
State of the Trauma Center at John Muir Health

2019

John Muir Health, Walnut Creek Medical Center, has served as Contra Costa County's only designated trauma center since 1992. In May of 2010, the Contra Costa County Board of Supervisors voted to continue that exclusive designation for ten more years through May of 2021, with automatic renewal for an additional ten years through May of 2031, upon certain findings by the Board of Supervisors prior to May 21, 2019. The following information has been prepared in anticipation of action by the Board of Supervisors.

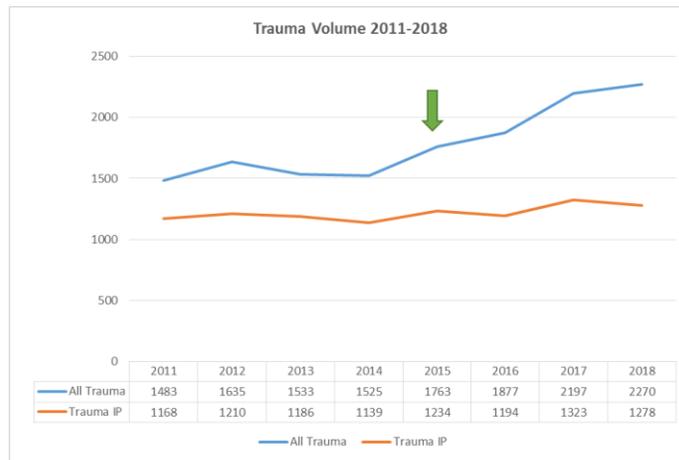
Requirement 1: That Hospital has continued to perform those services described in the agreement to the substantial satisfaction of the County.

In addition to achieving and maintaining Level II verification by the American College of Surgeons Committee on Trauma since 2007, there have been many changes made at the Trauma Center both in anticipation of potential volume growth and to continue to improve the overall quality of care provided, including but not limited to the following:

Facilities and Hospital Services

- Continued service as Contra Costa County's only Base Station, including the provision of medical direction and certified Mobile Intensive Care Nurses (MICNs), as well as a dedicated Base Station Coordinator;
- Relocation of the helipad to the roof of the Long Tower, placing it directly above the trauma bays in the emergency department and the addition of two high speed trauma elevators to expedite movement of patients from the helipad to the trauma room;
- Trauma bay capacity doubled from two to four with all four bays equipped with new state-of-the-art technology including new Focused Abdominal Sonography in Trauma (FAST) machines, Belmont rapid fluid warming and infuser devices, ROTEM (thromboelastogram/TEG) and Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA);
- Implementation of a dedicated trauma ED nurse role;
- Dedicated state-of-the-art trauma and neurosciences critical care units with all private rooms;
- Dedicated and recently renovated trauma medical/surgical unit with all staff including nursing, social services, rehabilitation (PT, OT, speech) and case management specifically trained in the care of the severely injured trauma patient;
- Establishment of a cohesive trauma service, which includes the addition of four critical care surgeons; additionally, the trauma service is supported 24/7/365 by a team of trauma Advanced Practice Providers.

Since 2011, trauma patient volume overall has grown by 53%, however trauma inpatient volume has remained relatively steady throughout that same time period fluctuating up and down with an average of approximately 1,200 inpatients:¹



To ensure the optimal use of resources in serving those patients most in need while still accommodating increased demand for the trauma center, changes to the internal trauma triage criteria were developed and implemented. Changes included the roll-out of a new 3-tiered activation criteria in March of 2017, followed by a revision of the activation criteria in May of 2018.

The tables below illustrate those revisions and their impact on internal over-and under-triage:

Trauma PI Indicators	2015	2016	2017	2018
Alpha Activations	90%	80%	40%	24%
Beta Activations	10%	20%	27%	32%
Charlie Activations			33%	44%

