

**PRE-HOSPITAL
PATIENT CARE
PROTOCOL**

TRAUMA PROTOCOLS

Section III

**Rappahannock EMS Council
250 Executive Center Parkway
Fredericksburg, VA 22401**

**BASIC LIFE SUPPORT/ADVANCED LIFE SUPPORT
ADMINISTRATIVE PATIENT CARE PROTOCOL**

BOARD APPROVED AUGUST, 2022

Rappahannock EMS Council Regional Field Trauma Triage Decision Scheme

Step
1

Measure vital signs and level of consciousness	
Glasgow Coma Scale	< 14 or
Systolic blood pressure	< 90 or
Respiratory Rate	< 10 or >29 (<20 in infant < one year)

YES

NO

Take to trauma center. Steps 1 and 2 attempt to identify the most seriously injured patients. These patients should be transported preferentially to a Level I or Level II Trauma Center.

Assess the patient's injuries. Do they have:

Step
2

- Penetrating injuries to head, neck, torso, and extremities proximal to elbow and knee.
- Flail Chest
- Two or more proximal long-bone fractures
- Crushed, degloved, or mangled extremity
- Amputation proximal to wrist and ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis

YES

NO

Take to trauma center. Steps 1 and 2 attempt to identify the most seriously injured patients. These patients should be transported preferentially to a Level I or Level II Trauma Center.

Assess mechanism of injury and evidence of high-energy impact. Is injury a result of:

Step
3

AUTO V. PEDESTRIAN/BICYCLIST THROWN, RUN OVER, OR WITH SIGNIFICANT (>20 MPH) IMPACT FALLS:	Older adults (55 and over): >20 ft. (one story is equal to 10 ft.)
	Children: >10 ft. or 2-3 times the height of the child
HIGH-RISK AUTO CRASH:	Intrusion: >12 in. occupant site; >18 in. in any site
	Ejection (partial or complete) from automobile
	Death in same passenger compartment
	Vehicle automatic crash notification data consistent with high risk injury
MOTORCYCLE CRASH >20 MPH	

YES

NO

Transport to closest appropriate hospital. Preferentially a Level I, II, or III Trauma Center.

Assess special patient or system considerations.

Step
4

AGE: Older Adults (above age 55)	Children should be triaged preferentially to a pediatric-capable trauma center.
ANTICOAGULATION AND BLEEDING DISORDERS	
BURNS: Without other trauma mechanism:	Triage to burn facility
With trauma mechanism:	Triage to trauma center
TIME SENSITIVE EXTREMITY INJURY	
END-STAGE RENAL DISEASE REQUIRING DIALYSIS	
EMS PROVIDER JUDGMENT	

YES

NO

Contact medical control and consider transport to a trauma center or specialty care hospital.

Transport according to normal operational procedures.

NOTE: Pre-hospital providers should transport trauma patients with uncontrolled airway, uncontrolled hemorrhage, or if CPR is in progress to the closest emergency department for stabilization and transfer to a Trauma Center.



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Traumatic Cardiac Arrest	
Criteria: All viable patients in cardiac arrest secondary to blunt and or/penetrating trauma	
B	Insert BIAD “Rescue Airway” such as King, CombiTube, iGel, and ventilate at a rate of NO FASTER THAN 1 every 6 seconds for adults; 1 every 2-3 seconds for pediatrics.
	Termination of CPR is recommended if no signs of life after 10 minutes of high quality BLS resuscitation obtain a Code Gray
A	Administer fluid 2 liters Normal Saline or Lactated Ringers rapid bolus
	If severe hemorrhage is suspected cause of cardiac arrest administer 2 g Tranexamic Acid slow IV/IO push
I	Identify and correct reversible causes of cardiac arrest before starting ACLS/PALS
	Perform bilateral lateral needle decompression; repeat as needed
	If hypoxia is suspected, and the patient is 13 years or over, consider placing endotracheal tube during CPR. Do NOT stop compressions or stop resuscitation to place endotracheal tube
P	If hypoxia is suspected, and the patient is 12 years or younger, consider placing endotracheal tube during CPR. Do NOT stop compressions or stop resuscitation to place endotracheal tube
	If there is suspicion for cardiac tamponade, perform pericardiocentesis
Medication Summary	
Tranexamic Acid (Cyklokapron): 2 g over slow IV/IO push	
<u>Notes:</u> 1) Non-viable patients include those who have injuries not compatible with life (i.e., decapitation, body mutilation, massive open head trauma) 2) Defer backboard usage until after ROSC but consider stabilizing fractured pelvis 3) After ROSC, transport patient immediately per trauma triage guidelines	



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Injury – Bleeding/Hemorrhage Control

Criteria:

1. Patients with uncontrolled or profuse bleeding resulting from trauma
2. Patients in traumatic cardiac arrest who recently had vital signs

B

Apply direct pressure.

