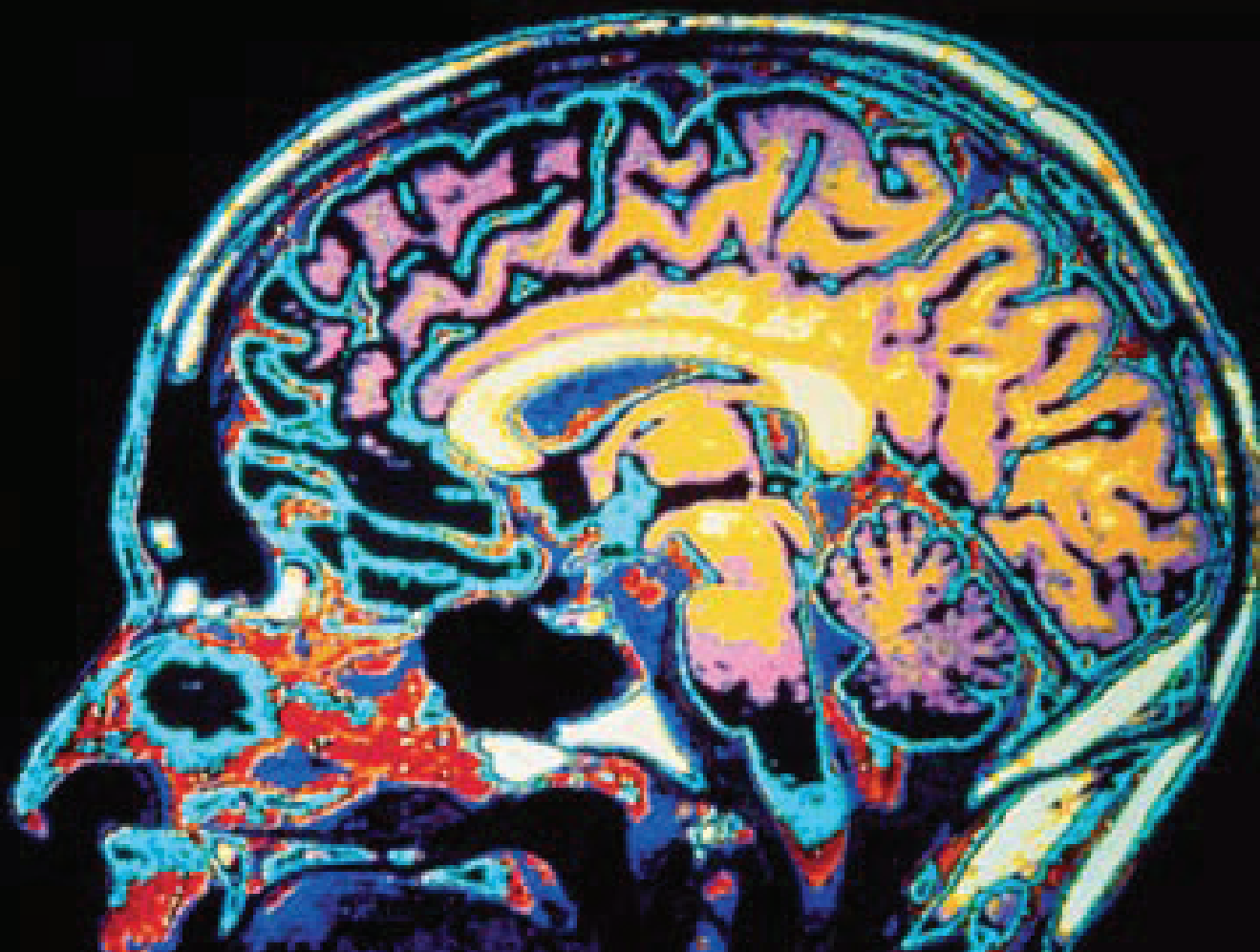David Geffen
School of Medicine
UCLA | Health

VALUE–BASED NEUROSURGERY

CHASING PERFECTION IN NEUROSURGERY

2013–2014 CLINICAL REPORT

UCLA NEUROSURGERY

1 **MORTALITY RATE:** Over the past 2 years, we have significantly reduced the risk-adjusted mortality rate, passing from the 84th percentile (97/114) to the **18th** percentile **(23/119)** for the 12 months ending in Quarter 2, 2014. Neurosurgery Orthopedic Comprehensive Spine Center has been **3rd** in the country in risk-adjusted mortality.

2 **LENGTH OF STAY:** Over the past 5 years, we have **reduced** the average length of stay by **1.65 days** from 8.23 days to 6.58 days.

3 **READMISSION RATE:** Over the past 4 years, we have succeeded in **decreasing** the absolute percentage and variability of all-cause 30-day readmissions.

4 **VALUE–BASED NEUROSURGERY – COST REDUCTION:** Over the past 2 years, we have engaged in transformative service line specific value initiatives, resulting in sustained outcome improvements AND **cost reduction** (**25%** cost decrease in the microvascular decompression and **14%** cost decrease in the pituitary service lines)

5 **VALUE–BASED NEUROSURGERY – COMPREHENSIVE CARE REDESIGN:** Over the past year, we have been pioneering comprehensive care redesign strategies, resulting in accelerated and enhanced recovery, value, and safety of the surgical care episode. As an example, **early mobilization** on the day of surgery starting with sitting upright at the side of the bed **improved** from 2% to **82%** after the redesign. This resulted in an increase in early **ambulation** (walking 50 feet by noon on the first post-operative day), which is now reliably achieved in **60-70%** of our elective adult cranial patients.

6 **STROKE CARE INITIATIVES:** The UCLA Stroke Center has been designated a comprehensive stroke center by the Joint Commission and the American Heart Association. The UCLA Stroke Center has been awarded **"Target: Stroke" honor roll status** and the "Get With the Guidelines–Stroke" **Gold Plus Achievement Award.**

DEPARTMENT OF NEUROSURGERY
2013–2014 CLINICAL VALUE REPORT

MESSAGE FROM THE CHAIRMAN

I am delighted to present this update on the UCLA Department of Neurosurgery Quality Program. This program began in 2009 with the goals of raising quality and patient satisfaction, improving efficiency, and reducing cost. Over the past five years, our team has measured and analyzed neurosurgical complications, outcomes, and costs, and instituted a series of initiatives to improve performance. This report describes our findings, our improvement programs, and our results.

The Quality Program in Neurosurgery has expanded considerably, and includes physicians in neurosurgery, neurological critical care, hospital medicine, and neuroanesthesiology, along with our colleagues in OR, ICU, and medical/surgical nursing. The team includes as well physical therapists, pharmacists, case managers, social workers, and departmental administrative staff. Our efforts are informed by the advice of an active patient and family advisory committee. The program has been coordinated with and supported by the leadership and administrative teams of UCLA Health in the Medical Center, and in the Faculty Practice Group. Without the dedicated efforts of every one of these team members, the program would not have been successful. I want to extend my most sincere appreciation to all the talented and dedicated participants in this program. And most importantly, on behalf of our patients and their families, who are at the center of this work, and who benefit most from these efforts – Thank You!

The program has been supported generously by our Health System, by the office of the President of the University of California, and by visionary philanthropists. We all are tremendously appreciative and grateful.

Through the last five years we have developed a vision for our program – **to chase perfection in neurosurgical care.**

Perfection: The condition of being free, or as free as possible, from all flaws.

True healthcare quality is defined by the degree to which the complete clinical process approaches perfect performance every time, in order to deliver for our patients the outcomes that matter most to them, all at reasonable cost. This is our overarching goal.

Sincerely,

Neil A. Martin, MD
Professor & W. Eugene Stern
Chair in Neurosurgery

Nasim Afsarmanesh
Assistant Clinical Professor
Internal Medicine and Neurosurgery

Jody Anderson
Director of Quality Analytics

Julie Byrd
Administrative Nurse
Neurosurgery

Langston Holly
Associate Professor
Director, UCLA Spine Center

Elaine Parker
Hospitalist

Jeffrey Saver
Professor of Neurology
Co-Director, UCLA Stroke Center

Barbara Van De Wiele
Professor, Executive Vice Chair
Anesthesiology & Perioperative Medicine

Barbara Anderson
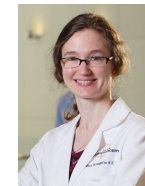Unit Director
Neuroscience/Trauma ICU

Marvin Bergsneider
Professor
Co-Director, Pituitatry Tumor Program

Steven Cohen
Chief Administrative Officer
Neurosurgery

Nancy McLaughlin
Assistant Clinical Professor
Neurosurgery

Nader Pouratian
Assistant Clinical Professor
Neurosurgery

Paul M. Vespa
Professor
Neurosurgery & Neurology
Director, Neurocritical Care Program

MISSION STATEMENT

The mission of the Department of Neurosurgery is to invent the future of neurosurgery by improving neurosurgical treatment of brain and spinal conditions through innovative research and development, by providing **optimal value of care** for our patients and training the next generation of neurosurgical pioneers. **We aim to provide a perfect and flawless patient experience, every time, any time.**

ON THE FOREFRONT OF
VALUE-BASED CARE DELIVERY

The Department of Neurosurgery has shown leadership within University of California (UC) Health Systems, pioneering numerous Safety and Quality initiatives that have subsequently been implemented throughout the UCLA campus, the UC health system, and in other health organizations.

Key to the Department of Neurosurgery's success in driving **safety and quality** as a top priority has been the exceptional dedication and involvement of faculty members, nurses, care partners, therapists, pharmacists, infection control specialists, performance excellence specialists, patient affairs liaisons, and medical center finance department representatives. By working together, we aim to deliver perfect and flawless care and patient experience to each patient.

Throughout all these initiatives, one concept of care delivery has emerged within the department, the Health System, and the Nation, as an overarching framework that the vast majority of stakeholders in healthcare embrace: **Value of care.**

The current challenging economic environment and the need for a comprehensive health care reform have brought leaders to propose that the central focus should be to increase the **value of care**, with value being equated to the meaningful outcomes delivered to the patient achieved per dollar spent. In addition to delivering the best outcome and achieving a perfect patient experience, care needs to be delivered in a **cost-conscious** way to truly drive value based care delivery. The Department of Neurosurgery is leading the path in waste and cost analysis, development of cost-containment strategies and alternative costing models.

*This report presents the **on-going initiatives contributing to optimal value of care.** Results of the quality, patient satisfaction, and cost initiatives are presented using various parameters collected by national organizations.*

UCLA NEUROSURGERY

ABOUT THE **UCLA** **DEPARTMENT OF NEUROSURGERY**

The Department of Neurosurgery at UCLA delivers clinical care on two campuses: the **Ronald Reagan UCLA Medical Center** (RRUMC), dedicated to cranial neurosurgery, and the **Santa Monica UCLA Medical Center** (SMUCLA), dedicated mostly to spinal neurosurgery.

The ***Clinical Programs*** include:

- Acoustic Neuroma
- Brain Aneurysms and Arteriovenous Malformations
- Brain Injury
- Brain Tumor
- Chiari & Syringomyelia
- Epilepsy
- Hydrocephalus

- Meningioma and Skull Base Tumor
- Minimally Invasive Surgery
- Neurocritical Care
- Neuroendoscopy
- Neuromodulation for Movement Disorders and Pain Program
- Pediatric Neurosurgery
- Peripheral Nerve

- Pituitary & Skull Base Tumor
- Spinal Disorders
- Stereotactic Radiotherapy and Radiosurgery
- Stroke

*Our clinicians deliver state-of the art treatments and push the limits of their respective subspecialty fields in order to assure the **best care** to all our patients.*

The ***Research Programs*** in Neurosurgery at UCLA include:

- Brain Injury Research Center (BIRC)
- Brain Tumor Program
- Clinical Informatics Program
- Cerebrovascular Program

- Hydrocephalus Program
- Neurocognitive Program
- Pediatric Epilepsy Program
- Peripheral Nerve Program

- Spine Program
- Stroke Program
- VALUE Research Program

UCLA NEUROSURGERY RECOGNITION AND AWARDS:

▶ **Top 10** Neurosurgery Department according to **U.S. News and World Report**

▶ **No.2** in **National Institutes of Health** (NIH) **research grants**

▶ **No.5** in the world for **most research papers published** in medical journals

▶ **Joint Commission National Quality Approval** awarded to **UCLA Stroke Center**

▶ **The UCLA Stroke Center is a designated center** of the **NIH-funded Specialized Programs of Translational Research in Acute Stroke** (SPOTRIAS)

▶ **Seven clinicians** in the UCLA Neurosurgery department have been **voted BEST DOCTOR IN AMERICA**.

