This Trauma Protocol section covers the following emergencies:

- Trauma Emergencies with management of specific injuries
- Tranexamic Acid
- Spinal Motion Restriction (SMR)
- Burns
- Eye injury
- Adult crushing trauma
- Trauma arrest
- Trauma triage protocols

A. Perform scene size-up to establish scene safety, number of patients and mechanism of injury. Request additional resources as needed. Begin assessment of the patient(s), looking for immediate life-threats.

B. Rapid Trauma Assessment and recognition of major/multiple system trauma is essential to the subsequent treatment. Establish life-threats; chief complaints; assess airway and initiate appropriate therapies; assess breathing and initiate appropriate therapies; assess circulation and control major bleeding; establish a general impression of patient condition and prioritize patient for transport.

C. Special attention must be paid to the State of Ohio field trauma triage criteria, listed at the end of this protocol. The prehospital provider on scene must use the triage criteria to quickly determine the appropriate receiving facility and method of transport (ground vs. aeromedical transport – See Transport Policy).

D. Transport MUST NOT BE DELAYED! Every effort should be made to limit on-scene time to 10 minutes or less.

E. With pregnant trauma patients, the fetus may compress the iliac vessels, inferior vena cava and the abdominal aorta when the mother is supine. To minimize the effects of the fetus pressure on venous return place a wedge (pillow) under the right abdominal flank/hip or apply continuous manual displacement of the uterus to the left. If spinal trauma is suspected, tilt the backboard to the left.

F. If the patient is entrapped or inaccessible, contact Medical Control and advise of condition and circumstances. Document reason for prolonged on-scene time.

A. Urgent Patient
   1. Maintain spinal motion restriction (SMR) if mechanism suggests spinal injury.
   2. Control life-threatening hemorrhage by appropriate method.
3. Assess and manage airway:
   a. Administer oxygen as needed to treat shock and/or respiratory distress.
   b. Apply pulse oximeter and treat per pulse oximeter procedure.
4. Perform a Rapid Trauma Assessment – quick head-to-toe survey to find additional life and/or limb-threatening injuries.
5. TRANSPORT IMMEDIATELY (ALS intercept when available). During transport:
7. Evaluate patient’s pulses, skin color and temperature, and nerve function distal to fractures / injuries. Splint individual fractures if time permits.
8. Obtain relevant history of condition and determine OPQRSTI and SAMPLE. Especially the where, when, and how regarding mechanism of injury.
9. Contact Medical Control and advise of patient condition.
10. Perform Detailed Physical exam and Ongoing Assessment during transport – head-to-toe assessment to identify additional injuries and to assess the effectiveness of treatments to this point.

B. Non-Urgent Patient
1. Maintain spinal motion restriction (SMR) if mechanism suggests spinal injury.
2. Assess and manage airway.
3. Administer oxygen as needed to treat shock and/or respiratory distress.
4. Apply pulse oximeter and treat per pulse oximeter procedure.
5. Control hemorrhage by appropriate methods.
6. Perform focused exam on injured area.
7. Splint all fracture(s). (In Non-Life Threatening situations ONLY)
8. Evaluate and document pulses, skin color and temperature, and nerve function distal to injury before and after splinting.
9. Obtain relevant history of condition and determine OPQRSTI and SAMPLE. Especially the where, when, and how regarding mechanism of injury.
10. Perform Detailed Physical exam and Ongoing Assessment during transport – head-to-toe assessment to identify additional injuries and to assess the effectiveness of treatments to this point.
11. Contact Medical Control and advise of patient condition and transport.

C. Management of specific injures – see Specific Injuries table on page 3

Advanced EMT

A. Start IV NS to maintain perfusion. Do NOT delay transport to start IV. If patient is hypotensive and symptomatic administer normal saline IV bolus:
   1. 250 – 500 ml for adults
   2. 20 ml/kg for pediatric patient (to a maximum of 500 ml)
   3. Repeat boluses as needed to maintain blood pressure to 110 systolic in head injured patients and 80 systolic in patients without head injury.
B. Apply cardiac monitor and check rhythm
C. See Pain Management Protocol as needed.

