

MEMORIAL EMS SYSTEM
ADULT PREHOSPITAL CARE MANUAL

TRAUMA PROTOCOLS



MEMORIAL EMS SYSTEM
ADULT PREHOSPITAL CARE MANUAL

Routine Trauma Care Protocol

Assessment and management of patients with injury or suspected injury shall be conducted in accordance with ITLS/ PHTLS guidelines. Time from injury to definitive trauma center care is a critical factor in the morbidity and mortality of the injured patient. Scene times should be kept to a minimum and the patient should be promptly transported to the trauma center.

Trauma notification should be made via telemetry as soon as possible.

EMR Care, BLS Care, TEMS Care, ILS Care, ALS Care

1. Scene Assessment (Scene Size-Up)

- Ensure scene safety – identify any hazards (e.g. fire, downed power lines, unstable vehicle, leaking fuel, weapons).
- Determine the number of patients.
- Identify the **mechanism of injury** (gunshot wound, vehicle rollover, high speed crash, ejection from the vehicle).
- Identify special extrication needs, if any.
- Call for additional resources if needed. If ALS needed, start intercept early.

2. Primary Survey (Initial Assessment)

The purpose of the primary assessment is for the prehospital provider to rapidly identify and manage life-threatening conditions:

- Obtain a general impression of the patient's condition.
- Assess, secure and maintain a patent airway while simultaneously using C-spine precautions.
- Assess breathing and respiratory effort:
 - Approximate respiratory rate.
 - Assess quality of respiratory effort (depth of ventilation and movement of air).
- **Oxygen:** If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - Maintain SPO2 \geq 94%
 - **Chest Seal:** if open chest wound identified apply occlusive dressing.
 - **Needle Chest Decompression (TEMS and ALS only):** if patient is in severe respiratory distress or cardiac arrest with s/s of tension pneumothorax.
- Assess circulation:
 - Evaluate carotid and radial pulses.
 - Evaluate skin color, temperature and condition.
 - Immediately control major external bleeding. Treat based on *Bleeding Control Protocol* if needed.
- **Critical Decision** (based on mechanism of injury & initial exam):
 - Limit scene time to 10 minutes or less if the patient has a significant mechanism of injury or meets "Load & Go" criteria.

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2. Primary Survey (Initial Assessment) (continued)

- Determine disability (level of consciousness):
 - **A – Alert**
 - **V – Responds to verbal stimuli**
 - **P – Responds to painful stimuli**
 - **U – Unresponsive**
- Expose the patient:
 - Cut the patient's clothing away quickly to adequately assess for the presence (or absence) of injuries.

3. Secondary Survey (Focused History & Physical Exam)

The secondary survey is a head-to-toe evaluation of the patient. The object of this survey is to identify injuries or problems that were not identified during the primary survey.

- Examine the head:
 - Search for any soft tissue injuries.
 - Palpate the bones of the face & skull to identify deformity, depression, crepitus or other injury.
 - Check pupils for size, reactivity to light, equality, accommodation, roundness and shape.
- Examine the neck:
 - Examine for contusions, abrasions, lacerations or other injury.
 - Check for JVD, tracheal deviation, deformity.
 - Palpate the c-spine for deformity & tenderness.
- Examine the chest:
 - Closely examine for deformity, contusions, redness, abrasions, lacerations, penetrating trauma or other injury.
 - Look for flail segments, paradoxical movement & crepitus.
 - Auscultate breath sounds.
 - Watch for supraclavicular and intercostals retractions.
- Examine the abdomen:
 - Examine for contusions, redness, abrasions, lacerations, penetrating trauma or other injury.
 - Palpate the abdomen and examine for tenderness, rigidity and distention.
- Examine the pelvis:
 - Examine for contusions, redness, abrasions, lacerations, deformity or other injury.
 - Palpate for instability and crepitus. **DO NOT** perform pelvic rock.

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3. Secondary Survey (Focused History & Physical Exam) (continued)

- Examine the back:
 - Log roll with a minimum of 2 rescuers protecting the spine.
 - Look for contusions, abrasions, lacerations, penetrating trauma, deformity or any other injury.
 - Log roll onto long spine board and immobilize based on *Field Immobilization Decision Scheme*.
- Examine the extremities:
 - Examine for contusions abrasions, lacerations, penetrating trauma, deformity or any other injury.
 - Manage injuries en route to the hospital.
- Neurological exam:
 - Calculate Glasgow Coma Scale (GCS)
 - Reassess pupils
 - Assess grip strength & equality and sensation.
 - Calculate Revised Trauma Score (RTS)
- Vital signs:
 - Blood pressure
 - Pulse
 - Respirations
 - Pulse Oximetry
- History:
 - Obtain a SAMPLE history if possible.
 - Signs & symptoms
 - Allergies
 - Medications
 - Past medical history
 - Last oral intake
 - Events of the incident
- **Interventions (en route)**
 - Cardiac monitor
 - Blood glucose level
 - IV access / fluid bolus
 - Wound care
 - Splinting

