

**EMERGENCY MEDICAL SERVICES AUTHORITY**

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March 4, 2020

Travis Kusman, Director  
San Mateo EMS Agency  
801 Gateway Blvd, 2<sup>nd</sup> Fl.  
South San Francisco, CA 94080

Dear Mr. Kusman:

The EMS Authority (EMSA) has approved San Mateo County EMS Agency's 2020 Trauma System Status Report (TSSR). San Mateo County EMS Agency's trauma system information provided in each report and subsequent correspondence is in compliance with California Code of Regulations, Title 22 Trauma Care Systems.

In accordance with the regulations, Section 100253, the local EMS agency shall submit to the EMS Authority an annual TSSR. Your next TSSR will be due by February 28, 2021. If you have any questions, please contact Elizabeth Winward at (916) 431-3649 or [elizabeth.winward@emsa.ca.gov](mailto:elizabeth.winward@emsa.ca.gov).

Sincerely,

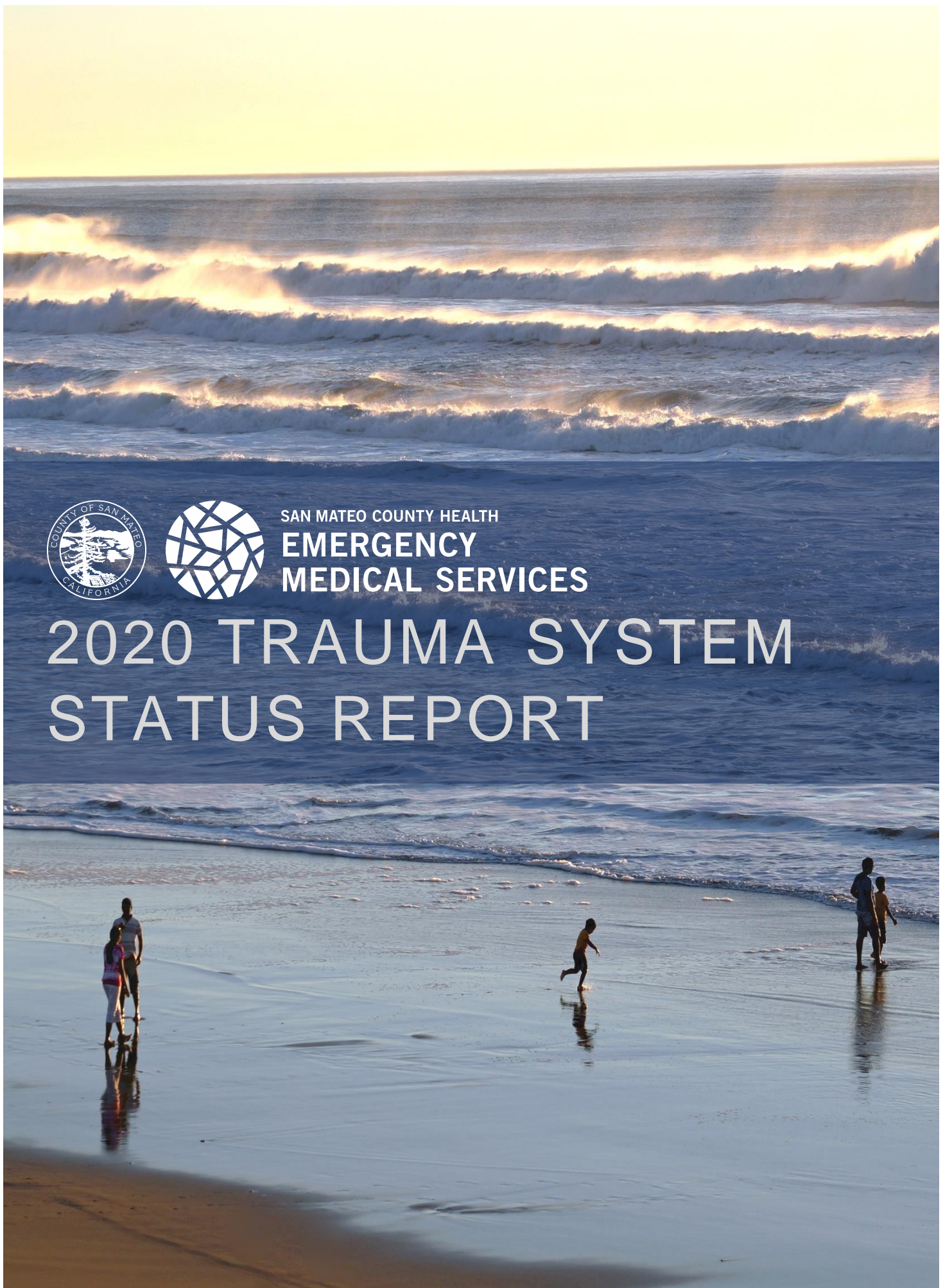
A handwritten signature in blue ink, appearing to read "Tom McGinnis", enclosed in a blue oval.

Tom McGinnis, EMT-P  
Chief, EMS Systems Division



SAN MATEO COUNTY HEALTH  
**EMERGENCY  
MEDICAL SERVICES**

# 2020 TRAUMA SYSTEM STATUS REPORT



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## Introduction

San Mateo County (SMC) has a very stable trauma system that utilizes American College of Surgeons (ACS) verified Level One Centers: Zuckerberg San Francisco General Hospital (ZSFG) for the Northern region of the County and Stanford Health Care (SHC) for the Southern region of San Mateo County for both adults and pediatrics. None of the receiving hospitals in San Mateo County are designated as trauma centers at any level, however, all have the ability to quickly re-triage patients to a trauma center if indicated. Although our designated receiving hospitals for trauma patients originating within San Mateo County are physically located outside of our County jurisdictional boundaries, patients are transported to both centers seamlessly due to the systems, continuous quality improvement and oversight by the San Mateo County EMS Agency that are in place.

## Summary of Changes

There have been no major changes to the trauma delivery system since our last submission. Rather, this report provides updates to our February 2019 submission. Both the adult and pediatric facilities designated as trauma receiving centers by the San Mateo County EMS Agency (EMS Agency) have been re-verified as Level One Centers without deficiencies by the ACS. The EMS Agency participated in the ACS site visits including the pre-review questionnaire and evening session, and also received and reviewed the reports of findings. Additionally, the EMS Agency Clinical Services Manager accompanied San Francisco local EMS agency personnel during their on-site visit and chart review for ZSFG performed in accordance with Title 22 regulations.

Stanford Health Care constructed and has moved into a new hospital which includes a new Emergency Department with Trauma suites that increase its capacity for trauma care. Our Trauma treatment protocols have been redesigned into an algorithmic-style for ease of use and congruency with our overall treatment protocol redesign and are now available through both Android and iOS applications.

## Structure & Organizational Description

The EMS Agency Clinical Services Manager serves as the primary liaison with the SMC trauma receiving centers. This role includes attending the Bay Area Regional Trauma Care Committee (RTTC) meetings, trauma center site meetings, follow up on CQI issues and relaying information back to key stakeholders. The EMS Agency Medical Director provides overall medical direction to the prehospital community and works closely with the trauma medical community. The EMS

Agency Director provides administrative oversight and schedule permitting, attends local and regional trauma meetings. The EMS Agency Operations Manager monitors response time performance and time on scene and facilitates overall data aggregation and analysis as well as treatment protocol, procedure, and policy development. The EMS Agency Clinical Nurse provides support of continuous quality improvement and education activities and the EMS Agency Office Coordinator provides administrative support including coordination of Maddy and Richie fund activities.

## Names and Title of LEMSA agency personnel and Their Role in the Trauma Program

- Travis Kusman, MPH, Paramedic, EMS Director-Administration and Strategic Leadership
- Gregory H. Gilbert, MD, FAAEMS, EMS Medical Director-Medical Control of the local EMS system
- Linda Allington RN, MPH, MPA, FACHE, EMS Clinical Services Manager-Trauma Program Manager, Liaison with the receiving hospitals, Continuous Quality Improvement (CQI)
- Susan Smith, RN, Clinical Nurse-CQI, Education
- Chad Henry, MBA, Paramedic, EMS Operations Manager-Performance management, CQI, Policy, Protocol and Procedure committee coordinator and facilitator.
- Garrett Fahey, MBA, EMS Office Coordinator-Administrative coordination and support

## Designated Trauma Centers for San Mateo County of San Mateo

- Zuckerberg San Francisco General Hospital - Level One Adult  
1001 Potrero Avenue  
San Francisco, CA 94110
- Stanford Health Care - Level One Adult and Pediatrics  
300 Pasteur Drive  
Stanford, CA 94305

## Trauma Triage and Transport-Operations 22

The SMC trauma treatment protocols have been revised and will be effective April 1, 2020. The treatment protocols now align with the California Emergency Medical Services Authority list of primary impressions and will reduce variability. Much of the information that was previously found in policy has been integrated into the treatment protocol, streamlining access to this critical information for Paramedics and EMT's.



POLICY NO:	OPS -22
DATE ISSUED:	1/2012
DATE REVISED:	9/2017
REVIEW DATE	9/2019

## TRAUMA TRIAGE AND TRANSPORT

**Purpose:** To provide standard criteria for the identification and transport of major trauma patients

**Authority:** Division 2.5 Health and Safety Code. Article 2.5 Regional Trauma Systems. 1798.163

### Definitions

1. Major Trauma Victim (MTV) is an injured patient(s) who meets one or more physiologic, anatomic or mechanism of injury criteria as defined in this policy.
2. Pediatric Major Trauma Victim is an injured child <15 years of age, who meets one or more physiologic, anatomic or mechanism of injury criteria as defined in this policy. Those Pediatric Major Trauma Victims <6 years of age shall be transported to Stanford Health Care.
3. Trauma Center is a licensed hospital, accredited by the Joint Commission, which has been designated as a Level I, II, III, or IV trauma center and/or Level I or II pediatric trauma center by the local EMS agency (LEMSA) and American College Surgeons (ACS).