SURGICAL VOLUME

*The Department of Neurosurgery at UCLA performs **over 2,000 procedures** between the Ronald Reagan UCLA Medical Center and the Santa Monica Medical Center.*

Procedure Volume by Location – UCLA Department of Neurosurgery (2012)
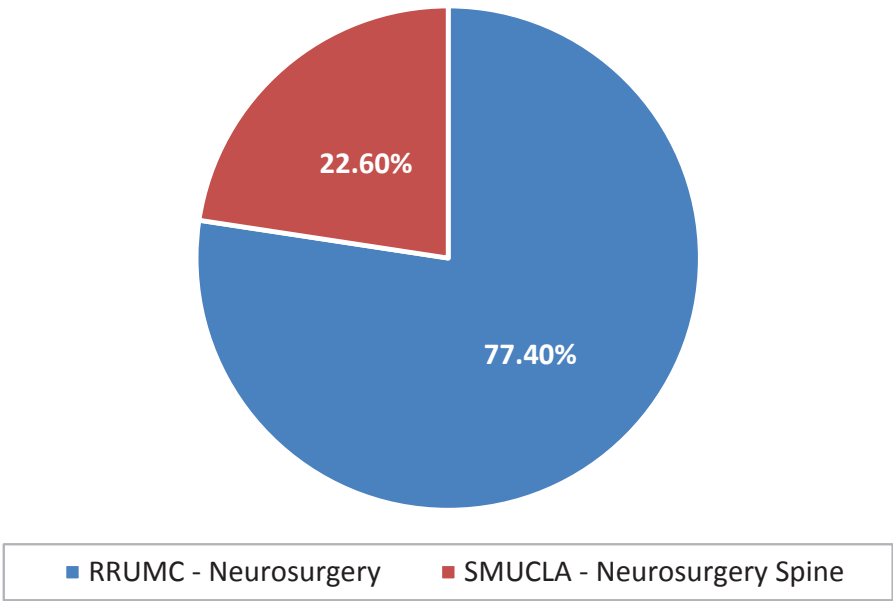
22.60%

77.40%

- RRUMC - Neurosurgery
- SMUCLA - Neurosurgery Spine

Procedure Volume by Location – UCLA Department of Neurosurgery (2013)

22.90%

77.10%

- RRUMC - Neurosurgery
- SMUCLA - Neurosurgery Spine
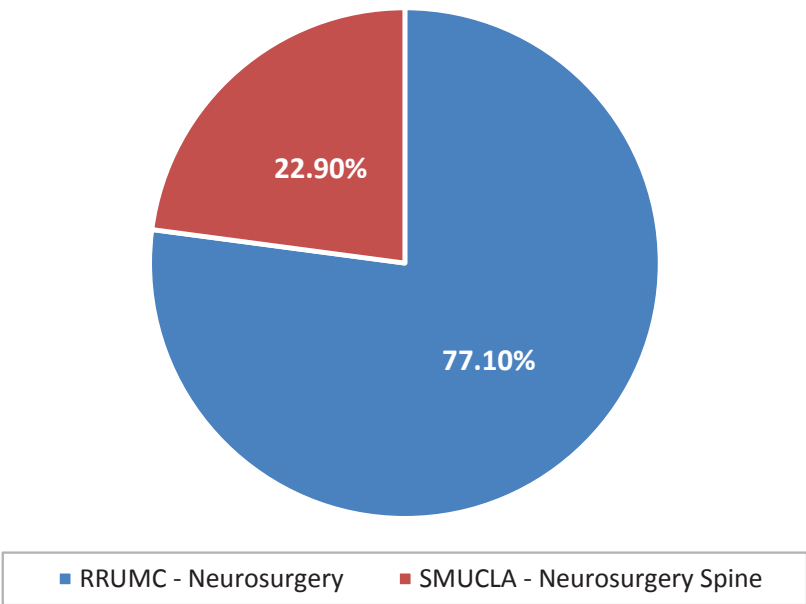
NEUROSURGERY
CLINICAL QUALITY/VALUE PROGRAM

In February 2009, the Department of Neurosurgery at UCLA launched the **Clinical Quality Program:** Enhancing Quality Safety and Efficiency. The Department leadership worked with the UCLA Medical Center to align mutual quality improvement priorities, ultimately aiming to improve the value of neurosurgical care. The Clinical Quality Program inspired a culture for change and progress, while developing an infrastructure to implement new processes designed to achieve and sustain performance improvement.

The two major innovative concepts that resulted from the launch of the Neurosurgery Quality Program were: **1) the creation of an electronic quality data dashboard,** enabling to prioritize and monitor data-based quality initiatives; **2) the creation of a multidisciplinary care coordination team** that reviews the quality data dashboard every month and steers improvement initiatives in collaboration with the frontline care providers.

In 2013, the Neurosurgery Clinical Quality/Value Program focused on the following **quality initiatives:**

CLINICAL CARE INITIATIVE	PATIENT CENTERED CARE AND SATISFACTION	EFFICIENCY AND THROUGHPUT
• Infection prevention • Blood pressure control project • Readmission reduction • Reoperation reduction • Mortality reduction	• Transition of care, namely the discharge process • Patient and Family Advisory Council (PFAC)	• Average length of stay • Discharge by noon initiative • Healthcare sustainability

*The Department of Neurosurgery is dedicated to delivering **optimal value of care** to its patient population and devoted to being a leader in value-based care.*

In addition to our long-term dedication to safety and quality, we are pioneering in the field of value-based care delivery by launching strategic initiatives to minimize waste and cost contain throughout the care experience, always with the ultimate goal of achieving the best outcome and patient satisfaction.

We are also contributing to patient registries such as the National Neurosurgery Quality and Outcome Database (N2QOD) and Get with the Guidelines - Stroke Database that will enable evaluation of specific outcomes for defined populations and drive optimal value of care.

The Neurosurgery Clinical Quality/Value Program has been driving the following **waste and cost initiatives:**

| WASTE INITIATIVES	COST ANALYSIS	COST CONTAINMENT STRATEGIES
• Waste analysis • Water waste reduction • Recycling of plastic and cardboard containers on the unit • Conscious linen utilization	• Cost analysis in collaboration with decision support • Implementation of new costing models in collaboration with the Harvard Business School and the Anderson Business School	• Defer use • Shorten care cycles • Equivalent substitutions • Re-engineering care delivery

LENGTH OF STAY

Neurosurgery is committed to improving the patient experience and throughput by **optimizing patient recovery, coordinating care, and reducing length of stay**.

*Over the past 5 years, the Department of Neurosurgery has **reduced** the average hospital length of stay by **1.65 days** at Ronald Reagan UCLA Medical Center.*

In the last two years, the average length of stay of the majority of elective admissions has been successfully decreased to 1-3 days following surgery (**50% reduction** for some service lines).

Average Length of Stay - UCLA Neurosurgery and Spine
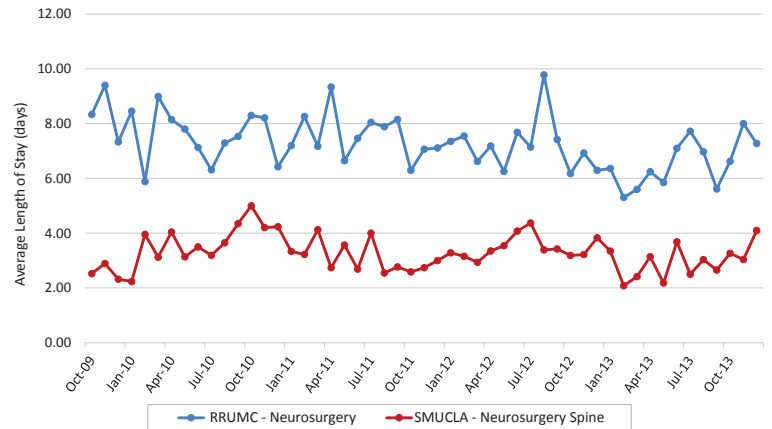
Cranial Neurosurgery Service Line - Length of Stay Index by Quarter RRUMC vs Select US News & World Report Neurosurgery Honor Roll Hospitals

Source: UHC's Clinical Database
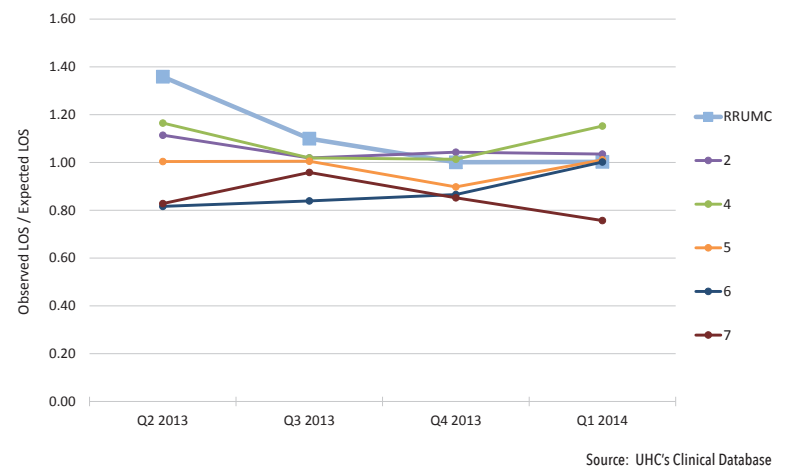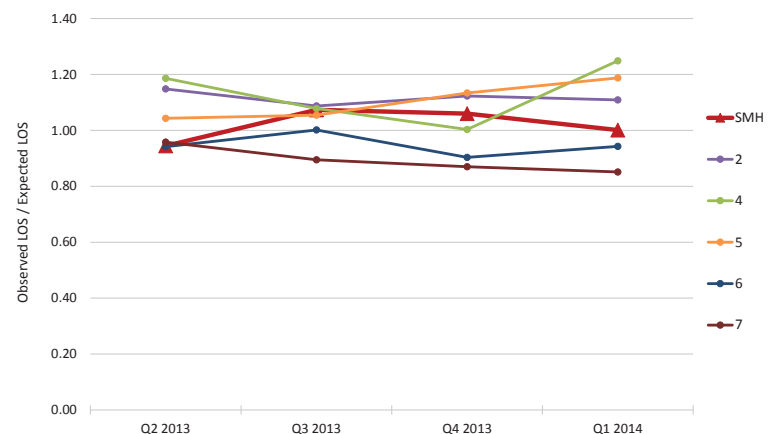
RRUMC – Neurosurgery Average Length of Stay by Year

Spine Neurosurgery Service Line - Length of Stay Index by Quarter RRUMC vs Select US News & World Report Neurosurgery Honor Roll Hospitals

Source: UHC's Clinical Database

8

The Department of Neurosurgery is improving patient flow by targeting discharge by noon at both RRUMC and SMUCLA.

Our initiatives have addressed the causes of discharge delays, improved communication with patients and their families regarding the discharge day and time, and resolved delays due to transportation and incomplete paperwork.

