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This edition of the Hoag Pickup Family Neurosciences Institute Annual Report was made possible through a generous contribution from Mary Lynn & Rusty Turner.
ADDENDUM: As this annual report goes to press, we are facing one of the greatest challenges to health care delivery in recent times, the COVID-19 pandemic, and its consequences to our community. We know that with the brave, tireless, resolute, and persevering health care workforce at Hoag, the trust and support of our community, we will overcome any threats and challenges to our society, and be stronger and better on the other side of this event. We hope that reading this report will help reassure all regarding our relentless pursuit of wellness and excellence.
In 2007, Hoag announced its 5th Center of Excellence, Hoag Neurosciences Institute. Twelve years on, this unique comprehensive collaborative of neurosciences programs in Orange County, 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 and spine.

Spearheading Pickup Family Neurosciences Institute is Hoag’s multidisciplinary team of nationally recognized medical experts, who subspecialize in the fields of neurology, neurosurgery, diagnostic and interventional neuroradiology, radiation 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 13 endowed chairs (unique for a non-academic, community hospital), three of which are in Pickup Family Neurosciences Institute. Dr. Michael Brant-Zawadzki is the Ron and Sandi Simon Chair of Pickup Family Neurosciences Institute. Dr. William R. Shankle is the Judy and Richard Voltmer Chair of the Memory and Cognitive Disorders Program. Dr. Robert Louis is the Empower 360 Endowed Chair of the Pituitary and Skull Base Program. The remarkable generosity of our benefactors demonstrates not only 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.
Hoag’s comprehensive Stroke Program is led by full-time 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 stroke rescue process starts immediately on arrival with assessment of the patient by our experts, and triage for the most advanced treatment appropriate to the patient’s condition. As part of the stroke team, Hoag’s Emergency Department physicians and staff initiate the stroke protocol.

In place since January 2008 but continuously updated, the so-called “Code 20” process is like a NASCAR pit crew. Upon a stroke patient’s arrival at the ED, neurological assessment, lab testing, and neuro imaging are done within 20 minutes.

Evidence-based use of clot-busting drug treatments, as well as endovascular mechanical intervention – “thrombectomy” – optimizes the chances for stroke reversal. Our team has the longest experience with endovascular stroke rescue in Orange County.

Patients are then cared for in the hospital’s Neurosurgical Intensive Care Unit and/or the 41-bed Advanced Brain and Spine Unit. All stages of care are staffed with nurses experienced in the diagnosis, treatment, and complications of stroke patients. Hemorrhagic strokes, including aneurysmal rupture, have a distinct care pathway, led by our neurosurgeons, neuro-interventional radiologists and neurohospitalists together with our intensive care physicians. Preventative aneurysm treatment using image-guided micro-interventional techniques is a component of the Stroke Program’s portfolio, and is also used in acute aneurysm rupture.

Hoag’s Newport Beach campus is a certified Comprehensive Stroke Center and Hoag Irvine is a certified Primary Stroke Center by DNVGL. Hoag has been awarded the Stroke Gold PLUS Performance Achievement Award by the American Stroke Association for nine years in a row. In 2019, Hoag achieved the Target Stroke Honor Roll Elite Plus Award by the American Heart Association / American Stroke Association.

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 13.3% currently. This rate triples the national average of 5%. Of the patients arriving in the Emergency Department meeting the criteria for the drug, 100% of patients received treatment. At 90 days, 56% of Hoag’s stroke patients return to a self-sufficient lifestyle. Our Physical Rehabilitation service, including the Fudge Family Acute Rehabilitation Center, is also key to our superior outcomes.

Hoag’s Stroke Program is led by David Brown, M.D., a neurologist with a specialty in stroke and cerebrovascular disease and a neurohospitalist. Dr. Brown leads the dedicated, multi-disciplinary acute stroke team that provides immediate care to stroke patients, and meets regularly for process improvement.

The Stroke Program Manager is Deb Mastrolia, R.N. Deb is certified with the American Board of Neuroscience Nursing for both Neuroscience nursing (CNRN) and Stroke nursing (SGRN) along with the American Association of Critical Care nursing (CCRN) 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, R.N., S.C.R.N. She works collaboratively with the multidisciplinary team to oversee the patients, care and manage quality. She meets with the patients and families to assess individual needs for treatment, prevention and education.
Functional Outcomes

All stroke survivors are called at 30 days and 90 days post discharge by the stroke nurse navigator. A telephone interview is performed to assess functional status of the survivor. Valuable teaching is reinforced regarding neurology follow-up appointments, medication teaching, risk factor modification, stroke symptom identification and the need to call 911 for any recurring signs of stroke.

Hoag continues to have the second highest volume of ischemic stroke patients in the state of California.

Stroke Program Volumes

Table 1. Combined HNB & HHI/Primary & Secondary Diagnosis

Table 2. HHI Stroke Volumes

Table 3. HNB Stroke Volumes


Stroke: After Clot Removal. MCA branches now open.
### Gold Plus “Get with the Guidelines” Stroke Core Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV tPA Arrive by 2 Hr, Treat by 3 Hr</td>
<td>97.0%</td>
<td>97.0%</td>
</tr>
<tr>
<td>Early Antithrombotics</td>
<td>99.4%</td>
<td>98.7%</td>
</tr>
<tr>
<td>VTE Prophylaxis</td>
<td>99.6%</td>
<td>99.8%</td>
</tr>
<tr>
<td>Antithrombotics on Discharge</td>
<td>99.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Anticoagulation for AFib/AFlutter</td>
<td>99.1%</td>
<td>99.1%</td>
</tr>
<tr>
<td>Smoking Cessation</td>
<td>97.4%</td>
<td>100%</td>
</tr>
<tr>
<td>Discharge on Statin</td>
<td>99.6%</td>
<td>99.8%</td>
</tr>
</tbody>
</table>

### Gold Plus “Get with the Guidelines” Stroke Quality Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIHSS Reported</td>
<td>100%</td>
<td>99%</td>
</tr>
<tr>
<td>Dysphagia Screen</td>
<td>90.6%</td>
<td>92.7%</td>
</tr>
<tr>
<td>Stroke Education</td>
<td>100%</td>
<td>99.8%</td>
</tr>
<tr>
<td>Rehab Considered</td>
<td>99.8%</td>
<td>99.8%</td>
</tr>
<tr>
<td>LDL Documented</td>
<td>99.7%</td>
<td>99.8%</td>
</tr>
<tr>
<td>Intensive Statin Therapy on Discharge</td>
<td>97.3%</td>
<td>99.2%</td>
</tr>
<tr>
<td>IV tPA Arrive by 3.5 Hours, Treat by 4.5 Hours</td>
<td>96.1%</td>
<td>95.0%</td>
</tr>
<tr>
<td>Time to IV tPA – 60 minutes or less</td>
<td>92.3%</td>
<td>94.6%</td>
</tr>
<tr>
<td>Time to IV tPA – 45 minutes or less</td>
<td>46.7%</td>
<td>63%</td>
</tr>
</tbody>
</table>

### Table 4. Hoag Newport Beach

Gold “Get with the Guidelines” Stroke Core Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV tPA Arrive by 2 Hr, Treat by 3 Hr</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Early Antithrombotics</td>
<td>98.6%</td>
<td>100%</td>
</tr>
<tr>
<td>VTE Prophylaxis</td>
<td>98.6%</td>
<td>95.6%</td>
</tr>
<tr>
<td>Antithrombotics on Discharge</td>
<td>100%</td>
<td>99.4%</td>
</tr>
<tr>
<td>Anticoagulation for AFib/AFlutter</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Smoking Cessation</td>
<td>89.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Discharge on Statin</td>
<td>99.3%</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 5. Hoag Irvine

Gold “Get with the Guidelines” Stroke Core Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV tPA Arrive by 2 Hr, Treat by 3 Hr</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Early Antithrombotics</td>
<td>98.6%</td>
<td>100%</td>
</tr>
<tr>
<td>VTE Prophylaxis</td>
<td>98.6%</td>
<td>95.6%</td>
</tr>
<tr>
<td>Antithrombotics on Discharge</td>
<td>100%</td>
<td>99.4%</td>
</tr>
<tr>
<td>Anticoagulation for AFib/AFlutter</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Smoking Cessation</td>
<td>89.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Discharge on Statin</td>
<td>99.3%</td>
<td>100%</td>
</tr>
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</table>

### Table 6. Thrombolytic Treatments: Combined HNB & HHI

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV only</td>
<td>51</td>
<td>75</td>
<td>77</td>
<td>56</td>
<td>92</td>
<td>94</td>
</tr>
<tr>
<td>IV &amp; IA</td>
<td>10</td>
<td>14</td>
<td>11</td>
<td>14</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>IA only</td>
<td>7</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Total Tx</td>
<td>68</td>
<td>96</td>
<td>103</td>
<td>86</td>
<td>124</td>
<td>115</td>
</tr>
</tbody>
</table>

### Table 7. Combined HNB & HHI Treatments

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV only</td>
<td>2</td>
<td>4</td>
<td>11</td>
<td>14</td>
<td>3</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>72</td>
</tr>
<tr>
<td>IV &amp; IA</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>IA only</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>46</td>
</tr>
<tr>
<td>Total Tx</td>
<td>12</td>
<td>10</td>
<td>17</td>
<td>18</td>
<td>6</td>
<td>15</td>
<td>9</td>
<td>7</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>3</td>
<td>137</td>
</tr>
</tbody>
</table>
Every Stroke patient is called at 30 and 90 days to evaluate their functional outcome using a well validated tool: the Modified Rankin Scale. A score of 0 – 2 reflects a self-sufficient status.

Table 8. HNB & HHI mRS Results for all Ischemic Strokes

<table>
<thead>
<tr>
<th>Patients with mRS=0 or 1 at 30 Days (%)</th>
<th>Sample</th>
<th>Yes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4 2018</td>
<td>128</td>
<td>77</td>
<td>60%</td>
</tr>
<tr>
<td>Q1 2019</td>
<td>148</td>
<td>62</td>
<td>42%</td>
</tr>
<tr>
<td>Q2 2019</td>
<td>157</td>
<td>80</td>
<td>51%</td>
</tr>
<tr>
<td>Q3 2019</td>
<td>141</td>
<td>73</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Average Yes Response</strong></td>
<td></td>
<td></td>
<td>51%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients with mRS=0 or 1 at 90 Days (%)</th>
<th>Sample</th>
<th>Yes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4 2018</td>
<td>132</td>
<td>83</td>
<td>63%</td>
</tr>
<tr>
<td>Q1 2019</td>
<td>146</td>
<td>69</td>
<td>47%</td>
</tr>
<tr>
<td>Q2 2019</td>
<td>156</td>
<td>91</td>
<td>58%</td>
</tr>
<tr>
<td>Q3 2019</td>
<td>151</td>
<td>85</td>
<td>56%</td>
</tr>
<tr>
<td><strong>Average Yes Response</strong></td>
<td></td>
<td></td>
<td>56%</td>
</tr>
</tbody>
</table>

585/844 = 69% all Ischemic stroke patients reached on phone at 90 days. 56% of all ischemic stroke patients were self-sufficient.

Table 9. Combined HNB + HHI

<table>
<thead>
<tr>
<th>Modified Rankin Score 0-2 at 90 days post D/C IV Alteplase</th>
<th>Sample</th>
<th>Yes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4 2018</td>
<td>16</td>
<td>12</td>
<td>75%</td>
</tr>
<tr>
<td>Q1 2019</td>
<td>10</td>
<td>9</td>
<td>90%</td>
</tr>
<tr>
<td>Q2 2019</td>
<td>25</td>
<td>16</td>
<td>64%</td>
</tr>
<tr>
<td>Q3 2019</td>
<td>13</td>
<td>9</td>
<td>69%</td>
</tr>
<tr>
<td><strong>Average Yes Response</strong></td>
<td></td>
<td></td>
<td>72%</td>
</tr>
</tbody>
</table>

64/72 = 89% of all IV TPA patients reached at 90 days. 72% of all ischemic stroke patients were treated with IV TPA and were self-sufficient.

Table 10. Combined HNB + HHI

<table>
<thead>
<tr>
<th>Modified Rankin Score 0-2 at 90 days post D/C All Treatments</th>
<th>Sample</th>
<th>Yes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4 2018</td>
<td>31</td>
<td>21</td>
<td>67%</td>
</tr>
<tr>
<td>Q1 2019</td>
<td>28</td>
<td>18</td>
<td>64%</td>
</tr>
<tr>
<td>Q2 2019</td>
<td>33</td>
<td>21</td>
<td>64%</td>
</tr>
<tr>
<td>Q3 2019</td>
<td>26</td>
<td>15</td>
<td>56%</td>
</tr>
<tr>
<td><strong>Average Yes Response</strong></td>
<td></td>
<td></td>
<td>64%</td>
</tr>
</tbody>
</table>

118/137 = 86% of all IV, IV & IA, IA patients reached at 90 days. 64% of all ischemic stroke patients were treated with IV, IV & IA or IA and were self-sufficient.
65-year-old female with sudden left sided paralysis and inability to speak. Initial perfusion CT brain scan shows blood flow deficit in right hemisphere. Cath lab angiograms show the blocked main carotid artery supplying the brain. Clot extraction – samples on gauze – produced unclogging of artery, as shown by the subsequent pictures, and full recovery for the patient.
Support & Education

A stroke support group meets monthly in the Hoag Conference Center, as does a brain aneurysm & AVM support group. There is an educational presentation at each, 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 at both Hoag Hospital Newport Beach and Hoag Hospital Irvine. They teach the signs and symptoms of a stroke, stroke prevention and treatments. The Stroke Program also attends employee health fairs, senior centers and events, and performs blood pressure checks, while reviewing stroke risks and prevention.

