson’s Disease Foundation Moving Day, an event that attracts patients, families and community members. The event provided an opportunity to showcase the Salsbury Family Movement Disorders Program.

The Salsbury Family Movement Disorders Program also continued to collaborate with community groups who serve the Parkinson’s population in Southern California. Hoag neuro-rehabilitation therapy has continued to offer services to patients with PD, offering weekly specialized group classes and individual therapy sessions.

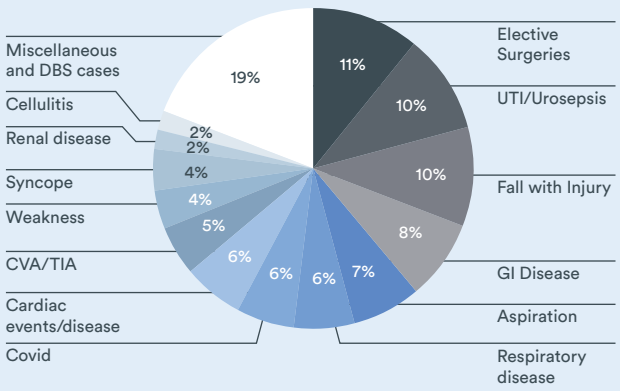
Additional Services

The Salsbury Family Movement Disorders program has a nurse navigator who is dedicated to the support of patients in the outpatient and inpatient setting. The nurse navigator provides both patient and nurse education, emotional support and resource referrals to our patients. The nurse navigator meets with patients and their families, confirms home PD medication regimens, reviews specific Parkinson’s symptoms and helps coordinate support services. Additionally, the nurse navigator inpatient role provides an opportunity for tailored patient advocacy, end-of-life and palliative collaborative input and care-partner support.

In 2022, the number of inpatient admissions of patients who have Parkinson’s disease increased. In 2022, 606 admitted inpatients had Parkinson’s as a co-morbid condition.

An analysis of these admissions revealed that most are admitted for urinary tract infections and falls with injury. The graph below details admissions. By tracking this data, the program seeks to provide education and services in the hope of reducing admissions despite the growing PD population.

Hospital admitting diagnosis in patients with PD:
Need for program’s support



Saulena Shafer, DO

Kaveh Saremi, MD

Mindy Bixby, DO

Sandeep Thakkar, DO

Christopher Duma, MD

Alexander Taghva, MD

Devin Binder, MD

Lauren Bennett, PhD, ABPP-CN

Seda Terzyn, PhD

Belinda Stewart-Burger, MSN

Salsbury Family Movement Disorders Program Team

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Mindy Bixby, DO
Kaveh Saremi, MD
Saulena Shafer, DO
Sandeep Thakkar, MD

FUNCTIONAL NEUROSURGEONS

Christopher Duma, MD, FACS
Alexander Taghva, MD
Devin Binder, MD

NEUROPSYCHOLOGY TEAM

Lauren Bennett, PhD, ABPP-CN
Seda Terzyn, PhD

NEURO-REHABILITATION THERAPY TEAM NURSE NAVIGATOR

Belinda Stewart-Burger, MSN

Pickup Family Neurosciences Institute in the news

hoag.

‘One in a Million’: What Celine Dion’s Stiff Person Syndrome Diagnosis Teaches Us About Rare Disorders

Hoag.org – December 9, 2022

To her fans, the heartbreaking news that Celine Dion is battling a condition that only affects about ‘one in a million’ people is, perhaps, no surprise. The iconic singer is in a lauded category of her own. It would take a rare condition to affect such a rare vocal treasure.

A disease is considered rare if it affects fewer than 200,000 people. According to the National Institutes for Health, that adds up to about 7,000 rare diseases.

“What people don’t always realize about rare diseases is how common it is for someone to be suffering from one. It sounds counter-intuitive, but one in about every 10 people are contending with a rare disease,” said Saulena Shafer, M.D., neurologist and director of the Salsbury Family Movement Disorders Program at Hoag’s Pickup Family Neurosciences Institute. “In fact, only a small handful of cancers are actually considered rare.”

Dion told her fans in an emotional video on Thursday that she is working with a sports medicine therapist to build back her strength. Her announcement illuminates the specialized work, dedication and resources necessary to contend with a rare disorder.

“Across every aspect of medicine, rare diseases and disorders challenge medical researchers and doctors,” Shafer said. “I applaud Celine Dion for her bravery in coming forward. Her announcement sheds an important light on the isolation and difficulty many people feel when contending with a rare condition.”

What do you need to know about rare diseases and disorders?

They Run in the Family: Many rare diseases are genetic. While some do not appear until later in life, others are apparent at birth. About two-thirds of Americans with rare diseases are children.

Photo Courtesy: Rolling Stone

They Can Affect Any Part of the Body: From cystic fibrosis to Celine Dion’s stiff person syndrome, rare diseases and disorders can show up in any body system and across the medical spectrum.

“The breadth of rare diseases and disorders means that, at some point, every physician specialist has seen at least one,” Shafer said. “At Hoag, we offer patients access to the most advanced clinical trials, treatment options and technological innovations available.”

These rare diseases can make a person feel as though they are suffering alone. But, at Hoag, you’re not alone. Even for that “one in a million” patient, Hoag is by your side.

To learn more about Hoag’s Salsbury Family Movement Disorders Program, visit hoag.org/movement-disorders.

Epilepsy Program

Overview

Pickup Family Neurosciences Institute's (PFNI's) epilepsy team focuses on providing an individualized and comprehensive approach to caring for patients with epilepsy and seizures. Regardless of whether a patient is referred to our program for evaluation of transient neurological symptoms, first lifetime convulsion, or drug-resistant seizures, our epilepsy team focuses on answering the most critical questions:

- Is it epilepsy?
- What kind?
- How do we eliminate or most effectively control seizures?
- Is surgery an option?
- Can we reduce side effects of medications?
- What about alternative therapies such as diet and CBD?
- What about quality of life, reproductive health, pregnancy and long-term effects of anti-seizure medications?

These are just some of the pressing matters to our patients. The PFNI Epilepsy Team strives to address all of these questions and more.

Team

The program is led by David Millett, MD, PhD, a nationally recognized epileptologist and specialist in electroencephalography (EEG), who joined Hoag in 2014 and has overseen dramatic growth of the Epilepsy Program in his eight years of leadership.

In 2018, Dr. Millett was joined by James D. Park, DO, a fellowship-trained epileptologist and co-director of the epilepsy monitoring unit. Angel Samich, NP-C, became a crucial addition to the team in 2021 to assist in the management of our epilepsy patients.

The surgical management of patients with drug-resistant epilepsy is led by Chief of Epilepsy Surgery Vivek Mehta, MD, a nationally recognized expert in the treatment of difficult-to-treat epilepsies. Dr. Mehta is joined by Kelly Watkins, MSN, FNP-C, APRN.

Our Epilepsy Program strives to provide a patient-centered approach to epilepsy care, focusing on cognitive and

Epilepsy Program: 949-764-8319


David Millett, MD


Vivek Mehta, MD


James Park, DO


Lauren Bennett, PhD, ABPP-CN


Sheena Dhiman, BSN, MBA


Kambria Hittelman, PsyD

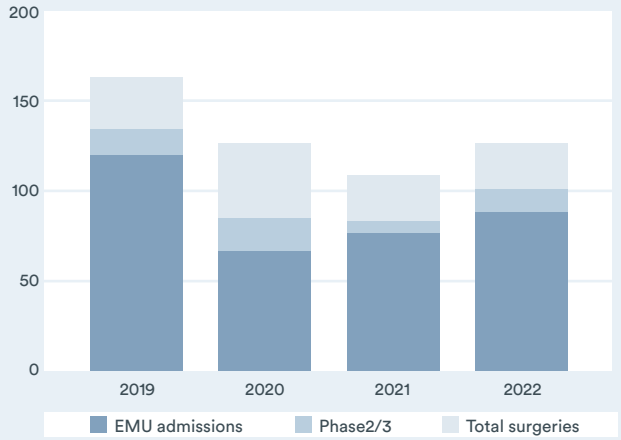

Angel Samich, NP-C


Autumn McMaster


Ashley Miller, PhD, ABPP-CN


Ruth Morin, PhD

Figure 1. Epilepsy Monitoring Unit Volume



psychological well-being in addition to seizure-control. The addition of neuropsychologist Lauren Bennett, PhD, ABPP-CN, in 2020 provided a critical resource to better understand the cognitive and psychological impact of epilepsy on our patients and provide appropriate guidance and therapy to improve their quality of life. Dr. Bennett was joined by Ruth Morin, PhD in 2021, and by Ashley Miller, PhD, ABPP-CN in 2022 to expand these services.

Our exceptionally dedicated director of neurosciences programs and services is Sheena Dhiman, BSN, MBA, who works closely with physicians, nurses, and technicians in the EEG laboratory and epilepsy monitoring unit (EMU) to optimize patient care, including appropriate referrals and resources, education of patients and staff, and coordinating programs to promote psychological and physiological wellness. Our team cannot succeed without the care and expertise of EEG technologists and our nurses, both in the Lucy Curci Neurosciences Specialty Clinic and our inpatient Epilepsy Monitoring Unit. This multidisciplinary team is dedicated to providing the most effective and least invasive treatments to help patients achieve seizure freedom and the highest possible quality of life.

Program Highlights

VISITING SURGEON PROGRAM

Hoag is designated by Medtronic to be a visiting surgeon site for Medtronic's Autoguide Cranial Robotic platform. Hoag is proud to share expertise in minimally invasive robotic cranial surgery with surgeons around the U.S. and the world. This program has been made possible by the Bill and Nancy Thompson Foundation and it has allowed Hoag to train future neurosurgeons and stay at the forefront of this advanced technology. Dr. Mehta has been recognized as a leader in this technology by Medtronic.

SLATE

Hoag is proud to be named a clinical trial site for minimally invasive laser ablation to treat epilepsy. Hoag's Level 4 Epilepsy Center is proud to be only the 3rd clinical site in California (along with UCSF and Stanford) to offer this treatment to patients with difficult-to-treat epilepsy. "We are aiming to make surgery scarless, less scary and with an easier recovery," Dr. Mehta said. "We are excited to be a part of this study and to pioneer an effective option for our patients with epilepsy." Over 75% of patient who have undergone laser ablation (LITT) in our program have become seizure-free compared to the national average of 51-62%.

HOAG PARTNERS WITH THE CAMERON BOYCE FOUNDATION TO END SUDEP

SUDEP, or sudden unexplained death in epilepsy, is a rare but terrible complication of poorly controlled epilepsy. In 2019, Disney star and actor Cameron Boyce tragically passed away from SUDEP at age 21. In his honor, his family formed The Cameron Boyce Foundation with the aim of raising awareness and educating the public to help end SUDEP. Hoag was proud to be selected as the foundation's premier clinical partner, and Dr. Vivek Mehta was selected to be a part of the foundation board.

The Cameron Boyce Foundation event in May 2022.

The organization's inaugural fundraising gala was held in 2022, with notable celebrities and Cameron's friends and family attending and supporting. As lead sponsor for the gala, Hoag's Pickup Family Neurosciences Institute and its Epilepsy Program gained local, national and global attention through entertainment and social media.

"Partnering with The Cameron Boyce Foundation is a huge honor for Hoag as we aim to tackle epilepsy in all dimensions – from the clinical realm in our state-of-the-art EMU and operating rooms to the public awareness space," said Dr. Mehta. "It's important for patients and families to know about epilepsy and, in particular, the risks of SUDEP and how a Level 4 Epilepsy Center like Hoag can help."

NEUROPACE CENTER OF EXCELLENCE FOR RNS IMPLANTATION AND MANAGEMENT

The PFNI Epilepsy Program acquired a novel intraoperative robot for precision guidance in the placement of stereotactic recording electrodes and laser ablation catheters. The Medtronic Stealth Autoguide system allows Dr. Mehta to advance the field of minimally invasive neurosurgery and epilepsy surgery.

- This technology at Hoag has been featured as one of the novel advances in minimally invasive neurosurgery and Dr. Mehta was honored to give a keynote lecture at the Hong Kong Neurosurgical Society regarding Hoag's excellent outcomes.
- Dr. Mehta was named a key opinion leader for Medtronic, Surgical Theater and NeuroPace as an expert in epilepsy surgery, helping other surgeons learn this technique.
- Hoag was selected as a visiting surgeon site for this technology, enabling Hoag to host surgeons from around the world to learn the advanced techniques pioneered here.
- Nearly 90% of our patients who have undergone RNS implantation have reported a meaningful response to neurostimulation therapy and 64% are "super-responders" with a >90% reduction in seizures.

DEEP BRAIN STIMULATION

Deep Brain Stimulation (DBS) was FDA approved for the treatment of medically refractory epilepsy in 2018 and is now utilized alongside other neurostimulation devices such as Vagus Nerve Stimulation (VNS) and Responsive NeuroStimulation (RNS). These devices have revolutionized how we treat patients with drug-resistant epilepsy. Patients who were previously not considered good candidates for epilepsy surgery now have more options available to them. Our first patient at Hoag with a DBS for epilepsy had the device placed in August 2020. He was found to have multifocal epilepsy, meaning seizures were arising from multiple locations on both sides of the brain and making focal treatments like resection impossible. DBS reduced the frequency of his seizures and has helped to prevent seizures from progressing to ones with loss of awareness. Research has shown that seizure control can improve over time the longer neuromodulation devices like DBS are stimulating the brain.

Accomplishments

Over the past several years, the PFNI Epilepsy Program has achieved several notable accomplishments. The program received the highest accreditation of Level 4 Comprehensive Epilepsy Center by the National Association of Epilepsy Centers in 2018, recognizing the highly specialized physicians, resources, and number of patients with drug-resistant epilepsy who have been admitted to our monitoring unit.

In 2018, Dr. Millett was recognized by the Epilepsy Foundation at its Care and Cure Gala for his continued efforts to provide the highest level of epilepsy care in Southern California.

That same year, Dr. Millett and the PFNI Epilepsy Program received an extraordinary $1 million gift from philanthropists Nancy and Bill Thompson to expand clinical services for epilepsy to Orange County residents who have no other access to health care. This novel program has created a powerful synergy between the Lestonnac Free Clinics and Hoag's own Charity Care Program to provide the entire spectrum of epilepsy care – from outpatient clinic visits and anti-seizure medications to diagnostic services such as EEG, MRI, and video-EEG – to underserved patients in the region. We are delighted that, through the generosity of the Thompson Epilepsy Fund and Hoag's financial assistance program, patients with severe drug-resistant epilepsy and no other access to advanced epilepsy care have been able to receive surgical treatment, dramatically improving their quality of life and the lives of their families.

Pickup Family Neurosciences Institute in the news

Daily Pilot

Artists bring ‘hidden truths’ of epilepsy to light in art exhibition at Marina Park

by Lilly Nguyen – September 24, 2022

A unique art show in Newport Beach last weekend sought to promote awareness of epilepsy and to empower individuals living with the neurological disorder that causes seizures.

Held at the Marina Park Community Center, “1:26 The Art of Epilepsy” was hosted by the Hidden Truths Project, founded by Dr. Julie Thompson-Dobkin. She describes epilepsy as an invisible disability.

The name of the show reflects the number of people in the population – one in 26 – who live with the disorder.

Costa Mesa artist Zach Beckemeyer is one of them.

For Beckemeyer, art turned out to be just the balm he needed.

Beckemeyer was first diagnosed in 2011 when he was 22, after he had a seizure in the passenger seat of his mother’s car while they were on their way to a nephew’s birthday party.

He’s since had two surgeries to address his epilepsy that removed 3 millimeters of his brain. The operations, after which he had to relearn to walk, speak, read and write, allowed him this week to say he’s been seizure-free since August 2018.

Beckemeyer said he found art by accident in 2017 but that it has since become a therapeutic in ways that he hadn’t expected for him both physically and mentally.

“I was just feeling like I was in a good mood one day. My niece was turning 13 at the time. She’s starting to really get into music. I’m a huge music fan. I play instruments myself,” said Beckemeyer. “We would always play around. I’m going to try and draw something for us. I ended up finding an idea in my mind and it was a little cheeseburger monster type of a thing.

“It was kind of goofy. It had these wiggly arms, these big eyes. It was black and white and it said happy birthday on it and she still has that today. Turned out she loved it so much she wanted it on a T-shirt.”

So, Beckemeyer printed out a few T-shirts, sold them and said that the sales gave him the confidence to keep going. He said he would frequent local cafes every morning, order coffee and draw in a small sketchbook until he started experiencing tremors and struggled with his mental health. So, he took a break from that ritual.

Zach Beckemeyer, 34, of Costa Mesa shows his art of the Newport Beach Pier during the Art of Epilepsy show presented by the Hidden Truths Project at Marina Park Community Center in Newport Beach. Beckemeyer has had two brain surgeries to control his seizures. Following the procedures, he had to relearn to walk, speak, read and write. (James Carbone)

It wasn’t until the last two or three years that he picked up a pen again and completed a drawing every day, he said.

“I just realized, wow, this feels great. This is nothing I’ve ever experienced. The only thing I’ve ever experienced of that nature that really made me feel comfortable was playing my drums and playing my guitar,” said Beckemeyer, who added with a laugh that his apartment walls are too thin to even consider playing his drums today.

“The thing with artwork is that it was helping out the physical problems I was having, such as the shakiness and the tremors. But all of my perspective ... it was a deep concentration on an entirely new universe and ... it was some kind of a high that I got out of it,” said Beckemeyer. “Before then, all I did all day was smoke marijuana and cigarettes. But when I realized how much of a better feeling [art gave me] ... that completely cut me out from smoking anything.”

Continue reading at latimes.com/socal/daily-pilot/news/story/2022-09-24/artists-bring-hidden-truths-of-epilepsy-to-light-in-art-exhibition-at-marina-park

Table 1. Lestonnac Clinic

	2019	2020	2021	2022
Clinic Patients	77	84	98	96
Surgeries Performed	2	1	1	1

The PFNI Epilepsy Program participated in an important clinical trial of a new drug-delivery system to stop seizures before they lead to disability or require emergency medical care. Our program continues to look for unique research opportunities that will advance the care of epilepsy patients.

Dr. Mehta championed the use of minimally invasive laser ablation surgery for the treatment of mesial temporal lobe epilepsy, the most common form of surgically remediable focal epilepsy (Table 1).

The PFNI Epilepsy Program acquired a novel intraoperative robot for precision guidance in the placement of stereotactic recording electrodes and laser ablation catheters.

