MISSION STATEMENT

To deliver comprehensive, state-of-the-art stroke care that integrates preventive and rehabilitative services to patients with cerebrovascular disease. The Kaiser Permanente Los Angeles Medical Center (LAMC) Comprehensive Stroke Center provides the highest quality of care, while innovating through clinical research and advanced technology to prevent, diagnose, and treat stroke patients.

GOALS AND OBJECTIVES

• Improve outcomes, functionality, and quality of life for patients with stroke.
• Reduce complications and recurrence through quality monitoring and performance improvement initiatives.
• Multidisciplinary collaboration in all levels of care including pre and post-hospital discharge.
• Innovate stroke diagnostic and therapeutic interventions through clinical research.
• Provide stroke prevention and early symptom identification via active participation in community events.
• Elevate stroke care through training and education with a systems of care approach.
AWARDS & ACHIEVEMENTS

- Los Angeles Medical Center has been accredited by The Joint Commission as a Primary Stroke Center since 2010.
- The Regional Tele-Stroke Program was initiated in 2013 to provide expert stroke care via Tele-Medicine to KP medical centers across the region.
- The Stroke Program has been the recipient of national accolades for the following:
  - 2017 Gold Plus Award
  - 2017 Target Stroke Elite Plus Honor Roll
  - 2016 Gold Plus Award
  - 2016 Target Stroke Elite Plus Honor Roll
  - 2015 Gold Plus Award
  - 2015 Target Stroke Elite Plus Honor Roll
  - 2014 Gold Plus Award
  - 2014 Target Stroke Elite Plus Honor Roll
  - 2013 Gold Plus Award
  - 2012 Gold Plus Award

PATIENT STORY

Visit: https://vimeo.com/216592309/cd41088370

COMMUNITY OUTREACH IN 2016

- Glendale Health Festival
- Pasadena Community Fair
- Thai Cultural Day
- Strike Out for Stroke – Dodgers
- Together to End Stroke – Clippers
- Pasadena Block Party
- Stroke & Women’s Health Fair
- Stroke Awareness with The Price is Right
WHAT IS A STROKE

• A stroke occurs when blood supply to the brain is disrupted. This will typically lead to weakness or numbness on one side of the face, arm or leg.

• There are two kinds of strokes:
  • Ischemic Stroke: Caused by a blockage in an artery in the brain due to a clot or narrowing in the artery
  • Hemorrhagic Stroke: Caused by sudden leakage or bursting of an artery

SYMPTOMS OF A STROKE

• Sudden numbness or weakness of the face, arm or leg, usually on one side of the body.

• Sudden confusion.

• Sudden trouble speaking.

• Sudden trouble seeing out of one or both eyes.

• Sudden trouble walking.

• Sudden difficulty with coordination.

• Sudden dizziness, loss of balance or incoordination.

• Sudden, severe headache (often described as the worst headache of your life).

If you notice one or more of the symptoms above, either in yourself or another person, call 9-1-1 immediately.

WHAT IS A TRANSIENT ISCHEMIC ATTACK? (TIA)

• This is a brief disruption in blood supply to the brain.

• Symptoms of a TIA are similar to those that can be seen in a stroke (please see stroke symptoms)

• Luckily, because blood supply is quickly restored, symptoms of this potential stroke may resolve. Transient ischemic attacks can typically come before an actual stroke may happen.

• Patients who experience a transient ischemic attack should call 9-1-1 and seek immediate emergency medical attention.

WHAT ARE THE LONG-LASTING EFFECTS OF A STROKE?

• When brain cells suffer a stroke, it is considered a permanent injury. As such, a stroke can leave serious, long-lasting effects. If a stroke is untreated, permanent paralysis, speech and swallowing problems, visual disturbances and inability to wake up may persist.
• It is very important to seek immediate medical attention by dialing 9-1-1 if you or someone near you is suffering a stroke.
  • In cases of hemorrhagic stroke, immediate medical attention can reduce the expansion of the bleed.
  • In cases of ischemic stroke, immediate medical attention may include treatment with a clot busting medication (IV-tPA) and possibly the removal of the clot (Thrombectomy).

CONDITIONS AND TREATMENTS

• **Ischemic Stroke**
  Ischemic stroke is caused by the disruption of blood flow to the brain, due to a blockage or narrowing of an artery in the brain.