Beth McIntyre serves as the Neuroscience Data Coordinator. Beth’s role has been instrumental in assisting with data compilation for the Stroke Program.

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)

Clinical Research

“Sleep SMART: Sleep for Stroke Management And Recovery Trial” The primary goals of this study are to determine whether (1) treatment of obstructive sleep apnea (OSA) with positive airway pressure after acute ischemic stroke or high risk TIA reduces recurrent stroke, acute coronary syndrome (ACS), and all-cause mortality 6 months after the event, and (2) treatment of OSA shortly after acute ischemic stroke improves stroke outcomes at 3 months. David Brown, M.D., Principal Investigator NIH Funded.

Publication

Award Praises Hoag For Stroke Treatment

By A. Leigh Corbett
Monday, July 29, 2019

Irvine Hospital Wins Kudos for Quick Responses

Hoag Hospital Irvine has won the American Heart Association/Stroke Association’s Gold Plus Quality Achievement Award.

Hoag Hospital Irvine earned the award by meeting specific quality achievement measures for the diagnosis and treatment of stroke patients at a set level for a designated 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.

The award highlighted the commitment of the hospital’s Pickup Family Neurosciences Institute Stroke Program to provide the best possible care and treatment based on the latest research.

This is the eighth year Hoag has won this award.

tPA Use

The Association praised Hoag for “reducing the time between the patient’s arrival at the hospital and treatment with the clot-buster tissue plasminogen activator, or tPA, [which is] the only drug approved by the U.S. Food and Drug Administration to treat ischemic stroke.”

The “Golden Hour” in medicine refers to the first hour following a stroke or a traumatic injury. It is often referred to as being the most important window in administering treatment for optimal recovery and reducing death and disability as complications.

“Stroke care is advancing rapidly and this award demonstrates Hoag’s commitment” to providing the highest quality patient care, Michael Brant-Zawadzki, M.D., the Ron and Sandi Simon Executive Medical Director Endowed Chair of the Pickup Family Neurosciences Institute at Hoag, said in a statement.

Ron Simon is a member of this week’s Business Journal OC’s Wealthiest list, with a fortune estimated at $1.25 billion.

Richard Pickup and his family also made the list with an estimated wealth of $625 million. The family donated $15 million to the hospital in 2017 for the institute.
Pickup Family Neurosciences Institute includes five dedicated neuroradiologists, armed with the latest advances in technology for imaging. These resources offer crucial support to each of our various neurosciences programs. The latest generation of multidetector CT scanners are capable not only of routine anatomic imaging but also CT angiography that provides high resolution imaging of the vascular system supplying the brain, as well as advanced perfusion analysis for stroke patients, using the automated software (RAPID, IschemaView). Perfusion analysis actually calculates how much blood flow per minute each portion of the brain receives. This determines whether, and how much salvageable brain exists, when a stroke patient arrives in our ED.

Hoag’s multiple MRI scanners include three high field 3-Tesla instruments capable of high resolution brain, neck and spine imaging, functional brain MRI, diffusion tensor imaging, which allows analysis of white matter pathways through which tumors can spread, chemical analysis of brain tissue using MRI spectroscopy, as well as brain perfusion imaging, all with 3-dimensional capabilities. In addition, Hoag neuroradiologists utilize NeuroQuant MRI Brain scans, a new tool in the evaluation of patients with memory loss and dementia. This measures actual brain volume in the brain areas affected the earliest by Alzheimer’s disease.

Recently, Hoag added a PET/MR scanner, one of few such instruments available for clinical use in the United States. Also, the addition of the 3D Lab, which allows dedicated staff to reconstruct images in preparation for surgical procedures as well as allow neurologists and neurointerventionalists to immediately diagnose perfusion imaging so that physicians are able to make immediate decisions regarding the need to invasively treat patients.

After reconstruction, CT and MR images can be fed into other computers used to guide stereotactic vascular intervention, focused radiosurgery or conventional brain surgery during the procedure. Thus, our advanced imaging team supports the image-guided stereotactic and functional neurosurgery teams in their approach to brain tumors and epilepsy surgery.

Pickup Family Neurosciences Institute also collaborates with the NFL Player’s Association and Cleveland Clinic as the only West Coast location for the Brain and Body and Milestone Program administered through the trust in providing transitioning players with brain MRI as part of comprehensive services aimed at enhancing the cognitive and physical well-being of former NFL players.
Hoag is also home to the latest generation of 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, greatly facilitating minimally invasive image-guided, catheter-based treatments such as aneurysm coiling, AVM embolization, stenting, and dural arteriovenous fistula treatment.

The Institute’s two full-time neurointerventional radiologists provide 24/7/365 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 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 successful outcomes for patients. Hoag neurointerventionalists are also available for outpatient appointments and consultations in Hoag’s multi-specialty 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. The additional growth in volume in 2019 may be attributed to the DEFUSE-3 and DAWN trials, which now expand the time window of opportunity for intervention in emergent large vessel occlusions (ELVO) up to 24 hours in certain situations as recommended in the updated American Stroke Association guidelines for intracranial thrombectomy. This has allowed us to help more patients with potentially devastating ischemic brain injuries.

Dr. Christopher Baker, the director of Interventional Neuroradiology, has continued to keep Hoag at the forefront of rapidly changing technology. 2019 saw the introduction of two new embolization devices for treatment of intracranial aneurysms. The WEB device is an intra-saccular flow diversion device that is designed for aneurysms with a broad opening that are difficult to treat with the help of a balloon or stent to keep embolization coils inside the aneurysm sac. The Surpass device is a flow diverter stent that more effectively reduces flow into an aneurysm than previous devices while being easier and safer to deploy precisely.

42-year-old woman, slumped over in parking lot. Giant leaking brain aneurysm treated by threading 12 coils from the groin femoral artery into the center of the aneurysm.

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
</tr>
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<tr>
<td>Aneurysm Coiling</td>
<td>26</td>
<td>18</td>
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<tr>
<td>WEB Device</td>
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<td>9</td>
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<td>Pipeline</td>
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<td>13</td>
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<td>78</td>
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<tr>
<td>Other</td>
<td>37</td>
<td>20</td>
</tr>
<tr>
<td>Total Cases</td>
<td>207</td>
<td>203</td>
</tr>
</tbody>
</table>
Incidence and Prevalence

According to the National Cancer Institute, approximately 23,880 adults will be diagnosed with a primary malignant brain tumor in 2018.¹ Metastatic brain tumors are significantly more common and will affect as many as 200,000 people in the US each year, though estimates widely vary. Annually, approximately 13,000 individuals in the U.S. will require surgery for pituitary tumors, fewer than 1% of these are malignant.²

Program Overview

The Brain Tumor Program at the Pickup Family Neurosciences Institute provides the entire continuum of care for all patients with primary brain tumors and metastatic tumors to the brain in partnership with the Hoag Family Cancer Center for seamless care. This 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 Tumor Board, providing consensus on best evidence-based care.

The 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. This 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 GammaKnife and CyberKnife instruments and the use of virtual reality-guided brain surgery. Our subspecialized neuro-oncologists and our dedicated brain tumor navigator partner with our oncologists to oversee the trajectory of care for our patients. We offer the latest clinical research trials, including vaccine approaches to managing 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.

Brain Tumor Program: 888-325-0242
The Brain Tumor Program is led by Medical Director Christopher Duma, M.D., F.A.C.S., a board-certified neurosurgeon and a fellow of the American College of Surgeons. Robert Louis, M.D., who is board-certified in neurosurgery and fellowship-trained in complex cranial surgery and minimally invasive skull base and pituitary surgery, leads Hoag’s Skull Base and Pituitary Program.

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 pilot a new laser technology, Invenio, for rapid intraoperative diagnosis of brain tumors, shortening surgery and optimizing full resection. Tumor molecular genomic profiling is done on all patients with gliomas to help clinicians select the most precise targeted treatment. This bioinformatic analysis is presented for discussion at the Neuro-Oncology Tumor Board.

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

Treatment

Surgery
Hoag’s neurosurgeons employ 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.

Neuro-Oncology Clinic
The Hoag Neuro-Oncology Clinic provides state-of-the-art treatment for patients with cancers of the brain and nervous system. Physicians Santosh Kesari, M.D., and Jose Carrillo, M.D., 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 by them as well.
Each of the next generation of neurosurgical operating suites is equipped with the Storz CollaboraTOR; an 84 inch ultra-HD, multi-input, interactive display allowing for visualization of relevant imaging and surgical data in a single location.

Ambient green light enhances surgeons’ visualization, minimizes distraction and decreases eye strain, especially during complex procedures.

Surgery planning using Surgical Theater
3D Virtual Reality

**Tumor Board**

Hoaq Neuro-Oncology Tumor Board is designed for all practitioners to present and discuss patient cases. It is attended by neurosurgeons, ENT surgeons, neurologists, neuro-ophthalmologists, neurooncologists, radiation oncologists, neuroradiologists, pathologists, endocrinologists, and the specialized nurse navigator.

The Neuro-Oncology Tumor Board is held every Friday at 11:30 a.m. at the Patty & George Hoag Cancer Center in Newport Beach and via video conferencing at Hoag Cancer Center Irvine. It is moderated by Christopher Duma, M.D., F.A.C.S.

To submit a case for the Neuro-Oncology Tumor Board, contact Brain, Skull Base & Pituitary Tumors Nurse Navigator, Lori Berberet, M.S., R.N., at 949-764-6656 or lori.berberet@hoag.org or Rosana Figueroa at 949-764-7044 or TumorBoard@hoag.org.

**Radiation Oncology**

Hoaq offers all three radiosurgery options for the treatment of brain tumors – Gamma Knife Radiosurgery, Cyberknife®, and TomoTherapy® – ensuring patients receive the most appropriate and effective treatment for their unique case.

Hoaq offers Gamma Knife® Perfexion, which is the most advanced radiosurgical device available and targets 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 includes neurosurgeons, radiation oncologists, physicists, and specially trained nurses.

Stereotactic radiation therapy can also be delivered in fractionated form using Hoag’s advanced technologies in cases where single treatment radiosurgery is not indicated. Hoag radiation oncologists meet weekly to discuss the most appropriate treatment modalities and have expertise in utilizing both radiosurgery and stereotactic radiation therapy techniques.

Cyberknife is a non-invasive robotic radiosurgery system that can be used to treat both neurological sites (i.e., the brain and spine) as well as tumors throughout the body. Because of its unique engineering and freely moving robotic arm, it can target tumors from hundreds of angles with submillimeter accuracy. In 2019, the Cyberknife at the
BRAIN TUMOR PROGRAM

Newport Beach Radiosurgery Center/Hoag Hospital (NBRC) continued to be quite busy, treating hundreds of cancer patients from referral centers across Southern California. Of these, 124 were neurosurgical cases; 109 intracranial and 15 spine. Because of the Cyberknife’s ability to treat extracranial lesions, both brain and spine tumors (malignant and benign alike) are included in these figures. Dr. Amanda Schwer, a Hoag-affiliated radiation oncologist, is the medical director for the Cyberknife at NBRC.

Clinical Research
Through Hoag Family Cancer Institute’s Developmental Therapeutics Program, in alliance with USC Norris Comprehensive Cancer Center, patients have access to clinical trials not typically offered at community hospitals. For an up-to-date list of open trials, please contact Leila Andres, M.S., at 888-862-5318.

Screening and 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 and Education
Hoag’s Brain Tumor Support Group offers education and support for anyone diagnosed with a primary brain tumor or metastatic disease. The group meets monthly and is beneficial for patients, family, and friends. The program’s specialized nurse navigator, Lori Berberet, M.S., R.N., is a vital member of the team, providing guidance and navigation to patients with brain, pituitary, and skull base tumors throughout their treatment. She also leads the brain tumor support group that meets regularly.

Hoag Family Cancer Institute’s range of Integrated Cancer Support Services help patients address the emotional, physical, spiritual, social, and financial challenges that accompany a cancer diagnosis. Hoag is also designated as a teaching center for Stereotactic Radiosurgery for the UCI Neurosurgical Residency Program annually. It is a three-month rotation, approved by the Board of Neurologic Surgeons. The program director is Christopher Duma, M.D.

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)
Surgical Theater 3D Virtual reality tumor surgery planning in the OR
The Skull Base and Pituitary Tumor Program of Pickup Family Neurosciences Institute 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 in order 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 Skull Base and Pituitary Tumor Program has seen dramatic growth under the direction of Robert Louis, M.D. In the years since the program’s inception, a total of 388 minimally invasive surgeries for tumor removal have been completed at Pickup Family Neurosciences Institute.

