# The Maryland
# Medical Protocols
## for Emergency Medical Services

**Maryland Institute *for***
**Emergency Medical Services Systems**

Effective July 1, 2026

The complete “Maryland Medical Protocols for Emergency Medical Services” is also available on the Internet at www.MIEMSS.org.
Protocols are occasionally amended during the year. Please check the MIEMSS website to be sure you have the most up-to-date version.
The edition date appears on the lower portion of the page.

This text was produced from materials from the Division of State Documents (DSD), Office of the Secretary of State, State of Maryland. Only text obtained directly from the DSD is enforceable under Maryland law.
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Thank you to the Baltimore City Fire Department.

# Welcome Letter

***Maryland Medical Protocols for Emergency Medical Services***
**New and Revised Protocols for 2026**

We are pleased to present the Maryland EMS community with several new and revised EMS treatment protocols for 2026. The protocols have been approved by the EMS Board with the advice of the Statewide EMS Advisory Council, Protocol Review Committee, and a multi-disciplined group of subject matter experts from around the state.

Prior to July 1, 2026, all EMS clinicians must complete the Maryland EMS Update: 2026, which will highlight the new material. The protocol update will be available for continuing education credit on the MIEMSS Online Training Center (www.emsonlinetraining.org) in the spring of 2026.

- **Abuse / Neglect:** This revision adds the new statewide hotline for child and vulnerable adult abuse and neglect reporting, 1-800-91PREVENT, pursuant to a recent change in Maryland law.

- **Angioedema:** This new protocol addresses an adverse reaction associated with ACE inhibitor medications. Patients may experience isolated, but severe swelling of the lips, tongue or throat. The protocol defines treatment with epinephrine and tranexamic acid (TXA) after medical consultation.

- **Chest Pain:** This protocol revision includes guidance for the treatment of suspected aortic syndrome (aortic dissection). Labetalol may be given with medical consultation.

- **Choking / Foreign Body Airway Obstruction:** This addition to the GPC incorporates new American Heart Association guidelines for the treatment of choking in patients of all ages.

- **Critically Unstable Patient:** This revision adds a pediatric section that describes immediate interventions for critically ill pediatric patients prior to initiating transport.

- **Crush Syndrome (Hyperkalemia):** This protocol modification simplifies the dosing of sodium bicarbonate (bolus only) and removes the consult for high-dose albuterol. The timing of medication administration for patients with hyperkalemia due to crush syndrome is further defined (e.g., pre- and post-extrication).

- **MODEL-T (Buprenorphine):** This protocol revision enables Cardiac Rescue Technicians (CRTs) who have additional training to administer buprenorphine.

- **Newly Born Protocol:** The ALS and BLS protocols have been consolidated into a single protocol. A Newly Born resuscitation checklist has been added.

- **Patient-Initiated Refusal of Care:** The protocol has been revised to focus on the assessment of a patient's capacity to make an informed medical decision. The checklist has been reconfigured for clarity, so that any "no" answers lead to transport or medical consultation.

- **Seizure – Adult and Pediatric:** This protocol modification increases the maximum patient dose of midazolam for adults to 10 mg IM/IN. For adult patients with IV or IO access, ALS clinicians may now administer up to two doses of midazolam 5 mg IV/IO. The medical consult for the second IV/IO dose of midazolam has been removed. Ketamine has been added as a second-line medication for seizures that continue after the maximum dose of midazolam.
- **Stroke:** In the revised stroke protocol, patients with severely elevated blood pressure (SBP greater than or equal to 220 and DBP greater than or equal to 120) may be treated with labetalol 10 mg IV x2 doses. Higher doses of labetalol may be given with medical consultation.
- **Trauma, Multiple/Severe & Traumatic Arrest:** This protocol revision adds the "X-ABC" approach to the initial management of a trauma patient, which focuses on prompt hemorrhage control. The use of the abdominal aortic and junctional tourniquet (AAJT) has been added for ALS clinicians who have additional jurisdictional training. A tourniquet conversion to pressure dressing procedure has been added.

Timothy Chizmar, MD, FACEP, FAEMS
State EMS Medical Director

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Executive Director

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## A. GENERAL PROVISIONS

The goal of prehospital emergency medical services is to deliver a viable patient to appropriate definitive care as soon as possible. Optimal prehospital care results from a combination of careful patient assessment, essential prehospital emergency medical services, and appropriate medical consultation.

The Maryland Medical Protocols were developed to standardize the emergency patient care that EMS clinicians, through medical consultation, deliver at the scene of illness or injury and while transporting the patient to the closest appropriate hospital. These protocols will help EMS clinicians anticipate and be better prepared to give the emergency patient care ordered during the medical consultation.

Maryland has highly trained and dedicated basic and advanced life support personnel who may need online medical consultation only for complicated or extended resuscitative patient care. These protocols are a form of "standing orders" for emergency patient care intervention in a patient who has a life-threatening illness or injury. It remains the responsibility of the EMT, CRT, or paramedic to obtain online medical consultation when appropriate. If it is genuinely impossible or inappropriate (i.e., when rendering emergency care to a patient who has a life-threatening injury or medical condition) to obtain online medical consultation, the EMT/CRT/paramedic may render emergency patient care in accordance with these protocols in an effort to save a patient's life or limb. Whenever such emergency lifesaving patient care is rendered, the EMT/CRT/paramedic must document the treatment rendered and the reason online medical consultation could not be obtained on the Patient Care Report (PCR) and on an additional narrative. In addition, the "exceptional call" area on the PCR must be marked, and the clinician must immediately notify the EMS Jurisdiction. The EMS Jurisdiction must notify the State EMS Medical Director within five (5) days of the incident. This general provision applies throughout these protocols.

Requests for additions, deletions, or exceptions must be submitted through the State EMS Medical Director's Office of the Maryland Institute for Emergency Medical Services Systems.

Unless otherwise specified, a mandate with a stated year but no date shall be interpreted as taking effect on the protocol implementation date for that year.

THE GENERAL PATIENT CARE SECTION AND THE ALGORITHMS MUST BE FOLLOWED IN THE SPECIFIC SEQUENCE NOTED.

FOR ALL OTHER TREATMENT PROTOCOLS, THE OUTLINE FORMAT IS STRICTLY FOR RAPID AND UNIFORM REFERENCE AND DOES NOT IMPLY OR DIRECT A MANDATORY SEQUENCE FOR PATIENT CARE.

**THE GENERAL PATIENT CARE SECTION SHALL APPLY TO ALL PATIENT ENCOUNTERS UNLESS OTHERWISE NOTED IN ANY SPECIFIC TREATMENT PROTOCOL.**

# General Information – GENERAL PROVISIONS (continued)



ALERT

IF AN EMERGENCY MEDICAL RESPONDER IS DISPATCHED AS AN EMS UNIT, OR FOR PURPOSES RELATED TO MEDICAL ASSISTANCE, OXYGEN AND AED TREATMENT MAY BE UTILIZED, WHEN APPROPRIATE AND APPLICABLE, PROVIDED THE EMERGENCY MEDICAL RESPONDER IS JURISDICTIONALLY AUTHORIZED TO USE AN AED AND/OR THE EMERGENCY MEDICAL RESPONDER HAS BEEN EDUCATED AND TRAINED TO PROVIDE OXYGEN AND/OR AED THERAPY.