4. Monitoring and Reassessment (Ongoing Assessment)

- Evaluate effectiveness of interventions
- Vital signs every *5 minutes*
- Reassess mental status (GCS) every *5 minutes*
- Reassess Revised Trauma Score (RTS) every *5 minutes*

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EMS Alert Patient Report- Trauma

The following information and format necessitate expedited delivery of information for potential pre-hospital trauma declaration. Scene time should be limited to ten minutes or less unless extrication is needed. Report should be provided as early as possible to activate trauma teams

1. Unit identification
2. ETA & Destination if other than Medical Control Center being contacted.
 - a. (Agencies should utilize their approved local Medical Control.)
 - b. (Agencies whose normal Medical Control Center may not always be the receiving destination of a Trauma patient must communicate early to determine destination. Report to include everything needed to activate TraumaTeam.)
3. “Inbound EMS Alert Patient Report- Potential Trauma.”
 - a. The above statement should be made within the first 5 seconds of the communication.
4. Mechanism of injury and comorbidities
 - a. Type (MVC/ fall/ stab/ GSW/ burn)
 - b. Incident details (speed/ protective factors/height/ scale/ etc.)
 - c. Blood thinner status
 - d. Any loss or decrease of consciousness
5. Patient status
 - a. Level of conscious
 - b. Significant injuries
 - c. Vitals and if ever hypotensive
6. Acknowledge necessary treatment plan. (May not be complete at time of communication.)
7. Determine destination (facility and location).

Transporting Units

1. Destination decisions must be informed decisions based on local and regional destination capabilities, time since onset and transportation distances.
 - a. See *EMS Triage Destination Plan*.
 - b. Include **Medical Control** in the decision making.

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Routine Trauma Care Protocol

Glasgow Coma Scale

Eye Opening	Spontaneous	4
	To Voice	3
	To Pain	2
	None	1
Verbal Response	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Words	2
	None	1
Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraw (pain)	4
	Flexion (pain)	3
	Extension (pain)	2
	None	1
TOTAL		<input type="text"/>

Revised Trauma Score

		<u>Score</u>
A. Ventilatory Rate	10-29/min	4
	> 29/min	3
	6-9/min	2
	1-5/min	1
	0	0
B. Systolic Blood Pressure	> 89 mmHg	4
	76-89 mmHg	3
	50-75 mmHg	2
	01-49 mmHg	1
	No pulse	0
C. Glasgow Coma Scale Score	13-15	4
	9-12	3
	6-8	2
	4-5	1
	< 4	0

RTS Total = A+B+C

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Trauma Shock Protocol

Common signs and symptoms of shock include:

- Confusion
- Restlessness
- Combativeness
- ALOC
- Pallor
- Diaphoresis
- Unexplained tachycardia (persistent or worsening after stress of the event subsides)
- Tachypnea
- Hypotension

Conditions that may indicate impending shock include:

- Significant mechanism of injury
- Tender and/or distended abdomen
- Pelvic instability
- Bilateral femur fractures

“Load & Go” with any trauma patient with signs and symptoms of shock – on scene treatment should be minimal. Conduct a *Primary Survey*, manage the airway, take C-spine precautions & immobilize, if indicated, and control any life-threatening hemorrhage. Contact Medical Control as early as possible.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol* and *Routine Trauma Care Protocol*.
2. **Oxygen:** 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. Maintain SPO₂ \geq 94%
3. Control bleeding based on *Bleeding Control Protocol*.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

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**Trauma Shock
Protocol**

BLS Care {Continued}

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. Apply **waveform capnography** (if equipped)
3. Initiate ALS intercept and transport as soon as possible.

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ILS Care includes all components of *BLS Care*.
2. **IV Fluid Therapy**: 500mL fluid bolus's as needed to maintain a systolic BP of 90mmHg. 90 mmHg is optimum so as to avoid dislodging a clot. *This permissive hypotension does NOT apply to significant TBI patients.*

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ALS Care includes all components of *ILS Care*.
2. If advanced airway control becomes necessary, maintain inline cervical immobilization. Consider first line use of airway adjuncts such as the supraglottic airway if intubation appears difficult, or if unable to strictly maintain inline cervical immobilization.
3. If > 30 minutes of decreased circulation to an extremity due to entrapment and/or crush injury, **contact Medical Control** for possible order of **Sodium Bicarbonate and 1L of Normal Saline (not LR)**.
4. **Contact Medical Control** as soon as possible.

Critical Thinking Elements

- **Hypotension may not occur in the early stages of shock. However, aggressive therapy is indicated if there is a significant mechanism of injury and/or shock is suspected.**
- **IV access should be obtained en route and should not delay transport time.**
- **IV fluid bolus/flow rate should be regulated and patient response to fluid monitored closely.**

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Traumatic Head Injury Protocol

Injuries to the head may cause underlying brain tissue damage. Increased intracranial pressure from bleeding or swelling tissue is a common threat after head trauma. Common signs and symptoms of increased intracranial pressure include:

- Confusion
- ALOC
- Dilated or unequal pupils
- Markedly increased systolic blood pressure
- Decreased pulse (bradycardia)
- Abnormal respiratory patterns
- Nausea/ vomiting

Priorities for the treatment of head injury patients include airway management, maintenance of adequate oxygenation & blood pressure as well as appropriate C-spine control & immobilization.