- If bleeding is to an extremity, apply a tourniquet. Dress the wound once bleeding is controlled.
- If the wound is in a torso or junctional area, expose the wound and remove any clots or dressings and pack the wound with hemostatic or sterile gauze. If the wound is a scalp laceration, apply direct pressure. Hold 10 pounds of pressure for 3 minutes with hemostatic gauze, or 10 pounds of pressure for 10 minutes with sterile gauze. Apply pressure dressing once bleeding is controlled.
- These patients require rapid transport.

A

For patients greater than 11 years of age with tachycardia and hypotension (hemorrhagic shock) related to profuse hemorrhage, who have suffered an injury within the previous three (3) hours, administer **Tranexamic Acid** 2 g slow IV/IO push

Notes:

1. Providers are encouraged to follow current TECC guidelines for the management of injuries

Medication Summary:

Tranexamic Acid (Cyklokapron): 2 g slow IV/IO push

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Injury - Burns	
Criteria: Patients with chemical, electrical, thermal, and/or radiation burns	
EMR	<p>Safely remove patient from source. Stop the burning process.</p> <p>Watch for and PREVENT hypothermia, dry sterile dressings shall be used for wound care</p>
A	<p>Administer Normal Saline or Lactated Ringers IV 500 mL/hr (<i>for children age 6-13, 250 mL/hr, age <6, 125 mL/hr</i>)</p> <p>Administer Fentanyl 1-2 mcg/kg, q 5 minutes, max dose 300 mcg (<i>pediatric dose 1-3 mcg/kg, max single dose of 100 mcg</i>)</p>
I	<p>If cyanide poisoning is suspected, mix Cyanokit according to manufacturer's recommendations. Administer 5g (<i>pediatric dose 70mg/kg, max dose 5g</i>), repeat once it patient does not improve.</p> <p>If Fentanyl is not effective or available, administer Ketamine 0.25-0.5 mg/kg. <i>Pediatric dosing is the same.</i> Repeat once after 10 minutes if needed.</p>
Medication Summary:	
<p>Fentanyl (Sublimaze): 1-2 mcg/kg, repeat once after 5-10 mins (<i>pediatric dose: 1-3 mcg/kg max 100 mcg</i>). Contact medical control if more than 300 mcg is needed to manage patient condition.</p> <p>Ketamine (Ketalar): 0.25-0.5 mg/kg; repeat once after 10 if needed (<i>pediatric dose same as adult</i>)</p> <p>Hydroxocobalamin (Cyanokit): 5g Repeat once (if needed) (<i>Pediatric dose 70mg/kg, max dose 5g</i>)</p>	
<u>Notes:</u>	
<ol style="list-style-type: none"> 1. Patients with isolated burns to critical areas (head/face/airway, hands/feet, genitalia, or with circumferential burns or TBSA that meets criteria for treatment in a burn center should be transported directly to the burn center whenever possible. 2. Patients with multiple trauma AND burns are considered trauma patients and should be transported to closest appropriate trauma center 3. Fluid resuscitation should be aggressively monitored to avoid fluid overload. 4. A high index of suspicion and low intubation threshold should be practiced for all burns involving the patient's airway. Delayed sequence intubation should be considered for all airway burns. Additional DSI consideration should be given if patient care is hindered due to inability to manage pain, or if injuries could potentially effect ability to ventilate (i.e., circumferential thoracic burns). 5. Circumferential burns can pose significant vascular risk to an extremity. 6. Remove the patient's rings, bracelets, contacts and other potentially constricting or interfering items. 7. Patient decontamination should be considered and attempted prior to transport, and receiving hospital should be made aware of any special circumstances or considerations. 	

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Injury- Diving Emergencies

Criteria: Patients suffering from suspected dive related trauma including Decompression Sickness (DCS) and Arterial Gas Emboli (AGE)

B

Administer 100% oxygen via non-rebreather. Assess for and treat signs of shock.