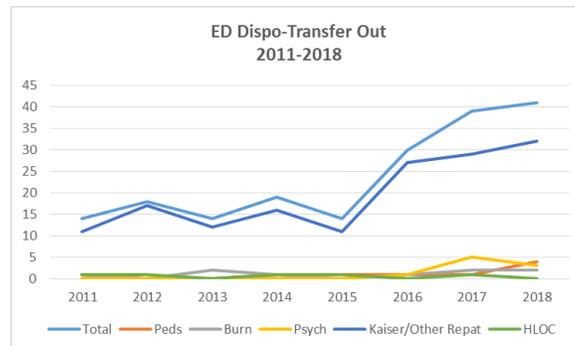
Trauma Triage	2015	2016	2017	2018
Overtriage Rate (Cribari Matrix Method ²)	77%	86%	83%	80%
Undertriage Rate (Cribari Matrix Method)	19%	10%	9%	7%
Overtriage Rate (Standardized Triage Assessment Tool ³)				65%
Undertriage Rate (Standardized Triage Assessment Tool)				4%

With the implementation of the 3-tiered activation system, the trauma center can more appropriately direct and “right-size” the trauma team resources needed for the acuity of the patient, thereby decreasing over-utilization of resources (over-triage) while simultaneously ensuring that the highest acuity patients’ needs do not go under-resourced (under-triage).

¹ Green arrow indicates initiation of changes to EMS trauma triage criteria.

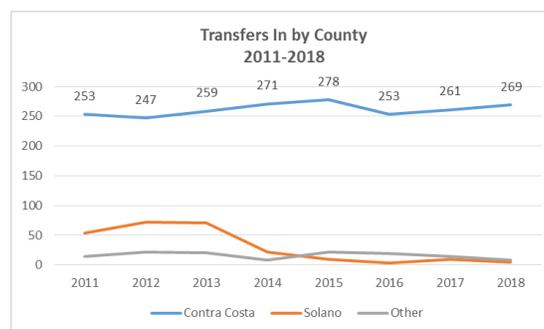
² Roden-Foreman, et al. (2018). *J Trauma Acute Care Surg*, 84: 718-726.

Other indicators that are followed to ensure that the trauma center continues to provide the resources needed to meet the needs of Contra Costa trauma patients are Transfers Out and Transfers In.



The above graph demonstrates that while overall trauma patient volume did increase, the trauma center continued to meet the specialty care trauma needs of Contra Costa patients with no corresponding increase in transfers out for Higher Level of Care (HLOC, in green). However, there was an increase in health system repatriations from the ED for patients who were directed to the trauma center with no findings of acute injury, but still in need of inpatient admission for a non-injury cause.

Additionally, there was no corresponding decrease in the transfer in of Contra Costa trauma patients and the trauma center continued to be able to accept appropriate trauma patients in transfer from other acute care hospitals in Contra Costa.



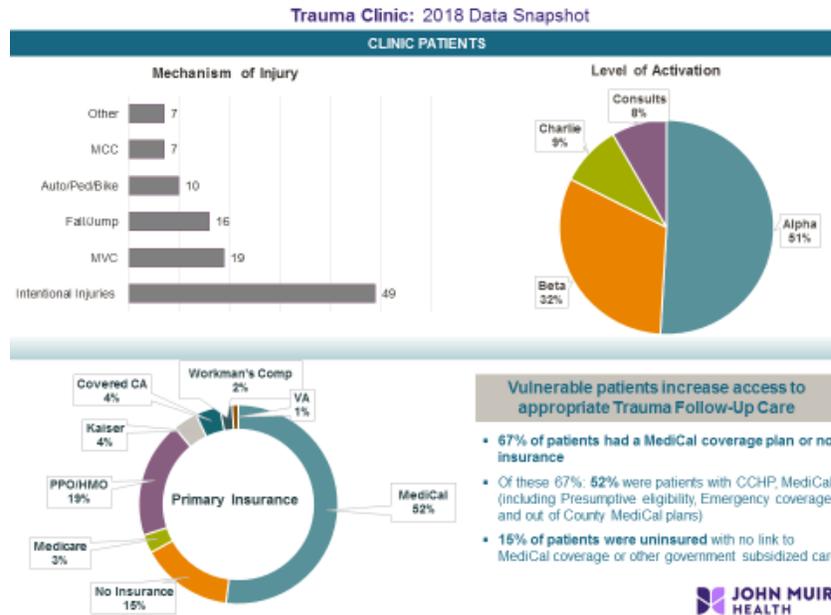
Trauma Diversion

The trauma center is contractually permitted to be on trauma bypass/divert up to 5% of the time. Historically, however, the diversion has been well below that and has been trending down over the last ten years. In 2017 the trauma center revised the internal diversion criteria and approval process. As a result, there has been no trauma diversion since that change was made.