Hypotension, hypoxia, and hyperventilation should be avoided at all costs as they significantly increase the mortality of head injury patients.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. Be prepared for vomiting and have suction readily available.
3. **Oxygen:** 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. Maintain SPO2 \geq 94%
4. **Patients with poor respiratory effort may require ventilation with a BVM at 8-10 breaths/min. Remember: hyperventilating causes cerebral vasoconstriction and in turn decreased cerebral blood flow.**
5. Control bleeding based on *Bleeding Control Protocol*.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. Repeat vital signs, GCS & RTS every **5 minutes**.

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Traumatic Head Injury Protocol

BLS Care (Cont.)

3. If patient has an altered mental status, perform **blood glucose level test**. Treat based on *Altered Mental Status Protocol* as appropriate.
4. Apply **waveform capnography** (if equipped).
5. Initiate ALS intercept if needed and transport as soon as possible.

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ILS Care includes all components of *BLS Care*.
2. **IV Fluid Therapy**: 500mL fluid bolus's as needed to maintain a systolic BP \geq 100 mmHg.

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ALS Care includes all components of *ILS Care*.
2. **Contact Medical Control** as soon as possible.

Critical Thinking Elements

- Head trauma patients should receive oxygen to keep SpO₂ > 94%, preferably via NRM. Even just one SPO2 reading below 90% can double the mortality in a patient with significant TBI.
- -Avoid hyperventilation. If any assisted ventilations (BVM, Supraglottic, ETI) are required, goal directed ETCO₂ should be 35- 45.
- Deeply comatose patients may require advanced airway placement (GCS < 8). Consider a supraglottic airway or BVM.
- Treat for hemorrhagic shock if the patient's systolic BP is < 100mmHg. Hypotension decreases cerebral perfusion and worsens brain injury and must be corrected.

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Spinal Trauma Protocol

Injuries to the spine commonly result from mechanism of injury involving high kinetic energy. Any neurovascular impairment or spinal deformities are indicative of possible spinal trauma. Refer to Field Triage Decision Scheme for most common mechanisms of injury.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM. Frequently reassess the patient's airway & ventilatory status.
3. Assess and record any pain on palpation of the spine, any motor/sensory deficits of the extremities, abnormal arm position, ptosis and/or priapism.
4. Assess skin for temperature which will initially be warm, flushed and dry (below the point of injury). Cover the patient and keep him/her warm.
5. Assess for neurogenic shock: decreased BP, decreased pulse, & decreased respiratory rate.
6. Fully immobilize the patient and protect paralyzed limbs by securing the patient to the backboard. Refer to *Field Immobilization Decision Scheme* if any question regarding immobilization.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. Repeat vital signs, GCS & RTS every **5 minutes**.
3. Initiate ALS intercept and transport as soon as possible.
4. Apply **waveform capnography** (if equipped).

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Spinal Trauma Protocol

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ILS Care includes all components of *BLS Care*.
2. **IV Fluid Therapy:** 500mL fluid bolus's as needed to maintain a systolic BP of 90 mmHg.
 - a. All hypotension in trauma patients should be presumed to be caused by blood loss and should be treated/ monitored accordingly until proven otherwise.

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ALS Care includes all components of *ILS Care*.
2. **Dopamine:** If the patient remains hypotensive. Begin infusion at 24gtts/min. Increase by 12gtts/min every **2 minutes** to achieve and maintain a systolic BP of at least 90 mmHg. Closely monitor vital signs.
 - *Dopamine is provided premixed (400mg in 250mL D₅W). This yields a concentration of 1600mcg/mL. The initial rate of infusion is 1-10mcg/kg/min which can be achieved with a 24gtts/min infusion rate*
3. **Contact Medical Control** as soon as possible.

Bites and Envenomation Protocol

EMR Care, TEMS Care, BLS Care, ILS Care, ALS Care:

1. Routine Trauma Care Protocol should be initiated.
2. **Contact Medical Control.**

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Traumatic Arrest Protocol

Resuscitation success rates of trauma patients in cardiac arrest are extremely poor, usually due to prolonged hypoxia. Efforts to resuscitate are more likely to be successful if EMS arrives early in the arrest, understands the differences between traumatic cardiac arrest patients & medical cardiac arrest patients and treatment is directed at identifying & treating the underlying cause. Traumatic arrest is usually caused by airway problems (unmanaged airway during unconsciousness), breathing problems (from chest trauma) and/or circulatory problems (internal or external hemorrhaging).

Patients who are found in **asystole** after massive blunt trauma or penetrating trauma of a vital organ are dead and may be pronounced dead at scene with the concurrence of Medical Control.