Paramedic

A. See Tranexamic Acid (TXA) Protocol as needed – page 4.
### SPECIFIC INJURIES

<table>
<thead>
<tr>
<th>HEAD</th>
<th>NECK / SPINE</th>
<th>CHEST</th>
<th>ABDOMEN / PELVIS</th>
<th>EXTREMITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic EMT</td>
<td>Basic EMT</td>
<td>Basic EMT</td>
<td>Basic EMT</td>
<td>Basic EMT</td>
</tr>
</tbody>
</table>
| Evaluate patient condition: level of consciousness, pupil size / reaction, GCS | SMR is to be applied to trauma patients meeting any of the following criteria:  
- Patient complains of neck or upper back pain.  
- Patient has or had motor weakness, numbness / tingling, or loss of feeling to any extremity.  
- Patient has a MOI consistent with a possible spinal injury and:  
  - Has an altered mental status, (i.e. is not A&O x3 or GCS is not 15).  
  - Has a communications barrier preventing a complete and meaningful assessment, (e.g. Language barrier, young pediatric patients, patients with a CVA or dementia preventing or limiting assessment, patients with significant MR / developmental delay, etc.).  
  - Exam suggests that the patient may be impaired based upon alcohol intoxication, drugs, or other medications.  
  - Has a distracting injury, (i.e. other significantly painful injury which could mask symptoms from a spinal injury).  
  - Has pain or tenderness on palpation of the neck or upper thoracic spine.  
  - Has pain or tenderness on cervical range of motion assessment.  
  | Sucking chest wound: always cover with non-porous dressing and seal on 3 sides.  
| Flail chest: Assist respirations with positive pressure ventilations.  
| Advanced EMT / Paramedic  
Pneumothorax / Hemothorax: transport in position of comfort and monitor for tension pneumothorax development  
Symptoms of tension pneumothorax:  
- Chest pain or evidence of trauma  
- Tachypnea  
- Tachycardia  
- JVD  
- Diminished / absent breath sounds on affected side  
- Resistance felt with BVM  
- May initially present with hypertension progressing to hypotension  
- Hyperresonance on affected side  
- Tracheal deviation from affected side (late sign)  
| Evisceration: Cover organs with sterile dressing moistened with saline.  
| Suspected Pelvic Fracture: Apply circumferential stabilization with commercial pelvis sling or belt. If commercial device unavailable, consider slings made from sheets  
| Hemodynamically unstable patients with an appropriate mechanism of injury should have pelvis stabilization until injury can be ruled out.  
| Advanced EMT / Paramedic  
Pneumothorax / Hemothorax:  
Symptoms of tension pneumothorax:  
- Chest pain or evidence of trauma  
- Tachypnea  
- Tachycardia  
- JVD  
- Diminished / absent breath sounds on affected side  
| Open Wounds: Control bleeding by most appropriate method:  
- Direct pressure  
| Bleeding that is unable to be controlled with pressure / tourniquets or injuries to axilla / groin, consider use of hemostatic agent if available.  
| Wound Packing: is recommended for injuries with wound cavities when direct pressure does not control bleeding or when the wound is located in a non-compressible area such as the groin, axilla, neck, or clavicle area.  
| Sucking chest wound: always cover with non-porous dressing and seal on 3 sides.  
| Flail chest: Assist respirations with positive pressure ventilations.  
| Advanced EMT / Paramedic  
Pneumothorax / Hemothorax: transport in position of comfort and monitor for tension pneumothorax development  
Symptoms of tension pneumothorax:  
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| Wound Packing: is recommended for injuries with wound cavities when direct pressure does not control bleeding or when the wound is located in a non-compressible area such as the groin, axilla, neck, or clavicle area.  
| Complete Amputations:  
- Complete gross decon if needed  
- Cover wound with sterile dressing and carefully bandage  
| Attempt to find avulsed part, but do NOT delay transport.  
| Transport avulsed part in cool, dry, sterile dressing  
| Long Bone Fractures: If enough resources are available, apply traction splints for patient transports greater than 15 minutes.  
| Advanced EMT / Paramedic  
See Pain Management protocol for pain treatment of long bone fractures.  

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**Helmet Removal Procedure**

If patient is wearing a helmet – see Helmet Removal Procedure.

**Spinal Motion Restriction**

- Transport with head elevated 8-10° by lifting backboard and maintaining spinal motion restriction (SMR)
- Assess and manage airway; support with 100% oxygen by NRB or BVM
- Hyperventilate (rate of 20/min. for adult and 30/min. for pediatric)
- ONLY when there are signs of cerebral herniation! – blown pupil, bradycardia, posturing, HTN.
- Check blood sugar
- Evisceration: Cover organs with sterile dressing moistened with saline.
- Hyperventilate (rate of 20/min. for adult and 30/min. for pediatric)
- DO NOT place exposed bowel or organs back into abdominal cavity. Lay patient flat and elevate knees.

**Spinal Motion Restriction**

- Spinal Motion Restriction (SMR) should be accomplished gently with spinal motion restriction (SMR) such as the groin, axilla, neck, or clavicle area.

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**Criteria:**

- Patient has pain or tenderness on palpation of the neck or upper thoracic spine.
- Patient has pain or tenderness on cervical range of motion assessment.

**Open Wounds:**

- Control bleeding by most appropriate method:
  - Direct pressure
  - ITClamp
  - Tourniquet

- Wound Packing: is recommended for injuries with wound cavities when direct pressure does not control bleeding or when the wound is located in a non-compressible area such as the groin, axilla, neck, or clavicle area.

**Complete Amputations:**

- Complete gross decon if needed
- Cover wound with sterile dressing and carefully bandage
- Attempt to find avulsed part, but do NOT delay transport.
- Transport avulsed part in cool, dry, sterile dressing

**Long Bone Fractures:** If enough resources are available, apply traction splints for patient transports greater than 15 minutes.

---

**Advanced EMT / Paramedic**

- See Pain Management protocol for pain treatment of long bone fractures.

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**Effective 12/22/2017**

**Replaces 5/1/2017**

**Trauma Emergencies**

**Page 3 of 17**
TRANEXAMIC ACID (TXA)

GENERAL CONSIDERATIONS

Tranexamic Acid (TXA) has existed for decades. Initially used to minimize bleeding during surgical cases, it is now used in the management of trauma patients with severe hemorrhage and hemorrhagic shock. It is a medication that inhibits the breakdown of fibrin, and thus helps prevent clots from dissolving. By stabilizing the clot it allows the body a chance to “plug the holes” and stop or slow the rate of bleeding. TXA is most helpful with internal bleeding that cannot be otherwise controlled and best when given shortly after injury (ideally <1hr).

Paramedic

Indications for TXA use in trauma patients:
- Evidence of marked blood loss
- Sustained tachycardia (>110/Min, despite a 500 ml bolus of IVFs)
- Initial systolic BP < 90
- Sustained hypotension (<100 systolic, despite a 500 ml bolus of IVFs)
- Major trauma with suspicion for pelvic and/or abdominal injury
- Major arterial bleeding requiring tourniquet

Contraindications:
- Non-hemorrhagic shock
- Non-traumatic shock
- Isolated head injury
- Allergy

Side Effects:
TXA has not been shown to cause significant increase in deep venous thrombosis (DVT), pulmonary embolus (PE), myocardial infarction (MI), or stroke in published trials to date.

Dosage:
Administer 1 Gram/100ml IV piggyback over 10 minutes. Administration can be completed in the emergency department.
For pediatrics: 15mg/kg TXA loading dose (max 1g) over 10 minutes
**Indication:** This Protocol addresses the assessment and treatment for trauma patients with potential cervical, thoracic, or lower spinal injuries. When indicated, Spinal Motion Restriction, (SMR), is performed by the application of a rigid cervical collar.