When seizure control with medication becomes challenging, advanced diagnostics, including 3D imaging, functional and metabolic brain scanning, and even minimally invasive brain activity mapping, are used to select patients who may be candidates for focused surgical intervention, which can lead to a successful seizure-free life. As part of a multidisciplinary and collaborative approach to epilepsy, neurosurgeons, epileptologists, neuro-radiologists, neuropsychologists, epilepsy care coordinators, EEG technologists and other health care professionals meet on a regular monthly basis to review patient-specific cases, including those being considered for surgical interventions. Patients benefit from this combined expertise and experience of the collective physicians and professionals.

A New and Minimally Invasive Way to Treat One of the Most Challenging Forms of Epilepsy: LITT

Laser Interstitial Thermal Therapy (LITT) is a minimal-ly-invasive technique that allows surgeons to precisely target and selectively ablate the source of the seizures using real-time MRI guidance. As compared to traditional open surgery, which would result in a several-day hospital stay with a large surgical scar, this new technique allows patients to go home either the same day or the next with just one small stitch. The result is a much faster recovery time and a significantly shorter hospital stay.

This treatment has gained popularity at high-level epilepsy centers around the U.S. and Hoag is proud to offer this option to patients whose seizures are difficult to control. The early data is promising with seizure cure and reduction rates nearly compatible with open surgery and with fewer complications and side effects.

Peer Reviewed Journal Articles

Millett D and Pach S. Fenfluramine in the successful treatment of super-refractory status epilepticus in a patient with Dravet syndrome. Epilepsy Behav Rep. 2021;100461.

Pregnancy outcomes of refractory epilepsy patients treated with Brain-responsive neurostimulation. Li Y, Eliashiv D, LaHue SC, Rao VR, Martini ML, Panov F, Oster JM, Yoshii-Contreras J, Skidmore CT, Kalayjian LA, Millett D, Meador KJ. Epilepsy Res. 2021;169:106532.

Epilepsy surgery in the underserved Hispanic population improves depression, anxiety, and quality of life. Smith JAD, Armacost M, Ensign E, Shaw S, Jimenez N, Millett D, Liu C, Heck CN. Epilepsy Behav. 2018 Jun;83:1-6.

Research

Medtronic Stereotactic Laser Ablation for Temporal Lobe Epilepsy (SLATE). PI for this trial is Dr. Mehta and Drs. Millett and Park are Sub-Investigators.

EEG & Neurodiagnostics Services

Overview

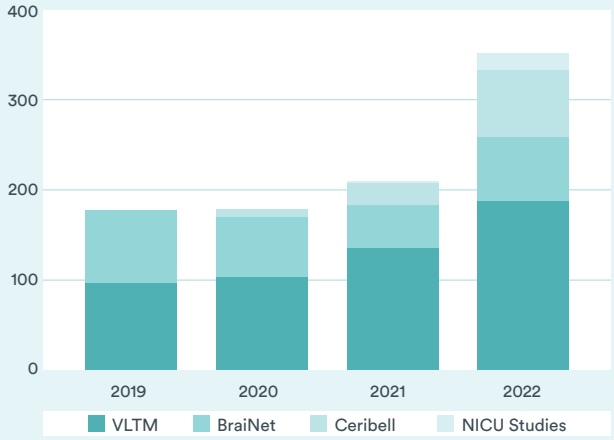
The year 2022 was one of the busiest years that we have had at the Neurodiagnostic Lab since we opened. The Neurodiagnostics Lab provides inpatient and outpatient services for the evaluation and diagnosis of central and peripheral nervous system disorders at both the Newport Beach and Irvine campuses. Certified neurodiagnostics technologists perform many types of neurophysiologic exams on inpatients and outpatients, and sub-specialized neurologists oversee the service. The service also provides monitoring during surgeries to help assess and protect the structural integrity of the nervous system.

The Neurodiagnostics Lab provides specialized procedures such as routine, extended, sleep-deprived electroencephalography (EEG) and bedside continuous long-term video electroencephalography (VLTM), as well as continuous brain wave monitoring on acutely hospitalized patients. Hoag is one of a few hospitals in Orange County that provides this 24/7 inpatient EEG service, having established unique applications (BraiNet and Ceribell) protocol utilizing the entire hospital team, including our excellent nursing staff.

Other services requested by our community for various specialized neurological diagnoses include brain stem auditory evoked potentials (BAEP), somatosensory evoked potentials (SSEP) and visual evoked potentials (VEP). Board-certified and eligible physicians with subspecialty training in nerve conduction studies (NCS) and electromyography (EMG) testing perform studies for our community in Newport Beach.

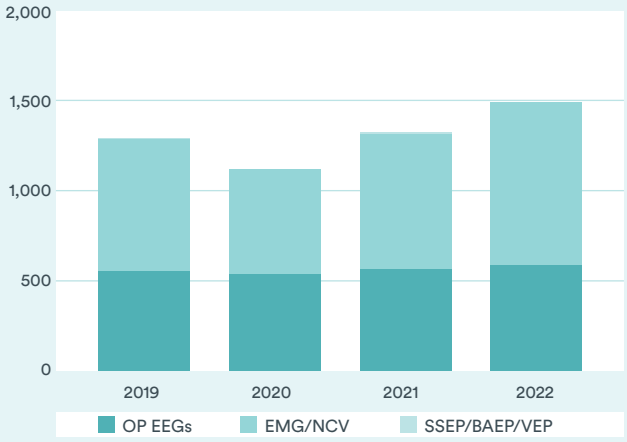
A vigorous Epilepsy Program is staffed by epilepsy monitoring technologists who perform 24/7 direct patient observation in the Epilepsy Monitoring Unit (EMU).

Hoag Hospital Newport Beach – Inpatient



	2019	2020	2021	2022
VLTM	96	103	136	188
BraiNet	82	67	48	72
Ceribell	0	10	24	74
NICU Studies			3	20

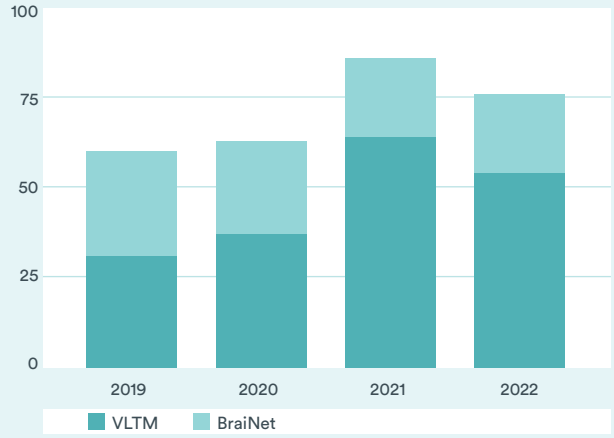
Hoag Hospital Newport Beach – Outpatient



	2019	2020	2021	2022
OP EEGs	559	541	570	589
EMG/NCV	738	586	756	913
SSEP/BAEP/VEP	5	1	6	1

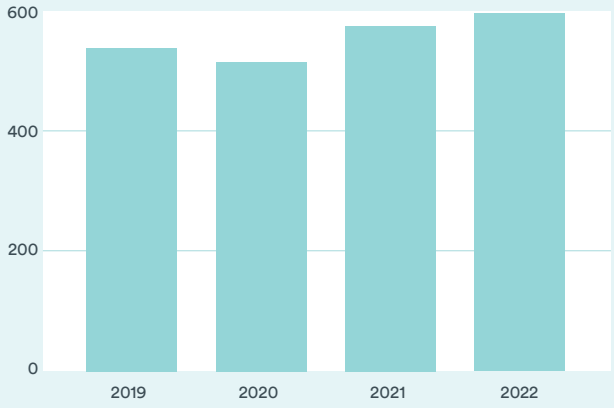
EEG & Neurodiagnostics: 949-764-6066

Hoag Hospital Irvine – Inpatient



	2019	2020	2021	2022
VLTM	31	37	64	54
BraiNet	29	26	22	22

IONM Cases



	2019	2020	2021	2022
Number of Cases	541	518	578	599

Team

The Neurodiagnostic Lab team includes Drs. Victor Doan, Andrew Ly, David Millett, Jason Muir, James Park, Jose Puangco, and Kaveh Saremi who are neurophysiology-trained neurologists, along with a dedicated team of EEG technicians and specialty inpatient nursing staff.

Intraoperative Neurophysiologic Monitoring (IONM)

IONM provides surgeons with immediate data on the structural and functional integrity of the nervous system when patients are under anesthesia. Our surgeons incorporate the acquired data from these techniques during surgery to assure the utmost safety. Some of the surgeries that benefit from IONM are brain surgery, orthopedic and spine surgeries, and surgeries for throat and larynx disorders.

Memory & Cognitive Disorders Program

Overview

Addressing cognitive impairment (CI) is a critical yet unmet need with some experts describing many healthcare systems as “dementia deserts.” At the Pickup Family Neurosciences Institute (PFNI), we offer a multidisciplinary approach dedicated to educating both physicians and the public, as well as providing clinical expertise and the latest technology for the diagnosis, treatment, and management of individuals and their families with CI. Access to the newest drug therapeutics through clinical research trials is also available.

There are many conditions that lead to CI including the four most common neurodegenerative diseases (ND): Alzheimer’s disease (AD), Lewy body disease (LBD), vascular cognitive impairment (VCI) and frontotemporal disease (FTD). Early assessment of CI is crucial to slow progression, as well as to identify many potentially reversible causes of CI including vitamin deficiencies, sleep disorders, psychiatric, and alcohol and/or chemical dependencies. Management and treatment of all those conditions as well as understanding the impact of these diseases on the family requires innovative and pragmatic approaches to address the cognitive health of individuals in our community.

The last several decades have seen significant advancement in the field of ND research including more accurate diagnostic modalities and a better understanding of the pathological process leading to disease. Recently, the FDA approved the first two agents (aducanumab and lecanemab) that have demonstrated a disease-modifying effect on the biology of early-stage Alzheimer’s disease. Although there is no cure for ND, ongoing management, access to community resources, and medical management of ND is necessary to alleviate suffering associated with ND.

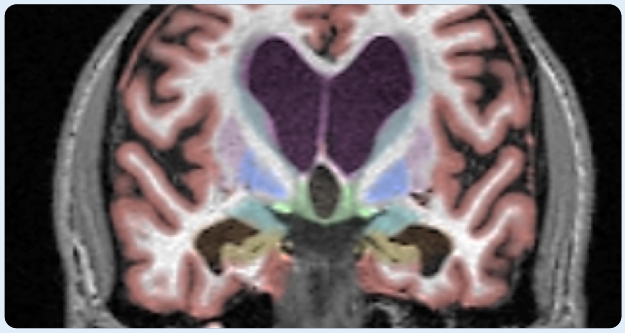
Strategy

At our Memory & Cognitive Disorders Program, we continue to address cognitive health in our community through innovative and pragmatic approaches. There are three main focuses at our program:

1. Screening individuals for the first signs of CI through the Orange County Vital Brain Program (OCVBP), a community-based cognitive health initiative offering low-cost memory screening, public and physician education, and facilitating referrals to the PFNI.

Memory & Cognitive Disorders Program: 949-764-6066
Orange County Vital Brain Program: 949-764-6288

Figure 1. Quantitative volumetric MRI



Selected coronal MRI slice with the cortical segmentation algorithm shows the hippocampal atrophy (olive green region) as well as enlargement of lateral ventricles and inferior lateral ventricles commonly observed in patients with Alzheimer s disease.

Figure 2. Quantitative measure for the hippocampal region. Patient’s hippocampal volume below 2 standard deviations, a biomarker of Alzheimer’s

Brain Structure	Volume (cm^2)	% of ICV (5%-95% Normative Percentile)	Normative Percentile
Hippocampi	7.33	0.40 (0.41-0.58)	< 5

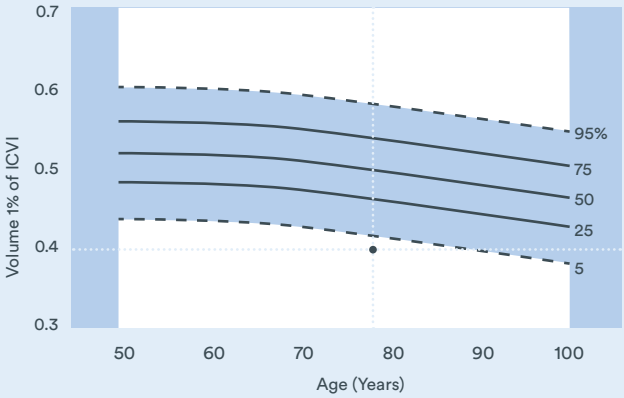
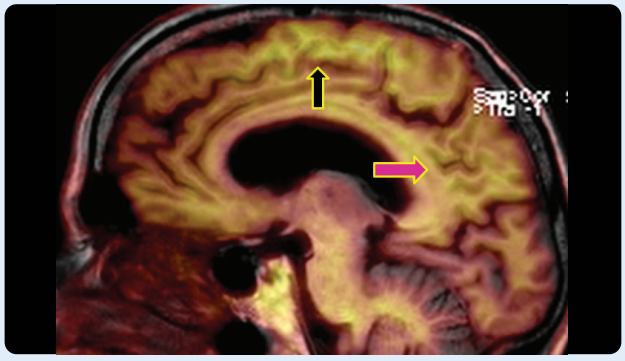


Figure 3. MR-PET amyloid imaging



MR-PET allows regional quantification of AD pathology such as beta amyloid (arrows), offering better diagnostic insights.

Aaron Ritter, MD
Larkin Family Endowed Chair
in Integrative Brain Health
Director, Memory & Cognitive
Disorders Program

Dr. Ritter's clinical research interests include improving early diagnosis of neurodegenerative diseases such as Alzheimer's, Lewy body dementia and chronic traumatic encephalopathy. His responsibilities include continued development of the Center for Integrative Brain Health, which will empower primary care physicians and non-neuro specialists with the necessary personnel, expertise, processes and tools to integrate care for cognitive and mental health challenges so commonly associated with chronic and acute medical conditions.

2. Delivering an accurate and timely diagnostic assessment of CI and related NDs. The comprehensive program includes a thorough neuropsychologic assessment, cutting-edge biomarker analyses (PET, quantitative MRI and cerebrospinal fluid) (Figures 1 and 2); expert neurobehavioral physicians, all focused on facilitating the earliest and most accurate diagnosis and best available treatment options.
3. Providing access to clinical research including FDA-approved Phase I, II, and III clinical trials allowing the earliest stage of diagnosis and treatment options.

Team

The program is led by Aaron Ritter, MD, Director of the Memory & Cognitive Disorders Program, who joined Hoag in September 2022 from Cleveland Clinic Lou Ruvo Center for Brain Health. It is supported by William R. Shankle, MS, MD, Program Research Advisor and the Judy & Richard Voltmer Endowed Chair in Memory and Cognitive Disorders. Dr. Ritter, as Larkin Family Endowed Chair in Integrative Brain Health, also leads the effort to create the first truly integrative health management system focused on addressing the needs for individuals age 65 and older with brain-based issues including CI, psychiatric, psychological, movement disorders, and substance abuse issues.

Dr. Ritter is teamed with a multidisciplinary clinical team of neurology, neuropsychology, and psychiatry experts as well as with a support team for education, research and outreach. The clinical team includes, but is not limited to, neurologists Bruce Cleeremans, MD, Victor Doan, MD, and Mindy Bixby, DO, a psychiatrist and clinical trialist Gustavo Alva, MD, DFAPA, and neuropsychologists Lauren Bennett, PhD, ABPP-CN, Ruth Morin, PhD, and Ashley Miller, PhD. The program's research and academic development is led by Junko Hara, PhD, who also oversees the OCVBP program development and outcome evaluations. The program also partners with Hoag Medical Group to enable cognitive care in the primary care setting as its key focus.

Orange County Vital Brain Program

Since 2010, OCVBP has been promoting cognitive health in our community through a multidisciplinary portfolio of services including its online portal (OCBrain.org). The program is currently lead by Dr. Ritter as its director, and this effort has been supported by prior grants and philanthropy. Targeting persons over 45 years old, OCVBP provides public and healthcare professional education seminars, self-education and self-screen tools, in-person memory assessment services, plus triaging community resources and healthcare services when indicated. The program also collaborates with Hoag Medical Group to further promote cognitive health in primary care settings, and with Melinda Hoag Smith Center for Healthy Living (MHSCHL) to provide scholarships for some of its services to those who require financial assistance.

OCVBP continues to receive interest and participation from our community. OCVBP's free online self-screen tools on

Figure 4. Online Self-Assessment Usage (2020-2022)

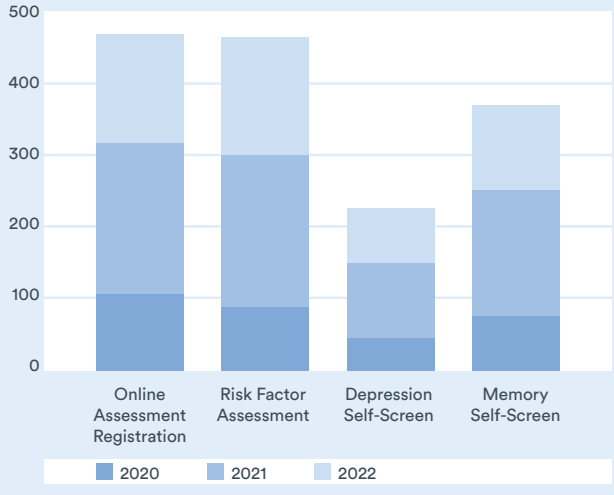


Figure 5a. Participants by Age Group

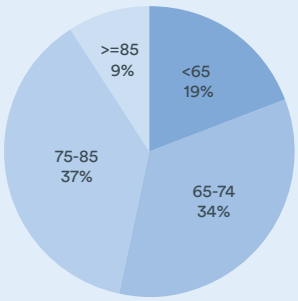


Figure 5b. Participants by Ethnic Group

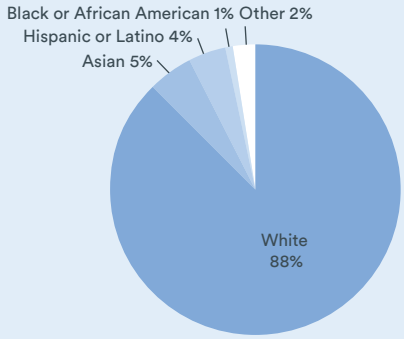


Figure 6a. Number of Participants by Age Group (Female)

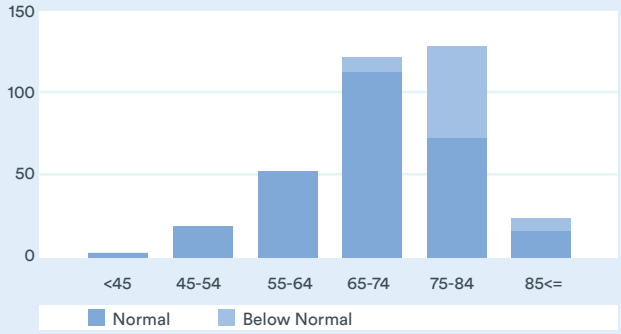


Figure 6b. Number of Participants by Age Group (Male)

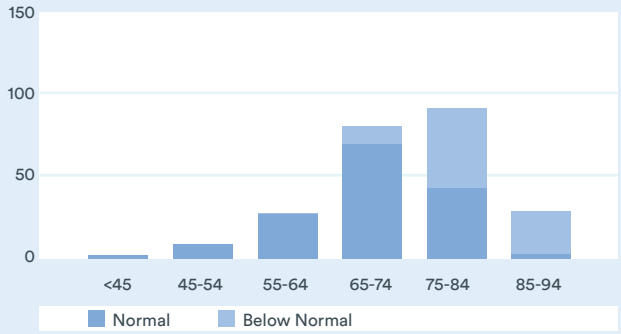


Table 1. In-Person Assessment Summary (2022)

	Female	Male	Total
# Assessment (%)	347 (59.0%)	241 (41.0%)	588 (100.0%)
Average Age	71.6 +/- 9.9	73.3 +/- 9.9	72.3 +/- 9.9
Youngest Age	40	44	40
Oldest Age	98	94	98
# Below Normal (%)	73 (21.0%)	87 (36.1%)	160 (27.2%)

risk factors for cognitive impairment, depression and mood, and memory loss have attracted 154 new registered users, totaling 6,030 community members to date, who have taken advantage of the tools (Figure 4).