Percent Discharge by Noon per Month, RRUMC – Neurosurgery
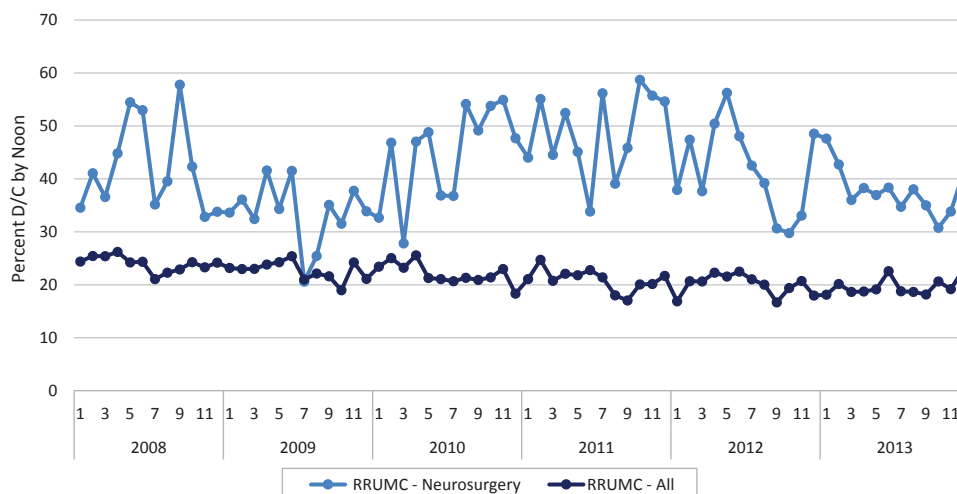
The UCLA Department of Neurosurgery has had sustained improvement in discharge by noon, and consistently outperforms RRUMC and SMUCLA hospital-wide discharge by noon performance.

Percent Discharge by Noon per Month, SMUCLA – Neurosurgery Spine
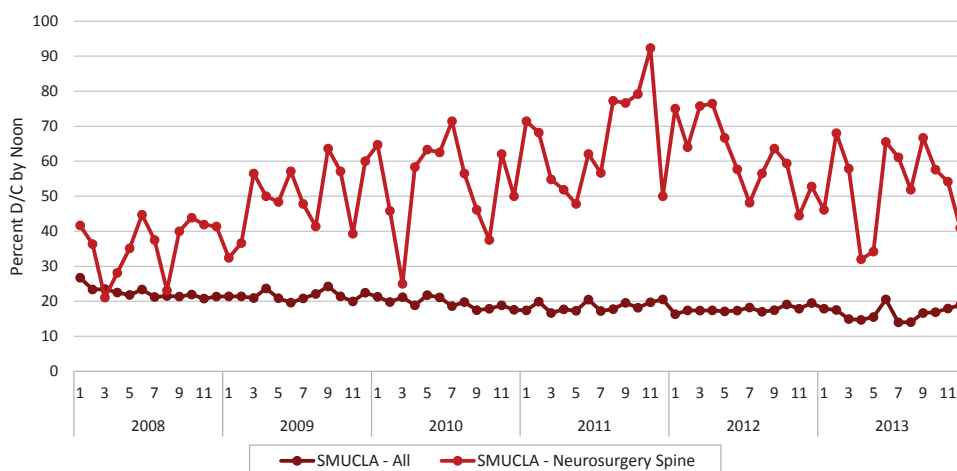
READMISSION REDUCTION

The UCLA Department of Neurosurgery has conducted an extensive three-year chart review of readmissions and categorized preventability and common etiologies of readmissions.

Strategic interventions are being implemented to address the most common causes of readmissions.

The UCLA Department of Neurosurgery is succeeding in reducing its rate of readmission and is continuously striving to eliminate all preventable readmissions.

Legend:
- Infection
- Medical diagnosis
- Medication
- Neurologic Decompensation
- Other
- Pain
- Related to original Diagnosis
- Social
- Surgical Complication

Values shown: 24%, 16%, 1%, 8%, 10%, 3%, < 1%, < 1%, 38%

RRUMC - Neurosurgery Etiologies of 30-Day Surgical Readmissions
(Baseline data)

Percent All-Cause 30-Day Readmissions
RRUMC UHC Cranial Neurosurgery Service Line

Cranial Neurosurgery Service Line - Percent All-Cause 30-Day Readmission by Quarter: RRUMC vs Select US News & World Report Neurosurgery Honor Roll Hospitals
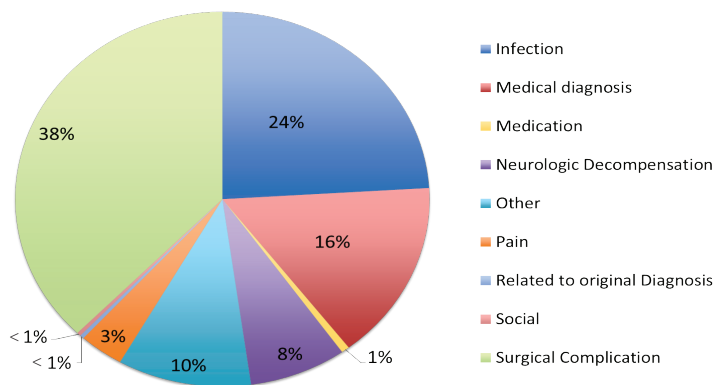

Source: UHC's Clinical Database
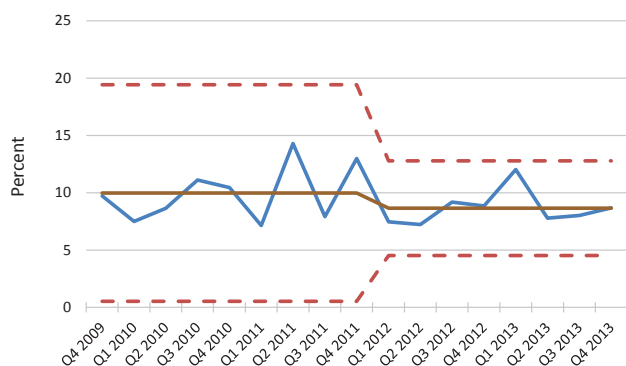
Percent All-Cause 30-Day Readmissions
SMUCLA UHC Neurosurgery Spine Service Line

Neurosurgery Spine Service Line - Percent All-Cause 30-Day Readmission by Quarter: SMUCLA vs Select US News & World Report Neurosurgery Honor Roll Hospitals

Source: UHC's Clinical Database

REOPERATION RATES

Detailed reoperation data is being considered by quality programs as a surgical quality indicator to assess and improve the **value of care** delivery.
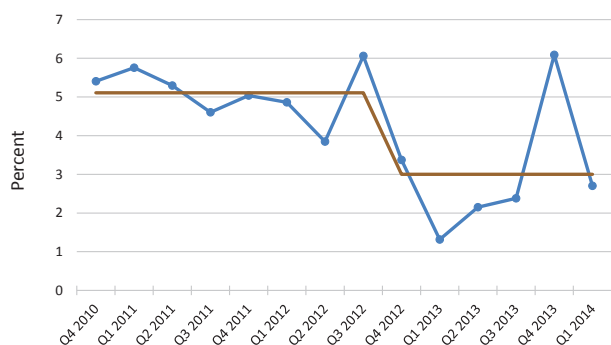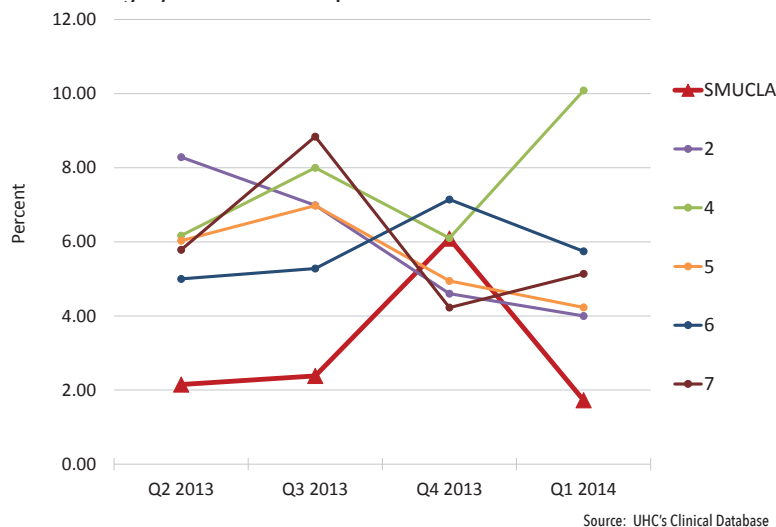
The UCLA Department of Neurosurgery has conducted an extensive five-year chart review of reoperations, assessing which conditions were most at risk of reoperations, the etiology of reoperations, and their timing.

- The incidence of early unplanned reoperation was 3.5% for the UCLA Department of Neurosurgery.
- In 2013, the Clinical Quality Program planned a strategic agenda to address the most frequent etiologies for reoperations.

Most common index surgery of patients having undergone an early* unplanned re-operation), 2008-2012 (RRMC and SMMC)

Index Surgery Category	Number of reoperated cases	Reoperation %
Shunt-related procedure	56	5.5
Craniotomy for resection of tumor (intra-axial, extra-axial, skull base)	24	2.0
Spinal procedure	22	1.2
Endoscopic endonasal approach for pituitary region pathology	16	4.0
Decompressive hemicraniectomy with/without evacuation of hematoma	16	4.2
Craniotomy for treatment of cerebrovascular pathology	13	4.2
Miscellaneous	36	N/A

*Occurring within 7 days of the index surgery

*We are engaging the surgeons and care teams in assessing what can be done before and after surgery, but also critically what can be done during the procedure to **reduce the rate** of unplanned reoperations.*

Intra-operative process improvement to consider at the time of the index surgery

Reoperations	Intra-operative process improvement ideas to consider at the time of the index surgery

Shunt dysfunction	- Define criteria for use of:
	    1) intra-operative navigation;
	    2) laparoscopic placement of peritoneal catheter;
	    3) intra-operative imaging for confirmation of appropriate shunt placement;
	- Standardize use of intrathecal use of antibiotics during insertion of the catheter

Post-operative bleed	- Standardize coagulopathy reversal; - Define criteria for use of DDAVP intra-operatively in patients not known coagulopathic but noted "oozy"; - Evaluate the benefit of a "5 minute bleeding time-out" to wait and assess hemostasis in "oozy" patients; - Standardize use of tack-up sutures; - Standardize post-operative blood pressure parameters
Cerebrospinal fluid leak	- Review the endoscopic endonasal skullbase approach repair protocol; - Review exposure and closure techniques for retrosigmoid craniotomies/craniectomies and develop expert recommendations on optimal reconstruction strategies; - Emphasize need for smooth awakening at the end of surgery (prevent bucking/wretching)
High intracranial pressure	- Emphasize recommended size of the decompressive craniectomies; - Evaluate the potential benefit of performing a subtemporal decompression

MORTALITY REDUCTION

The UCLA Department of Neurosurgery is dedicated to reducing its mortality rate.

The UCLA Department of Neurosurgery has conducted an extensive chart review over 3 years to identify the diagnoses with the highest rate of mortality and assess delivered treatments, performed surgeries, and documentation processes.