EMR Care, TEMS Care, BLS Care, ILS Care, ALS Care

Care should be focused on rapid assessment confirming that the patient is in cardiac arrest and determine if resuscitation will be attempted. Medical Control must be consulted for death determination on scene. If resuscitative efforts are going to be attempted, begin resuscitation *immediately* and “Load & Go” with the patient.

1. Rapidly assess to determine possible causes of the arrest and determine if resuscitation will be attempted. If treatment cannot be started immediately consider how the delay will impact the ability to resuscitate the patient.
2. Initiate cardiac arrest protocols and procedures.
3. **Rapidly extricate, fully immobilize and “Load & Go”. Once transport is on scene, all treatment should be done enroute to hospital.**
4. “Load & Go” with any type of penetrating trauma. If transport agency is not on scene at the time traumatic arrest occurs or is identified, work to minimize scene time.
5. **BLS Care:** High Quality CPR. Place a **Supraglottic Airway** using in-line stabilization of the cervical spine or utilize basic airway control techniques.
6. **TEMS Care, ILS Care and ALS Care:** If advanced airway control is indicated: May attempt **intubation x1** maintaining strict inline cervical immobilization. If airway appears difficult, or if inline cervical immobilization is not feasible during airway control, utilize a supraglottic airway or utilize basic airway control techniques. Obtain **IV access** en route to the hospital with a 14g or 16g IV catheter (if possible). A 2nd line may be established if time permits.
IV Fluid Therapy: 500mL fluid bolus to achieve and maintain a systolic BP of ≥ 90 mmHg. Repeat as necessary.
7. **TEMS Care and ALS Care Only:** **Bilateral needle chest decompression** if chest trauma is present and the patient is in traumatic cardiac arrest.

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Field Triage Scheme

National Guideline for the Field Triage of Injured Patients

RED CRITERIA

High Risk for Serious Injury

Injury Patterns	Mental Status & Vital Signs
<ul style="list-style-type: none">• Penetrating injuries to head, neck, torso, and proximal extremities• 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	<p>All Patients</p> <ul style="list-style-type: none">• 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% <p>Age 0–9 years</p> <ul style="list-style-type: none">• SBP < 70mm Hg + (2 x age years) <p>Age 10–64 years</p> <ul style="list-style-type: none">• SBP < 90 mmHg or• HR > SBP <p>Age ≥ 65 years</p> <ul style="list-style-type: none">• SBP < 110 mmHg or• HR > SBP

Patients meeting any one of the above RED criteria should be transported to the highest-level trauma center available within the geographic constraints of the regional trauma system

YELLOW CRITERIA

Moderate Risk for Serious Injury

Mechanism of Injury	EMS Judgment
<ul style="list-style-type: none">• High-Risk Auto Crash<ul style="list-style-type: none">– Partial or complete ejection– Significant intrusion (including roof)<ul style="list-style-type: none">▪ >12 inches occupant site OR▪ >18 inches any site OR▪ Need for extrication for entrapped patient– Death in passenger compartment– Child (Age 0–9) unrestrained or in unsecured child safety seat– Vehicle telemetry data consistent with severe injury• Rider separated from transport vehicle with significant impact (eg, motorcycle, ATV, horse, etc.)• Pedestrian/bicycle rider thrown, run over, or with significant impact• Fall from height > 10 feet (all ages)	<p>Consider risk factors, including:</p> <ul style="list-style-type: none">• 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 <p>If concerned, take to a trauma center</p>

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)

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Field Triage Scheme

*For the RED CRITERIA transport recommendations, patients in extremis (e.g., unstable airway, severe shock, or traumatic arrest) may require transport to the closest hospital for initial stabilization, prior to transport to a level I-II trauma center for definitive care. Pediatric patients meeting the RED CRITERIA

should be preferentially triaged to pediatric-capable trauma centers.

†The EMS Judgement criteria should be considered in the context of resources available in the regional trauma system, including consideration of on-line medical control for further direction.

‡Examples of patients with special, high resource healthcare needs include tracheostomy with ventilator dependence, cardiac assist devices, etc.

¶Patients with combined burns and trauma should be preferentially transported to a trauma center with burn care capability. If not available, then a trauma center takes precedence over a burn center.

#Specific age used to define “children” is based on local system resources and practice patterns.