OCBVP's in-person memory assessment service is currently provided in both English and Spanish at four testing locations – Hoag Hospital Newport Beach, Hoag Health Center Irvine, Oasis Senior Center and the Huntington Beach Senior Center. At the assessment, those found to be cognitively normal learn about maintaining their cognitive health through managing existing medical conditions, modifying their lifestyle, and engaging in regular physical, cognitive and social activities. Those identified with CI are assisted in finding the right healthcare professionals to diagnose the underlying causes and to treat and manage them. All participants are encouraged to monitor their memory annually.

In 2022, 588 individuals participated in OCVBP's in-person assessment (Table 1), totaling 6,806 assessments provided, with many returning each year. This high participation underscores the community's interest in their cognitive health and the importance of our services.

Among the participants in 2022, 21.3% were under 65 years of age (Figure 5a) and 12.2% were non-white (Figure 5b), reflecting our effort to reach younger and diverse at-risk populations. This effort will be further emphasized in the coming years. Among those participants, the overall rate of CI was 27.2%, with a higher CI rate for male (36.1%) than for female (21.0%) (Figures 6ab).

The program's collaborative efforts with community physicians were reflected in their referral to our program. Approximately 30% of new participants were referred by community primary care physicians.

Support and Education

The Memory & Cognitive Disorders Program provides ongoing public education classes. Continuing from the previous year, these classes were held virtually through livestream, focusing on the basics of mild CI and dementia due to ADRD, including risk factors, causes, preventive strategies, and practical ways to maintain cognitive health. The recordings of those classes are available through Hoag's YouTube channel.

Clinical Research

Clinical research provides a great opportunity to better understand the ADRD mechanisms and to provide treatment options for our patients. Our clinical research team continues to engage not only in FDA AD clinical trials, but also primary prevention trials where cognitively healthy participants with increased risk for AD are studied to understand how to prevent or delay the disease.

PEER-REVIEWED JOURNAL ARTICLES

Shan G, Ritter A, Miller J, Bernick C. Effects of dose change on the success of clinical trials. Contemp Clin Trials Commun. 2022;30:100988.

Ritter A, Shan G, Montes A, Randall R, Bernick C. Traumatic encephalopathy syndrome: application of new criteria to a cohort exposed to repetitive head impacts. Br J Sports Med. 2022:bjsports-2022-105819.

Wong C, Cross C, Kinney J, Ritter A, Caldwell J, Kramer J. Peripheral inflammation and cognition in older adults with and without cognitive impairment. Alzheimer's & Dementia. 2022;18: e068245.

Mishra V, Sreenivasan K, Cordes D, Ritter A. Effects of Acquisition Protocol on Advanced Diffusion MRI Measures. Alzheimer's & Dementia. 2022;18:e066683.

Roach JC, Hara J, Fridman D, Lovejoy JC, Jade K, Heim L, Romansik R, Swietlikowski A, Phillips S, Rapozo MK, Shay MA, Fischer D, Funk C, Dill L, Brant-Zawadzki M, Hood L, Shankle WR. The Coaching for Cognition in Alzheimer's (COCOA) trial: Study design. Alzheimers Dement (N Y). 2022;8(1):e12318.

Zhuang X, Bennett L, Nandy R, Cordes D, Bernick C, Ritter A. Longitudinal Changes in Cognitive Functioning and Brain Structure in Professional Boxers and Mixed Martial Artists After They Stop Fighting. Neurology. 2022;99(20):e2275–84.

Bock JR, Russell J, Hara J, Fortier D. Optimizing Cognitive Assessment Outcomes for Alzheimer's Disease by Matching Wordlist Memory Test Features to Scoring Methodology. Front. Digit. Health, 03 November 2021.

Brant-Zawadzki M, Fridman D, Robinson PA, Zahn M, Chau C, German R, Breit M, Burke E, Bock JR, Hara J. Prevalence and Longevity of SARS-CoV-2 Antibodies Among Healthcare Workers, Open Forum Infectious Diseases. ofab015, 2021.

Rhodes E, Insel PS, Butters MA, Morin R, Bickford D, Tosun D, Gessert D, Rosen HJ, Aisen P, Raman R, Landau S, Saykin A, Toga A, Jack CR, Weiner MW, Nelson C, Mackin S; Alzheimer's Disease Neuroimaging Initiative; ADNI Depression Project. The Impact of Amyloid Burden and APOE on Rates of Cognitive Impairment in Late Life Depression. J Alzheimers Dis. 2021;80(3):991-1002.

Bernick C, Shan G, Bennett L, Alberts J, Cummings J. Assessing Clinical Change in Individuals Exposed to Repetitive Head Impacts: The Repetitive Head Impact Composite Index. Front Neurol. 2021;12:605318.

Lutz J, Mackin RS, Otero MC, Morin R, Bickford D, Tosun D, Satre DD, Gould CE, Nelson JC, Beaudreau SA. Improvements in Functional Disability After Psychotherapy for Depression Are Associated With Reduced Suicide Ideation Among Older Adults. Am J Geriatr Psychiatry. 2021;29(6):557-561.

Mackin RS, Insel PS, Landau S, Bickford D, Morin R, Rhodes E, Tosun D, Rosen HJ, Butters M, Aisen P, Raman R, Saykin A, Toga A, Jack C Jr, Koeppe R, Weiner MW, Nelson C; Alzheimer's Disease Neuroimaging Initiative and the ADNI Depression Project. Late-Life Depression Is Associated With Reduced Cortical Amyloid Burden: Findings From the Alzheimer's Disease Neuroimaging Initiative Depression Project. Biol Psychiatry. 2021 Apr 15;89(8):757-765.

Bickford D, Morin RT, Nelson JC, Mackin RS. Determinants of Suicide-related Ideation in Late Life Depression: Associations with Perceived Stress. Clin Gerontol. 2020 Jan-Feb;43(1):37-45.

Zhuang X, Mishra V, Nandy R, Yang Z, Sreenivasan K, Bennett L, Bernick C, Cordes D. Resting-State Static and Dynamic Functional Abnormalities in Active Professional Fighters With Repetitive Head Trauma and With Neuropsychological Impairments. Front Neurol. 2020;11:602586.

Bennett LL, Stephen SJ, Bernick C, Shan G, Banks SJ. Sex Moderates the Relationship That Number of Professional Fights Has With Cognition and Brain Volumes. Front Neurol. 2020;11:574458.

Stephen SJ, Shan G, Banks SJ, Bernick C, Bennett LL. The Relationship Between Fighting Style, Cognition, and Regional Brain Volume in Professional Combatants: A Preliminary Examination Using Brief Neurocognitive Measures. J Head Trauma Rehabil. 2020;35(3):E280-E287.

Lee JK, Wu J, Bullen J, Banks S, Bernick C, Modic MT, Ruggieri P, Bennett L, Jones SE. Association of Cavum Septum Pellucidum and Cavum Vergae With Cognition, Mood, and Brain Volumes in Professional Fighters. JAMA Neurol. 2020;77(1):35-42.

Pickup Family Neurosciences Institute in the news

INSIDER

What's the difference between Alzheimer's disease and dementia? Why it's important to understand their similarities and differences

by Kelly Burch; edited by Emily Hein; medically reviewed by Scott Kaiser, MD – December 16, 2022

If you notice a loved one becoming forgetful, you may worry that they have Alzheimer's disease or dementia. But these conditions are not the same, says Dr. Aaron Ritter, a dementia expert who directs the Memory & Cognitive Disorders Program at Hoag Hospital.

"Alzheimer's Disease is a disease that causes a group of symptoms that usually progresses to a stage called dementia," Ritter says.

Dementia is "an umbrella term to describe memory and thinking problems severe enough to interfere with daily living," says Dr. Rade Vukmir, vice president of medical affairs at Alzheimer's Association.

Alzheimer's Disease is the most common type of dementia. However, dementia can be caused by other brain diseases and injuries including stroke and Parkinson's disease. Identifying the cause of dementia can affect treatment options.

Both Alzheimer's and dementia are different from short-term memory loss or normal age-related memory loss, Vukmir says.

Continue reading to learn more about Alzheimer's vs. dementia, and why knowing the difference is important for patients and their care teams.

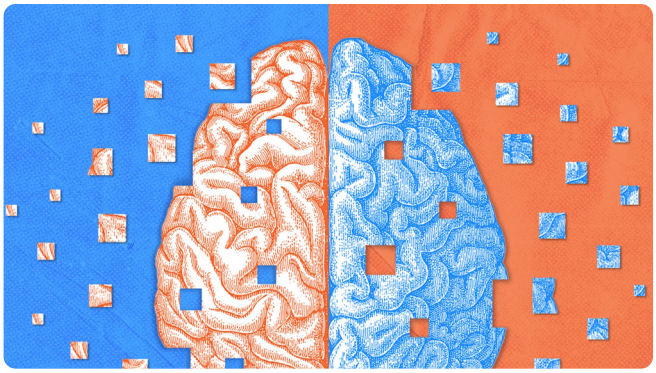
What is Alzheimer's?

Alzheimer's is a progressive brain disease. It causes neuron cells, the brain's messengers, to die. Ultimately, this leads to the brain shrinking and related complications from severe loss of brain function – such as dehydration, malnutrition or infection – that can ultimately be fatal.

Causes and risk factors

Researchers believe there are two ways that Alzheimer's disease causes brain damage:

- Plaque formation: A protein called beta-amyloid slowly builds up and forms plaques. These plaques interfere with nerve signals, and may trigger inflammation.
- Tangles: A protein called tau helps stabilize nerve cells in healthy individuals. But in people with Alzheimer's, tau forms tangles. This eventually causes neurons to die.



Understanding key symptoms, risks, and coping mechanisms can help those with Alzheimer's or dementia. Rachel Mendelson/Insider

Certain populations are at higher risk for Alzheimer's Disease, says Dr. Kate Burke, senior medical advisor at Patients Like Me, an online community for people seeking healthcare:

- Older people: The risk for Alzheimer's is about 1/3 for those over age 85.
- People of color: African American people are twice as likely to develop Alzheimer's than white people, and Hispanic people are 1.5 times as likely to develop Alzheimer's.
- People with family history. The genetic connection is particularly strong for early-onset Alzheimer's, where symptoms appear before the mid-60s.

Symptoms of Alzheimer's

Many people associate Alzheimer's with severe symptoms, like an inability to speak or remember names. However, "it starts with small symptoms — forgetting appointments, repeating, difficulty with complex calculations — and progresses over years to more severe symptoms," Ritter says.

Continue reading at insider.com/guides/health/alzheimers-vs-dementia

CONFERENCE PRESENTATIONS

Roach JC, Edens LE, Rajbhandari S, Hara J, Bramen J, Rapozo MK, Funk C, Shankle WR, Hood L. A multimodal clinical and lifestyle intervention induces multiomic systemic effects and improves cognitive outcomes in Alzheimer's disease. Clinical Trials on Alzheimer's Disease, Oral Presentation, San Francisco, November 2022.

Hara J, Bock J, Shah K, Fortier D, Lee M. Calculating Generalized Recall Probability Using Digital Cognitive Biomarkers Derived from Wordlist Memory Test Assessment. Clinical Trials on Alzheimer's Disease, Poster Presentation, San Francisco, November 2022.

Bock J, Hara J, Fortier D, Mangrola T, Shankle W, Lee M. Digital Cognitive Biomarkers for the ADAS-Cog Word Recall Test: Accuracy and Validity of Classifying Cognitive Impairment. Clinical Trials on Alzheimer's Disease, Poster Presentation, San Francisco, November 2022.

Bock J, Hara J, Fortier D, Albala B. Characterizing Cognitive Changes in Early-Stage Alzheimer's Disease using Latent Cognitive Measures from the ADNI Dataset. Clinical Trials on Alzheimer's Disease, Poster Presentation, San Francisco, November 2022.

Lee L, Liu S, Loza S, Tabaza R, Morin R, Bennett L. Interaction between APOE-e4 genotype and type of work for women on cognitive dysfunction. Alzheimer's Association International Conference, Poster Presentation, San Diego, July 2022.

Hunte Y, Bennett L. The impact of racial disparities on dementia types in the Black community. Annual Meeting of the Society of Black Neuropsychology, Poster Presentation, virtual, July 2022.

Wiersig S, Bennett L. (2022, February). Diagnostic Validity Comparisons of MMSE and ADAS-Cog Using CSF Tau. Annual Meeting of the International Neuropsychological Society, Poster Presentation, New Orleans, February, 2022.

Richardson J, Haley K, Neel A, Meese J, Castellano N, De Sanctis J, Coho E, Cavanaugh E, Bennett L. (2021, November) Fighting for words: Word information measure in professional fighters. The Annual Meeting of the American Speech-Language-Hearing Association, Poster Presentation. Washington, D.C., November 2021.

Libutti F, Wood Z, Bennett L. Depression as a Moderator of Relationship between APOE 4 Allele Presence and Alzheimer's Disease Severity. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. San Diego, February 2021.

Kuffell R, Morin RT, Covinsky K, Boscardin J, Li Y, Byers AL. Frailty and risk of suicide in young-old to oldest-old veterans. The Gerontological Society of America Annual Scientific Meeting. March 2021.

Rhodes E, Insel P, Butters M, Morin RT, Bickford D, Tosun D, Rosen H, Aisen P, Raman R, Landau S, Saykin A, Toga A, Jack CR, Weiner M, Nelson JC, Mackin RS. The impact of amyloid burden and APOE on rates of cognitive impairment in late life depression. The International Neuropsychological Society Meeting, San Diego, February 2021.

McClure R, Nguyen A, Salonga S, Bennett L. Blood Glucose Levels Predict Verbal Memory in Individuals with Alzheimer's Disease and Type II Diabetes. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. San Diego, February 2021.

Nguyen A, McClure R, Martinez A, Bennett L. Examination of Potential Cross-Cultural Differences in Individuals who are at a Higher-Risk for Dementia. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. San Diego, February 2021.

Salonga S, Wood Z, McClure R, Scholl J, Bennett L. Severity of Combat Exposure of Veterans with PTSD and Dementia. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. San Diego, February 2021.

Scholl J, Wood Z, Salonga S, Bennett L. Relationship Between APOE4 Status, Combat Exposure, and Dementia. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. San Diego, February 2021.

Wood ZB, Scholl J, Salonga S, Bennett L. Effect of Depressive Symptoms and Alzheimer's Disease Severity on Right Hippocampal Volume. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. San Diego, February 2021.

Bennett L, Brunet H, Miller J. Semantic Clustering in Verbal List Learning in a Mixed Clinical Sample of Older Adults. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. Denver, February 2020.

Brunet H, Bennett L, Miller J. Semantic Clustering May Bolster Verbal Learning in Women with Mild Cognitive Impairment. The Annual Meeting of the International Neuropsychological Society. Poster Presentation. Denver, February 2020.

Richardson J, Neal A. Bennett L, Banks S, Bernick C. Speech Rate, Pausing, and Disfluency Associated with Cognitive Decline in Professional Fighters. The Annual Conference on Motor Speech. Poster Presentation. Santa Barbara, February 2020.

Multiple Sclerosis & Neuroimmunology Program

Hoag's Pickup Family Neurosciences Institute is dedicated to helping patients throughout their multiple sclerosis (MS) disease journey. MS is the leading cause of disability in young adults. This disease is mediated by an autoimmune response causing damage to the nervous system. The program is led by MS expert Yasir N. Jassam, MD, MBChB, MRCP/FRCP (UK), FAAN, director of the Multiple Sclerosis & Neuroimmunology Program in Hoag's Pickup Family Neurosciences Institute. Since the program's recent inception, we have embraced over 260 people diagnosed with MS, and evaluated countless others in whom the disease was excluded, and other conditions where overlapping symptoms were found.

Important advances in the field are now significantly improving the course and the outcome of the disease. We've assembled the best MS specialists and most advanced technologies in neurological care to address disorders of the brain, nerves and spine by using evidence-based clinical care, state-of-the-art technology, advanced clinical research, therapeutics and more.

Our advanced, individualized and comprehensive multiple sclerosis disease management and care programs are guided by world-leading innovation.

Innovation

Hoag Pickup Family Neurosciences Institute's MS Program partnered with Octave to ensure world-class MS care is offered to our patients (hoagoctave-ms.com). Octave's blood biomarker test could efficiently monitor overall disease activity in people with MS. Called the MS Disease Activity (MSDA) test, the assay measures the levels of 18 proteins, showing which pathways and mechanisms related to MS are activated and to what extent. Upon completion of this blood test assay, Dr. Jassam meets with patients to review their MS disease status with the most personalized approach. Hoag is the first hospital in Southern California to offer and utilize this robust MSDA biomarker analysis.