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, Pickup Family Neurosciences Institute 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 skull base and pituitary tumors.

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 360-degree reconstruction, planning, rehearsal and navigation for complex neurosurgical procedures. By performing a Virtual Reality “fly-through” on each case, our surgeons are literally able to practice an operation in 3-D before ever picking up the scalpel.

40-year-old female with blurred vision, headaches: Note large pituitary mass effacing the optic nerves and third ventricle
Pre- 1 year post

Pituitary & Skull Base Program: 949-764-6066
The tool optimizes minimally invasive approaches, with smaller incisions, fewer complications, and better overall outcomes. In fact, several studies have demonstrated superior outcomes in surgeons who first rehearse using Virtual Reality. It has also been shown that preoperative rehearsal can lead to a change in the surgical plan nearly 25% of the time. In the four years since Surgical Theater was introduced, more than 1,200 neurosurgical surgical cases have been performed at Pickup Family Neurosciences institute using this innovative technology. Owing to the profound success of this technology in neurosurgery, in 2019 Hoag expanded the availability to all surgical specialties in an enterprise-wide deployment. In modern practice, 360VR 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 implantation of virtual reality and augmented reality guidance for neurosurgery and beyond. Hoag’s Pickup Family Neurosciences Institute remains the only center in California and ranks as the second highest volume center in the nation to use Augmented Reality in Neurosurgery.

In 2019, the availability of Augmented Reality 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.

The Skull Base and Pituitary Tumor Program’s technology enhanced clinical practice approach via implementation of a cutting-edge VR and AR platform was validated as shown by the following success measures:

- Infection/Meningitis – 0.8%
- Post-op CSF leak – 1.1%
- Diabetes Insipidus – transient 38%, permanent 4%

**Team**

The Pituitary Program is led by Robert Louis, M.D., Board Certified Neurosurgeon and Empower360 Endowed Chair for Skull Base ad 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, M.D., 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.

Chris Duma, M.D., is the director of the Hoag Brain Tumor Program and also serves a pivotal role in the Skull Base and Pituitary Program. Drs. Louis, Duma, and Kelley often work together, combining their skills and expertise to ensure the best possible outcome for patients.

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

The nurse navigator for the program is Lori Berberet, M.S., R.N., who helps coordinate the complex and often confusing journey from diagnosis to cure.
Surgeons use virtual reality to fly through patients’ brains at Hoag Hospital

By Lou Ponsi

PUBLISHED: June 25, 2019 at 11:06 a.m. | UPDATED: June 25, 2019 at 1:08 p.m.

Whether navigating a star ship through a meteor storm or lurking through the murky underbelly of a city at midnight, gamers have long used virtual reality technology to make their experiences seem ... well, virtually real.

Hoag Hospital in Newport Beach recently hosted a tour of its operating rooms that are using the same technology to let doctors virtually experience human anatomy in great detail and perfect surgeries before performing the real thing.

Hoag was the first hospital in Orange County and is one of only a handful around the country using systems created by Surgical Theater, a Los Angeles company specializing in virtual reality medical imagining.

Wearing the Surgical Theater headset, which looks exactly like what would be worn by gamers, Dr. Robert Louis, a neurosurgeon, said he can virtually implant himself in a patient’s brain and travel anywhere in the brain he needs to go.

The technology allows a surgeon to rehearse complex brain and spine surgery in virtual reality, multiple times if necessary, before operating on a live patient.

“I can do it three or four times in the virtual space and I only have to do it once – and I can do it safely – in a real patient,” Louis said. “Before this, there was no ability to practice surgery. The practice was on patients.”

Surgical Theater was founded by Alon Geri and Moty Avisar, former Israeli fighter pilots adapted the technology used in flight simulators to the operating room.

Geri and Avisar began working on their project in 2005 and the technology received FDA clearance in 2013.

The technology uses existing MRI scans to create 3D models of the brain that are compatible with virtual reality.

Surgical Theater also allows the surgeon to take the patients through the 3D images and the planned surgery.

“The advantage of this is that I can give myself what we call a ‘Superman’s view,’ allowing me to see what I will not be able to see in surgery until the tumor is removed,” Louis said. “I’m actually flying through the tumor, and then bringing myself out to the back side.”

Hoag began using Surgical Theater in 2015, building on the systems in recent years.

Additions include software enabling 3D imagery used before the surgery to be overlaid on top of a live surgical image of a patient during the surgery.

It gives you the ability to see what you can’t see,” Louis said.

The hospital has two operating rooms equipped with Surgical Theater equipment and has used it in more than 1,000 cases, Louis said.

Both operating rooms are also equipped with an 84-inch touchscreen monitor – think of giant flat-screen TV – that allows for manipulating an image in 4K resolution.

The images can be recorded and later reviewed, or they can be streamed live onto screens outside of the operating room.

Initially the virtual reality technology was used mainly for brain surgery, but the 3D platform is now being expanded to other medical specialties, said Dr. Michael Brant-Zawadzki, senior physician executive at Hoag.

“We’re starting to see virtual reality in healthcare expanding dramatically,” Brant-Zawadzki said. “It ensures shorter patient surgical times, improves outcomes and improves safety, (equating) to cost savings for the healthcare.”
Surgical Outcomes

Biochemical Remission for Functional Tumors 81%
Visual Improvements 83%
Gross Total Resection 81%

Tumor Resections Designated as Skull Base/Pituitary/Minimally Invasive

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<th>Year</th>
<th>Cases</th>
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<tr>
<td>2014-2015</td>
<td>51</td>
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<tr>
<td>2015-2016</td>
<td>76</td>
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<tr>
<td>2016-2017</td>
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<td>2018</td>
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<td>2019</td>
<td>87</td>
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<td>Total Surgical Cases</td>
<td>388</td>
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Publications, Book Chapters Invited Lectures

Editor, Central and Peripheral Nervous System. Netter Atlas of Anatomy. Published 2018


Surgical Outcomes

Composed of pituitary adenoma, craniopharyngioma, Rathke’s Cleft Cysts, meningioma, schwannoma, metastases, epidermoid, dermoid, hemangioma, hemangioblastoma, SNUC, Olfactory Neuroblastoma.

Lectures at National/International Conferences

Using Virtual Reality Technology across the Patient Treatment Continuum Results in Enhanced Patient Engagement and Satisfaction. HIMSS Physicians’ Executive Symposium. March 5, 2018. Las Vegas, NV.


Overview

The last century of medical progress has approximately doubled the life expectancy and improved survival rates for chronic diseases in the USA. These gains in healthcare have brought disorders of aging to the forefront of major socioeconomic and healthcare challenges.

Cognitive impairment (CI) due to Alzheimer’s disease (AD) or other dementias contribute substantially to this problem. Orange County (OC) is particularly impacted. Those over 65 represent the only growing age group, one projected to increase in the next 25 years from 14% in 2015 to 24% in 2040. In addition, while four of the five leading causes of death in OC have decreased by between 16% and 40% in the past 10 years, AD has increased by 125%. Therefore there is an urgent and crucial need for the innovative and pragmatic approach to manage cognitive health in our community.

Our Memory and Cognitive Disorders Program focuses on three main goals:

1. Promoting cognitive health through the Orange County Vital Brain Program (OCVBP), a population-based prevention program, offering public and physician education, cognitive assessment services embedded within the community, and coordination and triage of healthcare resources for the program participants.

2. Providing an accurate diagnostic assessment and monitoring of AD and related disorders (ADRD). The services include a comprehensive neuropsychologic assessment as well as a biomarker analysis (e.g., quantitative volumetric MRI (Figures 1 and 2), functional MRI, amyloid PET imaging (Figure 3), and cerebrospinal fluid assessment), allowing the earliest stage diagnosis and wider treatment options.

3. Clinical research in FDA ADRD Phase I, II, and III clinical trials and prevention trials, as well as research in behavior and healthcare outcomes to improve measurement in ADRD healthcare.

Almost half of CI cases are due to more manageable, reversible conditions, including cerebrovascular disease, hypertension, diabetes, cardiac, pulmonary, and renal diseases, depression, obesity, and certain lifestyle choices. AD, which accounts for about 45% of all CI cases, can also be significantly delayed at all severity stages with proper medication, better

Memory & Cognitive Disorders Program: 949-764-4430

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

<table>
<thead>
<tr>
<th>Brain Structure</th>
<th>Volume (cm³)</th>
<th>% of ICV (5%-95% Normative Percentile)</th>
<th>Normative Percentile</th>
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<td>Hippocampi</td>
<td>7.33</td>
<td>0.40 (0.41-0.58)</td>
<td>&lt; 5</td>
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</tbody>
</table>

Figure 3. MR-PET amyloid imaging

MR-PET allows regional quantification of AD pathology such as beta amyloid (arrows), offering better diagnostic insights.
memory of existing medical conditions, lifestyle modification, and appropriate caregiver support. And as is the case for any medical condition, prevention and early detection are the keys to effective management of CI or dementia.

“Prevention through Delay” characterizes the philosophical approach of the Memory and Cognitive Disorders program. Our sensitive monitoring tools, advanced diagnostic methods, state-of-the-art treatment approaches, and disease management works with optimal community education and other services coordinated among physicians, patients, and community organizations. This approach is critical to slow progression of CI, prevent full blown dementia that incapacitates people and raises health care costs.

Team
The team is led by William R. Shankle, M.S., M.D., F.A.C.P., the Judy & Richard Voltmer Endowed Chair, Memory and Cognitive Disorders Program. He also serves as a director of OCVBP, and is teamed with neurology and psychiatry colleagues with support from multi-disciplinary talent in education, research, and outreach. The team includes Greg Whitman, M.D., an ADRD specialist serving the Irvine community, neurologists Bruce Cleeremans, M.D. and Victor Doan, M.D., and a neuropsychologist Lauren Bennett, Ph.D. who also serves as a clinical supervisor for the OCVBP. Celine Keeble and Jeremy Engle coordinate the OCVBP’s education, assessment, and outreach efforts. Junko Hara, Ph.D., leads its research and academic development, as well as grant procurement effort.

Orange County Vital Brain Program
OCVBP (www.OCBrain.org) has led a community-wide, multi-disciplinary program, supported by prior grants and philanthropy, promoting cognitive health in our community since 2010. Targeting persons over 45 years old, this effort is disseminated through 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 (HMG) to further promote cognitive health in primary care settings, and with Melinda Hoag Smith Center for Healthy Living (MHSCHL) to outreach to Hispanic and Latino communities.

OCVBP’s free self-screen tools, accessible on its website, evaluate and educate users on risk factors for cognitive impairment, depression and mood, and memory loss. To date, 5,557 community members have taken advantage of them. These tools have attracted steady use by community members each year (Figure 4).

Figure 4. Online Self-Assessment Utilization (2017-2019)

- Risk Factor Self-Screen
- Depression Self-Screen
- Memory Self-Screen

OCVBP’s in-person memory assessment service is provided in both English and Spanish at five testing locations (Hoag Hospital Newport Beach, Hoag Health Center Irvine, Oasis Senior Center, Senior Center Huntington Beach, MHSCHL).

At the assessment, those found 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 after age 45.

To date, 5,537 (Table 1) individuals have participated in the assessment and many have returned for their annual follow ups. The overall rate of CI was 21%, which is similar to nationally published data in primary care settings. There were close to twice as many assessments of females (64%) than males (36%), although males had higher impairment rate (29%) than

Table 1. In-Person Assessment Summary

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Overall</th>
</tr>
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<tr>
<td># Assessment (%)</td>
<td>2,783 (36%)</td>
<td>4,902 (64%)</td>
<td>7,685 (100%)</td>
</tr>
<tr>
<td>Average Age</td>
<td>72.2 +/- 10.0</td>
<td>69.1 +/- 10.8</td>
<td>70.2 +/- 10.6</td>
</tr>
<tr>
<td># Below Normal</td>
<td>808 (29%)</td>
<td>835 (17%)</td>
<td>1,643 (21%)</td>
</tr>
</tbody>
</table>
females (17%). This is partly due to older average age for male participants as the CI rate increases with age (Figures 5a and 5b).

The program's effort to reach the younger at-risk population is evident (Figures 6a and 6b). At the time of the assessment, 27% of all assessments were for participants under 65 years old, and 36% were for 65 to 74 years old. Of those participants, approximately 23% of assessments were referred by their primary care physician, and 25% by family and friends, reflecting the program's education and outreach effort in our community.

The program's collaborative effort with HMG is also evident. The memory assessment service within HMG has seen a 53% increase, compared to the prior year, indicating proactive approach taken by its primary care physicians.

Support and Education

The Memory and Cognitive Disorders Program provides ongoing public and healthcare professional education seminars, and works with community organizations serving seniors and persons with ADRD.

In 2019, 13 public seminars were provided in either English, Spanish, or Japanese addressing a proactive approach to maintaining a healthy brain. Also OCVBP has participated in 18 community events including senior health fairs. For healthcare professionals, 7 CME/CEU programs and ongoing online CME events were offered.