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Spinal Immobilization Procedure

Any type of patient manipulation may be dangerous during the care of a suspected spinal injury patient. Spinal injury should be suspected in all patients presenting with:

- Head, neck or facial trauma (*i.e.* injury above the clavicles)
- ALOC with unknown history of events
- Complaints of neck or back pain unrelated to the patient's medical history
- Complaint of head pain related to trauma
- Physical findings suggesting neck or back pain
- Unknown mechanism of injury
- High mechanism of injury despite complaints
- Suspected deceleration injuries

General Spinal Management

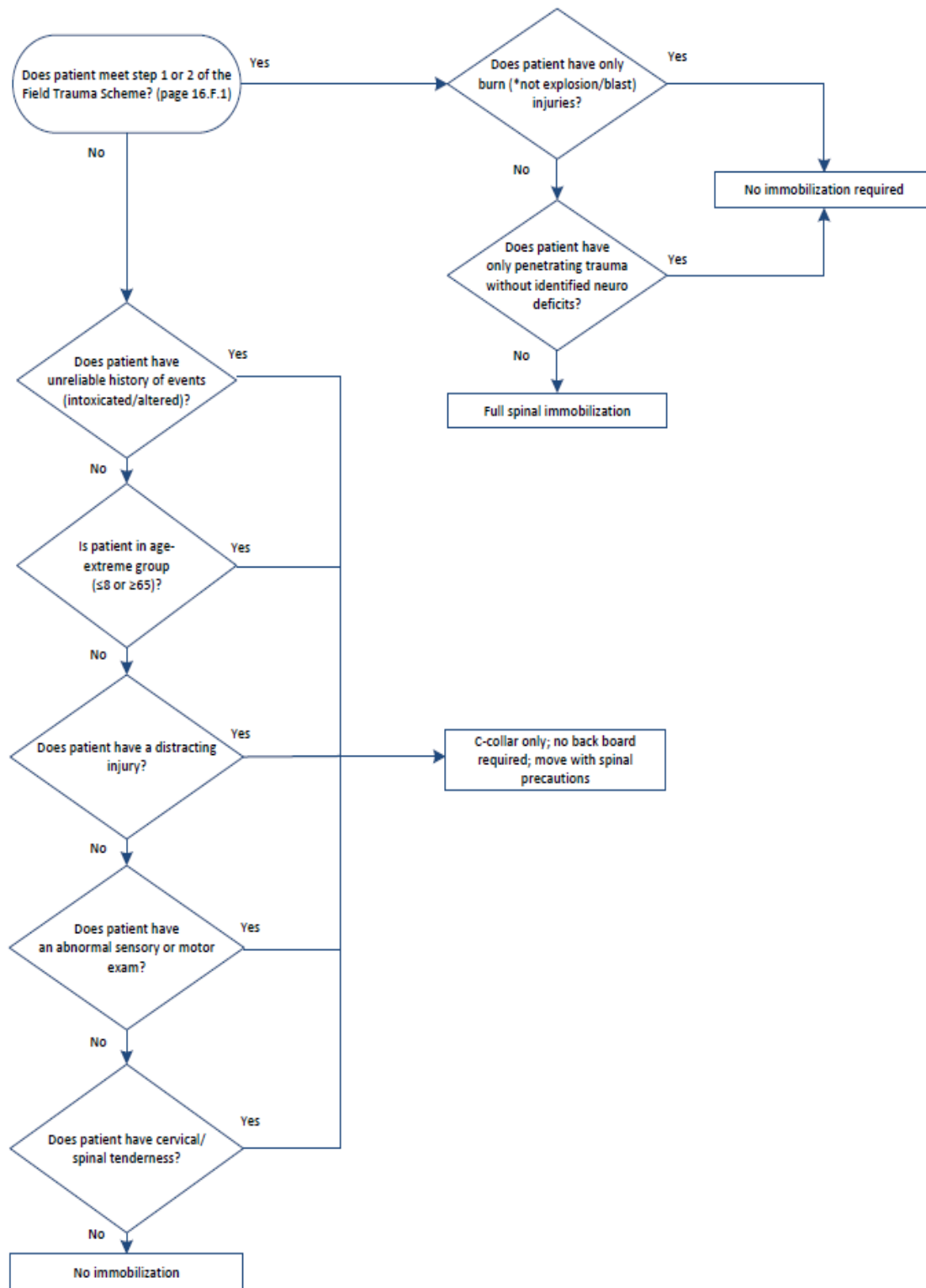
1. Render initial care according to *Routine Trauma Care*.
2. Immediately establish manual stabilization of the cervical spine.
 - a) Approach the patient in a manner that prevents the patient from moving his/her head & neck to see you or answer your questions.
 - b) Stabilize the patient's head & neck in a neutral in-line position by grasping the patient's head along the lateral aspects (and perform a modified jaw thrust if indicated).
 - c) Assess based on *Field Immobilization Decision Scheme (16.G.2)*.
 - a. If patient does not meet immobilization criteria, but requires spinal precautions, a C- Collar only should be applied. Patient should be moved along long axis. Assistance of slide boards may be utilized.
3. If the patient does meet immobilization criteria; apply a rigid C-collar after airway, breathing, and circulatory status have been assessed.
4. Log-roll the patient onto a long backboard. Assess and document neurovascular status *before and after* immobilization.
5. Secure the patient's torso and extremities to the backboard using spider straps or belts.
6. Reassess (perform ongoing assessment).

