Quality and Productivity Commission

33rd Annual Productivity and Quality Awards Program

"Empowering Innovative Solutions"

2019 APPLICATION

Title of Project (Limited to 50 characters, including spaces, using Arial 12 point font):

NAME OF PROJECT: Rancho Los Amigos Cranial Reconstruction Program

DATE OF IMPLEMENTATION/ADOPTION: October 2007

(Must have been **fully** implemented **for a minimum of** at least one year - on or before July 1, 2018)

PROJECT STATUS: X Ongoing _____ One-time only

HAS YOUR DEPARTMENT PREVIOUSLY SUBMITTED THIS PROJECT? _____ Yes X No

EXECUTIVE SUMMARY: Describe the project in 15 lines or less using Arial 12 point font. State clearly and concisely what difference the project has made.

Challenge: The early 2000's marked a significant paradigm shift in the management of severe traumatic brain injuries (TBI) to include the liberal use of decompressive hemicraniectomies, including at LAC-USC and HUCLA. These skull defects require reconstruction in cranioplasty procedures associated with very high complication rate as reported nationally and internationally, including at the DHS hospitals. **Solution:** In 2007, the Rancho Los Amigos (RLA) Cranial Reconstruction Program was initiated to address this growing and unmet need and to provide a critical service based where the patients receive both rehabilitative and ongoing brain injury-related care. **Benefits:** The program is now one of the most productive (highest volume) and by far the highest quality (lowest complications) in the world, meeting the needs of the DHS. The DHS has avoided a large number of mortalities and permanent disabilities, as well as millions of dollars in saved/avoided costs. This effort has also led to the establishment of a neurosurgery program at RLA to support other DHS needs, i.e. the RLA-DHS Comprehensive Epilepsy Center, the first and only National Association of Epilepsy Centers Level IV (highest) in a public safety-net hospital and winner of a PQA in 2011.

BENEFITS TO THE COUNTY

(1) ACTUAL/ESTIMATED **ANNUAL** COST AVOIDANCE	(2) ACTUAL/ESTIMATED **ANNUAL** COST SAVINGS	(3) ACTUAL/ESTIMATED **ANNUAL** REVENUE	(1) + (2) + (3) = TOTAL **ANNUAL** ACTUAL/ESTIMATED BENEFIT	SERVICE ENHANCEMENT PROJECT
$ 1.3 MILLION (ESTIMATED)	**$540K (ESTIMATED)**	**$**	**$ 1.84 MILLION (ESTIMATED)**	☐

ANNUAL = 12 MONTHS ONLY

SUBMITTING DEPARTMENT NAME AND COMPLETE ADDRESS
Department of Health Services – Rancho Los Amigos National Rehabilitation Center
313 N. Figueroa St. Rm. 912
Los Angeles, CA 90012

TELEPHONE NUMBER

PROGRAM MANAGER'S NAME
Charles Liu, MD, PhD
Kevin Rolfe, MD

TELEPHONE NUMBER

EMAIL
Cliu6@dhs.lacounty.gov
krolfe@dhs.lacounty.gov

PRODUCTIVITY MANAGER'S NAME AND SIGNATURE
(PLEASE CALL (213) 893-0322 IF YOU DO NOT KNOW YOUR PRODUCTIVITY MANAGER'S NAME)
Connie Salgado-Sanchez
C. Salgado-Sanchez

DATE
6/27/19

TELEPHONE NUMBER
213-288-8483

EMAIL
cosanchez@dhs.lacounty.gov

DEPARTMENT HEAD'S NAME AND SIGNATURE
Christina R. Ghaly, M.D.

DATE
6/27/19

TELEPHONE NUMBER
213-288-8050

Title of Project (Limited to 50 characters, including spaces, using Arial 12 point font):
NAME OF PROJECT: Rancho Los Amigos Cranial Reconstruction Program

1st FACT SHEET – LIMITED UP TO 3 PAGES ONLY: Describe the **challenge(s), solution(s), and benefit(s)** of the project **to the County**. What quality and/or productivity-related outcome(s) has the project achieved? Provide measures of success **and specify assessment time frame**. Use Arial 12 point font.

Challenge: Traumatic brain injury (TBI) is a major cause of death around the world, in the USA, and locally in LA County. Most recent CDC statistics show that TBI-related emergency department visits, hospitalizations, and deaths increased by over 50% in the past decade. In the United States alone, an average of 155 people died each day from injuries that include a TBI. Those that survive with TBI face long term and often permanent consequences that lead to lower productivity, poor quality of life, increased dependence on public services and subsidies, and homelessness. Anchored by LAC+USC Medical Center and Harbor-UCLA Medical Center (HUCLA), the trauma centers of the DHS provide a singular service for all residents of LA County. The early 2000's marked a significant paradigm shift in the management of severe TBI to include the liberal use of decompressive hemicraniectomies, whereby a large portion of the patient's skull is removed to relieve uncontrollable intracranial pressure. While hemicraniectomies have led to increased survival of patients with severe TBI, the subsequent need for reconstruction of the skull defects emerged as a real and significant burden to the DHS. Most of these severe TBI patients receive their rehabilitation at Rancho Los Amigos National Rehabilitation Center (RLA). Furthermore, most of these patients have ongoing social and medical needs that are centralized at RLA. However, RLA did not have the services or resources to provide the cranial reconstruction surgeries. This led to an inefficient workflow whereby patients would be transferred out of the venue where most of their medical and other services were being provided to LAC+USC or HUCLA, resulting in long care delays, poor cost utilization, and discontinuity of care, particularly in the vulnerable DHS safety-net population. These workflow inefficiencies compounded the impact of cranioplasty surgical complications, which are well-documented as being amongst the highest in all surgeries, leading to avoidable costs, death, disability and suffering.