### San Mateo County Recognized Trauma Centers

Per the approved San Mateo County Trauma Plan, San Mateo County trauma system utilizes designated trauma centers in bordering counties: Zuckerberg San Francisco General Hospital and Stanford Health Care. Stanford Health Care is also recognized as the designated Pediatric Trauma Center.

### Trauma Center Catchment Areas

1. Zuckerberg San Francisco General Trauma Center  
Persons injured in any area north of Devils Slide; on the north side or to the north of Trousdale Avenue, from Highway 280 to El Camino Real; on the north side or to the north of Millbrae Avenue, from El Camino Real to the San Francisco Bay.
2. Stanford Health Care Trauma Center/Pediatric Trauma Center

APPROVED:

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Gregory H. Gilbert, MD, EMS Medical Director

Persons injured in any area south of and including Devils Slide; on the south side to the south of Trousdale Avenue, from Highway 280 to El Camino Real, on the south side or to the south of Millbrae Avenue, from El Camino Real to the San Francisco Bay.

3. Eden Trauma Center

Persons injured east bound on the San Mateo Bridge or Dumbarton Bridge may be transported to Eden Medical Center in Alameda County.

**Triage Criteria**

1. Patients identified, as MTVs should be transported to a Trauma Center
  - a. Transportation to a non-trauma center should only occur if a patient has an unmanageable airway.
2. Pediatric patients <6 years of age identified as MTVs shall be transported to Stanford Health Care Trauma Center
3. If there is any question as to the trauma status of the patient, consult shall be made with the Trauma Center as early as possible in the patient's evaluation.
4. The following categories are to be used to define a MTV: physiologic, anatomic, or mechanism of injury. If a patient meets one or more of any of the following criteria, they are considered to be a MTV and shall be transported to a Trauma Center.

**Physiologic Criteria**

	<b>Adult</b>	<b>Pediatric</b>
<b>Systolic B/P</b>	<90 mmHg	<6 yrs = <60 mmHg >6 yrs = <90 mmHg
<b>Respiratory Rate</b>	<10 or >29/min	<10 or >29/min <20 /min (< 1 yr ) Requires ventilatory support
<b>Glasgow Coma Scale</b>	≤13	≤13

**Anatomic Criteria**

1. Penetrating injuries to head, neck, chest, back, abdomen, groin or extremities proximal to elbow or knee
2. Chest wall instability or deformity (e.g., flail chest)
3. Trauma with associated burns
4. Two or more proximal long bone fractures
5. Pelvic fractures
6. Open or depressed skull fracture
7. Traumatic paralysis or paresthesia
8. All gunshot wounds
9. Amputation proximal to ankle or wrist



10. Crushed, de-gloved, mangled, or pulseless extremity

**Mechanism of Injury**

1. Falls (one story = 10 ft.)
  - a. Adult = > 20 ft.
  - b. Pediatric = > 10 ft. or 2 times the height of the child; whichever is less.
2. High risk auto crash
  - a. Death of a victim in the same passenger compartment of a vehicle
  - b. Ejection (partial or complete) from the vehicle
  - c. Extrication time > 20 minutes
  - d. Vehicle telemetry data consistent with high risk injury
  - e. Intrusion into interior compartment, including roof: >12 inches occupant site; >18 inches at any site
3. Auto-pedestrian/auto-bicycle, motorcycle
  - a. Complaint of pain
  - b. Obvious injury
  - c. Thrown, run over, or separation from cycle
4. Significant blunt force trauma to head or torso from large animal (e.g. fall or kick from horse)

**Special Considerations**

1. Older Adults
  - a. Risk of injury/death increases after age 55
  - b. Systolic B/P <110 mmHg might represent shock after age 65 years
  - c. Low impact mechanisms (e.g. ground level falls) might result in severe injury
2. Children
  - a. Under 6 years of age shall be transported to Stanford Health Care Trauma Center
3. Co-morbid factors:
  - a. Hx anticoagulation therapy or with bleeding disorder
  - b. Hx cardiac, respiratory, diabetes and other metabolic diseases
  - c. Hx end-stage renal disease requiring dialysis
  - d. Pregnancy > 20 weeks
  - e. Burns
    - Without trauma mechanism: triage to a burn facility
  - f. Time sensitive extremity injury
    - Open fracture
    - Fracture with vascular compromise
  - g. CNS changes witnessed by prehospital personnel that include the following:
    - Post traumatic seizure
    - Transitory or prolonged LOC (>1 minute)
    - Repetitive questioning

- h. Patients, who in the best professional judgment of the paramedic, need to be categorized as major trauma victims.

### **Trauma Center Transportation**

1. MTVs will be transported to the appropriate Trauma Center based on the defined Trauma Center catchment areas.
2. The decision to use Code 3 transportation to the Trauma Center will be determined by the transporting paramedic.
3. The paramedic will notify the TRAUMA CENTER as soon as possible.

## Facilities 4

The purpose of the Facilities 4 policy, Emergency Department Patient Interfacility Transfers, is to provide guidance for emergency department initiated interfacility transfer of patients to higher-level care at a trauma center. As Critical Care Transport (CCT) resources are often limited, Facilities 4 outlines staffing and resource requirements and capabilities for BLS and ALS ambulances.

The “Red Box/Blue Box” criteria displayed within the chart are provided as a reference to all basic emergency department receiving centers to assist in expeditiously transferring patients in need to a higher-level of care. These criteria were developed in collaboration with the Regional Trauma Care Committee (RTCC) to assist non-trauma hospitals with both recognition of acuity and the need for transfer to a trauma center. The 911 system can be utilized to emergently facilitate a trauma transport if time is of the essence due to patient condition patient. The EMS Agency reviews a report of all 911 system facilitated emergent interfacility transports (referred to as “MEDER”) on a weekly basis. This report includes both trauma and medical patients and serves as a starting point for further follow up and quality review if indicated. The trauma centers have reported that the “Red Box/Blue Box” has helped non-trauma receiving hospitals in the transfer decision-making process and facilitated the rapid movement of patients when required.



POLICY NO:	FAC-4
DATE ISSUED:	5/2005
LAST REVIEW:	9/2017
NEXT REVIEW:	9/2020

## ED PATIENT INTERFACILITY TRANSFERS

**Purpose:** To provide guidance for emergency departments on ground ambulance transport of patients that require interfacility transfer at the Basic (EMT), Advanced Life Support (ALS) (Paramedic), or Critical Care Transport (CCT) levels.

### Compliance with law


- 1) All transfers shall comply with mandates contained in Federal and State law.
- 2) The sending ED physician determines the appropriate level of transportation required. Each ambulance service dispatch center should have call screening mechanisms assisting callers in selecting the most appropriate unit. The dispatch center will identify ALS calls and immediately transfer the call to Public Safety Communications (PSC) for a paramedic response.
- 3) The sending physician or designee should provide verbal report and transfer documents to arriving crews. These transfer documents must include the name of the sending and receiving physician. Once this has occurred, care for the patient is transferred to the ambulance crew until arrival at the destination and care has been transferred to the staff of the receiving facility.
- 4) The sending ED physician makes arrangements for the receipt of the patient by another physician at the receiving facility.


### Description of Transport Options

#### CCT-RN Units

- 1) Type of patient:
  - a) Unstable patient or a stable patient that requires care outside of the paramedic scope of practice
  - b) Service can be scheduled or unscheduled and can be from any hospital department.
- 2) Staffing, equipment and authorization for care:
  - a) The CCT unit is staffed with at least one (1) Registered Nurse and one (1) additional crew member at no less than the EMT level.

APPROVED:

  
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 Nancy A. Lapolla, MPH, EMS Director

  
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 Gregory H. Gilbert, MD, EMS Medical Director

- b) The transferring physician, receiving physician, or CCT provider agency may suggest additional staff.
  - c) If specialized equipment is needed details should be discussed at the time the service is requested.
  - d) Care is provided by the registered nurse under standing orders and standardized procedures authorized by the provider's medical director. Additional orders are provided by the transferring physician.
- 3) Patient destination is determined by the transferring physician based on patient need.
- 4) Requesting a CCT Ambulance:
- a) Request CCT Ambulance through private ambulance provider.
  - b) Urgent service can be requested if needed.
  - c) Do not request a CCT through PSC.

### BLS Ambulance

- 1) Type of patient:
- a) Stable patient unless the BLS ambulance staffing is supplemented by additional health care providers (MD, RN, RT)
- 2) Staffing:
- a) Basic Life Support ambulances are usually staffed with two (2) Emergency Medical Technicians.
  - b) Additional staff may accompany the BLS unit from the transferring hospital if needed and approved by the BLS provider.
  - c) Specialized units staffed by EMT providers may accompany teams for critical care transfer of specialized patients.
- 3) Care During Transports/Scope of Practice:
- a) The EMT will follow standard orders provided by the ambulance provider that are within the state scope of practice (see scope of practice table below).
  - b) The transferring facility may provide additional instructions within this scope of practice
  - c) If the patient's condition deteriorates during transport requiring treatment not included by the physician orders and EMT scope of practice, ambulance personnel will divert to the closest receiving hospital and notify the receiving hospital prior to arrival. The transferring physician will be notified as soon as possible.
- 4) Requesting a BLS ambulance:
- a) Service may be scheduled or unscheduled.
  - b) Urgent service can be requested if needed.
  - c) Do not request a BLS ambulance through PSC.