THE EMERGENCY MEDICAL RESPONDER SHALL DOCUMENT ALL PATIENT CARE.

## B. IMPORTANT NUMBERS

| | |
|---|---|
| 1. Commercial Ambulance Licensing and Regulation | **(410) 706-8511** |
| 2. Critical Incident Stress Management | **(410) 706-7639** |
| 3. Office of EMS Clinician Services | **(800) 762-7157** |
| 4. Regional Programs | |
| a) Region I/II (Allegany, Garrett, Washington, and Frederick Counties) | **(301) 895-5934** |
| b) Region III (Baltimore City, Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties) | **(410) 706-3996** |
| c) Region IV (Caroline, Cecil, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Wicomico, and Worcester Counties) | **(410) 822-1799** |
| d) Region V (Calvert, Charles, Montgomery, Prince George's, and St. Mary's Counties) | **(301) 474-1485** |
| 5. State EMS Medical Director | **(410) 706-0880** |
| 6. SYSCOM (Administrative) | **(410) 706-7639** |
| 7. EMRC | |
| a) Consult Line (Region I/II) | **(301) 722-0494** |
| b) Consult Line (Region III) | **(410) 578-3805** |
| c) Consult Line (Region IV) | **(877) 963-6963** |
| d) Consult Line (Region V) | **(410) 706-1532** |

# General Information – IMPORTANT NUMBERS (continued)



ALERT POISON INFORMATION CENTER RECOMMENDATIONS SHOULD BE SOLICITED IN CONJUNCTION WITH MEDICAL CONSULTATION, BUT MEDICATION ORDERS CAN ONLY BE ACCEPTED FROM AN APPROVED BASE STATION.

1. Poison Control Center
   a) Maryland Poison Center/University of Maryland School of Pharmacy, Baltimore **(800) 222-1222**

2. In-Patient Hospice Facilities
   a) Gilchrist Center–Towson **(443) 849-8200**

   b) Gilchrist Center Baltimore–Joseph Richey House **(410) 523-2150**

   c) Stella Maris Hospice **(410) 560-9695**

   d) Casey House (Montgomery/PG Hospice) **(240) 631-6800**

3. Tissue Donation
   a) Infinite Legacy **(800) 923-1133**

## C. MARYLAND TRAUMA AND SPECIALTY REFERRAL CENTERS

### Adult Trauma Centers

***Primary Adult Resource Center***

- R Adams Cowley Shock Trauma Center (UM), Baltimore

***Level I***

- The Johns Hopkins Hospital Adult Trauma Center (JHM), Baltimore

***Level II***

- Capital Region Medical Center (UM), Largo
- Johns Hopkins Bayview Medical Center (JHM), Baltimore
- Sinai Hospital of Baltimore (LifeBridge)
- Suburban Hospital (JHM), Bethesda

***Level III***

- Meritus Medical Center, Hagerstown
- Peninsula Regional (TidalHealth), Salisbury
- Western Maryland (UPMC), Cumberland

***Out-of-State Centers***

- Christiana Hospital (ChristianaCare), Newark, DE
- Washington Hospital Center (MedStar), Washington, DC

### Specialty Referral Centers

***Eye Trauma***

- Wilmer Eye Institute/The Johns Hopkins Hospital (JHM), Baltimore

***Hand/Upper Extremity Trauma***

- The Curtis National Hand Center for Treatment of the Hand and Upper Extremity/ Union Memorial Hospital (MedStar), Baltimore

***Hyperbaric Medicine***

- Center for Hyperbaric Medicine/R Adams Cowley Shock Trauma Center (UM), Baltimore

***Neurotrauma (Head and Spinal Cord Injuries)***

- Neurotrauma Center/R Adams Cowley Shock Trauma Center (UM), Baltimore

***Pediatric Trauma***

- Johns Hopkins Children's Center (JHM), Baltimore
- Children's National Medical Center, Washington, DC

***Burns***

- Adult Burn Center/Johns Hopkins Bayview Medical Center (JHM), Baltimore
- Adult Burn Center/Washington Hospital Center (MedStar), Washington, DC
- Pediatric Burn Center/Johns Hopkins Children's Center (JHM), Baltimore
- Pediatric Burn Center/Children's National Medical Center, Washington, DC

*Health Care Facility Codes may be found online at www.MIEMSS.org, under the Protocols tab.*

## Specialty Referral Centers

***Perinatal Referral Centers***

- Anne Arundel Medical Center (Luminis), Annapolis
- Capital Region Medical Center (UM), Largo
- Franklin Square Medical Center (MedStar), Baltimore
- Frederick Health Hospital, Frederick
- Greater Baltimore Medical Center, Towson
- Holy Cross Hospital, Silver Spring
- Howard County General Hospital (JHM), Columbia
- Johns Hopkins Bayview Medical Center (JHM), Baltimore
- Mercy Medical Center, Baltimore
- Saint Agnes Hospital (Ascension), Baltimore
- Saint Joseph Medical Center (UM), Towson
- Shady Grove Medical Center (Adventist), Rockville
- Sinai Hospital of Baltimore (LifeBridge)
- The Johns Hopkins Hospital (JHM), Baltimore
- University of Maryland Medical Center (UM), Baltimore

***Acute Stroke Ready***

- Upper Chesapeake Medical Center (UMUCH), Aberdeen

***Primary Stroke***

- Anne Arundel Medical Center (Luminis), Annapolis
- Atlantic (Tidal Health), Berlin
- Baltimore Washington Medical Center (UM), Glen Burnie
- CalvertHealth Medical Center, Prince Frederick
- Capital Region Medical Center (UM), Largo
- Carroll Hospital Center (LifeBridge), Westminster
- Charles Regional Medical Center (UM), La Plata
- Doctor's Community Hospital (Luminis), Lanham
- Frederick Health Hospital, Frederick
- Good Samaritan Hospital (MedStar), Baltimore
- Greater Baltimore Medical Center, Towson
- Harbor Hospital (MedStar), Baltimore
- Holy Cross Hospital, Germantown
- Holy Cross Hospital, Silver Spring
- Howard County General Hospital (JHM), Columbia
- Mercy Medical Center, Baltimore
- Meritus Medical Center, Hagerstown
- Midtown Campus (UM), Baltimore
- Montgomery Medical Center (MedStar), Olney
- Northwest Hospital (LifeBridge), Baltimore
- Peninsula Regional (TidalHealth), Salisbury
- Saint Agnes Hospital (Ascension), Baltimore
- Saint Joseph Medical Center (UM), Baltimore
- Saint Mary's Hospital (MedStar), Leonardtown

***Primary Stroke (continued)***

- Shore Medical Center at Easton (UMSRH)
- Southern Maryland Hospital (MedStar), Clinton
- Union Hospital (ChristianaCare), Elkton
- Union Memorial Hospital (MedStar), Baltimore
- Western Maryland (UPMC), Cumberland
- White Oak Medical Center (Adventist), Silver Spring
- Upper Chesapeake Medical Center (UMUCH), Bel Air