1) **SMR is to be applied to trauma patients meeting any of the following criteria:**
   - Patient complains of neck or upper back pain.
   - Patient has or had motor weakness, numbness / tingling, or loss of feeling to any extremity.
   - Patient has a MOI consistent with a possible spinal injury and:
     - Has an altered mental status, (i.e. is not A&O x3 or GCS is not 15).
     - Has a communications barrier preventing a complete and meaningful assessment, (e.g. Language barrier, young pediatric patients, patients with a stroke or dementia preventing or limiting assessment, patients with significant MR / developmental delay, etc.).
     - Exam suggests that the patient may be impaired based upon alcohol intoxication, drugs, or other medications.
     - Has a distracting injury, (i.e. other significantly painful injury which could mask symptoms from a spinal injury).
   - Has pain or tenderness on palpation of the neck or upper thoracic spine.
   - Has pain or tenderness on cervical range of motion assessment.

2) If the patient's MOI is such that a cervical spinal injury could exist, and they have not had SMR applied based upon the above criteria, then perform the **cervical range of motion (CRM) assessment.** Stop the assessment, have the patient return to the neutral position, and apply SMR if the patient experiences pain, discomfort, numbness or tingling to an extremity, or other such symptoms.

3) Otherwise, SMR is not indicated.

**CERVICAL RANGE OF MOTION ASSESSMENT:**

CRM assessment is **not** to be performed if the patient meets any of the other SMR criteria above.

CRM testing is to be performed by the patient themselves, EMS personnel are not to move the patient's head.

Have the patient gently flex their cervical spine by bringing their chin down to their chest, and then extend their cervical spine by tilting backwards to look upwards. From the neutral position then have the patient rotate their head to the left and right, by bringing their chin over to towards their shoulders.

**MECHANISM OF INJURY, (MOI):** Trauma patients experiencing the following MOI's require a SMR assessment.

- Fall from standing position with the possibility of having hit their head
- Fall from any height
- Vehicle crash, (MVC, ATV, motorcycle, bicycle, skimobile, skateboard, etc.)
- Pedestrian struck by a vehicle
- Swimming, diving, or near drowning incident
- High voltage or lightning injury
- Altercation with potential for spinal injury
- Other event consistent with a possible spinal injury
PATIENT'S MEDICAL RECORD: If a spinal care assessment was performed then clearly document on the patient's medical record why SMR was indicated or that it was not indicated.

BACKBOARD, (LONG SPINE BOARD), UTILIZATION: The backboard is to be considered an extrication device, not a treatment modality. Patients warranting SMR may be transported on the EMS cot with a rigid cervical collar in place and without a backboard, or CID, (head blocks, etc.).

If a backboard, Reeve's stretcher, scoop stretcher, or similar device is utilized for extrication most patients should be removed from them as soon as possible, i.e. prior to transport.

Backboards may be utilized for extrication and / or transport of major trauma patients, patients who are semiconscious / unconscious, for those who are otherwise difficult to move, or in whom possible pelvic or hip injuries preclude patient movement without the backboard. The backboard may be padded.

Application of the backboard to a standing patient is contraindicated.

Full body vacuum mattresses, (with or without a backboard for additional support), may be used for both extrication and transport as needed.

SELF-EXTRICATION /AMBULATION: Excluding major trauma / rapid roll out patients, patients involved in a MVC should be assessed for SMR prior to their removal from the vehicle. If indicated, a rigid cervical collar should be applied while the patient is still within the vehicle. If the patient is able to do so, they may be assisted in exiting the vehicle without the use of either a short or long spine board, (backboard). Manual stabilization of the patient's cervical spine by EMS personnel during extrication is an alternative to early cervical collar application.

The patient's motor and sensory exam of the extremities is to be assessed, (and subsequently documented), both prior to and following extrication.

A patient who is otherwise able to do so may walk several steps, with or without a rigid cervical collar in place, as indicated, to either a stair chair or cot. For example: A patient involved in a MVC who is experiencing neck pain could be placed in a rigid cervical collar while in the vehicle, and then be assisted in exiting the vehicle and walking several steps to a cot.

If spinal care assessment is deferred prior to extrication the reason for doing so is to be documented in the patient's medical record, (e.g. patient in extremis, rapid rollout, vehicle was on fire, vehicle was under water, etc.).

LOW BACK PAIN: A patient with low back pain, without major trauma or pelvic injuries, and without indications as above for SMR, may be transported on the EMS cot without the use of a backboard. A full body vacuum mattress may be used if deemed appropriate to do so.

COT POSITIONING: A patient with or without a cervical collar in place may be transported in their position of comfort, (supine, partially reclined, or upright), barring other indications for specific positioning, (e.g. Supine for a patient in shock).

EXCLUSION CRITERIA: Penetrating injuries, (GSW, knife, etc.), to the head, neck, and torso do not require SMR unless the patient is awake and complaining of a new neurological, (motor or sensory), deficit, and immobilization can be performed without otherwise compromising the patient's airway management.

Patients experiencing an exacerbation of chronic back pain, without having experienced a new traumatic event, do not require SMR.
**ALTERNATIVE IMMOBILIZATION OPTIONS**: In patients for whom SMR is indicated, but from whom an appropriately fitting rigid cervical collar is not available, alternative methods of restricting the spinal motion may be employed. These include, but are not limited to, using a towel roll or a full body vacuum mattress.

**HIGH RISK INDIVIDUALS**: Keep in mind that geriatric patients, patients with prior spinal surgery, dialysis patients, and those with known metastatic cancer are at a higher risk of sustaining spinal injuries.

Spinal Care Protocol JC V3.docx
GENERAL CONSIDERATIONS

A. The first priority is to assure scene safety and then remove the patient from heat and flame, electrical and/or chemical exposure.

B. When dealing with contaminated environments, EMTs must have appropriate PPE. If not available, contact appropriate HazMat team for assistance.

C. Airway, Breathing, and Circulation must be stabilized before attending to the burn. Onscene time should be minimized to 10 minutes or less.

D. For patients with both traumatic injuries and critical burns, patients should be rapidly transported to a trauma center. Traumatic injuries and airway management are priority over burns.

E. Patient with extensive burns must be monitored for hypothermia. Avoid use of ice and/or prolonged use of cold compresses. When in doubt, cover with a dry dressing.

F. In caring for the burn patient, the EMT should:
   1. Stop the burning
   2. Reduce the pain
   3. Prevent contamination

G. For patients with critical burns, EMTs should contact Medical Control to advise them of patient’s condition and request transport to the Burn Center. Squads should never pass the nearest acute care facility unless they are Advanced Life Support staffed (Paramedic) and are capable of providing total airway management as indicated (endotracheal intubation and/or surgical cricothyroidotomy).

