The following protocol is designed to focus on patient care not covered in the Initial Assessment/Care **Protocol 1** and specific injuries that require specialized care. Patients meeting Trauma Alert Criteria should be transported immediately, with scene times as minimal as possible. Aside from a prolonged extrication, on scene times should be no greater than **10 minutes**. If on scene times are greater than 10 minutes, the reason for delay must be documented on the ePCR narrative.

A Trauma Alert will be declared for patients with injuries that meet Trauma Alert Criteria that have occurred within the last **24-hours.**

A. Hemorrhage Control
B. Penetrating Wounds to the Torso
C. Suspected Head/Spinal Injury
D. Epistaxis (Nose Bleed)
E. Soft Tissue Injuries
F. Suspected Fractures
G. Trauma in Pregnancy
H. Burn Injuries
I. Eye Injuries
J. Reperfusion (Crush) Injury
K. Traumatic Asphyxia

General Care

EMR/BLS

1. Initial Assessment/Care **Protocol 1**.
2. The mode of transportation to a Trauma Center will be decided as soon as possible if the patient meets the Trauma Alert Criteria **Appendix 3**, **Appendix 4**. In these cases, emphasis in pre-hospital care will be on rapid packaging and initiating transport to a Trauma Center. Therefore, on-scene delays should be minimal and vascular access attempts shall not delay transport.
3. Control active hemorrhage with appropriate sterile pressure dressings. Note exact nature and location of blood/fluid loss (e.g., ear canals, nostrils, face or scalp wounds).
4. Administer oxygen and provide Airway Management **Protocol 7** as necessary.
5. Maintain body temperature by covering patient with blankets or a thermal mylar blanket, when available and consider turning off A/C unit in the patient compartment during transport.

ALS

6. Fluids should be administered as necessary to maintain peripheral pulses (maintaining a SBP of 80-90 mmHg).

    a) Except for patients with traumatic brain injury (TBI), in which IV fluids should be administered to maintain a minimum SBP of 100-110 mmHg, **Section C**.

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A. Hemorrhage Control

Blood from wounds that damage large vessels of the extremities are a common source of massive external hemorrhage. The cause of external hemorrhage can be varied depending on the setting in which the injury has taken place. Some of these causes include, but are not limited to, gunshots, stabbings, shrapnel, vehicle accidents and blasts. The identification of life-threatening hemorrhage versus non-life-threatening hemorrhage is of great importance. The difference between life threatening and non-life threatening exists in the amount of blood loss and patients' hemodynamic status.

Massive hemorrhage may be fatal within 60 – 120 seconds. Treatment should not be delayed and controlling major hemorrhage should be the first priority over securing the airway. Application of tourniquet may be your first option.

EMR/BLS

1. Perform a rapid trauma head-to-toe exam and identify external bleeding.
2. Treat hemorrhage using the following procedures:
   a) Assess and find the source of bleeding.
   b) Apply direct pressure on the wound.
3. To control life-threatening external hemorrhage from an arm or leg apply a tourniquet **Procedure 48** or an appropriate pressure dressing. Deep wound packing with hemostatic gauze and/or plain gauze **Procedure 9** may also be indicated.
4. To control life-threatening bleeding from junctional areas (neck, shoulder or groin), Pack the wound with hemostatic gauze and/or plain rolled gauze **Procedure 9**.
5. For any partial or complete amputation, a tourniquet should be applied regardless of bleeding. Amputations and open fractures will be dressed with a sterile dressing **Procedure 28.** Amputated part(s) should be managed appropriately and transported with patient.
6. If patient is hypotensive, place patient in the Trendelenburg position.
7. Maintain body temperature by covering patient with blankets or a thermal mylar blanket, when available and consider turning off A/C unit in the patient compartment during transport.

ALS

8. Attempt to establish at least two large-bore IVs.
   a) **Do not delay transport to obtain intravenous access on the Trauma Alert patient.**
   b) **If vascular access is not quickly obtainable via the IV route, establish IO access.**
9. If the blood pressure is less than 80 mmHg, **administer a fluid bolus of 500 mL Normal Saline**. This may be repeated once until a systolic BP of 80-90 mmHg is obtained.

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10. If the patient meets Trauma Alert Criteria with torso injuries and/or amputation(s) with severe bleeding not controlled by tourniquet that results in a systolic blood pressure less than 90 mmHg and/or sustained heart rate greater than 110 (hemorrhagic shock) consider the administration of **Tranexamic Acid (TXA) 2 grams slow IVP** as soon as possible, within the first 3 hours after injury.
11. The Trauma Center **must** be notified that **2 grams of TXA** has been administered.