Clinical Research

Clinical research provides a great opportunity to better understand the ADRD disease mechanisms and to provide treatment options for our patients. The Memory and Cognitive Disorders Program engages not only in FDA ADRD clinical trials, but also prevention trials where healthy participants are studied to understand how to prevent or delay ADRD. In collaboration with affiliated partner Institute for Systems Biology, our team continues to conduct a trial called Coaching for Cognition in Alzheimer's (COCOA) to determine how health coaching affects the cognitive function in early stage AD. This study will also analyze longitudinal, metabolomic data to explore transitions in cognitive function over time. As the focus of scientific and
clinical research shifts toward prevention and early detection of AD, especially before symptoms develop, understanding non-pharmacologic approaches to treat AD will become more important.

CONFERENCE PRESENTATIONS


Hoag, UCI Race For Alzheimer’s Cure

By A. Leigh Corbett
Thursday, August 8, 2019

School Develops ‘Mighty Mouse;’ Hospital Focuses on Prevention

Hoag Hospital Newport Beach and University of California-Irvine say they are making progress in research for a cure and ways to prevent the onset of Alzheimer’s disease.

UCI headlined a July 31 article: “Call it Mighty Mouse: Breakthrough leaps Alzheimer’s research hurdle.”

Researchers from the school “have made it possible to learn how key human brain cells respond to Alzheimer’s, vaulting a major obstacle in the quest to understand and one day vanquish it,” the article said.

Meanwhile, Hoag researchers said they have compelling data from its Orange County Vital Brain Aging Program that shows the benefit of early detection to stave off cognitive impairment and the dementia of Alzheimer’s disease.

“What you do in your mid-age affects what happens in your brain in your 70s and 80s,” said William R. Shankle, director of the Memory and Cognitive Disorders program at the Pickup Family Neurosciences Institute at Hoag, in a July 19 statement.

“This [data] represents a shifting attention from Alzheimer’s chronic care to prevention,” he said.

The researchers presented at this year’s Alzheimer’s Association International Conference, the largest and most influential annual meeting dedicated to Alzheimer’s disease.

Examining the rodent several months later, the scientists found about 80% of the microglia in the mice’s brains was human.

“Microglia are now seen as having a crucial role in the development and progression of Alzheimer’s,” Blurton-Jones said.

“The functions of our cells are influenced by which genes are turned on or off. Recent research has identified over 40 different genes with links to Alzheimer’s and the majority of these are switched on in microglia. However, so far we’ve only been able to study human microglia at the end stage of Alzheimer’s in post-mortem tissues or in petri dishes.”

The specialized mouse will allow researchers to better mimic the human condition during different phases of Alzheimer’s while performing experiments, said Jonathan Hasselmann, one of the two neurobiology graduate students involved in the study.

Hoag’s Microglia

Mathew Blurton-Jones, who is an associate professor of neurobiology and behavior at UCI and a member of the Sue & Bill Gross Stem Cell Research Center, led a team that recently published its work in the scientific journal Neuron.

They spent four years developing a new rodent model that contains two sets of DNA. They said the model was “Chimeric,” a mythical Greek monster that was part goat, lion and serpent, or in modern scientific terms, has two or more complete sets of DNA.

“The rodent, completely unaware of its role in scientific breakthroughs, has also become a once-mythological Chimera in the process of assisting science,” UCI said.

The researchers injected the human cells of adult patients into the mice. Researchers then coaxed the mouse into developing microglia, which function like microphages.

About 44 million people suffer worldwide from Alzheimer’s disease, including 5.8 million in the U.S., where about 200,000 new cases are diagnosed annually.

UCI’s Microglia

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Hoag’s Research

Junko Hara, program manager at the Hoag Pickup Family Neurosciences Institute, and her team, led by Dr. William Shankle, are looking into not just treatment, but preventing the switch from ever being “clicked” on.

“We’ve seen younger people taking part in the assessments because they are interested in prevention and want to take action,” Shankle said. “They have seen their parents’ or their grandparents’ decline, and they are scared. The stigma of Alzheimer’s is going away gradually. They are ready to do something.”

Hoag offers patients free access to the Orange County Vital Brain Aging Program.

“We do a lot of workshops—primary care physicians, their role in managing community health is more than the patient,” Hara said.

Dementia isn’t a disease, but rather a collection of symptoms signifying a certain cognitive impairment, Hara said. “Dementia is a symptom but there are many types,” Hara said, naming Parkinson’s, stroke, and Alzheimer’s as examples.

There is no “mild” form of dementia—any form of cognitive impairment is impactful, Hara said.

Hoag’s data found that primary care physicians were often not well informed enough to help. About 24% of all participants in the Hoag study were found to be impaired, meaning that their conditions had gone unnoticed by their physicians.

Either physicians would say “don’t worry, you’re just getting old” or patients never raised their concerns to their doctors, according to the report.

The reality is that you don’t lose your memory as you age—that’s a myth; the brain is constantly engaged in neurogenesis, or the formation of new neurons, Hara said.

And when it comes to brain training games, “There is no way to know how much benefit it has—but there is no benefit,” Hara said. “The brain is like a muscle. Use it or lose it.”
Overview
Hoag Neurosurgery Spine and Back Pain Program specializes in the accurate diagnosis and treatment of neck and back disorders with personalized conservative care and, only when needed, the most advanced minimally invasive treatment options available. Our best practice care pathways include patient evaluations by primary care physicians, physical therapy, occupational therapy, speech pathology, pain management specialists, neurologists and neurosurgical consultations when appropriate. Emphasizing personalized patient-centered care, Hoag’s multi-disciplinary team of spinal care experts strive to first utilize the latest conservative nonsurgical therapies to alleviate pain, restore function and improve quality of life.

To deliver the most effective and efficient care possible, the program creates an algorithm customized for each patient, be it rehabilitation therapy, pain management, surgery or a combination of all three. Each specialist supports the program’s principles of collaboration, comprehensive evaluation and conservative management.

When surgery is necessary, Hoag’s board-certified and/or fellowship-trained neuro spine experts are among the nation’s top physicians in the field of minimally invasive spine surgery, consistently achieving superior patient outcomes that outperform national statistics. In 2019, 36% of total volume of spine surgeries were minimally invasive.

There are numerous benefits to minimally invasive spine surgery as documented by our data spanning the past 48 months: 0% infection rate, 0% complication rate, 0% blood transfusion rate and 0% ICU stay. Our risk-adjusted laminectomy rate of infection is well below the national average.

In addition to minimally invasive spine surgery, Hoag continues to provide complex spinal surgeries including management of significant deformities.

Hoag’s leadership in providing cutting-edge, state-of-the-art patient care opened two new highly advanced brain and spine fully integrated operating room suites. Hoag added the 7D Surgical System for spinal procedures, making it the first West Coast hospital to do so. The 7D system offers technology for faster, safer surgery with a reduced recovery time for patients. This system uses the same technology found in self-driving cars to provide an unprecedented level of surgical navigation for radiation-free placement of spinal implants.

Burak Ozgur, M.D., chief of service for the Neurosurgery Spine and Back Pain Program at Pickup Family Neurosciences Institute, states: “The 7D uses machine-learning technology and is the leading-edge in terms of surgical navigation. It allows the surgeon to be in complete control, but enhances the accuracy and speed during surgery.”

Another addition to the new operating room suites includes an 84-inch touch screen system known as the CollaboratOR that displays information from a variety of sources, including X-rays and MRIs and videos. The system permits surgeons, nurses and surgical assistants to simultaneously view, monitor and analyze the information. Hoag is the only hospital in the nation with the CollaboratOR.

“Dr. Ozgur wanted to make sure I could return to the things that were important to me, and for the most part I have been able to do that. I was in chronic pain, my pain never let up, never stopped. Now I do have some pain, but it is very manageable. I feel better about life. I’m able to sit, able to sleep on my side. Dr. Ozgur has given me back a quality of life that I thought was gone permanently.”

Judy Digon, patient
These new platforms are examples of Pickup Family Neurosciences Institute’s dedication to innovation.

Hoag has received numerous national, state and local accolades for its success and was named one of the Top 100 Hospitals & Health Systems with Great Neurosurgery and Spine Programs for 2019 by Becker’s Hospital Review.

The quality of our program is assured by ongoing collection and analysis of outcome data, a monthly Neurosciences Spine Case Conference, as well as preoperative and postoperative contact by a dedicated spine nurse navigator.

Team

The Neurosurgery Spine and Back Program is led by Burak Ozgur, M.D., and includes Pawel Jankowski, M.D., Robert Louis, M.D., Vivek Mehta, M.D. and Daniel Yanni, M.D.
Clinical Research

“Clinical Development and Evaluation of Nociscan™ Diagnostic Software Suite for Post-processing MRI and MR Spectroscopy (MRS) of Lumbar Intervertebral Discs to Diagnose Disc Pain and Degeneration”; Burak Ozgur, MD, Co-Investigator.

Retrospective outcomes analysis of zero-profile standalone anterior cervical interbody device usage in ACDFs.

Retrospective outcomes analysis and comparison of zero-profile standalone anterior cervical interbody device usage in comparison to traditional ACDF cage and plating.

Description of indications and retrospective outcomes analysis of usage of ISP devices in the posterior lumbar spine.

Publications, Lectures, & Book Chapters

PUBLISHED BOOK


BOOK CHAPTERS


Large fibrosarcoma invading spinal canal


Overview

Parkinson’s Disease is the second most common neurodegenerative disorder, affecting over a million Americans, and is under-recognized in its early stages. It has diverse effects, from stiffness and pain, to unusual involuntary movements and tremors. Early diagnosis and medical management greatly improve the quality of life for those affected.

Pickup Family Neurosciences Institute’s Movement Disorders Program had its origins in 1994 with emphasis on specialized patient evaluation, advanced medical therapy and community support groups throughout Orange County. The program treats patients with movement disorders including Parkinson’s disease, dystonia, essential tremor and gait problems, enabling them to achieve their highest level of independence.

One of the latest innovations offered is the minimally invasive implantation of a small intestinal tube through which a constant infusion of Doupa, a new formulation of carbo-levodopa, provides a steady state blood level of the drug using a small wearable pump (just like in diabetics). This minimizes the “downtime” Parkinson’s patients feel between oral drug intake. For the patients who have been treated with this device to date, the functionality improvement has been significant.

Additionally, our program has long incorporated a very active Deep Brain Surgery surgical treatment with our neurosurgical lead, Christopher Duma, M.D., who has longstanding experience with some of the highest annual volumes in Southern California. Targeted therapy is team based and provided in the Outpatient Rehabilitation Department with physical therapists, occupational therapists and speech pathologists who have extensive training and experience in assessment and treatment of movement disorders. Additionally, they offer several forced-use exercise classes, “Power Over Parkinson’s” classes, and a driving rehabilitation program.

The Movement Disorders Program supports the community of people with Parkinson’s disease and their families by offering support groups, an Annual Parkinson’s Disease Symposium and Parkinson’s wellness patient education programs throughout the year.
In 2019, there were 441 admissions of patients with Parkinson’s Disease to Hoag Hospitals. Our Parkinson’s Nurse Navigator rounds on these patients in order to provide continuity of care from home to hospital. Often these admissions are for disease-related events like falls, aspiration pneumonias, or urinary tract infections. The navigator meets with patients/families, confirms home PD medication regime and specific Parkinson symptoms. Then educating nurses and staff on these specifics to provide patient specific care. And updating the patients Movement Disorders neurologist helps ensure continuity of care.
Deep Brain Stimulation Therapy Total Volume

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![Graph showing number of DBS surgeries and patients over years](image-url)

Volume of New DBS Patients and Surgeries

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<td>72</td>
<td>111</td>
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![Graph showing volume of new DBS patients and surgeries over years](image-url)
Team

The Movement Disorders Program has three movement disorders neurologists with combined expertise of 50 years in managing patients with movement disorders. The program is led by Program Director Sandeep Thakkar, D.O. (neurologist), Saulena Shafer, D.O., (neurologist), Janet Chance, M.D. (neurologist), Christopher Duma, M.D., F.A.C.S. (neurosurgeon), and Julie Treat, M.S.N., R.N. (nurse navigator).

Support & Education

A multidisciplinary case conference is held each month to review complex patient cases. This unique forum offers the opportunity for members of all disciplines, including physicians, nurses, physical therapists, speech pathologists, occupational therapists, and other health care professionals to share information about innovative new therapies.

All patients who are candidates for surgery are reviewed by this team to optimize care. Patients benefit from this combined expertise and experience.
Overview

Pickup Family Neurosciences Institute’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 the past 20 years.

The Judy & Richard Voltmer Sleep Center at Hoag Health Center Newport Beach has expanded to meet the growing needs of sleep disorders patients throughout the community with Hoag Sleep Center at Hoag Health Center Irvine opening in April 2017. With four private bedrooms to conduct sleep studies, each room is designed to feel like a high-quality hotel. The latest diagnostic equipment from CareFusion 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 Jose Puangco, M.D. (neurologist), and was joined by Ahmed El-Bershawi, M.D. (pulmonary medicine), in 2017. The program has four additional board-certified sleep physicians giving patients a choice in sleep specialists with varying backgrounds, including critical care, pulmonary, and neurology specialists. Our team of physicians is supported by highly skilled polysomnography technologists.