Spinal Management of Patients in a Sitting Position

1. Patients found in a sitting position that have a suspected spinal injury and meet immobilization criteria should be secured to an extrication device (*i.e.* KED).
2. Patients who meet "Load & Go" criteria should be moved using the rapid extrication technique. Proper manual stabilization must be maintained throughout the extrication.
 - a. Secure neutral, in-line stabilization of the head & neck (as per *General Spinal Management*).
 - b. Keeping the patient's spine in a neutral position, pivot the patient in order to place a long backboard under the patient's buttocks and behind his/her back.
 - c. Lower the patient to the long backboard and secure (as per *General Spinal Management*).

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Field Immobilization Decision Scheme



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Extremity Injury Protocol

Attention should be given to extremity injuries to limit further damage and discomfort for the patient. However, extremity care should never interfere with lifesaving decisions or interventions and should not delay transport of trauma patients.

Signs of extremity injury include:

- Pain
- Deformity
- Contusion
- Tenderness
- Swelling
- Instability
- Crepitus
- Absence of distal pulses

EMR Care, BLS Care, ILS Care, ALS Care

Care should be focused on assessing the situation and initiating care to assure the patient is maintaining an airway, is breathing, and has a perfusing pulse and beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a) If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM
3. Control any external bleeding:
 - a) Apply direct pressure and pressure dressing.
 - b) Refer to bleeding control protocol (tourniquet) for bleeding not quickly controlled with direct pressure and dressings.
4. Splint musculoskeletal injuries:
 - a) Immobilize the joints with a rigid splint above and below the injury for long bone injuries.
 - b) Immobilize the long bones with a rigid splint above and below the injured site for joint injuries.
 - c) Assure the joints and bones are immobilized sufficiently to stabilize the injured structures (especially when using a soft splint or pillow).
 - d) Assess distal pulse, motor & sensation.
5. If the extremity is angulated and no distal pulse is present, reduce by gently applying manual traction until the pulse returns.
 - a) Reassess distal pulse, motor and sensation.

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Extremity Injury Protocol

EMR Care, BLS Care, TEMS Care, ILS Care, ALS Care
(Continued)

6. Amputation cases:
 - a) Control external bleeding.
 - b) Dress, bandage and/or splint the injured extremity.
 - c) Attempt to recover the severed part:
 - Grossly decontaminate any debris from the severed part with NS or sterile water.
 - Wrap in slightly damp sterile gauze, towel or sheet. (care must be taken to not make the part “soggy”).
 - Place severed part in waterproof bag or container if possible and seal.
 - Place the bag/container in another container filled with ice.
 - DO NOT immerse the amputated part in any solutions.
 - DO NOT allow the tissue to freeze.
 - Transport the container with the patient.
7. Initiate ALS intercept if needed and transport as soon as possible.
8. Contact the receiving hospital as soon as possible or Medical Control if necessary.

TEMS Care

ILS Care

1. ILS Care includes all components of *BLS Care*.
2. Obtain **IV access**.
3. **IV Fluid Therapy**: 500mL fluid bolus's as needed to maintain a systolic BP \geq 90 mmHg.
4. **Manage patient pain** based on *Pain Control Protocol*.

ALS Care

1. ALS Care includes all components of *ILS Care*.
2. Contact the receiving hospital as soon as possible or Medical Control if necessary.

Needle Thoracentesis (Needle Chest Decompression) Procedure (**TEMS** & **ALS** Only)

Thoracic decompression involves placement of a needle through the chest wall of a **critical patient who has a life-threatening tension pneumothorax and is rapidly deteriorating due to intrathoracic pressure**. Remember: a simple pneumothorax usually requires routine to supportive care only, a tension pneumothorax is an immediate life threat!

Signs and symptoms of **tension** pneumothorax include:

- Absent lung sounds on the affected side
- Unequal breath sounds
- Severe respiratory distress
- Traumatic cardiac arrest
- Restlessness and agitation
- Hypotension/ tachycardia
- Increased airway resistance with ventilations
- JVD
- Subcutaneous emphysema
- Hyper resonance to percussion on the affected side
- Cyanosis
- Tracheal deviation
- Respiratory arrest

Initiate *Routine Trauma Care*. If a **tension** pneumothorax is identified:

1. Locate the 4th intercostal space at the mid-axillary line on the side of the pneumothorax. (if this location is inaccessible, use the 2nd intercostal space at the mid-clavicular line on the same side as the pneumothorax).
2. Cleanse the site with providone-iodine preps and maintain as much of a sterile field as possible.
3. Attach a 10-20mL syringe to a 3.25 inch (minimum) 10-14g IV catheter (or system approved device).
4. Puncture the skin perpendicularly, just superior to the 5th rib (in the 4th intercostal space). Direct the needle just over the 5th rib (or 3rd rib if mid-clavicular access) and into the thoracic cavity. A “pop” should be felt as well as a “rush of air” along with the plunger of the syringe moving outward.
5. Advance the catheter while removing the needle and syringe.
6. Secure the catheter in the chest wall with a dressing and tape.
7. Monitor the patient **closely** and continue to reassess.

