



# **TRAUMA**

## **2018 Q1/Q2**

### **Major Trauma**

### **Report**

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February 7, 2019

## Overview

This review was conducted in an effort to better understand the trauma patient population in the S-SV EMS region, and to assure current protocols, policies and practices are appropriately managing this specialty patient population. Major trauma is commonly defined by the American College of Surgeons (ACS) as patients who have a traumatic mechanism of injury with a resultant Injury Severity Score of >15. In the S-SV EMS region, this population, combined with those patients who die of a trauma related mechanism at scene, represent approximately 15% of all trauma patients who are injured and transported or transferred to a regional trauma specialty center.

## Definition

For the purpose of this report, major trauma includes any patient with an Injury Severity Score (ISS) of >15 who arrived at a S-SV EMS designated trauma center, or who died at scene as a result of trauma. This resulted in an evaluation of three hundred and forty eight (348) patients.

- 267 patients met the criteria of ISS >15.
- 6 patients were transported to a trauma center and died in the ED with an ISS <15. In these patients, death occurred prior to comprehensive identification of all injuries.
- 75 patients were dead on scene as a result of trauma and not transported.

## Data source

Trauma One Registry data was reviewed for the following S-SV EMS regional Trauma Centers

- Enloe Medical Center – Level 2, Chico
- Mercy Medical Center – Level 2, Redding
- Sutter Roseville Medical Center – Level 2, Roseville
- Adventist Health + Rideout – Level 3, Marysville
- Mercy Medical Center Mt. Shasta – Level 3, Mt. Shasta
- St. Elizabeth Community Hospital – Level 3, Red Bluff
- Fairchild Medical Center – Level 4, Yreka

ImageTrend data was utilized to review patient care reports (PCRs) for S-SV EMS regional prehospital providers.

## Inclusion Criteria

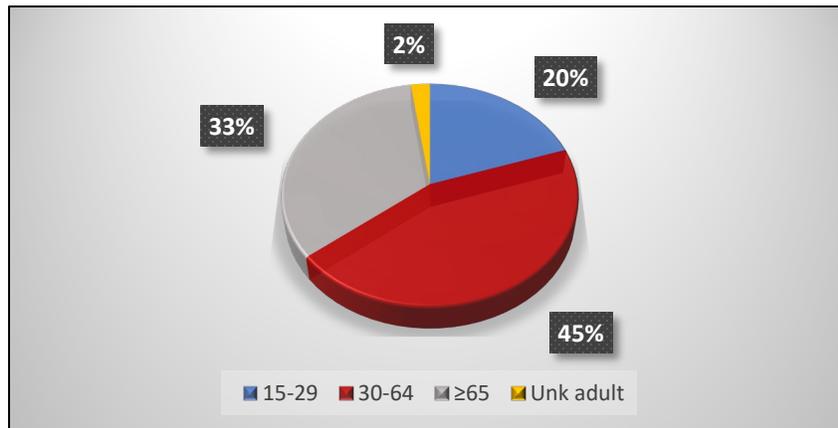
Only injuries that occurred within the S-SV EMS region were included in this review (*Butte, Colusa, Glenn, Nevada, Placer, Shasta, Siskiyou, Sutter, Tehama or Yuba counties*). Patients were either not transported secondary to death at scene, transported by EMS to a S-SV EMS regional trauma center, or were transported to another regional hospital and subsequently transferred to a S-SV EMS regional trauma center. Pediatric patients less than 15 years old were not included in this review. Limitations in data collection for non-trauma hospitals within the S-SV EMS region may have resulted in the exclusion of a small number of trauma patients who were transported to the closest non-trauma center secondary to airway/neuro/hemorrhage issues and not subsequently transferred to a trauma center within the S-SV EMS region. Secondary to

inconsistent and incomplete EMS documentation identifying patients who died on scene, it is possible that some patients who were not transported due to determination of death by an ALS provider may be excluded.

Injuries occurred between January 1, 2018 and June 30, 2018.