Adult Sleep Studies

Hoag Sleep Health Program saw 2,568 new patients in consultation and 4,340 returning patients, which is 57% growth from the previous year. The clinics performed 738 diagnostic polysomnography studies (PSG), 259 split night PSG studies, 260 PSG studies with a full night dedicated PAP titration (CPAP, BPAP, ASV), up 54% from last year. 33 PSG studies classified as other (including Oral Appliance Therapy or Inspire Therapy titrations), 20 Multiple Sleep Latency Tests (MSLT) and Maintenance Wakefulness Tests (MWT) and 1,409 home sleep studies which is a 41% increase from the previous year for home sleep testing.

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) therapy, which uses mild levels of air pressure, provided through a mask, to keep the throat open while you sleep.

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. Additionally, Dr. Puangco continues to be the only provider of the Inspire Medical Device in Orange County, giving patients a surgical option for the treatment of Obstructive Sleep Apnea.

Inspire
Pickup Family Neurosciences Institute at Hoag 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. Hoag Sleep Health Program initiated Inspire implantation with 4 patients treated in late 2018.

More than 18 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. Continuous Positive Airway Pressure (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 non-compliant. 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
As accredited centers through the American Academy of Sleep Medicine, Hoag Sleep Health Program offers additional support to our patients. Hoag Sleep Health Program offers patients 1:1 education with one of our experienced technologists. These visits are offered to answer questions and assist patients who do not necessarily require a physician visit. Our technologists saw 523 patients last year to provide the following services: Mask fittings, education, trouble shooting equipment issues, and education. This ensures that our patients feel comfortable using their PAP equipment and remain compliant in doing so.
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%.
The Mission
The Pickup Family Neurosciences Institute’s Epilepsy Team is dedicated to providing an individualized and comprehensive approach to all aspects of caring for patients with epilepsy and seizures. Regardless of whether a patient is referred to our program for transient symptoms, a first lifetime convulsion, or severe 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 reproductive health, pregnancy and long-term effects of anti-seizure medications? These are just some of the pressing matters to our patients and the PFNI Epilepsy Team strives to address all these questions and more.

The Team
The program is led by David Millett, M.D., Ph.D., 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 five years of leadership. Dr. Millett is now joined by fellowship-trained epileptologist Dr. James Park, DO, and two nurse practitioners: Suzanne Pach, MSN, FNP-C, SCRN, and Kelly Watkins, MSN, FNP-C, APRN in the outpatient clinics. Our exceptionally dedicated program manager and nurse navigator 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. For the surgical management of patient with drug-resistant epilepsy, the PFNI boasts three epilepsy-specialized neurosurgeons: Vivek Mehta, M.D., Charles Liu, M.D., Ph.D., and Jonathan Russin, M.D. Our team cannot be successful without the care and expertise that our trained Registered Nurses and Registered EEG technologists provide. 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 (Figure 1).
Our Accomplishments

Over the past five years, the PFNI Epilepsy Program has achieved several notable accomplishments. The PFNI Epilepsy 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 seizures who have been admitted to our Epilepsy Monitoring Unit.

In 2018, Dr. Millett and the PFNI Epilepsy program received a $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, video-EEG monitoring and even epilepsy surgery – to uninsured patients in our community. We are delighted that through the generosity of the philanthropy and the Charity Care program, two patients with severe drug-resistant epilepsy, and no traditional access to advanced epilepsy care, were provided all the above services and are now seizure-free after epilepsy surgery.

In 2019:

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.

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.

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 (Figure 2).

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

Patient-related outcome metrics are a cornerstone to measuring the quality of our program, and guiding process improvement. Patients in our Epilepsy Program...

Figure 1. EMU Volume

Figure 2. Laser Ablation

MRI guided real time ablation allows surgeons to selectively target structures deep in the brain that cause seizures without affecting surrounding areas. The PFNI at Hoag is one of only a few places in the country to offer this minimally invasive epilepsy treatment.
Monitoring Unit are surveyed using the Quality of Life in Epilepsy (QOLIE -10- P) assessment tool. The average patient in FY19 experienced a 356% improvement in Quality of Life. The longest seizure free interval for our surgical resection patient is 46 months (Figure 3).

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 that will lead to successful seizure-free life. As part of a multi-disciplinary, collaborative approach to epilepsy, neurosurgeons, epileptologists, neuroradiologists, 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**

Dr. Vivek Mehta and Dr. Christopher Duma, neurosurgeons at the Hoag Pickup Family Neuroscience Institute, along with epileptologist Dr. David Millett have partnered to bring this revolutionary treatment option to cure the most difficult form of epilepsy.

Laser interstitial thermal therapy (LITT) is a technique to selective ablate areas of the brain that cause seizures. This new minimally invasive technique allows surgeon to precisely target and ablate the source of the seizures using real time MRI guidance. As compared to traditional open surgery which would

“People don’t know what their options are. Medicine has made it possible for more people to be candidates for surgery, but there isn’t enough awareness about it. I feel so grateful. I have been given so much, and now I just want to give back to the people who helped me like Dr. Millett.”

*Amanda Wayne, patient*

*To read more patient stories, go to [www.hoag.org/patient-stories/](http://www.hoag.org/patient-stories/)*
WHAT IT’S LIKE TO...

Be Free From Epilepsy

By Roy M. Wallack
January 24, 2019

Chris Marten of Santa Ana turned his life around after brain surgery stopped his daily seizures. This is his story:

From age 18 on, I was a ticking time bomb. That year, while driving, I had an epileptic seizure. Neurons in your brain misfire, sending wild signals to muscles and nerves. I lost consciousness for 30 seconds and lost control of my Nissan.

From that point on, my life was radically changed. I actually had my first seizures as a baby in the hospital—two 20-minute grand mals. But we didn’t know I was epileptic during childhood.

However, after the grand mal at 18, smaller petit mal seizures hit all the time. It’s hard to explain the feeling. Little lapses in time, four to 20 seconds gone. You get what we call “auras”—you feel it coming on. I’d sit down, relax, let it pass, get a headache. It’s a sensation of déjà vu; present, past, and future all mixed up.

Meds eliminated the grand mals, but I still had multiple petit mals a month. I quit my job at Ralph’s, switched to nighttime security for a few years, then landed my job of the past 16 years: selling women’s extra-small shoes—size 2 to 5 1/2—by phone.

Life was OK until age 27. One day, I again lost consciousness while driving and crashed into a pole, luckily not hurting myself or anyone else. I began having grand and petit mal seizures all the time. New meds didn’t work. My future looked grim, as the condition gets worse with age.

After I turned 33, my older sister Misty, whom I live with, went to a psychic.

“I see better options out there for your brother,” she was told. In February 2016, after lots of research, Misty took me to David Millett, a neurologist at Hoag Hospital specializing in seizures and epilepsy.

After a basic checkup and some drug trials, none of which worked, Millett said I might be a good candidate for an operation to cut out the misfiring part of my brain. If the bad section is too deep, they don’t do it. Why mess up your life even more? But they found my problem area was isolated on an easy-to-access spot, so Millett recommended I go for it. Worst case was a little short-term memory loss and seizure reduction by 85 to 90 percent.

In May 2016, Millett’s team removed a portion of my brain. I wondered: Would I come out normal? Since then, after reducing medications to zero, I’m episode-free—not one seizure. They tell me they’ve never gotten someone to the point of no seizures and no drugs.

I started driving again after eight months. I don’t get the headaches or the side effects of the pills—depression, anger, snapping at the littlest thing. I walk, go out, feel like doing things. I’ve lost 50 pounds. My confidence is coming back with women. Not having to rely on anyone else is pure freedom. I’ll go hiking, to the beach, golfing—all the stuff people take for granted.

But here’s the funny thing: Sometimes I kind of miss the seizures!
result in several day hospital stay with a large surgical scar, this new technique allows patients to go home either the same day or next with just one small stitch. The result is much faster healing and recovery 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 to patients whose epilepsy is difficult to treat. The early data is promising with seizure cure and reduction rates nearly compatible with the open surgery with much less complications and side effects.

Support & Education

The Epilepsy Center at Hoag offers an interactive support group for all adolescent and adult epilepsy patients. This support group functions under the direction of a licensed clinical social worker and includes group and family discussions to help patients better understand and cope with epilepsy. This support group meets on the first Wednesday of every month from 6:30 to 8 p.m. in Pickup Family Neurosciences Institute, 3rd floor conference room.

Clinical Research

UCB Pharma Protocol No1199: An open-label, multicenter, follow-up trial to evaluate the long-term safety and efficacy of Brivaracetam used as adjunctive treatment at a flexible dose up to 150 mg/day in subjects aged 16 years or older suffering from epilepsy. October 2013. Add:

Engage Therapeutics: ENGAGE-E-001 “A Double-Blind, Placebo-Controlled, Inpatient, Dose-Ranging Efficacy Study of Staccato Alprazolam (STAP-001) in Subjects with Epilepsy with a Predictable Seizure Pattern” Dr. David Millett, MD Principal Investigator

Publications, Lectures, Book Chapters

BIBLIOGRAPHY

(*indicates senior/corresponding author)

PEER REVIEWED


The Neurodiagnostics Lab provides inpatient and outpatient services for the evaluation and diagnosis of central and peripheral nervous system disorders. 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 a unique application (BraiNet) 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 (NCV) and electromyography (EMG) testing perform studies for our community in Newport Beach.

A vigorous Epilepsy Program is staffed by epilepsy monitoring technologists that perform 24/7 direct patient observation in the Epilepsy Monitoring Unit (EMU); with administrative staff providing oversight and education for Movement Disorders, Spine, MS, Headache, Stroke and in-house support for our neurohospitalists.

Team
The Neurodiagnostic Lab team is led by Dr. Jason Muir, Chief of Service Clinical Neurophysiology. He is board certified in Neurology, Clinical Neurophysiology and Sleep Medicine. The team includes the Newport Neurohospitalists Medical Group, EEG techs, and specialty specific inpatient nursing staff.
In the year 2018, outpatient EEG services expanded to the Hoag Hospital Sand Canyon site in Irvine. Increased community utilization was apparent as we performed 60 studies since opening in mid-2018 where our lab exclusively provides routine, extended and sleep deprived EEG services.

IONM Intraoperative Neurophysiologic Monitoring
As mentioned, intraoperative neurophysiologic monitoring 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 intraoperative neurophysiologic monitoring are brain surgery, orthopedic and spine surgery, and surgery for throat and larynx disorders.
Overview
The Headache and Facial Pain Program at Pickup Family Neurosciences Institute offers a multidisciplinary approach to headache treatment. The goal of the program is to simultaneously address medical, physical and emotional needs, with a major focus on patient education. Patients are evaluated by our headache specialty physicians and a customized plan is developed, which includes experts in the fields of physical therapy, nutrition, biofeedback, cognitive behavioral therapy and acupuncture.

The Headache Program is a four consecutive week program comprised of appointments with our physician and/or his PA, one session with a physical therapist, one session with a dietary therapist and four sessions with a biofeedback therapist.

The program tracks outcomes through PHQ-9 and HIT 6 questionnaires, and we have seen positive changes in our patients’ physical and mental health after joining this program.

Team
The team is led by Philip O’Carroll, M.D., and includes Sally DeCastro, PA and Gayle Hartell, Ph.D. The nurse navigator for the program is Sheena Dhiman, BSN, MBA.

Support & Education
We hold community education classes and seminars to provide education to our community on the various types of headaches, management of headaches and chronic migraines.

Publications, Lectures, Book Chapters


Psycho Somatic Disorders and The Brain-Body Connection (Book: Submitted for publication).
A new diagnosis may often leave patients asking, "Where do I go from here?" At Pickup Family Neurosciences Institute, we provide answers and much more through experienced clinical navigators. Hoag’s clinical navigators provide assistance to patients and their families, to help them access and then chart a course through the health care system.

**Clinical support**
- Improves patient access to care by navigating through health care barriers
- Provides quicker access to diagnostic testing
- Once diagnosed, reviews disease/condition and discusses treatment options with patient
- Provides guidance on selecting a specialty physician or surgeon, if needed
- Aids patients in scheduling surgery or making pre- and post-treatment appointments
- Assesses complex psychosocial needs, including emotional and situational support of the patient and their family, and appropriately coordinates resources
- Uses evidence-based best practices in the care and management of patients through research dissemination
- Visits patient while in hospital/recovery, follows up after discharge if needed and may follow the patient in support groups for many years to come

**Education**
- Assists patients and their family in understanding the diagnosis, treatment options, and resources available using evidence-based guidelines
- May provide community education to aid in prevention diagnosis and early treatment
- Designs and evaluates innovative educational programs and tools for patients, families and groups
- In collaboration with physicians, improves prevention and early detection efforts by participating in community education forums and screenings
- Educates eligible patients about appropriate clinical research studies

**Navigator Program:** 949-764-6066
Overview
Addiction is a brain disease. It is chronic and progressive, and it affects the entire family. 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. With significant expansion of inpatient, residential recovery, and intensive outpatient treatment services in Newport Beach, Hoag Addiction Treatment Centers (HATC) provides the most comprehensive, vertically integrated continuum available. The newest addition, SolMar Recovery, is a 21-bed residential facility, which is unique in the state in that it is located within an acute care hospital.