H. Gross decontamination must be done at the scene. Advise receiving facility if complete decontamination was not done at the scene and be prepared to transport to decontamination area.

Basic EMT

A. Assess and manage airway. Apply pulse oximeter and treat per procedure.

B. Determine type of burn and treat as follows:

   1. Thermal burn (dry and moist):
      a. Stop the burning process, i.e., remove patient from heat source, cool skin, remove clothing.
      b. If patient starts to shiver or skin is cool, stop cooling process.
      c. Cover burn areas with dry bulky dressing if time permits. Dressing burns should not delay transport
2. Radiation burns:
   a. Treat like thermal burns except if burn is contaminated with radioactive source, treat like a chemical burn.
   b. Wear appropriate PPE when dealing with contamination.
   c. Contact HazMat Team for assistance.

3. Chemical burns:
   a. Wear appropriate PPE when dealing with contamination
   b. Remove patient from contaminated area to decontamination site (NOT in squad)
   c. Determine chemical involved; contact appropriate agency for chemical information
   d. Remove patient's clothing and flush skin.
   e. Leave contaminated clothing / belongings at scene. Cover patient over and under before loading into squad
   f. Patient should be transported by personnel not involved in decontamination process.
   g. Relay type of substance involved to Medical Control. If available, bring safety data sheet (SDS) with patient to the hospital.

4. Electrical burns:
   a. Shut down electrical source; do not attempt to remove the patient until electricity is CONFIRMED to be shut off.
   b. Assess for visible entrance and exit wounds and treat as thermal burns.
   c. Assess for internal injury, i.e., vascular / tissue damage, fractures, etc. and treat accordingly.
   d. Consider SMR for patients with electrical burns.

5. Inhalation burns:
   a. Always suspect inhalation burns when the patient is found in closed, smoky environment and/or exhibits any of the following: burns to face/neck, singed nasal hairs, cough and/or stridor, soot in sputum.
   b. Provide 100% oxygen via NRB or BVM

   C. Estimate extent (percentage of body surface area involved) and depth of burn (superficial, partial thickness, full thickness). Determine seriousness of burn (see chart).

   D. Contact Medical Control and transport.

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Advanced EMT / Paramedic

A. Refer to Advanced Airway Management Procedure as indicated.

B. Apply cardiac monitor and identify dysrhythmias.

C. If signs and symptoms of hypovolemia are present, start IV per shock protocol. **Do NOT delay transport for IVs and AVOID multiple IV attempts.**

D. For pain relief, see Pain Management Protocol.
**RULE of NINES**

Relative percentage of body surface area (BSA) affected by growth

<table>
<thead>
<tr>
<th>Body Part</th>
<th>0 yr</th>
<th>1 yr</th>
<th>5 yr</th>
<th>10 yr</th>
<th>15 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>a = 1/2 of head</td>
<td>9 1/2</td>
<td>8 1/2</td>
<td>6 1/2</td>
<td>5 1/2</td>
<td>4 1/2</td>
</tr>
<tr>
<td>b = 1/2 of 1 thigh</td>
<td>2 3/4</td>
<td>3 1/4</td>
<td>4</td>
<td>4 1/4</td>
<td>4 1/2</td>
</tr>
<tr>
<td>c = 1/2 of 1 lower leg</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 3/4</td>
<td>3</td>
<td>3 1/4</td>
</tr>
</tbody>
</table>

For irregular shaped burns - 1% BSA is equal to the surface of the palm of the patient’s hand.

**SERIOUSNESS OF BURNS**

<table>
<thead>
<tr>
<th>Minor burn</th>
<th>Moderate Burn</th>
<th>Critical Burn</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;70% superficial burn</td>
<td>&gt;70% superficial burn</td>
<td>&gt;30% partial thickness burn</td>
</tr>
<tr>
<td>&lt;10% partial thickness burn</td>
<td>10-30% partial thickness burn*</td>
<td>&gt;2% full thickness burn</td>
</tr>
<tr>
<td>&lt; 2% full thickness burn*</td>
<td>Any burns with trauma</td>
<td>Any burns with head, face, feet and/or genitalia involved</td>
</tr>
</tbody>
</table>

*Only if hands, face, feet, or genitalia are NOT involved.
GENERAL CONSIDERATIONS

TRAUMA

A. Do not allow eye injury to distract you from the basics of trauma care

B. Do not remove any foreign body imbedded in the eye or orbit. Stabilize any protruding foreign bodies.

C. With blunt trauma to the eye, if time permits, examine the globe briefly for gross laceration as the lid may be swollen tightly shut later. Scleral rupture may lie beneath an intact conjunctiva.
   1. Exert no pressure on the globe at any time
   2. A light sterile wet dressing may be used to cover the eye for transport. Avoid pressure directly to the eye by covering with a protective shield. (metal patch, drinking cup)
   3. Do not delay transport to cover the eye if the patient has other life-threatening injuries.

D. Covering both eyes when only one eye is injured may help to minimize further trauma to the injured eye, but in some cases the patient may be too anxious to tolerate this.

E. Transport patient at 45° unless other life-threats prohibit this.

F. Do NOT administer tetracaine if a penetrating injury is suspected.

CHEMICAL BURNS

A. The affected eye(s) should be irrigated with copious amounts of water or saline for a minimum of 15 minutes, started as soon as possible. Any delay may results in serious damage to the eye.

B. Paramedic may administer 2 drops of tetracaine in affected eye(s) prior to irrigation. Always ask about allergies to lidocaine and other anesthetics.

C. Obtain name of substance and, if possible, a sample of the contaminant.

CONTACT LENSES

A. If possible, contact lenses should be removed from the eye; be sure to transport them to the hospital with the patient. If lenses cannot be removed, notify the ED personnel as soon as possible.

B. If the patient is conscious and alert, it is much safer and easier to have the patient remove their own lenses.

ACUTE UNILATERAL VISION LOSS

A. When a patient suddenly loses vision in one with no pain, there may be a central retinal artery occlusion. Urgent transport is necessary.