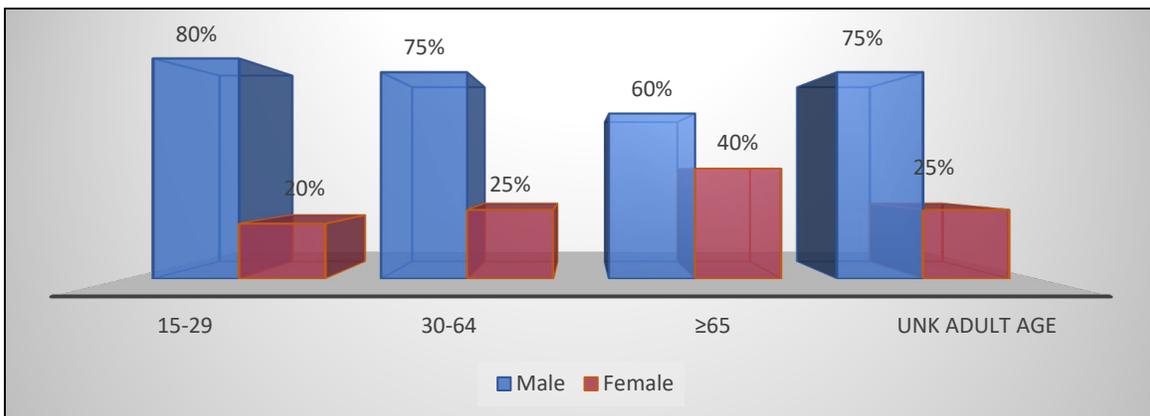
### Patient Demographics

Patients were divided into three broad age categories. Young adult trauma patients 15-29 years of age; Mid-adult trauma patients 30-64 years of age; and, Geriatric trauma patients 65 years of age and older. Ages ranged from 16 to 97 years old.



According to the 2016 NTDB Annual Report, trauma initially peaks in the 14-29 year old age group primarily from motor vehicle related incidents and peaks again in the 40-50 year old age group as falls begin to increase. Overall 91% of patients had a major traumatic injury secondary to blunt mechanisms vs. 9% by penetrating mechanisms.

Not surprisingly, males in each age group are more likely to experience major trauma. In the geriatric population those numbers close significantly. This is similar to national trauma statistics.



## Incident Location and Transport Mode

90% of the study population were transported by ground EMS providers. Of the 10% transported by air providers, 11% were transported by an air rescue provider while 89% were transported by air ambulance. 24% of patients flown by air ambulance had interventions performed which were beyond the scope of paramedic providers.

Total Population	Butte	Colusa	Glenn	Nevada	Placer	Shasta	Siskiyou	Sutter	Tehama	Yuba
1,226,552	229,294	21,805	28,094	99,814	386,166	179,921	43,853	96,648	63,926	77,031
% of S-SV EMS Region	18.7%	1.8%	2.3%	8.1%	31.5%	14.7%	3.6%	7.9%	5.2%	6.3%
% of Study Population	17.0%	2.0%	2.0%	12.0%	20.0%	19.0%	3.0%	6.0%	5.0%	13.0%
Transported by Ground	79%	79%	100%	82%	93%	86%	100%	100%	89%	96%
Transported by Air	21%	21%	0%	18%	7%	14%	0%	0%	11%	4%

## Mechanisms of Injury:

Overall, only 2% of the study population who were transported by EMS were not transported to a trauma center from scene, indicating that there are an appropriate number and distribution of trauma centers within the S-SV EMS region. Four of the five patients who were not transported to a trauma center were older than 65 and experienced a ground level fall (GLF). A review of PCR documentation indicates that these patients did not receive a comprehensive trauma assessment resulting in several being under-triaged to an inappropriate receiving facility.

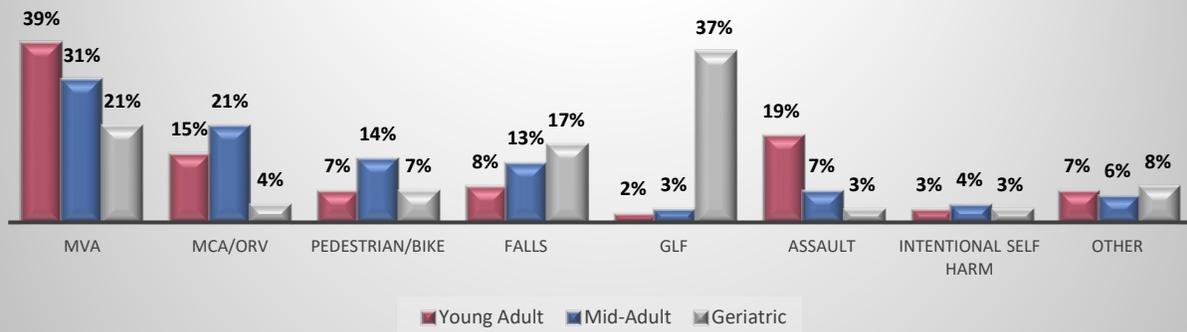
In reviewing the mechanisms of injury for study population patients who were transported by EMS, approximately 30% of each mechanism resulted in ISS scores >25. ISS scores >25 indicate multi-system trauma and are associated with a significantly higher mortality rate across all age groups. Motor vehicle and motorcycle related incidents were associated with the highest number of deaths at 13 (43%).