As a licensed hospital-based treatment center integrated within Pickup Family Neurosciences Institute, Hoag provides evidence-based addiction treatment services that successfully guide families from their own trauma of exposure to the 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.

In 2019, Hoag detoxed over 900 patients, treated approximately 250 residential patients, and provided treatment for more than 300 patients in our outpatient programs. Our typical daily census of patients in addiction treatment is approximately 80.

Hoag’s robust alumni community frequently interacts with those in treatment, providing a thriving network of ongoing support and resources for lifetime sobriety.

HATC had over 6,000 encounters with our alumni and their families in our Continuing Care Program. Some of the many personalized services offered by Hoag Addiction Treatment Centers include:

Medically Managed, Evidence Based Treatment Programs across all Levels of Care

• Medical inpatient detox
• SolMar Recovery – 21-bed residential facility: medical and counseling professionals available 24/7
• Outpatient programs (day and evening)

• Extended care transitional programs
• Ongoing recovery management through lifetime support groups and alumni programs

Innovative and Multi-Disciplinary Treatment Programming

• State licensed and credentialed clinicians
• Individualized treatment planning involving both medical and counseling staff
• Individual and group therapy
• Blend of 12-step recovery and evidence-based treatment modalities
• Mindfulness meditation and stress management groups
• Gender-specific, trauma-informed group sessions
• Daily yoga and exercise groups
• Gender-based groups
• Relapse prevention
• Education on the disease of addiction and recovery including a daily lecture series presented by outside professionals working in the field of addiction treatment

Family Continuum of Care

• Weekly family education group
• Week-long intensive family program including education, counseling and after-care planning
• After-care follow-up workshop
• Ongoing recovery management through no-cost continuing care services that provide individuals and their families with the support and resources they need to maintain lifelong sobriety.

Team

The clinical treatment team is led by Steven Ey, M.D. Dr. Ey is board certified by the American Board of Addiction Medicine, and is a Distinguished Fellow of the American Society of Addiction Medicine. Dr. Ey provides medical and clinical leadership for Hoag’s inpatient, partial hospital and residential treatment services. He has previously served as medical director of the Betty Ford Center and South Coast Hospital, which is now Mission Laguna Beach.
The clinical team is multidisciplinary, comprised of registered nurses, licensed therapists and psychiatrists, certified addiction treatment counselors, registered dietitians, and certified personal trainers.

Support and Education
Hoag Addiction Treatment Centers is host to 12-step meetings and no-cost community support groups for the recovering community every night of the week.

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

Members of the Addiction Treatment team also provide community education events throughout the year at multiple venues to ensure accessibility for the concerned and interested public.
Overview
Families across Orange County are facing significant and increasing challenges with their adolescents. 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 recent published article stated that suicide is the third leading cause of death for young people ages 15 to 24. Approximately 20 percent of teens experience depression before they reach adulthood, and between 10 to 15 percent suffer from symptoms at any one time. Only 30 percent 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 1 of 7 young people had a major depressive episode in 2017.

Pickup Family Neurosciences Institute at Hoag has launched a programmatic answer to this glaring community need: ASPIRE (After School Program: Intervention and Resiliency Education) 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.

The program is offered at Hoag’s Center for Healthy Living in Newport Beach, and in 2018 added an additional location in Irvine.
Program Summary:
- 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
- De-stigmatize mental illness and mental health care
- Promote mental and behavioral health and well-being
- Emphasize “skill building & resiliency training”; 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

Community Partnership
Hoag is working in close collaboration with five school districts in Orange County to combat the growing rates of teen depression and mental health.
- Newport Mesa
- Irvine
- Tustin
- Saddleback
- Capistrano
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. Hoag and the school districts are working to provide high school credit to adolescents who complete the ASPIRE program.

Team
The ASPIRE clinical team is led by Sina Safahieh, M.D. 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 CHOC to meet this community need. Prerna Rao, LMFT, is the clinical program manager. Prerna has developed the clinical 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.

ASPIRE also interfaces with Jerry Weichman, Ph.D., who specializes in outpatient mental health treatment for teens and their parents. Dr. Weichman operates The Weichman Clinic, and oversees the Teen Brain program there. Teen Brain brings together a multidisciplinary team of specialists housed at Pickup Family Neurosciences Institute to provide a unique and comprehensive diagnostic assessment and treatment planning service for struggling adolescents and young adults.

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.
The Hoag psychiatry consultation-liaison service is comprised of five specialized psychiatrists who have expertise in the diagnosis and treatment of psychiatric disorders in complex medically ill patients. This team supports the various medical subspecialty teams throughout the hospital with on-site consultation, evaluation and assistance with behavioral management. Additionally, our psychiatrists work closely with our social services department ensuring patients with neurobehavioral disorders receive community-based resources for ongoing treatment beyond their acute care hospitalization.

Our psychiatry consultation-liaison team is comprised of five psychiatrists, two psychiatric nurse practitioners, and a psychologist. The team provides on-site consultations to the various medical disciplines delivering acute care in both our Newport Beach and Irvine campuses. Hoag recognizes the benefits of proactively evaluating and managing the complex neurobehavioral elements encountered when treating our patient’s acute medical issues. Furthermore, addressing our patient’s neurobehavioral health allows for improved identification of neurobehavioral disorders, patient & family psychoeducation, initiation of treatment, and connection with outpatient neurobehavioral services.

The addition of our psychiatric consultation-liaison team improves the overall quality of patient care delivered at Hoag by assessing and treating the whole person, which has further translated into improved patient, physician and staff satisfaction. The team has increased value in the continuum of hospital-based care by lowering the costs associated with emergency department visits, reducing hospital & emergency room 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, M.D. Dr. Garcia is board certified in both general adult psychiatry and consultation-liaison psychiatry, a subspecialty of psychiatry that focuses on the interface between general medicine and psychiatry. She completed her medical education at Loma Linda University School of Medicine, general psychiatry residency at University of Southern California (USC), and consultation-liaison fellowship at Stanford University. Dr. Garcia has worked closely with Hoag’s Neurosciences Institute to further grow and develop the neurobehavioral services provided to Hoag’s patient population.
Overview
Maternal Depression, also known as perinatal mood and anxiety disorders (PMADs), affects 15 to 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 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—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:
• Pre-conception planning (women with existing mental health conditions or who are already taking medications with plans to conceive)
• Mental health assessment during pregnancy and post-partum
• Individual and group psychotherapy
• Medication Safety Evaluation during Pregnancy and Breastfeeding
• Pharmacogenomics Testing to personalize treatments and achieve better outcomes.
• Linkage to supportive services through the Maternal Mental Health Support Line
• Support groups and classes

Clinic Information
The Maternal Mental Health 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. 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 Patricia De Marco, M.D. Dr. De Marco is board certified in Adult Psychiatry as well as Psychosomatic Medicine by the American Board of Psychiatry and Neurology. She completed fellowship training in Psychosomatic Medicine with emphasis on Reproductive Psychiatry at the University of Southern California.

The team 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 Center for Wellness including Acupuncture, Massage, Pilates, Yoga and Meditation, Guided Imagery, Registered Dietitian and certified Fitness Trainer.
Outcomes
Since its launch, the clinic has provided over 2,700 individual face to face encounters, provided support to over 700 callers and linked over 300 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, a randomly selected sample of patients have shown significant improvements on the EPDS score. 72% of patients have had five points or better improvement on the EPDS score at three months post initial assessment.

Staying true to its mission of providing outreach and education, the clinic team has provided over 10 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 clinic have been at the forefront to develop and implement such programs.

In 2019, the Maternal Mental Health Clinic, along with other Hoag Neurobehavioral Health programs received accreditation from Counsel on Accreditation for Rehabilitation Facilities (CARF).
Overview
Hoag Rehabilitation Services are available for patients across the full continuum of care, from the acute hospitalization to the inpatient rehabilitation facility to the outpatient 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 practice and state-of-the-art equipment and technology. 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
- 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
- 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 support individuals who are experiencing performance deficits in daily life skills as a result of injury or disease such as:

- Stroke
- Traumatic brain injury
- Brain tumor
- Parkinson’s disease and other movement disorders
- Multiple sclerosis and other degenerative neurological diseases
- Fracture, dislocation and subluxation of fingers, hand, wrist and elbow
- Tendon and ligamentous injuries of the wrist and hand
- Upper extremity peripheral neuropathy
- Cumulative trauma disorder/repetitive strain injury
- Cancer

Individual patient needs may include:

- Upper extremity exercises to improve strength and dexterity
- Provision of orthotics and splinting
- Edema management
- Computerized strengthening equipment
- Training in self-care and activities of daily living
- Instruction in use of adaptive equipment
- Provision of suggestions for environmental modifications and fall prevention strategies
- Cognitive training – attention, memory, concept formation, time management, problem solving and thinking skills
- Perceptual 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
- Vocational simulation
- Patient, family and caregiver education
- Driving assessment and training – the assessment consists of a clinical evaluation and a behind-the-wheel evaluation
- Comprehensive Parkinson’s disease program including PWR! Principles

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.

Specialized neonatal occupational therapists also provide care in our Neonatal Intensive Care Unit at Hoag Hospital Newport Beach. 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 exercise, neuromuscular stimulation and biofeedback.
- 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 can be safely swallowed
- Provision of recommendations for optimal swallowing safety
- Development 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
- Perceptual clinical assessment of the vocal mechanism
- Identify 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 LSVT® Loud and SpeakOut®
- Neuromuscular electrical stimulation for treatment of dysphagia

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, and 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, which is a videofluoroscopic X-ray assessment of the swallowing mechanism or fiberoptic endoscopic evaluation of swallowing (FEES). These exams enable the clinicians to identify the disorder and help guide the appropriate treatment program. 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 the 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.

Independent Gym Exercise Class

This class continues the exercise program that was prescribed by their therapist in a supervised setting utilizing the Hoag Rehabilitation gym and equipment. Participant must be able to walk unassisted and be independent. The class will meet twice each week (Tuesdays and Thursdays) for eight weeks.

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 that 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.

Balance Mobility Exercise Class

This class focuses on balance and mobility. It will build on the principles introduced in previous 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 twice each week (Tuesdays and 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 60-80% heart rate max. The classes are taught by a licensed therapist at 7:45 a.m. or 12:30 p.m. This class will meet three times each week (Monday, Wednesday and Friday) 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 will improve their overall movement and coordination, walking, arm and leg movement, and balance. The morning class will meet at 7:30 a.m. on Tuesdays and Thursdays for eight weeks. The afternoon classes will meet at 1:15 p.m. on Thursdays for eight weeks. The classes are taught by a licensed physical therapist and occupational therapist.

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 two of 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. There is also a corresponding caregiver support group that meets concurrently and is supported by a licensed social worker once a month.

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 Avenue, Suite 100, and can be reached at 949-764-5645. The Irvine office is located at 16300 Sand Canyon Avenue, 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, DPT, NCS, doctor of physical therapy and board-certified neurologic clinical specialist. In Newport Beach, the inpatient program is led by Samantha Day, PT, DPT, and the outpatient program is led by Gene Peterson, PT. In Irvine, the inpatient and outpatient programs are led by Amy M. Salinas, OTR/L. The Speech-Language Pathology program is led by Tracy Thomas, MS, CCC-SLP. The Fudge Family Acute Rehabilitation Center is led by Keyvan Esmaeili, M.D., Brian Boone, PT, DPT and Hadi Rasul, RN, BSN, MBA.

The clinical team includes board-certified clinical specialists in geriatrics, oncology, orthopedics, and neurology. Also included are certifications in lymphedema care, vestibular rehabilitation, hand therapy, and wound care, clinical expertise in use of
**NEURO-REHABILITATION SERVICES**

**Average Functional Improvement**

- Vestibular Impairments: 21%
- Gait Imbalance: 14%
- Spinal Disorders - Neck: 11%
- Spinal Disorders - Back: 14%
- Stroke: 14%
- Knee Function: 18%

**Combined Inpatient/Outpatient Rehabilitation Sessions**

- 2013: 90,000
- FY2014: 60,000
- FY2015: 30,000
- FY2016: 0
- FY2017: 0
- FY2017 Stub: 0
- CY2018: 0
- CY2019: 0

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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 receiving neurological rehabilitation:

- **With physical therapy:** Patients referred for vestibular rehabilitation experienced a 21% functional improvement in only seven visits.
- **Patient satisfaction scores have reached top quartile in both outpatient centers.**
- **With occupational therapy:** Patients with hand dysfunction experienced 42% improvement in functional abilities with treatment.
Hoag Stokes Fire Captain’s Ambitious Rehab Goals

After more than two decades as a Huntington Beach firefighter and a paramedic, Jeff Nelson was familiar with Hoag. He has rushed countless people to the hospital. People who have suffered accidents, heart attacks and strokes. But none of that prepared Jeff to be the one on the gurney.

