Contra Costa County Emergency Medical Services

Extremity Trauma

### 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?**

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**E**

control hemorrhaging

- Apply tourniquet for hemorrhage or shock

- Place splints and cold packs to stabilize fractures as necessary

- Establish IV/IO

- Cardiac monitor

- If SBP < 90 in adults
  - Normal Saline bolus 500ml IV/IO
  - Reassess patient for criteria above
  - May repeat to a Maximum 1L as long as criteria above exists

- If poor perfusion or shock in peds
  - Normal Saline bolus IV/IO
  - Use PEDIATAPE and refer to dosing guide
  - Repeat to age dependent goal SBP
  - May repeat to a Maximum 1L as long as criteria above exists

- In the absence of head trauma, age-specific hypotension, poor perfusion or AMS
  - Consider, Fentanyl for pain control

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

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**P**

control hemorrhaging

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

- Establish IV/IO

- Cardiac monitor

- EtCO$_2$ monitoring

- If SBP < 90 in adults
  - Normal Saline bolus 500ml IV/IO
  - Reassess patient for criteria above
  - May repeat as long as criteria above exists

- If poor perfusion or shock in peds
  - Normal Saline bolus IV/IO
  - Use PEDIATAPE 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, Fentanyl for pain control

- Prior to release from entanglement
  - Albuterol nebulizer 5mg in 6ml Normal Saline

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

- Albuterol nebulizer 5mg in 6ml Normal Saline
- Calcium Chloride 1gm over 60 seconds
- 20ml flush IV/IO prior to administering next med
- Sodium Bicarbonate 1mEq/kg

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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

• 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.
• In cases of clear-cut traumatic arrest, epinephrine is not indicated in PEA or asystole. Epinephrine will not correct arrest caused by a tension pneumothorax, cardiac tamponade, or hemorrhagic shock. If there is any doubt as to the cause of arrest, treat as a non-traumatic arrest.
• 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 elevation and direct pressure 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.
• Avoid hyperventilation. Maintain an EtCO₂ of 35 or greater, which may be unreliable if the patient was subject to multisystem trauma or poor perfusion.
• Hypotension usually indicates injury or shock and should be treated aggressively.
• 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.