



TUCSON FIRE DEPARTMENT

Trauma 2016 FISCAL YEAR IN REVIEW

Medical Administration

Gone are the days when a patient suffering from a "Time Sensitive" injury was tossed into the ambulance and taken to any Emergency Department. Skilled Interventions, while keeping a watchful eye on the clock now, play an important aspect when it comes to the care and outcome of the critically ill patient.

Introduction: In the United States the majority of calls for emergency service are for medical emergencies. In many cases these calls will represent 70 to 80% of all calls for service; the number of calls for Emergency Medical Services is rising, as those calls for fire-related services are seeing a decline. In fact, the total for EMS-specific calls can be upwards of 80% of a department's call volume – and for 99% of American communities, the first response for EMS is the fire service.

The City of Tucson falls in line with this trend. The highly trained EMS professionals, enables us to provide the highest caliber of emergency medical services to the community. Firefighters working in roles as Paramedics and Emergency Medical Care Technicians (EMCT's), are the first on-scene at accidents, medical emergencies, and natural disasters. TFD Paramedics have the essential skills and education to provide the highest level of care in life-threatening-time-sensitive emergencies on our dual paramedic ambulances.



911 Communication Center: In Tucson, the continuity of care begins when the callers connect with the Tucson Fire 911 Communication Center. Enhanced 9-1-1 (E9-1-1) remains the optimal form of access to expedite *trauma care* in that it enables the caller's location to be automatically displayed on a computer screen. Cellular use is increasing making wireless E9-1-1 coverage even more essential.

Automatic crash notification systems, such as *OnStar* are built into vehicles, automatically providing alerts to the 911 Communications Center in the event of a crash. The notification initiates the dispatch of critical apparatus and EMS personnel to provide emergency care.

Emergency Medical Dispatchers receiving 9-1-1 calls make up an important component of the trauma system acting as the system entry point of a time sensitive emergency. The EMD screens calls and structures questions to determine the best utilization and requisition of resources and then is responsible for rapidly dispatching the most appropriate resources.

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While emergency responders are Enroute, the EMD's provide critical pre-arrival instructions to the caller and remain on the line until their arrival.

Tucson Fire Medical Direction and Medical Administration compiled the 2015 Administrative Guidelines. These guidelines provide the TFD personnel a tailored document, which allows the department an evidence-based avenue to provide care for the citizens of Tucson, Arizona. One avenue is the ability to transfer care of the patient based upon the level of acuity such as those patients who meet the stable criteria for Basic Life Support. This transfer frees up the TFD Paramedics to transport the highest acuity or the sickest of the sick.

In an EMS system, Medical Direction provides the operational framework and offline authorization for TFD's Paramedics and EMCT's to provide emergency treatment outside the hospital with respect to triage, patient care and transport of trauma patients. This offline oversight allows for Paramedics to be able to treat the signs and symptoms on-scene using their knowledge base and skill set to create a complete concise package based upon their assessment.

Trauma Triage Criteria: The goal of trauma triage is to rapidly identify, using standardized and validated criteria, the individual whose injuries may be life threatening or require specialty services. Triage decisions may be based on physiologic and anatomic conditions, mechanism of injury information, pre-morbid conditions, and/or clinical judgment.

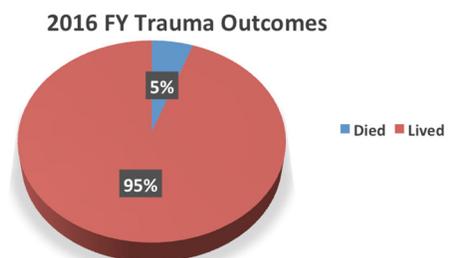
The American College of Surgeons (ACS) provides a field triage decision scheme that may be used as a framework for developing individualized, region-specific triage algorithms. Triage decision schemes have been designed to identify which injured patients will benefit from being transported to a trauma center.

The ability of TFD's Paramedics and EMS personnel to accurately utilize triage schemes is dependent upon education and experience.