Multiple projects to reduce mortality have been launched including:

▷ **Code Brain Initiative** *(targeting hemorrhagic or ischemic strokes that are not triaged Code Stroke)*

▷ **Documentation and coding** optimization initiative to ensure that the complexity of our patients is appropriately documented

▷ **Weekly peer review** of mortalities to identify any opportunity for improvement

*Over the past two years, the Department of Neurosurgery has significantly reduced its **risk-adjusted mortality rate**, passing from the 84th percentile (97/114) to the **18th percentile (23/119)** for the 12 months ending in **Quarter 2, 2014**.*

*At Santa Monica UCLA Medical Center, the Neurosurgery Orthopedic Comprehensive Spine Center has had only one mortality over the past four years, which is significantly better than our competitors and has ranked SMUCLA – Neurosurgery Ortho **3rd in the country** in **risk-adjusted mortality**.*

UHC Risk Adjusted Mortality, RRUMC – Cranial Neurosurgery Service Line and the top 20 US News and World Report Neurosurgery Programs, 2013
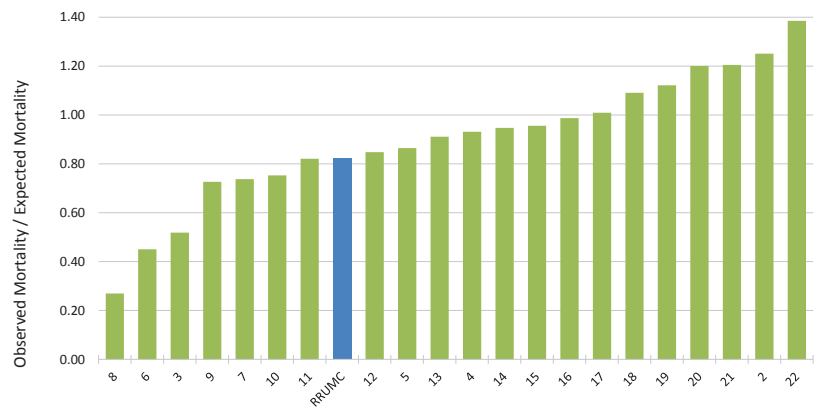
UHC Risk Adjusted Mortality, RRUMC - Neurology Service Line and the top 20 US News and World Report Neurology Programs, 2013
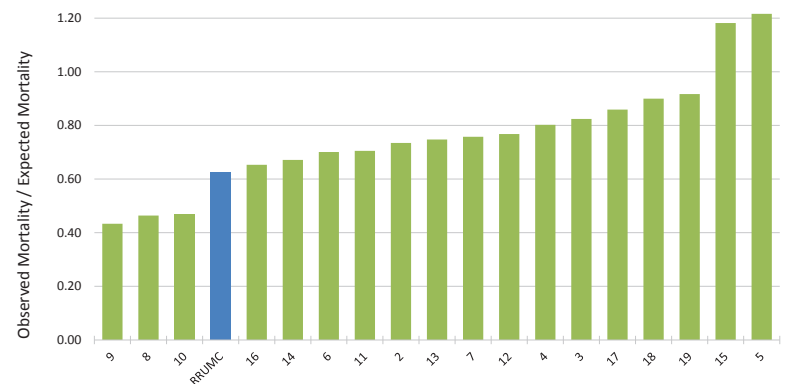
Risk Adjusted Mortality, RRUMC UHC Cranial Neurosurgery Service Line
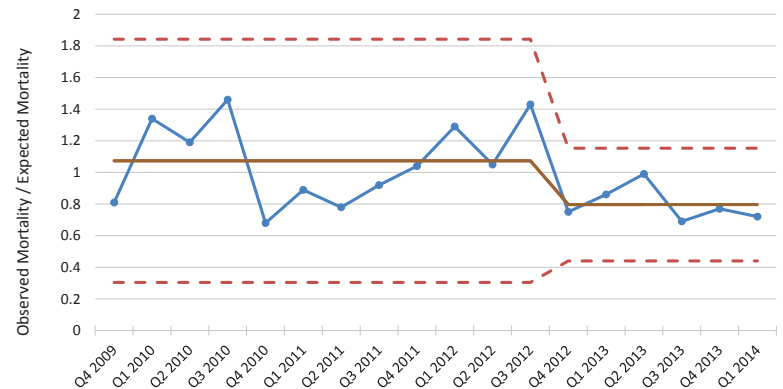
Cranial Neurosurgery Service Line - Risk Adjusted Mortality by Quarter RRUMC vs Select US News & World Report Neurosurgery Honor Roll Hospitals
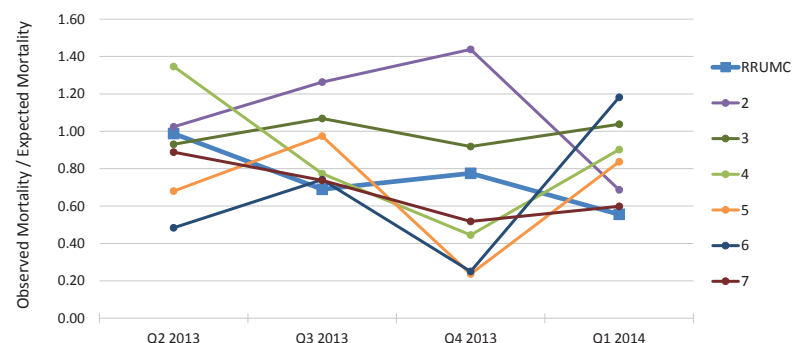
Source: UHC's Clinical Database

NURSING–DRIVEN OUTCOMES
FALLS AND ULCER PREVENTION

The neuroscience nursing teams are leading innovative initiatives to prevent falls and ulcers.

*Since October 2013, a new fall prevention program was launched and succeeded in decreasing by 35%
the number of falls on the Neuroscience ward, even achieving **ZERO** falls for 4 consecutive months!*

Fall Prevention, RRUMC – Neurosurgery (2013)
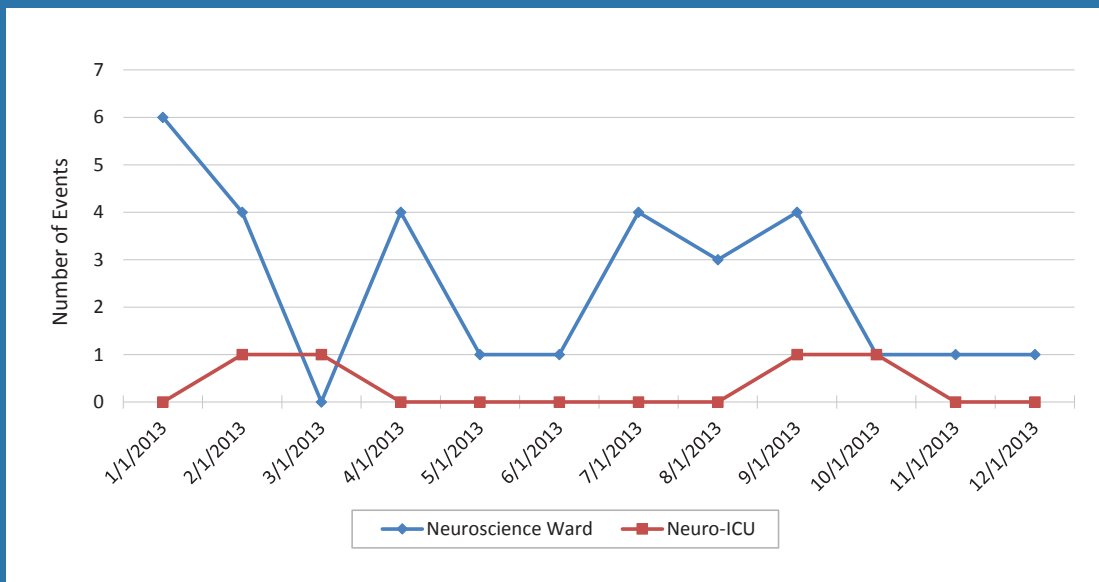
Pressure Ulcer Prevention, RRUMC – Neurosurgery (2013)
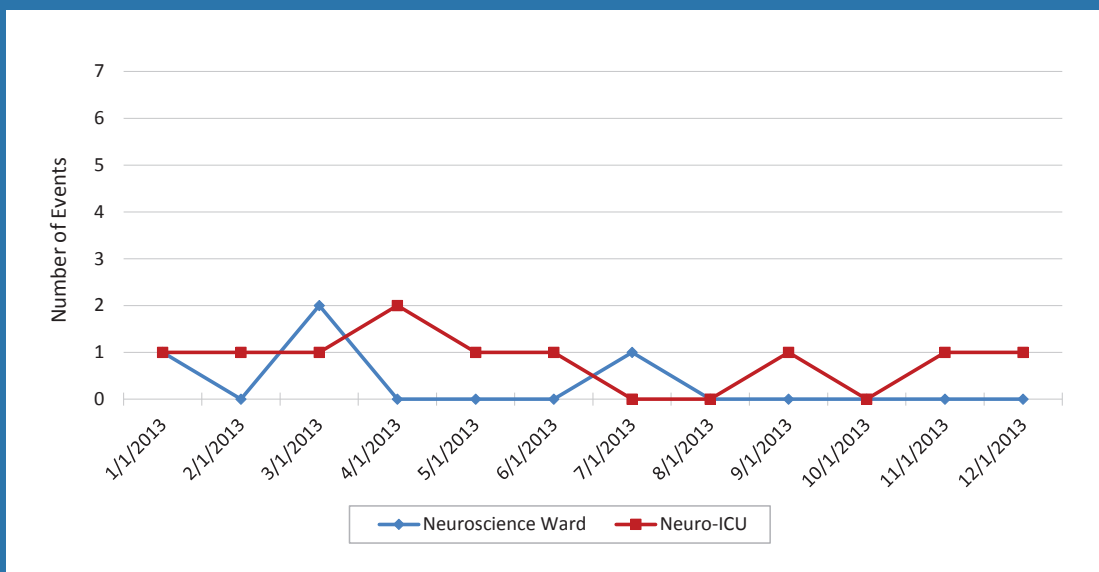
PATIENT SATISFACTION

*The Department of Neurosurgery is dedicated to improving **patient satisfaction**, a major component of the **value** of delivered care.*

The **HCAHPS** (Hospital Consumer Assessment of Healthcare Providers and Systems) survey is the first national, standardized, publicly reported survey of patients' perspectives of hospital care.

The **CGCAHPS** (Clinician & Group Consumer Assessment of Healthcare Providers and Systems) survey asks patients about their recent experiences with clinicians and their staff.

HCAHPS Survey, RRUMC-Neurosurgery (Jan 2012 to Dec 2013)
Question: Would you recommend this hospital to your friends and family?

— 75th percentile = National Hospital Average
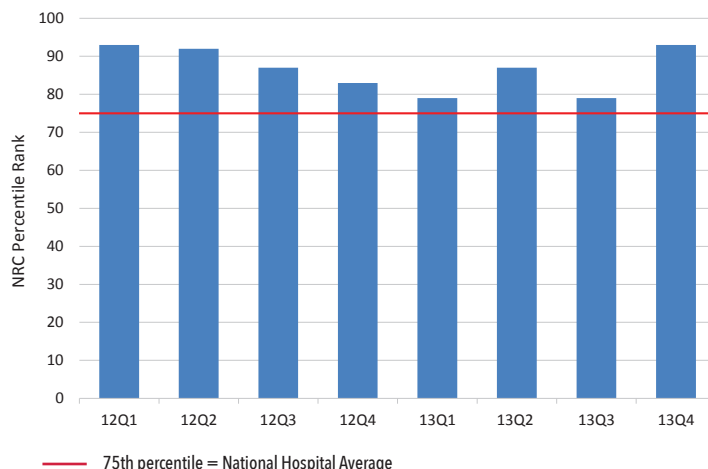
CAHPS Clinician & Group Survey - 2013

■ UCLA ■ RRUMC-Neurosurgery ■ SMUCLA-Spine Ortho
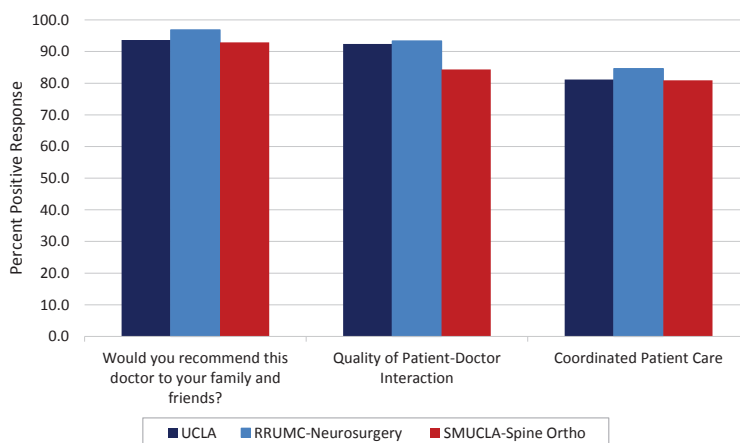
Comprehensive assessment of patient satisfaction throughout the entire episode of surgical care

LEGEND:

ARC: Assessing Resident CICARE

CGCAHPS: Clinician & Group Consumer Assessment of Healthcare Providers and Systems survey

CICARE: Patient feedback cards available throughout the hospital

HCAHPS: Hospital Consumer Assessment of Healthcare Providers and Systems survey

PCAT: Peer CICARE Assessment Tool

PFAC: Patient and Family Advisory Council
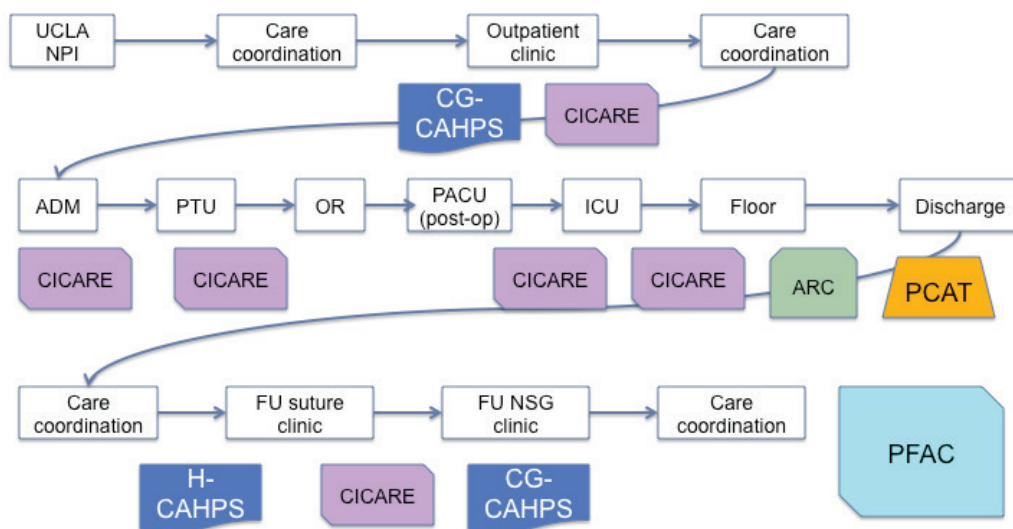
PATIENT AND FAMILY ADVISORY COUNCIL

The patient's voice and his/her family's voice is essential to the Department of Neurosurgery. We therefore launched a **Patient and Family Advisory Council** (PFAC).