B. Penetrating Wounds to the Torso

EMR/BLS

1. Do not remove penetrating objects, unless through the cheek causing airway obstruction or in the chest and interfering with CPR.
    a) Such objects may be cut down to six inches from the point of entry to minimize movement.
    b) Stabilize the object in place with bulky dressings.
2. Any penetrating injuries to the chest or upper back, will be covered immediately with occlusive chest seals **Procedure 6**.
3. Monitor the patient with penetrating torso trauma for the development of a possible tension pneumothorax. Non-invasive decompression can be performed by removing the occlusive dressing and physically "burping" the chest seal and re-apply.
4. Penetrating, open injuries of the abdominal cavity will be dressed rapidly and carefully with a sterile gauze dressing (e.g. Multi-Trauma dressing) **Procedure 6**.
    a) Use care not to injure any exposed intra-abdominal organs. Exposed bowel (evisceration) will be dressed with a large trauma dressing previously moistened with sterile saline. This, in turn, will be covered by dry, occlusive dressing, such as plastic packaging or foil. **Do not attempt to put organs back in.**

ALS

5. Attempt to establish at least two large-bore IVs.
    a) **Do not delay transport to obtain intravenous access on the Trauma Alert patient.**
    b) **If vascular access is not quickly obtainable via the IV route, establish IO access.**
6. If a tension pneumothorax is suspected, decompress the chest **Procedure 5**.
7. If the blood pressure is less than 80mmHg, **administer a fluid bolus of 500 mL Normal Saline**. This may be repeated once until a systolic BP of 80-90 mmHg is obtained.
8. If the patient has penetrating trauma to the torso and/or amputation(s) with severe bleeding not controlled by tourniquet that results in a systolic blood pressure less than 90 mmHg and/or sustained heart rate greater than 110 (hemorrhagic shock) consider the administration of **Tranexamic Acid (TXA) 2 grams slow IVP** as soon as possible, within the first 3 hours after injury.
9. The Trauma Center **must** be notified that **2 grams of TXA** has been administered.

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10. Provide cardiac monitoring for dysrhythmias due to chest trauma, such as a possibility of complications due to myocardial contusions, myocardial rupture, or cardiac tamponade. Treat dysrhythmias appropriately.

C. Suspected Head/Spinal Injury

EMR/BLS

1. If history, symptoms, or signs of head or neck injuries are present, manually immobilize the head and neck while assuring airway maintenance per Airway Management **Protocol 7**.

2. Spinal Motion Restriction is indicated for patients experiencing signs/symptoms of a possible spinal cord injury subsequent to trauma **Protocol 40**.

3. Manage Helmet Removal if indicated **Procedure 42.**

4. In the absence of hypotension, consider elevating the head of the backboard 30 degrees (12-18").

5. It is critical to prevent hypotension and hypoxia in management of Traumatic Brain Injury (TBI).

   a) If hypoxia, patients with head injury should be ventilated at a rate of no greater than 1 breath every 3 seconds (20 breaths/min.) which will **maintain an $ETCO_2$ of 35-40 mmHg** and should be maintained with oxygen saturation more than 90%. Avoid hyperventilation of the injury patient.

   b) If *Neurogenic Shock* is suspected because of trauma to the spine, elevate the foot end of the spine board slightly, placing the patient's arms across the chest without moving the spine. Monitor the patient's breathing, lowering the spine board if there is an onset of breathing problems. Provide assisted ventilations if respirations are weak or inadequate.

6. **Avoid excess administration of Dextrose solutions (D50%, D25%, D10%, D5W, etc.) unless hypoglycemia is identified.** Dextrose may increase cerebral edema.

7. Open wounds of the cranial vault will be dressed carefully with a sterile dressing **without** the use of Betadine or other antiseptic solutions.

8. Blood from the ear after a head injury may be a sign of a skull fracture.

   a) Assess blood or drainage from the ear with a 4x4 dressing, and let it sit for about a minute.

   b) If a characteristic staining of the dressing appears like a target or halo (blood stain in the middle), cerebrospinal fluid may be draining from the ear. Cover the bleeding site with a sterile gauze pad and apply light compression by loosely wrapping the dressing around the head.