***Primary Stroke, Thrombectomy-Capable***

- Johns Hopkins Bayview Medical Center (JHM), Baltimore
- Shady Grove Medical Center (Adventist), Rockville
- Sinai Hospital of Baltimore (LifeBridge)
- Suburban Hospital (JHM), Bethesda

***Comprehensive Stroke***

- Franklin Square Medical Center (MedStar), Baltimore
- The Johns Hopkins Hospital (JHM), Baltimore
- University of Maryland Medical Center (UM), Baltimore

***Cardiac Interventional***

- Anne Arundel Medical Center (Luminis), Annapolis
- Baltimore Washington Medical Center (UM), Glen Burnie
- Capital Region Medical Center (UM), Largo
- Carroll Hospital Center (LifeBridge), Westminster
- Christiana Hospital (ChristianaCare), Newark, DE
- Franklin Square Medical Center (MedStar), Baltimore
- Frederick Health Hospital, Frederick
- Holy Cross Hospital, Silver Spring
- Howard County General Hospital (JHM), Columbia
- Johns Hopkins Bayview Medical Center (JHM), Baltimore
- Kent General (Bayhealth), Dover, DE
- Meritus Medical Center, Hagerstown
- Nanticoke (TidalHealth), Seaford, DE
- Peninsula Regional (TidalHealth), Salisbury
- Saint Agnes Hospital (Ascension), Baltimore
- Saint Joseph Medical Center (UM), Baltimore
- Shady Grove Medical Center (Adventist), Rockville
- Shore Medical Center at Easton (UM)
- Sinai Hospital of Baltimore (LifeBridge)
- Southern Maryland Hospital (MedStar), Clinton
- Suburban Hospital (JHM), Bethesda
- The Johns Hopkins Hospital (JHM), Baltimore
- Union Memorial Hospital (MedStar), Baltimore
- University of Maryland Medical Center (UM), Baltimore
- Washington Hospital Center (MedStar), Washington, DC
- Western Maryland (UPMC), Cumberland

***Cardiac Interventional (continued)***

- White Oak Medical Center (Adventist), Silver Spring
- Upper Chesapeake Medical Center (UMUCH), Bel Air

***Maryland Sexual Assault Forensic Examination (SAFE) Hospitals***

SAFE hospital programs recognized by the Maryland Coalition Against Sexual Assault (MCASA). Adult Centers are for patients 13 years of age and older.

- Aberdeen Medical Center (UM) (Adult)
- Anne Arundel Medical Center (Luminis) (Adult)
- Atlantic (Tidal Health), Berlin (Pediatric and Adult)
- Baltimore Washington Medical Center (UM) (Pediatric and Adult)
- CalvertHealth Hospital (Adult)
- Cambridge Medical Center (UM) (Pediatric and Adult)
- Capital Region Medical Center (UM) (Pediatric and Adult)
- Carroll Hospital Center (LifeBridge) (Pediatric and Adult)
- Charles Regional Medical Center (UM) (Pediatric and Adult)
- Chestertown Medical Center (UM) (Adult)
- Easton Medical Center (UM) (Pediatric and Adult)
- Frederick Health Hospital (Pediatric and Adult)
- Garrett Regional Medical Center (WVU) (Pediatric and Adult)
- Greater Baltimore Medical Center (Pediatric and Adult)
- Howard County General Hospital (JHM) (Pediatric and Adult)
- Mercy Medical Center (Adult)
- Meritus Medical Center (Pediatric and Adult)
- Peninsula Regional (TidalHealth) (Pediatric and Adult)
- Saint Mary's Hospital (MedStar) (Adult)
- Shady Grove Medical Center (Adventist) (Pediatric and Adult)
- Union Hospital (ChristianaCare) (Adult)
- University of Maryland Medical Center (UM) (Pediatric)
- Western Maryland (UPMC) (Pediatric and Adult)

***Maryland High Consequence Infectious Disease (HCID) Treatment Hospitals***

Hospitals recognized as Regional Emerging Special Pathogen Treatment Centers by NETEC, CDC and ASPR.

- The Johns Hopkins Hospital (JHM), Baltimore
- Washington Hospital Center (MedStar), Washington, DC