The value of a triage scheme is determined by its ability, when used correctly, to facilitate appropriate and expeditious trauma care that minimizes morbidity and mortality.

In all Time Sensitive Emergencies, having the expertise of the dual paramedic ambulance cannot be overstated. Having the highly skilled paramedics working together on-scene and en-route creates the best opportunity for the patients' survival, allowing multiple life-saving interventions to be performed simultaneously. This duplicity shortens on-scene times and allows crews to get the patient to definitive care more quickly.

In fiscal year 2016, 95% of the trauma patients treated and transported by TFD's dual paramedic ambulances lived, surviving their emergent injuries. This data is based upon the discharge outcomes provided by the local Level I Trauma Center, Banner University Main Tucson Campus.



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2016 FY Deaths Related to Trauma

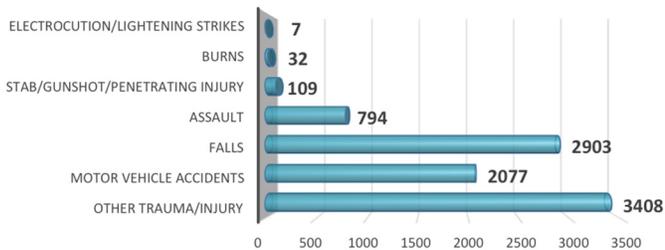


5% of the patients who died from their injuries related to trauma was 54. Further breakdown of the 54 patients showed 30 patients died in the ED or arrived dead on arrival unable to be revived.

In fiscal year 2016 Tucson Fire Department was dispatched to 82,372 medical calls, which included 9,371 trauma and injury dispatches. Of these 9,371 dispatches 9,330 were further categorized. Based upon the regions Trauma Triage, 998 transports to the Level I Trauma Center met the criteria for Trauma.

Trauma is classified as a “Time Sensitive call that requires definitive care; It is all about getting the patient to the right destination within the Golden Hour.

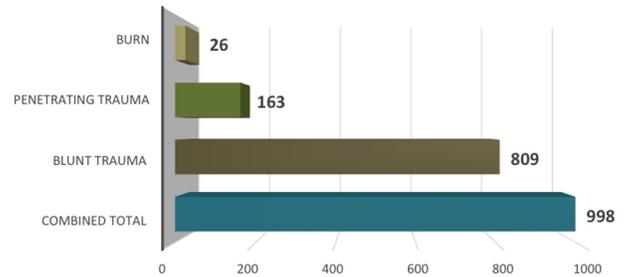
2016 FY Trauma and Injury



2016 FY numbers for Trauma and Injury were obtained by CAD and ePCR. Components that make up the categories for Penetrating trauma include stabbings, gunshot wounds and other penetrating injuries. Burns include electrocution and lightning strikes and assaults, falls, motor vehicle accidents are placed into Blunt trauma. All remainder of categories are defined as Other Trauma /Injury.

Three categories of trauma include: Blunt Trauma, Penetrating Trauma and Burns.

2016 FY Trauma Categories



In 2016 FY the total number of trauma treated and transported was 998. Averages for Blunt Trauma followed the national norm at 82%, with Penetrating Trauma at 16% and burns at 2%.

Blunt Trauma

Blunt trauma, blunt force trauma or non-penetrating trauma refers to physical trauma to a body part, by impact, injury or physical attack. The term blunt trauma refers to the initial trauma, from which develops more specific types such as contusions, abrasions, lacerations and/or bone fractures.

Blunt force injuries are more difficult to assess and the patient can quickly spiral downward. In blunt or non-penetrating trauma, there may be an impact, but the skin is not necessarily broken. Blunt trauma is contrasted with penetrating trauma, where an object, such as a bullet enters the body. Blunt trauma makes up the majority of the injuries patients’ incur out of the three categories of trauma.

Equally important, however, are the characteristics of the blunt object and the surface that is impacted.