EMS/911 System Paramedic Ambulance/ALS Ambulance

- 1) Type of patient:
  - a) Unstable or potentially unstable patients from the emergency department transferred to another hospital for specialized or higher level of care. (Examples include: patients identified as major trauma victims by anatomic or physiologic criteria, patients with 3rd trimester obstetrical complications and patients in need of immediate surgical intervention for life threatening events. 911 ambulances may also transfer patients for acute STEMI or stroke care as defined by San Mateo County policy and protocols.)
- 2) Staffing:
  - a) The 911 ambulance is staffed by two health care providers. At least one is a paramedic. The second staff member may be an EMT or paramedic.
- 3) Care During Transport/Scope of Practice:
  - a) The paramedic will follow San Mateo County Emergency Medical Services Policies, Protocols, and Procedures. Any modification must be by a Base Hospital physician and must be within the San Mateo County Scope of Practice (see Scope of Practice chart below)
  - b) Patient destination is determined by the sending physician but must comply with San Mateo County policy and protocol.
- 4) Requesting a 911 system/paramedic ambulance:
  - a) Contact San Mateo County PSC by Microwave phone (344) or landline telephone at 650-364-1313.
  - b) PSC will ask five screening questions to determine patient condition
  - c) The patient should be ready for transfer within 15 minutes of the request to PSC. The ambulance will usually arrive at the hospital within 13 minutes of the request.

Special Considerations

Major Trauma Patient Transfer/Consult (see Trauma Transfer algorithm, next page):

**TRAUMA TRANSFER PROCEDURE**

<b>STEP 1</b>	Determine appropriate level of transfer using chart below. Contact receiving Trauma Center and confirm acceptance of the patient <b>Stanford Trauma Center</b> <ul style="list-style-type: none"> <li>• 1-650-724-2243 (Emergency)</li> <li>• 1-650-723-4696 (Urgent – Adult)</li> <li>• 1-650-723-7342 (Urgent – Pediatric)</li> </ul> <b>Zuckerberg S.F. General Trauma Center:</b> <ul style="list-style-type: none"> <li>• 1-628-206-8111</li> </ul> <b>**Request to speak to Attending in Charge (AIC) about Trauma Re-Triage Patient**</b>
<b>STEP 2</b>	As soon as need for transfer is recognized, request <b>CODE 3 TRAUMA TRANSFER</b> using ED to County Communication microwave direct line (#344)
<b>STEP 3</b>	Prepare patient and paperwork for immediate transport before ambulance arrives.
<b>STEP 4</b>	For trauma consults on patients not meeting red or blue box criteria, contact the trauma center and request to speak to the Trauma Attending-In-Charge about Trauma Re-Triage Patient <ul style="list-style-type: none"> <li>• Stanford Trauma Center: 1-650-723-4696 (Adult) or 1-650-723-7342 (Pediatric)</li> <li>• Zuckerberg SF General Trauma Center: 1-628-206-8111</li> </ul>

**TRAUMA TRANSPORTATION SELECTION CRITERIA****EMERGENCY TRANSFER PATIENTS: Call Trauma Center PRIOR to Transfer and state RED BOX TRAUMA TRANSFER****Stanford Trauma Center:**

- 1-650-724-2243

**Zuckerberg S.F. General Trauma Center:**

- 1-628-206-8111

**\*\*Request to speak to Attending in Charge (AIC) about Trauma Re-Triage Patient\*\*****ED physician determines patient requires immediate evaluation/resuscitation by a trauma center**

Some indicators:

Blood Pressure

- B/P of <90 or
- Decrease in B/P by 30mmHg following 2 liters of IV crystalloid

Head Injury with Blown Pupil

Penetrating Thoracic or Abdominal Trauma

**URGENT TRANSFER PATIENTS: Call Trauma Center PRIOR to Transfer****Stanford Trauma Center:**

- 1-650-723-4696 (Adult)
- 1-650-723-7342 (Pediatric)

**Zuckerberg S.F. General Trauma Center:**

- 1-628-206-8111

**\*\*Request to speak to Attending in Charge (AIC) about Trauma Re-Triage Patient\*\*****ED physician determines that the patient requires urgent evaluation by a trauma center based on the following indicators:**

Anatomic area	Related Injuries
<b>Central Nervous System</b>	<ul style="list-style-type: none"> <li>• GCS &lt;14 with abnormal CT Scan</li> <li>• Spinal Cord or major vertebral injury</li> </ul>
<b>Chest</b>	<ul style="list-style-type: none"> <li>• Major chest wall injury with &gt;3 rib fractures and/or pulmonary contusion</li> <li>• Cardiac Injury</li> </ul>
<b>Pelvis/Abdomen</b>	<ul style="list-style-type: none"> <li>• Pelvic ring disruption</li> <li>• Solid organ injury confirmed by CT Scan or ultrasound demonstrating abdominal fluid</li> </ul>
<b>Major extremity injuries</b>	<ul style="list-style-type: none"> <li>• Fracture/dislocation with loss of distal pulses and/or ischemia</li> <li>• Open long bone fractures</li> <li>• Two or more long bone fractures</li> <li>• Amputations that require reimplantation</li> </ul>
<b>Co-morbid factors</b>	<ul style="list-style-type: none"> <li>• Adults &gt; 65 y/o</li> <li>• <b>Pediatric &lt; 6 y/o Transfer to Stanford (Pediatric Trauma Center)</b></li> <li>• Pregnancy - &gt;22 weeks gestation</li> <li>• Insulin dependent diabetes</li> <li>• Morbid obesity</li> <li>• Cardiac or Respiratory disease</li> <li>• Immunosuppression</li> <li>• Antiplatelet or anticoagulation agents</li> </ul>
<b>Multiple-System Injury</b>	<ul style="list-style-type: none"> <li>• Trauma with associated burns <b>Transfer to closest Trauma Center</b></li> <li>• Major injury to more than two body regions</li> <li>• Signs of hypoperfusion – Lactate &gt;4 or Base Deficit &gt;4</li> </ul>

**TRAUMA LEVEL OF TRANSPORTATION**

CATEGORY	TYPE/STAFF	DESCRIPTION	CAPABILITIES	TYPICAL ETA	PROVIDERS
Emergent ALS	Advanced Life Support	Standard Paramedic transport	Consider for cases meeting <b>emergency</b> and <b>urgent</b> criteria above, paramedic scope of practice	Approx. 10 min	9-1-1 System
CCT-RN	Critical Care Transport Ground: 1 RN	Critical Care RN Transport	Mechanical ventilation and most medications	60-120 min ETA can be extended	Facility Choice
Air Ambulance	Critical Care Transport Air: 2 RNs	Critical Care RN Transport	Advanced practice RN / expanded scope of practice	ETA can be extended	CALSTAR/REACH; LifeFlight

- 1) Pediatric Critical Care Center Transfer:
  - a) San Mateo County recognizes three Pediatric Critical Care Centers (PCCC).
  - b) To contact these centers call their 24 hour consultation line to make transfer and transportation arrangements:
    - i) Stanford Health Care Lucile Packard Children’s Hospital Dispatch 650-723-7342
    - ii) California Pacific Medical Center 888-637-2762 (Transfer Center) or 415-600-0720 (PICU)
    - iii) UCSF Benioff Children’s Hospital– 877-822-4453 (Transfer Center) or 415-353-1352 (PICU)
  - c) If the intended PCCC cannot immediately accept the patient, that PCCC will take responsibility for:
    - i) locating an alternate PCCC able to immediately accept the patient, and
    - ii) keeping the sending hospital informed as to the success or failure of securing a PCCC able to immediately accept the patient.
    - iii) Inform EMS Agency, if PCCC did not assist in finding an alternate PCCC.
- 2) Scope of Practice Chart – (CCT-RN Scope of Practice is determined by provider’s medical director):

Skills/Medication/Procedure	BLS	911 – Paramedic
Vital signs stable	X	X
Unstable vital signs		X
Oxygen by mask or cannula	X	X
Level of consciousness-stable	X	X
Level of consciousness-unstable		X
Peripheral IV established (no additives) 5 or 10% Dextrose, Saline, Ringer’s Lactate or combined solutions	X	X
Peripheral IV established with Lidocaine, Dopamine, or potassium chloride (20 mEq/mL)		X
Mechanical respiratory assistance (patient’s vent accompanied by a trained attendant who will do suctioning)	X	X
Intubated patient with BVM ventilation		X
NG, gastric tubes, Foley catheter	X	X
Saline lock, indwelling vascular access device (not infusing fluids or medication)	X	X
Central IV line in place (non-infusing)	X	X
Cardiac monitor		X
Temporary pacemaker in place		X



Standby or anticipated transcutaneous pacing		X
Medication administration in progress or anticipated. IV drips cannot be maintained on a mechanical pump and are only approved as noted. Adenosine Albuterol Atropine Calcium Chloride Dopamine-IV Drip Dextrose Diphenhydramine Midazolam Morphine Sulfate Narcan Nitroglycerine spray or paste Ondansetron Sodium Bicarbonate		X

# Trauma Treatment Protocols

# Trauma Triage

Scene time goal is 10 minutes

## ACTIVATION



Traumatic arrest?



 **Traumatic Arrest**

Unmanagable airway?