• **Symptoms**
  As with any stroke, symptoms can include sudden onset weakness or numbness on one side of the body, sudden onset speech or swallowing problems, trouble walking or vision problems.

• **Causes**
  • Carotid Artery Disease
  • Intracranial Artery Stenosis
  • Small Vessel Ischemic Infarct
  • Atrial Fibrillation
  • Hypercoagulable State

• **Acute Treatment**
  • IV-tPA
  • Thrombectomy

• **Preventive Treatment**
  • Treatments depend on the underlying cause of ischemic stroke, however modification of Risk Factors will decrease risk of stroke.

• **Modification of Risk Factors**
  • Life style changes that are known to reduce ischemic stroke and TIA include:
    • Keeping your blood pressure under control.
    • Managing diabetes.
    • Stopping tobacco use.
    • Lowering high cholesterol.
    • Managing afib and other heart conditions.
    • Managing carotid stenosis and other arterial (heart) diseases with medication or surgery, if necessary.
• Limiting alcohol consumption and avoiding drug use.
• Getting regular physical activity and maintaining a healthy weight.

• **Carotid Artery Disease**
  • The carotid arteries are the two main arteries that supply the front, left and right parts of the brain. When plaque builds up on the artery walls, the arteries become narrowed and the amount of blood flow to the brain is reduced. This happens due to either severe narrowing of the artery, or a piece of clot rupturing from the plaque, blocking an artery further down stream.
  • Patients who suffer from carotid artery disease with a corresponding TIA or ischemic stroke, should be evaluated for possible surgery (Carotid Endarterectomy or Carotid Artery Stenting) to help lower their risk of further strokes.

• **Intracranial artery stenosis**
  Strokes can also occur if there is a direct narrowing of the arteries in the brain. Typically, maximum medical therapy is recommended with aspirin, clopidogrel and a cholesterol medication. Controlling modifiable risk factors is also important. Routine intervention with placement of stents and angioplasty is not recommended as first line therapy.

• **Small Vessel Ischemic Infarct**
  • Chronic high blood pressure and diabetes can cause a type of stroke called a small vessel ischemic infarct. This type of stroke occurs when the smaller, deeper, root-like vessels in the brain build up with micro clots and eventually close off. Although these types of strokes are small, they tend to cause significant symptoms and often affect your strength and sensation. A neurologist would identify a small vessel ischemic infarct after reviewing its location and your risk factors.
  • Being on an antiplatelet (such as aspirin, Aggrenox or clopidogrel) and cholesterol lowering medications can help prevent strokes. Ultimately, addressing modifiable risk factors will be key.

• **Atrial Fibrillation**
  • Atrial fibrillation is an abnormality in the rhythm of the heart. When blood tends to stagnate in the heart due to abnormal rhythms such as atrial fibrillation, there is an increased risk of developing clots that travel up to the brain. This can cause an ischemic stroke.
  • Depending on your risk factors, your doctor can help you decide whether or not you would benefit by being on an anticoagulant to prevent further strokes. If you have atrial fibrillation, you can view your risk of strokes annually here: (CHADS2 VASC calculator)

• **Hypercoagulable states**
  Underlying genetic factors can cause a person to have “thickened blood” or hypercoagulable states. Certain hypercoagulable states may need to be anticoagulated. While there are many causes, you should speak to your doctor about which testing is appropriate for you if you have had a stroke.
• Acute Treatment in Ischemic Stroke – IV-tPA
  • IV-tPA
    • When a patient suffers an acute ischemic stroke, they can potentially receive a clot busting medication named IV-tPA if they seek care within 4.5 hours of the start of the symptoms.
    • IV-tPA has about a 40% chance of helping improve a patient’s outcome from a stroke.
    • A multidisciplinary team will evaluate the patient during a code stroke to see the patient is a good candidate to receive IV-tPA.
  • As noted, time is a very important component of stroke care. If you or someone near you is suffering a stroke, call 9-1-1 immediately.

