Adult/Pediatric Trauma Triage

PURPOSE

The goal of any trauma patient assessment and transportation guideline is to facilitate delivery of the patient to the most appropriate level of care in the most expeditious manner.

Exception to these triage guidelines is made for trauma patients requiring airway intervention that cannot be accomplished by pre-hospital personnel. These patients will be transported to closest appropriate hospital to allow for airway management, resuscitation and immediate transfer for definitive care as indicated.

I. Assess Patient According to National Guideline for the Field Triage of Injured Patients
  A. RED CRITERIA – High Risk for Serious Injury - Include the Following
    1. Injury Patterns
      a. Penetrating injuries to head, neck, torso, and proximal extremities
      b. Skull deformity, suspected skull fracture
      c. Suspected spinal injury with new motor or sensory loss
      d. Chest wall instability, deformity, or suspected flail chest
      e. Suspected pelvic fracture
      f. Suspected fracture of two or more proximal long bones
      g. Crushed, degloved, mangled, or pulseless extremity
      h. Amputation proximal to wrist or ankle
      i. Active bleeding requiring a tourniquet or wound packing with continuous pressure
    2. Mental Status & Vital Signs
      a. All Patients
        i. Unable to follow commands (motor GCS < 6)
        ii. RR < 10 or > 29 breaths/min
        iii. Respiratory distress or need for respiratory support
        iv. Room-air pulse oximetry < 90%
      b. Age 0-9 Years
        i. SBP < 70mm Hg + (2 x age in years)
      c. Age 10-64 years
        i. SBP < 90 mmHg or
        ii. HR > SBP
      d. Age ≥ 65 Years
        i. SBP < 110 mmHg or
        ii. HR > SBP
  B. Patients meeting any one of the **above** RED CRITERIA should be transported to a Level 1 or Level 2 trauma center, with the following age group guidance:
    1. **Adult** (15 years of age or older) – In order of preference of destination
      a. Level 1 or Level 2 Trauma Center within 45 minutes. (If Level 1 or Level 2 Trauma Center is not possible within 45 minutes by ground transport from scene – consider air medical.)
      b. Level 3 Trauma Center within 45 minutes

c. Level 4 Trauma Center within 45 minutes

2. **Pediatrics** (14 years of age or younger) – In order of preference of destination
   a. Pediatric Level 1 or Pediatric Level 2 Trauma Center if within 45 minutes
   b. Level 1 or Level 2 Trauma Center within 45 minutes (If NEITHER a Level 1 or Level 2 Pediatric Trauma Center NOR Level 1 or Level 2 Trauma Center is possible by ground transport from scene – consider air medical.)
   c. Level 3 Trauma Center within 45 minutes
   d. Level 4 Trauma Center within 45 minutes.

II. **YELLOW CRITERIA** – Moderate Risk for Serious Injury – Include the Following

A. Mechanism of Injury
   1. High-Risk Auto Crash
      a. Partial or complete ejection
      b. Significant intrusion (including roof)
         i. >12 inches occupant site OR
         ii. >18 inches any site OR
         iii. Need for extrication for entrapped patient
      c. Death in passenger compartment
      d. Child (age 0-9 years) unrestrained or in unsecured child safety seat
      e. Vehicle telemetry data consistent with severe injury
   2. Rider separated from transport vehicle with significant impact (e.g., motorcycle, ATV, horse, etc.)
   3. Pedestrian/bicycle rider thrown, run over, or with significant impact
   4. Fall from height > 10 feet

B. EMS Judgement
   1. Consider risk factors, including
      a. Low-level falls in young children (age ≤ 5 years) or older adults (age ≥ 65 years) with significant head impact
      b. Anticoagulant use
      c. Suspicion of child abuse
      d. Special, high-resource healthcare needs
      e. Pregnancy > 20 weeks
      f. Burns in conjunction with trauma
      g. Children should be triaged preferentially to pediatric capable centers
   2. If concerned, transport to a trauma center

C. Patients meeting any one of the **YELLOW CRITERIA** WHO DO **NOT** MEET **RED CRITERIA** should be preferentially transported to a trauma center, as available within the geographic constraints of the regional trauma system (need not be the highest-level trauma center per local MCA and trauma policies)

National Guideline for the Field Triage of Injured Patients

RED CRITERIA

High Risk for Serious Injury

Injury Pattern	Mental Status & Vital Signs
• Penetrating injuries to head, neck, torso, and proximal structures • Skull deformity, suspected skull fracture • Suspected spinal injury with new motor or sensory loss • Chest wall instability, deformity, or suspected flail chest • Suspected pelvic fracture • Suspected fracture of two or more proximal long bones • Crushed, degloved, mangled, or pulseless extremity • Amputation proximal to wrist or ankle • Active bleeding requiring a tourniquet or wound packing with continuous pressure	All Patients • Unable to follow commands (motor GCS < 6) • RR < 10 or > 29 breaths/min • Respiratory distress or need for respiratory support • Room-air pulse oximetry < 90% Age 0–9 years • SBP < 70mm Hg + (2 x age in years) Age 10–64 years • SBP < 90 mmHg or • HR > SBP Age ≥ 65 years • SBP < 110 mmHg or • HR > SBP

Patients meeting any one of the above RED criteria should be transported to a Level 1 or Level 2 trauma center.

***RED CRITERIA* Adult** (15 years of age or older) Order of destination choices

1. Level 1 or Level 2 Trauma Center within 45 minutes.

   **If Level 1 or Level 2 Trauma Center is not possible within 45 minutes by ground transport from scene – consider air medical.*
2. Level 3 Trauma Center within 45 minutes
3. Level 4 Trauma Center within 45 minutes.

***RED CRITERIA* Pediatrics** (14 years of age or younger) Order of destination choices

1. Pediatric Level 1 or Pediatric Level 2 Trauma Center if within 45 minutes
2. Level 1 or Level 2 Trauma Center within 45 minutes

   **If Level 1 or Level 2 Pediatric Trauma Center NOR Level 1 or Level 2 Trauma Center is possible by ground transport from scene – consider air medical.*
3. Level 3 Trauma Center within 45 minutes
4. Level 4 Trauma Center within 45 minutes

YELLOW CRITERIA

Moderate Risk for Serious Injury

Mechanism of Injury

- High-Risk Auto Crash
  - Partial or complete ejection
  - Significant intrusion (including roof)
    - >12 inches occupant site OR
    - >18 inches any site OR
    - Need for extrication for entrapped patient
  - Death in passenger compartment
  - Child (age 0–9 years) unrestrained or in unsecured child safety seat
  - Vehicle telemetry data consistent with severe injury
- Rider separated from transport vehicle with significant impact (e.g., motorcycle, ATV, horse, etc.)
- Pedestrian/bicycle rider thrown, run over, or with significant impact
- Fall from height > 10 feet (all ages)

EMS Judgement

Consider risk factors, including:

- Low-level falls in young children (age < 5 years) or older adults (age > 65 years) with significant head impact
- Anticoagulant use
- Suspicion of child abuse
- Special, high-resource healthcare needs
- Pregnancy > 20 weeks
- Burns in conjunction with trauma
- Children should be triaged preferentially to pediatric capable centers

If concerned, take to a trauma center

Patients meeting any one of the YELLOW CRITERIA WHO DO NOT MEET RED CRITERIA should be preferentially transported to a trauma center, as available within the geographic constraints of the regional trauma system (need not be the highest-level trauma center per local MCA and trauma policies)

NOTES

1. Medical Control may be contacted to determine the appropriate destination when indicated.

2. High risk pelvic fracture does not include isolated hip fractures without significant mechanism

General Trauma

This protocol should be followed for severely injured patients meeting trauma triage guidelines and methodology, including chest injuries, and patients with symptoms of spinal cord injury, along with extremity weakness, numbness, or sensory loss. It consists of assessment, stabilization, extrication, initiation of resuscitation, and rapid transportation to the closest appropriate trauma facility.