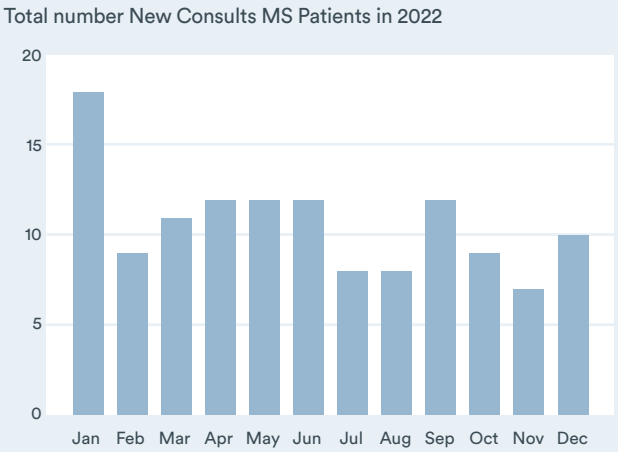
PFNI MS Hope Center

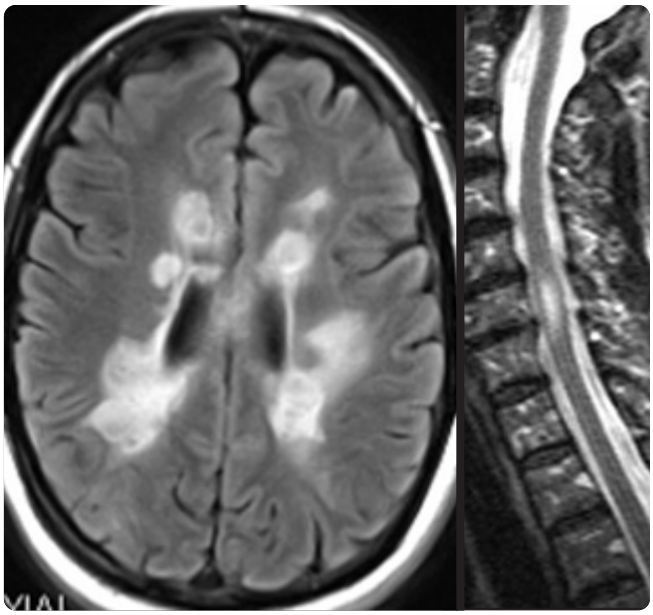
In 2022, we opened the PFNI MS Hope Center, which offers patients a holistic approach to MS symptom management. This program is fully supported by philanthropy. MS can affect vision, sensation, coordination, movement and

Multiple Sclerosis Program: 949-764-8141

100% of participants of the PFNI MS Hope Center answered "strongly agree" to this satisfaction survey question:

I would recommend participation in this MS Hope Center session to other people affected by multiple sclerosis.





MRIs of the brain and cervical spine showing classical brain periventricular and cervical spine intramedullary demyelinating lesions.

bladder or bowel control. Our multidisciplinary team is here to help patients and their families gain a better understanding of the disease. With an educational focus, the PFNI MS Hope Center offers a variety of classes and services beyond routine doctor's appointments. Patients acquire tools to strengthen the skills needed to manage everyday tasks at any stage along their MS journey.

This is the first comprehensive center focused on MS-related hot topics in the Orange County community and was featured by the National MS Society (NMSS) during the Challenge Walk MS and Together for a Cure MS Luncheon events. The NMSS deemed the PFNI MS Hope Center as a novel opportunity for anyone affected by MS.

Group sessions offer beneficial peer support along with clinical experts specializing in the unique needs of MS. The goal of this exceptional program is to build up hope for those who are challenged by MS. Each session is led by an expert in the topic presented.

SESSIONS PRESENTED

- Stress reduction and communication techniques
- Pilates
- Fatigue management
- Yoga
- Guided meditation (VR-guided meditation)
- Physical therapy
- Occupational therapy
- Dietary services
- Anti-inflammatory meal preparation classes

Neuroimmunology

Our MS program also provides expertise in neuroimmunology for related conditions such as autoimmune encephalitis, neurosarcoidosis and others. This field has expanded to encompass multiple rare and challenging presentations that share similar pathology to MS, all driven by the immune system, mistakenly attacking a patient's own nervous system. Syndromes like MS such as optic neuritis (loss of vision), transverse myelitis (spinal cord dysfunction), encephalitis (brain inflammation), and meningitis can result from autoimmune syndromes. New neuroimmunological tests and therapies have given new hope to afflicted patients.

Yasir N. Jassam, MD, MBChB, MRCP/FRCP (UK), FAAN
Director, Multiple Sclerosis & Neuroimmunology Program
Vice Chair, Department of Neurology and Psychiatry
Pickup Family Neurosciences Institute

Audrey Johns, MSN, RN, PHN
Clinical Nurse Navigator, Multiple Sclerosis & Neuroimmunology Program

Team

The program is headed by neurologist and neuroimmunologist Yasir Jassam, MD, MBChB, MRCP/FRCP (UK), FAAN. Notably, in 2022, Dr. Jassam was elected a Fellow of the American Academy of Neurology (FAAN), a Fellow of the Royal College of Physicians and Surgeons of Glasgow, and a Fellow of the Royal College of Physicians of London. He is a board-certified neurologist and previously was professor of neurology and neuroimmunology at Kansas University Medical Center before joining Hoag in March 2021. His focus of specialty includes autoimmune neurological and neuroinflammatory disorders.

Audrey Johns, MSN, RN, PHN is the program's specialized nurse navigator, providing guidance and navigation for patients with MS. This includes providing advanced education on medications, infusion site coordination, disability paperwork completion and leadership of the PFNI MS Hope Center.

Samuel Bernier, OTD, OTR/L
Occupational Therapist

Nina Surber, PT, DPT
Board Certified Specialist in Geriatric Physical Therapy, Vestibular Therapist

Oscar Jan
Registered Dietitian

Hoag for Her Center for Wellness
Pilates instructors, yoga instructors, certified personal trainers

Pickup Family Neurosciences Institute in the news

HealthCentral

How Having MS Can Affect Your Driving

Not everyone with multiple sclerosis has issues behind the wheel, but for those who do, there are solutions.

by Erin L. Boyle, Health Writer; Medical Reviewer, Shaheen Lakhan, M.D. – October 11, 2022

Driving is synonymous with freedom and independence for many of us. With a set of keys and our GPS app of choice, we can go where we want, whenever we want. In the United States – where public transportation is often limited, and about 88% of people own a car, according to a 2015 Pew Research Center survey – the ability to drive (or not) can seriously impact a person's income and quality of life. This includes people with multiple sclerosis (MS) – and the condition can make driving a bit more complicated.

People with MS may have a higher risk of getting into a car accident when driving, according to recent research. This aligns with research finding that MS patients needed treatment at emergency rooms after road traffic accidents more often than non-MS patients. And while m=any people with MS have no issue driving, the progression of the disease can cause challenges behind the wheel. As a result, many states require disclosure of medical conditions that could impair driving, such as MS.

The good news? Help is available if driving proves problematic because of your MS. Let's take a look at how MS symptoms can impact driving, and how you (or a loved one) can stay safe on the road.

How MS Affects Driving

MS is an autoimmune disease of the central nervous system that impacts the brain, spinal cord, and optic nerves. In this condition, the protective layer around the nerve fibers in the brain and spinal cord – called myelin – is damaged, which interrupts signals to and from the brain. The result is the many varied symptoms of MS, including fatigue, weakness, and vision issues, all of which can lead to challenges while driving.

"The brain allows us to conduct many of our fine movements and skills," explains Yasir N. Jassam, M.D., a neurologist and director of the Multiple Sclerosis & Neuroimmunology Program in Hoag's Pickup Family Neurosciences Institute in Newport Beach, CA. "And because MS is a multi-system disease, it can impact one's driving abilities in many different ways."

MS symptoms can also vary from person to person, and even from day to day, flaring up at certain times, points out Kathy Zackowski, Ph.D., an occupational therapist and associate vice president of research at the National MS Society in New York City. During MS attacks or relapses, symptoms can worsen and then later improve. These flare-ups can affect strength, sensation, vision, fatigue, and cognition, Zackowski notes. MS-specific issues that can impact driving include:

Fatigue

Some 80% of people with MS experience fatigue, and they tend to describe it as not just sleepiness, but total exhaustion. "They liken it to moving through mud or thinking through a fog," Zackowski explains. When driving, fatigue can dull reflexes and attention, and it can worsen for some MS patients as the day goes on, posing a challenge to the evening commute. "Fatigue makes it hard to make split-second decisions and hard to stay attentive at the wheel," Zackowski says.

Chronic Pain

Some patients with MS have unrelenting pain in areas like their neck, back and legs, which can make driving uncomfortable, Dr. Jassam points out, especially for longer rides. "Sitting in the vehicle for prolonged time might be difficult in certain positions," he says.

Cognitive Issues

Problems with impaired cognition are common and very real for some MS patients, according to the Cleveland Clinic. Memory loss and slowed information processing speed can negatively impact driving, Zackowski says. "This can look like 1) forgetting where you are going, 2) confusion about where you are and how to get to your destination, and 3) poor concentration leading to issues with tending to multiple tasks at once, like turning the windshield wipers on and braking to avoid hitting a pedestrian," she explains.

Effects of Medication

Continue reading at www.healthcentral.com/article/can-you-drive-with-ms

Dr. Jassam presenting as the keynote speaker at the Together for a Cure National MS Society Luncheon.

Accomplishments & Support

The NMSS recognized the Hoag MS program as a Partner in MS Care. The criteria for the Partner in MS Care include demonstrated knowledge and expertise in treating people with MS. This prestigious designation consists of collaboration with the national MS Society and extensive community outreach.

The PFNI MS Program has been inducted into the Consortium of Multiple Sclerosis Centers (CMSC). The CMSC's mission is to be the preeminent professional organization for multiple sclerosis healthcare providers and researchers in North America, and a valued partner in the global MS community.

Clinical Research

The RIMS study is a two-phase project where we aim to develop a risk score for predicting the incidence of MS in the community using certain risk factors. This part, thanks to philanthropic support, is already ongoing. The next step is to implement this test for real-life validation study and apply it to healthy individuals and relatives of MS patients to try to anticipate the risk of their family members of getting MS.

PATIENT TESTIMONIAL

"The MS Hope Center is full of HOPE! Before the MS Hope Center at Hoag was available to me, I was hopeless. Not only did I not trust myself, but I was having a hard time trusting those around me. Once they opened the Hoag MS Hope Center, I was able to get my loved ones more involved and found lots of hope happening quickly. Thanks to good doctors, good medication, the Hope center and a ton of work, I have gone from dragging myself along, while talking about walkers and other assisted devices, to walking on my own, going to exercise three times per week and doing SO much better! With each Hope Center visit, life improves just a little bit more."

– Whitney W., patient

We also have other future projects focusing on neuromyelitis optica (NMO), which is another devastating disease like MS, including one project that looks at the prevalence of NMO antibodies in the community and another to detect the risk of bacterial meningitis in patients treated for this condition with complement inhibitors.

PEER-REVIEWED JOURNAL ARTICLES

Lynch S, Baker S, Hunt S, Thuringer A, Jassam Y, Bruce J. The Impact of COVID-19 on the Lives of Individuals with Multiple Sclerosis: 1 Year Into the Pandemic. Int J MS Care. 2022;24(3):139-144. doi:10.7224/1537-2073.2021-099

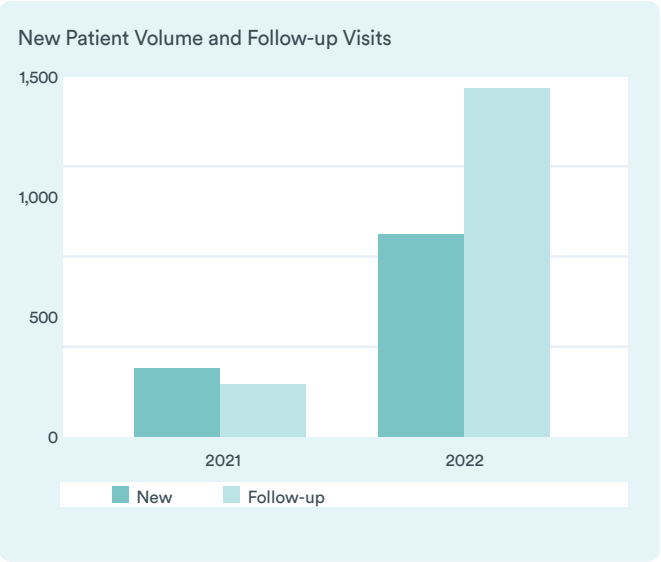
Chronic Pain & Neuropathy Program

Overview

The Chronic Pain & Neuropathy Program of Pickup Family Neurosciences Institute (PFNI) was launched in August of 2021. The program helps to reduce or eliminate pain and improve our patients' quality of life. Our team of experts provides a comprehensive and evidence-based approach to the evaluation and treatment of chronic pain and neuropathy. We collaborate with various specialists including spine surgeons, orthopedic surgeons, neurologists, rheumatologists, radiologists, physical/occupational therapists, acupuncturists, and psychologists to offer the best treatment plans for our patients.

We also offer treatment modalities such as spinal cord and peripheral nerve stimulators, epidural steroid injections, selective nerve root blocks, radiofrequency ablations, sympathetic blocks (stellate, celiac plexus, and ganglion impar), intercostal nerve blocks, botulinum toxin injections for migraine headaches, sphenopalatine ganglion blocks, qutenza (capsaicin 8%) patches for post-herpetic neuralgia (PHN) and diabetic peripheral neuropathy (DPN), trigger point injections, and joint injections. We are exploring the use of closed loop spinal cord stimulators for the treatment of refractory back and leg pain. Additionally, we are investigating basivertebral nerve ablation and restorative neurostimulation for chronic mechanical low back pain. The prescription of non-opioid medications may be recommended to alleviate pain and restore functioning, and we are investigating Ketamine for selected patients. We also offer access to virtual reality modulation of pain response, a promising new approach to chronic pain management.

In 2022, the outpatient Chronic Pain & Neuropathy Program treated nearly 850 new patients, with dramatic growth from inception.



Our specialists focus on the diagnosis and treatment of conditions involving chronic pain ranging from neck and low-back pain to peripheral neuropathy, toxin/chemo-induced neuropathy, autoimmune neuropathy, joint pain, abdominal pain, cancer pain, and post-surgical pain as well as headaches. The program uses diagnostic technologies to evaluate nerve function such as NCS/EMG, MR neurography, and skin biopsies (to evaluate for small fiber neuropathy).

For the evaluation of chronic neck or lower-back pain, the patients undergo a thorough history and physical examination and additional X-rays, CT and/or MRI studies are utilized to further evaluate the primary pain generator.

We tailor our treatment plan to each individual patient's needs and encourage regular exercise, eating a healthy diet (with nutritionist support), as well as supporting a state of mental well-being.

Chronic Pain & Neuropathy Program: 949-764-1475

The Inpatient Pain Service at Hoag is led by Matthew Reed, MD and Tom Schreiber, NP. Dr. Reed is triple board certified in psychiatry, pain medicine and internal medicine. This newly enhanced pain service addresses acute and chronic pain issues in our patients hospitalized for other conditions, with a broad evidence-based approach mindful of psychiatric and addiction contributors to pain. The hours of in-hospital coverage for the pain service have been extended to 7 a.m. - 7 p.m. seven days per week (after-hours coverage by phone). By early 2023, this will be further increased to full 24:7 in-hospital coverage. Supporting care transitions is a key priority for our service. This includes facilitating timely follow-up for needed outpatient interventional procedures or other specialized pain interventions.

As utilization of buprenorphine for both chronic pain management and addiction continues to increase in response to the opioid epidemic, collaboration between inpatient pain, addiction, and outpatient chronic pain providers has never been more essential. Providers on the inpatient service identify appropriate patients for initiation on buprenorphine and, after initiation, facilitate continued care into the outpatient setting. Similarly, we collaborate with outpatient pain and addiction providers, anesthesiology, and surgical teams to best manage acute perioperative pain in patients on chronic opioids (including buprenorphine). This collaboration improves perioperative pain control, patient satisfaction, and decreases length of stay.

Utilization of Hoag's new inpatient pain service has increased with consultation rates 50-75% higher following transition to the new service. We expect utilization of the service to remain high as Hoag providers recognize its value in providing excellent evidence-based care for hospitalized patients.


Shawn Zardouz, MD


Phillip O'Carroll, MD


Matthew Reed, MD


Tom Schreiber, NP

Team

Shawn Zardouz, MD
Program Director
Dr. Zardouz is double board certified and fellowship trained in pain medicine and in neurology.

Matthew Reed, MD
In-patient Pain Service Director
Dr. Reed is triple board certified in psychiatry, pain medicine and internal medicine.

Phillip O'Carroll, MD
Program Advisor, Headache, Mind Body Disorders
Dr. O'Carroll is board certified by the American Board of Psychiatry and Neurology.

Tom Schreiber, NP
Supervisor of Pain Nurse Practitioners

Neurobehavioral Health:
Hoag Addiction Treatment Centers

Overview

Hoag Addiction Treatment Centers (HATC) is nationally recognized for providing unparalleled medical care and emotional support within a healing patient-centered environment. In this environment, health and dignity are renewed as individuals and families heal together on their path to recovery.

Addiction is a brain disease. It is chronic and progressive, and it affects the entire family. Times of stress accentuate the predisposed brain to the extremes of addiction. Treatment for addiction is as effective as treatment for other chronic conditions, such as diabetes or heart disease.

There are many addiction recovery programs available, but few that provide the highest level of medically supervised, patient-centered care like the Pickup Family Neurosciences Institute offers. With significant expansion of inpatient, residential recovery, and intensive outpatient treatment services in Newport Beach, HATC provides the most comprehensive, vertically integrated continuum available. At all levels of care, co-morbid psychiatric conditions are treated along with primary addictions (dual diagnosis treatment across the continuum of care).

SolMar Recovery is a 21-bed residential facility, unique in the state for its location on the campus of an acute-care hospital.

The residential program is certified to provide incidental medical services (IMS), making it among the best equipped to address primary addiction, co-morbid psychiatric conditions, and associated medical issues. With IMS certification, our medical providers now offer addiction treatment services onsite in the residential program and administer lifesaving, long-acting injectable medications such as Sublocade and Vivitrol.

As a licensed hospital-based treatment center integrated within Pickup Family Neurosciences Institute (PFNI), Hoag provides evidence-based addiction treatment services that successfully guide families from their own trauma of exposure to addiction toward an effective partnership in the recovery process. With more than 30 years of experience as Southern California's leading addiction medicine center, Hoag has treated thousands of individuals and their families.