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Impacts involving a large surface area with regard to the impacting object or with regard to the tissues being impacted will result in a greater dispersion of energy, over a larger area and less injury to the impacted tissues.

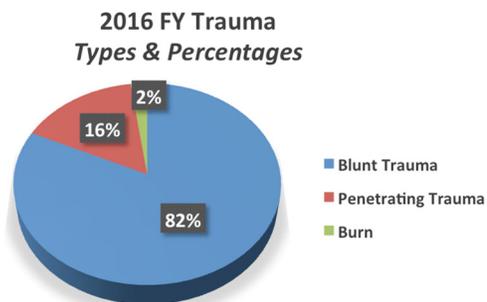
Blunt injuries with rapid deceleration as with a motor vehicle crash may propel the driver into the steering wheel or dashboard or seatbelt causing contusions in less serious cases, or rupture of internal organs from briefly increased intraluminal pressure in the more serious, depending on the force applied.

The severity of injuries inflicted as a result of blunt force trauma is dependent on the amount of kinetic energy transferred and the tissue to which the energy is transferred. In general, a somewhat lighter object traveling at high speed will cause more damage than a heavier object traveling at low speed.

Likewise, an impact on a small area of a curved surface, such as the head, will cause greater damage than would be caused were that same impact to occur on a flat surface, such as the back, since there will be a more concentrated point of impact on the head.

Another factor affecting the severity of blunt force injuries is the amount of time the body and the impacting object are in contact. A longer period of contact allows kinetic energy to be dissipated over a prolonged period, resulting in less damage to the tissues than an equally forceful impact with dispersion of energy over a brief period.

Of all of the trauma calls TFD responds to for fiscal year 2016, 82% are blunt trauma. Assaults, falls and motor vehicle accidents make up the primary numbers tallied for blunt trauma.



Tucson's trauma numbers fall in line with the country's averages based upon the above referenced trauma types.

Penetrating Trauma

Penetrating trauma is an injury that occurs when an object pierces the skin and enters a tissue of the body; which creates an open wound. The penetrating object may remain in the tissues, come back out the way it entered, or pass through the tissues and exit from another area.

An injury in which an object enters the body or a structure and passes all the way through is called a perforating injury. Penetrating injury implies that the object does not pass through

The extension of the penetrating injury is the perforating injury. A perforating injury is associated with an entrance wound and often times, a larger exit wound.

Penetrating trauma can be caused by a foreign object or by fragments of a broken bone; usually occurring in violent crimes or armed assault or combat. Penetrating injuries are commonly caused by gunshots and stabbing. This type of trauma can be serious because it can damage internal organs and presents a risk of shock related to blood loss and infection.

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The severity of the injury varies widely depending on the body parts involved, the characteristics of the penetrating object and the amount of energy transmitted to the tissues.

Due to the violent nature and severity of penetrating trauma, it stands to reason that 163 occurrences for penetrating trauma in Tucson are much lower than the number of blunt traumas.

Traumatic Burns

Burns: There are three primary types of burns: first, second, and third-degree. Each degree is based on the severity of damage to the skin, with first-degree being the most minor and third-degree being the most severe.

Damage includes:

- first-degree burns: red, non-blistered skin
 - second-degree burns: blisters and some thickening of the skin
 - third-degree burns: widespread thickness with a white, leathery appearance
- There are also fourth-degree burns. This type of burn includes all of the symptoms of a third-degree burn and also extends beyond the skin into tendons and bones.

Excluding fourth-degree burns, third-degree burns are the most severe. They cause the most damage, extending through every layer of skin. However, with this type of burn the damage is so extensive that there may not be any pain because of nerve damage. Without surgery, these wounds heal with severe scarring and contracture. There is no set timeline for complete spontaneous healing for third-degree burns.

Complications: Compared with first- and second-degree burns, third-degree burns carry the most risk for complications, such as infections, blood loss, and shock, which can lead to death. Burns also carry the risk of infections because bacteria can enter broken skin.