GENERAL TRAUMA MANAGEMENT

1. Follow **General Pre-Hospital Care-Treatment Protocol**.
2. Stabilize spinal column while opening the airway, determine level of consciousness. Refer to **Spinal Injury Assessment-Treatment Protocol**.
3. Manage airway and ventilation per **Airway Management-Procedure Protocol**. Avoid Hyperventilation/Hyperoxygenation.
4. Control major external bleeding. Refer to **Bleeding Control (BCON)-Treatment Protocol.**
5. If signs of shock are present, refer to **Shock-Treatment Protocol**.
6. Refer to **Mass Casualty Incidents-Special Operations Protocol** if appropriate.
7. Determine if the patient is taking blood thinners and document the results in the PCR.
8. Initiate transport according to the **Adult/Pediatric Trauma Triage-Treatment Protocol** or refer to applicable MCA Transport Protocol.
9. Alert receiving hospital as soon as appropriate. Include pertinent trauma triage criteria.
10. Obtain vascular access (in a manner that will not delay transport).
11. Refer to **Pain Management-Procedure Protocol**.

CHEST INJURY

1. Control hemorrhage per **Bleeding Control (BCON)-Treatment Protocol** and **Soft Tissue and Orthopedic Injuries-Treatment Protocol** and **Bleeding Control-Treatment Protocol**.
2. Assess, monitor, and treat life threatening respiratory problems.
   A. Administer high-flow oxygen. *Avoid positive pressure ventilation if possible.*
   B. Cover open and/or sucking chest wounds with an occlusive dressing or an FDA approved, MCA authorized commercial device.
      1. Release dressing if worsened shortness of breath, or signs of tension pneumothorax.
3. If tension pneumothorax suspected, perform needle decompression per **Pleural Decompression-Procedure Protocol.**

ABDOMINAL INJURY

1. Cover intestinal eviscerations with a sterile dressing moistened with sterile saline or water; cover the area with an occlusive material (aluminum foil or plastic wrap). Cover the area with a towel or blanket to keep it warm. Transport with knees slightly bent, if possible. DO NOT PUSH VISCERA BACK INTO ABDOMEN.
2. If signs of shock see **Shock-Treatment Protocol** and/or **Hemorrhagic Shock-Treatment Protocol**

HEAD INURY

1. Avoid hypo or hyper ventilation. See **Head Injury-Treatment Protocol**

Burns

NOTE: When calculating Total Body Surface Area (TBSA) do not include superficial burns (erythematous tissue) in the TBSA

BURN SEVERITY DETERMINATION/DEFINITIONS
SUPERFICIAL - NOT counted in TBSA
Dry, red, easily blanching, sometimes painful (i.e., sunburn)
SUPERFICIAL PARTIAL THICKNESS – counted in TBSA
Moist, red, blanching, blisters, very painful
DEEP PARTIAL THICKNESS – counted in TBSA
Drier, more pale, less blanching, less pain
FULL THICKNESS – counted in TBSA
Dry, leathery texture, variable color (white, brown, black), loss of pin prick sensation

GENERAL TREATMENT:

1. Follow **General Pre-Hospital Care-Treatment Protocol**.
2. Pediatric patients (≤ 14 years of age) utilize MI MEDIC cards for appropriate medication dosage. When unavailable utilize pediatric dosing listed within protocol
3. If evidence of possible airway burn, consider proactive airway management per **Airway Management-Procedure Protocol.**
4. Administer 100% oxygen to all patients rescued from a confined space fire (i.e., building, automobile) regardless of pulse oximetry reading.
5. Determine burn extent & severity (rule of nines, or palm = 1%).
6. Keep patient warm and avoid hypothermia.
7. Assess and treat for associated injuries.
8. If burns are associated with unconsciousness or respiratory burns, or cyanide poisoning, refer to **Cyanide Exposure-Special Operations Protocol.**

THERMAL BURNS:

1. Stop the burning process. Remove smoldering and non-adherent clothing.
2. Consider potential for secondary contamination .
3. Assess and treat associated trauma.
4. Remove any constricting items.
5. Cover burns with dry clean dressings to prevent hypothermia.

CHEMICAL BURNS:

1. Protect personnel from contamination.
    a. Identify chemical agent when possible.
2. Remove all clothing and constricting items.
3. Decontaminate patient prior to transport, brushing off dry chemicals prior to irrigation refer to **Hazard Contaminate Patient-Special Operations**.
4. Evaluate for systemic symptoms, which might be caused by chemical contamination.
5. Notify receiving hospital of possible chemical contamination.
6. Cover burned area in clean, dry dressing for transport.

ELECTRICAL INJURY:

1. Protect rescuers from live electric wires.

2. When energy source is removed, remove patient from electrical source.
3. Treat associated injuries, provide spinal precautions per **Spinal Injury Assessment-Treatment Protocol** when indicated.
4. Assess and treat contact wound(s).
5. Monitor patient ECG for possible arrhythmias. Treat as per specific arrhythmia protocol.

FOR ALL TYPES OF BURNS:

1. Obtain vascular access if indicated for pain management or fluid therapy per **Vascular Access and IV Fluid Therapy-Procedure Protocol**.
2. For patients with hypotension administer **LR** (**NS** if **LR** not available) IV/IO fluid bolus
   a. Adults: up to 1 liter
   b. Pediatrics: up to 20 ml/kg
3. If patient remains hypotensive consider other underlying causes for hypotension and contact Medical Control prior to further fluid resuscitation.
4. For non-superficial burns without hypotension and BSA > 10% deep partial thickness (second degree) or any full thickness (third degree) administer fluids according to age
   a. <1 year Contact Medical Control
   b. 1-5 years old: 125 mL/hour
   c. 6-13 years old: 250 mL/hour
   d. ≥14 years: 500 mL/hour
5. Administer analgesic medication. Refer to **Pain Management-Procedure Protocol**.

TRANSPORT:

1. Follow local MCA Transport Protocol.
2. Special Transport Considerations
   a. If severe airway/breathing compromise that cannot be managed transport to the closest facility.
   b. Burn patients that also meet the field trauma triage criteria (refer to **Adult/Pediatric Trauma Triage-Treatment Protocol**) should be transported to the closest appropriate trauma facility per MCA Transport Protocol.
   c. Consider transport directly to burn center if:
      i. Full thickness burns
      ii. Partial thickness ≥10% TBSA
      iii. Any deep partial or full thickness burns involving the face, hands, genitalia, feet, perineum, or over any joints
      iv. All patients with suspected inhalation injury
      v. Circumferential burns
      vi. All chemical injuries
      vii. All high voltage (≥1,000V) electrical injuries
      viii. Lightning injury
   d. Consider air ambulance transportation for long transport times, pain control requiring deep sedation, and airway concerns that might necessitate advanced airway management.