During the pandemic, we have remained committed in our mission to provide the highest-quality health care to the communities we serve, and the individuals that require our assistance during this challenging time.

In 2022, Hoag served over 700 patients for acute detoxification, treated approximately 120 residential treatment patients, and served more than 235 patients in our intensive outpatient programs as well as partial hospitalization.

We are fortunate to be the highest-ranked hospital in Orange County, so we can easily coordinate with experts when a higher-level of acute medical care is warranted. Our inpatient detox unit is comprised of highly trained and experienced medical staff and nurses who are prepared to both recognize warning signs and implement preventative measures to reduce risk. We have full medical attention, 24 hours per day, 7 days a week, 365 days a year.

Being able to facilitate a "warm hand-off" to our residential, partial hospitalization program (PHP), and intensive outpatient program (IOP) levels of care, we provide a seamless continuum of care through sub-acute face-to-face services, recognizing the importance of structure and accountability for those suffering from addiction over the longer term needed.

MEDICALLY MANAGED, EVIDENCE-BASED TREATMENT PROGRAMS ACROSS ALL LEVELS OF CARE

- Medical inpatient detox
- SolMar Recovery – 21-bed residential facility with medical and counseling professionals available 24/7
- Partial hospitalization program
- Intensive outpatient program

INNOVATIVE AND MULTIDISCIPLINARY TREATMENT PROGRAMMING

- Licensed master-level therapists
- Credentialed drug and alcohol counselors
- Magnet-designated hospital and nursing staff
- Individualized treatment planning involving medical providers, therapists, and counseling staff

Neurobehavioral Program: 949-764-6883

We recognize the importance of incorporating a variety of treatment modalities such as:

- Evidence-based individual and group therapies
- Dialectical behavioral therapy
- Cognitive behavioral therapy
- Mindfulness meditation and stress management groups
- Extensive psycho-education on relapse prevention, trigger and craving management, medication management, etc.
- Art and experiential therapies
- Equine therapy

FAMILY CONTINUUM OF CARE

At Hoag, our patient care philosophy depends greatly upon engaging families to be a part of the healing process. Due to Covid-19, Hoag continued to provide family sessions by Zoom to ensure that families continued to be an integral part of their loved ones' healing process.

Team

The clinical treatment team is led by Steven Ey, MD, and Matthew Reed, MD. Dr. Ey is board certified by the American Board of Preventive Medicine in Addiction Medicine and is a Distinguished Fellow of the American Society of Addiction Medicine. Dr. Ey provides medical and clinical leadership for Hoag's Addiction Treatment Centers. As Chief of Service, Dr. Ey expanded his services and expertise to Hoag's Emergency Department and inpatient floors with the Addiction Medicine Consult Service. He received his medical degree from UCLA and completed an addiction medicine fellowship at Loma Linda University. He has previously served as medical director of the Betty Ford Center and Mission Hospital in Laguna Beach.

Dr. Reed oversees sub-acute addiction treatment at Hoag in his role as chief of outpatient addiction services and medical director for the SolMar Residential program. Dr. Reed is triple board certified in psychiatry, pain medicine and internal medicine. He received his medical education at the University of Utah School of Medicine and completed his general psychiatry residency, general internal medicine residency, and pain medicine fellowship at the University of California, Davis. Complementary to his roles with Hoag's addiction programs, Dr. Reed serves as chief of the inpatient
pain service addressing acute and chronic pain often involving addiction or other psychiatric co-morbidities.

SolMar Recovery and the outpatient programs are led by Jeannette Rojas Rivero, HATC's operational manager. Jeannette brings over 25 years of extensive experience across the mental health, addictions and eating disorder treatment continuum. Her experience spans all levels of care, from outpatient therapy to inpatient treatment. She originally studied at Anahuac University in Mexico City, becoming a clinical psychologist. While at Anahuac, she also received a postgraduate degree in Substance Abuse and Alcoholism. Jeannette completed a Master's degree in Psychology in the United States. She is a licensed associate substance abuse counselor (LASAC) in the state of Arizona, a certified eating disorder specialist (CEDS), and a certified alcohol and drug abuse counselor in the state of California (CADC- II).

Jeannette manages the operations of Hoag Addiction Treatment Centers, with long-standing experience in the community substance abuse rehabilitation field.

Michelle Freyre, MSN, RN, has worked for Hoag Hospital since 2007 and has worked as a nurse in Orange County for more than 25 years. As the clinical nurse manager, Michelle provides clinical and operational oversight for the detox unit. The detox unit is the recipient of the Guardian of Excellence Award Patient Experience from Press-Ganey

Members of the Hoag Addiction Treatment Centers team.

for 2020 and 2021, while also being a recipient of the Pinnacle of Excellence Award for Patient Experience from Press Ganey for 2021.

The clinical team is multidisciplinary, comprised of registered nurses, physicians, licensed therapists, certified addiction treatment counselors, nurse practitioners, and licensed vocational nurses. It also provides consultation to our medical and surgical inpatient floors, helping manage those patients' substance abuse co-morbidities.

Support & Education

The program holds regular continuing education trainings for the professional community addressing the most pressing mental health concerns with the most contemporary clinical information.

Alumni

After 30 years of service, the HATC Alumni continue to meet on Zoom for peer support. The alumni also provide scholarships for qualified program graduates in need of sober living. Their dedication to sobriety and service to Hoag remains steadfast throughout the pandemic restrictions.

Neurobehavioral Health:
ASPIRE Program

Overview

The Covid-19 pandemic has had a significant impact – especially on the mental health of adolescents – and little support exists for children and their parents moving through this fragile stage of development. For many families, unaddressed neurobehavioral challenges have become devastating catastrophes.

A recently published article stated that suicide is the third leading cause of death for young people ages 15 to 24. Approximately 20% of teens experience depression before they reach adulthood, and between 10 to 15% suffer from symptoms at any one time. Only 30% of depressed teens are being treated for it. In addition, co-occurring mental health disorders feed and are fed by a rise in the substance abuse epidemic. If you are a parent of a teen in Orange County today, you likely have your own story – direct or indirect – to underscore this unfortunate reality. A recently published nationwide study documented that 3.2% of children aged 3-17 years (approximately 1.9 million) have diagnosed depression.

Pickup Family Neurosciences Institute at Hoag provides an innovative, focused answer to this glaring community need: ASPIRE (After School Program: Intervention and Resiliency Education). ASPIRE is an intensive outpatient program for adolescents ages 13-17 with primary mental health disorders and possible co-occurring substance abuse challenges. The program is evidence based and outcomes driven, and guides teens and their families through an eight-week curriculum of skills-based training in stress management, resiliency, interpersonal communication, mental health and substance abuse education. It is accredited to provide high school credit toward graduation requirements.

The curriculum incorporates dialectical behavior therapy, cognitive behavioral therapy, goal creation, building healthy habits, distress tolerance skills, education on emotions, interpersonal effectiveness, identity/values building and life skills. The program provides support in respect to the multifamily group specific for parents to also learn the skills and implement and support their teens at home while in the program. In addition to communicating with academic counselors, scheduling coursework in order to graduate, secondary education, independent life skills, hygiene, sleep protocols, education on time management,

ASPIRE team at Hoag

scheduling (balancing productive and pleasant activities), and managing anxious and depressive features this is in conjunction with time spent processing items learned to share with peers and gain insight from one another.

Program Summary: ASPIRE

- Adolescents 13-17 and their parents
- 8-week outpatient program; skills-based curriculum
- 4 nights weekly for 3 hours; parents 2 nights weekly for multifamily group
- Multidisciplinary team
- Collaborative with local schools

PROGRAM GOALS:

- Early intervention
- Destigmatize mental illness and mental health care
- Promote mental and behavioral health and well-being
- Emphasize “skill building & resiliency training” and de-emphasize “therapy”
- Empower parents for the unique demands of this life stage
- Help adolescents navigate the challenges inherent in the age, and build a foundation for young adulthood

ASPIRE: 949-764-6066

Community Partnership

Hoag is working in close collaboration with six school districts in Orange County to combat the growing rates of teen depression and mental health.

- Newport Mesa
- Irvine
- Tustin
- Saddleback
- Capistrano
- Huntington Beach

Hoag has played a pivotal role in community integration related to presentations that have been conducted with the various school districts, educating on various topics such as gaming and technology, substance use and vaping, in addition to general mental health of adolescents. Hoag is positioned to support high school teens identified with mental health challenges by the school staff.

The program is offered at Hoag's Center for Healthy Living in Newport Beach, as well as in Irvine.

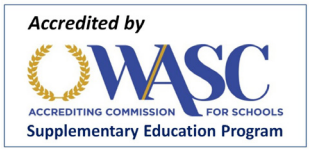
The ASPIRE program remained open throughout the Covid-19 pandemic, continuing to support teens during these uncertain times.

A survey conducted in 2020 showed that 92% of teens who completed the ASPIRE program felt that the skills they learned were useful throughout their time and after, and 97% of parents who attended the ASPIRE multifamily group felt that the program supported them during their teens' time in the program.

Team

The ASPIRE clinical team is led by Sina Safahieh, MD. Dr. Safahieh is board certified in child and adolescent psychiatry, and provides the program's medical and clinical leadership, creating a unique partnership between Hoag and Children's Health Orange County to meet this community need. Prerna Rao, LMFT, is the clinical program manager. Prerna has developed the clinical team, and with the team structured the program content, and has positioned ASPIRE to be a model for adolescent mental health treatment. Prerna is overseeing the program's clinical and patient experience outcomes.

Hoag ASPIRE received the prestigious WASC (Western Association for School and Colleges) accreditation in January of 2019. With this accreditation, the ASPIRE program is the first mental health program in Southern California to give school credits for teens who attend a mental health skills-based program.



Neurobehavioral Health:
Young Adult Mental Health Program

As the need for mental health continued through the pandemic, the ASPIRE program launched the Young Adult Mental Health Program for those ages 18-26 with a primary mental health condition at its Irvine location. The program has since been successful as an additional resource for the community and meeting the growing mental health needs in Orange County.

Hoag's Young Adult Mental Health Program is tailored for 18-26-year-olds who are working toward managing primary mental health symptoms and general habit changes to support the transition from teenage years to adulthood. The program is 8 weeks long, 3 days a week with consultation with our medical director, Sina Safahieh, MD.

The curriculum incorporates dialectical behavior therapy, cognitive behavioral therapy, goal creation, building healthy habits, distress tolerance skills, education on emotions, interpersonal effectiveness, identity/values building and life skills. The program provides support in respect to resume building, job searches, communicating with academic counselors, scheduling coursework in order to graduate secondary education, independent life skills, hygiene, sleep protocols, education on time management, scheduling (balancing productive and pleasant activities), and managing anxious and depressive features while navigating higher education and employment avenues including support while preparing for interviews, mock interviews and future goal setting.

Young Adult Mental Health Program team at Hoag

Program Summary: Young Adult Mental Health Program

- Adults 18-26
- 8-week outpatient program; skills-based curriculum, in addition to life skills
- 3 days weekly for 3 hours
- Multidisciplinary team

PROGRAM GOALS:

- Early intervention
- Destigmatize mental illness and mental health care
- Promote mental and behavioral health and well-being
- Emphasize "skill building & resiliency training" and de-emphasize "therapy"
- Help young adults navigate through life skills and build resilience regarding decision making

Neurobehavioral Health:
Psychiatry Consult & Liaison Service

Medical illness and hospitalization are very stressful experiences to all patients and Hoag recognizes the importance of treating the entire patient, including one's emotional, psychological, and behavioral health. Hoag's psychiatry consultation-liaison service (psych CL) is comprised of a multidisciplinary team of psychiatrists, psychiatric nurse practitioners and a psychologist. Our specialized team has an expertise in the diagnosis and treatment of psychiatric disorders in the medically ill, and the complex neurobehavioral disturbances that arise when treating one's acute medical illnesses. The psych CL team provides support to the emergency room, medical/surgical units, and intensive care units by conducting on-site consultation, evaluation, and assistance with behavioral management at both our Newport and Irvine campuses.

Proactively addressing our patients' neurobehavioral health allows for improved identification, patient and family psychoeducation, initiation of treatment and referrals for continuation of care via outpatient psychiatric or neurobehavioral health services. Our psychiatry team collaborates with inpatient social workers and case managers to ensure that our patients receive community-based resources for ongoing treatment beyond their acute care hospitalization. Additional specialized inpatient psychiatric admission can be facilitated by our psych CL team and case managers if it is identified that a patient is in the midst of a psychiatric or neurobehavioral health emergency.

Furthermore, the quality of patient care improves when assessing and treating the whole person. Physician and staff satisfaction have also improved with the ability to provide appropriate, important neurobehavioral health care to our patients. The team has increased value in the continuum of hospital-based care by lowering the costs associated with emergency department visits, reducing lengths of stay and focusing on decreasing re-admissions as a result of untreated neurobehavioral health disorders.

Hoag's psychiatry consultation-liaison team is led by Director Renee Garcia, MD. She is board certified in both general adult psychiatry and consultation-liaison psychiatry, a subspecialty of psychiatry focusing on the interface between general medicine and psychiatry. Mohamed El-Gabalawy, MD, is board certified in both general adult psychiatry and addiction psychiatry. Ashrah Elmashat, MD, is board certified in both general adult and child/adolescent psychiatry. Natalie Song, PMHNP-BC, is a nurse practitioner with years of experience in general adult and emergency psychiatry.

Neurobehavioral Health:
Maternal Mental Health Program

Overview

Maternal Depression, also known as perinatal mood and anxiety disorders (PMADs), affects 15-20% of new mothers. It is the most common complication related to childbirth. Hoag Maternal Mental Health Program's outpatient clinic was launched in December 2017 as a collaboration between the Pickup Family Neurosciences Institute (PFNI) and Women's Health Institute. The program is an integral part of the comprehensive maternity care and education provided at Hoag Hospital, which is widely recognized for excellence in obstetrics and neurobehavioral health. The Hoag Maternal Mental Health Program is committed to identifying and treating mental health conditions before, during, and after pregnancy to ensure healthy outcomes for both mothers and babies. With its focus on four core principles including universal screening for maternal depression; linkage to supportive services; early intervention and treatment; and community education, the program is set to make a significant impact on the wellbeing of mothers and babies in our communities.

Services

This unique program provides screening services to identify maternal mental health conditions early and offers a variety of treatment options including lifestyle modifications, cognitive behavioral therapy, group psychotherapy and medication management. Under the supervision of a board-certified reproductive psychiatrist, treatments are evidence based and follow recommended guidelines. The shared decision-making process carefully considers the known risks of untreated depression and the risks and benefits of treatment. The clinical team works in collaboration with the patient, support person(s), and clinical providers to optimize care.

Some of the services offered by the Hoag Maternal Mental Health Program include:

- Preconception planning (women with existing mental health conditions or who are already taking medications with plans to conceive)
- Mental health assessment during pregnancy and postpartum
- Individual and group psychotherapy
- Medication safety evaluation during pregnancy and breastfeeding
- Linkage to supportive services through the Maternal Mental Health Support Line
- Support groups and classes

Maternal Mental Health Program: 949-764-8191

Clinic Information

The Maternal Mental Health Program's outpatient clinic and the Maternal Mental Health Support Line operate Monday through Friday 9 a.m. to 5 p.m. The clinic is located inside the Hoag for Her Center for Wellness in Newport Beach and Irvine. With its calm and welcoming surroundings, women feel at ease and removed from the stigma of seeking care for mental health.

Team

The clinical team is led by Dr. Mercedes Szpunar, MD, PhD. Dr. Szpunar completed her psychiatry residency at the UCSD Women's Reproductive Mental Health clinical training program. She was junior faculty at Harvard Medical School Center for Women's Mental Health. Dr. Szpunar led several analyses with the Massachusetts General Hospital National Pregnancy Registry for Psychiatric Medications, with the goal to increase reproductive safety after use of psychiatric medications during pregnancy.

The team also includes Sarah Kauffman, MD, and Elizabeth Whitham, MD. Dr. Kauffman is board certified in Adult Psychiatry by the American Board of Psychiatry and Neurology. She completed fellowship training in both Women's Mental Health and Forensic Psychiatry at Columbia University. Dr. Whitham completed her postgraduate psychiatry education in General Psychiatry at Loyola University Stritch School of Medicine in Chicago where she focused on women's mental health. Dr. Whitham has significant women's mental health research experience and has authored numerous publications.

The Maternal Mental Health Program clinic team also includes licensed marriage and family therapists and licensed clinical social workers who are maternal mental health certified through Postpartum Support International.

Patients have access to a range of wellness providers and complementary medicine offerings within the Hoag for Her Center for Wellness including acupuncture, massage, Pilates, yoga and meditation, a registered dietitian and certified fitness trainer.

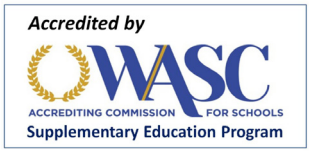
Outcomes

Since its launch, the clinic has provided over 10,750 individual face-to-face encounters, provided support to over 1,725 callers to the Maternal Mental Health Support Line annually, and linked individuals to community resources.

Using the Edinburgh Postnatal Depression Scale (EPDS) as a screening tool, the clinic has been able to track outcomes. At three months post treatment, over 70% of patients have five points or better improvement on the EPDS score assessment.

Staying true to its mission of providing outreach and education, the clinic team has provided virtual lectures to community physicians around maternal mental health and caring for pregnant and new moms. In September 2018, California passed into law important maternal mental health legislation requiring obstetric and primary care physicians to screen patients for depression, requiring hospitals to provide training to all clinical staff who care for pregnant and new moms and requiring the State Department of Health to secure and utilize federal funding to develop maternal mental health programs. Hoag and its Maternal Mental Health Program clinic have been at the forefront to develop and implement such programs.

In 2019, the Maternal Mental Health Program clinic, along with other Hoag Neurobehavioral Health programs received accreditation from the Counsel on Accreditation for Rehabilitation Facilities (CARF).



Neurobehavioral Health:
Crisis Response Team

In response to escalating workplace violence, Hoag's Pickup Family Neurosciences Institute in collaboration with Hoag Security created a Crisis Response Team for early intervention and rapid response to acute behavioral crises. This effort was supported by hospital leadership and included nursing and physician partners. The team consists of a lead psychiatrist, supervised, trained nurse practitioners on-site 24/7 for consultation, education, interventions, and debriefing of events. Goals of this team include identifying escalating behaviors and intervention prior to a negative event, providing integrative clinical treatment to our patients, de-escalation and standardized care for an acute behavioral decompensation. This team has improved the quality of care delivered by Hoag to be proactive in managing behavioral escalations and crises.