Solution: In 2007, the RLA Cranial Reconstruction Program was established to address a growing and unmet need for cranioplasty surgeries. Working with the administrative and medical leadership at RLA, a unique workflow and clinical team was established that took maximum advantage of established and robust surgical services, existing personnel, and a functioning ICU, all requiring minimal capital investment by the DHS. We assembled a basic set of cranial neurosurgical instruments and worked with nursing leadership to train Operating Room (OR) and Intensive Care Unit (ICU) staff. The clinical team of neurosurgeons, orthopedic surgeons, and physician extenders took immediate ownership and pride in the new program, along with nursing and support personnel. The team surveyed all available implants to identify the most cost-effective option. The team recognized the differential resources of a rehab hospital. For example, Rancho has neither CT

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technicians nor OR/anesthesia teams on-site after hours, so most importantly, a surgical approach and workflow was developed specifically to reduce complications. A partnership was also developed with LAC+USC to ensure rapid transfer to higher level of care for true emergencies. From its inception, over 200 DHS patients have been managed through the program.

Benefits: Since its inception in October 2007, the benefits can be considered for:

Patients: The complication profile for cranioplasty of the RLA-DHS program is *by far the lowest of any published series*. A recent meta-analysis of 8000+ patients in a national database revealed a 36% complication rate. A survey of recently published results from "top centers" revealed an average complication rates of 27%, reoperation rates of 16%, and mortality rates of 2.7%. By comparison, our program had 12% complication rate (mostly minor; 55% reduction) and only 1.6% reoperation rate (90% reduction). There were no emergent transfers to LAC+USC or returns to surgery, only 1 prolonged ICU stay, no blood transfusions, and no patient deaths. The literature clearly shows that uncomplicated cranioplasty leads to better long-term outcomes.

DHS: The program has become one of the *most productive (highest volume) and by far the highest quality (lowest complication rate)* of any single center worldwide, public or private, with very significant cost savings/avoidance. The deeply-discounted off-the-shelf titanium mesh implants from KLS Martin is about $5K cheaper per patient compared to typical custom options used in most centers ($90K annual; $1M from inception). Also, the hospitalization length (4.2 days) and operative times (<3hrs) are far less (60%) than any literature reports; conservatively, this represents $25K per patient ($450K annual; $5M from inception). The program's dramatically lower complication rates result in even greater cost-avoidance. Each reoperation for infection requires surgery to remove the infected cranioplasty, 7 additional days of hospitalization, infectious disease care and home-health for 6 weeks with intravenous antibiotics, another surgery and hospitalization for re-implantation. Each avoided reoperation represents $500K cost, conservatively. The DHS has thus avoided $1.3M cost annually ($14M from inception). It is difficult to estimate the cost-savings from the workflow improvements, potential litigation or cost of human life. The program has also been featured favorably in the national print and broadcast media, such as the *LA Times* and *Aqui y Ahora*. Finally, the program has led to the establishment of the neurosurgery program at RLA to support other DHS programs, such as the RLA-DHS Comprehensive Epilepsy Center, the first and only NAEC Level IV (highest level) center in a public safety-net hospital. This program received a PQA in 2011.

Contribution to knowledge: The program is being featured in a publication entitled: "Complication Reduction in Cranioplasty in 188 Patients- the Rancho Los Amigos Approach." This paper will likely be a very important contribution to the field. A large number of federally-funded research projects based on hemicraniectomy patients are on-going at RLA to study the mechanisms of permanent neurological deficits in TBI patients, which will lead to transformative solutions to restore lost function.

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Linkage to the County Strategic Plan – 1 page only. Which County Strategic Plan goal(s) does this project address? Explain how. Use Arial 12 point font.

The Program aligns with the following goals of the County Strategic Plan:

Goal I. Make Investments that Transform Lives

Strategy I.1 – Increase Our Focus on Prevention Initiatives – The program has been developed using the best evidence-based practices for reducing complications to maximize patient outcomes. This had led to a dramatic reduction in surgical complications that are clearly associated with improved long-term outcomes and thus decreased continued reliance on the social safety net of the County.