Protocol Source/References: National Association of State EMS Officials (2016); American Burn Association (2022) Guidelines for Burn Patient Referral.

General Crush Injury

Purpose:

This protocol should be considered when the patient has been entrapped at the scene for more than one hour, one or more full extremities trapped by an object capable of causing a crush injury, including machinery, dirt, rock, and rubble or there is entrapment of patient with history of previous cardiac or renal disease or dialysis treatment.

Crush Syndrome:

Should be suspected in patients with entrapment/compression of greater than one hour, especially when a large muscle mass/group is involved. Treatment of the patient at risk for Crush Syndrome **should begin before the patient is removed when practical.**

Treatment:

1. Follow **General Trauma-Treatment Protocol**, identify and treat life threats.
2. Pediatric patients (≤ 14 years of age) utilize MI MEDIC cards for appropriate medication dosage. When unavailable utilize pediatric dosing listed within protocol.
3. Assess for signs of Compartment Syndrome or Crush Syndrome.
4. Use tourniquet as indicated (see **Tourniquet Application-Procedure Protocol**.
5. Administer oxygen to patient if environment allows.
6. Administer **albuterol** 2.5 mg/3ml **NS** nebulized per **Medication Administration-Medication Protocol** continuous if IV access is not immediately available. (Per MCA selection may be EMT skill). **Albuterol** may be continued to a maximum dose of 20 mg

Nebulized **albuterol** administration
☑ EMT

7. Establish large bore IV(s) and/or IO (refer to **Vascular Access and IV Fluid Therapy-Procedure Protocol**) and administer fluid bolus prior to removal of patient, when practical.
   a. Adults: 1 liters **LR** IV/IO wide open followed by 500-1,000 mL/hr
   c. Pediatrics: 20 ml/kg **LR** IV/IO wide open followed by 10/mL/kg/hr
8. Treat patient pain per **Pain Management-Procedure Protocol**.
9. Initiate cardiac monitoring and assess for hyperkalemia, i.e., wide QRS or peaked T waves. Monitor continuously for changes.
10. If extrication is prolonged, and/or hyperkalemia is suspected (peaked T waves, widened QRS, hypotension):

a. Administer **calcium chloride**
   i. Adults: 1 gram slow IVP over 5 minutes
   ii. Pediatrics: 20 mg/kg slow IVP over 5 minutes, max dose 1 gram over 5 minutes

11. Perform repeated 12-Lead ECG, if conditions allows. (Per MCA selection, may be a BLS or Specialist procedure) follow **12 Lead ECG-Procedure Protocol**

Protocol Source/Reference: Michigan 2.4 General Crush Injury; Version 5/22/23

Additional References

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2) Effects of normal saline vs. lactated ringer's during renal transplantation. Renal Failure. 2008; 30(5):535-9.
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5) Effects of intraoperative and early postoperative normal saline or Plasma-Lyte 148® on hyperkalaemia in deceased donor renal transplantation: a double-blind randomized trial. Br J Anaesth. 2017;119(4): 606-615
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12) Hyperkalemia. Internet Book of Critical Care [internet]. June 20, 2021
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14) Balanced Crystalloids versus Saline in Critically Ill Adults with Hyperkalemia or Acute Kidney Injury: Secondary Analysis of a Clinical Trial. Am J Respir Crit Care Med. 2021; 203(10):1322-1325.
15) Management Algorithm for Adults with Hyperkalemia (K> 5.5 mEq/L). ACEP; 2022.

<u>Medication Protocols</u>

Albuterol

Calcium Chloride

Soft Tissue & Orthopedic Injuries

1. Follow **General Pre-hospital Care Protocol**.
2. Pediatric patients (≤ 14 years of age) utilize MI MEDIC cards for appropriate medication dosage. When unavailable utilize pediatric dosing listed within protocol.
3. Control bleeding (refer to **Bleeding Control (BCON)- Procedure Protocol**)
    A. Utilize direct pressure.
    B. Consider early tourniquet use (refer to **Tourniquet Application-Procedure Protocol**).
    C. Consider MCA approved hemostatic agents and hemorrhage control devices.
    D. Consider use of pressure dressings with deep wound packing.
    E. Consider pelvic binding for suspected unstable pelvic fracture.
4. For uncontrolled bleeding with hemorrhagic shock see **Hemorrhagic Shock-Treatment Protocol**
5. If appropriate, maintain spinal precautions for patient per **Spinal Injury Assessment-Treatment Protocol.**
6. Assess pain on 1-10 scale and treat per **Pain Management-Procedure Protocol**.
7. Immobilize/splint orthopedic injuries as appropriate.
    A. Special Considerations
        i. Consider traction splinting for closed femur fractures (excluding hip/femoral neck).
        ii. Straighten severely angulated fractures if distal extremity has signs of decreased perfusion.
        iii. Evaluate and document neurovascular status before and after splinting.
8. Partial/complete amputations, major soft tissue injuries (e.g., mangled extremity) and open fractures.
    A. Control bleeding as above
    B. Cover wounds with sterile dressings moistened with sterile solution.
    C. Splint extremity.
    D. Recoverable amputated parts should be brought to hospital as soon as possible.
    E. Wrap amputated part in sterile dressing moistened with sterile solution. Seal in a plastic bag and, if available, place bag in container of ice and water. DO NOT place part directly on ice.
    F. Obtain IV access per **Vascular Access and IV Therapy-Procedure Protocol.**
    G. Administer antibiotics (per MCA selection).

MCA Selection for Antibiotics

☐ No antibiotic selection

☑ **Ceftriaxone Slow IV Push**: 2gm diluted with 20ml **NS**
1. Adult: 2 gm (diluted) slow IVP 3-5 min
2. Pediatrics > 2 months of age:
   a. Administer diluted dose according to MI MEDIC cards.
   b. If MI MEDIC cards are not available, administer 50 mg/kg (diluted) slow IVP 3-5 min (Maximum dose 2 gm)

☑ **Ceftriaxone Infusion:** Diluted dose added to 100 mL NS bag
1. Adult: 2 gm (diluted) added to 100 mL NS bag. Infuse over 15-30 min
2. Pediatrics ≥ 7 years of age:
   a. Ceftriaxone Infusion according to MI MEDIC cards
   b. If MI MEDIC cards are not available, add 50 mg/kg (diluted) to 100 mL NS bag. Max dose 2 gm. Infuse over 15-30

☐ **Cefazolin Slow IV Push:** 2 gm diluted with 20 ml or **NS**,
1. Adults: 2 gm (diluted) slow IVP 3-5 min
2. Pediatrics:
   a. Administer diluted dose according to MI MEDIC cards.
   b. If MI MEDIC cards are not available, administer 30 mg/kg (diluted) slow IVP 3-5 min (Maximum dose 2 gm)

☐ **Cefazolin Infusion**. Diluted dose added to 100 mL NS bag
1. Adult: 2 gm (diluted), added to 100 mL bag of NS. Infuse over 15-30 minutes.
2. Pediatrics ≥ 7 years of age:
   a. Cefazolin Infusion according to MI MEDIC cards.
   b. If MI MEDIC cards are not available, add 30 mg/kg (diluted) to 100 mL NS bag. Max dose 2 gm. Infuse over 15- 30 minutes.