ALS

8. Attempt to establish at least two large-bore IVs.

   a) **Do not delay transport to obtain intravenous access on the Trauma Alert patient.**

   b) **If vascular access is not quickly obtainable via the IV route, establish IO access.**

9. Monitor for signs and symptoms of increased intracranial pressure (e.g. irregular respirations, bradycardia, and hypertension) and/or Trismus (clenched teeth), manage the airway appropriately as per **Protocol 7**.

   a) Endotracheal intubation, if indicated, will be accomplished while maintaining in-line stabilization with no hyperextension of the head and neck. Sedation may be required prior to intubation if there is a gag reflex.

10. If hypotensive (systolic BP less than 90 mmHg).

    a) Administer a **fluid bolus 500 mL of Normal Saline**.

    b) This may be repeated to a goal of improving mental status, strong peripheral pulses, and maintain a systolic BP:

       i. Ages 15-49: 110 mmHg or greater

       ii. Ages 50 or more: 100 mmHg or greater

11. If *Neurogenic Shock* is suspected because of trauma to the spine and SBP remains less than 90 mmHg.

    a) Administer a **fluid challenge of Normal Saline 500 mL** and repeat once as needed.

    b) If BP is still less than 90 mmHg systolic following fluid challenges and no signs of severe hemorrhage, **administer Dopamine 10 mcg/kg/min** and titrate to 20 mcg/kg/min as needed. Notify the receiving Trauma Center of possible Neurogenic Shock and treatment.

MCP

12. Additional fluid boluses above 1 L (1000 mL).

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D. Epistaxis (Nosebleed)

General Care

EMR/BLS

1. Position the patient leaning forward and sitting.
2. Apply direct pressure by pinching the nostrils together.
3. Apply a cold pack over the bridge of the nose.
4. Continue pinching the nose until the bleeding stops.
5. An alternative method if a cold pack is not available or if not tolerated by the patient, is to apply pressure using a rolled gauze bandage between the upper lip and gum.
6. Assess and treat for shock.

E. Soft Tissue Injuries

General Care

EMR/BLS

1. Soft Tissue injuries can be irrigated with Normal Saline.
2. Be cautious with abrasions:
    a) A superficial wound caused by the skin rubbed or scraped over a rough surface; examples such as a road rash or mat burns – rubbing, brushing, or washing the wound will cause additional bleeding and pain.
    b) After irrigation of skin avulsions, gently fold the skin flap back onto the wound to assist in reperfusion.
    c) DO NOT use hydrogen peroxide or iodine/betadine on any open soft tissue injuries/wounds.
    d) Cover the wound with dry sterile dressing and apply cold packs to the surrounding area to decrease pain and swelling.
3. Animal bites and human bites can cause soft tissue injuries and are treated as such with dry sterile dressings.
    a) If there is gross contamination, irrigate the wound with Normal Saline.
    b) If the arm or leg is injured, splint the extremity.
    c) Consider all such bites as contaminated and potentially infected wounds that may require antibiotics, tetanus prophylaxis, and possibly suturing.
4. Amputations and open fractures will be dressed with a sterile dressing **Procedure 28**.

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F. Suspected Fractures

General Care

EMR/BLS

1. Any fracture or suspected fracture will be immobilized to reduce the possibility of further injury.
2. Severe angulated fractures may be aligned once, if there is an absence of distal pulse or neurological function.
    a) Distal pulses, skin color, and temperature will be documented prior to and after splinting the angulated fracture.
3. Proximal and distal manual stabilization may be applied to the injured extremity, as necessary, when applying a splint.
    a) The splint should extend, if possible, one joint above and one joint below the fracture site.
4. The use of cold packs is recommended to help reduce swelling. Avoid direct application to exposed skin.
5. Primary care of open fractures involves removal of gross contamination.
    a) If protruding contaminated bone ends have been pulled back into the wound, it will be noted in the report.
    b) Dress open bone fractures with moist dressing using normal saline.
6. Because of the severe muscle spasm associated with femoral fractures, traction leg splints are to be used to adequately stabilize isolated closed fractures of the femur. **Do not use the traction splint if a pelvic fracture or knee/ankle injury is suspected.**
7. Assess and treat for shock.