This council is co-led by a family member and a representative from the Department of Neurosurgery. It is composed of a number of former patients and family members (spouses and parents) treated for a variety of conditions and members of the Department of Neurosurgery (Elizabeth Cattell, NP, and Steven Cohen, CAO).

The mission of the Neurosurgery PFAC is to create an **active partnership** *based on* **mutual respect** *between physicians, nurses, staff, patients and families to enhance the patient and family experience.*

Members of the council provide input and feedback on patient care, services provided, new policies, and also recommend new programs and strategies. The PFAC is committed to empowering patients and families to better understand and participate in their care experience.

The PFAC has provided valuable input for:
> Patient Portal in CareConnect
> Hospital wide "Family Support Hospitality Services" binder
> Discharge planning process

The PFAC is developing:
> Neurosurgery specific patient and family resource materials
> A Peer Counselor Program
> Initiative to improve the discharge process

Wendy Tucker, Co-Chair of the PFAC with her husband, Marco Ferreira

The outcome measures hierarchy for patients undergoing microvascular decompression
(Adapted from Porter ME, N Engl J Med, 2010)

	Dimension	MVD Pilot
Tier 1 Health status achieved or retained	Survival	Mortality
	Degree of health recovery	Relief of pain/spasm
		Return home after surgery
Tier 2 Process of recovery	Time to recovery	Average total time in OR
		Average pre-incisional preparation time
		Average surgical time
		Median PO LOS
		Average PO LOS
		Average LOS PACU
		Average LOS ICU
		Average LOS floor
		Discharge before noon
	Disutility of care of tx process	Need for blood transfusion
		Stroke
		New deficit
		Infection
		CSF leak
		Readmission
		Surgery for wound revision
Tier 3 Sustainability of health	Sustainability of health recovery and nature of recurrences	Symptom recurrence
		Need repeat surgery for TN/HFS
	Long term consequence of tx	Need for continued pain Rx
		Vestibular dysfunction
		Loss hearing
		Unexpected facial numbness
		Incisional pain

HFS: Hemifacial spasm; ICU: Intensive care unit; LOS: Length of stay;PACU: Post-acute care unit;
PO: Post-operative; OR: Operating room; TN: Trigeminal neuralgia; Tx: Treatment

Mean duration of pre-incisional preparation time, surgical procedure, and total time in operating room before (group 1) **and after** (group 2) **implementation of process improvements**

Microvascular decompression (MVD), a relatively standard procedure performed for the treatment of facial pain or hemi-facial spasm, was selected as a pilot service line. We assessed the impact of implementing improvement processes across the episode of surgical care and cost containment strategies on the value of neurosurgical care. An array of outcomes meaningful to the patient were analyzed.

The **rate of complete resolution/significant improvement** of pre-operative symptomatology was high (97% for patients with facial pain and 100% for patients with hemifacial spasm at 6 months).

*Patients treated following the implementation of process improvement benefited from a **reduction in the average total OR time**, decrease in the mean and median post-operative LOS, decrease in the mean LOS on the ward, reduction of complications and readmissions.*

*After implementation of cost containment interventions targeting the 3 most expensive activities: **the average cost of surgical care episode** (index hospitalization + read-mission/reoperation) **decreased 25%** (see cost initiatives).*

Percent of Patients Discharged by Post-Operative Day 2 and Post -Operative Day 3 before Noon
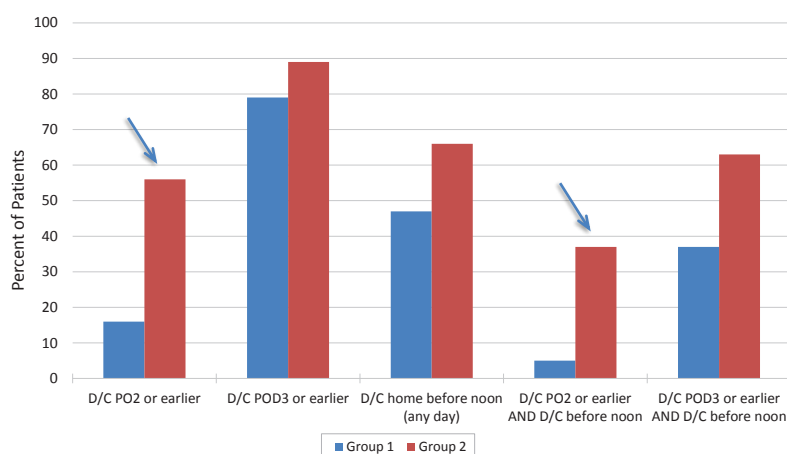
The outcome measures hierarchy for patients undergoing resection of a pituitary adenoma via a purely endoscopic endonasal approach (Adapted from Porter ME, N Engl J Med, 2010)

	Dimension	Pituitary Adenoma Pilot
Tier 1 Health status achieved or retained	Survival	Mortality
	Degree of health recovery	GTR+NTR (NF)
		Endocrine remission (F)
Tier 2 Process of recovery	Time to recovery	Average total time in OR
		Average pre-incisional preparation time
		Average surgical time
		Median PO LOS
		Average PO LOS
		Average LOS PACU
		Average LOS ICU
		Average LOS floor
		Discharge home before noon
	Disutility of care of tx process	Need for blood transfusion
		Carotid injury
		New PO hemianopsia
		New PO decreased visual acuity
		New PO EOM deficit
		Infection
		CSF leak
		Hyponatremia
		Diabetes insipidus
		Reoperation during index hospitalization
		Readmission
		Reoperation during readmission
Tier 3 Sustainability of health	Sustainability of health recovery and nature of recurrences	Recurrence of endocrinopathy
		Recurrence of tumor (NF or F)
		Need repeat surgery or other tx
	Long term consequence of tx	Need for continued hormonal replacement
		SNOT assessment

CSF: Cerebrospinal fluid; F: Functional adenoma; GTR: Gross total resection; ICU: Intensive care unit; NF: Non-functional adenoma; LOS: Length of stay; NTR: Near Total resection; PACU: Post-acute care unit; PO: Post-operative; OR: Operating room; Tx: Treatment

The Pituitary Tumor Program also launched a service line specific multidisciplinary value improvement program including:

- implementation of a Pituitary Optimum Care pre-operative and intra-operative protocol
- standardization of post-operative orders
- revision of the pre-operative and discharge information packets to improve patient education
- implementation of cost containment strategies

Assessing performance on multiple patient-centered outcomes that encompass the entire surgical care episode will determine the value of pituitary care.

After implementation and maturation of Departmental QI initiatives, service line specific QI initiatives, and the implementation of cost containment strategies in the Pituitary program, **the average cost of surgical care decreased 14% compared to the pre-implementation group** *(see cost initiatives).*

Length of postoperative stay of patients before (group 1) and after (group 2) implementation of process improvement and cost containment initiatives (A). Percentage of Patients Discharged by POD2 and POD3 before Noon (B).

A.

B.
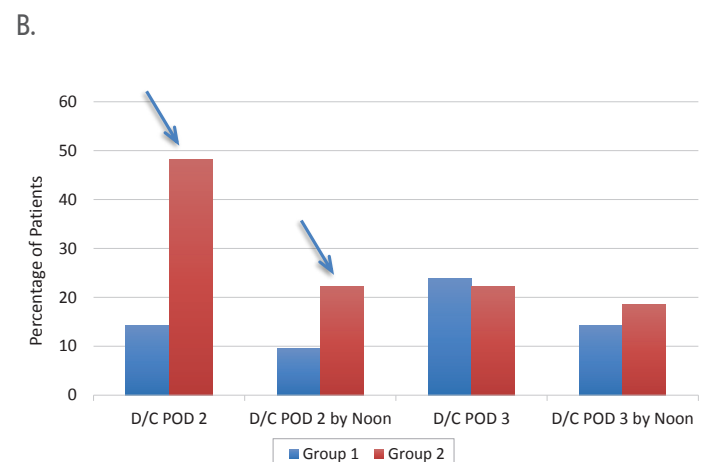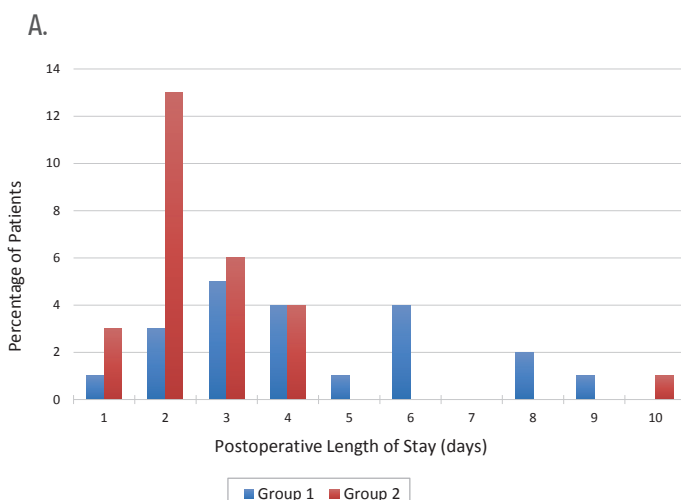
VALUE–BASED NEUROSURGERY
COST INITIATIVE

Cost containment initiatives

Although health care providers have put significant effort in the quality and safety of care delivered in the past decade, little attention has been brought to cost measurement, and even less to cost containment.

Cost analysis has emerged as critical to contain or reduce cost of delivery of care and further improve and maximize value of care.

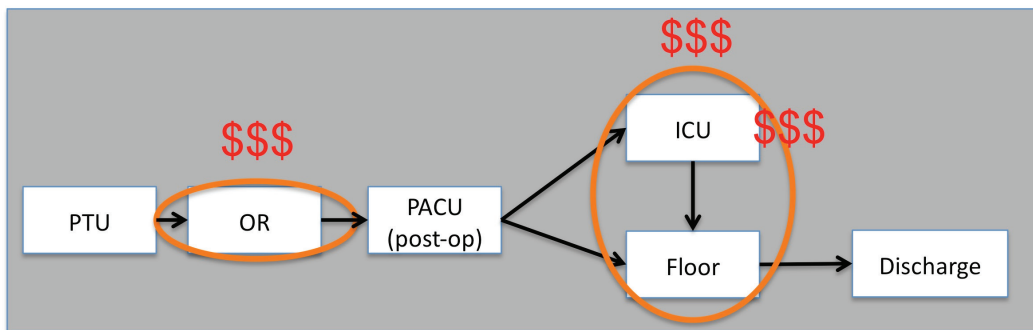The Department of Neurosurgery at UCLA has lead pioneering cost analysis studies and is leading, in collaboration with the UCLA Decision Support team, cost containment initiatives throughout its service lines.

Simplified Value Stream Map: What are the most expensive costs?