H. Frequent monitoring of circulation, sensation, and motion distal to the injury during transport.

9. For severe crush injuries, refer to **General Crush Injury-Treatment Protocol**.
10. Impaled objects are left in place and stabilized. Removal of impaled objects is only with approval of Medical Control.
11. Follow MCA transport protocol.
12. Provide pain management per **Pain Management-Procedure Protocol.**

Medication Protocols
Cefazolin
Ceftriaxone

Spinal Injury Assessment

1. Follow **General Pre-hospital Care-Treatment Protocol**.
2. Assess the mechanism of injury.
    A. Negative mechanism does not need a spine injury clinical assessment.
    B. Patients with mechanism of injury with the potential for causing spine injury shall have a spine injury clinical assessment performed.
3. Clinical criteria are used as the basis for assessment. If any of the clinical criteria are present or if the assessment cannot be completed, the patient has a positive spine injury assessment.
4. If the mechanism of injury with the potential for causing spine injury exists, the following clinical criteria are assessed:
    A. Altered mental status
    B. Use of intoxicants
    C. A painful injury that distracts the patient from assessment of the spine.
    D. Motor and/or sensory deficit
    E. Spine pain and/or tenderness
5. If any of the clinical criteria are present the patient has a positive spine injury assessment. If none of the clinical criteria are present the patient has a negative spine injury assessment.
6. Patients with a positive spine injury assessment should have spinal precautions maintained during movement and transport. Refer to **Spinal Precautions-Procedure Protocol.**
7. Patients over the age of 65 with evidence of a head strike mechanism of injury will have a rigid extrication collar applied even if the spinal injury clinical assessment is negative.

Protocol Source/References: NASEMSO Clinical Guidelines

MCA Name: Delta
MCA Board Approval Date: 12/6/23
MCA Implementation Date: 3/1/24
MDHHS Approval: 5/22/23
MDHHS Reviewed 2023

Traumatic Arrest

Purpose: The patient in cardiac arrest from a traumatic cause requires rapid assessment and treatment for any chance of meaningful recovery. Standard ACLS is not the optimal approach. Successful resuscitation of the traumatic cardiac arrest patient requires rapid identification and correction of specific entities and rapid transport to an appropriate facility.

1. Indications:
    a. Patients in cardiac arrest from a traumatic source (blunt or penetrating)
2. Contraindications:
    a. Patient that meets DOA criteria, refer to **Dead on Scene/Termination of Resuscitation-Procedure Protocol.**
    b. Suspected traumatic cardiac arrest of more than 10 minutes prior to any interventions, refer to **Dead on Scene Termination of Resuscitation-Procedure Protocol**
    c. If the trauma appears to be minor/minimal and a medical condition appears to be the cause of the cardiac arrest, refer to the appropriate cardiac arrest protocol.
3. Procedures
    a. CPR - high quality CPR needs to be maintained refer to **Adult or Pediatric General Cardiac Arrest-Treatment Protocol**
        i. It is permissible to interrupt CPR briefly for life saving interventions like needle decompression/hemorrhage control.
    b. MEDICATIONS - Prioritize findings and reversing life threatening injuries as standard ACLS medications may not be useful.
    c. AIRWAY - Rapid establishment of an advanced airway with 100% oxygen administration refer to **Airway Management-Procedure Protocol**
    d. CHEST DECOMPRESSION - Refer to **Pleural Decompression-Procedure Protocol**.
        i. Consider bilateral needle decompression in the presence of chest trauma, regardless of findings.
    e. HEMORRHAGE CONTROL - Bleeding control is essential refer to **Bleeding Control (BCON)-Treatment Protocol** and if applicable **Tourniquet Application-Procedure Protocol**.
        i. Penetrating Trauma - Areas not amenable to tourniquet should have a pressure dressing and/or wound packing per **Bleeding Control (BCON)-Procedure Protocol**.
        ii. Blunt Trauma – Place a pelvic binder (commercial or a sheet) on all patients with blunt or blast trauma suffering traumatic arrest. If using a sheet, it should be wrapped around the greater trochanters.

iii. Consider TXA, as available, per **Hemorrhagic Shock-Treatment Protocol**.

f. VOLUME ADMINISTRATION - Rapid vascular access should be obtained. If large bore IV access cannot be rapidly obtained, IO access preferably in the proximal humerus should be obtained **NS** or **LR** rapidly infused. Refer to **Vascular Access & IV Fluid Therapy-Procedure Protocol**
   i. Adults: up to 1 liter
   ii. Pediatrics: up to 20 ml/kg

g. These interventions are not a substitute for rapid transport to an appropriate facility.
   i. If these interventions fail to correct the issues, contact Medical Control for consultation regarding termination of efforts.

4. Termination of efforts should be considered if:
   a. Blunt traumatic arrest in asystole
   b. No signs of life for greater than 10 minutes of intervention
   c. Transport time greater than 15 minutes
   d. Injuries incompatible with life.
5. Continuation of care should be considered with:
   a. Penetrating trauma with signs of life (reactive pupils), PEA with HR greater than 40
   b. ROSC
   c. Hypothermia
   d. Pregnant females with gestational age estimated at greater than 20 weeks.
   e. Patients under 18 years of age.
      i. Transport to the closest appropriate trauma facility per MCA Transport Protocol.
6. Post arrest care:
   a. If pulses are obtained, refer to **Adult or Pediatric Return of Spontaneous Circulation-Treatment Protocol.**
      i. Consider TXA per **Hemorrhagic Shock-Treatment Protocol**

Drowning/Submersion Injury

Drowning is defined as**, "**A process resulting in primary respiratory impairment from submersion or immersion in a liquid medium." (American Heart Association, 2010).

For patients who have been submerged and in cardiac arrest:

1. In cold water (water temperature less than 70° F/21° C)
    - A. Initiate resuscitative efforts if submersion time is less than 90 minutes.
        -  i. Contact Medical Control for instructions on transport timing and destination for in-hospital rewarming.
    - B. For submersion time greater than 90 minutes see **Dead on Scene/Termination of Resuscitation-Procedure Protocol**
2. In warm water (temperature is greater than 70° F/21° C)
    - A. Initiate resuscitative efforts if submersion time is less than 30 minutes.
        -  i. Contact Medical Control for futher direction, which may include instructions on transport timing, destination, or termination of resuscitation.
    - B. For submersion time greater than 30 minutes see **Dead on Scene/Termination of Resuscitation-Procedure Protocol**
3. It may be impractical to determine water temperature; subsurface water temperatures may be considerably colder than surface temperature. When in doubt, consider water to be cold.
4. Time estimation begins when the patient is presumed to be submersed.