B. Patient should be transport upright.
A. Follow the Trauma Emergencies Protocol as indicated.

B. Institute this crush protocol if one extremity has been trapped for two or more hours or if two extremities are trapped for one or more hours.

C. Note that this protocol requires a considerable amount of Sodium Bicarbonate. Additional resources may be needed to achieve therapeutic effect.

D. **Prior to extrication:**
   1. Coordinate time of release with rescue personnel
   2. Establish at least one large bore IV of normal saline and administer 1000 ml bolus.
   3. Administer 1 mEq/kg Sodium Bicarbonate IV/IO (minimum dose is 50 mEq)
   4. After initial 1000 ml NS bolus, add 50 mEq Sodium Bicarbonate to each 1000 ml NS to be infused. Be sure to label every IV bag that has the sodium bicarbonate added to it. Maintain a continuous infusion at a rate of 1000ml per hour.
   5. Apply cardiac monitor. Obtain monitor tracing prior to and sequentially during further treatment.
   6. Contact Medical Control and advise of the patient’s crushing injury.
   7. Anticipate Crushing Syndrome and possible cardiac arrest upon extrication of the patient.

E. **Just before extrication:**
   1. Administer an additional 1 mEq/kg bolus of Sodium Bicarbonate (minimum dose of 50 mEq)
   2. Open the IV to run at wide open rate and run in the remainder of the 1000 ml bag.

F. **Upon extrication:**
   1. Return to the maintenance infusion of 50 mEq Sodium Bicarbonate in each 1000 ml NS bag administered at 1000 ml per hour.
      a. Monitor ECG closely. Watch for tall, peaked T waves or widened QRS complexes (> 0.12 seconds)
         i. If treating suspected hyperkalemia – flush out the sodium bicarbonate in the IV line or use a separate line to administer Calcium gluconate (10%) 15-30 ml IV/IO over 2-5 minutes

G. Transport to an appropriate and certified trauma center.

H. For pain relief, see Pain Protocol.
**TRAUMA ARREST**

**GENERAL CONSIDERATIONS**

A. Resuscitation should not be attempted in cardiac arrest patients with hemicorporectomy, decapitation, or total body burns, nor in patients with obvious, severe blunt trauma who are without vital signs, pupillary response and/or an organized or shockable cardiac rhythm at the scene.

B. Multiple blunt trauma victims who are initially found by EMS in cardiac arrest or found at the scene without vital signs may be considered dead and follow the DOA protocol.

C. Extensive, time-consuming care of the trauma victim in the field is usually not warranted. Unless the patient is trapped, they should be enroute to a medical facility within 10 minutes after arrival of the ambulance on the scene.

D. While CPR in the pulseless trauma patient has overall been considered futile, several reversible causes of cardiac arrest in the context of trauma are correctible and their prompt treatment could be life-saving. These include hypoxia, hypovolemia, hypothermia, and diminished cardiac output secondary to tension pneumothorax or cardiac tamponade.

E. Mechanism of injury should be considered when deciding resuscitative measures. Generally, trauma arrest resuscitation efforts are statistically low. However, research has shown that penetrating injuries have a higher successful resuscitation rate (11.2%) versus severe blunt injuries (1.6%). If EMS chooses to attempt resuscitation, all measures should be taken including advanced airway, CPR, and appropriate medications.

**Basic EMT**

A. Maintain spinal motion restriction (SMR)

B. Control life-threatening hemorrhage; apply tourniquet and/or hemostatic agent if indicated

C. Begin CPR with consideration of C-Spine; refer to Cardiac Arrest Protocol

**Advanced EMT / Paramedic**

A. Start IV NS to maintain perfusion. Do NOT delay transport to start IV.

B. Treat dysrhythmias – refer to dysrhythmia protocols.
DEFINITIONS

A. As used in section 4765.01 of the Ohio Revised Code (ORC), chapter 4765-14 of Ohio Administrative Code (OAC) and in this protocol, “trauma” or “traumatic injury” means severe damage to or destruction of tissue that satisfies both of the following conditions:
   1. It creates a significant risk of any of the following:
      a. Loss of life;
      b. Loss of limb;
      c. Significant, permanent disfigurement;
      d. Significant, permanent disability; and
   2. It is caused by any of the following:
      a. Blunt or penetrating injury;
      b. Exposure to electromagnetic, chemical, or radioactive energy;
      c. Drowning, suffocation, or strangulation;
      d. A deficit or excess of heat.

B. “Trauma patient” or “trauma victim” means a person who has sustained a traumatic injury.

C. “Trauma care” means the assessment, diagnosis, transportation, treatment, or rehabilitation of a trauma victim by emergency medical service personnel or by a physician, nurse, physician assistant, respiratory therapist, physical therapist, chiropractor, occupational therapist, speech-language pathologist, audiologist, or psychologist licensed to practice as such in this state or another jurisdiction.

D. “Trauma center” means all of the following:
   1. Any hospital that is verified by the American college of surgeons as an adult or pediatric trauma center;
   2. Any hospital that is operating as an adult or pediatric trauma center under provisional status pursuant to section 3727.101 of the ORC;
   3. Any hospital in another state that is licensed or designated under laws of that state as capable of providing specialized trauma care appropriate to the medical needs of the trauma patient.

E. “Evidence of poor perfusion” means physiologic indicators of hemorrhage or decreased cardiovascular function, which may include any of the following symptoms:
   1. Weak, distal pulse;
   2. Pallor;
   3. Cyanosis;
   4. Delayed capillary refill;
   5. Tachycardia

F. “Evidence of respiratory distress or failure” means physiologic indicators of decreased ventilatory function, which may include any of the following symptoms:
   1. Stridor;
   2. Grunting;
   3. Retractions;
   4. Cyanosis;
5. Hoarseness;
6. Difficulty speaking.

G. “Evidence of hemorrhagic shock” means physiologic indicators of blood loss that may include any of the following symptoms:
   1. Delayed capillary refill;
   2. Cool, pale, diaphoretic skin;
   3. Decreased systolic blood pressure with narrowing pulse pressure;
   4. Altered level of consciousness.

H. “Seatbelt sign” means abdominal or thoracic contusions and abrasions resulting from the use of a seatbelt during a motor vehicle collision.