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## D. PROTOCOL KEY

1. Basic Life Support Level Care

2. Advanced Life Support Level Care

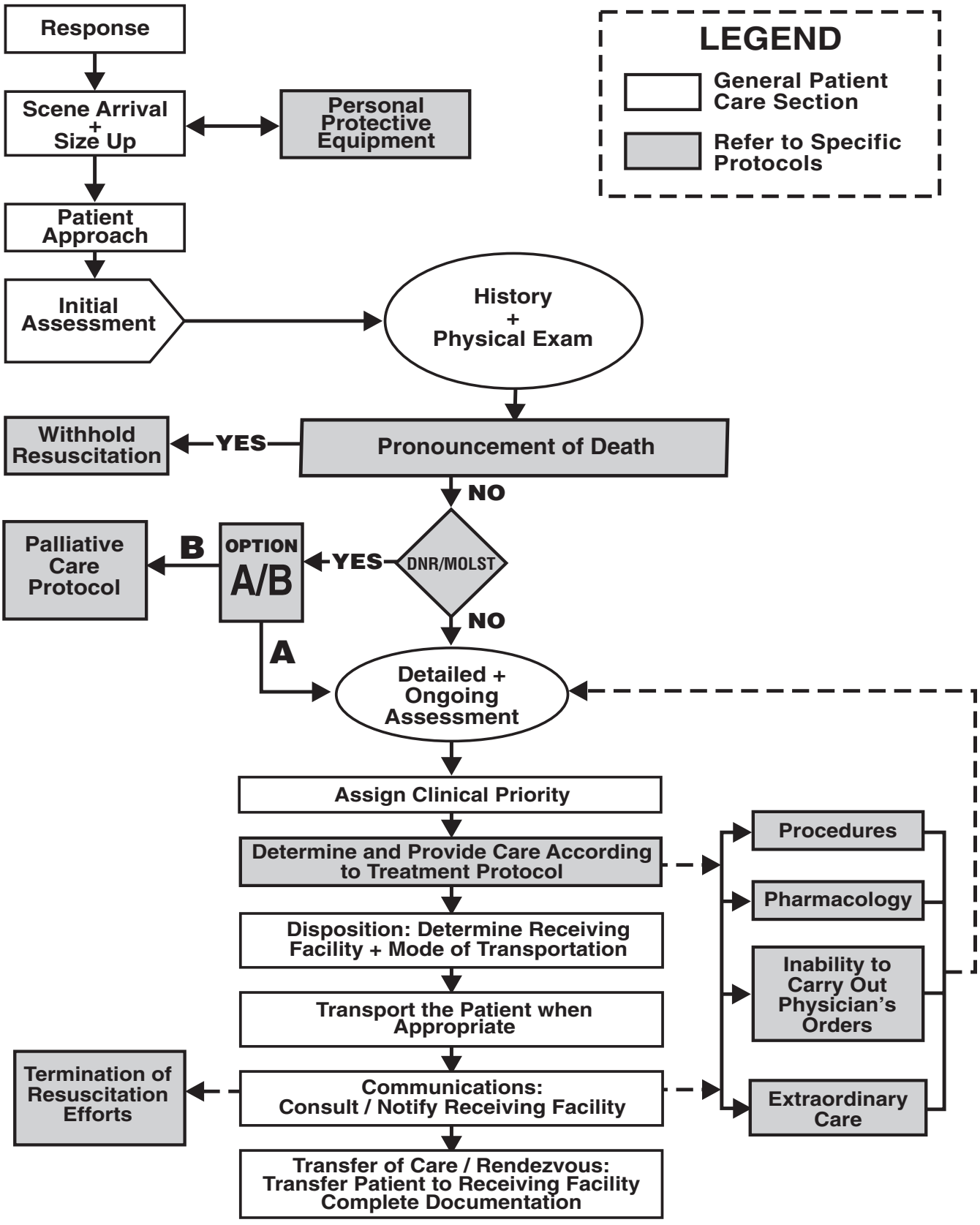
3. Requires Medical Consultation

4. Pediatric Care
NOTE: ALL CLINICIANS (BLS and ALS) SHOULD CHECK ALL PEDIATRIC SECTIONS FOR NECESSARY CARE.

| Description | Age |
|---|---|
| Newly Born | Up to 1 hour |
| Neonate | 1 hour to 28 days |
| Infant | > 28 days to 1 year |
| Toddler | 1 to < 2 years |
| Preschooler | 2 to 4 years |
| School-Age | 5 to 12 years |
| Adolescent | 13 to 18th birthday |

5. Caution/Warning/Alert

## E. PROTOCOL USAGE FLOW DIAGRAM



## F. PROTOCOL VARIATION PROCEDURE

If an error or variance occurs (i.e., any act or failure to act, in practice or judgment, involving patient care that is not consistent with established protocol, whether or not it results in any change in the patient's status or condition):

1. The EMS clinician must:
   a) Notify the consulting physician via radio as soon as the error or variance is discovered, if prior to arrival at the receiving hospital,
   b) Monitor the patient's condition very closely for any changes,
   c) Notify the receiving physician upon arrival, and
   d) Notify the local EMS jurisdiction or licensed commercial ambulance service and Program Medical Director within 24 hours of the incident.

2. The EMS Operational Program **Quality Assurance Officer,** in accordance with COMAR 30.03.04.02 B(6), must:
   a) Within **5 days** of being made aware of the incident, submit written notification of the incident to the:
      (1) Local EMS jurisdiction,
      (2) Program Medical Director,
      (3) MIEMSS Office of Integrity, and
      (4) State EMS Medical Director.
   b) Within **14 days** of the written notification of the incident, initiate a Medical Review Committee QA investigation.
   c) Within **30 days** of the written notification of the incident, forward to MIEMSS' Office of Integrity and State EMS Medical Director the written results of the Medical Review Committee QA investigation and recommendations.

## G. INABILITY TO CARRY OUT PHYSICIAN ORDER

Occasionally, a situation may arise in which a physician's order cannot be carried out (e.g., the clinician feels the administration of an ordered medication would endanger the patient, a medication is not available, or a physician's order is outside the protocol). If this occurs:

1. The EMS clinician must:
   a) Immediately notify the consulting physician as to the reason the order cannot be carried out.
   b) Document on the patient care report what was ordered, the time it was ordered, and the reason the order could not be carried out.
   c) As soon as practical following the call, notify the local EMS jurisdiction of the incident.

2. Public Service EMS Operational Programs must:
   a) Within **5 days** of being made aware of the incident, submit written notification of the incident through the local EMS jurisdiction and Program Medical Director to the Regional Medical Director with a copy to the State EMS Medical Director. The MIEMSS Regional EMS Coordinator shall be notified at the discretion of the Regional Medical Director.
   b) Within **14 days** of the written notification of the incident, initiate a QA investigation under the authority of the Medical Review Committee.
   c) Within **30 days** of the written notification of the incident, forward to the MIEMSS Office of Integrity and State EMS Medical Director written results of the Medical Review Committee QA investigation and recommendations.

3. Licensed Commercial Programs must:
   a) Within **5 days** of being made aware of the incident, submit written notification of the incident through the commercial Program Medical Director to the Director of the State Office of Commercial Ambulance Licensing and Regulation with a copy to the State EMS Medical Director.
   b) Within **14 days** of the written notification of the incident, initiate a QA investigation under the authority of the Medical Review Committee.
   c) Within **30 days** of the written notification of the incident, forward to the Program Medical Director and to the Director of the State Office of Commercial Ambulance Licensing and Regulation and State EMS Medical Director written results of the Medical Review Committee QA investigation and recommendations.

## H. PHYSICIAN ORDERS FOR EXTRAORDINARY CARE NOT COVERED BY MARYLAND PROTOCOL

1. **ALL** of the following criteria MUST be present for EMS clinicians to proceed with an order under this section:

   a) During the consultation, both the consulting physician and the EMS clinician must agree that the patient's condition and extraordinary care are not addressed elsewhere within these medical protocols and that the order is absolutely necessary to maintain the life of the patient.

   b) The EMS clinician must feel capable of correctly performing the care directed by the consulting physician, based on the instructions given by the consulting physician.

   c) The EMS clinician must inform the consulting physician of the effect of the treatment and notify the receiving physician of the treatment upon arrival at the hospital (if the receiving physician is different than the consulting physician).

   d) The EMS clinician must inform the EMS Operational Program Medical Director as soon as practical after the call.

2. If an EMS clinician receives an order for care that is not covered by Maryland protocols and does not feel comfortable with it or does not agree that it is absolutely necessary to maintain the life of the patient, they shall proceed with the "Inability to Carry Out Physician Order" section.

3. This extraordinary care protocol is intended to address the potential rare, unusual or unforeseen situations not specifically addressed within protocols. This extraordinary care protocol is neither a *carte blanche* for any and all actions nor a device to avoid or circumvent protocols. In all situations, emergency health care clinicians, both EMS and on-line physicians providing medical direction, are accountable for their actions in discharging their patient care responsibilities.

**EXTRAORDINARY CARE CHECKLIST**

- Identify the need for extraordinary care with physician consult and EMS clinician acceptance.
  - Care is not covered elsewhere in the protocols.
  - Care is absolutely necessary to maintain the life of the patient.
- Immediately upon delivery of patient, EMS clinician must notify the receiving physician of the effect of treatment rendered.
- Notify the EMS Operational Program Medical Director as soon as practical after the call.

**The General Patient Care section shall apply to all patient encounters unless otherwise noted in any specific treatment protocol.**

## A. RESPONSE

Review the dispatch information and select appropriate response.

## B. SCENE ARRIVAL AND SIZE-UP

1. Consider Body Substance Isolation (BSI).
2. Consider Personal Protective Equipment (PPE).
3. Evaluate the scene safety.
4. Determine the number of patients.
5. Consider the need for additional resources.