For patients who have been submerged and NOT in cardiac arrest

1. If SCUBA incident with rapid ascent, the maintain the patient in a supine position.
2. Follow **General Pre-hospital Care-Treatment Protocol**.
    - A. Administer high flow oxygen.
    - B. Primary survey should include proactive airway management and restoration of adequate oxygenation and ventilation.
    - C. Exam should include consideration of possible c-spine injury.
    - D. Assess for other associated injury such as injury to the head or dive-related emergency.
    - E. Assess patient's temperature.
    - F. If patient is hypothermic, go to **Hypothermia/Frostbite-Treatment Protocol,** handle patients gently. Excessive/aggressive movement can precipitate cardiac arrest.
    - G. Prevent further heat loss by transport in a warm environment.
    - H. Patient should be dry and/or wrapped in vapor barrier, as available.
    - I. Patients may develop subacute respiratory difficulty after drowning and therefore all victims of drowning should be transported for observation.
        -  i. Consider transport to facility with hyperbaric oxygen therapy capability.
    -  J. Consider CPAP (Per MCA selection, may be a BLS procedure) follow **CPAP-Procedure Protocol**.
    -  K. Contact Medical Control if no transport is considered or no transport is requested.

*Note: For SCUBA incident with rapid ascent, contact Medical Control. Medical Control may consider contacting the Divers Alert Network (DAN) @ 919-684-9111 to arrange evacuation and hyperbaric re-compression at a properly equipped and staffed chamber.

Protocol Source/References: AHA, National Association of State EMS Officials; cold water temp - https://www.coldwatersafety.org/why-did-we-pick-70f-21c

Poisoning/Overdose/Environmental Exposure

NERVE AGENT/ORGANOPHOSPHATE EXPOSURE refer to **Nerve Agent/Organophosphate Pesticide Exposure-Special Operations Protocol**.

GENERAL MANAGEMENT OF TOXIC EXPOSURE (INCLUDING INGESTION)

1. Follow **General Pre-hospital Care-Treatment Protocol.**
2. Pediatric patients (≤ 14 years) utilize MI MEDIC cards for appropriate medication dosage. When unavailable utilize pediatric dosing listed within protocol.
3. Use proper personal protective equipment and prepare for decontamination if necessary.
4. Remove clothing exposed to chemical (dry decon) refer to **Hazardous Contaminated Patient-Special Operations**
5. Identification of the substance the patient has been exposed to.
6. If altered mental status, refer to **Adult or Pediatric Altered Mental Status-Treatment Protocol**.
7. If suspected opioid overdose, refer to **Opioid Overdose Treatment and Prevention-Treatment Protocol.**
8. If respiratory distress, refer to **Adult or Pediatric Respiratory Distress-Treatment Protocol.**
9. If the patient is seizing, refer to **Adult or Pediatric Seizure-Treatment Protocol.**
10. Alert receiving hospital if patient may present HAZMAT risk.
11. Sample of drug or substance and any medication or poison containers should be brought in with patient if it does NOT pose a risk to rescuers.
12. Refer to **Pain Management-Procedure Protocol**
13. For inhalation exposures, ensure high flow oxygen is provided.
14. If suspected cyanide gas exposure, refer to **Cyanide Exposure-Special Operations Protocol** and contact Medical Control immediately.
15. If suspected nerve agent or organophosphate pesticide, refer to **Nerve Agent/Organophosphate Pesticide Exposure-Special Operations Protocol** and contact Medical Control immediately.
16. Obtain 12 lead (Per MCA selection, may be a BLS or Specialist procedure) refer to **12-Lead ECG- Procedure Protocol** and monitor cardiac rhythm, treat dysrhythmia per appropriate dysrhythmia protocol.
17. For extrapyramidal dystonic reactions, administer **diphenhydramine.**
    a. For adults (>14 years of age), 50 mg IV.
    b. For pediatrics (≤ 14 years of age), 1 mg/kg IV (max dose 50 mg).
15. For symptomatic tricyclic antidepressant ingestions (tachycardia, wide complex QRS), contact Medical Control for administration of **sodium bicarbonate**
    a. Adults (>14 years of age), 50 mEq IV, repeat as needed per medical control.
    b. Pediatrics (≤ 14 years of age), 1mEq/kg IV, repeat as needed per medical control.
16. For symptomatic calcium channel blocker overdose, contact Medical Control and consider **calcium chloride**
    a. Adults (>14 years of age), 1 gm IV.
    b. Pediatrics (≤ 14 years of age), 20 mg/kg IV (max dose 1 gm).

17. For other specific medications in overdose (i.e., beta blockers), contact Medical Control for further guidance.

EYE CONTAMINATION:

1. Irrigate continuously with **NS,** tap water, or bottled water (if available) for 15 minutes (attempt to continue enroute) or as directed by Medical Control.
2. For alkali exposure, maintain continuous irrigation.
3. If available (per MCA selection), administer **tetracaine,** 1-2 drops per eye every 5 minutes, maximum of 5 doses, to facilitate irrigation. Ensure patient does not rub eye.

Tetracaine Included?
(●) Yes ( ) No

SKIN ABSORPTION:

1. Brush off dry chemicals before irrigation
2. Irrigate continuously with **NS** or tap water for 15 minutes or as directed by Medical Control.

MANAGEMENT OF BITES AND STINGS

SPIDERS, SNAKES AND SCORPIONS:

1. Protect rescuers. Bring in spider, snake or scorpion if captured and contained or if dead for accurate identification.
    a. CAUTION: Dead snakes can reflexively bite after "death". Ensure animal is dead prior to placement into container and utilize tools that keep a distance between the rescuer and the animal whenever possible (e.g., shovel, tongs, etc.)

2. Ice for comfort on spider or scorpion bite; DO NOT apply ice to snake bites.
3. SNAKES
    a. Determine if localized or systemic reaction to bite:
        1) Localized Signs/Symptoms (pain and swelling, numbness/tingling, bruising)
            a) Consider pain management, per **Pain Management-Procedure Protocol** (avoid **morphine** if possible as the histamine release from **morphine** may lead to confusion between envenomation vs. medication effects
        2) Systemic Signs/Symptoms (hypotension, altered mental status, hemorrhage, airway swelling/compromise)
            a) Prepare to manage airway & hypotension; if necessary, refer to **Airway Management-Procedure Protocol, Adult or Pediatric Respiratory Distress-Treatment Protocol, Shock-Treatment Protocol** and **Anaphylaxis/Allergic Reaction-Treatment Protocol**
            b) Consider pain management, per **Pain Management-Procedure Protocol** (avoid morphine if possible)
        3) Obtain specific snake information:
            a) Species, color, rattle, elliptical pupils, or thermal pit (photos are encouraged

b. Evaluate and document appearance of wound: location, puncture marks and number, timing of bite, and prior first aid.
c. Remove all constricting items from bitten limb (rings, jewelry, watch, clothing etc.)
d. Immobilize bitten part below the level of the heart (sling, loose wrapping)
e. Initiate prompt transport.
f. If present, mark margins of erythema and/or edema with a marker and include time measured.
g. Do NOT use ice, refrigerants, tourniquets, scalpels, or suction devices.
h. Specific Precautions
    1) Eastern Massasauga Rattlesnake is the only venomous snake native to Michigan.
    2) Exotic venomous snakes i.e., pets/zoo animals, are common; obtain species information and antivenom if available on-scene, from pet owner/zookeeper and transport with patient. Antivenom should be available on-site if patient is coming from a zoo.
    3) Transport to the closest facility.