Critical Thinking Elements

- Nerve bundles and blood vessels are located under the ribs and puncturing them could cause nerve damage and extensive bleeding. Ensure that the puncture is being made over the top of the 5th rib.
- Should the tension pneumothorax reoccur, repeat the above process on the affected side with a new needle.

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Flail Chest Treatment Protocol

Flail chest occurs when two or more adjacent ribs are fractured in more than one place along their length. The result is a segment of chest wall that is no longer in continuity with the remainder of the chest. When the respiratory muscles contract to raise the ribs up and out and lower the diaphragm, the flail segment paradoxically moves inward in response to the negative pressure being created within the thoracic cavity. Similarly, when these muscles relax, the segment may move outward as pressure inside the chest increases. This paradoxical motion of the flail segment makes ventilation less efficient. The degree of inefficiency is directly related to the size of the flail segment. The significant force necessary to produce such a lesion is generally transmitted to the underlying lung, resulting in a pulmonary contusion. The patient thus may have two mechanisms that compromise ventilation. Management of flail chest is directed toward pain relief, ventilatory support, and monitoring for deterioration.

Emergency Medical Responder Care

Care should be focused on assessing the situation and initiating care to assure the patient is maintaining an airway, is breathing, and has a perfusing pulse and beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol* and *Routine Trauma Care Protocol*.
2. **Oxygen:** 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. Maintain SPO2 \geq 94%
 - b. **Patients with poor respiratory effort may require ventilation with a BVM at 8-10 breaths/min.**
3. Control bleeding based on *Bleeding Control Protocol*.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. Repeat vital signs, GCS & RTS every **5 minutes**.
3. Initiate ALS intercept and transport as soon as possible.
4. Apply **waveform capnography** (if equipped).

Flail Chest Treatment Protocol

TEMS Care

ILS Care

5. ILS Care includes all components of *BLS Care*.
6. Obtain **IV access**.
7. **IV Fluid Therapy**: 500mL fluid bolus as needed to maintain a systolic BP \geq 90 mmHg.
8. **Manage patient pain** based on *Pain Control Protocol*.

ALS Care

3. ALS Care includes all components of *ILS Care*.
4. Contact the receiving hospital as soon as possible or Medical Control if necessary.

Critical Thinking Elements

- Support of ventilation with bag-mask device assistance or endotracheal intubation may be necessary (particularly with longer transport times) for those patients who are having difficulty maintaining adequate oxygenation.
- Efforts to stabilize the flail segment with sandbags or other means are contraindicated as they may further compromise chest wall motion and possibly impair ventilations.
- Always maintain a high index of suspicion for pneumothorax/hemothorax!

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**Unstable Pelvic Fracture
Protocol**

Pelvic fractures and more specifically unstable pelvic fractures have some of the highest morbidity rates of all traumas. Patients who have signs or symptoms of an unstable pelvic injury need that injury stabilized early in treatment to limit internal bleeding.

Signs of an unstable pelvic injury include:

- Pain in the abdomen and/ or pelvic region
- Pain to the super pubic region upon light palpation
- Inability to relax lower extremities straight out
- Uneven lower extremities
- Bruising over abdomen
- Distended abdomen

EMR Care, BLS Care, ILS Care, ALS Care

Care should be focused on assessing the situation and initiating care to assure the patient is maintaining an airway, is breathing, has a perfusing pulse and beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen**: If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a) If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM
 - b) Use great care when moving patient.
3. If symptoms indicate Pelvic Sling can be applied before patient is moved from position found.
4. **Apply Pelvic Sling**
 - a) Remove any objects from patient's pockets and pelvic area.
 - b) Place Sling with white side closest to patient beneath the hips (trochanters). Do not apply over the Iliac Crest.
 - c) Place black strap through buckle and pull completely through until snug.
 - d) Hold orange strap and pull black strap in opposite direction until you hear and feel **one** buckle click. A second click after the device is secured is not uncommon.
 - e) Must have **Medical Control Order** for Pediatrics and adolescents. The standard sized device should fit most of the adult population but there are three sizes of the device.
 - f) Secure ankles/ lower legs together with Kling to provide additional stability.
5. Render care in accordance with *Routine Trauma Protocol* and *Trauma Shock Protocol*.

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Bleeding Control Protocol

Recent military campaigns have provided increased medical evidence as well as necessitated improved design of bleeding control techniques that can be rapidly deployed in the prehospital setting. Increasing evidence shows that tourniquets can be useful tools in the prehospital treatment of some critically injured patients if applied for short periods of time without creating an absolute desolate outcome for the extremity where applied.

When assessing the patient with uncontrolled hemorrhage, the prehospital provider must make a rapid assessment of if the bleeding can be controlled via traditional means (direct pressure, pressure points, elevation) or if more aggressive treatment is needed. If initial assessment determines that bleeding cannot be control with traditional means, immediately move to tourniquet and or wound packing/ hemostatic agents.

Wound Packing

Indications for Wound Packing

- Uncontrolled bleed that direct pressure cannot reach and tourniquet will not address.
- Neck, chest or torso injuries (typically puncture wounds) with bleeding that cannot be controlled because the injury cannot be reached with traditional means or tourniquet.