**Transport to closest facility to secure airway**

### Measure vital signs and level of consciousness

1

GCS $\leq$ 13
Systolic blood pressure $<$ 90mmHg $\leq$ 6 years old SBP $<$ 60 mmHg
Adult respiratory rate $<$ 10 or $>$ 29 <u>or</u> need for ventilatory support
Infant ( $<$ 1 year of age) respiratory rate $<$ 20



**Trauma Center transport with early notification**

### Assess anatomy of injury

2

All gunshot wounds	Open or depressed skull deformity
Chest wall instability or deformity (e.g., flail chest)	Traumatic paralysis or paresthesia
Two or more proximal long bone fractures	Combination of trauma with burns
Crushed, degloved, mangled, or pulseless extremity	
Amputation above the wrist or ankle	
Penetrating injuries to head, neck, torso, groin and extremities proximal to elbow and knee	
Pelvic fractures	



**Trauma Center transport with early notification**

### Assess mechanism of injury and evidence of high-energy impact

3

Adult fall $>$ 20 feet	Auto-pedestrian/auto-bicycle/motorcycle Separated from, thrown or run over Obvious injury Complaint of pain or injury
Pediatric fall $>$ 10 feet <u>or</u> 2 times height of child	Significant blunt trauma to head/torso from large animal (i.e. kick/fall from horse)
High risk auto crash: Death in same vehicle Ejection (partial or complete) Extrication $>$ 20 minutes Vehicle telemetry data confer high risk Intrusion on patient side or roof $>$ 12 inches <u>or</u> $>$ 18 inches at any site	



**Trauma Center transport with early notification**

Adult and Pediatric Trauma Treatment Protocols



# Trauma Triage

Scene time goal is 10 minutes

**For other situations not described below, consider Trauma Base Hospital contact if paramedic has concern that a serious injury may exist**

### Risk Factor Advisory

Patients who do not meet Box 1-3 criteria may still be prone to seriously injury, specifically if they have one or more of the following risk factors:

- Pregnancy over 20 weeks
- Communication barrier (e.g., age, language, psychiatric, or developmental issues)
- Age 55 or older
- Patient taking anticoagulants or with known bleeding disorder
- Patient with co-morbidity factors
- Central nervous system changes
- Time sensitive injuries

**4**

Motor vehicle crash

- Estimated impact speed of > 40mph
- Mechanical extrication required by fire department personnel
- Rollover with unrestrained occupant

Person struck by a vehicle at < 20mph

Person ejected/fell from other object (e.g., motorcycle, horse, or ATV)

Blunt assault with weapon (e.g., pipe, bat, or golf club)

Falls > 10 but < 20 feet

*This list is not all-inclusive and other high energy mechanisms encountered also merit Trauma Base Hospital contact*



Trauma Center transport with early notification



Transport to hospital of patient choice



# Trauma Triage

Scene time goal is 10 minutes

## Pearls

- Do *not* let alcohol confuse the clinical picture. Persons using alcohol may have unrecognized injuries, particularly head bleeds.
- A complete hands on head-to-toe assessment is required for all trauma patients.
- Transport should be initiated within 10 minutes of ambulance arrival unless patient requires extrication.

## Age Categories

Adult Patient – Trauma patients 15 years of age and older.

Pediatric Patients – Trauma patients under the age of 15 years.

## Trauma Receiving Facilities

Adult Trauma Center catchment areas:

- Stanford Hospital – Any area south of and including Devil’s Slide; City of Millbrae south of Trousdale Drive between I-280 and El Camino Real; and south of Millbrae Avenue between El Camino Real and the San Francisco Bay.
- Zuckerberg San Francisco General Hospital – Any area north of Devil’s Slide; City of Millbrae north of Trousdale Drive between I-280 and El Camino Real; and north of Millbrae Avenue between El Camino Real and the San Francisco Bay. Include San Francisco International Airport.
- Eden Medical Center – Eastbound on the San Mateo or Dumbarton Bridges.

Pediatric Trauma Center catchment areas:

- Stanford Hospital – **All patients < 6 years** or any area south of and including Devil’s Slide; City of Millbrae south of Trousdale Drive between I-280 and El Camino Real; and south of Millbrae Avenue between El Camino Real and the San Francisco Bay.
- Zuckerberg San Francisco General Hospital – All patients > 6 years and any area north of Devil’s Slide; City of Millbrae north of Trousdale Drive between I-280 and El Camino Real; and north of Millbrae Avenue between El Camino Real and the San Francisco Bay. Include San Francisco International Airport.

Receiving Facilities – Local hospitals that are not trauma receiving facilities are destinations for patients who are triaged by the Base Hospital at the time of report as not requiring trauma center care. A trauma receiving facility may also serve as the receiving facility when it is the patient’s facility of choice.

## Low Energy Mechanism Trauma

Low energy mechanism trauma may not obviously reveal significant trauma. Examples include, but are not limited to ground level or short falls, blunt assault without a weapon (e.g., closed fist), low speed motor vehicle crash, or other blunt trauma (e.g., sports injury). Symptoms or concern may include:

- Symptoms in the presence of head injury such as headache, vomiting, loss of consciousness, repetitive questioning, abnormal, or combative behavior or new onset of confusion
- Pain level greater than 5/10 related to head, neck, or torso injury
- Any concerns due to hypotension, tachycardia, or tachypnea
- Systolic BP < 110mmHg in patients 65 years of age or older
- Torso injury with tenderness of abdomen, chest/ribs or back/flank
- Suspected hip dislocation or pelvis injury

## Other Definitions

Unmanageable Airway – A patient whose airway is unable to be adequately maintained with BLS or ALS maneuvers. All trauma patients are candidates for immediate redirection to the trauma center following airway stabilization at a non-trauma receiving facility.



# Extremity Trauma

For any traumatic injury (-ies) to the extremities that does not involve the head

**History**

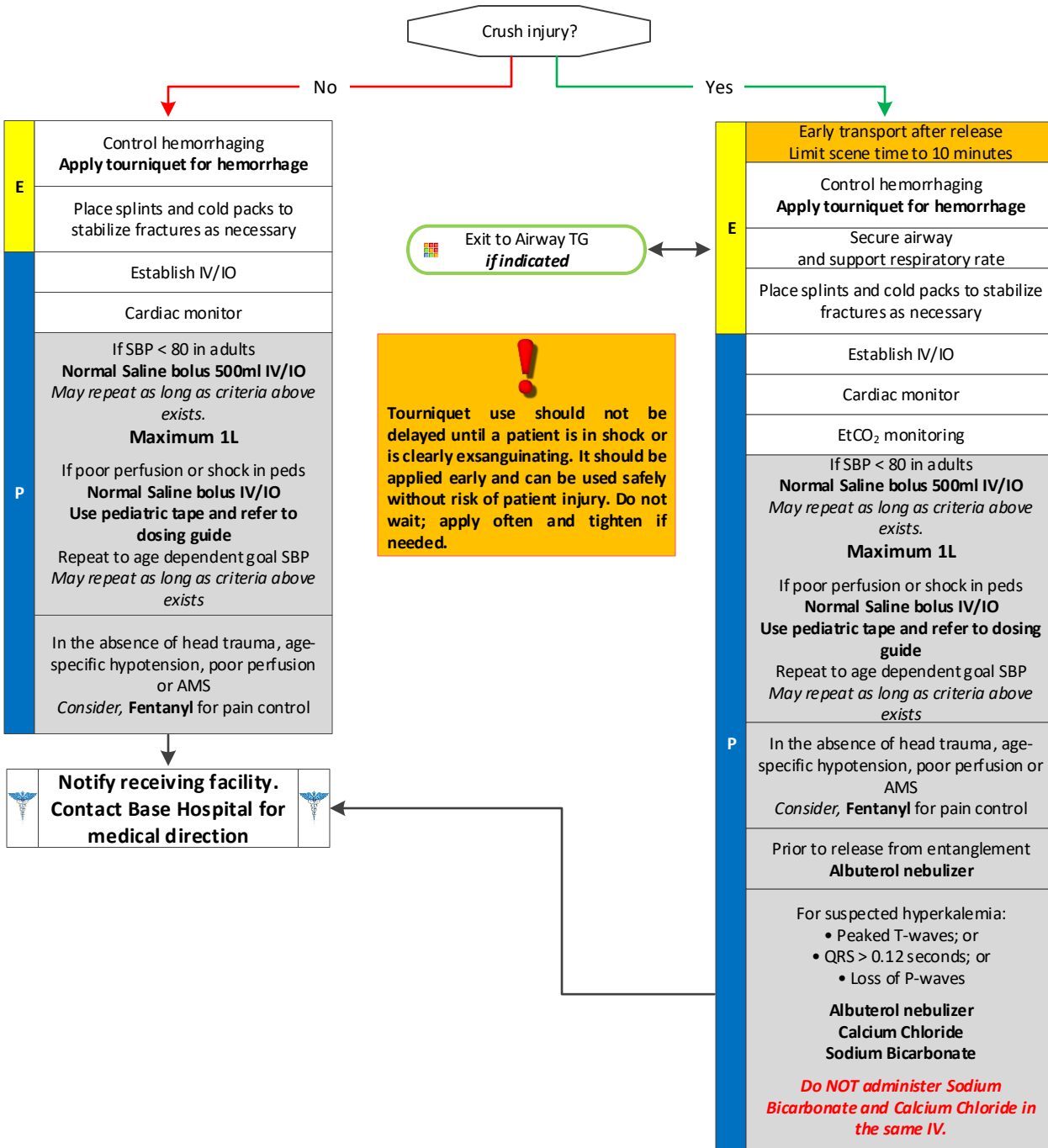
- Type and time of injury
- Mechanism (crush, penetrating, blunt, or amputation)
- Open vs. closed wound/fracture
- Past medical history
- Medications

**Signs and Symptoms**

- Evidence of trauma
- Pain, swelling, deformity, or bleeding
- Altered sensation or motor function
- Diminished pulse or capillary refill
- Decreased extremity temperature