Post-acute Care

In 2015 the trauma center implemented a post-discharge Trauma Follow-up Clinic, including the addition of a trauma social worker in 2017. While primarily intended to ensure optimal continuity of care, the trauma clinic has been a much needed addition to the services the trauma center provides as community resources have become increasingly taxed.

The following graphs provide information on the post-discharge services provided to trauma patients through the trauma clinic.



Patients with intentional injury are disproportionately represented in the trauma clinic, underscoring the additional needs often required by this particularly vulnerable population. The payer mix shown above is the targeted population, with MediCal and uninsured patients representing nearly 70% of trauma clinic patients.

Injury Prevention

In addition to the injury prevention program support fee paid to the County annually, the trauma center remains very committed to guiding other efforts in reducing and preventing traumatic injury. Ongoing programs include,

- Participation in “Every 15 Minutes”, a two day program for high school students aimed at preventing teen drinking and driving. An average of five Contra Costa high schools participate annually in this emotionally evocative two day experience;
- Child passenger safety education and distribution of car seats to low income families;
- Senior fall prevention through a regional collaborative;

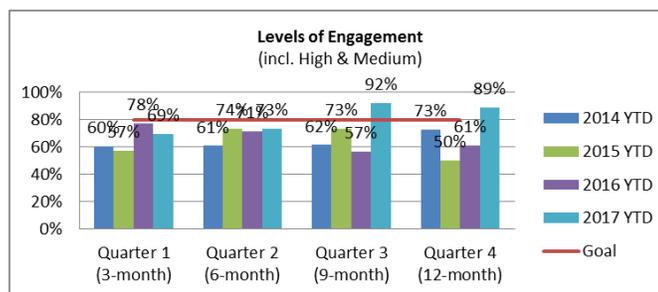
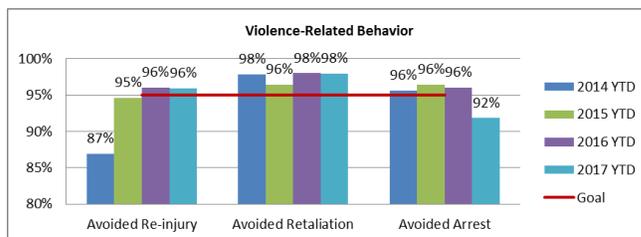
- In 2018 John Muir Health began offering the Department of Defense’s “Stop the Bleed” program. The purpose of the campaign is to build national resilience by better preparing the public to save lives by raising awareness of basic actions to stop life threatening bleeding following everyday emergencies, and man-made and natural disasters. The trauma center’s initial efforts around “Stop the Bleed” have focused on obtaining course supplies and preparing over 100 course instructors to bring the campaign to the community.

All of these injury prevention initiatives are impactful to the populations they reach, however the majority of the trauma center’s injury prevention efforts over the past ten years have been focused primarily on youth violence prevention, through the Beyond Violence program, which was initiated in 2010 through a collaborative effort that included Contra Costa Health Services Department and EMS, as well as numerous community based organizations.

The primary goals of Beyond Violence are to prevent retaliation, re-injury and criminal recidivism. The program objectives are:

- Social Worker: Signed consents from 85% of eligible patients
- Intervention Specialist: Signed consents from 75% of referred patients
- 70% of clients engaged for at least 6 months
- 90% of clients still alive in 3 and 6 months from time of referral
- 75% of clients without criminal incident in 3 and 6 months from time of referral
- 70% of clients will have received assistance with documentation prep or completion (VVC, DMV, etc.)
- 70% of clients have pursued life enhancement activities

The following information demonstrates some of the program’s outcomes since 2014:



Beyond Violence efforts have been focused in East and West County only. Additionally, while in West Contra Costa County there are community services more typical of what is found in an urban

setting, East Contra Costa in comparison remains without a similar infrastructure of support services, particularly mental health services.