Ten years ago, while training for a marathon, Jeff passed out in the shower and was transported to Hoag for evaluation. The doctors discovered he had an arteriovenous malformation (AVM), an abnormality in the blood vessels connecting his arteries and veins. Radiation treatments and surgery followed, but Jeff knew he wasn’t out of the woods.

During the last decade, doctors routinely monitored Jeff, analyzing the effectiveness of the treatment he had received, and suggesting that he would likely need more aggressive intervention down the line.

The day came on February 19, 2017. Jeff was at work at the Huntington Beach Fire Department when he began to have stroke-like symptoms. The crew recognized his symptoms and transported him to Hoag, where he was stabilized.

He later underwent surgery at a hospital in Los Angeles that alleviated the AVM, but Jeff suffered a massive hemorrhagic bleed and subsequent stroke that left the right side of his body limp.

“After four days, they started waking me up. I knew immediately that something bad had happened,” he said.

Jeff remained at the hospital in Los Angeles for five weeks until he could regain his strength enough to return home.

“My goal was to get home to see my oldest child graduate from high school,” he said.

“When I came back to Huntington Beach I worked hard with the team at Hoag. Physical therapy, occupational therapy and speech therapy, twice a week for more than six hours per week. I would do duplicate workouts at home.”

The road was hard, but Jeff was determined. Recognizing his drive, the Outpatient Rehabilitation team at Hoag pushed Jeff to achieve his goals. And then some.

“The staff is so skilled and encouraging and helpful. They would challenge me. They were very motivating,” he said. “They became like a second family because I spent so many hours with them.”

When he first came to Hoag, Jeff was able to transfer from his wheelchair to his feet, speak and do basic tasks. But walking, fine motor skills and even thinking clearly were difficult.

“I had a sense of pain or heat all the way down from my head to my right foot,” he said. “I could stand up, and I could take tiny steps with assistance. But I was very limited in terms of mobility and endurance. I would be exhausted after 10 minutes of talking.

“My [rehab] appointments allowed me to be challenged each and every day through the grueling and frustrating things they would put me through. And I asked for homework every day,” he said. “So, it was like double the workout. I worked out at Hoag and at home. I wanted my life back, and they kept challenging me and pushing me.”

After he used all the rehabilitation hours allotted to him by his insurance, Jeff continued to work out at home, improving his strength, confidence and mobility – and lifting others up in the process. Whenever someone at Hoag’s outpatient rehabilitation facility is in need of support, the staff knows they can reach out to Jeff.

“I talk to people and try to encourage them,” he said. “I think that’s what I’ve learned out of this, to encourage others and lift people up.”

The emotional piece of it is especially important, Jeff said.

“Emotionally I had a tough time about halfway through it. You start to think, ‘What is your life going to look like?’ You sink into a dark place,” he said.

“Emotionally there were needs that I didn’t realize needed to be addressed, but the team here recognized it. I was able to talk to someone and validate my concerns, feelings and emotions. That was the second wind I needed to get back.”

After 479 days, Jeff returned to his post as fire captain at the Huntington Beach Fire Dept. He’s even back to wakeboarding and swimming.

“With a lot of hard work, and a lot of questions and doubts, I was able to come back,” he said. “I have a huge amount of gratitude and appreciation.”

Having spent time at Hoag’s rehabilitation gym both as a patient and as a supporter, Jeff knows that his outcome is uncommon.

“People ask me, ‘How did you do it?’ And I always say, ‘Faith, family, friends and a lot of hard work,'” he said. “Hoag bought in and really pushed me. I’m still getting better.”

Now that he’s back to saving others, Jeff said his experience informs everything he does.

“I always thought I was compassionate, but being on this side of it, I can identify with patients better,” he said. “It’s very scary for the person having the medical issue. I have a different perspective now.”

He also has a new perspective on Hoag. He’s always trusted the hospital: all three of his children were born here, and he’s had a few surgeries and procedures at Hoag over the years.

But now his appreciation runs deeper.

“This is where you bring your loved one,” he said. “We had a suspected stroke patient yesterday at work and brought her here. Hoag is fully capable. This is the gold standard.”
Fudge Family Acute Rehabilitation Center

The Fudge Family Acute Rehabilitation Center (FFARC), located on the third floor of the West Tower of Hoag Hospital Newport Beach, is a state-of-the-art rehabilitation center providing customized programs to help patients improve function, attain their greatest level of independence and return to community living. Our world-class facility offers intensive rehabilitation to maximize independence and improve quality of life.

The Center 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 18-bed, 21,000 sq. ft. center provides comprehensive care with 24-hour nursing, full time medical director oversight and a team of certified experts. We also provide state-of-the-art equipment and access to Hoag education programs, as well as treatment in the therapy garden and a putting green.

The FFARC utilizes an interdisciplinary team approach focused on highly specialized assessments of 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.

Gary Fudge (pictured third from right) at the opening of the Acute Rehabilitation Center

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.

Our interdisciplinary treatment team includes:
- Nurse navigator
- Occupational therapists
- Physicians
- Rehabilitation nurses
- Physical therapists

**Neuro-Rehabilitation Services: Fudge Family Acute Rehab Center**

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.

Our interdisciplinary treatment team includes:
- Nurse navigator
- Occupational therapists
- Physicians
- Rehabilitation nurses
- Physical therapists
NEURO-REHABILITATION SERVICES: FUDGE FAMILY ACUTE REHAB CENTER

• Recreational therapist
• Speech language pathologists

Other services may include:
• Case management
• Chaplain services
• Dietary services and dietitian consults
• Hospital pharmacy
• Laboratory services
• Radiology services
• Respiratory therapy

Keyvan Esmaeili, M.D., is the medical director of the Fudge Family Acute Rehabilitation Center. He is a board certified physical medicine and rehabilitation physician. Brian Boone, PT, DPT, is the Therapy Manager, and Hadi Rasul, RN, BSN, MBA, is the Nurse Manager.

2019 Facility Metrics

<table>
<thead>
<tr>
<th>Fudge Family Acute Rehabilitation Center</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharges in Sample</td>
<td>455 patients</td>
</tr>
<tr>
<td>Average length of stay</td>
<td>12.3 days</td>
</tr>
<tr>
<td>60% Rule Compliance</td>
<td>76.30%</td>
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</tbody>
</table>

2019 Quality Metrics

<table>
<thead>
<tr>
<th></th>
<th>Fudge Family Acute Rehabilitation Center</th>
<th>Weighted National Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Discharge Rate</td>
<td>&gt; 90% to home</td>
<td>77.7% to home</td>
</tr>
<tr>
<td>SNF Discharge Rate</td>
<td>3.70%</td>
<td>11.90%</td>
</tr>
<tr>
<td>Functional Independence Measure Admission to Discharge Change</td>
<td>25.1</td>
<td>24.8</td>
</tr>
</tbody>
</table>

Functional Scoring Comparison: FIM
Hoag was selected by the Cleveland Clinic to be their West Coast partner in administering the Brain & Body Wellness Program and the Milestone Wellness Assessment. This program is sponsored by The Trust, a division of the National Football League Players Association. Launched in February of 2016, the program has now seen over 280 former players. Each participant receives a comprehensive physical and receives recommendations based upon the assessment.

Hoag Executive Health and the affiliated providers associated with these NFL programs truly make a difference in former players’ lives and post exam survey’s prove out that the “Hoag NFL Experience” is truly world class and one of a kind. Nearly 97% of players strongly agree that their assessment at Hoag has influenced them to make changes in their lifestyle or habits and they have learned something new about their healthcare outlook. Even more impressive is that 100% of them would recommend the assessment to former players."

“My experience with HOAG was one that I will never forget, the BEST thing that has ever happened!”

“This was an amazing experience! I will tell everybody and anybody about this! The kindness of the people that work there is unlike any place else I’ve ever been! Thank you thank you thank you!”

“I can’t imagine that there’s a better, more comprehensive examination out there. My entire experience was phenomenal!”

“I had a great experience, I felt like they really cared for my wellbeing and gave me some tips to help prolong my life. Thank you all who are involved.”
Memory & Cognitive Health
Classes are held with informative discussion on how to prevent memory loss and other cognitive impairment due to Alzheimer’s disease and related disorders (ADRD). Learn about ADRD risk factors and their management, how to recognize the early signs of memory loss, and what we can do about it. Presented by William R. Shankle, M.D., program director, Hoag Memory & Cognitive Disorders. Classes are offered regularly.

Mental Health of Adolescents and Teens
Learn the signs for concern related to teen behavior, differences between normal adolescent rebellion and potentially harmful behavior.

Presented by Prerna Rao, LMFT. Classes are offered two times a year.

Neuro Vascular Case Conference
This is held the third Thursday of the month at 2 p.m. in the 2 North Conference Room at Hoag Hospital in Newport Beach.

Neuro Tumor Board
This is held every Friday at 11:30 a.m. in the Hoag Family Cancer Institute in Newport Beach.

Parkinson’s and Movement Disorders Case Conference
This is held the second Wednesday of the month at 7:30 a.m. at 520 Superior Ave. in Newport Beach.

Epilepsy Case Conference
This is held each Wednesday at 8 a.m. at Hoag Hospital Newport Beach.

Class Registration: 800-400-HOAG (4624)
Brain Aneurysm/AVM
This support group is held for those diagnosed or treated for an aneurysm or arteriovenous malformation of the brain. Meetings are scheduled the first Wednesday of every other month at 6:30 p.m. at the Hoag Conference Center. For more information, please contact Pickup Family Neurosciences Administration at 949-764-5942.

Brain Tumor
This group meets on the third Wednesday of each month from 3 to 5 p.m. at the Advanced Technology Pavilion. 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
The Epilepsy Program at Hoag offers interactive support groups for all adolescent and adult epilepsy patients. Join us for group discussions to help you better understand and cope with Epilepsy. This group meets on the first Wednesday of every month from 6:30 to 8 p.m. at Pickup Family Neurosciences Institute Conference Room. For more information, please call 949-764-6066.

Parkinson’s/ Movement Disorders
Weekly support groups and seminars are offered for patients with Parkinson’s, their families, caregivers and medical professionals. For more information, please call 949-764-6277.

Stroke
The Stroke support group is held on the fourth Thursday of every month from 2-3:30 p.m. at Hoag Conference Center. For more information, please call 949-764-1454.

The Pickup Family Neurosciences Institute has a major commitment to innovation through clinical research trials of advanced technological tools, cutting edge diagnostics, and the latest drug and other treatment options by leveraging groundbreaking clinical research.

These unique clinical trials help patients access the newest treatment options being explored that aim to improve healthcare by exploring the safety and effectiveness of new drugs, therapies, medical devices, and clinical and surgical methods. Ongoing collaboration between physician investigators and study volunteers is one of the foundations of modern health care because clinical trials help advance patient care.

Our Institute’s founding membership in Hoag’s 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 commitment to clinical research cements our commitment to compassionate care, clinical excellence, and creative intelligence.
In 2017, Richard Pickup and his family committed a transformative $15 million gift to promote programmatic excellence, research, and innovation in the field of neurosciences. In honor of this historic gift, one of the largest in Hoag’s history, the Institute was renamed to Pickup Family Neurosciences Institute. The gift carries the added benefit of increased visibility for the Institute, which has positioned leadership to recruit some of the best and brightest new physicians in needed specialties.

Philanthropy is the foundation for Pickup Family Neurosciences Institute’s continuing growth and innovation. It allows us to dream big and do things that most other hospitals cannot. Many of the programs and services highlighted in this report were launched or are sustained by our community’s generosity. With immense gratitude to every donor who has supported the Institute, we are pleased to recognize examples of gifts that made a particularly significant impact in 2019.

Pickup Family Neurosciences Institute Fundraising

<table>
<thead>
<tr>
<th>Year</th>
<th>Fundraising</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-2018</td>
<td>$35,000,000</td>
</tr>
<tr>
<td>2013-2015</td>
<td>$25,000,000</td>
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<tr>
<td>2010-2012</td>
<td>$15,000,000</td>
</tr>
<tr>
<td>2007-2009</td>
<td>$10,000,000</td>
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</tbody>
</table>
Endowed Chairs
An Endowed Chair is among the most strategic gifts to a medical center and a critical tool that honors and recognizes superior distinction among our physicians. It provides invaluable financial support in perpetuity for the chair holder for use in discretionary research and program development and adds further distinction and awareness to their discipline. We are honored by the newest Endowed Chair for Pickup Family Neurosciences Institute, Empower360 Endowed Chair in Skull Base and Minimally Invasive Neurosurgery, and its first holder, Dr. Robert G. Louis.