Complete the Divers Alert Network (DAN) Neurological Assessment



A

If hypotensive, establish peripheral IV/IO and administer Normal Saline or Lactated Ringers.

I

Assess for possible over pressurization injury. Decompress chest if tension pneumothorax is suspected.

Notes:

1. Contact the Diver's Alert Network (DAN) as soon as possible- they will serve as Medical Direction. DAN will provide the primary care provider(s) with pertinent treatment information and transport destination recommendations.
 - a. DAN Emergency Assistance Number: **1-(919)-684-9111** (24-hour number)
 - b. Confirm type of compressed air utilized in SCUBA (i.e., Air, Nitrox, Heliox, etc.)
2. Begin a chain-of-custody of the diver's gear for investigation purposes if deemed necessary.
3. Decompression Sickness (DCS) is categorized by Type I and Type II
 - a. **Type I** - Includes joint pain and symptoms involving the skin, or swelling and pain in lymph nodes.
 - b. **Type II** - In the early stages, symptoms may not be obvious and the stricken diver may consider them inconsequential. The diver may feel fatigued or weak and attribute the condition to overexertion. Even as weakness becomes more severe the diver may not seek treatment until walking, hearing, or urinating becomes difficult. Type II symptoms are divided into three categories: neurological, inner ear (staggers), and cardiopulmonary (chokes).
4. Arterial Gas Embolism (AGE) is caused by entry of gas bubbles into the arterial circulation as a result of pulmonary over inflation syndrome. The signs and symptoms of AGE may include near immediate onset of altered LOC, dizziness, paralysis or weakness, paresthesia, vision abnormalities, convulsions or personality changes.



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Injury – Head (Traumatic Brain Injury)	
Criteria: Patients that have suffered blunt or penetrating ISOLATED head trauma and as a result are unresponsive or presenting with a GCS at or <12	
B	Maintain neutral position of head, elevate head of bed or LBB 20 degrees. Avoid hyperventilation.
	Ventilate patients at a rate to achieve ETCO ₂ at 40 mmHg
A	Administer 20 cc/kg Normal Saline or Lactated Ringers (max dose 1 L). Titrate to achieve SBP at or above 100 mmHg (MAP > 65)
	With signs of herniation*, hyperventilate the patient to achieve ETCO ₂ of 35 mmHg
I	Administer 5-20 mcg Epinephrine (1:100,000) q 3-5 minutes as push pressor or 2-10 mcg/min Epinephrine infusion. Titrate for MAP > 65
P	If patient has TBI with GCS < 9 and/or patient is not able to maintain a secure airway, refer to RSI Airway management
Medication Summary:	
Epinephrine: 2-10 mcg/min infusion or 5-20 mcg 1:100,000 push pressor – may repeat q 3-5 minutes to maintain MAP > 65	
<u>Notes:</u>	
<ol style="list-style-type: none"> 1. Patients with significant blunt trauma should be assumed to have a spinal injury until proven otherwise by X-Ray and should be fully immobilized 2. Goals are to minimize ICP increase and to promote cerebral perfusion through the maintenance of sufficient circulation and oxygenation 3. Recommend the use of GCS to monitor and trend patient improvement or deterioration. Providers are encouraged to review the Excellence in Prehospital Injury (EPIC) and other evidence-based practice guidelines 4. To mix the Epinephrine push pressor – mix 1ml 1:10,000 Epinephrine in 9 ml of Normal Saline to provide 10 mcg/ml. To mix an Epinephrine infusion – mix 1 mg (1 mL) of 1:1000 Epinephrine in 1L of fluid (to produce 1 mcg/ml). See Epinephrine infusion drip chart in reference section for further. 5. * Herniation = blown or unequal pupils, GCS 3, and/or posturing 	
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Injury – Multisystem

Criteria: Patients who require complex or extended extrication and who will benefit from anxiolysis or significant pain management in order to accommodate the extrication or patient manipulation required for disentanglement; patients with prolonged immobility at risk for crush syndrome