Contraindications for Wound Packing

- Any bleed that can be controlled by traditional means or by tourniquet

Procedure for Wound Packing

- Obtain Hemostatic Gauze or rolled gauze.
- With gloved hand, find source of bleeding and apply direct pressure with 1-2 fingers.
- Without releasing pressure begin packing unrolled gauze into injury cavity until bleeding stops or no area in wound cavity remains unpacked.
- If unable to control with initial roll and using Hemostatic Gauze, **remove** Hemostatic Gauze to apply fresh gauze to bleeding site. If using rolled gauze, continue packing with another roll. **Do not remove** previous roll.
- When bleeding is controlled apply direct pressure for three minutes

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Bleeding Control Protocol

Combat Application Tourniquet

Indications for tourniquet use:

- Severe, ongoing hemorrhage from an extremity which is not alleviated quickly by standard bleeding control measures.
- Trauma with partial extremity amputation or extreme soft tissue injury.
- Bleeding from ruptured graft or fistula.

Contraindications for tourniquet use:

- Any bleeding that can be managed by direct pressure, elevation, and/ or pressure points.
- Major bleeding to a non-extremity.

EMR Care, BLS Care, ILS Care, ALS Care

The CAT (Combat Application Tourniquet) is the recommended tourniquet of choice.

1. Render care in accordance with *Routine Trauma Protocol* and *Shock Protocol*.
2. **Oxygen:** If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM
3. Recognition that bleeding is uncontrollable with direct pressure, elevation and/ or pressure points and immediately begin application of CAT.
 - a. Wrap CAT around extremity proximal to bleeding site, do not cover joints. If unable to rapidly identify the injury location, then apply 'high and tight'.
 - b. Pass Self Adhering Band through both sides of the Friction Adapter Buckle (Generation 6) or through the single side of the Friction Adapter Buckle (Generation 7).
 - c. Pass Self Adhering Band through outside slit of Buckle.
 - d. Pull Self Adhering Band tight and Secure back against itself.
 - e. Twist Tension Rod until bleeding stops.
 - f. Lock Tension Rod in the Windlass Clip.
 - g. Secure Tension Rod with the Windlass Clip Strap.
 - h. Make note of application time (on patient and/or on tourniquet).

Use great care when moving patient. Conscious patients may try to fight against the tourniquet due to the pain it can cause when occluding blood flow (consider pain meds). Tourniquets (once applied) should **NOT** be removed by EMS.

4. If bleeding continues apply a second tourniquet proximal to the first (not covering joints) in the previously described fashion.
5. Continuously reassess for hemostasis. Reassess after every move!

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Tranexamic Acid/ TXA
Protocol
-ALS Only-

Traumatic injuries continue to be the leading cause of death in patients under forty years of age. TXA is now being used to treat severely injured trauma patients who have or at great risk for severe hemorrhage.

Tranexamic Acid (TXA) is a synthetic amino acid (Lysine) that blocks plasminogen from being converted to the enzyme plasmin. Plasmin works to break down already-formed blood clots in the human body by attacking and breaking down fibrin destroying clots in a process known as fibrinolysis. Studies have shown Tranexamic Acid to improve clotting ability while reducing the magnitude of the inflammatory response by the body.

Assessment

When considering the appropriateness of Tranexamic Acid therapy, all of the following inclusion criteria must be considered.

Inclusion criteria

All of the following criteria must be met for the administration of Tranexamic Acid.

1. Patient age of 18 years or older.
2. Penetrating trauma to chest, abdomen or pelvis who are at high risk for ongoing internal hemorrhage.
 - a. Sustained tachycardia HR >120.
 - b. Sustained hypotension SBP < 90 mmHg.
3. Signs of peripheral vasoconstriction
 - a. Cool, pale skin.
 - b. Delayed cap refill.
4. **Injury occurred \leq 3 hours prior to TXA administration.**
5. Consult **Medical Control** for orders prior to TXA administration.

Absolute exclusion criteria

1. Head injury
2. Time of injury > 3 hours or unknown.
3. Patients who antifibrinolytic therapy is contraindicated.
 - a. A history of DVT/PE or procoagulant disorder (i.e. protein c, protein s or Anithrombin III disorder)
4. Age less than 18

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**Tranexamic Acid/ TXA
Protocol (Cont.)
-ALS Only-**

Treatment and Interventions

1. Initiate patient care based on the *Patient Care Overview* and *Trauma Care Overview*.
2. **Tranexamic Acid:** 1 gm in 100 mL D5W over 10 minutes IV infusion

Critical Thinking Elements

- **TXA should never be administered at a “wide open” rate.**
- **Female patients taking or using any form of birth control containing estrogen or progestin are at increased risk for blood clots. This medication significantly increases that risk.**
- **Hypotension has been observed when TXA is administered too rapidly.**
- **Use with caution in patients with a history of DVT, PE, known clotting disorders, and severe renal failure.**