## C. PATIENT APPROACH

1. Determine the Mechanism of Injury (MOI)/Nature of Illness (NOI).
2. If appropriate, begin triage and initiate Mass Casualty Incident (MCI) procedures.
3. If a perceived language barrier is present, the EMS clinician should utilize a translation line via PSAP or other jurisdictionally approved method

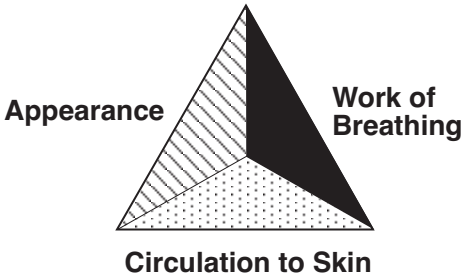
## D. INITIAL ASSESSMENT

Rapidly develop a general impression of the patient on first contact:

1. Identify the critically unstable patient – any patient *in extremis* or with imminent risk for deterioration to arrest:
   a) New onset of altered mental status (AVPU not alert)
   b) Airway compromise
   c) Acute respiratory distress
   d) Signs of poor perfusion
   e) Any other patient judged by the clinician to be *in extremis* or at risk for deterioration to cardiac arrest

2. If you have identified a critically unstable patient:
   a) STOP ALL MOVEMENT OF PATIENT
   b) DO NOT INITIATE TRANSPORT
   c) PROCEED TO *CRITICALLY UNSTABLE PATIENT* PROTOCOL IMMEDIATELY

**For pediatric patients, use the Pediatric Assessment Triangle.**



3. Assess mental status
   a) **A**lert
   b) Responds to **V**erbal stimuli
   c) Responds to **P**ainful stimuli
   d) **U**nresponsive

4. Airway
   a) Stabilize cervical spine when appropriate
   b) Open and establish airway using appropriate adjunct.
   c) Place patient in appropriate position.
   d) Suction airway as needed, including tracheostomy tubes.
   e) Foreign Body Airway Obstruction (FBAO)
      (1) Conscious patients 1 year of age and older
         (i) Alternate five (5) back blows followed by five (5) abdominal thrusts, until the object is expelled or the person becomes unresponsive.
      (2) Conscious infants (less than 1 year of age)
         (i) Alternate five (5) back blows and five (5) chest thrusts using the heel of one hand, until the foreign object is expelled or the infant becomes unresponsive.
      (3) Unconscious patients (all ages)
         (i) Begin HP-CPR immediately.
         (ii) If the object is seen in the mouth, remove it with a finger sweep.
   f) **If a patent airway cannot be established, the patient must be transported to the closest appropriate hospital-based emergency department or designated freestanding emergency medical facility.** EMS clinicians should remain available to assist with patient transfer, if the hospital determines such a transfer is appropriate.
   g) In infants and young children, inspiratory stridor is an indication of upper airway foreign body or partial airway obstruction. Request ALS rendezvous. Transport the patient rapidly and with caution. Have foreign body airway removal equipment ready for immediate use in case the patient's airway becomes obstructed.

5. Breathing
   a) Determine if breathing is adequate and assess oxygen saturation ($SpO_2$) with pulse oximeter.
      (1) If patient's ventilations are not adequate, provide assistance with 100% oxygen using Bag-Valve-Mask (BVM).
         (i) For patients 13 years of age and older, deliver 1 breath every 6 seconds (10 breaths per minute).
         (ii) For neonates and patients less than 13 years of age, deliver 1 breath every 3 seconds (20 breaths per minute).
         (iii) For newly born patients (first hour after delivery), refer to the *Universal Algorithm for the Newly Born.*
      (2) The decision to oxygenate will be based on the patient's clinical condition.
         (i) If the patient has $SpO_2$ less than 94%, administer supplemental oxygen, titrated to $SpO_2$ level of 94%.

(ii) **Supplemental oxygen is not needed if $SpO_2$ greater than or equal to 94%** unless the patient is in respiratory distress, acutely dyspneic, or suffering from suspected CO poisoning. Patients in severe respiratory distress may benefit from high-flow oxygen from a nonrebreather (NRB).

(iii) Unless in respiratory distress, avoid administration of high-flow oxygen to patients presenting with the following conditions:
(a) STEMI / angina
(b) CVA / stroke
(c) Post-arrest

(iv) CO exposure: Apply 100% oxygen via NRB mask. Maintain $SpO_2$ at 100%.

(3) Utilize continuous $ETCO_2$ waveform monitoring in all intubated patients.

(4) Measure carbon monoxide level with a co-oximeter, if appropriate and available.

| Percent $O_2$ Saturation | Ranges | General Patient Care |
|---|---|---|
| 94–100% | Normal | Give oxygen as necessary |
| 91–93% | Mild Hypoxia | Give oxygen as necessary |
| 86–90% | Moderate Hypoxia | Give 100% oxygen<br>Assisting Ventilations if necessary |
| less than or equal to 85% | Severe Hypoxia | Give 100% oxygen<br>Assist Ventilations<br>If indicated, Intubate |
| ALERT | INACCURATE OR MISLEADING $SpO_2$ READINGS MAY OCCUR IN PATIENTS WITH: HYPOTHERMIA, HYPOPERFUSION (SHOCK), CO POISONING, HEMOGLOBIN ABNORMALITY, ANEMIA, VASOCONSTRICTION, AND DARK SKIN COLOR. | |

b) Hyperventilate the head-injured patient only if signs/symptoms of herniation are present, including posturing, loss of pupillary light response, dilation of one or both pupils, vomiting, hypertension, bradycardia, and/or irregular respirations.

(1) If hyperventilating, use the following rates:
(i) Adult (including adolescent 13 years of age or older): 20 breaths per minute
(ii) Child (1-12 years of age): 30 breaths per minute
(iii) Infant (less than 1 year of age): 35 breaths per minute

(2) Use $ETCO_2$ monitoring.
(i) Maintain $ETCO_2$ between 35-40 mmHg for any patient with significant head injury
(ii) For patients with significant head injury **and** signs of herniation, adjust ventilations to achieve $ETCO_2$ of 30-35 mmHg.

6. Circulation

a) Assess pulse.

(1) Patients within the first hour after delivery, refer to the *Universal Algorithm for the Newly Born*.

(2) Patients from one hour after birth up to those who have not reached their 13th birthday, refer to the *Universal Algorithm for Pediatric Emergency Cardiac Care for BLS*.

| HPCPR Reference Chart for All Ages | | | |
|---|---|---|---|
| Component | Adults and Adolescents | Children (Age 1 Year to Puberty) | Infants (Age Less Than 1 Year, Excluding Newborns) |
| Compression-ventilation ratio without advanced airway | Give 1 breath for every 10 compressions during recoil (up-stroke) of the 10th compression. | ***1 rescuer*** 30:2 ***2 or more rescuers*** 15:2 | |
| Compression-ventilation ratio WITH advanced airway | Continuous compressions at a rate of 100-120/min. Give 1 breath every 6 seconds (10 breaths/min). | Continuous compressions at a rate of 100-120/min. Give 1 breath every 3 seconds (20 breaths/min). | |
| Compression rate | 100-120/min | | |
| Compression depth | At least 2 inches (5 cm). Compression depth should be no more than 2.4 inches (6 cm). | At least one-third anterior-posterior diameter of chest. About 2 inches (5 cm). | At least one-third anterior-posterior diameter of chest. About 1½ inches (5 cm). |
| Hand placement | 2 hands on the lower half of the breastbone (sternum). | 2 hands or 1 hand (optional for very small child) on the lower half of the breastbone (sternum). | 2 thumbs-encircling hands in the center of the chest, just below the nipple line. |

(3) Patients 13 years of age or greater, refer to the *Universal Algorithm for Adult Emergency Cardiac Care for BLS*.