• Acute Treatment in Ischemic Stroke – Thrombectomy
  • Thrombectomy
    • A thrombectomy is the physical removal of a clot. A person may be candidate for a thrombectomy if they:
      • have suffered an acute ischemic stroke.
      • seek care within six hours of the first symptoms.
      • have a visible clot blocking a major blood vessel in the brain.
    • Thrombectomy is not an open surgery. It is a procedure which involves accessing the brain arteries through the arteries near the groin.
  • As noted, time is a very important component of stroke care. If you or someone near you is suffering a stroke, call 9-1-1 immediately.

• Hemorrhagic Stroke
  Hemorrhagic stroke is a rupture or tearing of a blood vessel in the brain, causing bleeding in the brain. Hemorrhagic strokes are categorized based on the location of the bleed.
  • Epidural hemorrhage
  • Subdural hemorrhage
  • Subarachnoid hemorrhage
  • Intra-parenchymal hemorrhage

• Epidural and Subdural Hemorrhage
  • Epidural and subdural hemorrhages are bleeds on the surface of the brain which are typically caused by trauma, or accumulate over time. These types of bleeds are typically managed by a neurosurgeon.
  • If the bleed is causing significant pressure and shifting of the brain, surgery may be necessary.
• **Subarachnoid Hemorrhage**
  - A subarachnoid hemorrhage is a bleed that is typically located on the outside surface of the brain, usually at the base.
  - The predominant symptom for this type of stroke is a headache. Other signs and symptoms are the same as those for a standard stroke (link to symptoms on slide 3).
  - A subarachnoid hemorrhage is typically caused by an aneurysm that may have ruptured.
    - Treatment involves
      - Securing the aneurysm by either clipping or coiling, to prevent further bleeding.
      - Reversing any medications which may have contributed to extra thinned blood.
      - Extensive ICU management of medical conditions and Neurosurgical capabilities to manage complications of:
        - Rebleeding.
        - Further strokes that may develop in the brain.
        - Seizures.
        - Increased intracranial pressure.
        - Concurrent heart injury.

• **Intra-parenchymal hemorrhage**
  Intra-parenchymal hemorrhages occur when there is blood within the brain tissue itself. Intraparenchymal hemorrhages have many different causes.
  - Treatment:
    - Typically consists of dealing with the underlying cause.
    - Includes controlling blood pressure and reversing any excessive thinness of blood due to medications.

• **Causes of Intra-Parenchymal Hemorrhages**
  - **Hypertensive Hemorrhage**
    This is the most common cause of an intra-parenchymal hemorrhage. Typical locations of bleed in the deeper parts of the brain along with elevated blood pressures are consistent with hypertensive hemorrhages. The best way to treat and prevent hypertensive hemorrhage is by keeping blood pressure under control.
  - **Amyloid Angiopathy**
    Protein deposits in the small vessels in the brain cause the vessels to be brittle. This leads to increased risks of bleeding. While there is no clear preventative therapy at this time, keeping blood pressure under control and avoiding anticoagulation is likely beneficial.
• **Arterial Vascular Malformation**  
  Abnormal connections between the artery and the veins can lead to rupture and bleeding in the brain. These malformations can be evaluated with blood vessel imaging. Treatment typically involves endovascular treatment, performed by a neuro-interventionalist.

• **Hemorrhagic Conversion of Ischemic Stroke**  
  Sometimes an ischemic stroke can convert and bleed. Any type of injury in the brain leads to fragile tissue, which can sometimes bleed. Treatment again involves controlling your blood pressure and holding any antiplatelet or anticoagulants until your doctor says it is safe to resume.

• **Coagulopathy**  
  Being on blood thinners or having an inherent genetic condition can cause bleeding in the brain. Immediate treatment involves reversing the thinness of the blood.

• As with any of these causes of hemorrhage, medical treatment with blood pressure control and addressing underlying cause of the bleed is the mainstay of treatment.

• **Prevention /What can I do to prevent stroke or TIA?**
  • Lifestyle changes that are known to reduce stroke and TIA include:
    • Keeping your blood pressure under control.
    • Managing diabetes.
    • Stopping tobacco use.
    • Lowering high cholesterol.
    • Managing atrial fibrillation and other heart conditions.
    • Managing carotid stenosis and other arterial (heart) diseases.
    • Limiting alcohol consumption and avoiding drug use.
    • Getting regular physical activity and maintaining a healthy weight.