**Differential**

- Abrasion
- Contusion
- Laceration
- Sprain
- Dislocation
- Fracture
- Amputation



Adult and Pediatric Trauma Treatment Protocols

# Extremity Trauma

For any traumatic injury (-ies) to the extremities that does not involve the head

## Pearls

- For partial amputations, splint affected extremity in anatomic location and elevate extremity.
- For complete amputations, place amputated part in a dry container or bag and place on ice. Seal or tie off bag and place in second container or bag. DO NOT place amputated extremity directly on ice or in water. Elevate extremity and dress with dry gauze.
- Penetrating trauma to an extremity may hide significant vascular injury and hemorrhage. Early application of a tourniquet should be considered.
- Hypotension is age dependent. This is not always reliable and should be interpreted in context with the patient's typical BP, if known. Shock may be present with a seemingly normal blood pressure initially.
  - Neonate: < 60mmHg or weak pulses
  - Infant: < 70mmHg or weak pulses
  - 1-10 years: < 70mmHg + (age in years x2)
  - Over 10 years: <90mmHg
  - Over 65 years: <110mmHg
- If vigorous hemorrhage is not controlled with direct pressure and elevation on wound, apply a tourniquet. Tourniquets may be used in pediatric patients. Tourniquets may also be appropriate for hemorrhage control in multi-casualty incidents.
- Crush Injury Syndrome is caused by muscle crush injury and cell death. Most patients have an extensive area of involvement such as a large muscle mass in a lower extremity or the pelvis. May develop after one (1) hour in the presence of a severe crush, but usually requires at least four (4) hours of compression. Hypovolemia and hyperkalemia may occur, particularly in extended entrapments.
- An important item to monitor and document is a change in the level of consciousness by repeat examination.
- Do not overlook the possibility of associated domestic violence or abuse.



# Head Trauma

For any traumatic injury that involves the head; includes multi-system trauma that involves the head

**History**

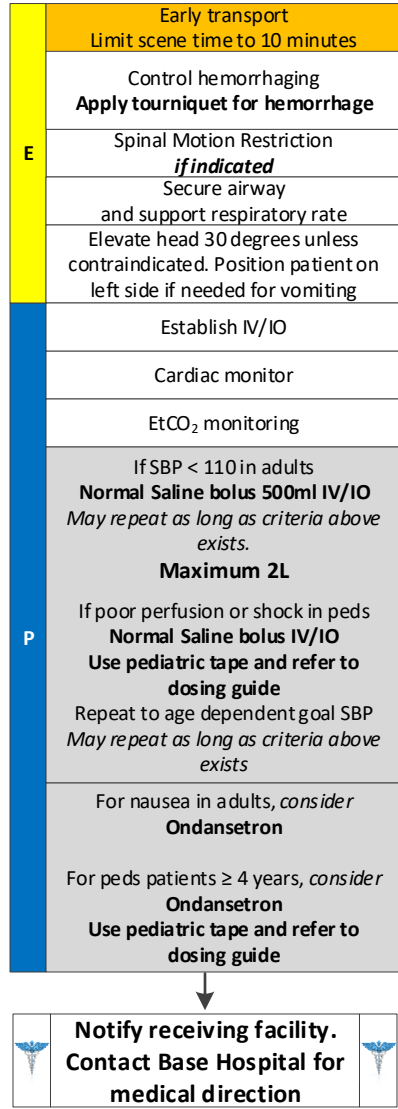
- Time of injury
- Mechanism (blunt vs. penetrating)
- Loss of consciousness
- Bleeding
- Past medical history
- Medications (anticoagulants)

**Signs and Symptoms**

- Evidence of trauma
- Pain, swelling, or bleeding
- AMS
- Unconscious
- Respiratory distress or failure
- Vomiting
- Seizure

**Differential**

- Skull fracture
- Spinal injury
- Abuse



**Respiratory Arrest/Failure**  
if indicated

**Tourniquet use should not be delayed until a patient is in shock or is clearly exsanguinating. It should be applied early and can be used safely without risk of patient injury. Do not wait; apply often and tighten if needed.**

Adult and Pediatric Trauma Treatment Protocols



# Head Trauma

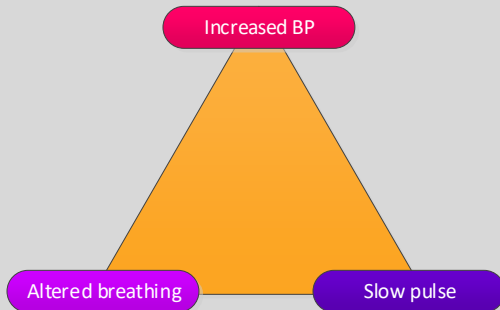
For any traumatic injury that involves the head; includes multi-system trauma that involves the head

## Increased Intracranial Pressure

Changes in LOC  
Impaired eye movement  
↓ sensory/motor function

### Infants

*Bulging fontanel*  
*Cranial suture separation*  
*↑ head circumference*  
*High-pitched cry*



Headache  
Pupillary changes  
Vomiting  
Changes in vital signs  
    ↑ Blood pressure  
    ↓ Pulse  
    Changes in respiratory pattern

### Pearls

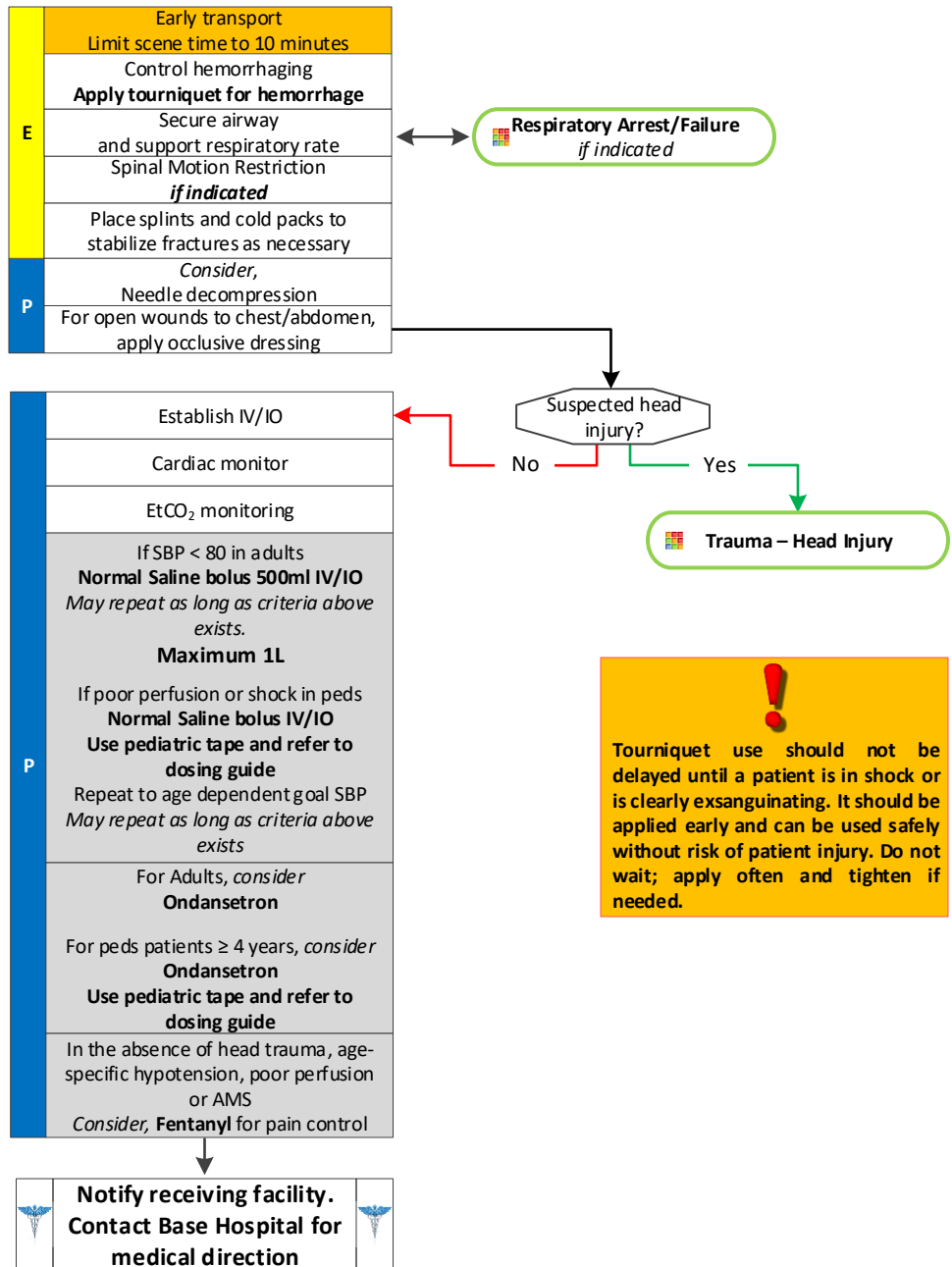
- ALS procedures in the field do not significantly improve patient outcome in critical trauma patients.
- Basic airway management is preferred unless unable to effectively manage with BLS maneuvers. Utilize modified jaw thrust technique to open the airway.
- Intubation of head injury patients is best addressed at the hospital.
- Hypotension is age dependent and is not always a reliable sign. It should be interpreted in context with the patient's typical BP, if known. Shock may be present with a seemingly normal blood pressure initially.
  - Neonate: < 60mmHg or weak pulses
  - Infant: < 70mmHg or weak pulses
  - 1-10 years: < 70mmHg + (age in years x2)
  - Over 10 years: <90mmHg
  - Over 65 years: <110mmHg
- Avoid hyperventilation. Maintain an EtCO<sub>2</sub> of 35 or greater, which may be unreliable if the patient was subject to multisystem trauma or poor perfusion.
- In patients with a dilated pupil on one side or posturing, which indicates brainstem herniation, modest hyperventilation is appropriate. Keep EtCO<sub>2</sub> of 30 or greater.
- Scalp hemorrhage can be life threatening. Treat with direct pressure and pressure dressing.
- Increased intracranial pressure may cause hypertension and bradycardia.
- Hypotension usually indicates injury or shock unrelated to the head injury and should be treated aggressively.
- An important item to monitor and document is a change in the level of consciousness by repeat examination.
- Limit IV fluids unless the patient is hypotensive.
- Concussions are traumatic brain injuries involving any number of symptoms including confusion, LOC, vomiting, or headache. Any prolonged confusion or mental status abnormality which does not return to the patient's baseline within 15 minutes of injury or any documented LOC should be evaluated by a physician.
- Do not overlook the possibility of associated domestic violence or abuse.



