San Mateo County Emergency Medical Services

**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

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**Crush injury?**

**No**

**Yes**

- **Early transport after release**
  - Limit scene time to 10 minutes
  - Control hemorrhaging
    - Apply tourniquet for uncontrolled hemorrhage
  - Secure airway and support respiratory rate
  - Place splints and cold packs to stabilize fractures as necessary

- **Exit to Airway protocols if indicated**

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**Crush injury?**

**No**

- **Notify receiving facility.**
- **Contact Base Hospital for medical direction**

**Yes**

- **Establish IV/IO**
- **Cardiac monitor**
  - **EtCO₂ monitoring**
  - If SBP < 80 in adults
    - Normal Saline bolus 500ml IV/IO
    - May repeat as long as criteria above exists.
    - Maximum 1L
  - If poor perfusion or shock in peds
    - Normal Saline bolus IV/IO
    - Use pediatric tape and refer to dosing guide
    - Repeat to age dependent goal SBP
    - May repeat as long as criteria above exists
  - In the absence of head trauma, age-specific hypotension, poor perfusion or AMS
    - Consider, Acetaminophen or Fentanyl for pain control

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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.**

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**For suspected hyperkalemia:**
- Peaked T-waves;
or
- QRS > 0.12 seconds;
or
- Loss of P-waves

**Albuterol/Levalbuterol**
**Calcium Chloride**
**Sodium Bicarbonate**

*Do NOT administer Sodium Bicarbonate and Calcium Chloride in the same IV.*
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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.