The Crisis Response team is led by Dr. Mathew Reed and NP Supervisor Thomas C. Schreiber, FNP-BC.

Dr. Reed oversees subacute addiction treatment at Hoag in his role as chief of Outpatient Addiction Services and serves as medical director for the SolMar Residential program. Dr. Reed is triple board certified in general adult psychiatry, pain medicine, and internal medicine. He completed his general psychiatry residency, general internal medicine residency, and pain medicine fellowship at the University of California Davis. Complementary to his roles with Hoag's addiction programs, Dr. Reed serves as chief of the Inpatient Pain Service addressing acute and chronic pain often involving addiction or other psychiatric comorbidities.

Tom Schreiber spent most of his health care career in emergency medicine as a paramedic, emergency care technician, and registered nurse working in the emergency departments at Pine Ridge Physician's Regional in Naples, Florida and at Hoag Hospital, Newport Beach. While obtaining his Master's degree, Tom worked as a relief charge nurse in Hoag's Chemical Dependency Unit. Tom has previously worked as a nurse practitioner at Pain Medicine Associates and Advatmed. Prior to graduating from USC with a Master's degree as a family nurse practitioner, he graduated with honors with a Bachelor's degree in Nursing from West Coast University.

NFL Player's Association Brain & Body Program

Hoag is the West Coast delivery partner for the Brain & Body Physical Program, a clinical partnership with the Cleveland Clinic sponsored by The Trust, a division of the National Football League Players Association. Launched in February of 2016, the program has now had almost 600 former NFL players come through the Hoag administered program.

Coordinated by Hoag Executive Health, this two-day program employs a comprehensive multispecialty approach to health care and includes examinations by Hoag-affiliated providers in the following areas:

- Internal medicine
- Exercise physiology
- Orthopedics
- Physical therapy
- Cardiology
- Sleep medicine
- Neurology
- Neuropsychology
- Advanced imaging

To complement the examinations, players also undergo in-house imaging and laboratory testing that includes:

- Brain MRI
- Sleep study
- Neuropsychological assessments
- Calcium CT scans
- Full lab panel that includes advanced lipids and hormones
- Echocardiography
- Cardiopulmonary testing
- Vision
- Audiology
- Body composition and mobility
- Balance testing
- Bone density testing

Upon completion of the assessments, a comprehensive follow-up consultation is conducted by their primary physician and clinical results and individualized recommendations are reviewed with the former player. Each former player receives a detailed report which provides results

NFL Brain and Body Clinical Partners

Cleveland Clinic

Cleveland Clinics' Brain Health and Restoration Program is dedicated to developing a collaborative "game plan" with former players to help maintain and enhance cognitive, motor and social functioning.

hoag. Pickup Family Neurosciences Institute

Pickup Family Neurosciences Institute Brain and Body assessment is dedicated to developing a collaborative "game plan" with former players to help maintain and enhance cognitive, motor and social functioning.

MGH 1811 MASSACHUSETTS GENERAL HOSPITAL

The MGH Brain and Body Program is dedicated to providing world-class, evidence-based medical care to former NFL players in order to help them develop and maintain a healthy brain and body.

Tulane INSTITUTE OF Sports Medicine

The multidisciplinary treatment team at Tulane Institute of Sports Medicine (TISM) takes pride in their services to support players' health and safety both on and off the field.

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

The medical assessments offered by the CSRA, in collaboration with UNC's Departments of Neurology and Physical Medicine and Rehabilitation, provides former athletes with a comprehensive evaluation of their cognitive and physical functioning.

THE TRUST POWERED BY THE NFLPA

NFL

Participants in the NFL Brain & Body Program.

and individualized recommendations. Hoag is committed to maintaining a close relationship with each player and offering follow-up support in the form of providing referrals, answering questions, and more. This program is offered to players at no cost, and they are eligible to participate every five years.

Due to the Covid-19 pandemic, air travel for these exams was suspended from April of 2020 until March of 2022 and Hoag only treated former players within driving distance. To bridge this gap and continue the focus on good health, Hoag provided virtual consultations with physicians and exercise physiologists for players who had already gone through the program. Since resuming air travel, Hoag has seen an influx of demand from former players and is currently seeing an average of 16 participants per month.

NFL Dedicated Hospital Network Program

In September of 2021, the NFL launched the Dedicated Hospital Network (DHN) Program, a clinical program designed to provide vested former players with a supplemental "first dollar" health plan solution in partnership with Cigna and covered by the National Football League.

Partner Health Systems

NFL PLAYER BENEFITS

Dignity Health	Baylor Scott & White Health	Intermountain Healthcare/ Desert Orthopaedic Center	Atlantic Health System
Emory Healthcare	UCHealth	Hoag Hospital	Penn Medicine/Rothman Orthopaedic Institute
MedStar Health	Henry Ford Health System	Cedars Sinai	University of Pittsburgh Medical Center
Kaleida Health	Bellin Health	Baptist Health South Florida	Stanford Health Care
Atrium Health/ OrthoCarolina	Houston Methodist	North Memorial Health/ Twin Cities Orthopedics	Virginia Mason Franciscan Health
Advocate Health Care	Indiana University Health	Mass General Bringham	Advent Health
TriHealth	Baptist Health	Ochsner Health	Ascension Saint Thomas/ Tennessee Orthopedic Alliance
University Hospitals	The University of Kansas Health System	Hackensac Meridian Health/ Hospital for Special Surgery	Inova

This program established a network of high-quality medical care providers in NFL markets to offer primary care and other services to former players. Services under the DHN Program are provided free of charge to eligible vested former players and cover basic preventative screenings, mental health care, and orthopedic treatments up to an annual maximum of $25,000. Hoag Corporate Health manages and facilitates this program and coordinates with Dr. Eugene Yim and Dr. Jeremiah Ray, both with Hoag Sports Medicine, to provide the initial intake assessments and establish each former player's personalized care plan. Since its launch in September of 2021, the program has provided services to just under 100 former players. The services and specialties that are being provided by Hoag-affiliated providers include:

- Sports medicine
- Orthopedics
- Cardiology
- Gastroenterology
- Advanced imaging

Former players register for the program directly with a dedicated Cigna concierge team member who then contacts the Hoag NFL program coordinator, Jocelyne Chavarria. Jocelyne then works with the former player to establish care and schedule the necessary appointments and follow-up consultations. Given Hoag's experience with the NFL Brain & Body program, many of the processes and procedures we have developed for that program were adopted by Cigna and the national network of clinical partners for the DHN Program.

Hoag Sleep Health Program

Studies amply document that sleep disturbance greatly impacts all aspects of health including mental health, increased risk of cardiovascular disease, metabolic disturbance, and even immune system functions. Managing sleep disorders is fundamental to health care delivery.

Overview

Pickup Family Neurosciences Institute's (PFNI's) Sleep Health Program was among the first centers in Orange County dedicated to studying and treating patients with sleep disorders and has now been serving the community for over 21 years.

The Judy & Richard Voltmer Sleep Center at Hoag Health Center Newport Beach has eight private bedrooms to conduct sleep studies. The Irvine Sleep Center at Hoag Health Center Sand Canyon is equipped with four private bedrooms. In both centers, each room is designed to feel like a high-quality hotel. The Hoag Sleep Program recently upgraded its diagnostic equipment to Nihon Kohden, which meets and exceeds the American Academy of Sleep Medicine guidelines. Sleep patterns can be evaluated throughout the night or day at both sleep centers.

Our physicians are sleep medicine specialists who can diagnose and treat various sleep disorders such as insomnia, narcolepsy, obstructive sleep apnea, periodic limb movement disorder/restless legs syndrome, and REM sleep behavior disorder. The program also offers a highly effective outpatient behavioral treatment course for insomnia. Program achievements include accreditation from the American Academy of Sleep Medicine.

Team

Hoag Sleep Health Program is led by our Program Director, neurologist Jose Puangco, MD. The program has multiple board-certified sleep physicians and one nurse practitioner giving patients a choice of sleep specialists with varying backgrounds, including critical care, pulmonology, internal medicine and neurology specialists. Our team of physicians is supported by highly skilled and board-registered polysomnographic technologists.

Jose Puangco, MD

Alana Sherrill, CCSH, RPSGT

Adult Sleep Studies

In 2022, Hoag Sleep Health Program saw 2,060 new patients in consultation and 2,395 returning patients. Telehealth visits continue to grow with 1,393 virtual video visits conducted by Hoag's certified sleep specialists. The sleep labs performed 803 diagnostic polysomnography studies (PSG), 239 split night PSG studies, and 251 with a full night dedicated PAP titration (CPAP, BPAP, ASV, IVAPS). There were 27 PSG studies with oral appliance therapy or Inspire therapy, 18 multiple sleep latency tests (MSLT) and maintenance wakefulness tests (MWT). Additionally, there were 1,384 home sleep apnea tests. A total of 2,722 studies were performed in 2022.

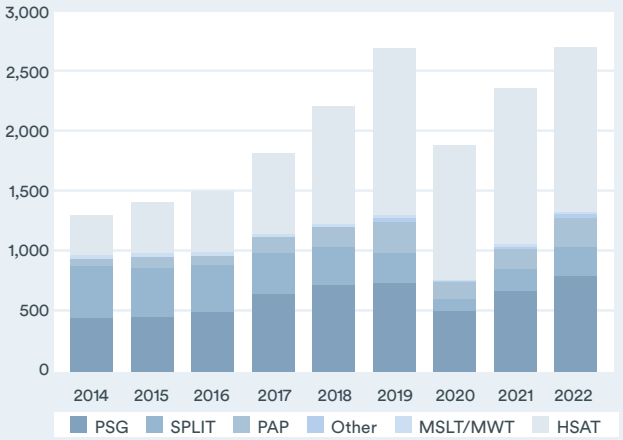
Obstructive Sleep Apnea

According to the American Academy of Sleep Medicine, it is estimated that nearly 30 million adults in the United States have obstructive sleep apnea, which is a sleep-related breathing disorder characterized by repetitive episodes of complete or partial upper airway obstruction occurring during sleep. One treatment option for obstructive sleep apnea is continuous positive airway pressure (CPAP).

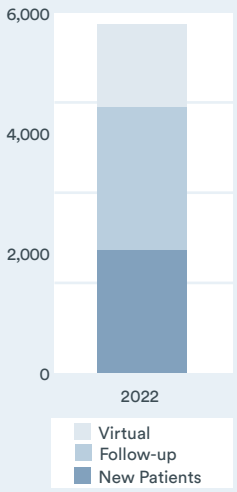
Along with traditional methods of treating obstructive sleep apnea, the program has adopted new treatment methods. For the treatment of obstructive sleep apnea, the Sleep Health Program is working in collaboration with local dentists to provide oral appliance therapy. Hoag and Dr. Puangco were the first in Orange County to offer the Inspire medical device, giving patients a surgical option for the treatment of obstructive sleep apnea.

Sleep Health Program: 949-764-8070

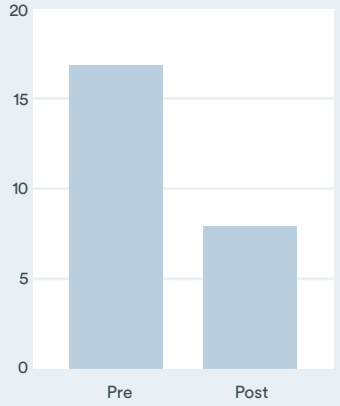
Adult Sleep Studies



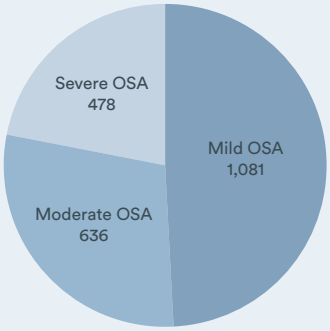
New Patient Volume and Follow-up Visits



Average Insomnia Severity Index



Total Number of Patients Diagnosed with Obstructive Sleep Apnea (OSA)



Inspire

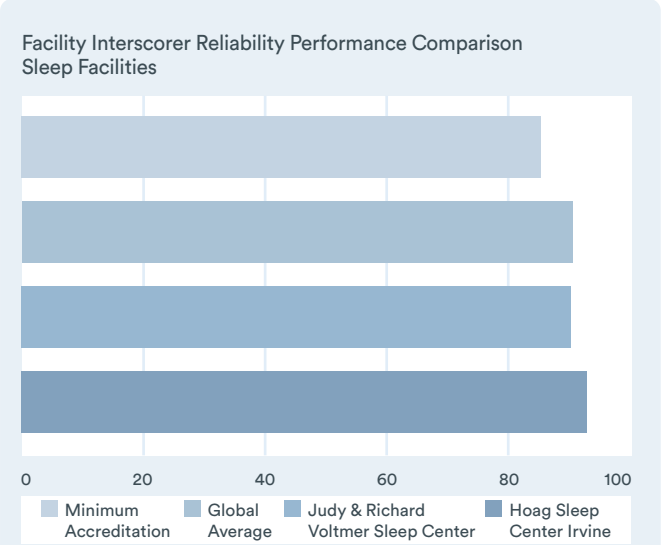
PFNI is the first in Orange County to offer a new, cutting-edge treatment option for obstructive sleep apnea (OSA). The Inspire Upper Airway Stimulation therapy is the first implantable device for treating OSA. This innovative therapy represents a significant advance in sleep apnea treatment and is life-changing for some of our patients who are unable to use CPAP.

More than 30 million Americans have sleep apnea. Depending on the degree of severity, OSA can be a potentially life-threatening condition. Research shows that a person with poorly managed sleep apnea is at increased risk for heart attack, stroke, weight gain, high blood pressure, and heart failure. CPAP therapy has been shown to be an effective treatment for sleep apnea; however, studies show that roughly half of all patients that start CPAP eventually become noncompliant. A recent study in the *Journal of Clinical Sleep Medicine* found that hospital readmission rates, for all causes including cardiovascular and pulmonary, in patients with OSA were more than double for those who did not adhere to their CPAP therapy.

Support & Education

Hoag Sleep Health Program offers a Behavioral Sleep Medicine six-week course to help with insomnia. Designed to break the pattern of insomnia through cognitive-behavioral therapy, this class teaches the participants techniques to alleviate insomnia and improve quality of life. Insomnia is difficulty falling asleep or staying asleep during the night. Chronic illness, caffeine, medications, physical discomfort, daytime napping, counterproductive sleeping habits, and excessive time spent awake in bed are all factors associated with insomnia. These classes are now being offered via Zoom to help those who suffer with insomnia through the pandemic.

In 2022, 100% of the participates of the insomnia program reported noticeable improvements in insomnia severity by the end of the six-week series. For class dates or to register, call 800-400-HOAG (4624) or go to hoag.org/education. For more information about sleep disorders, visit hoag.org/sleep.



Quality Assurance

The standards for accreditation by the American Academy of Sleep Medicine mandate a rigorous scoring quality assurance program comparing the scoring of registered polysomnographic technologists with a gold standard of board-certified sleep physicians with an inter-scorer reliability greater than 85%.

Covid-19 Safety Measures for 2022

Rest assured that Hoag Hospital is taking key safety measures to protect patients and staff during these unprecedented times.

SCHEDULING APPOINTMENTS

- To minimize patients' time in waiting areas, we are scheduling to add space between visits.
- Telehealth appointments via phone or video are available and recommended.

DURING THE APPOINTMENT

- Anyone entering a Hoag facility – physicians, staff, or patients, are required to wear a face mask or cloth covering. Individuals will also be screened at hospital entrances and at all outpatient facility entrances.
- Hand sanitizer is routinely used, as well as disinfectant cleaning products on all equipment and exam rooms between patients.
- Physicians and staff are using the proper personal protective equipment for all visits. Covid-19 testing and rapid testing for certain procedures have been added for both the safety of staff and patients.

For additional information on Covid-19 and to view videos about Covid-19, visit hoag.org/COVID. Contact us by calling 949-764-8070 or email sleepcenter@hoag.org.

Neuro-Rehabilitation Services:
Fudge Family Acute Rehabilitation Center

Overview

The Fudge Family Acute Rehabilitation Center (FFARC) located on the third floor of the West tower and North building of Hoag Newport Beach, is a stand-alone hospital within a hospital, providing a state-of-the-art rehabilitation center with customized programs to help patients in post-acute recovery of neuro and physical function attain their greatest level of independence and return to community living. Our world-class facility offers intensive, daily rehabilitation services to maximize independence and improve quality of life.

FFARC is available to adults who have been treated for a wide variety of illnesses and injuries including brain injury, brain tumor surgery, spinal cord injury, and surgery, or stroke. Our 24-bed, 25,000-square-foot center provides comprehensive care with 24-hour rehabilitation nursing, full-time medical director oversight, and a team of certified experts. We also provide state-of-the-art equipment and new technologies such as Bioness Integrated Therapy System (BITS) and Functional Electrical Stimulation wearable devices, and REAL Immersive Virtual Reality system by Penumbra, access to Hoag education programs, as well as treatment in the outdoor therapy garden and even a putting green. The center completed the expansion of six new beds in 2022 resulting in a total of 24 beds.

FFARC utilizes an interdisciplinary team approach focused on highly specialized assessments of each individual's functional health patterns. Treatment goals are mutually agreed upon by patients and caregivers, targeting optimal functional outcomes. The overall well-being of the patient is achieved through realistic goals using current research and evidence-based strategies. Treatment is provided primarily in one-on-one sessions, exceeding the typical volumes provided nationally. Families and home caregivers are included in transition hand-offs to outpatient care.

In 2022, the Fudge Family Acute Rehabilitation Center expanded from 18 to 24 beds, all in private rooms with warm, comfortable surroundings and state-of-the art amenities.

> Fudge Family Acute Rehabilitation Center has achieved the highest patient satisfaction.

2022 Patient Experience – Press Ganey

Overall Care	Likelihood to Recommend
94.84 MEAN SCORE	97.14 MEAN SCORE
91ST PERCENTILE RANK	93RD PERCENTILE RANK

Peer Group: All hospital DB | PG Overall N=229 | CAHPS Item Level N=Invalid | Received Date | 01 Jan 2022 - 31 Dec 2022

Our compassionate care environment promotes recovery. From the design of the center to the design of our team, our specialists have thought of every detail to help patients return to independent or modified independent living. Specialized board-certified rehabilitation registered nurses account for 33% of our nursing team. Additional certifications include board-certified neurologic clinical specialists in physical therapy.