Cost Reduction Strategy
Intra-operative
    1) Shorten Care Cycle: Optimize parallel team work in the OR to prevent waste
    2) Defer Use: Simplify intra-operative monitoring strategy
Post-operative
    1) Re-engineer Care Delivery: Orient selected patient to floor instead of ICU
    2) Shorten Care Cycle: Optimal coordination of post-operative care, patient recovery, and return to home

*Average cost of surgical care episode **decreased 25%** after improving care delivery (group 2) and implementing cost containment strategies (group 3) in the microvascular decompression service line.*

Impact of Cost Containment in the Microvascular Decompression Service Line

	Av. Length of Stay (days)	Av. Total Cost of Index Hospitalization ($)	Total Cost Readmission & Reoperation for Study Population ($)	Av. Cost of Surgical Care Episode*
Group 1 (benchmark)	3.2	20,816	68,939	24,771
Group 2 (post process improvement initiatives)	2.7	21,286	11,659	23,161
Group 3 (Post cost containment initiatives)	2.1	18,480	0	18,480

*Surgical care episode: index hospitalization, readmission, and reoperation

Impact of cost containment in the Pituitary Adenoma service line
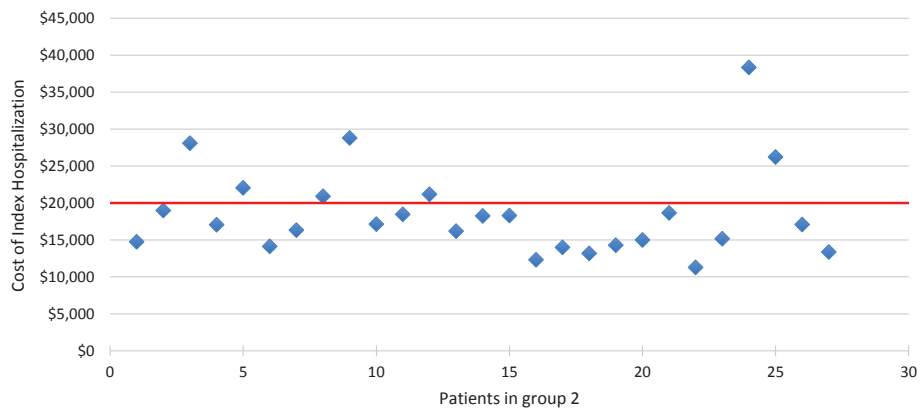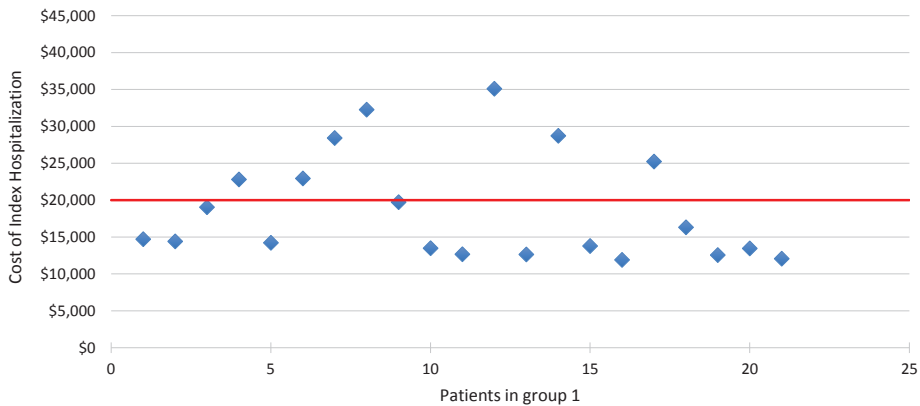
*For the Pituitary adenoma service line, the average cost of surgical care episode **decreased 14%** and its cost became **less variable** after maturation of quality improvement processes and implementation of cost containment interventions (group 2).*

Time-Driven Activity-Based Costing (TDABC)

In collaboration with the Harvard Business School, the Department of Neurosurgery has piloted the **Time-Driven Activity Based Costing (TDABC) model**. This costing model estimates the resources used for treating a patient and combines this with the quantity of time each resource uses for each activity during a patient's care.

TDABC captured activities and their related costs that were not accounted for by current accounting systems, for example the cost of coordination of care in the pre-operative setting. Health centers around the nation are beginning to apply TDABC in an evaluation of bundled payments.

Costing the pre-operative care using TDABC model

Pre-op
Outpatient: $1,125.61

Coordination of Care: $645.01

Delivery of Care: $116.06

Ancillary:$364.54
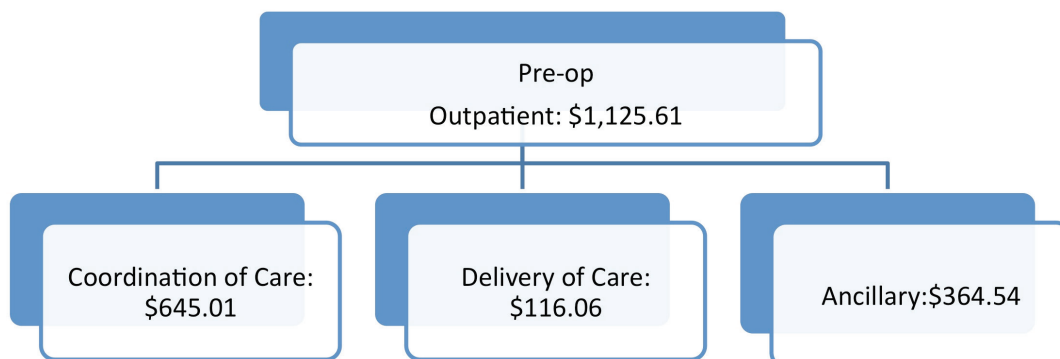
COMPREHENSIVE NEUROSURGERY CARE REDESIGN
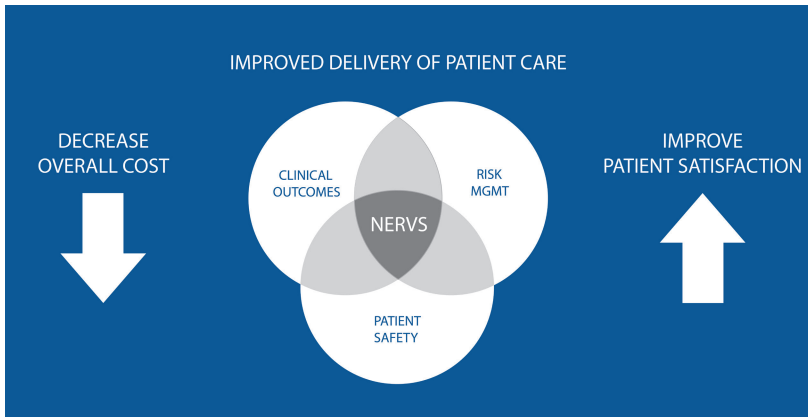
Overview of the NERVS care redesign initiative
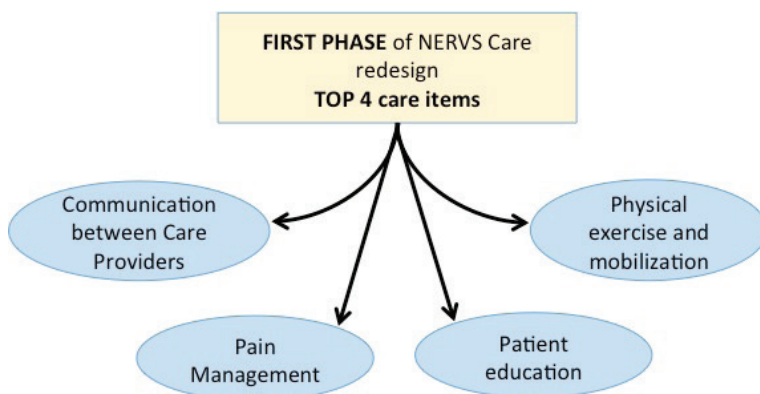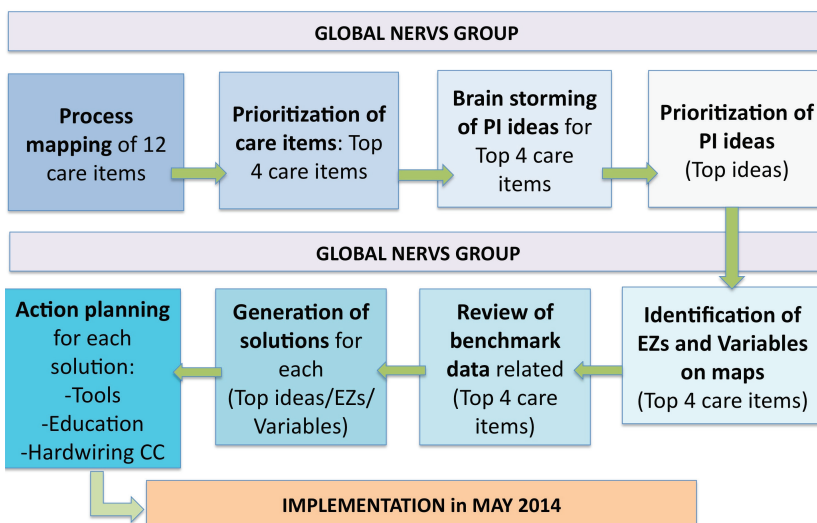
The Department of Neurosurgery is leading a comprehensive care redesign initiative called **NERVS** (Neurosurgery Enhanced Recovery after surgery, Value, and Safety).

The NERVS care redesign initiative is unique as it is:

▶ **multidisciplinary**: over 40 members actively participating in the redesign project

▶ **spans the continuum of care**, not only the inpatient surgical episode.

Only by addressing all three phases of care and by encompassing all medical specialties and related services, can we effectively achieve optimal surgical care.

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*The **NERVS** care redesign initiative aims to **improve patient outcomes** and **patient satisfaction** while **decreasing the cost** of care delivery.*

*We strongly believe that **NERVS** will be **THE** model of integrated optimal surgical care delivery throughout the patient's entire care.*

NEURO–INTENSIVE CARE UNIT
INITIATIVES

The Neuro-Intensive Care Unit collects data on a series of performance measures based on national best practices. When performed collectively and reliably, these sets of best practices, organized in **bundles of care**, have been proven to improve patient outcomes.

In addition to the nationally recognized care bundles including the ventilator, central line insertion, and sepsis bundles, two novel UCLA-specific bundles were developed: the Glycemic Control and the Neuro bundles.

Data is reviewed by a multidisciplinary team and is used to drive process improvement in several ways including: educational efforts on best practices to physicians and nurses, revision of prospective order sets, root cause analyses, and selection of new equipment for use in the ICU.

INITIATIVES IMPROVING VALUE OF DELIVERED CARE

▷ **Early Ambulation Program:**
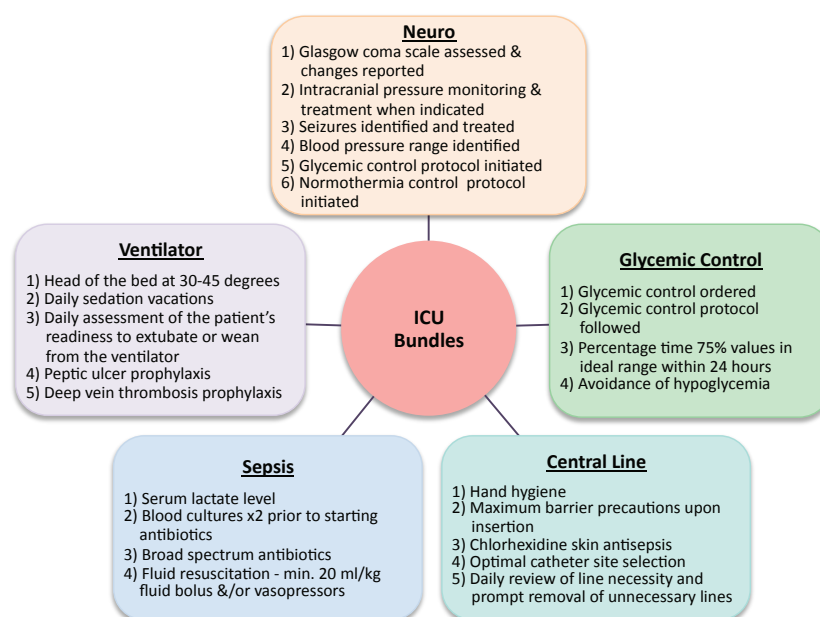Patients meeting a set of eligibility criteria are mobilized early on, with specific goals to meet throughout their care. We are studying the impact of early mobilization on various aspects of hospital care including length of stay, prevention of complications, patient satisfaction, and cost of care delivery.