• **Type of strokes treated at LAMC**
  • Ischemic stroke
  • Hemorrhagic stroke
    • Intra-parenchymal hemorrhage
    • Subdural/epidural hematoma
    • Subarachnoid hemorrhage
**DEMOGRAPHICS OF STROKE PATIENT POPULATION**

- **Gender**
  - Male: 52%
  - Female: 48%

- **Stroke Type**
  - Ischemic Stroke: 55%
  - Subarachnoid Hemorrhage: 15%
  - Intracerebral Hemorrhage: 21%
  - Transient Ischemic Attack: 9%

- **Ethnicity**
  - White: 33%
  - African American: 17%
  - Other: 10%
  - Asian/Pacific Islander: 12%
  - Hispanic: 36%

- **Age**
  - Ages 18-45: 24%
  - Ages 46-65: 34%
  - Ages 66-85: 22%
  - Ages >85: 20%

- **Discharge Disposition**
  - Home: 64%
  - Skilled Nursing Facility: 24%
  - Other: 2%
  - Transfer: 4%
  - Inpatient Rehab: 6%

**QUALITY OUTCOMES**

<table>
<thead>
<tr>
<th>Hospital Mortality Rate</th>
<th>Ischemic</th>
<th>Intracerebral Hemorrhage (ICH)</th>
<th>Subarachnoid Hemorrhage (SAH)</th>
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</thead>
<tbody>
<tr>
<td>Kaiser Permanente Los Angeles Medical Center</td>
<td>3.8%</td>
<td>3.7%</td>
<td>2.1%</td>
</tr>
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</table>

- Post-Aneurysm Coiling Procedure Mortality Rate: 8.7% (2016)
STROKE RESEARCH

- Local LAMC Research Program – licensed IRB reviews ongoing clinical research and actively involves residents in training.
- Supporting the stroke program:
  1. Clinical Trials Project Manager
  2. Clinical Research Coordinators
- LAMC is participating in 6 clinical trials and registries; 3 recently closed; 2 upcoming
- As of May 2017, there are 97 patients currently enrolled in various stroke clinical trials

STROKE CLINICAL TRIALS & REGISTRIES

<table>
<thead>
<tr>
<th>Study</th>
<th>Sponsor</th>
<th>Primary Objective</th>
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<tbody>
<tr>
<td>CREST-2</td>
<td>NINDS</td>
<td>Incidence of stroke or death for CEA and CAS vs. Intensive Medical Management</td>
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<tr>
<td>RESPECT ESUS</td>
<td>Boehringer-Ingelheim</td>
<td>Dabigatran etexilate vs. aspirin in prevention of stroke recurrence</td>
</tr>
<tr>
<td>POINT</td>
<td>NINDS</td>
<td>Clopidogrel in preventing major ischemic vascular events</td>
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<tr>
<td>WEAVE</td>
<td>Stryker Neurovascular</td>
<td>Post Market Surveillance: Wingspan Stent System</td>
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<tr>
<td>CONFIDENCE</td>
<td>MicroVention, Inc.</td>
<td>Roadsaver™ stent and Nanoparasol® Embolic Protection System for patients with carotid artery stenosis with elevated risks for AEs following CEA</td>
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<tr>
<td>MaRISS</td>
<td>AHA/ASA &amp; Univ of Miami</td>
<td>Observational: long-term outcomes of mild and rapidly improving stroke symptoms associated with tPA</td>
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<tr>
<td>Amulet</td>
<td>St. Jude Medical</td>
<td>AMPLATZERTM AmuletTM LAA Occluder vs. BSCI LAA closure device to reduce the risk of thromboembolism from the LAA in patients with non-valvular AF</td>
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<tr>
<td>PFO Occluder</td>
<td>St. Jude Medical</td>
<td>Assess safety of AMPLATZERTM 5-year rate of recurrent ischemic stroke</td>
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</tbody>
</table>
### STROKE RESEARCH JOURNAL PUBLICATIONS