I. “Signs or symptoms of spinal cord injury: means physiologic indicators that the spinal cord is damaged, including, but not limited to, paralysis, weakness, numbness, or tingling of one or more extremities.

J. “Evidence of neurovascular compromise” means physiologic indicators of injury to blood vessels or nerves including, but not limited to, pallor, loss of palpable pulses, paralysis, paresthesias, or severe pain.

K. “Body region” means a portion of the trauma victim’s body divided into the following areas:
   1. Brain;
   2. Head, face, and neck;
   3. Chest;
   4. Abdomen and pelvis;
   5. Extremities;

L. “Evidence of traumatic brain injury” means signs of external trauma and physiologic indicators that the brain has suffered an injury caused by external forces including, but not limited to:
   1. Decrease in level of consciousness from the victim’s baseline;
   2. Unequal pupils;
   3. Blurred vision;
   4. Severe or persistent headache;
   5. Nausea or vomiting;
   6. Change in neurological status.

**DETERMINATION OF A TRAUMA VICTIM**
4765-14-02 of the OAC

Emergency medical services personnel shall use the criteria in this rule, consistent with their certification, to evaluate whether an injured person qualifies as an adult trauma victim, geriatric trauma victim, or pediatric trauma victim, in conjunction with the definition of trauma in section 4765.01 of the ORC and chapter 4765-14 of the OAC.

A. **An Adult trauma victim** is a person between the ages of sixteen and sixty-nine years of age inclusive exhibiting one or more of the following physiologic or anatomic conditions:
   1. Physiologic Conditions:
      a. Glasgow Coma Scale less than or equal to 13;
      b. Loss of consciousness more than five minutes;
      c. Deterioration in level of consciousness at the scene or during transport;
d. Failure to localize pain;
e. Respiratory rate less than 10 or greater than 29;
f. Requires endotracheal intubation;
g. Requires relief of tension pneumothorax;
h. Pulse rate greater than 120 in combination with evidence of hemorrhagic shock;
i. Systolic blood pressure less than 90, or absent radial pulse with carotid pulse present;

2. Anatomic Conditions (the same for all ages):
   a. Penetrating trauma to the head, neck, or torso;
   b. Significant penetrating trauma to extremities proximal to the knee or elbow with evidence of neurovascular compromise;
   c. Injuries to the head, neck, or torso where the following physical findings are present:
   d. Visible crush injury;
   e. Abdominal tenderness, distention, or seatbelt sign;
   f. Pelvic fracture;
   g. Flail chest;

3. Injuries to the extremities where the following physical findings are present:
   a. Amputations proximal to the wrist or ankle;
   b. Visible crush injury;
   c. Fractures of two or more proximal long bones;
   d. Evidence of neurovascular compromise.
   e. Signs or symptoms of spinal cord injury;
   f. Second degree (partial thickness) or third degree (full thickness) burns greater than 10% total body surface area, or other significant burns involving the face, feet, hands, genitalia, or airway.

B. A Pediatric trauma victim is a person under sixteen years of age exhibiting one or more of the following physiologic or anatomic conditions:
   1. Physiologic Conditions:
      a. Glasgow Coma Scale less than or equal to 13;
      b. Loss of consciousness greater than 5 minutes;
      c. Deterioration in level of consciousness at the scene or during transport;
      d. Failure to localize pain;
      e. Evidence of poor perfusion or evidence of respiratory failure or distress.

C. A Geriatric Trauma Victim is a person 70 years of age or older exhibiting one or more of the following causes on injury or physiologic or anatomic conditions:
   1. Physiologic Conditions:
      a. Glasgow Coma Scale less than or equal to 14 in a trauma patient with a known or suspected traumatic brain injury;
      b. Glasgow Coma Scale less than or equal to 13;
      c. Loss of consciousness greater than 5 minutes;
      d. Deterioration in level of consciousness at the scene or during transport;
      e. Failure to localize pain;
      f. Respiratory rate less than 10 or greater than 29;
      g. Requires endotracheal intubation;
      h. Requires relief of tension pneumothorax;
      i. Pulse rate greater than 120 in combination with evidence of hemorrhagic shock;
      j. Systolic blood pressure less than 100, or absent radial pulse with carotid pulse present.
2. Anatomic Conditions – see A. 2. Anatomic Conditions listed for the Adult Trauma Victim, plus the following:
   a. Fracture of one proximal long bone sustained as a result of a motor vehicle crash;
   b. Injury sustained in two or more body regions.

3. Cause of injury:
   a. Pedestrian struck by a motor vehicle;
   b. Fall from any height, including standing falls, with evidence of a traumatic brain injury.

D. Emergency medical service personnel shall also consider mechanism of injury and special considerations, as taught in the EMT training curriculum when evaluating whether an injured person qualifies as a trauma victim.

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EXCEPTIONS TO MANDATORY TRANSPORT
4765-14-05 of the OAC

A. Emergency medical service personnel shall transport a trauma victim, as defined in section 4765.01 of the ORC, chapter 4765-14 of the OAC and this protocol, directly to an adult or pediatric trauma center that is qualified to provide appropriate adult or pediatric care, unless one or more of the following exceptions apply:
   1. It is medically necessary to transport the victim to another hospital for initial assessment and stabilization before transfer to an adult or pediatric trauma center;
   2. It is unsafe or medically inappropriate to transport the victim directly to an adult or pediatric trauma center due to adverse weather or ground conditions or excessive transport time;
   3. Transport the victim to an adult or pediatric trauma center would cause a shortage of local emergency medical service resources;
   4. No appropriate adult or pediatric trauma center is able to receive and provide adult or pediatric trauma care to the trauma victim without undue delay;
   5. Before transport of a patient begins, the patient requests to be taken to a particular hospital that is not a trauma center or the patient is less than 18 years of age or is unable to communicate, such a request is made by an adult member of the patient’s family or a legal representative of the patient.