OUR INTERDISCIPLINARY TREATMENT TEAM INCLUDES:

- Licensed clinical social workers
- Neuropsychology and psychology
- Occupational therapists and assistants
- Physicians

Fudge Family Acute Rehabilitation Center: 949-764-3900

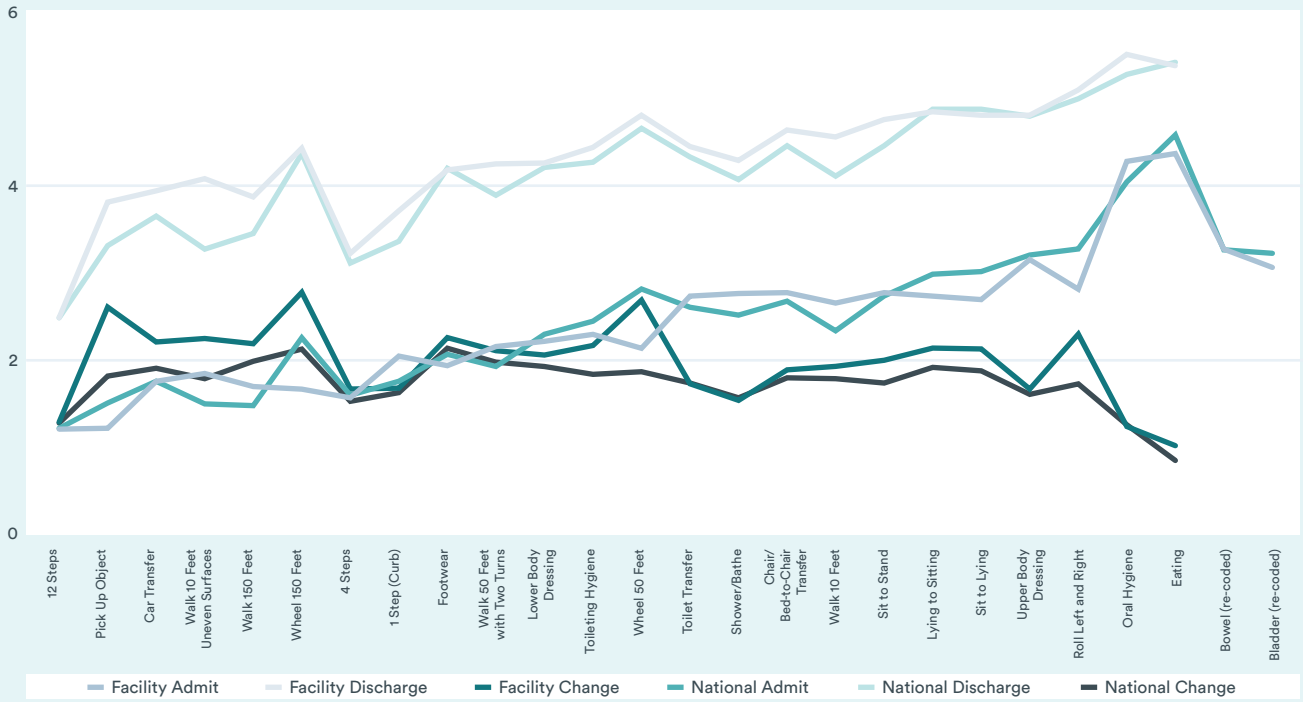
2022 Facility Metrics – Fudge Family Acute Rehabilitation Center

	2020	2021	2022
Discharges in Sample	538 Patients	599 Patients	535 Patients
Average length of stay	12.2 days (14.2 days national average)	12.19 days (14.51 days national average)	12.19 days (14.51 days national average)
60% Rule Compliance	72.7%	73.0%	73% (69% national average)

2022 Quality Metrics – Fudge Family Acute Rehabilitation Center

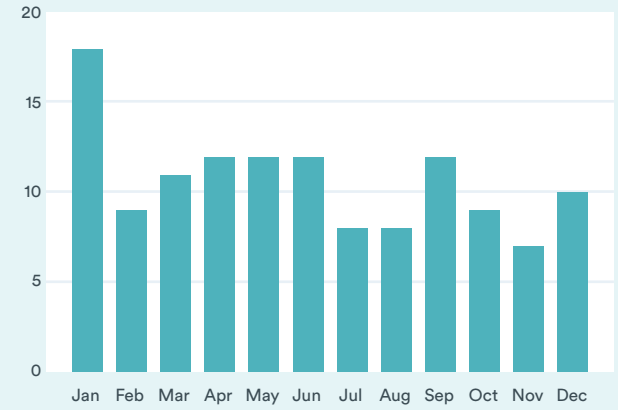
	2020	2021	2022
Community Discharge Rate	86.4% (76.9% national average)	88% home (79% national average)	90% home (77% national average)
SNF Discharge Rate	2.4% (11.3% national average)	4% (10% national average)	2% (11% national average)
Average Functional Gain	26 (23 points national average)	28 (30 points national average)	26.21 (23.78 points national average)
Therapy Minutes Per Patient Day	146 (139 national average)	146 (139 national average)	144 (125 national average)

Functional Scoring Comparison: Functional Abilities

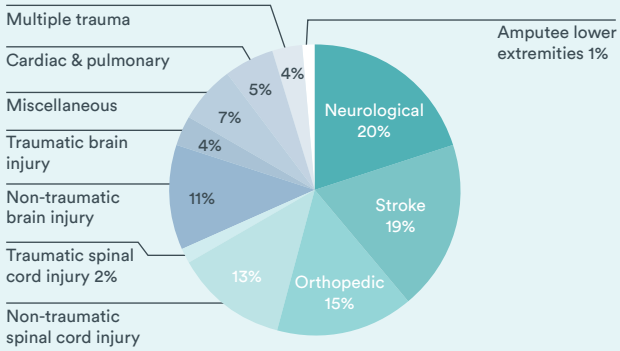


Hoag's FFARC significantly exceeds national benchmarks for patients discharged to home setting, with fewer discharges to subacute nursing facility or back to hospital for acute care.

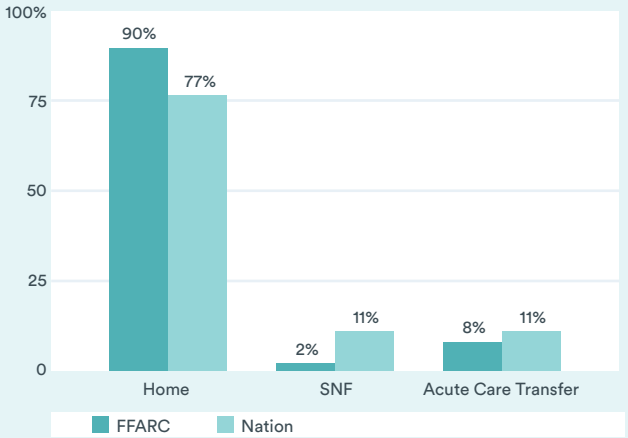
Total number New Consult MS Patients 2022

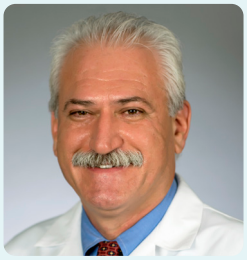


2022 Diagnostic Distribution



Discharge Destination





Keyvan Esmaeili, MD

Hadi A. Rasul, RN, BSN, MBA, CRRN

Brian Boone, PT, DPT

Lisa Fahey, MSN, RN, CRRN

- Rehabilitation nurses
- Physical therapists and assistants
- Recreational therapist
- Speech language pathologists

OTHER SERVICES MAY INCLUDE:

- Case management
- Chaplain services
- Dietary services and dietitian consultations
- Hospital pharmacy
- Laboratory services
- Radiology services
- Respiratory therapy

Team

Keyvan Esmaeili, MD, is the medical director of the Fudge Family Acute Rehabilitation Center. He is a board-certified physical medicine and rehabilitation physician. Hadi Rasul, RN, BSN, MBA, CRRN, is the director of acute rehabilitation. Brian Boone, PT, DPT, is the therapy manager, and Lisa Fahey, MSN, RN, CRRN, is the nurse manager.

Outpatient Neuro-Rehabilitation Services

Overview

Hoag Rehabilitation Services are available for patients across the full continuum of care, including acute hospitalization, inpatient rehabilitation facility, the outpatient setting, and home setting. The rehabilitation team of specialists is here to support patient needs at each step of their journey. Our goal is to help return our patients to their highest level of functioning and optimize outcomes by integrating skilled treatment techniques with patient and caregiver education. This program is offered at both Hoag Newport Beach and Hoag Irvine. The Fudge Family Acute Rehabilitation Center is located on the Newport Beach campus.

The rehabilitation team includes physical therapists and physical therapist assistants, occupational therapists and occupational therapy assistants, and speech-language pathologists. The therapists and assistants have advanced certification or training in neurology, orthopedics, vestibular rehabilitation, geriatrics, lymphedema, pelvic floor, hand rehabilitation, voice, and swallowing.

Rehabilitation Services at Hoag provides high-quality care by utilizing evidence-based practices and state-of-the-art equipment and technology. Care is delivered one on one by our licensed and specialized staff. Our highly skilled staff collaborate with the physician and the rest of the interdisciplinary team to develop an individualized plan of care.

Comprehensive rehabilitation services play an important role in assisting patients with neurological disorders to achieve their highest level of function.

PHYSICAL THERAPY

Hoag physical therapists and assistants are specifically trained to improve movement, restore function, and/or relieve pain for the following disorders:

- Neurological disorders such as stroke, traumatic brain injury, and brain tumor
- Parkinson's disease and other movement disorders
- Multiple sclerosis
- Balance and vestibular disorders including vertigo and dizziness
- Other degenerative neurological diseases
- Neuropathy

Bertec® Computerized Dynamic Posturography (CDP/IVR) coming soon for balance and vestibular rehabilitation in 2023.

- Spinal disorders
- General weakness
- Orthopedic injuries
- Headaches
- Gait instability
- Facial weakness
- Lymphedema

Individual patient needs may include:

- Comprehensive balance and vestibular testing and fall prevention treatment
- Functional mobility and transfer training
- Gait training
- Exercises for strength and flexibility
- Neuromuscular re-education
- Cardiovascular conditioning
- Joint and soft tissue mobilization
- Modalities for swelling and muscle re-education

Irvine: 949-557-0630 | Newport Beach: 949-764-5645

Hoag utilizes the latest rehabilitation equipment and technologies. Images courtesy of Bioventus

- Patient, family and caregiver education
- Wheelchair evaluation
- Comprehensive Parkinson's disease program including PWR! Principles
- Neuromuscular electrical stimulation gait training with Walkaide®

OCCUPATIONAL THERAPY

Hoag occupational therapists and assistants help improve or maintain the ability of individuals to perform meaningful everyday occupations of life that have been affected by injury or disease, such as:

- Neurological disorders such as stroke, traumatic brain injury and brain tumor
- Parkinson's disease and other movement disorders
- Multiple sclerosis and other degenerative neurological diseases
- Spinal disorders and orthopedic injuries
- Fracture, dislocation, and subluxation of fingers, hand, wrist and elbow
- Tendon and ligamentous injuries of the wrist and hand
- Upper extremity peripheral neuropathy and general weakness
- Cumulative trauma disorder/repetitive strain injury
- Cancer

Individual patient needs may include:

- Re-training in activities of daily living such as self-care, bathing, toileting, eating, and cooking, money management, gardening, housecleaning, childcare, working, etc.
- Upper extremity exercises to improve strength and coordination
- Provision of orthotics and splinting
- Edema management
- Instruction in use of adaptive equipment
- Environmental modifications and fall prevention strategies
- Cognitive re-training – attention, memory, concept formation, time management, problem solving and thinking skills
- Perceptual re-training – ability to interpret sensory information received from the environment
- Visual processing therapy – visual eye control, reading, reduced vision due to double or blurred vision and visual field deficits
- Neurodevelopmental treatment and neuromuscular electrical stimulation
- Vocational simulation
- Patient, family and caregiver education
- Driving assessment and training
- Comprehensive Parkinson's disease program including PWR! Principles
- Neuromuscular and cognitive treatment using the REAL® y-Series™ virtual reality (VR) rehabilitation application and Bioness Integrated Therapy System (BITS™)

DRIVING REHABILITATION PROGRAM

The goal of Hoag Hospital's Driving Rehabilitation Program is to promote independence and ensure safety while using a vehicle. This program can help maintain a client's independence, teach compensation strategies

for physical, cognitive and visual limitations, and ensure safety on the road. The assessment consists of a clinical evaluation and a behind-the-wheel evaluation. The clinical evaluation includes assessment of vision, reaction time, cognition, perception, memory, concentration, attention, judgment, processing, physical function, and the need for adaptive equipment. The behind-the-wheel evaluation assesses the driver's skills under normal driving conditions. Adaptive equipment may be added to the vehicle and used if needed. Recommendations will be made for any needed car modifications. The assessment is provided by an occupational therapist and driving instructor who are certified driver rehabilitation specialists at the Newport Beach location.

SPECIALIZED NEONATAL CARE

Specialized neonatal occupational therapists and physical therapists also provide care in our Neonatal Intensive Care Unit at Hoag Hospital Newport Beach and Irvine. Critically ill newborns and infants are seen for developmental progression, feeding, positioning, massage and parent/family education.

SPEECH-LANGUAGE PATHOLOGY

Hoag speech-language pathologists specialize in assessment and treatment of the following:

- Communication and cognitive problems after a stroke or brain injury
- Parkinson's disease and other movement disorders
- Aphasia – loss of the ability to express or understand spoken or written language
- Dysarthria – disturbance in the strength or coordination of the muscles of the speech mechanism
- Apraxia – difficulty sequencing movements or actions related to speech
- Voice disorders such as vocal nodules, paralyzed vocal cords and muscle tension dysphonia
- Dysphagia – swallowing difficulties; interventions include diagnostic procedures: modified barium swallow studies and fiberoptic endoscopic evaluation of swallowing; treatment may include exercises, strategies, and neuromuscular electrical stimulation
- Communication and swallowing problems after surgical procedures and/or radiation therapy

Individual patient needs may include:

- Identification of appropriate diet that specifies the thickness and consistency of food and liquids that are safer to swallow
- Provision of recommendations for optimal swallowing safety
- Train and educate on strategies including postural changes and other maneuvers to enhance swallowing
- Instruction in appropriate oral hygiene
- Exercises for strengthening and improving coordination of the swallowing mechanism
- Neuromuscular electrical stimulation to improve swallowing ability and facial weakness
- Perceptual clinical assessment of the vocal mechanism
- Identifying factors contributing to voice problems
- Education on environmental irritants, vocal use, adequate hydration, avoidance of phonotraumatic behaviors and control of health issues – reflux, allergies and asthma
- Establishing a phonation pattern that does not cause damage – addresses pitch, loudness, intonation, phonation, breathing and resonance
- Vocal function exercises to achieve optimal stamina, strength and coordination of breath support, phonation and resonance
- Acoustic and objective analysis
- Family and caregiver training
- Comprehensive Parkinson's disease program including SpeakOut!®

SWALLOW STUDIES

Swallowing is a complex function involving the mouth, throat, and esophagus. Hoag's speech-language pathologists provide a comprehensive approach to evaluation and treatment of swallowing disorders caused by stroke, other neurologic disorders, cervical spine disease, head and neck cancer, laryngectomy, and weakness of or damage to the muscles and nerves used for swallowing. Initial assessment may include a modified barium swallow study (MBSS) or videofluoroscopy (VFSS), which is an X-ray assessment of the swallowing mechanism, or fiberoptic endoscopic evaluation of swallowing (FEES) which is a

swallow study using a small fiberoptic flexible scope. These exams enable the clinicians to identify the disorder and help guide the appropriate treatment program. With the addition of TIMS Medical Video Platform®, clinicians benefit from high-resolution video and audio recording of the swallow study. The goal of the program is to keep patients eating by mouth or to return them to eating by mouth whenever possible.

AFTERCARE AND GROUP CLASSES

These classes are offered to Hoag Rehabilitation Services patients at Hoag Health Center Newport Beach. Each participant has already successfully completed their individualized, one-on-one rehabilitation. It enables the patients to continue activities in a supervised group setting while at Hoag. Some classes were modified, limited, or postponed due to Covid-19 limitations.

INDEPENDENT GYM EXERCISE CLASS

This class continues the exercise program that was prescribed by each patient's therapist in a supervised setting utilizing the Hoag Rehabilitation gym and equipment. The participant must be able to walk unassisted and be independent. The class meets twice each week (Tuesdays and Thursdays or Wednesdays and Fridays) for eight weeks at 12 p.m.

ASSISTED GYM EXERCISE CLASS

This class will enable the patient to continue the exercise program that was prescribed by their therapist in a supervised setting. This class provides closer supervision and is available for patients who require some physical assistance. If assistance is required, the participant must attend with a caregiver. The class is held twice each week (Tuesdays and Thursdays) for eight weeks, starting at 12 p.m.

BALANCE MOBILITY EXERCISE CLASS

This class focuses on balance and mobility. It will build on the principles introduced previously in physical therapy. This is for participants who may require some physical assistance and closer supervision. The class is taught by a licensed therapist. This class is held weekly (Thursdays) for eight weeks.

FORCED USE EXERCISE CLASS

This is a group class for people with Parkinson's disease focusing on exercise principles using equipment including the stationary bike, treadmill and elliptical trainer. This class includes high-intensity exercise during which participants will be working with a goal of a maximum heart rate of 60-80%. The classes are taught by a licensed therapist. This class meets three times each week (Monday, Wednesday and Friday) at 12 p.m. for eight weeks.

POWER OVER PARKINSON'S EXERCISE CLASS

This is a group exercise class for people with Parkinson's disease utilizing large amplitude movements (PWR! Principles). Participants improve their overall movement and coordination, walking, arm and leg movement, and balance. The classes are taught by a licensed physical therapist and occupational therapist. The intermediate class meets at 10:15 a.m. on Wednesdays and the beginner class meets on Thursdays at 1:30 p.m. for eight weeks.

COMMUNICATION RECOVERY GROUP

This once-per-week small group meeting is for those who have experienced speech and language impairment because of a neurological disorder such as a stroke. The group is facilitated by our speech-language pathologists with a goal of enabling practice and improvement of communicative abilities. This includes spoken and written expression as well as listening and reading comprehension. The group meets on Fridays from 1:15 p.m. to 2:30 p.m.