- **Aspiration Thrombectomy After Intravenous Alteplase Versus Intravenous Alteplase Alone**, J Mocco, Osama O. Zaidat, Rüdiger von Kummer, Albert J. Yoo, Rishi Gupta, Demetrius Lopes, Don Frei, Harish Shownkeen, Ron Budzik, Zahra A. Ajani, Aaron Grossman, Dorethea Altschul, Cameron McDougall, Lindsey Blake, Brian-Fred Fitzsimmons, Dileep Yavagal, John Terry, Jeffrey Farkas, Seon Kyu Lee, Blaise Baxter, Martin Wiesmann, Michael Knauth, Donald Heck, Syed Hussain, David Chiu, Michael J. Alexander, Timothy Malisch, Jawad Kirmani, Laszlo Miskolczi, Pooja Khatri and for the THERAPY Trial Investigators*. Published August 2, 2016. ([http://stroke.ahajournals.org/content/47/9/2331](http://stroke.ahajournals.org/content/47/9/2331))

### RECENT PUBLICATIONS


The Stroke Neurologists also participated in more than 22 abstracts in the last six years.

2017 INTERNATIONAL STROKE CONFERENCE ABSTRACT

Improving Stroke Clinical Trial Enrollment via the use of Telemedicine
Jared Noroozi, Nancy Flores, Howard Rho, Catherin Lui, Vena Sobhawongse, Navdeep Sangha Neurology, University of Southern California, Kaiser Permanente

Objective: We aimed to determine the ability of telemedicine to successfully recruit eligible acute stroke patients for the Mild and Rapidly Improving Stroke Study (MaRISS) trial at community hospitals in the Kaiser Permanente telemedicine network.

Background: Clinical trial enrollment is often limited to large academia centers. Telemedicine is commonly utilized to provide acute stroke care to community hospitals. The feasibility of successful remote enrollment into stroke clinical trials via telemedicine has been infrequently evaluated.
Design/Methods: Acute ischemic stroke patients presenting at an affiliated community hospital partnered with our hub stroke research center were evaluated clinically by a vascular neurologist via telemedicine. Eligible patients were identified during the initial telemedicine consultation. The following morning, a local research coordinator reviewed all stroke cases for appropriate enrollment, and the patients were consented via telemedicine. The patients had follow up examinations either via telemedicine or via a certified local neurologist. Thirty and ninety day follow up phone calls were performed by research coordinators at the hub.

Results: The period analyzed was 1/2016 to 9/2016. The community hospital was added 6/2016. The rate of enrollment prior to the community hospital addition was 1 patient/month vs. after the addition of the community hospital was 3.5 patients/month. A total of 19 patients were enrolled during the analyzed period, 12 from the hub and 7 from the community hospital. Enrollment was without the occurrence of any study procedure delays or protocol violations per site monitor review.

Conclusions: Our results indicate it is feasible to enroll acute stroke patients into clinical trials through the use of remote telemedicine consultations. Telemedicine can increase the rate of enrollment in stroke clinical trials. As telemedicine is increasingly utilized, the novel approach can be used to successfully accelerate the completion of clinical trials.

RESOURCES

- Patients Resources
  - Stroke Support Group: Stroke can be an overwhelming and stressful event. Connecting with other stroke survivors who have overcome similar challenges can be helpful.
  - For information on Department of Neurology, Neurosurgery, and Physical Medicine and Rehab, visit: https://goo.gl/ZsJwxJ
  - Healthy Balance: A Weight Management Program, visit: https://goo.gl/RZoDni
  - Freedom from Tabacco, visit: https://goo.gl/vDzwfD
  - Center for Healthy Living, visit: https://goo.gl/fEUhvL

- Outside Resources
  - The Joint Commission
  - Agency for Healthcare Research and Quality (AHRQ)
  - National Institutes of Health (NIH)
  - American Heart Association/American Stroke Association
  - National Stroke Association
  - National Institute of Neurologic Disorders and Stroke (NINDS)
  - NINDS Know Stroke Campaign
  - The Brain Attack Coalition
• **Education Resources**
  - Understanding and Managing High Blood Pressure
  - Women Face Higher Risk of Stroke
  - What is Pediatric Stroke?

• **Post Stroke Help**
  - Stroke Discharge Checklist for Patients and Caregivers
  - Caregivers: Practical Tips for Finding Time for Self Care
  - Finances after Stroke Guide
  - Aphasia: Communicating through Barriers
  - Exercise Recommendations for Stroke Survivors