To address these gaps, in 2018 the trauma center submitted a proposal to the CARESTAR Foundation to expand the Beyond Violence initiative with these additional objectives:

- Reduce emergency and trauma visits by troubled or vulnerable youth by addressing one of the leading causes of youth morbidity and mortality;
- Expand the Beyond Violence Program to a regional initiative, engaging other hospitals such as Kaiser Richmond and Sutter Delta, and incorporate out-patient as well as in-patient youth effected by crime;
- Convene area partners and identify key stakeholders to make a difference in our community;
- Develop a multi-organizational model to tackle violence prevention;
- Build Contra Costa County's community infrastructure to better address the needs of youth;
- Better prepare medical professionals to align with community partners and recognize when interventions may prevent violence; and
- Create stronger safeguards to protect our own healthcare providers so that they do not have to fear for their own safety when attending to others.

In December of 2018, John Muir Health was awarded a \$1 Million grant from the CARESTAR Foundation to expand the Beyond Violence intervention and prevention program. That work is currently underway and on-schedule.

Community Outreach

Outreach to the County's emergency departments have centered mainly on trauma triage and re-triage, with good provider engagement in discussions around continuing to improve the trauma triage and transfer process. Trauma outreach has recently been conducted with providers from the following non-trauma centers:

- John Muir Health, Concord Medical Center
- Kaiser Antioch
- Kaiser Walnut Creek
- San Ramon Regional (scheduled May 2019)
- Sutter Delta

There are also plans to conduct additional outreach in 2019 at Contra Costa Regional and Kaiser Richmond.

Requirement: That demographic and other conditions within the County have not changed in such a manner as to necessitate substantive changes in the County’s Trauma System Plan in order to assure optimal delivery of hospital trauma care services for the County’s residents.

The population of Contra Costa County grew 9% from a population of 1,049,025 to 1,147,439 between 2010 and 2017.³ East Contra Costa County has experienced the most robust growth⁴, however John Muir Health continues to meet the hospital trauma care needs of Contra Costa residents.

Requirement: Hospital has maintained patient charges that are comparable on a per case basis to other trauma centers in Northern California (the analysis is to be based on the charge per case using the then current MS-DRG classification methodology or its successor).

Per case MS-DRG comparable data was not available in the OSHPD data base. In lieu of that methodology, trauma activation fees and trauma ICU bed charges were used as a proxy. The level II trauma centers that were used for comparison are:

Trauma Center	City
Sutter Eden	Castro Valley
Enloe	Chico
Mercy San Juan	Carmichael
Sutter Roseville	Roseville
Doctors Medical Center	Modesto
Kaiser Vacaville	Vacaville
Santa Rosa Memorial	Santa Rosa
Regional Medical Center	San Jose
Natividad	Salinas

Using the identified proxies, John Muir Health maintained patient charges that are comparable to or lower than other similar Northern California trauma centers:

JMH Charge Code	JMH Charge Description	JMH	Average
20800811	HC ROOM RATE ICU TRAUMA	\$ 24,630.50	\$24,142.19
68200159	HC TRAUMA SERVICE ACTIVATION APLHA	\$ 27,151.00	\$33,037.89
68200161	HC TRAUMA SERVICE RESPONSE BETA	\$ 23,567.00	\$24,858.43
68200160	HC TRAUMA SERVICE RESPONSE CHARLIE	\$ 14,293.00	\$15,339.63

³ Source: U.S. Census Bureau 2017

⁴ <http://worldpopulationreview.com/us-counties/ca/contra-costa-county-population/>

Requirement: Hospital has worked reasonably and cooperatively with County in response to an evolving emergency medical system and to an evolving healthcare system.

The Trauma Center continues to actively participate in the following trauma and EMS committees and programs:

- Bi-county Trauma Advisory Committee (TAC);
- Greater San Francisco Bay Area Regional Trauma Coordination Committee (RTCC);
- Contra Costa County Emergency Medical Care Committee;
- American College of Surgeons Trauma Quality Improvement Project (TQIP);
- Trauma triage criteria workgroup: in 2015 and 2016 trauma center and base station personnel worked closely with EMS leadership to identify trauma center criteria to a less restrictive definition.

Additionally during the 2011-2018 contract period, at the request of EMS, the trauma center assumed responsibility for reporting trauma data directly to the California Emergency Medical Services Information System (CEMSIS).