<u>BEES, CENTIPEDES, SLUGS, AND WASPS:</u>

1. Remove stinger by scraping out. Do not squeeze venom sac if this remains on stinger.
2. Provide wound care.
3. Observe patient for signs of systemic allergic reaction. Treat anaphylaxis per **Anaphylaxis/Allergic Reaction-Treatment Protocol.**

<u>ANIMAL BITES</u>

1. Assure scene safety and contact Police or Animal Control Officer if necessary.
2. DO NOT collect live animals to avoid self-injury; delegate collection of animals to Animal Control Officer, if necessary, for rabies identification. Do NOT bring live animals to the Emergency Department or healthcare facility.
3. Consider pain management per **Pain Management-Procedure Protocol.**
4. Control bleeding per **Bleeding Control (BCON)-Treatment Protocol**.
5. Rabies evaluation:
    a. The following animals are known transmitters and confer risk requiring emergent evaluation: Bat, Skunk, Fox, Dog, Cat, Ferret, Livestock, Opossum, Woodchuck
    b. Obtain the following animal information: type/species of animal, wild/stray vs domestic, bite vs scratch, animal immunization status, and if animal collection was possible
    c. All patients at risk for rabies exposure should be transported, follow local MCA transport protocols. If patient refuses transport, they should be advised to seek immediate medical evaluation for rabies evaluation and possible vaccination. Document the refusal per **Refusal of Care; Adult and Minor-Procedure Protocol**.
6. For additional information, see www.michigan.gov/rabies or contact Michigan Department of Health and Human Services: Communicable Disease Division

Medication Protocols
Calcium Chloride
Diphenhydramine
Sodium Bicarbonate
Tetracaine

Heat Emergencies

1. Follow **General Pre-hospital Care-Treatment Protocol**.
2. Pediatric patients (≤ 14 years of age) utilize MI MEDIC cards for appropriate medication dosage. When unavailable utilize pediatric dosing listed within protocol
3. Determine history/evidence of heat exposure.
4. Check blood glucose (may be MFR skill, see **Blood Glucose Testing-Procedure Protocol**) and treat hypoglycemia per **Adult or Pediatric Altered Mental Status-Treatment Protocol**.

HEAT CRAMPS:

1. Move the patient to a cool environment and attempt oral liquids (may use commercial sports/rehydration).

HEAT EXHAUSTION:

1. Move the patient to a cool environment.
2. Remove tight clothing.
3. Cool patient, provide air conditioning/fanning. Avoid chilling/shivering.
4. Obtain IV/IO Access and administer fluid bolus **NS** or **LR** wide open (refer to **Vascular Access and IV Fluid Therapy-Procedure Protocol**).
   a. Adults (≥ 14 years of age): up to 1 liter
   b. Pediatrics (<14 years of age): up to 20 mL/kg
5. Patient may take oral fluid replacement rather than IV if no nausea. Allow oral intake of cool fluids or water (may use commercial sports/rehydration drinks). Do not permit patient to drink if altered mental status, abdominal pain, or nausea. Avoid carbonated, alcoholic and caffeinated beverages.
6. Treat nausea according to **Nausea/Vomiting-Treatment Protocol**.

HEAT STROKE:

1. Move the patient to a cool environment.
2. Remove tight clothing.
3. Immediate cooling – provide air conditioning and fanning. Avoid chilling/shivering.
4. Place patient in semi-reclining position with head elevated.
5. Obtain IV/IO Access and administer fluid bolus **NS** or **LR** wide open (refer to **Vascular Access and IV Fluid Therapy-Procedure Protocol**).
   a. Adults (≥ 14 years of age): up to 1 liter
   b. Pediatrics (<14 years of age): up to 20 mL/kg
7. Treat nausea according to **Nausea/Vomiting-Treatment Protocol**.
8. Initiation of aggressive cooling may take priority over transport. Contact Medical Control for further cooling and transport guidance.

MANAGEMENT OF PATIENT WITH EXERTIONAL HEAT STROKE

1. Cool as quickly as possible via ice or cool-water immersion, if possible. Alternative means, such as continually misting the exposed skin with tepid water while fanning the victim, may be used if immersion is not possible.

   a. Cool as much of the body as possible, especially the torso.
2. Cool first, transport second when possible.
3. Obtain IV/IO Access (consider resting the patient's arm on the side of immersion tub to start IV while patient is still immersed) and administer fluid bolus **NS** or **LR** wide open (refer to **Vascular Access and IV Fluid Therapy-Procedure Protocol**).
   a. Adults (≥ 14 years of age): up to 1 liter
   b. Pediatrics (<14 years of age): up to 20 mL/kg
4. If patient experiences seizures, refer to **Adult or Pediatric Seizure-Treatment Protocol**.
5. Monitor ECG (lead cables can go in the water).

Protocol Source/References: NASEMSO CLINICAL GUIDELINES

Hypothermia/Frostbite

1. Follow **General Pre-hospital Care-Treatment Protocol**

HYPOTHERMIA:

1. If cardiac arrest develops follow **Adult or Pediatric General Cardiac Arrest-Treatment Protocol**.
2. Move patient to a warm dry place, remove wet clothing & wrap in warm blankets and protect from wind exposure.
3. If the patient's temperature is greater than 30° C (86° F) or patient shivering & conscious:
   A. Apply heat packs to axillae and torso if possible.
   B. Use warmed humidified oxygen if available.
4. If patient is alert, administer warm non-caffeinated beverages (if available) by mouth, slowly.
5. If patient temperature is less than 30° C (86° F)
   A. Gentle handling is required.
   B. Facilitate transport immediately.
6. If altered mental status, check blood glucose (may be MFR skill, see **Blood Glucose Testing-Procedure Protocol)** and treat as indicated per **Adult or Pediatric Altered Mental Status-Treatment Protocol** and assess for other causes of alterations of mentation.
7. If hypotensive, follow **Shock-Treatment Protocol**.
   S A. If a commercial device designed for warming IV fluids is available, warm fluid prior to administration.
8. Administer oxygen, if available oxygen should be warmed and humidified.

SUSPECTED FROSTBITE:

1. Remove wet or constricting clothing. Keep skin dry and protected from wind.
2. Do not allow the limb to thaw if there is a chance that limb may re-freeze before evacuation is complete or if patient must walk to transportation.
3. Dress injured areas lightly in clean cloth to protect from pressure, trauma or friction. Do not rub. Do not break blisters.
4. Keep patient warm.
5. Frostbitten areas should be supported and elevated during transport.
6. Treat pain per **Pain Management-Procedure Protocol**.

Protocol Source/Reference: Michigan 2.11 Hypothermia Frostbite; Version 5/22/23.
Additional References:
1 NASEMSO CLINICAL GUIDELINES (does not recommend heat to neck but does recommend heat to thorax)
2 Wilderness Medical Society Practice Guidelines for the Out-of-Hospital Evaluation and Treatment of Accidental Hypothermia. *Wilderness & Environmental Medicine;* 25: 425–445 (2014)
3 "Cold Card" to Guide Responders in the Assessment and Care of Cold-Exposed Patients. *Wilderness & Environmental Medicine*; 29(4): 499-503 (2018)
4. Problems and Complications With Cold-Water Rescue. Wilderness & Environmental Medicine;17(2): 26-30 (2006)

MCA Name: Delta
MCA Board Approval Date: 12/6/23
MCA Implementation Date: 3/1/24
MDHHS Approved: 1/26/24

Head Injury – Moderate & Severe TBI

Purpose: Reduction of morbidity and mortality associated with Traumatic Brain Injury (TBI). The treatment of a patient with suspected TBI should focus on four important clinically identifiable conditions: hypoxia, hyperventilation, hypotension, and hemorrhage. Overall approach: Continuous monitoring of O2 saturation with high-flow oxygen regardless of O2 saturation, avoidance of positive pressure ventilation (PPV) whenever possible and use of continuous quantitative end-tidal CO2 (ETCO2) monitoring in patients requiring positive pressure ventilation, blood pressure monitoring every 3-5 minutes and using IV fluids to maintain BP above target, and assessment for signs of hemorrhage or hemorrhagic shock with use of applicable bleeding control interventions.