I	<p><u>ANXIETY MANAGEMENT/SEDATION</u></p> <p>Administer Midazolam 2-5 mg (<i>pediatric dose 0.1 mg/kg, max dose 2 mg</i>). If no response, or not available, administer Fentanyl 2 mcg/kg every 15 minutes (<i>pediatric dose is the same, max dose 100 mcg</i>)</p> <p><u>CHEMICAL EXTRICATION AND/OR CRUSH SYNDROME</u></p> <p>Administer Fentanyl 1-1.5 mcg/kg IV (<i>pediatric dose is the same, max dose 50 mcg</i>)</p> <p>In cases where an adult has concurrent crush injury and extrication time may be prolonged, CONSIDER 100 mEq Sodium Bicarbonate in 1000 cc NS/LR and infuse at 100-150 cc/hr</p> <p>If EKG indicates moderate to severe hyperkalemia, administer 100 mEq Sodium Bicarbonate and 1g Calcium (do not comingle/mix Bicarb and Calcium) and administer 10-20 mg nebulized Albuterol over 15-20 minutes. If hyperkalemia persists, patient remains pinned for extended period, and time permits, consider requesting insulin from nearest facility. Contact medical control for orders for insulin and Dextrose</p>
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P	<p>Administer Ketamine 1-2 mg/kg IV or 2-4 mg/kg IM (<i>pediatric dose the same, max dose 50 mg IV or 100 mg IM</i>). Closely monitor for respiratory depression</p>
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Medication Summary:

Albuterol (Ventolin): 10-20 mg
Calcium (Calcium Chloride): 1 g
Fentanyl (Sublimaze): Anxiety: 2 mcg/kg (*pediatric max dose 100 mcg*); Chemical Extrication 1.0-1.5 mcg/kg (*pediatrics max dose 50 mcg*)
Ketamine (Ketalar): 1-2 mg/kg IV; 2-4 mg/kg IM (*pediatric max dose 50 mg IV or 100 mg IM*)
Midazolam (Versed): Anxiety/Sedation: 2-5 mg (*pediatric dose 0.1 mg/kg, max dose 2 mg*)
Sodium Bicarbonate: 100 mEq; infusion at 100-150 cc/hour

Notes:

1. Patients with multiple trauma AND burns are considered trauma patients and should be transported to the closest trauma appropriate trauma center
2. If patient has open extremity injury, specific care should be taken to prevent further contamination during transport
3. Patients with crush injuries (anything with significant force or weight, or entrapment greater than fifteen minutes) may show signs/symptoms of pain outside normal bounds, redness, and swelling and decreased pulses
4. Patients with unstable pelvic fractures may show signs/symptoms of obvious pain and deformity; treat with stabilization and compression



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Spinal Immobilization/Clearance

Criteria:

1. Patients 14 years of age or older with low risk of occult spinal cord injury who are not grossly impaired by drugs or alcohol and who are capable of providing sound assessment feedback and information.
2. Traditional spinal immobilization is useful in some patients. Without clear evidence of occult and/or spinal cord injury, the general and routine use of KED's and backboards is prohibited as a patient safety concern. The use of a standing backboard for ambulatory patients at the scene is expressly prohibited.
3. The decision to use a backboard is a separate decision from spinal motion restriction (SMR). In fact, SMR should be used in all traumatic injuries where there is a mechanism for spinal injury.

B

1. Perform a complete and thorough patient assessment.
2. Patients with NO dangerous mechanism of injury¹ and no special circumstances² should be transported in a position of comfort. NO BACKBOARD should be used for immobilization.
3. With a reliable history and after a physical examination, any blunt trauma patient with bony tenderness along midline spine, numbness or tingling in the extremities, or a dangerous mechanism of injury¹ shall receive SPINAL MOTION RESTRICTION.
4. Patients with penetrating trauma that do not demonstrate clear neurological deficit do not require spinal immobilization.
5. For patients with multi-system trauma or who are severely impaired and unable to provide assessment feedback, use traditional FULL SPINAL IMMOBILIZATION.
6. Patients with dangerous mechanism of injury¹ or plausible spinal cord injury who are unresponsive or unable to provide and assessment feedback should receive FULL SPINAL IMMOBILIZATION.