Strategy I.2 – Enhance Our Delivery of Comprehensive Interventions – One key feature of the program is that it integrates cranioplasty surgeries within the overall rehabilitation and long-term medical care of TBI patients on one campus at RLA. With two busy Level 1 trauma centers and the only safety net rehabilitation center, the DHS serves the most vulnerable of TBI patients. The Program enhances RLA's ability to deliver comprehensive interventions to challenging patients with complex needs. High quality and cost-effective neurosurgery in a rehab hospital is unique to RLA/DHS.

Goal II. Foster Vibrant and Resilient Communities

Strategy II.1 – Drive Economic and Workforce Development in the County – Successful integration into society and back-to-work represent among the hardest goals for TBI patients. The substantial reduction of complications after cranioplasty surgeries and access to the re-integration programs of RLA give the TBI-cranioplasty population the best possible chance at a productive life to contribute to the tax base.

Strategy II.2 – Support the Wellness of our Communities – Improved outcomes after TBI are clearly associated with increased quality of life and increased social cohesion of affected families. In addition, the integration of cranioplasty services at RLA allows TBI patients access to the Don Knabe Wellness Center with resources for better physical fitness, mental health, and well-being.

Goal III. Realize Tomorrow's Government Today

Strategy III.3 – Pursue Operational Effectiveness, Fiscal Responsibility, and Accountability – The Program was created by leveraging existing resources and minimal initial capital investment. In addition, the significant estimated cost savings and cost avoidance are consistent with the goal of fiscal responsibility. Ongoing self-assessment and data tracking leads to increased accountability by the entire team.

Strategy III.4 – Engage and Share Information with our Customers, Communities and Partners – The "Rancho Approach" will be shared with cranioplasty centers around the world in a peer-reviewed publication. In addition, the Program has been featured favorably in national print and broadcast media, and members of the team have become resources for media about national stories involving cranioplasty and TBI. The program has fostered many federally-funded TBI research efforts at RLA at no cost to DHS. Together, this contributes to improving the DHS's image and overall impression with the County's customers, communities, and private and public partners.

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COST AVOIDANCE, COST SAVINGS, AND REVENUE GENERATED (ESTIMATED BENEFITS TO THE COUNTY): If you are claiming cost benefits, include a calculation on this page. Please indicate whether these benefits apply in total or on a per unit basis, e.g., per capita, per transaction, per case, etc. You must include an explanation of the County cost savings, cost avoidance or new revenue that matches the numbers in the box. Remember to keep your supporting documentation. Use Arial 12 point font

Cost Avoidance: Costs that are eliminated or not incurred as a result of program outcomes. Please indicate whether these are costs to the County or to other entities.

Cost Savings: A reduction or lessening of expenditures as a result of program outcomes. Please indicate whether these were expenditures by the County or by other entities.

Revenue: Increases in existing revenue streams or new revenue sources to the County as a result of program outcomes.

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Estimated Cost Avoidance (Based on Estimated Fair Market Value):

Average re-operation rate (8 recent published series from "top centers") – 16%

Re-operation rate for RLA-Cranial Reconstruction Program – 1.6% (90% reduction)

Reoperation requires surgery for explantation of implant, 7 days hospitalization, infectious disease care and home health for 6 weeks minimum of intravenous antibiotics, followed by second surgery and hospitalization for second cranioplasty. Estimated market-value is $500K per patient.

Average Estimated Cost Avoidance Total = 200 x (16%-1.6%) x $500K = $14.4M total

Average Estimated Cost Avoidance Annual = $14.4 / 11 years = $1.3M

Average Cost Avoidance Average Cost Avoidance Work-flow Improvement, Litigation Avoided, Mortalities Prevented = unknown

Estimated Cost Savings (Based on Estimated Fair Market Value:

Average Estimated Cost Savings Implants = $5K per patient

Reduction of complications from "top centers" of 27% to 12% (55% reduction) and decreased operative time and hospitalization by 40%; estimated fair market value of $25K/patient

Average Estimated Cost Savings Implants Annual = $5K x 18 = $90

Average Estimated Cost Savings Reduced OR time/hospitalization/complications Annual = 18 x $25K = $450K

Average Estimated Total Cost Savings Annual = $540K

Average Estimate Total Cost Savings from Program Inception = $5.9 Million

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FOR COLLABORATING DEPARTMENTS ONLY

(For single department submissions, do not include this page)

DEPARTMENT NO. 2 NAME AND COMPLETE ADDRESS	
PRODUCTIVITY MANAGER'S NAME AND SIGNATURE **EMAIL:** _____	**DEPARTMENT HEAD'S NAME AND SIGNATURE** **EMAIL:** _____
DEPARTMENT NO. 3 NAME AND COMPLETE ADDRESS	
PRODUCTIVITY MANAGER'S NAME AND SIGNATURE **EMAIL:** _____	**DEPARTMENT HEAD'S NAME AND SIGNATURE** **EMAIL:** _____
DEPARTMENT NO. 4 NAME AND COMPLETE ADDRESS	
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DEPARTMENT NO. 5 NAME AND COMPLETE ADDRESS	
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DEPARTMENT NO. 6 NAME AND COMPLETE ADDRESS	
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DEPARTMENT NO. 7 NAME AND COMPLETE ADDRESS	
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