# Multi-System Trauma

For any traumatic injuries that involve multiple systems or isolated chest or abdominal injuries. For injuries involving the head, use Head Trauma protocol

<p><b>History</b></p> <ul style="list-style-type: none"> <li>• Time of injury</li> <li>• Mechanism (blunt vs. penetrating)</li> <li>• Damage to structure or vehicle</li> <li>• Location of patient in structure or vehicle</li> <li>• Restraints or protective equipment use</li> <li>• Past medical history</li> <li>• Medications</li> </ul>	<p><b>Signs and Symptoms</b></p> <ul style="list-style-type: none"> <li>• Evidence of trauma</li> <li>• Pain, swelling, deformity, lesions, or bleeding</li> <li>• AMS</li> <li>• Unconscious</li> <li>• Respiratory distress or failure</li> <li>• Hypotension or shock</li> <li>• Arrest</li> </ul>	<p><b>Differential</b></p> <ul style="list-style-type: none"> <li>• Chest:             <ul style="list-style-type: none"> <li>• Tension pneumothorax</li> <li>• Flail chest</li> <li>• Pericardial tamponade</li> <li>• Open chest wound</li> <li>• Hemothorax</li> </ul> </li> <li>• Intra-abdominal bleeding</li> <li>• Pelvis or femur fracture</li> <li>• Spinal injury</li> <li>• Head injury</li> <li>• Hypothermia</li> </ul>
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Adult and Pediatric Trauma Treatment Protocols

# Multi-System Trauma

For any traumatic injuries that involve multiple systems or isolated chest or abdominal injuries. For injuries involving the head, use Head Trauma protocol

## Pearls


- ALS procedures in the field do not significantly improve patient outcome in critical trauma patients.
- Basic airway management is preferred unless unable to effectively manage with BLS maneuvers. Utilize modified jaw thrust technique to open the airway.
- Intubation of head injury patients is best addressed at the hospital.
- Hypotension is age dependent and is not always a reliable sign. It should be interpreted in context with the patient's typical BP, if known. Shock may be present with a seemingly normal blood pressure initially.
  - Neonate: < 60mmHg or weak pulses
  - Infant: < 70mmHg or weak pulses
  - 1-10 years: < 70mmHg + (age in years x2)
  - Over 10 years: <90mmHg
  - Over 65 years: <110mmHg
- Stabilize flail segments with bulky dressing.
- Cover eviscerated bowel with dry sterile dressing.
- Stabilize impaled object(s) with bulky dressing. Do not remove.
- Avoid hyperventilation. Maintain an EtCO<sub>2</sub> of 35 or greater, which may be unreliable if the patient was subject to multisystem trauma or poor perfusion.
- An important item to monitor and document is a change in the level of consciousness by repeat examination.
- Do not overlook the possibility of associated domestic violence or abuse.



# Traumatic Arrest

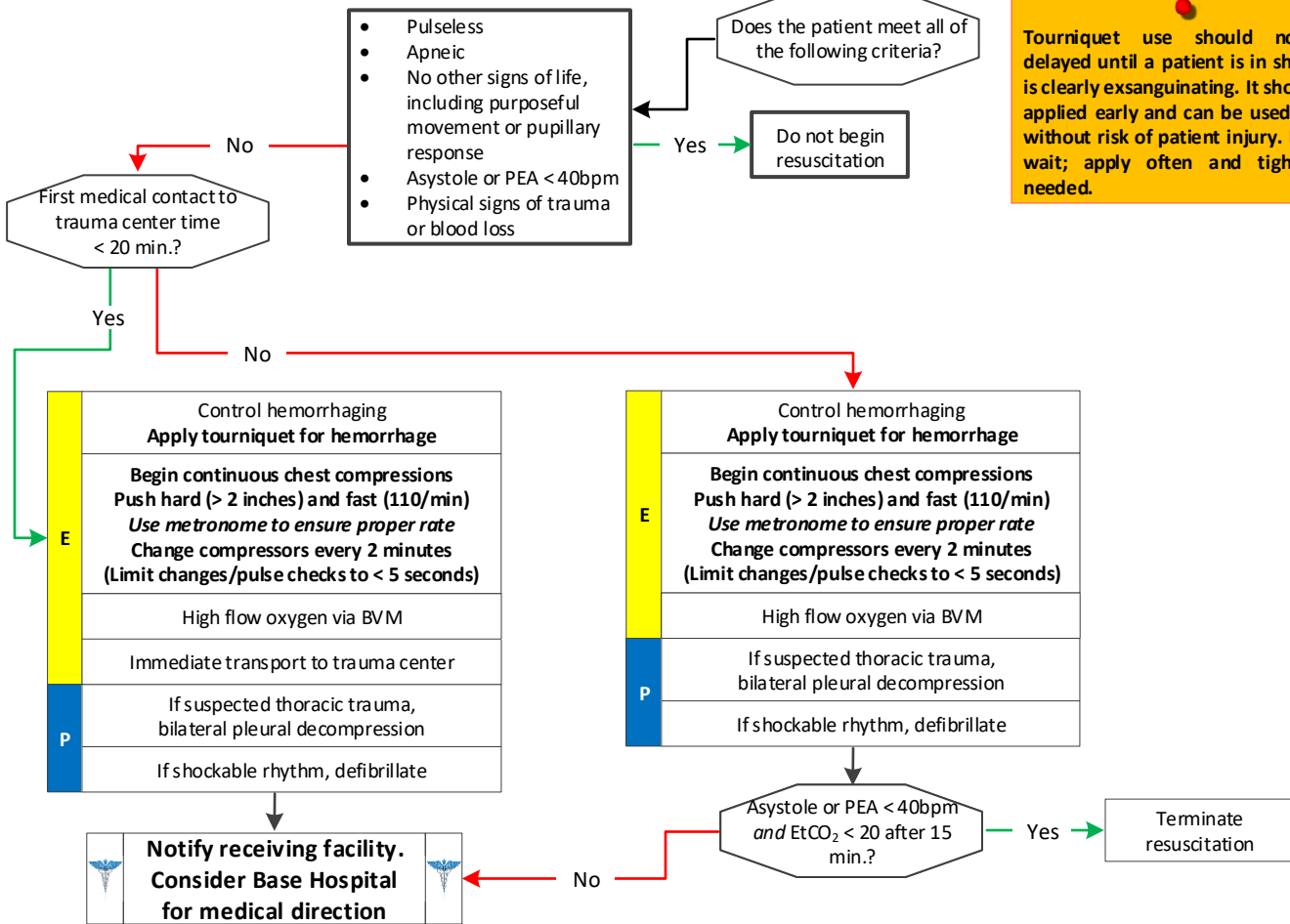
For cardiac arrest with penetrating or blunt traumatic mechanism. NOT for trauma sustained after cardiac arrest, use primary impression Cardiac Arrest – Non-traumatic

<b>History</b> <ul style="list-style-type: none"> <li>Evidence of trauma or blood loss</li> <li>Events leading to arrest</li> <li>Estimated downtime</li> </ul>	<b>Signs and Symptoms</b> <ul style="list-style-type: none"> <li>Unresponsive</li> <li>Apneic</li> <li>Pulseless</li> </ul>	<b>Differential</b> <ul style="list-style-type: none"> <li>Tension pneumothorax</li> <li>Cardiac tamponade</li> <li>Hypovolemic shock</li> <li>Spinal shock</li> <li>Traumatic brain injury</li> </ul>
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<b>E</b> <p>Has a paramedic, EMT, designated first responder, or public safety officer found injuries incompatible with life, including one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>Decapitation</li> <li>Incineration</li> <li>Rigor Mortis</li> <li>Decomposition</li> <li>Apnea with destruction and/or separation of the body from the heart, brain, liver, or lungs</li> <li>Multi-casualty incidents (MCIs) where triage principles preclude the initiation or continuation of resuscitation</li> </ul>	<p style="text-align: center;"><b>AT ANY TIME</b></p> <p style="text-align: center;">Return of spontaneous circulation</p>  <p style="text-align: center;">Multi-System Trauma</p>
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**!**

Tourniquet use should not be delayed until a patient is in shock or is clearly exsanguinating. It should be applied early and can be used safely without risk of patient injury. Do not wait; apply often and tighten if needed.



**Pearls**

- Patients who do not qualify for field determination of death but have or develop cardiopulmonary arrest should be transported to the closest trauma center.