If a trauma patient is not transported directly to an appropriate and qualified trauma center, you MUST document which of the above exceptions apply.
ABDOMINAL PAIN / NAUSEA VOMITING

TRAUMA

- OPEN AND MANAGE AIRWAY
- MAINTAIN O2 SATS >95%
- EVALUATE PATIENT CONDITION
- MONITOR VITAL SIGNS
  - HYPOPERFUSION (BP < 100 SYSTOLIC)
- OBTAIN MEDICAL HISTORY
  - NAUSEA/VOMITING
  - SURGERY
  - TRAUMA
- REASSURE PATIENT
- GIVE NOTHING BY MOUTH
- TRANSPORT IN POSTIION OF COMFORT

URGENT PATIENT
- MAINTAIN C-SPINE
- CONTROL LIFE-THREATENING HEMORRHAGE – APPLY TOURNIQUET AND/OR HEMOSTATIC AGENT IF INDICATED
- ASSESS AND MANAGE AIRWAY
- MAINTAIN O2 SATS >95%
- PERFORM RAPID TRAUMA ASSESSMENT TO FIND ADDITIONAL LIFE AND/OR LIMB-THREATENING INJURIES.
- TRANSPORT IMMEDIATELY (ALS INTERCEPT WHEN AVAILABLE)
- MONITOR VITAL SIGNS
  - HYPOPERFUSION (BP < 100 MMHG SYSTOLIC)
- OBTAIN MEDICAL HISTORY
- SPLINT FRACTURES IF TIME PERMITS
- REASSURE PATIENT
- REASSESS INTERVENTIONS

NON-URGENT PATIENT
- MAINTAIN C-SPINE
- ASSESS AND MANAGE AIRWAY
- MAINTAIN O2 SATS >95%
- CONTROL HEMORRHAGE BY APPROPRIATE METHODS
- PERFORM FOCUSED EXAM ON INJURED AREA
- SPLINT FRACTURES
- MONITOR VITAL SIGNS
  - HYPOPERFUSION (BP < 100 MMHG SYSTOLIC)
- OBTAIN MEDICAL HISTORY
- REASSURE PATIENT
- REASSESS INTERVENTIONS
- TRANSPORT

SEE SPECIFIC INJURIES TABLE FOR MANAGEMENT OF SPECIFIC INJURIES AND REFER TO SHOCK PROTOCOL

TRANEXAMIC ACID (TXA)

INDICATIONS FOR TXA USE IN TRAUMA PATIENTS:
- EVIDENCE OF MARKED BLOOD LOSS
- SUSTAINED TACHYCARDIA (>110/MIN, DESPITE A 500 CC BOLUS OF IVFS)
- INITIAL SYSTOLIC BP < 90
- SUSTAINED HYPOTENSION (<100 SYSTOLIC, DESPITE A 500 CC BOLUS OF IVFS)
- MAJOR TRAUMA WITH SUSPICION FOR PELVIC AND/OR ABDOMINAL INJURY
- MAJOR ARTERIAL BLEEDING REQUIRING TOURNIQUET

DOSAGE:
- ADMINISTER 1 GRAM/100ML IV PIGGYBACK OVER 10 MINUTES.
  ADMINISTRATION CAN BE COMPLETED IN THE EMERGENCY DEPARTMENT.
- FOR PEDIATRICS: 15MG/KG TXA LOADING DOSE (MAX 1G) OVER 10 MINUTES

IV NS (RUN TO MAINTAIN PERFUSION)
- MONITOR ECG
- CONSIDER PAIN MANAGEMENT PROTOCOL

CONSIDER TRANEXAMIC ACID (TXA) PROTOCOL
C-SPINE CONTROL IS USED IN ALMOST ALL NON-ISOLATED TRAUMA.

APPLY MANUAL C-SPINE CONTROL FOR ANY MECHANISM OF INJURY (MOI) FOR SPINE TRAUMA

SPINAL IMMOBILIZATION

MECHANISM OF INJURY ALONG WITH CLINICAL PRESENTATION WILL HELP DICTATE THE NEED FOR SPINAL IMMOBILIZATION. IF ANY DOUBT EXISTS IF A PATIENT SHOULD BE FULLY IMMOBILIZED, THEN SPINAL IMMOBILIZATION IS INDICATED AND SHOULD BE PERFORMED.

SIGNIFICANT MOI
- MULTIPLE TRAUMA
- MVC WITH EJECTION
- LONG FALLS
- DIRECT SPINAL INJURY

QUESTIONABLE MOI
- MVC
- FALLS
- VIOLENCE

MINIMAL MOI – LOW OR NO ENERGY APPLIED TO PATIENT

SPINAL IMMOBILIZATION REQUIRED

SPINAL IMMOBILIZATION NOT REQUIRED

C/O NECK PAIN OR NECK PAIN ON PALPATION

AGE > 69

NO

ANY DOUBT

UNRELIABLE EXAM DUE TO:
- ALTERED LOC
- HEAD INJURY
- DRUG OR ALCOHOL USE
- DISTRACTING INJURY
- LANGUAGE BARRIER

DEFICITS IN NEURO EXAM (PULSE, MOTOR, SENSORY)
• ASSESS AND MANAGE AIRWAY
• MAINTAIN O2 SATS >95%
• EVALUATE PATIENT CONDITION AND DETERMINE BURN TYPE
  **THERMAL**: STOP BURNING PROCESS, REMOVE FROM HEAT SOURCE, COOL SKIN, REMOVE CLOTHING (PREVENT SHIVERING) COVER BURN AREAS WITH DRY DRESSING.
  **RADIATION**: TREAT LIKE THERMAL BURNS (IF BURN IS CONTAMINATED WITH RADIOACTIVE SOURCE TREAT AS CHEMICAL BURN) WEAR APPROPRIATE PPE AND CONTACT HAZMAT
  **CHEMICAL**: WEAR APPROPRIATE PPE, REMOVE PATIENT FROM SOURCE TO DECON AREA, DETERMINE CHEMICAL INVOLVED, REMOVE CLOTHING AND FLUSH SKIN, LEAVE CONTAMINATED BELONGINGS ON SCENE AND TRANSPORT. IF AVAILABLE BRING MSDS.
  **ELECTRICAL** – SHUT DOWN ELECTICAL SOURCE, ASSESS FOR ENTRANCE AND EXIT WOUNDS - TREAT AS THERMAL BURNS, ASSESS FOR INTERNAL INJURY.
  **INHALATION** – ALWAYS SUSPECT INHALATION BURNS WHEN PATIENT FOUND IN CLOSED, SMOKY ENVIRONMENT, BURNS TO NECK OR FACE, SINGED NASAL HAIRS, COUGH, STRIDOR, OR SOOT IN SPITUM, PROVIDE 100% OXYGEN.
• MONITOR VITAL SIGNS
  o HYPOPERFUSION (BP < 100 MMHG SYSTOLIC)
• OBTAIN MEDICAL HISTORY
• REASSURE PATIENT
• TRANSPORT