Clinic Information

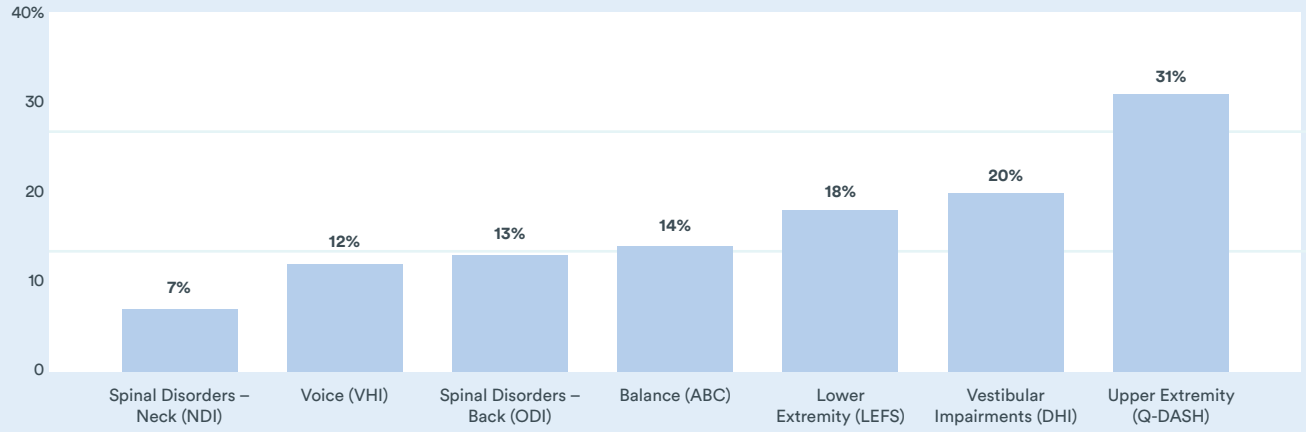
The outpatient rehabilitation offices operate Monday through Friday from 7 a.m. to 6 p.m. The Newport Beach office is located at 520 Superior Ave., Suite 100, and can be reached at 949-764-5645.

The Irvine office is located at 16300 Sand Canyon Ave., Suite 100, and can be reached at 949-557-0630. State-of-the-art equipment and facilities support recovery with compassionate and dedicated Hoag staff.

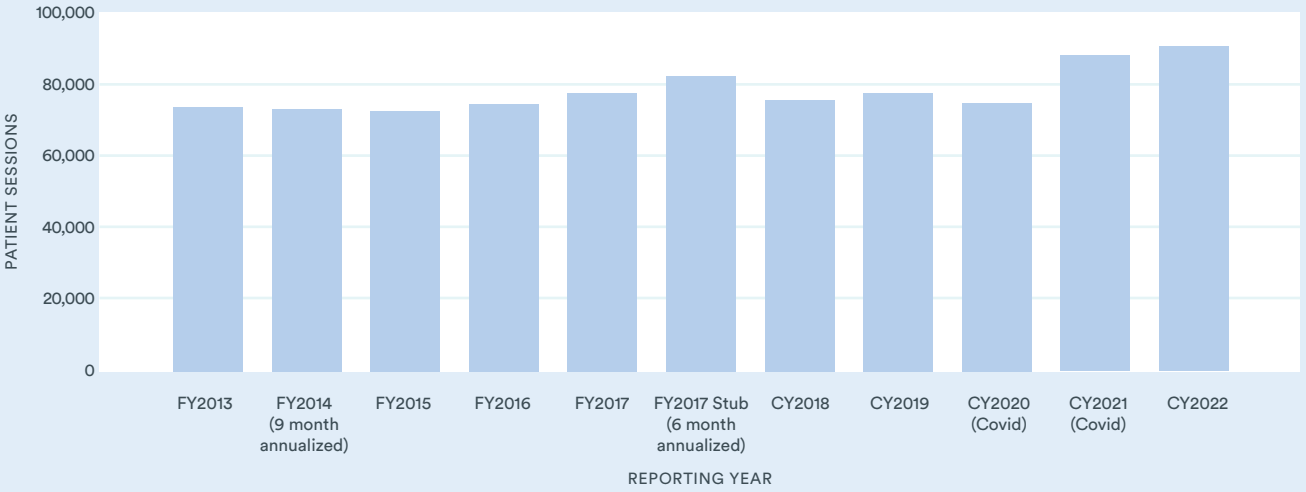
Team

The Rehabilitation Services program at Hoag is led by Mark Glavinic, PT, doctor of Physical Therapy and board-certified neurologic clinical specialist. In Newport Beach, the inpatient program is led by Tom DeBacker, PT, and the outpatient program is led by Gene Peterson, PT. In Irvine, the inpatient and outpatient programs are led by Amy M. Salinas, OT/L, MS, PAM. The inpatient and outpatient Speech-Language Pathology program is led by Tracy Thomas, MS, CCC-SLP. The Fudge Family Acute

Patient Outcomes 2022 – Average Functional Improvement



Combined Inpatient/Outpatient Rehabilitation Sessions



Rehabilitation Center is led by Keyvan Esmaeili, MD; Hadi Rasul, RN, BSN, MBA, CRRN; Brian Boone, PT, DPT; and Lisa Fahey, MSN, RN, CRRN.

The clinical team includes board-certified clinical specialists in neurology, geriatrics, oncology, orthopedics and women's health. Also included are certifications in lymphedema care, vestibular rehabilitation, hand therapy, wound care, clinical expertise in use of fiberoptic endoscopic evaluation of swallowing (FEES), and clinical specialization in critical care management of the adult and neonate.

Outcomes

Based on functional outcome measures, the following outcomes were achieved in clients:

- Patients report statistically significant improvement in self-reported outcome measures and objective tests and measures (see graph above).

Clinical Research

Pickup Family Neurosciences Institute (PFNI) is committed to innovation through clinical research development. This is driven by the PFNI's philosophy: compassionate care, clinical excellence and creative intelligence.

Leveraging research expertise and infrastructure available at Hoag Center for Research and Education*, PFNI has participated in national and international clinical studies including: advanced diagnostic tools, medical and surgical devices, pharmacologic and non-pharmacologic therapies and diagnostic biomarkers.

These research studies and clinical trials have helped patients access the newest treatment options available. Ongoing collaboration between physician investigators and study volunteers is one of the foundations of modern health care that allows rapid advancement of patient care.

Clinical Trials

ALZHEIMER'S DISEASE

Acumen Pharma. A Phase 1, Placebo-Controlled, Single- and Multiple-Dose Study of the Safety, Tolerability, and Pharmacokinetics of Intravenous ACU193 in Mild Cognitive Impairment or Mild Dementia due to Alzheimer's Disease
Principal Investigator: Dr. Gustavo Alva

Cassava Sciences. A Phase 3, Randomized, Double-blind, Placebo-controlled, Parallel-group, 76-week Study Evaluating the Safety and Efficacy of Two Doses of Simufilam in Subjects With Mild-to-Moderate Alzheimer's Disease
Principal Investigator: Dr. William Shankle

Eli Lilly. Phase 3. A Study of Donanemab (LY3002813) in participants with early Alzheimer's Disease (TRAILBLAZER-ALZ 2).
Principal Investigator: Dr. Gustavo Alva

NIH/Eisai, Inc. Phase 3. AHEAD 3-45 Study: A study to evaluate efficacy and safety of treatment with Lecanemab in participants with preclinical Alzheimer's Disease and elevated amyloid and also in participants with early preclinical Alzheimer's Disease and intermediate amyloid.
Principal Investigator: Dr. William Shankle

BRAIN CANCER

Aadi, LLC. A Phase 2, open-label study of ABI-009 (nab-Sirolimus) in patients with recurrent high-grade glioma and in patients with newly diagnosed glioblastoma.
Principal Investigator: Dr. Jose Carrillo

Aivita Biomedical. A Phase 2 Trial of AV-GBM-1 (Autologous Dendritic Cells Loaded with Autologous Tumor Associated Antigens) as adjunctive therapy following primary surgery plus concurrent chemoradiation in patients with newly diagnosed glioblastoma.
Principal Investigator: Dr. Christopher Duma

Nascent Biotech. A Phase 1, sequential cohort, open-label, dose-escalation study of the safety and CNS exposure of Pritumumab in patients with brain cancer.
Principal Investigator: Dr. Jose Carrillo

NovoCure Ltd. A pivotal randomized, open-label study of Optune (TTFIELDS, 200KHZ) concomitant with radiation therapy and temozolomide for the treatment of newly diagnosed glioblastoma
Principal Investigator: Dr. Jose Carrillo

EPILEPSY

MedtronicNeuro. Stereotactic Laser Ablation for Temporal Lobe Epilepsy (SLATE)
Principal Investigator: Dr. Vivek Mehta

NEUROSURGERY

7D Surgical Inc. Validation Study to evaluate utility of Flash Align Software in quantifying spinal alignment during posterior spinal fusion surgery.
Principal Investigator: Dr. Pawel Jankowski

PARKINSON'S DISEASE

Bukwang Pharmaceutical. A Randomized, Double-Blind, Placebo-Controlled, Two Part Study in Parkinson's Disease Patients With Dyskinesia to Assess the Efficacy and Safety/Tolerability of Fixed Dose Combinations of JM-010 and its Individual Components
Principal Investigator: Dr. Sandeep Thakkar

STROKE

NIH/StrokeNet. Phase 3 anticoagulation in intracerebral hemorrhage (ICH) survivors for stroke prevention and recovery (ASPIRE).
Principal Investigator: Dr. David Brown

*Hoag Center for Research and Education enhances our vision to be nationally recognized as a Center of Excellence in clinical research. Our mission is to promote a culture of research by integrating research with clinical care, educating the communities we serve, and partnering with our physician leaders. Our advances in clinical research cement our commitment to compassionate care, clinical excellence, and creative intelligence.

For more information on clinical research:
Adrienne Swietlikowski | 949-764-6797 | adrienne.swietlikowski@hoag.org
Rachel Romansik | 949-764-8595 | rachel.romansik@hoag.org

Support Groups

Brain Aneurysm/AVM

This support group is held the second Wednesday of every other month from 6 to 7:30 p.m. via Zoom. This is a support group for those diagnosed or treated for an aneurysm or arteriovenous malformation (AVM) of the brain. A link to the meeting can be obtained by visiting hoag.org/education and registering for the Brain Aneurysm/AVM Virtual Support Group. For more information, please call 949-764-1450.

Brain Tumor

This group meets virtually on the third Wednesday of each month from 3 to 5 p.m. via Zoom. This is both an educational and support group for anyone diagnosed with a primary brain tumor or metastatic disease. Family and friends are welcome to join us. For additional information, please call 949-7-CANCER (722-6237).

Epilepsy

In 2022, the PFNI Epilepsy Program at Hoag offered an interactive support group for all adolescent and adult epilepsy patients. The group met on the first Wednesday of every month from 6:30 to 7:30 p.m. via Zoom. The Women's Surgical Epilepsy Support Group provides mutual support and information for women who have epilepsy and have undergone or are considering surgical intervention. The group was facilitated by clinical psychology doctoral externs under the supervision of a licensed clinical psychologist. The support group was held on the second Tuesday of each month from 5:30 to 6:30 p.m. via Zoom. Both of these support groups are currently on hold until further notice.

Multiple Sclerosis

The PFNI Multiple Sclerosis Hope Center meets the second Thursday of every month from 4 to 6 p.m. Group sessions offer beneficial peer support along with clinical experts specializing in the unique needs of those affected by multiple sclerosis. Participants are led by a certified instructor/specialist through effective stress management practices such as virtual reality-guided meditation.

Location: 520 Superior Ave., Suite 100, Newport Beach, CA 92663

Online registration: hoag.org/education

Parkinson's/Movement Disorders

The Salsbury Family Movement Disorders Program hosts a caregiver support group on the third Saturday and second Wednesday alternating each month. The caregivers support groups are offered for care givers, their family and friends and for patients with Parkinson's who wish to attend. For more information, please call 949-764-6277.

Stroke

The Stroke support group is held on the fourth Thursday of every month from 2 to 3:30 p.m. via Zoom. This is a support group for stroke survivors, caregivers, family members and friends. A link to the meeting can be obtained by visiting hoag.org/education and registering for the Stroke Virtual Support Group. For more information, please call 949-764-1450.

Philanthropy

Philanthropy is indispensable to Pickup Family Neurosciences Institute's (PFNI's) continued growth and innovation. It allows us to envision and enact achievements that most other hospitals cannot. Many of the programs and services highlighted in this report are enabled and supported by the generous support of the community. The Covid-19 pandemic provided many challenges into 2022, but throughout, the community rallied around PFNI and provided support in unimaginable ways. With this generous support, PFNI remains in the top 10% nationally in neurological care according to *U.S. News & World Report*, an accolade that would not be possible without our dedicated supporters.

When the pandemic began, few foresaw the depth or longevity of detriment that this novel virus would wreak on health care and the financial markets. Hoag is immensely grateful to every donor who has supported PFNI over the years, including Donna and Dick Pickup, Sandi and Ron Simon, Gary Fudge, Nancy and Bill Thompson, Jeri and Daniel McKenna, Marilyn and Bill Robbins, Ginger and Tony Allen, and many others, including those mentioned below. We are humbled by all the support we have received and would like to share some new gifts we've received from stalwart supporters of PFNI through this time of market volatility.

Philanthropic Impact: Selected Highlights

PFNI's neurobehavioral health programs, such as ASPIRE and Hoag Addiction Treatment Centers, have continued to expand thanks to continued philanthropic support.

- We have added a Crisis Intervention Team equipped to help staff respond to challenging situations within the hospital to address the growing number of chronic pain cases we see in our inpatient, outpatient, and emergency department settings.
- We received significant support from the Patrick's Purpose Foundation, Suzanne and Tim Moshenko and Larry Broughton, the Tsao Family Foundation, and Carolyn and Gary McKitterick to continue our efforts to combat the teen mental health crisis through our ASPIRE program.
- We are also immensely grateful to the William Gillespie Foundation, Marisla Foundation, and George T. Pfleger Foundation for their unwavering support of our Hoag Addiction Treatment Centers.
- Finally, we received a six-figure gift from an anonymous couple to support our neurobehavioral health services at large. We are immensely grateful to all our donors who support this area of critical need in our community.

Our Fudge Family Acute Rehabilitation Center has remained at or near capacity since opening its doors four years ago. The need for specialized acute rehabilitation services remains high, and we recently completed a six-bed expansion that will allow us to serve even more members of our community. Support from two anonymous donors with six-figure gifts, Ann and John Clark, and many others has given this cornerstone of clinical care the opportunity to not only enhance the amazing services and clinical teams but also look to the future as we continue to enhance the amazing services offered here.

PFNI's Memory & Cognitive Disorders Program, which includes the Orange County Vital Brain Program, evolved into Hoag's newest initiative, the Center for Integrative Brain Health. Hoag recruited prominent neurobehavioral psychiatrist Dr. Aaron Ritter, who started in September 2022, to lead the center. After receiving a generous gift from the Larkin family, he was named the Larkin Family Endowed Chair in Integrative Brain Health. Gifts from Fran and Terry Buchanan, Brandie and Robert Koury, the Elliott Family Foundation, the Robbins Family, and many others this past year have helped maintain the clinical excellence within the Memory & Cognitive Disorders Program and enhanced research abilities in our search for ways to influence the progression of these detrimental diseases.

The Lucy Curci Neurosciences Specialty Clinic, established with an extremely generous gift by John Curci on behalf of the Curci family, houses an array of neuroscience specialties. Each department within the clinic has grown exponentially, and the vision is to continue expanding to meet the growing demand. Several programs within the clinic received significant gifts this year, supporting groundbreaking research, leading-edge technology, facilities, and vital educational resources.

- The Salsbury Family Movement Disorders Program now has four specialty-trained movement disorder neurologists, three functional neurosurgeons, a dedicated nurse navigator, and several additional specialists and therapists who provide a comprehensive approach to treatment. Through the leadership of our specialists, Hoag continues exploring novel therapeutics to keep delivering world-class care to our Parkinson's disease patients and those with similar disorders. We are incredibly grateful to Lisa and James Hale for their support of this growing program this year.
- Hoag recruited Yasir Jassam, MD, in March 2021 to expand our Multiple Sclerosis (MS) & Neuroimmunology Program after recognizing a gap in care for patients in Orange County. Thanks to support from the Hausman Family Foundation, the first contributors to this innovative program, Dr. Jassam has developed a center for patients with multiple sclerosis and other immune-related disorders. This space serves as a centralized area for these patients to gather as a community for support, education, group exercise, and therapy. Continued support from the Hausman Family Foundation as well as the Hale family has helped us continue these services and enhance our research capabilities within our MS program.

The Concussion/Mild Traumatic Brain Injury program within PFNI continues to focus on the diagnosis and treatment of traumatic brain injuries. We are trusted by the NFL Players Association as a site for the Milestone Wellness Assessment to provide a comprehensive health assessment of retired NFL players to gauge their wellbeing. Supporters, such as the Clemons Family Foundation, help us continue to enhance the services we provide and ensure that all patients diagnosed with a traumatic brain injury receive world-class care and never have to leave Orange County for the best treatment.

Another area of PFNI that experienced a significant spike in demand is our Spine Center. Thanks to a new gift from Andrea and Mark McCardle, there are added resources that will help continue to grow the resources within the Spine Center. We recruited Dr. Adam Kanter in 2022, who specializes in minimally invasive spine surgery and further enhances the expertise and national reputation of our neuro spine team. He also serves as the associate executive medical director of PFNI.

Many families have generously supported areas of PFNI that continue to touch multiple areas of the Institute. These gifts promote collegiality and partnership within the Institute, enhance research, and help purchase the latest technologies to remain at the forefront of advanced healthcare. Thanks to major gifts from the Clemons Family Foundation, the Clark family, the Harriet E. Pfleger Foundation, Sara and Michael Abraham, the Ruby Family Foundation, the Hausman Family Foundation, Sandi and Ron Simon, and support from thousands of additional donors, Pickup Family Neurosciences Institute will continue to be an innovator in the field of neurosciences.

The generous support of donors allows Hoag to seize new opportunities for advanced patient care and stay at the forefront of innovation, sponsoring novel technological developments, empowering transformative research, and attracting world-class physicians, nurses, clinical teams, and staff, especially during a time of economic uncertainty. We cannot thank our supporters enough for all that they have enabled us to do and accomplish.

For more information about philanthropic support for the Pickup Family Neurosciences Institute, contact Jennifer Brown, executive director of development, clinical institutes, Hoag Hospital Foundation, at 949-764-7454 or Jennifer.Brown@hoag.org.

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To learn more, visit us at hoag.org/neuro.