I. TBI Criteria (moderate or severe TBI)
   1. Anyone with physical trauma and a mechanism consistent for a brain injury AND one or more of the following:
      a. Any loss of consciousness OR any altered mental status (e.g., GCS <15)
      b. Multisystem trauma requiring PPV, whether the primary need for PPV was from TBI or from other injuries.
      c. Seizures: pre-traumatic or post-traumatic seizures whether continuing or not.
      d. In infants (where mental status may be difficult to interpret): any decreased level of consciousness or decreased responsiveness.

II. Procedure:
   1. Follow **General Pre-hospital Care Protocol**
   2. Transport according to **Adult and Pediatric Trauma Triage-Treatment Protocol** and MCA Transport Protocol.
   3. Manage Airway & Oxygenation (Prevent Hypoxemia)
      a. All patients identified with moderate or severe head injury should receive continuous high-flow oxygen immediately by non-rebreather mask.
      b. Monitor and maintain SpO2 equal to or greater than 90%.
      c. If hypoxia is present despite high-flow oxygen, basic maneuvers for airway repositioning should be attempted, followed by reevaluation.
      d. If this does not restore SpO2 to 90% or greater, or if there is inadequate ventilatory effort, bag-valve-mask (BVM) ventilation should be performed, 2-person with supplemental oxygen and basic airway adjuncts.
      e. Advanced airway placement only when BVM ventilation ineffective or other conditions warrant advanced airway (e.g., long transport time) refer to **Airway Management-Procedure Protocol**
   4. Manage Ventilation (Prevent Hyperventilation)
      Note: Identify and treat hypoventilation as well as prevent hyperventilation when assisting ventilation. As much as possible maintain normal ventilation. Hyper-ventilation decreases cerebral blood flow and worsens secondary brain injury. Strict attention on avoiding hypo- and hyper- ventilation is critical. It has been shown that repeatedly that inadvertent hyperventilation happens reliably if not

meticulously prevented. Use Pressure-Controlled Bags (PCBs) and Ventilation Rate Timers (VRTs) when available.

a. Utilize basic airway adjuncts (OPA, NPA).
b. Ventilate at the following rates:
    i. Adults (>14 years of age) ventilate at 10 breaths per minute.
    ii. Children (≥ 2 years of age - ≤ 14 years of age) ventilate at 20 breaths per minute.
    iii. Infants (< 2 years of age) ventilate at 25 breaths per minute.
c. Continuously monitor SpO2 and maintain ≥ 90%
d. Continuously monitor end tidal carbon dioxide per **End Tidal Carbon Dioxide Monitoring-Procedure Protocol**.
    i. Maintain ETCO2 35-45 mmHG (ideal target is 40 mmHG)
e. If hypoventilation or hypoxia persists after these interventions, consider advanced airway options, go to **Airway Management-Treatment Protocol.**

5. Manage Hemorrhage
    a. See **Bleeding Control (BCON)-Treatment Protocol**
    b. Consider **TXA**, if available, per the **Hemorrhagic Shock-Treatment Protocol**
        i. Consider contacting medical control for patients who may not meet clinical criteria for **TXA** administration but hemorrhage is suspected.

6. Manage Blood Pressure (Prevent Hypotension)

Note: Do not wait for the patient to become hypotensive.

a. Obtain vascular access per **Vascular Access & IV Fluid Therapy-Procedure Protocol** for all patients.
    i. Consider IO placement per **Vascular Access and IV Therapy-Procedure Protocol** in the presence of hypotension or other signs of shock when an IV cannot be established quickly.
b. Do not wait for patient to become hypotensive. Decreasing SBP or other signs of compensated shock (increasing heart rate, increasing respiratory rate) require proactive fluid administration.
c. Target blood pressures:
    i. Adults (>14 years of age) SBP 90-140 mmHG
    ii. Pediatrics (10-14 years of age) SBP 90-130 mmHG
    iii. Pediatrics (< 10 years of age) SBP ≥ 70 + (age x2)-100
d. Administer **LR** or **NS**
    i. Adults (> 14 years of age) up to 1L wide open for immediate correction.
    ii. Pediatrics (≤ 14 years of age) 20 ml/kg wide open for immediate correction.
    iii. Continue IV fluids as needed at TKO to maintain SBP in above range.
e. Check blood glucose (may be MFR skill), see **Blood Glucose Testing-Procedure Protocol** and treat hypoglycemia per **Adult or Pediatric Altered Mental Status-Treatment Protocol**

Protocol Source/References: Excellence in Prehospital Injury Care (EPIC) | Excellence in Prehospital Injury Care - Traumatic Brain Injury (arizona.edu)

Bleeding Control

Indications:
Patients with significant traumatic or non-traumatic (i.e., hemodialysis access) external hemorrhage

1. Follow **General Pre-hospital Care-Treatment Protocol** and **Soft Tissue & Orthopedic Injuries-Treatment Protocol.**
2. Apply direct pressure to the wound with clean gauze using universal precautions.
3. If the bleeding is not controlled with direct pressure, treat according to the location of the wound.
   a. Extremity bleeding - apply tourniquet:(Refer to **Tourniquet Application-Procedure Protoco**l)
      i. If tourniquet unsuccessful apply second/adjacent tourniquet per **Tourniquet Application-Procedure Protocol**.
      ii. NOTE- tourniquet may be painful, see **Pain Management-Procedure Protocol.**
   b. Junctional hemorrhage (neck, axilla/shoulder, or groin bleeding):
      i. Pack wound with MCA approved hemostatic dressing (if available, following manufacturer's instructions) or clean gauze.
      ii. Use as much of the dressing/gauze as needed to stop the blood flow.
      iii. Quickly apply pressure until the bleeding stops. (Approximately 3-5 minutes)
      iv. Leave the dressing in place and wrap area with bandaging to secure the dressing.
      v. Caution must be exercised when packing neck wounds to avoid airway compromise. Avoid an encircling bandage of the neck.
      vi. Packing penetrating head, chest, and abdominal wounds is contraindicated.
4. Do not remove the bandage or hemostatic dressing/gauze
5. Elevate the injury, if possible.
6. Reassess for bleeding through or around the dressing.
7. For patients who have signs or symptoms of shock, secondary to hemorrhage, refer to **Hemorrhagic Shock-Treatment Protocol**.
8. Transport according to **Adult and Pediatric Trauma Triage-Treatment Protocol** and MCA Transport Protocol

Notes:
If hemostatic dressing is used, contact medical control to advise of application, document time of use, and send packaging from dressing to hospital with patient for removal instructions.

Protocol Source/Reference: Michigan 2.13 BCON; Version 5/23/23.