# Burns

For any burn injury to skin. For inhalation injury, use primary impression Inhalation Injury. Use with primary impression Traumatic Injury if other trauma present

**History**

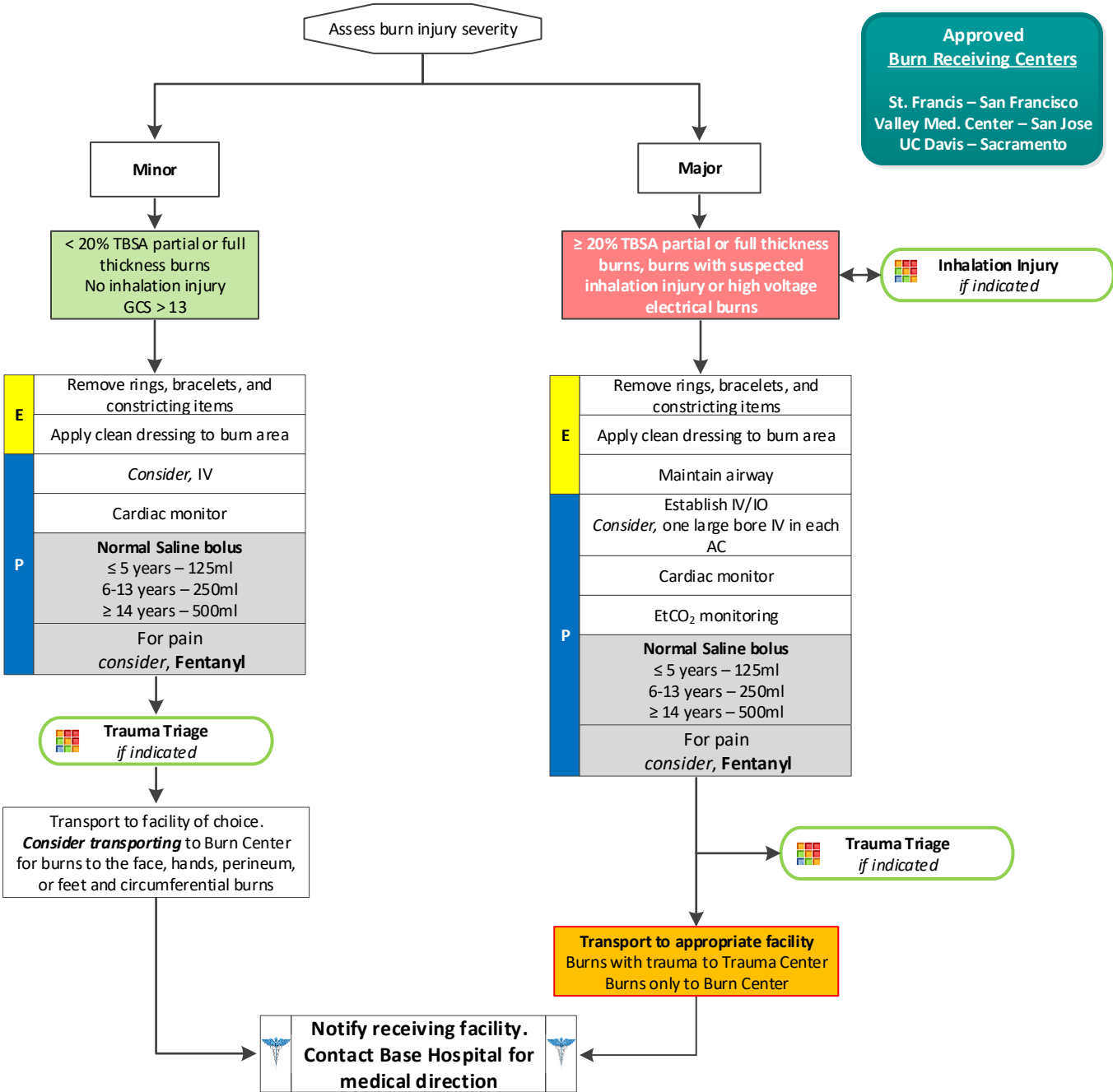
- Type of exposure (heat, gas or chemical)
- Inhalation injury
- Time of injury
- Other trauma
- Past medical history
- Medications

**Signs and Symptoms**

- Burns, pain, or swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise or distress could be presented as hoarseness or wheezing

**Differential**

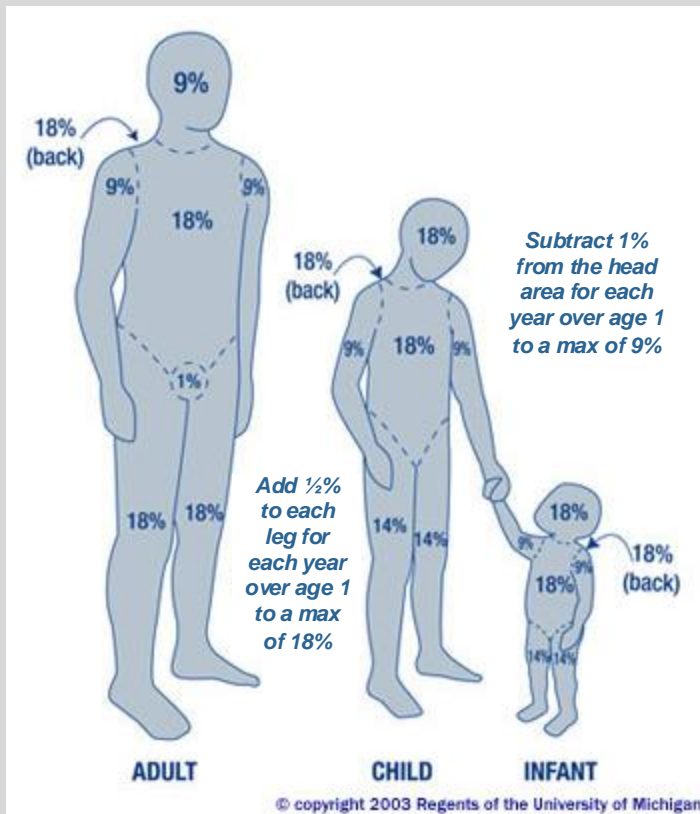
- Superficial – red and painful (do not include in TBSA)
- Partial thickness – blistering
- Full thickness – painless with charred or leathery skin
- Chemical injury
- Thermal injury
- Radiation injury
- Blast injury



Adult and Pediatric Trauma Treatment Protocols

# Burns

For any burn injury to skin. For inhalation injury, use primary impression Inhalation Injury. Use with primary impression Traumatic Injury if other trauma present



## Rule of Nines

- Seldom will you find a complete isolated body part that is injured as described in the Rule of Nines. More likely, it will be portions of one area, portions of another, and an approximation will be needed.
- For the purpose of determining the extent of serious injury, differentiate the area with minimal (superficial) burn from those of partial or full thickness burns.
- When calculating TBSA of burns, include only partial and full thickness burns; do not include superficial burns in the calculation.

## Burn Assessment Terminology

Approved Terminology	Old Terminology
Superficial	1 <sup>st</sup> degree
Partial thickness	2 <sup>nd</sup> degree
Full thickness	3 <sup>rd</sup> degree

Burn assessment should be documented and reported using only approved terminology

## Pearls

- Airway burns may lead to rapid compromise of the airway and can be identified by soot around the nares or mouth or visible burns or edematous mucosa in the mouth.
- Early intubation is required when the patient experiences significant inhalation injuries. If the patient requires advanced airway management that cannot be quickly achieved in the field, transport to the nearest facility for stabilization prior to transfer to the Burn Center. Do not wait for a helicopter if airway patency is a critical concern.
- Contact Burn Center prior to transport to confirm bed availability.
- For major burns, do not apply wet dressings, liquids or gels to burns unless it is to remove whatever caused the burn (i.e. dry chemical agent, etc.). Cooling large burns may lead to hypothermia.
- Burn patients are often trauma patients. If burns are evident in the presence of trauma, follow trauma triage guidelines and transport to trauma center if activation criteria is met.
- Circumferential burns to extremities are dangerous due to potential vascular compromise secondary to soft tissue swelling.
- Never administer IM pain medication into a burned area.
- IV/IOs may be placed through burns as a last resort.



# Data Collection-March 1, 2018-February 28, 2019

Stanford received 1,375 patients from San Mateo County during this twelve-month period. Based on data provided by Stanford, this number represents 47% all trauma patients that the hospital received via 911 system initiated transport and the largest number of patients that Stanford received from any County.

During the same time period, 531 trauma patients were transported by the SMC EMS system to ZSFG, representing approximately 13% of all trauma patients that the hospital received via 911 system initiated transport.