Mechanisms for patients who died at scene were evaluated separately. In the young adult study population, the majority of deaths were associated with intentional self-harm while the mid-adult study population died at scene more frequently secondary to motor vehicle related incidents. For geriatric patients, motor vehicle related incidents and intentional self-harm accounted for equal percentages of deaths.

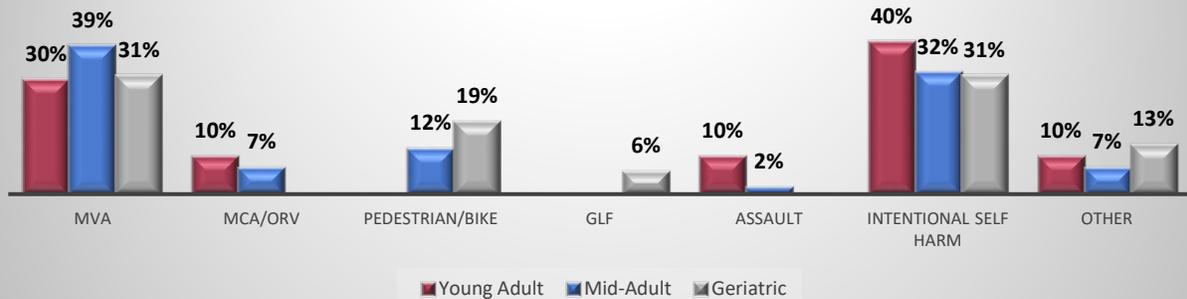
According to EMS PCR documentation, twenty one patients in the study population who experienced a ground level fall did not meet trauma triage criteria. Nineteen (90%) of these patients were diagnosed in the ED with a significant intracranial bleed. In reviewing the EMS PCRs for these patients, 63% had documented evidence of a head strike; however, the EMS PCR lacked documentation that the patient received a comprehensive trauma assessment.

Sixty three patients (23%) met mechanism of injury criteria only. Of these, 19% had an ISS score >25. 73% were injured in motor vehicle and motorcycle related incidents. 13% of these patients required subsequent acute transfer to a level 1 or level 2 trauma center.

## Transported - Mechanism of Injury

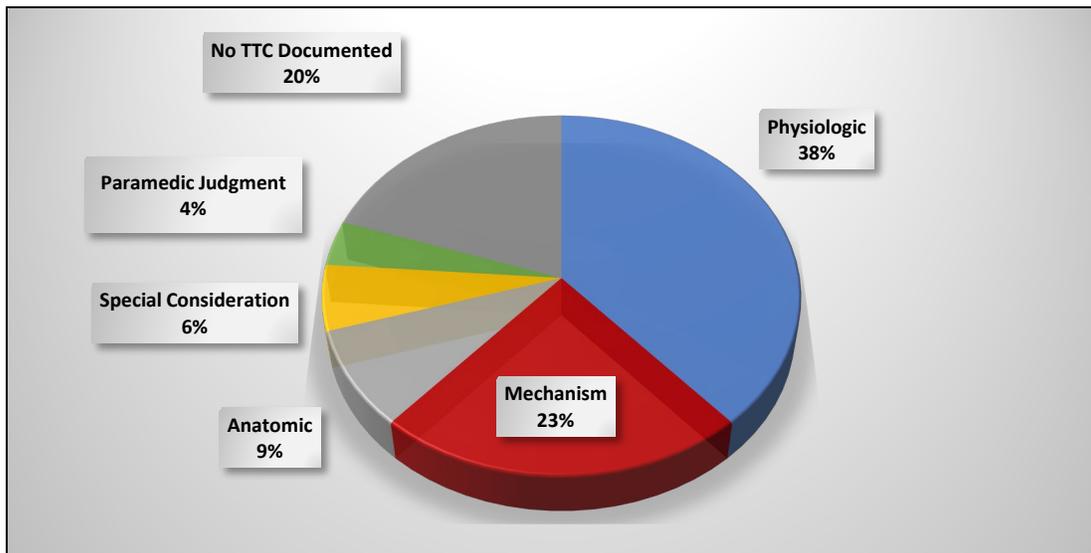


## Dead on Scene - Mechanism of Injury



## Trauma Triage Criteria (TTC)

PCRs of transported patients were reviewed to determine which trauma triage criteria, if any, were documented.