All patients with burns of a serious nature are transported to the local Level I Trauma Center, which opened a fully functioning Burn Center in 2014. This enabled the 26 patients to be stabilized, keeping the burn patient close to their family and friends.

Additional Trauma Information

Tracking Times is an important aspect of the Trauma's Golden Hour. Creating a time trail in order to decrease on-scene times is imperative when minimizing delays to the Level I Trauma Center.

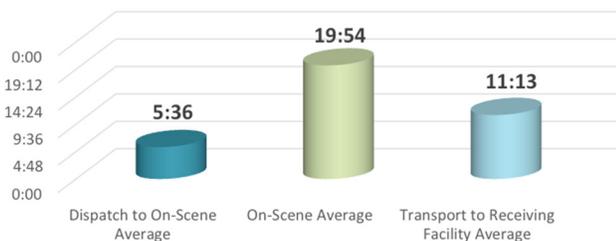
TFD's goal of decreasing trauma times is easier said than done as most traumatic scenes have chaos and external complications associated with the call. Contributing delays associated with Tucson's neighboring agencies such as TPD hold-offs, SW Gas and TEP utilities, patient entrapment during rush hour traffic; are just a few issues that can increase a scene time as Tucson is a sprawling city with varying distances to the trauma center.

TFD's average time for Dispatch to On-Scene is 5 minutes and 36 seconds, with an average On-Scene time of 19 minutes and 54 seconds, and the average time for Transport to Receiving Facility is 11 minutes and 13 seconds.

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The On-Scene and Transport to Receiving Facility times are based upon EMS calls that were dispatched as a trauma; however there currently is no distinguishable way to identify the differences between a true Level I trauma versus a non-traumatic injury within TFD's ePCR. Thus the on-scene and transport times depicted are skewed.

**2016 FY Trauma
Dispatch - Transport Times**

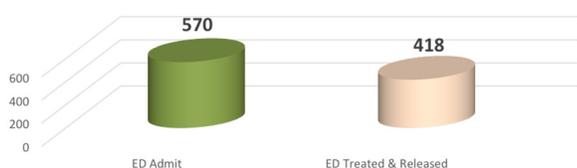


Patient Outcomes: Data for fiscal year 2016, showed that 998 patients were transported and received treatment at the Level I Trauma Center.

Based upon outcome data provided by the Trauma department 95% of the patients survived and 5% died in the Emergency department and /or were Dead on Arrival and was not able to be resuscitated.

570 Patients were admitted to the hospital based upon the injuries sustained; and of those admitted, 24 died during their inpatient status. 418 patients received care and treatment in the Emergency Department and were subsequently released.

**2016 FY Trauma
Patient Outcomes**



Evidence Based Care Roll Out:

Spinal Motion Restriction: In fiscal year 2016 with the rollout of the Administrative Guidelines, Spinal Motion Restriction (SMR) was taught; keeping evidence based prehospital treatment at the forefront.

Spinal Motion Restriction allowed TFD's Paramedic and personnel to deem what level of spinal immobilization the patient required. This decision was based upon the neuro assessment of the patient that includes the scene size-up as well as the patients' chief complaint. The education was provided to all neighboring agencies and all of Tucson's Base Hospitals. This creates an educational continuity of care for Tucson's citizens.

Technical Rescue Team: Tucson Fire Department in their arsenal of highly trained personnel has a Technical Rescue Team (TRT) that provides extrication skills for all types of patient entrapment as well as Swift Water Rescue.

MIST: Relaying information is vital when time matters; never has this been more important when simultaneously transporting and providing interventions to a critical patient, thus the creation of MIST. MIST is the telemetry system that allows the Paramedic to provide a more coordinated report to the Trauma Department Nurse Intermediary in less than 30 seconds.

Future Communication Endeavor: August 1, 2016 Tucson Police Department (TPD) will have radio to radio communication with TFD on-scene. This will create a more coordinated dialog between agencies especially when situations change requiring updates on a charged scene.