(4) If pulseless, stay on scene and immediately initiate high-quality continuous HPCPR.

(i) Ensure frequent clinician rotations and minimal interruptions (less than 10 seconds).

(ii) Mechanical CPR devices may be used, if available, for patients 13 years of age and older only.

(iii) Perform CPR while preparing for rhythm analysis and defibrillation.

b) Assess for and manage profuse bleeding, using a method appropriate for the patient's injuries:

(1) Direct pressure

(2) Wound packing

(3) Hemostatic gauze or chitosan-/kaolin-based agent

(4) Tourniquet or junctional tourniquet (with jurisdictional training)

c) Assess skin color, temperature, and capillary refill.

d) Initiate cardiac monitoring as appropriate.

7. Disability

a) Assess for pulse, motor and sensory function in all extremities

b) Assess GCS for trauma patients

c) Determine the need for *Spinal Motion Restriction*.

(1) Patients who have a blunt trauma with a high-energy mechanism of injury that has potential to cause spinal cord injury or vertebral instability ***and*** one or more the following should receive spinal motion restriction.

- Midline spinal pain, tenderness, or deformity
- Signs and symptoms of new paraplegia or quadriplegia

- Focal neurological deficit
- Altered mental status or disorientation
- Distracting injury: Any injury (e.g., fracture, chest, or abdominal trauma) associated with significant discomfort that could potentially distract from a patient's ability to accurately discern or define spinal column pain or tenderness.

(2) In addition to the above indicators for adults, the below apply to children who have not yet reached their 15th birthday.
- Neck pain or torticollis
- High-impact diving incident or high-risk motor vehicle crash (head on collision, rollover, ejected from the vehicle, death in the same crash, or speed greater than 55 mph)
- Substantial torso injury
- Conditions predisposing to spine injury

d) If NO to all of the above, transport as appropriate.
e) Infant or child car seats may **not** be used as a spinal immobilization device for the pediatric patient.
f) **If patient is unable to communicate or appropriately respond to the above questions, apply *Spinal Motion Restriction* protocol.**

8. Exposure
To assess patient's injuries, remove clothing as necessary, considering condition and environment.

9. Assign Clinical Priority
a) Priority 1 — Critically ill or injured person requiring immediate attention; unstable patients with life-threatening injury or illness.
b) Priority 2 — Less serious condition yet potentially life-threatening injury or illness, requiring emergency medical attention but not immediately endangering the patient's life.
c) Priority 3 — Non-emergent condition, requiring medical attention but not on an emergency basis.
d) Priority 4 — Does not require medical attention.
e) In the event of a multiple casualty incident, the Simple Triage and Rapid Treatment (*START* and/or *JumpSTART*) technique will be instituted for rapid tagging and sorting of patients into priority categories for both treatment and transport.

10. Normal Vital Signs Chart

| AGE | ESTIMATED WEIGHT | HEART RATE | RESPIRATORY RATE | SYSTOLIC B/P |
|---|---|---|---|---|
| Premature | Less than 3 kg | 160 | Greater than 40 | 60 |
| Newborn | 3.5 kg | 130 | 40 | 70 |
| 3 mo. | 6 kg | 130 | 30 | 90 |
| 6 mo. | 8 kg | 130 | 30 | 90 |
| 1 yr. | 10 kg | 120 | 26 | 90 |
| 2 yrs. | 12 kg | 115 | 26 | 90 |
| 3 yrs. | 15 kg | 110 | 24 | 90 |
| 4 yrs. | 17 kg | 100 | 24 | 90 |
| 6 yrs. | 20 kg | 100 | 20 | 95 |
| 8 yrs. | 25 kg | 90 | 20 | 95 |
| 10 yrs. | 35 kg | 85 | 20 | 100 |
| 12 yrs. | 40 kg | 85 | 20 | 100 |
| 14 yrs. | 50 kg | 80 | 18 | 110 |
| ADULT | Greater than 50 kg | 80 | 18 | 120 |

## E. HISTORY AND PHYSICAL EXAMINATION/ASSESSMENT

1. Conduct a Focused Examination/Detailed Examination/Ongoing Assessment.

2. Collect and transport documentation related to patient's history (example: Emergency Information Form, Medic Alert, EMS DNR/MOLST, or jurisdictional form).

3. Clinicians should obtain and document a contact telephone number for one or more individuals who have details about the patient's medical history so that the physician may obtain and validate additional patient information.

4. Obtain an EKG when appropriate.

ALL HEALTH CARE CLINICIANS ARE OBLIGATED BY LAW (MD CODE, FAMILY LAW, 5-704, 14-101, 14-302, 14-308) TO REPORT CASES OF SUSPECTED CHILD OR VULNERABLE ADULT ABUSE. CALL THE STATEWIDE REPORTING HOTLINE AT 1-800-91PREVENT (1-800-917-7383) AS SOON AS POSSIBLE. DO NOT INITIATE A REPORT IN FRONT OF THE PATIENT, PARENT, OR CAREGIVER.

## F. TREATMENT PROTOCOLS

1. Refer to **ALL** appropriate protocols.

2. Patients who have had an impaled conducted electrical weapon used on them will be transported to the nearest appropriate facility without dart removal (exception: Tactical

EMS). ANY conducted electrical weapon dart impalement to the head, neck, hands, feet, or genitalia must be stabilized in place and evaluated by a physician.

3. Clinicians may assist the patient or primary caregiver in administering the patient's prescribed rescue medication.
   a) BLS clinicians may assist with the administration of the patient's fast-acting bronchodilator MDI and sublingual nitroglycerin.
   b) ALS clinicians may administer the patient's prescribed benzodiazepine for seizures, Factor VIII or IX for Hemophilia A or B, or reestablish IV access for continuation of an existing vasoactive medication.
   c) Clinicians should obtain on-line medical direction to administer other prescribed rescue medications not specifically mentioned in *The Maryland Medical Protocols for Emergency Medical Services* (e.g., hydrocortisone (Solucortef) for adrenal insufficiency). The rescue medication must be provided by the patient or caregiver and the label must have the patient's name and the amount of medication to be given.
4. For patients with fever documented by EMS as greater than 100.4 F (38 C), clinicians may treat with *acetaminophen*.

DO NOT ADMINISTER ORAL MEDICATIONS (EXCEPT ORAL GLUCOSE) TO PATIENTS WITH AN ALTERED MENTAL STATUS.