▷ **Intravenous to Oral Transition:**
When patients are able to tolerate medication orally, we are assuring timely transition of intravenous to oral medications. We are studying the impact of this timely transition on various aspects of care including time to administration of medication, medication errors, reduction in drug costs, and length of stay.

Detailed Components of Neuro-ICU Care Bundles

Neuro
1) Glasgow coma scale assessed & changes reported
2) Intracranial pressure monitoring & treatment when indicated
3) Seizures identified and treated
4) Blood pressure range identified
5) Glycemic control protocol initiated
6) Normothermia control protocol initiated

Ventilator
1) Head of the bed at 30-45 degrees
2) Daily sedation vacations
3) Daily assessment of the patient's readiness to extubate or wean from the ventilator
4) Peptic ulcer prophylaxis
5) Deep vein thrombosis prophylaxis

ICU Bundles

Glycemic Control
1) Glycemic control ordered
2) Glycemic control protocol followed
3) Percentage time 75% values in ideal range within 24 hours
4) Avoidance of hypoglycemia

Sepsis
1) Serum lactate level
2) Blood cultures x2 prior to starting antibiotics
3) Broad spectrum antibiotics
4) Fluid resuscitation - min. 20 ml/kg fluid bolus &/or vasopressors

Central Line
1) Hand hygiene
2) Maximum barrier precautions upon insertion
3) Chlorhexidine skin antisepsis
4) Optimal catheter site selection
5) Daily review of line necessity and prompt removal of unnecessary lines

Care Bundle performance in the Neuro-ICU - 2012

Care Bundles	Annual Average (%)	Range (%)
Ventilator	100	100-100
Sepsis	100	100-100
Central Line	86.46	33.89-100
Glycemic Control	90.04	78.05-100
Neuro	99.54	94.44-100

STROKE INITIATIVES

The UCLA Stroke Center has been accredited by the Joint Commission as a **Primary Stroke Center** since 2005. In 2012, UCLA was among the country's first hospitals to be recognized and accredited by the Joint Commission as a Comprehensive Stroke Center.

As part of our ongoing efforts to provide the best care to both our ischemic and hemorrhagic stroke patients, the **UCLA Comprehensive Stroke Center** is actively involved in quality improvement initiatives.

Comprehensive stroke centers collect data regarding standardized performance measures, recognized to drive the next level of stroke care.

*The UCLA Comprehensive Stroke Center **consistently scores better than** other hospitals with approved stroke centers on key indicators of quality performance in stroke care and treatment.*

Summary of Stroke Performance Measures*

Stroke Performance Measures
Venous Thromboembolism (VTE) Prophylaxis
Discharged on Antithrombotic Therapy
Anticoagulation Therapy for Atrial Fibrillation/Flutter
Thrombolytic Therapy--Arrive by 2, treat by 3
Antithrombotic Therapy By End of Hospital Day 2
Discharged on Statin Medication
Smoking Cessation/Advice/Counseling

*Get with the Guidelines Stroke Achievement Measures http://www.heart.org/HEARTORG/
HealthcareResearch/Healthcare-Research_UCM_001093_SubHomePage.jsp)

Percent of Patients Satisfying ALL Stroke Performance Measures*
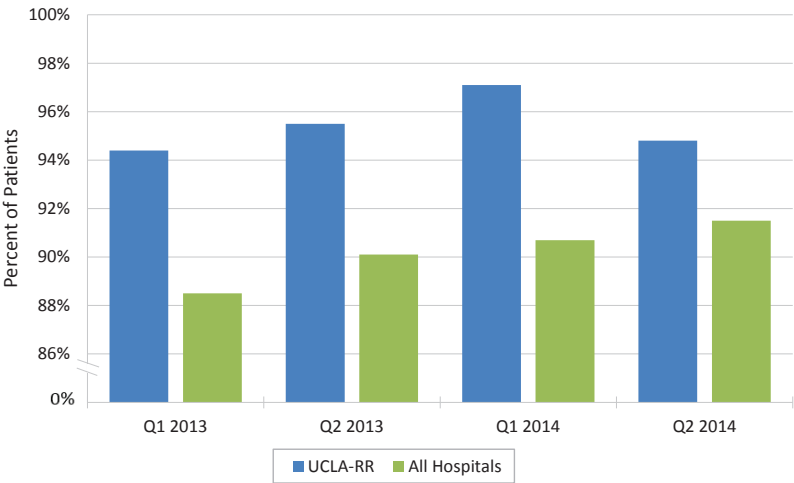
*Get with the Guidelines Stroke Achievement Measures http://www.heart.org/HEARTORG/
HealthcareResearch/Healthcare-Research_UCM_001093_SubHomePage.jsp)

INNOVATIONS TO IMPROVE VALUE OF DELIVERED CARE

▷ First mechanical device therapy for acute ischemic stroke: MERCI Retriever – invented at UCLA.

▷ First clinical cellphone PACS system for remote review of CT and MRI scans in acute stroke developed at UCLA.

▷ First Neuro ICU-adjacent comprehensive stroke imaging center with CT, PET, 3T, and MRI.

▷ First cerebral blood flow (CBF) laboratory to use bedside xenon CBF studies and transcranial doppler for stroke critical care and research.

▷ First US multicenter trial of endoscopic treatment for acute intracerebral hemorrhage.

CODE BRAIN INITIATIVE

As part of Neurosurgery's commitment to quality, every mortality case is reviewed by a peer committee. Review revealed that **intracerebral hemorrhage (ICH)** accounts for approximately one third of all mortalities in Neurosurgery.

In order to shorten the time interval between patient arrival, initial medical management, imaging, and subsequent management, the Department of Neurosurgery has launched a multidisciplinary initiative called **Code Brain** to ensure that all of our patients with neurological emergencies are recognized and treated promptly according to best practices.

Code Brain is a multidisciplinary care redesign initiative
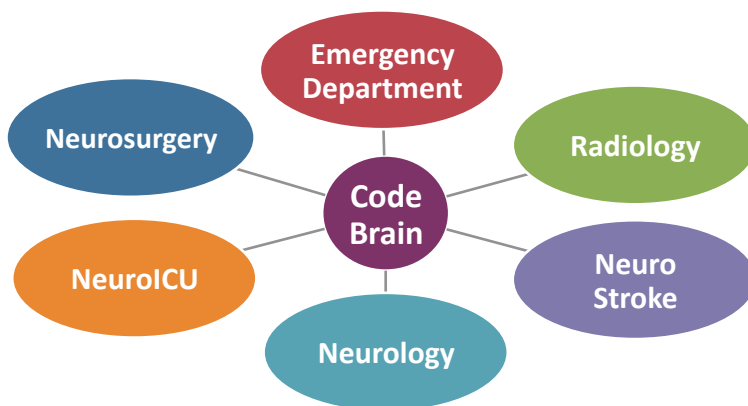
*This **multidisciplinary initiative** has **redesigned care** to rapidly identify patients with potential life threatening neurologic emergencies, to **expedite** their medical management and coordinate initial brain imaging.*

Code Brain Pathway
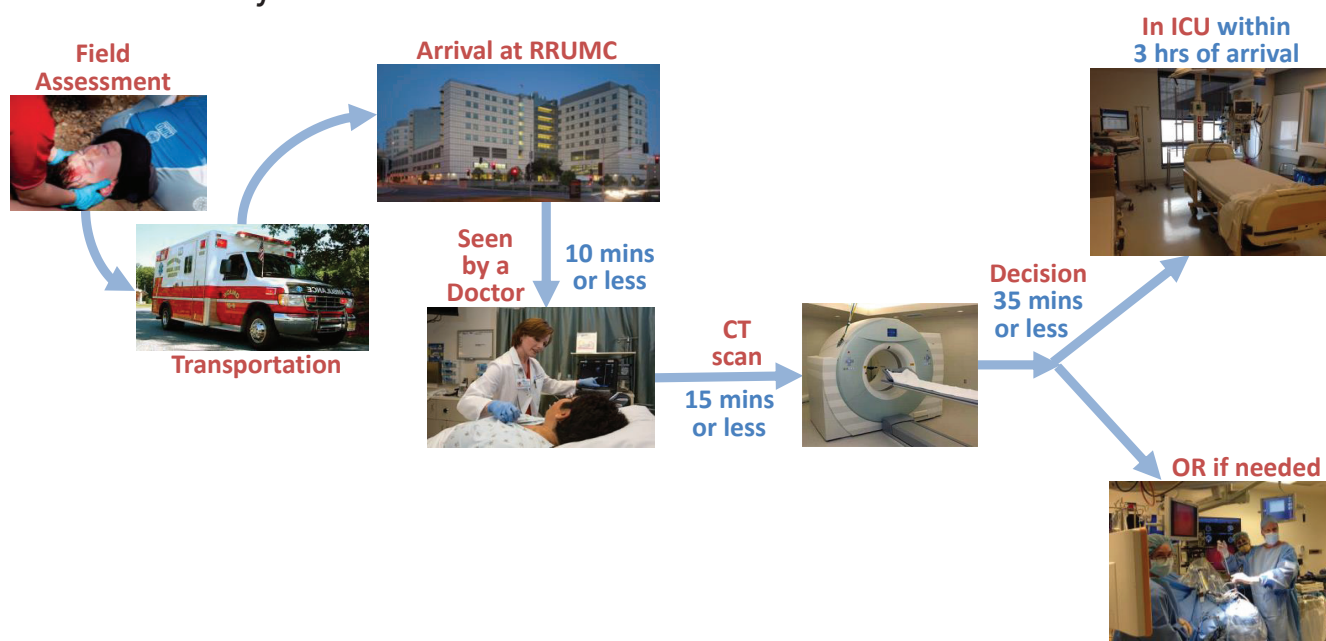
NURSING LED INITIATIVES

*Under the leadership of nursing unit directors and clinical nurse specialists, our nursing teams have developed and implemented numerous quality initiatives to improve patient care. Additionally, the Neuro-ICU and neuroscience ward are often selected to **pilot new ideas,** testifying to the **avant-garde spirit of their leaders** and **dynamic teams.***
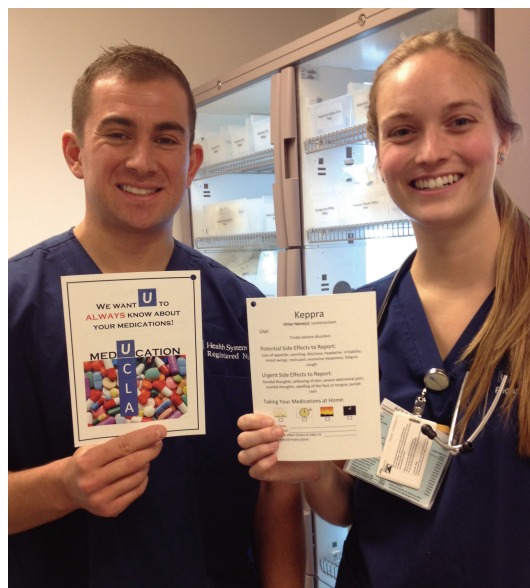
Nursing led quality initiatives in the Neuro-ICU:

Screening, Diagnosis and Management of ICU Delirium: Assessing if the use of the Confusion Assessment Method in the Neuro-ICU patient population will improve the nurses' knowledge of delirium detection, nurses' confidence in assessing and managing their patient's delirium, and the consistency in performing and documenting the CAM-ICU, compared to the current process of not using an objective and valid screening tool.

Interdisciplinary Goal Sheets: Interdisciplinary goal sheets are used and continually refined in order to capture nurse-sensitive categories that need to be discussed on daily rounds.

Optimizing Shift Hand-off: A change was implemented to include family presence during change of shift hand-off.