Transformational Giving
Longtime philanthropists Richard and Virginia Hunsaker recently notified Hoag Hospital Foundation that they have included a transformational $10 million gift in their estate to support the work of the Pickup Family Neurosciences Institute as well as advancements in ophthalmology. In honor of their extraordinary generosity, the North Tower of Hoag Hospital Newport Beach has been named the Richard C. & Virginia A. Hunsaker Pavilion. Hospital supporters since 1984, Richard and Virginia have watched Hoag grow from a small hospital into a renowned medical center with institutes of excellence. When Richard was hospitalized at Hoag in 2004, the exceptional care he received left a profound impression on him. The Hunsaker gift will help Hoag build upon the innovation and state-of-the-art neurosciences care that patients have come to expect. The work of Pickup Family Neurosciences Institute earned Hoag recognition by Becker’s Hospital Review as a Top 100 Hospital with Great Neurosurgery and Spine Programs.

Commitment to the Community
Thanks to a generous $1 million gift from longtime Hoag donors, Nancy and Bill Thompson, the Hoag Epilepsy Program is providing specialized epilepsy care for the uninsured, underinsured, and unfunded through a partnership with the Lestonnac Free Clinic in Orange. The gift supports expert care at the Clinic provided by David Millett, M.D., Ph.D., director of Hoag's Epilepsy Program, and the program's nurse navigator. Additionally, with support from the Thompsons, the Hoag Neurosciences team purchased the Stealth AutoGuide™ Cranial Robotic Guidance Platform from Medtronic. We are one of the first 10 hospitals in the country to have this technology. The AutoGuide™ will help with the accuracy of surgical procedures and ensure we continue to deliver world-class treatment here at Hoag.

Philanthropy is a game changer for Hoag because it allows us to deploy technology that would not be available to patients without generous community support.
APPENDIX

Clinical Trials

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)

ISCHEMIC STROKE

Dr. David Brown, Principal Investigator: Sleep SMART “Sleep for Stroke Management And Recovery Trial: Phase 3 Multicenter, Prospective Randomized Open-, Blinded-Endpoint (PROBE) Controlled Trial To Test Whether Treatment Of Obstructive Sleep Apnea (OSA) With Continuous Positive Airway Pressure Is Effective For Secondary Prevention And Recovery After Stroke.” Funded By NINDS.

ALZHEIMER’S DISEASE

Dr. William Shankle, Principal Investigator: Biogen 251AD201 “TANGO” - “Randomized, Double-Blind, Placebo-Controlled, Parallel-Group Study to Assess the Safety, Tolerability, and Efficacy of BIIB092 in Subjects with Mild Cognitive Impairment due to Alzheimer’s Disease or with Mild Alzheimer’s Disease”

Dr. William Shankle, Principal Investigator: COCOA: “Coaching for Cognition in Alzheimer’s Disease.”

Dr. William Shankle, Principal Investigator: National Institute on Aging “Long-Term Nicotine Treatment of Mild Cognitive Impairment (The MIND Study)"

PARKINSON’S DISEASE

Dr. Sandeep Thakkar, Principal Investigator: Impax Laboratories, LLC IPX203-B16-02 “A Randomized Controlled Study To Compare The Safety And Efficacy Of IPX203 With Immediate-Release Carbidopa-Levodopa In Parkinson’s Disease Patients With Motor Fluctuations”

Dr. Sandeep Thakkar, Principal Investigator: Impax Laboratories, LLC IPX203-B16-03 “An Open-Label Extension Study of the Safety and Clinical Utility of IPX203 in Parkinson’s Disease Participants with Motor Fluctuations”

EPILEPSY

Dr. David Millett, Principal Investigator: Engage Therapeutics, ENGAGE-E-001 “A Double-Blind, Placebo-Controlled, Inpatient, Dose-Ranging Efficacy Study of Staccato Alprazolam (STAP-001) in Subjects with Epilepsy with a Predictable Seizure Pattern”

BRAIN CANCER

(141-18) AIVITA AV-GBM-1: PHASE II TRIAL OF AV-GBM-1 Autologous Dendritic Cells Loaded With Autologous Tumor Associated Antigens for Treatment of Newly Diagnosed Glioblastoma (Phase 2 study for patients who have a certain type of brain cancer.)

(147-19) A Phase I, Sequential Cohort, Open-Label, Dose-escalation Study of the Safety and CNS Exposure of Pritumumab in Patients with Brain Cancer (Phase 1 clinical trial, appropriate for patients with brain cancer.)

(164-18) Orbis Therapeutics OT-15-001 STELLAR: STELLAR A Phase 3, Randomized, Open-Label Study To Evaluate the Efficacy and Safety of Efllornithine with Lomustine Compared to Lomustine Alone in Patients with Anaplastic Astrocytoma That Progress/Recur After Irradiation and Adjuvant Temozolomide Chemotherapy (Phase 3 study for patients who have a certain type of brain cancer.)

(171-18) Aadi, LLC ABI-009 GBM-007 nab-rapamycin for GBM: A Phase 2, Open-label Study of ABI-009 (nab-Rapamycin) in Patients with Recurrent High-grade Glioma and in Patients with Newly Diagnosed Glioblastoma (Phase 2 study for patients who have a certain type of brain cancer.)

Contact Laura Heim, BSN, RN for study details at 949-764-8190 or laura.heim@hoag.org
NEURO DIRECTORY

Programs & Services

Addiction Medicine | 949-764-5656
Physician Leadership: Steven Ey, MD

ASPIRE | 949-764-6360
Clinical Leadership: Sina Safahieh, MD
and Jerry Weichman, PhD

Brain Tumor/Gamma Knife | 949-764-5938, Opt. 4
Physician Leadership: Christopher Duma, MD
Nurse Navigator: Lori Berberet, RN | 949-764-6656

Epilepsy | 949-764-6066
Physician Leadership: David Millett, MD
Nurse Navigator: Sheena Dhiman, RN | 949-764-8430

Headache | 949-764-6066
Physician Leadership: Ali Makki, DMD,
and Philip O’Carroll, MD
Nurse Navigator: Sheena Dhiman, RN | 949-764-8430

Headache and Mind-Body Interface | 949-764-6066
Physician Leadership: Philip O’Carroll, MD

Memory & Cognitive Disorders | 949-764-6066
Physician Leadership: William Shankle, MD

Neurophysiology | 949-764-6066
Physician Leadership: Jason Muir, MD
and Andrew Ly, MD

Neurosurgery Spine | 949-764-6066
Physician Leadership: Burak Ozgur, MD
Nurse Navigator: Julie Treat, RN | 949-764-6277

Orange County Vital Brain Aging Program | 949-764-6288
Physician Leadership: William Shankle, MD
Program Coordinator: Celine Keeble

Orofacial Pain | 949-764-6066
Physician Leadership: Ali Makki, DMD
Nurse Navigator: Sheena Dhiman, RN | 949-764-8430

Pain Medicine | 949-764-6066
Physician Leadership: Medhat Mikhael, MD

Parkinson’s Disease & Movement Disorders | 949-764-6066
Physician Leadership: Sandeep Thakkar, DO
Nurse Navigator: Julie Treat, RN | 949-764-6277

Physical Medicine and Rehabilitation | 949-764-3900
Physician Leadership: Keyvan Esmaeili, MD

Pituitary & Skull Base Surgery | 949-764-6066
Physician Leadership: Robert Louis, MD
Nurse Navigator: Lori Berberet, RN | 949-764-6656

Psychiatry
Physician Leadership: Patricia De Marco Centeno, MD

Research
Laura Heim, RN | 949-764-8190

Sleep Health | 949-764-8070
Physician Leadership: Jose Puangco, MD (Newport Beach)
Ahmed El-Bershawi, MD (Irvine)

Stroke | 949-764-6066
Physician Leadership: David Brown, MD
Nurse Navigator: Victoria Tomczak, RN | 949-764-6183
Program Manager: Deb Mastrolia, RN | 949-764-6183

Physician Leadership
M. Brant-Zawadzki, MD
Executive Medical Director

David Brown, MD
Program Director Stroke/Neurohospitalist Service

Patricia DeMarco Centeno, MD
Psychiatry Consult Service Liaison

Christopher Duma, MD
Program Director, Brain Tumor

Keyvan Esmaeili, MD
Medical Director, Acute Rehabilitation

Steven Ey, MD
Program Director, Addiction Medicine

Robert Louis, MD
Program Director, Pituitary & Skull Base Surgery

Andrew Ly, MD
Program Director, Neurophysiology

Ali Makki, DMD
Orofacial Pain Medicine Service

Medhat Mikhael, MD
Program Director, Pain Medicine

David Millett, MD
Program Director, Epilepsy

Jason Muir, MD
Program Director, Epilepsy

Philip O’Carroll, MD
Program Director, Neurobehavioral Medicine

Burak Ozgur, MD
Program Director, Neurosurgery Spine

Jose Puangco, MD / Ahmed El-Bershawi, MD
Co-Service Chiefs, Sleep Health

Sina Safahieh, MD
Program Director, ASPIRE

William Shankle, MD
Program Director, Memory Disorders/MCI

Sandeep Thakkar, DO
Program Director, Movement Disorders
NEURO DIRECTORY

Administrative Leadership

M. Brant-Zawadzki, MD
Executive Medical Director

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

Kambria Hittelman, PsyD
Operations Director, Neurobehavioral

Leslie Rosini, MSN, RN
Director, Neurosciences Ancillary Operations

Monica Figueroa
Executive Assistant | 949-764-5942
Department Management

Physicians

ENT/Head and Neck Surgery | Carley Schrage, MD
ENT/Neuro-Otology | Jack Shohet, MD
ENT/Skull Base | Timothy Kelley, MD
Neurology | Victor Doan, MD
Neurology | Kaveh Saremi, MD
Neurology, Epilepsy | David Millett, MD
Neurology, Epilepsy | James D. Park, DO
Neurology | Valerie Acevedo, DO
Neurology | Bruce Cleeremans, MD
Neurology, Headache | Philip O’Carroll, MD
Neurology, Movement Disorders | Janet Chance, MD
Neurology, Movement Disorders | Saulena Shafer, DO
Neurology, Movement Disorders | Sandeep Thakkar, DO
Neurology, Memory Disorders | Teryn Clarke, MD
Neurology, Memory Disorders | William Shankle, MD
Neurology, Memory Disorders | Gregory Whitman, MD
Neurology, Neurohospitalist, Neurophysiology | Andrew Ly, MD
Neurology, Neurohospitalist, Neurophysiology | Jason Muir, MD
Neurology, Neurohospitalist, Stroke | David Brown, MD
Neurology, Neurohospitalist, Stroke, Sleep | Jose Puangco, MD
Neurology, Neuro-Oncology | Santosh Kesari, MD
Neurology, Pediatric Neurology | Diane Stein, MD
Neurology, Sleep | Monika Mathur, MD
Neurology, Sleep Health | Robert Moore, MD
Neurosurgery | Mark Anderson, MD
Neurosurgery | Devin Binder, MD
Neurosurgery | Edward Chappell, MD
Neurosurgery | William Dobkin, MD

Department Management

Lori Zaccari, RN
Director, Advanced Brain & Spine Care Unit | 949-764-5675

Hilary Stagliano, RN
Director, Neuro ICU | 949-764-1402

Autumn McMaster
Manager, Multi-specialty/Neuro Clinic | 949-764-1444

Kathy Thomas, RN
Manager, Gamma Knife | 949-764-6077

Sheena Dhiman
Manager, EEG, IONM, Epilepsy | 949-764-8430

Neurosurgery | Pawel Jankowski, MD
Neurosurgery | Charles Liu, MD
Neurosurgery | Vivek Mehta, MD
Neurosurgery | Tien Nguyen, MD
Neurosurgery | Burak Ozgur, MD
Neurosurgery | Peyman Tabrizi, MD
Neurosurgery | Daniel Yanni, MD
Neurosurgery, Gamma Knife | Christopher Duma, MD
Neurosurgery, Gamma Knife | Mark Linskey, MD
Neurosurgery, Gamma Knife | William Loudon, MD
Neurosurgery, Pituitary/Skull Base | Robert Louis, MD
Orofacial Pain, Headache | Ali Makki, DMD
Pain Management | Hasan Badday, MD
Pain Management | Medhat Mikhael, MD
Physical Medicine and Rehabilitation | Keyvan Esmaeili, MD
Psychiatry | Sina Safahieh, MD
Psychiatry | Patricia De Marco Centeno, MD
Psychiatry, Inpatient Consult Liaison | Mohamed El-Gabalawy, MD
Psychiatry, Inpatient Consult Liaison | Ashraf Elmasht, MD
Psychiatry, Inpatient Consult Liaison | Renee Garcia, MD
Psychiatry, Inpatient Consult Liaison | Mercedes Szpunar, MD
Psychiatry, Inpatient/Addiction Medicine | Lawrence Tucker, MD
Psychology | Jerry Weichman, PhD
Pulmonology, Sleep | Ahmed El-Bershawi, MD
Pulmonology, Sleep | Yvette Gozzo, MD
Radiation Oncology | Peter Chen, MD
Radiation Oncology | Brian Kim, MD
Nationally Ranked #37 out of 4,500 hospitals, top 5 in Southern California in Neurology & Neurosurgery