5. For pediatric patients
   a) Pediatric section of the treatment protocol will be used for children who have **not** reached their 15th birthday (trauma) or their 18th birthday (medical), except as otherwise stated in the treatment protocol.
   b) Medication dosing
      (1) Pediatric doses apply to patients weighing less than 50 kg.
      (2) For pediatric patients equal to or greater than 50 kg, utilize adult dosing.
   c) The developmental age of the infant/child must be considered in the communication and evaluation for treatment.
   d) Destination consideration:
      For those patients who are 18 years of age or older who receive specialized care at a pediatric facility, consider medical consultation with a Pediatric Base Station for patient destination.
   e) Infants and children must be properly restrained prior to and during transport.
   f) A parent/guardian/care taker may remain with a pediatric patient during transport, but must be secured in a separate vehicle restraint system at all times during transport.
   g) For patients with fever documented by EMS as greater than 100.4 F (38 C), clinicians may treat with *acetaminophen*.

## G. COMMUNICATIONS

1. **Hospital Notification:** A brief communication to the ED for notification of an inbound patient.
   a) All **Priority 1, Priority 2, and Specialty Alert** patients require hospital notification via EMRC. (Note: All communications via EMRC/SYSCOM are recorded.)
   b) For Priority 3 patients, notification may be made via EMRC or EOC/EMS communication system in accordance with the standard operating procedures of the local jurisdiction.

2. **Medical Consultation:** a bi-directional communication via EMRC between an authorized hospital-based physician (or EMSOP medical director) and prehospital EMS clinician for the purpose of incorporating the physician's knowledge and experience into ongoing patient care.

   **Medical consultation:**
   a) Shall be obtained when required by a specific protocol
   b) Should be obtained when a clinician has reached the end of their therapeutic or diagnostic capabilities without adequate effect from their treatments
   c) Is available at any time for any patient for any reason

3. If medical consultation is genuinely unavailable, or if the time necessary to initiate consultation significantly compromises patient care, the clinician shall proceed with additional protocol-directed care, so long as transport will not be significantly delayed. "Exceptional Call" must be indicated on the Patient Care Report (PCR).

4. Suggested elements for notifications and medical consults:

   a) Assigned patient priority (1 to 4)
   b) Age
   c) Chief complaint
   d) Clinician impression
   e) Pertinent patient signs and symptoms
   f) HR, RR, BP, Pulse Ox (do not use "within normal limits" or "stable" in description)
   g) Pertinent physical findings
   h) ETA

   **In addition, for specialty center patients:**

   Trauma
   a) Number of victims, if more than one
   b) GCS, including motor GCS score
   c) Patient Trauma Decision Tree Category (Alpha, Bravo, Charlie, Delta)

   Stroke
   d) Last known well time
   e) Specific neurological findings (sensory, motor, cognitive)
   f) Upon positive assessment using the Cincinnati Stroke Scale, a STROKE alert shall be made and the LAMS score will be included in the consult.

   STEMI
   g) 12-lead interpretation
   h) Duration of symptoms

5. Mass Casualty Incident (MCI) Communications
   a) When a local jurisdiction declares an MCI, it is extremely important to maximize patient

care resources and reserve EMS communications for emergent situations. Except for extraordinary care interventions, EMS clinicians may perform all skills and administer medications within protocol during a declared MCI. When the MCI condition is instituted, the "Exceptional Call" box must be checked on the PCR.

b) During an MCI, the EMS Officer-in-Charge (OIC) shall designate an EMS Communicator, who shall establish appropriate communications.

c) Reference the *Multiple Casualty Incident/Unusual Event* protocol.

## H. REASSESSMENT

1. Reassess unstable patients at a minimum of every 5 minutes.
2. Reassess stable patients at a minimum of every 15 minutes.
3. Reassess patients being discharged to home or long-term care at the beginning and end of the transport or more frequently, at the clinician's discretion.

## I. DISPOSITION

1. Destination
   a) Priority 1 patients shall be triaged according to Maryland Medical Protocols to the closest appropriate hospital-based emergency department, designated trauma, or designated specialty referral center. Critically unstable patients in need of immediate life-saving interventions that cannot be provided in the field shall, with the approval of EMS system medical consultation, be diverted to the closest facility (including freestanding emergency medical facility) capable of immediately providing those interventions.
   b) Priority 2 patients shall be triaged according to the Maryland Medical Protocols to the closest appropriate hospital-based emergency department, designated trauma or designated specialty referral center unless otherwise directed by EMS system medical consultation. Stable Priority 2 patients may be referred to a freestanding emergency medical facility.
   c) Stable Priority 3 or 4 patients who do not need a time-critical intervention may be transported to the local emergency department or freestanding emergency medical facility.
   d) For, Patients Under Investigation (PUI) for High Consequence Infectious Diseases (HCID), refer to *High Consequence Infectious Diseases* protocol. Helicopter transport is NOT indicated for PUI patients.
   e) **Continuity of Care:** for Priority 2 and Priority 3 patients not meeting a specialty center destination care protocol, the EMS clinician should ask if the patient has had a hospital admission (inpatient service) within the last 30 days. If the answer is yes, the EMS clinician should transport (repatriate) the patient to that hospital as long as that hospital is not more than 15 additional minutes further than nearest hospital (or greater if allowed for by the EMS Operational Program).
2. Mode of transport (air, land, water)
   a) Medevac patients with indications for specialty referral center should be flown to the appropriate type of specialty center if not more than 10–15 minutes further than the closest trauma center. (Patients with an airway, breathing, or circulatory status who would be jeopardized by going an additional 10–15 minutes should go to the closest trauma center.)
   b) Consider utilization of a helicopter when the patient's condition warrants transport to a trauma or specialty referral center and the use of a helicopter would result in a clinically

significant reduction in time compared with driving to a trauma/specialty center.

ALERT ALL REQUESTS FOR SCENE HELICOPTER TRANSPORTS SHALL BE MADE THROUGH SYSCOM. FOR TRAUMA DECISION TREE CATEGORY CHARLIE OR DELTA, RECEIVING TRAUMA CENTER MEDICAL CONSULTATION IS REQUIRED WHEN CONSIDERING WHETHER HELICOPTER TRANSPORT IS OF CLINICAL BENEFIT.

c) If the time of arrival at the trauma or specialty referral center via ground unit is less than 30 minutes, there will generally be no benefit in using the helicopter, especially for Trauma Decision Tree categories Charlie and Delta.
d) Refer to the *Trauma Decision Tree* when considering use of aeromedical transport. Provide SYSCOM with the patient's category (Alpha, Bravo, Charlie, or Delta).
e) On-line medical direction should be obtained from the local trauma center and the specialty referral center when transport to the specialty center would require more than 10–15 minutes additional transport time.
   (1) Pediatric Trauma Patients: Indications as per the pediatric section of the *Trauma* protocols.
   (2) Spinal Trauma Patients: Indications as per *Spinal Motion Restriction* protocol.
   (3) Burn Patients: Indications as per *Burn* protocol. Special note: Isolated burn patients without airway injury or other associated trauma should normally be flown to a burn center, regardless of the location of the closest trauma center.
   (4) Hand Injury Patients: Indications as per *Hand Trauma* protocol. Special note: Medevac patients with appropriate indications for hand center referral should normally be flown to the hand center, regardless of the location of the closest trauma center.