Medication Cards: The use of medication cards to teach families and patients about their medications is being piloted in the Neuro-ICU.

Innovative Nursing Team Model: The objectives of this change in our nursing care delivery model are to provide continuity of care and increased patient satisfaction, increased nursing teamwork, communication, and accountability, and improved patient clinical outcomes.

Implementation of the Medication Cards in Neuro-ICU

Nursing led initiatives on the neuroscience ward:

Discharge Notification Process: The charge nurse places a "car" label sticker on the nurse's assignment sheet at the beginning of his/her shift. This allows the bedside nurse to begin the discharge process to ensure the patient is discharged by noon.

Fall Prevention Programs: The charge nurse places high-risk fall patients strategically in the unit where there is high visibility. Ten high-risk fall patients are assigned to nurses every shift. The nurse proactively toilets this patient every 3-4 hours to prevent falls and encourage patients to use the restroom with assistance.

CLABSI Program: Our unit CLASBI champion, who is also a member of the Unit Practice Council, comes in every Sunday night to change the dressings and caps on patients who have central lines.

CAUTI Project: The staff is receiving standardized education regarding five key care points to prevent CAUTIs.

Increase Staff Certification: We have increased staff professional neuro-certification (SCRN and CNRN) through dedicated training sessions and providing incentives for them to receive their certification and advance their knowledge of the Neuroscience population.

DASHBOARDS

In 2007, the Department of Neurosurgery built a **_Quality Dashboard_** to help manage process measures and outcomes and ultimately to enhance clinical performance and patient care.

The Quality Dashboard evolved from containing 7 metrics manually abstracted from multiple data sources **_to now containing 190+ metrics with semi-automated data upload features._**

The content of the Quality Dashboard is reviewed monthly by the **Quality and Care Coordination Committee**.

Monthly review of the data stimulates discussion from the multidisciplinary team of providers, enabling identification of areas that need improvement, close monitoring following the implementation of process improvements, and celebration of successes.

The UCLA Department of Neurosurgery is at the forefront of data-driven value-based initiatives, leading the future of the digital and interactive dashboards, their utilization, and integration in daily care.

Sample of Data Components Included in the Quality Dashboard

Overview	UHC	Quality & Safety	Patient satisfaction	Operations
Number of discharges	Comparator hospital data	Infection rates	HCAHPS - percent positive	Escort response times
Average length of stay	Mortality O/E	Handwashing	HCAHPS - percentile rank	% PT orders done within 24 hrs
Discharge by noon	All 30-day readmissions	Stroke Center data	HCAHPS data - overall	Housekeeping times
Transfer center statistics	Risk adjusted length of stay	ICU Bundle data	HCAHPS data - physicians	Stat sodium times
	Sepsis related mortality	Glucose control metrics	HCAHPS data - nursing	Routine sodium times

Sample of Data Components Included in the NERVS Care Redesign Dashboard

Metric Description	Count
Percent of NERVS Patients with Pain Consult	2.4%
Percent of NERVS Patients with no IV pain meds after 8am POD1	61.9%
Percent of NERVS Patients with Severe pain (PS >= 8) between end of surgery (including PACU) and discharge or POD5	38.5%
Percent of NERVS Patients with Any Ambulation POD0	1.6%
Percent of NERVS Patients that receive PT that receive it on POD1	40.7%
Percent of NERVS Patients with PT orders on or before POD1 where order was placed before 9 AM POD1	52.3%

INFORMATICS AND QUALITY IMPROVEMENT

Information technology is the corner stone to the optimization of care delivery effectiveness

The UCLA Department of Neurosurgery strives to innovate in the field of healthcare informatics through several endeavors, including the design of hardware and software for mobile technologies.

iPad Rounding Project

• Use of the iPad and iPhone technology in the domains of healthcare delivery, rounding and hand-offs, imaging viewing, resident education, and IT research.

• Creation of a digital multimedia library, a central database of photographs, videos and literature pertaining to neurosurgery.

• Involvement of Neurosurgery residents in the first resident informaticist team at UCLA. Ongoing research involves the use of mobile technology to improve rounding, communication and delivery of care on the neurosurgery service.
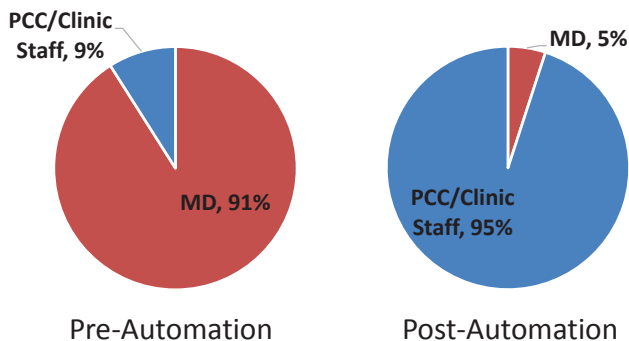
*The Department of Neurosurgery at UCLA has been **at the forefront** of applying mobile computing in the practice of modern health care.*

Streamlining the Receipt and Upload of Diagnostic Images in a Clinic Setting

The UCLA Department of Neurosurgery conducted a Lean project in an effort to improve the receipt and upload of outside diagnostic images in a neurosurgical ambulatory clinic.
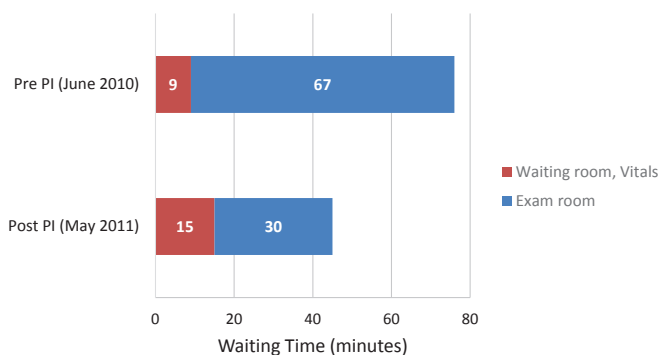
By decreasing preparation time, the combined technical and process flow improvements allowed clinicians to focus more on clinical decision, hence increasing the time spent consulting informatively with patients.

Time Spent on CD Image Handling by MD

PCC/Clinic Staff, 9%
MD, 91%
Pre-Automation

MD, 5%
PCC/Clinic Staff, 95%
Post-Automation

J Am Coll Radiol. 2012 Jul;9(7):512-5.

Patient Wait Times- Pre and Post Process Improvements

Pre PI (June 2010): 9 | 67
Post PI (May 2011): 15 | 30

Legend:
■ Waiting room, Vitals
■ Exam room

Waiting Time (minutes)
0 20 40 60 80

Publications:

1. Martin, N, Afsar-Manesh, N. *Healthcare reform from the inside: A neurosurgical clinical quality program*. Surg Neurol Int. 2012;3:128. doi: 10.4103/2152-7806.102943. Epub 2012 Oct 27.

2. McLaughlin N, Winograd D, Dash H, Van de Wiele B, Martin NA. *The UCLA surgical time out process: evolution, challenges, and future perspective*. Neurosurgical Focus. 2012 Nov;33(5):E5.

3. Garrett M, Pouratian N. *Repeat head CT scan in blunt trauma patients*. J Am Coll Surg. 2012 Dec;215(6):897; author reply 898. doi: 10.1016/j.jamcollsurg.2012.08.020. PubMed PMID: 23164143.

4. McLaughlin N, Winograd D, Chung HR, Van de Wiele B, Martin NA. *Impact of the time-out process in a tertiary neurosurgical department on safety attitude*. World Neurosurg. 2013 Jul 25.

5. Garrett MC, Bilgin-Freiert A, Bartels C, Everson R, Afsarmanesh N, Pouratian N. *An evidence-based approach to the efficient use of computed tomography imaging in the neurosurgical patient*. Neurosurgery. 2013 Aug;73(2):209-15; discussion 215-6. doi:

6. McLaughlin N, Buxey F, Chaw K, Martin NA. *Value-Based Neurosurgery: The example of microvascular decompression surgery*. J Neurosurg. 2014 Feb;120(2):462-72

7. McLaughlin N, Afsar-manesh N, Ragland V, Buxey F, Martin NA. *Tracking and sustaining improvement initiatives: Leveraging quality dashboards to lead change in a neurosurgical department*. Neurosurgery. 2014 Mar;74(3):235-43.

8. McLaughlin N, Upadhyaya P, Buxey F, Martin NA. *Value-based neurosurgery: measuring and reducing the cost of microvascular decompression surgery*. J Neurosurg. 2014 Jul 11:1-9. [Epub ahead of print]

9. McLaughlin N, Rodstein J, Burke MA, Martin NA. *Demystifying Process mapping: A key step in neurosurgical quality improvement initiatives*. – Neurosurgery. 2014 Mar 27

10. McLaughlin N, Garrett MC, Emami L, Foss SL, Klohn JL, Martin NA. *Integrating risk management data in quality improvement initiatives within an academic Neurosurgery department*. – JNS – Accepted with revision

11. Buchanan C, Hernandez E, Anderson J, Dye J, Leung M, Buxey F, Bergsneider M, Afsar-Manesh N, Pouratian N, Martin N. *Analysis of 30-day readmissions in neurosurgical patients: surgical complication avoidance is key to quality improvement*. Accepted JNS Jan 2014.

12. McLaughlin N, Martin NA, Upadhyaya P, Buxey F, Bari A, Wang W, Heaney A, Bergsneider M. *Analysis of a Service Line Cost Containment and Reduction Initiative: The example of the UCLA Pituitary Tumor Program* – Accepted in Neurosurgical Focus – for publication in Nov 2014

13. McLaughlin N, Burke MA, Setlur NP, Niedzwiecki DR, Kaplan AL, Wertheimer SR, Saigal C, Mahajan, A, Martin NA, Kaplan R. *Time-driven activity based costing: A driver for provider engagement in cost containment initiatives and value-based redesign* – Accepted in Neurosurgical focus – for publication in

14. McLaughlin N, Burke MA, Setlur, Niedzwiecki Douglas, Wertheimer SR, Kaplan R, Martin NA. *Use of Time-driven activity based costing to assess true cost in a neurosurgical episode of care* – Accepted in Neurosurgery with revision - March 2014

15. McLaughlin N, Jin P, Martin NA. *Assessing early unplanned reoperations in neurosurgery: Opportunities for quality improvement* –Accepted in JNS with revision - March 2014

16. Garrett, M, Bilgin-Freiert, A, Chen, J, Everson, R, Iqbal, O, Leu, K, Afsarmanesh, N, Pouratian, N. *Managing Sodium Values in the Neurosurgical Patient: Incidence of hypo-natremia and its associated complications* – Submitted to JNS 2014

17. McLaughlin N, Khalessi AA, Martin NA. H*ealth care economics in Neurosurgery: There is no turning back*. Accepted Neurosurgical Focus – for publication in Nov 2014

18. McLaughlin N, Ong, M, Tabbush V, Hagigi F, Martin, NA. *Contemporary Healthcare Economics: An overview*. Accepted in Neurosurgical Focus – for publication in Nov 2014

Presentations:

Poster: 11 total - including 81th AANS (2013); UCLA Short Term Training Program (2013); 82nd AANS (2014); 49th CFNS (2014); CNS (2013)

Oral: 14 total – including 81th AANS (2013); CNS (2013); 25th Annual National Forum on Quality Improvement in Health Care – IHI - (2013); UHC (2013); CANS (2013; 2014), NASBS (2014); CFNS (2014); CNS (2014); AANS (2014)

Grants:

1. University of California Center for Health Quality and Innovation Quality Enterprise Risk Management (CHQIQERM); Delivering Value-Based Neurosurgery: The Neurosurgery Enhanced Recovery, Value, and Safety (NERVS) protocol; $250,000 over three years; 08/2013 - present

2. University of University of California Structured Redesign to Achieve Value-Based Care; $50,000/year for 3 years; 2014 – present

3. University of California Center for Health Quality and Innovation Quality Enterprise Management (CHQIQERM); UC Care Check: A standardized multidisciplinary approach to improve neurosurgical patient outcomes and care experiences; Five-site collaborative; $1.25 million over three years; 08/3013 – present

ACKNOWLEDGEMENTS

UCLA NEUROSURGERY

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