ALS

8. Establish an IV. Attempt to establish at least two large-bore IVs on the critical patient.
    a) **Do not delay transport to obtain intravenous access on the Trauma Alert patient.**
    b) **If vascular access is not quickly obtainable via the IV route on the critical patient, establish IO access. Do not use the fractured bone as the proposed intraosseous site.**
9. If the injury is an isolated extremity injury, with no hypotension or respiratory distress, provide Pain Management **Protocol 18.**
10. If the blood pressure is less than 80 mmHg, **administer a fluid bolus of 500 mL Normal Saline**. This may be repeated once until a systolic BP of 80-90 mmHg is obtained.

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MCP

11. Additional fluid boluses above 1 L (1000 mL).

G. Trauma in Pregnancy

EMR/BLS

1. Adequate maternal oxygenation is essential to assure fetal well-being. Oxygen should be administered via high-flow face mask.
2. Avoid placing the mother in a supine position. After immobilizing the mother on a spine board, slightly elevate the right side of the board.

ALS

3. Establish an IV. Attempt to establish at least two large-bore IVs on the critical patient.
   a) **Do not delay transport to obtain intravenous access on the Trauma Alert patient.**
   b) **If vascular access is not quickly obtainable via the IV route on the critical patient, establish IO access.**
4. If the blood pressure is less than 90 mmHg, administer a **fluid bolus of 500 mL Normal Saline**. This may be repeated once until a systolic BP of more than 90 mmHg is obtained.
5. It is important to consider that post-mortem C-section has a high success rate for fetal survival if accomplished as early as possible. Therefore, rapid transport to the appropriate facility is essential.

H. Burn Injuries

General Care

EMR/BLS

1. Assess the burn:
   a) Determine the type of burn (thermal, chemical, etc.).
   b) Determine the area and depth: superficial (1st degree), partial thickness (2nd degree), or full thickness (3rd degree) burns.
   c) Determine the TBSA% injured with the Rule of Nines **Appendix 7**.
   d) Determine if the patient was in an enclosed space **Protocol 37.**
   e) Perform Airway Management **Protocol 7** as necessary and administer oxygen.

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NOTE: The following burns benefit from Burn Center Care and may require advanced specialized burn management, and should be transported to a Burn Center:

- Patients meeting Burns Trauma Alert Criteria
- 2nd degree (partial-thickness) burns more than 10% TBSA
- 3rd degree (full-thickness) burns in any age group
- Burns involving the face, eyes, hands, feet, genitalia, perineum, and/or major joints
- Respiratory burns, inhalation injury
- Electrical burns, including lightning injury
- Chemical burns
- Burns with associated major traumatic injury
- Circumferential burns to extremities that may cause vascular compromise and serious soft tissue swelling
- Any patient with burns and concomitant trauma (e.g. fractures) in which the burn injury poses the greatest risk of morbidity or mortality
- Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality

ALS

2. If smoke inhalation, obtain CO levels **Procedure 44** and treat appropriately for possible carbon monoxide and/or cyanide poisoning.
3. Establish IV access on all patients with second or third degree burns of 10% or greater body surface area. Attempt to establish at least two large-bore IVs.
   a) **Do not delay transport to obtain intravenous access on the Trauma Alert patient.**
   b) **If vascular access is not quickly obtainable via the IV route on the critical patient, establish IO access.**
4. Provide Pain Management **Protocol 18**.
5. If the blood pressure is less than 90 mmHg, administer a **fluid bolus of 500 mL Normal Saline**. This may be repeated once until a systolic BP of more than 90 mmHg is obtained.
6. Electrical burn patients will require ECG monitoring for possible cardiac abnormalities.

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Types of Burns

1. Thermal Burns

EMR/BLS

1. Remove rings, bracelets, and other constricting items on extremities.
2. Cover areas of burn with dry sterile dressings and/or wrap patient in a sterile sheet or burn blanket to provide a warm environment.
3. Cold (cryogenic) burns:
    a) Apply dry sterile dressings and/or sterile sheet**.**
    b) Consult with HazMat if chemically induced and contact MCP for further treatment guidance.
4. When treating significant burns to the fingers, toes, or other surfaces where surfaces burned may contact each other.
    a) Place bandages between the burned skin areas to prevent the wounds from sticking to each other.
5. Assess for Airway Compromise such as:
    a) Singed facial or nasal hair, hoarseness, soot, wheezing, and swelling.
    b) Treat appropriately and administer oxygen.
6. Begin fluid resuscitation for burns 10% or greater TBSA with **Normal Saline** at 80 gtts/min. with a 10 drop (macro) set.
    a) Recommended pre-hospital fluid resuscitation rate of 500 mL/hour for ages 14 or greater.
7. Keep the patient covered with a blanket to maintain thermal regulation.
8. Monitor for shock and treat appropriately.