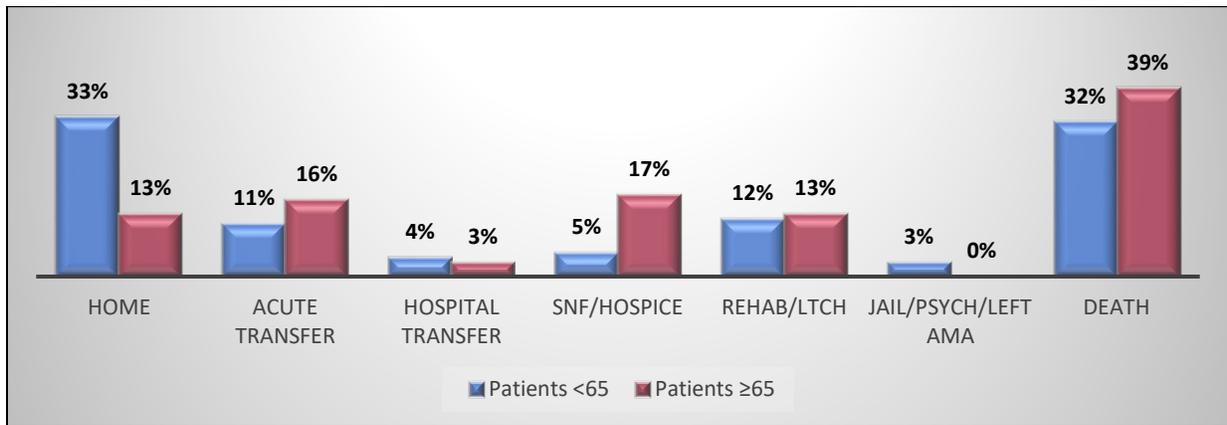


Fifty three transported patients (19%) with an ISS score >15 did not meet any trauma triage criteria according to EMS PCR documentation. While these patients were transported from scene to a trauma center, it appears that the hospital destination was selected based on closest facility rather than trauma specialty care. These patients were not trauma activated from the field which may have contributed to the significantly longer ED length of stay for these patients (288 minutes compared to 192 for all patients in study population). 47% of these patients were ≥65 years of age.

### Outcome/Discharge Disposition

Appreciable differences were noted in the outcomes of patients less than 65 years old and geriatric major trauma patients, particularly when looking at the number of patients discharged to home. Geriatric patients are more frequently acutely transferred than their younger counterparts, suggesting that destination decisions for this group may need further evaluation.

While there is only a 7% difference in overall trauma deaths between the adult and geriatric groups in this study population, it is interesting to note that 29% of patients under 65 who arrive alive to the trauma center die, while 47% of geriatric patients who arrive alive to a trauma center subsequently succumb to their injuries during initial hospitalization. Perhaps this is related to more frequent high energy mechanisms and suicide in the younger adult group and comorbidities and under-triage in the geriatric population. However, identifying relational factors would require further review than that which was conducted for this study.



### Conclusion

Overall EMS is managing care and destination of trauma patients well.

Mode of transport appears appropriate in most areas. The utility of air transport for patients who do not demonstrate a need for advanced procedures at scene and for whom there is not an appreciable time advantage with air transport could be further evaluated to assure that the advantages of these specialty resources and the associated risk and cost of this mode of transport is appropriate for the patient.

Additional review and evaluation of this data may result in recommendations that would broaden trauma triage criteria, particularly for geriatric trauma patients.

In 2009, the Ohio Department of Public Safety was the first to adopt state-wide triage guidelines specific to geriatric trauma. Early evaluation of the impact of these changes showed a slight decrease in mortality for patients over 70 years old with mild trauma (ISS<10). There was also an increase in the number of elderly patients discharged home following trauma.

A limited analysis of EMS PCR for geriatric patients in this study population shows that at least 56% of those who did not meet any of the current trauma triage criteria would be captured by adopting the Ohio Geriatric Trauma Triage Criteria, which include:

- GCS score <14 in the presence of known or suspected traumatic brain trauma
- SBP <100mmHg
- Fall from any height with evidence of traumatic brain injury
- Multiple body-system injuries
- Struck by a moving vehicle
- The presence of any proximal long bone fracture following motor vehicle trauma

EMS PCRs did not document a comprehensive trauma assessment for the majority of geriatric trauma patients, especially those experiencing ground level falls. While this population may have compounding factors making mental status assessment challenging, this has been identified as an area with considerable need for improvement. In order for patients to be appropriately triaged, they must first be adequately assessed. Beyond that, these EMS PCRs reveal a need to improve prehospital documentation related to: determination of death at scene, mechanism of injury, witness/caregiver report, past medical history, baseline mental status, and degree of functional independence prior to injury for trauma patients with low energy mechanisms.