Notes:

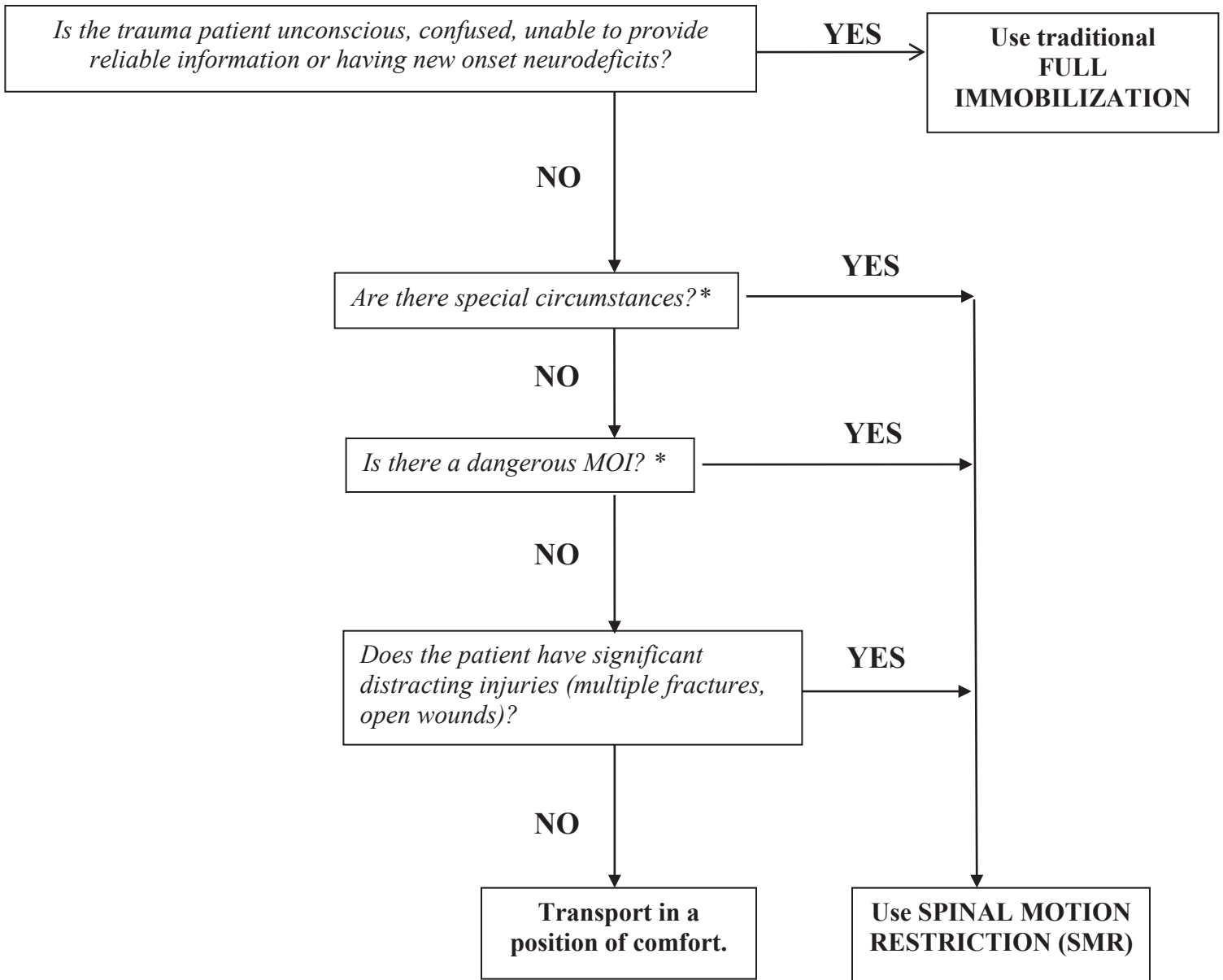
1. ¹Dangerous MOI = fall from elevation (greater than 10 feet or 5 stairs), axial loading to the head (dive into shallow water and striking head), high-speed MVC (>60 mph), rollover, or ejection, motorized recreational vehicles; pedestrian/bicycle struck.
2. ²Special circumstances = known spinal disease, previous c-spine surgery, language barrier, significant intoxication that impairs assessment, significant distracting injuries (multiple fractures, etc), GCS < 14.
3. Spinal Motion Restriction (SMR) = appropriate C-Collar in place, patient supine on padded stretcher. Whenever there is question or doubt, the patient should receive SMR.
4. Immobilization should not interfere with assessment and/or patient care (e.g. airway management, treatment of neck wounds, etc) and should not increase the patient's discomfort.
5. A backboard may be used as a method of transport to remove a patient from the environment, in appropriate circumstances, and may be used to transfer the patient to the transport stretcher.

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Rappahannock EMS Council Regional Treatment Protocols

Collect HPI, PMH, and perform a physical exam. C-Spine precautions may be needed until completed.



* As defined in the protocol