Hemorrhagic Shock

Purpose: To provide treatment for patients displaying signs and symptoms of shock attributed to hemorrhage including trauma and **severe postpartum hemorrhage.**

1. Follow **General Pre-hospital Care-Treatment Protocol** control bleeding according to **Bleeding Control (BCON)-Treatment Protocol** when applicable.
2. Transport according to **Adult and Pediatric Trauma Triage-Treatment Protocol** and MCA Transport Protocol.
3. No intervention should delay transport.
4. Obtain vascular access.
5. For signs of hypotension unaccompanied by moderate to severe head trauma administer NS or LR IV/IO fluid bolus IV/IO (refer to **Vascular Access and IV Fluid Therapy-Procedure Protocol**).
   a. Adults (≥ 14 years of age): up to 1 liter
      i. When possible, patients with hemorrhagic shock should have fluids administered in 500 ml boluses.
      ii. The patient will be reassessed for continuing signs of shock following each fluid bolus.
      iii. Patients without head injury should have fluids reduced to TKO rate when systolic BP is 100 mmHg or greater.
      iv. For patients with suspected head injury target blood pressures are higher and hypotension should be urgently corrected.
         a) Adults (>14 years of age) SBP 90-140 mmHg
         b) Pediatrics (10-14 years of age) SBP 90-130 mmHg
         c) Pediatrics (< 10 years of age) SBP > 70 + (age x2)-100
         d) Continue IV fluids as needed at TKO to maintain SBP in above range.
   b. Pediatrics (< 14 years of age): up to 20 mL/kg
6. For signs of hypotension accompanied by moderate to severe head trauma refer to **Head Injury–Treatment Protocol** for fluid administration guidelines.
7. Consider other causes of traumatic hypotension and treat accordingly. (Tension pneumothorax see **Pleural Decompression-Procedure Protocol,** neurogenic shock see **Shock-Treatment Protocol**)
8. Hypotensive patients unaccompanied by moderate to severe head trauma should receive additional IV/IO fluid boluses, as indicated by hemodynamic state.
   a. Adults (≥ 14 years of age): repeat IV/IO fluid bolus to a maximum of 2 liters.
   b. Pediatrics (< 14 years of age): repeat dose of 20 ml/kg to a maximum of 40 ml/kg.
   c. Monitor for pulmonary edema.
   d. If pulmonary edema presents, stop fluids and contact Medical Control for direction.
9. Per MCA Selection, if bleeding is uncontrolled and non-compressible, administer Tranexamic Acid (**TXA**)

MCA Name: Delta
MCA Board Approval Date: 12/06/2023
MCA Implementation Date: 3/1/24
MDHHS Approval: 1/26/24

Tranexamic Acid (TXA) Included

(●) Yes ( ) No

Age greater than 18 years old AND > 50 kg

1. Destination must be capable of administering 2nd dose.
2. Draw up and mix 1 gram of **TXA** into a 100 ml bag of **normal saline** solution (0.9% Sodium Chloride Solution).
   a. Use a filter needle if the medication is supplied in an ampule.
   b. Apply pre-printed "**TXA** added" fluorescent-colored label to IV bag.
3. Administer mixed medication via piggyback into IV/IO line over 10 minutes.

a. Hospital Notification and Documentation

   i. Contact Medical Control - the receiving hospital must be verbally notified that **TXA** has been given, prior to arrival.
   ii. A verbal report that **TXA** was administered must be provided to hospital ED staff (receiving physician preferred) upon hand-off of the patient from EMS.
   iii. The administration of **TXA** MUST be clearly documented on the EMS patient care record.

b. Contact Medical Control-Medical Control may order **TXA** for selected patients with suspected compensated shock not meeting the above criteria.

Protocol Source/Reference: Michigan 2.14 Hemorrhagic Shock; Version 5/23/23.

Additional references:

1. Damage Control Resuscitation. MILITARY MEDICINE; 183, 9/10:36 (2018)
2. Damage control resuscitation. Clin Exp Emerg Med; 7(1):5-13 (2020)

Medication Protocols
Tranexamic Acid (TXA)

MCA Name: Delta
MCA Board Approval Date: 12/06/2023
MCA Implementation Date: 3/1/24
MDHHS Approval: 1/26/24

Sexual Assault

Note to Responders: Victims of sexual assault commonly require psychological support.

- Respect all stress they may be enduring and be thoughtful with your speech and movement.
- Touching may be traumatic. Be clear and communicate what you are doing and any procedures or physical assessments that are completed.

I. Treat any life-threatening injuries or other emergencies first and according to protocol.

II. Neck Injury
   a. Signs and symptoms of strangulation and neck injury are not visible over 50% of the time.
      i. Evaluate for: loss of conscious, inability to recall how they became unconscious, voice change, involuntary urination, or defecation.
   b. Patients with signs or symptoms of any injury to the neck (e.g., strangulation) are at significant risk for complications.
   c. Visible signs may include:
      i. Any injury to the neck
         1. Redness
         2. Scratches
         3. Rope marks
         4. Bruising (especially thumb prints)
         5. Red eyes
   d. Symptoms
      i. Spasms of the neck/throat

III. Incontinence of bowel or bladder (this is a significant symptom associated with near death). During treatment, attempt to maintain evidence, refer to **Crime Scene Management-Procedure Protocol**.
   a. Do not cut through tears or stains. Only cleanse skin when necessary to provide immediate treatment.
   b. Any clothes that have been removed from the patient, should be bagged in paper bags, and brought with the patient to the hospital, if possible.
   c. Explain to the patient why they should not eat, drink, smoke, bathe, change clothing, or go to the bathroom. If they must urinate, ask that they not wipe.
   d. If the patient desires and/or mandatory reporting is indicated, notify law enforcement if they are not present.
   e. Any incident involving a minor or a vulnerable adult is a mandatory reporting event.

IV. At the request of the patient, further assessment and treatment may be delayed for law enforcement arrival only if no life-threatening situation is present.

V. During transport, allow the patient to choose the preferable attendant, if possible.

VI. Do not communicate details of a sexual assault over an open radio channel. Use telephone or other secure electronic communication.

VII. If the patient declines transport to the hospital:

a. Advise patients of risks and document according to the **Refusal of Care, Adult and Minor-Procedure Protocol**
b. Encourage patients to seek follow-up care at a local specialized treatment center.
c. If law enforcement is not present, and the patient refuses law enforcement contact, advise patient that evidence of assault is best collected within 120 hours.
d. Advise of available resources by seeking treatment or assistance, such as:
    i. MCA Specific resources, if available (i.e., Community Integrated Paramedicine if available and patient consents, MCA specific resource sheets if available, etc.)
    ii. Michigan's sexual assault hotline 1-855-VOICES4 (1-855-864-2374)
    iii. Links to local resources: https://www.michigan.gov/mdhhs/safety-injury-prev/domestic-violence/find-services-in-your-area
     iv. If unaware of local resources, and law enforcement is not available, contact Medical Control

VIII. Documentation
a. Excited utterances, which are statements that patients make while under stress from the event, should be noted as direct quotes from the patient
b. Thorough and accurate documentation of the incident is integral for continuity of care and the legal process.
c. In the case of refusals, risks documented should be specific to the type of injury and assault that occurred.