Stanford	Zuckerberg (ZSFG)	Total
Total n from SMC = 1,375	Total n from SMC = 531	1,906
Blunt trauma = 1,314 (95.6%)	Blunt trauma = 495 (93.2%)	
Penetrating trauma =61 (4.4%)	Penetrating trauma = 36 (6.7%)	

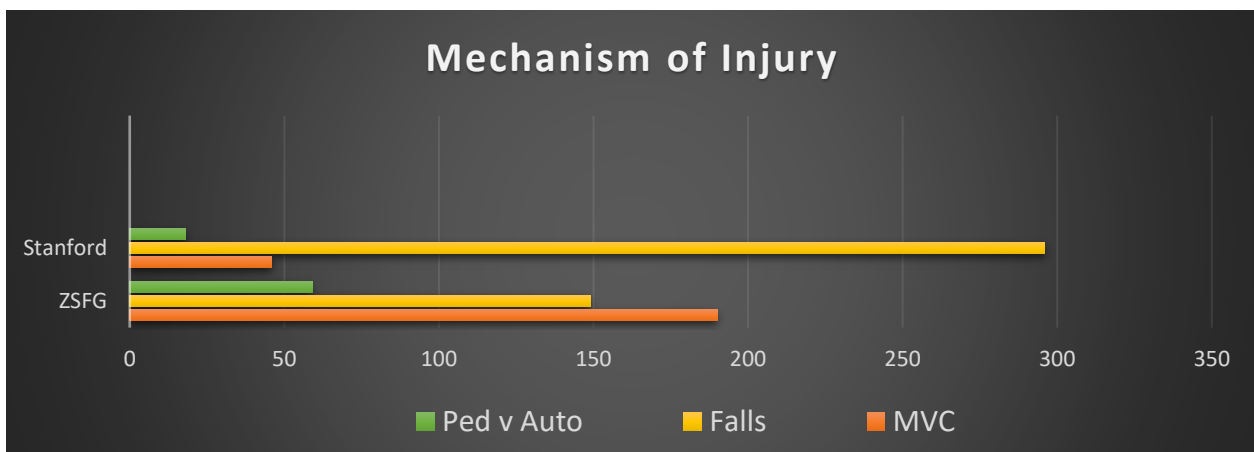
## Activation Levels

Major Trauma activations of all trauma patients:

- Stanford: 95 or 7%
- ZSFG: 100 or 19%

## Admission Rates

Of the 1,375 trauma patients transported from SMC to Stanford, 64% were admitted. Similarly, 63% of trauma patients transported to ZSFG from SMC were admitted.



The top three mechanisms of injuries for trauma patients treated at both centers were falls, motor vehicle collisions, and auto vs. pedestrian. ZSFG is located within the urban area of San Francisco. At this facility, motor vehicle crashes represented the largest mechanism of injury cohort, followed by falls and then automobile v. pedestrian.

By contrast, falls represented the largest mechanism of injury cohort at Stanford, followed second by motor vehicle crashes, and lastly by auto vs. pedestrian.

## FY2018/2019 Proposed Objectives

The following proposed objectives were submitted with the most recently submitted plan. The status of each is indicated in the color red.

1. Revise adult and pediatric trauma field treatment guidelines
  - a. Enlist input/review by all trauma centers-This has been completed and the updated field treatment protocols will be implemented April 1, 2020. Both adult trauma centers were consulted and provided input to the treatment protocols. The pediatric trauma center was also consulted and provided recommendations that were implemented.
  - b. Monitor/audit required prehospital trauma education-The approved trauma curriculum is being taught and monitored by each of our stakeholder agency supervisors, the EMS Medical Director and clinical staff.
2. Participate in the ACS re-verification site reviews of the three trauma centers-The EMS Director and the EMS Clinical Services Manager participated in both Stanford Adult and Pediatric ACS verifications as well as ZSFG ACS verification and the corresponding San Francisco LEMSA re-designation.
3. Review and renew as needed, contracts with the trauma centers pending re-designations by their respective LEMSAs. The EMS Agency has developed trauma receiving center contracts for SHC and ZSFG.
4. Monitor the proposed Richie Fund activities of the Level One Pediatric Trauma Center at Stanford Health Care-This is an ongoing activity. The EMS Agency meets regularly with Stanford in this regard.



## 2020 Objectives

1. Continue to monitor trauma center receiving hospital performance.
2. Stay up-to-date on current best practices for trauma care. Discuss recommendations and promote high quality care and prevention programs amongst the receiving trauma centers serving SMC.
3. Continue to monitor trauma scene time and discuss the findings with our prehospital stakeholders, making improvements when necessary.

## Trauma Quality Improvement

The recently revised Trauma treatment protocols prioritize early recognition of the critical trauma patient as well as activation and notification to facilitate the trauma team being ready when the patient arrives at the trauma center. Physiologic, anatomic, and mechanism criteria found in Operations policies are now listed in the Trauma Triage (T01) treatment protocol.

Limiting scene time to <10 minutes or documenting why doing so is not possible due to staging, extrication etc., is being taught in the trauma curriculum. There has been an ongoing effort to decrease trauma scene time as the Core Measure for this metric was approximately 23 minutes. This metric did not consider the need for patient extrication or staging.

If the mechanism was one of low-energy and a non-trauma hospital is considered for destination, early notification to the non-trauma hospital is encouraged. This allows the non-trauma hospital to redirect while the patient is still in the field if they feel the patient could be better served at a trauma center.

## Injury Prevention Public Education

The EMS Agency has been involved in public education related to injury prevention. Our involvement includes participation in Stop the Bleed, Elderly Falls, and other programs.

San Mateo County has also participated in data gathering efforts led by both trauma centers including ZSFG's and San Francisco's "Vision Zero" initiative related to motorized scooters and ride-share alternate transport modes designed to assess the impact of these methods of travel on injuries. The injury coding in our electronic data system has been expanded to provide much

more specificity relative to motor vehicle crash and now includes: motorcycles, motorized scooters, train, BART, and off-road vehicle for example.

SMC's 911 ambulance services agreement with American Medical Response now requires the provision of a Community Education Service Advocate. This position will collaborate with SMC to promulgate and support Injury Prevention programs within the County.

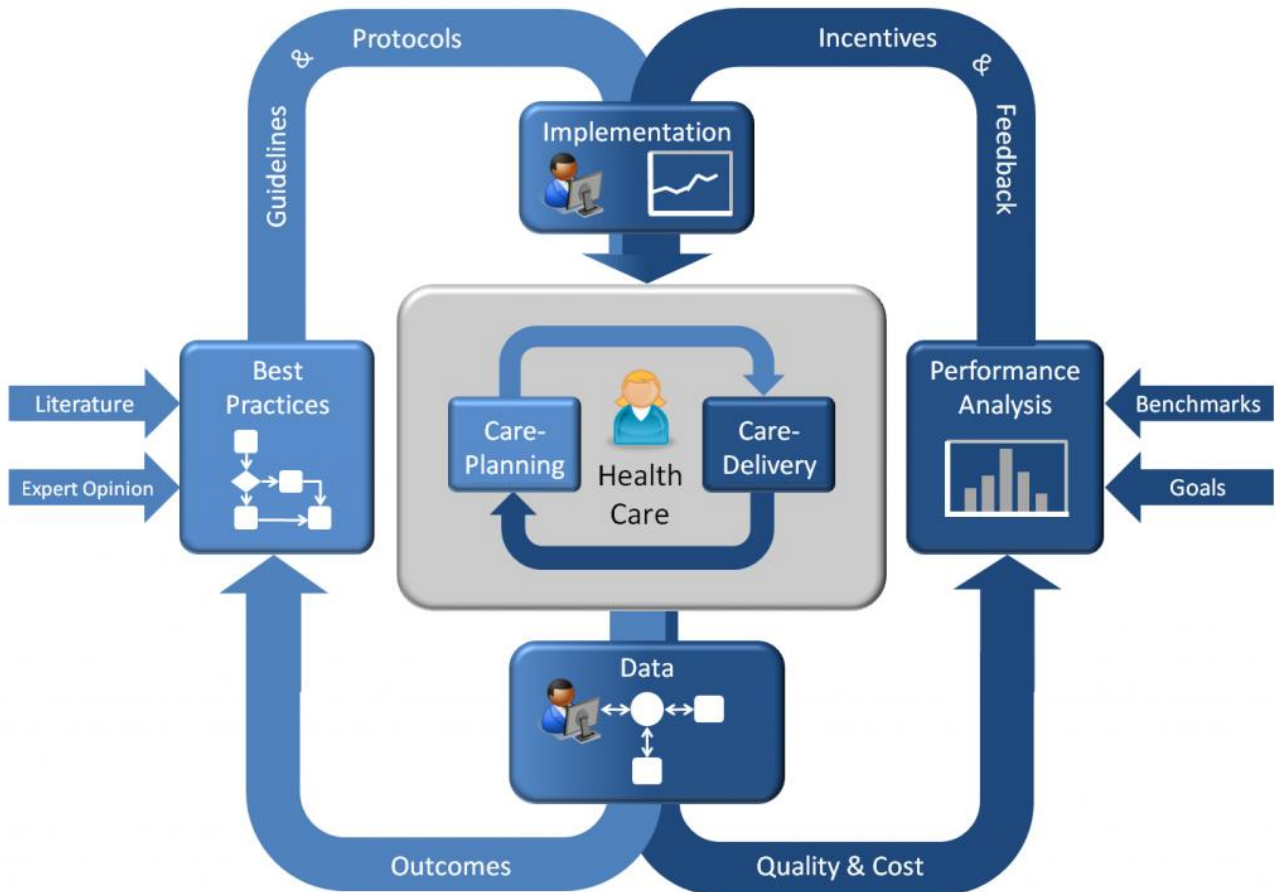
## Training and Education

All field crews are trained utilizing a standardized trauma curriculum that is evaluated and approved by the SMC EMS Medical Director as part of the annual training calendar for each 911 system provider agency.

A standardized training Power Point, post-test, and associated documents have been prepared by the EMS Agency, reviewed with key leadership stakeholders and disseminated to all provider agencies in anticipation of the new Trauma Triage and Treatment Protocols which become effective April 1, 2020.

# Action to Improve

The EMS Agency largely follows Deming's Circle concept of Plan-Do-Study-Act (PSDA), which is reviewed with our clinical system stakeholders.



Striving to create best practices, the EMS Agency focuses on clinical research, trauma continuous quality improvement, and recommendations by the American College of Surgeons. Best practices in trauma care and current literature for example, CRASH III, are discussed with key stakeholders at our quality meetings. Recommendations for practice change are discussed with our trauma centers and with our San Mateo County Medical Advisory Committee.

# Annual Update

The EMS Agency will update the trauma system status plan annually and send to EMSA. This update will include any system changes and other EMSA specified criteria.