• REFER TO ADVANCED AIRWAY MANAGEMENT PROCEDURE AS INDICATED
• IV NS (RUN TO MAINTAIN PERFUSION) CONSIDER IO IF UNABLE TO ESTABLISH IV IN TWO ATTEMPTS
• MONITOR ECG
• CONSIDER PAIN MANAGEMENT PROTOCOL

**BURN SERIOUSNESS**

- **MINOR BURN** -
  <70% SUPERFICIAL BURN
  <10% PARTIAL THICKNESS BURN
  <2% FULL THICKNESS BURN*

- **MODERATE BURN** -
  >70% SUPERFICIAL BURN 10-30% PARTIAL THICKNESS BURN*

- **CRITICAL BURN** -
  >30% PARTIAL THICKNESS BURN
  >2% FULL THICKNESS BURN*
  ANY BURNS WITH TRAUMA ANY BURNS WITH HEAD, FACE, FEET, AND/OR GENITALIA INHALATION INJURY HIGH VOLTAGE / LIGHTNING

*ONLY IF HANDS, FEET OR GENITALIA ARE NOT INVOLVED.
EYE INJURY

TRAUMA
- Do not allow eye injury to distract you from the basics of trauma care
- Do not remove any imbedded foreign bodies and stabilize any large protruding foreign bodies
- With blunt trauma to the eye, examine the globe briefly for injury
- Do not exert pressure on the globe. A light sterile wet dressing may be used to cover the eye for transport.
- Covering both eyes when only one eye is injured may help to minimize trauma to the injured eye, but in some cases the patient may be too anxious to tolerate this.
- Transport patient 45° unless other life threats prohibit this.

CHEMICAL BURNS
- Irrigate eye with copious amounts of water as soon as possible.
- Obtain name of substance and/or MSDS sheet.

CONTACT LENSES
- Remove lenses if possible and transport them with patient.
- Have patient remove their lenses whenever possible.

ACUTE UNILATERAL VISION LOSS
- Sudden loss of vision in one eye with no pain.
- Transport patient urgently in upright position.

If chemical burns present:
- Administer Tetracaine (Pontocaine) Ophthalmic 2 drops in affected eye(s) prior to irrigation.
- **MAINTAIN C-SPINE**
- **CONTROL LIFE-THREATENING HEMORRHAGE** – APPLY TOURNIQUET AND/OR HEMOSTATIC AGENT IF INDICATED
- **BEGIN CPR AND REFER TO CARDIAC ARREST PROTOCOL**
- **TRANSPORT**

- **IV NORMAL SALINE** – ADMINISTER FLUID BOLUSES OF 20 ML/KG TO MAINTAIN PERFUSION
- **MONITOR ECG**

- **REFER TO DYSRHYTHMIA PROTOCOLS AS INDICATED.**
Measure vital signs and level of consciousness

**Pediatric**
- GCS <=13
- Failure to localize pain
- Ining level of consciousness
- Loss of consciousness >5 mins
- Poor perfusion
- Resp distress/failure
- Resp <20, age <1

**Adult**
- GCS <=13
- Failure to localize pain
- Ining level of consciousness
- Loss of consciousness >5 mins
- Sys B/P <90
- Pulse >120 w/shock
- Resp <10 or >29
- Tension PTX
- Needs ventilatory support

**Geriatric**
- GCS <=14
- Failure to localize pain
- Ining level of consciousness
- Loss of consciousness >5 mins
- Sys B/P <100
- Pulse >120 w/shock
- Resp <10 or >29
- Tension PTX
- Needs ventilatory support
- GCS <15 w/TBI

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**Transport to a trauma center**

- Yes
- No

**Assess anatomy of injury**

- All Ages
  - Penetrating inj to head/neck/torso
  - Crush inj of head/neck/torso
  - Flail chest
  - Abd tenderness/distention/seatbelt sign
  - Pelvic fx
  - Spinal cord inj
  - Penetrating inj proximal to knee/elbow w/neurovasc compromise
  - Amputation proximal to wrist/ankle
  - Crush of arm/leg
  - 2 humerus/femur fx
  - Arm/leg inj w/neurovasc compromise
  - 2/3 burns >10% TBSA
  - Sig burns of face/feet/hands/genitals/airway
  - Open skull fx
  - Geriatric only
  - MVC w/ 1 humerus/femur fx
  - Inj of 2 or more body regions

**Assess cause of injury**

- Yes
  - No
  - Vehicle telemetry data = high-risk for injury
  - Geriatric only
  - Pedestrian struck
  - Fall w/TBI

**Consider special circumstances**

- These may include:
  - Falls >20’ (10’ or 2-3 x body ht. for peds)
  - Motorcycle crash >20mph
  - High-risk auto crash:
    - Ejection
    - Death in same compartment
    - Vehicle telemetry data shows high risk of injury
  - Auto vs. pedestrian/bicycle: thrown, run over, >20mph
  - Co-morbid conditions:
    - Pregnant
    - Bleeding disorder or anticoagulants
    - Dialysis
    - Diabetes
    - Immune compromised

**Yes**

**Contact medical control & consider transport to a trauma center**

**No**

**Transport per protocol**

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**Reminder:** Drowning, near-drowning, strangulation and asphyxia are considered trauma and should be transported to a trauma center.

* These criteria were developed for use by EMS personnel in the prehospital setting. They are not intended for use in determining candidates for interfacility transfer (secondary triage).

** Special circumstances are additional factors to be considered and should never be the sole reason for triaging a patient to a trauma center.

When in doubt, transport to a trauma center!
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