NOTE: Hot tar is a thermal burn not a chemical burn. Immerse the area in cold water to dissipate the heat from the tar and speed the process of hardening. Once hardened, it will not do further damage. **DO NOT** remove it in the field.

2. Chemical Burns

EMR/BLS

1. Remove clothing and expose area.
2. Brush off any visible dry chemicals or powder, maintaining proper respiratory precautions to prevent responder exposure.
3. Continuously flush the area with Normal Saline or copious amounts of potable water.
    a) If there is eye involvement, ensure to flush with eyes copiously.
4. Consult with HazMat.

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3. Electrical Burns

EMR/BLS

1. As with Thermal Burns, treat as indicated.
2. Search for entrance and an exit wound where the electrical current may have passed to the ground.
3. Assess for unseen internal injuries and refer to **Protocol 26** Environmental Emergencies – Section H. Lightning Strike for further guidance.

I. Eye Injuries

General Care

EMR/BLS

1. Obtain a brief injury history including the mechanism of injury, possible chemical exposure, and allergies.
2. Examine the eye(s) for signs of penetrating injury, foreign body, irritation, hemorrhage, prosthesis, or contact lenses.
3. Remove or ask the patient to remove contact lenses if still in the affected eye(s).
4. Determine gross visual acuity in both eyes, if possible.
   a) Have the patient read the largest letters on the patient's report at arm's length.
5. If penetrating injury is known or suspected:
   a) Stabilize obvious penetrating objects.
   b) Avoid direct pressure on the eye or any maneuvers that might increase intraocular pressure.
   c) Apply ocular shield or similar rigid device over affected eye. Cover both eyes to minimize eye movement.
6. If eyeball has been forced out of the socket:
   a) Cover the entire eye area with a rigid container, such as a disposable drinking cup. Avoid direct contact with the exposed globe.
   b) If bleeding, control by direct pressure with a sterile dry dressing.
7. If there are signs/symptoms or suspicion of ocular exposure to chemicals or foreign body without obvious or suspected penetrating injury or laceration of cornea or globe:
   a) Irrigate with Normal Saline solution.

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J. Reperfusion (Crush) Injury

If the patient's extremity or extremities have been trapped for an extended period greater than 60 minutes by a heavy object occluding peripheral perfusion, the patient must be treated to prevent reperfusion injury. Crush injury is to be distinguished from a simple entrapment. This treatment must be administered prior to the object being lifted from the patient.

EMR/BLS

1. Manage the airway appropriately and administer oxygen.

ALS

2. Obtain vascular access as needed **Procedure 13.** If peripheral access is limited, external jugular access should be considered.

3. Infuse **Sodium Bicarbonate 1 mEq/kg into a 1000 mL bag of Normal Saline** and run wide open.

4. Provide cardiac monitoring, when possible, in case of dysrhythmias and treat appropriately.

MCP

5. If Field Amputation is required, refer to **Procedure 16**.

K. Traumatic Asphyxia

Traumatic injuries that suddenly and forcefully compress the thoracic cavity, like an unrestrained driver hitting a steering wheel or a pedestrian, who is compressed between a vehicle and a wall, may induce traumatic asphyxia. The sudden compression of the chest causes a massive increase in pressure translated into the major veins of the head, neck and kidneys. The pressure increases then passes into the capillary beds, resulting in their rupture. Physical findings are characterized by cyanosis of the head, upper extremities, and the torso above the level of the compression. Ocular hemorrhage may be mild (subconjunctival hematoma) or extremely dramatic causing the eyes to protrude from their normal position (exophthalmos).

Adult Care

EMR/BLS

1. Take cervical spine precautions and perform spinal motion restrictions as necessary.

2. Manage the airway appropriately **Protocol 7** and administer oxygen.

ALS

3. Obtain vascular access as needed **Procedure 13.** If peripheral access is limited, external jugular access should be considered.

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4. Monitor and manage any life-threatening injuries as a result of chest trauma such as pneumothorax.

5. If the patient's chest remains compressed for a prolonged time more than 20 minutes, consider administration of **Sodium Bicarbonate 1 mEq/kg IV/IO** just before or during the removal of the entrapment.

6. Provide cardiac monitoring for dysrhythmias due to chest trauma. Treat dysrhythmias appropriately.

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