3. Status
   Evaluate the need for emergent versus non-emergent transportation.

ALERT DO NOT WAIT ON-SCENE FOR ADVANCED LIFE SUPPORT. ATTEMPT TO RENDEZVOUS EN ROUTE TO THE HOSPITAL.

## J. TRANSFER OF CARE/RENDEZVOUS AND TRANSITION OF PATIENT CARE ALS TO BLS

The ALS clinician-patient relationship is established when the ALS clinician initiates patient assessment and

1. ALS medication(s)* is/are administered or
2. ALS procedure(s)* is/are performed or
3. Upon ALS clinician assessment of the patient there is potential risk of deterioration.

* Based on the medication or procedure as listed in the *Procedures, Medical Devices, and Medications for EMS and Commercial Services* protocol.

ALS clinicians may only terminate their EMS clinician-patient relationship when they are assured that the patient will continue to receive care at the same or greater levels, or when they have documented with on-line medical direction that the patient's condition has improved and that patient care may be transferred safely to an EMS clinician with a lower scope of practice.

**BLS clinicians have the right to decline the transition of patient care. When consensus between the clinicians cannot be gained, ALS shall get on-line medical direction.** Clinicians will relay assessment findings and treatment provided to the individual(s) assuming responsibility for the patient(s). Should an ALS clinician perform an EKG (of any type), it shall be imported into the patient care report and a copy shall be sent with the BLS unit to the receiving facility.

Patients who have received a parenteral (IV/IO/IM/IN) dose of opioid, benzodiazepine, or ketamine from sending facility or ALS must be transported by ALS:

1. If any of the above medications were given within the past 1 hour **OR**
2. If the patient has an altered mental status without return to their baseline after receiving any of above medications **OR**
3. If the patient has potential for respiratory compromise (RR less than 14, oxygen saturation less than 94%, clinician judgment) after receiving any of the above medications.

## K. DOCUMENTATION

A Patient Care Report (PCR) will be completed and delivered to the receiving facility as soon as possible, ideally upon transfer of care. If this is not immediately possible, clinicians must provide documentation of the patient's prehospital care on a template and in a format provided or approved by MIEMSS for inclusion in the patient care record before leaving the receiving facility, then deliver the completed PCR within 24 hours after dispatch, in compliance with COMAR 30.03.04.04.

Only the unit that pronounces death will select the "Dead on Scene" option in the PCR (eMEDS®) and thus all other units will report "Operational Support Only." If no interventions are performed, the highest level EMS clinician on scene will pronounce death and document "Dead on Scene." If BLS care was rendered by a BLS unit and then termination of resuscitation and pronouncement of death occurred, the BLS unit will select "Dead at Scene with BLS Intervention" option on the eMEDS® PCR. If ALS care was rendered by an ALS unit and then termination of resuscitation and pronouncement of death occurred, the ALS unit will select "Dead at Scene with ALS Intervention" option on the eMEDS® PCR.

## L. CONFIDENTIALITY

Patient confidentiality must be maintained at all times.

## M. PROFESSIONAL CONDUCT

All patients should be treated with dignity and respect in a calm and reassuring manner.

# HISTORY AND PHYSICAL EXAMINATION

## TRAUMA PATIENT

### Significant MOI

Rapid Trauma Assessment

- **D** Head
  - Crepitation
- **C** Chest
  - Crepitation
  - Respiration
  - Paradoxical Motion
  - Breath Sounds
- **A**
- **P**
- **B** Abdomen
  - Rigidity
  - Distention
- **T**
- **L** Pelvis/GU
  - Pain on Motion
- **S**
  - Blood, Urine, Feces
  - Extremities
  - Pulse/Motor/Sensory
  - Posterior

Baseline Vital Signs
Obtain **SAMPLE** History

**S**igns & Symptoms
**A**llergies
**M**edications
**P**ertinent History
**L**ast Oral Intake
**E**vents Prior

### Non-Significant MOI

Determine Chief Complaint

- **D**
- **C**
- **A** Perform Focused Examination of the Injured Site and Areas Compatible with Given MOI
- **P**
- **B**
- **T**
- **L**
- **S**

Baseline Vital Signs
Obtain **SAMPLE** History

**S**igns & Symptoms
**A**llergies
**M**edications
**P**ertinent History
**L**ast Oral Intake
**E**vents Prior

## MEDICAL PATIENT

### Unresponsive Patient

Rapid Physical Examination

- **D** Head
- Neck
  - JVD
  - Medical Alert Device
- **C**
- **A** Chest
  - Breath Sounds
- **P** Abdomen
- **B**
  - Rigidity
  - Distention
- **T** Pelvis/GU
  - Blood, Urine, Feces
- **L** Extremities
- **S**
  - MSP
  - Medical Alert Device
  - Posterior

Baseline Vital Signs
Obtain History of Episode

**O**nset
**P**rovocation
**Q**uality
**R**adiation
**S**everity
**T**ime

Obtain **SAMPLE** History

### Responsive Patient

Obtain History of Episode

**O**nset
**P**rovocation
**Q**uality
**R**adiation
**S**everity
**T**ime

Baseline Vital Signs
Obtain **SAMPLE** History

**S**igns & Symptoms
**A**llergies
**M**edications
**P**ertinent History
**L**ast Oral Intake
**E**vents Prior

Focused Physical Exam
**DCAPBTLS**

Check areas suggested by **MOI** and **SAMPLE**.

CONSIDER ALS, PERFORM INTERVENTIONS, AND TRANSPORT.

# DETAILED AND ONGOING ASSESSMENTS

## DETAILED EXAMINATION

**D**
- HEAD
  - Scalp & Cranium
    - Crepitation
  - Eyes
    - Discoloration
    - Equality
    - Foreign Bodies

**C**
- Blood in Anterior Chamber
- Ears & Nose
  - Fluid Drainage or Bleeding
  - Discoloration

**A**
- Mouth
  - Teeth & Foreign Bodies
  - Swelling or Lacerations
  - Breath Odor
  - Discoloration

**P**
- NECK
  - Jugular Vein Distention
  - Trachea Position

**B**
- Crepitation
- CHEST
  - Paradoxical Motion
  - Breath Sounds
  - Crepitation

**T**
- ABDOMEN
  - Rigidity
  - Distention

**L**
- PELVIS/GU
  - Pain on Motion

**S**
- EXTREMITIES
  - Pulse, Motor, Sensory
  - Capillary Refill
- POSTERIOR

## ONGOING ASSESSMENT

### MEDICAL PATIENT

REPEAT INITIAL ASSESSMENT

- Reassess **AVPU**
- Reassess Airway
- Monitor Breathing
- Reassess Circulation
- Monitor Skin
- Confirm Clinical Priority

REPEAT & RECORD VITAL SIGNS

REPEAT FOCUSED ASSESSMENT
Especially Chief Complaint or Injuries

CHECK ALL INTERVENTIONS

- Assure Oxygen Adequacy
- Check Bleeding
- Check Interventions
- Check for Trending
- Stable Pt.- Every 15 Min.
- Unstable Pt.- Recommend Every 5 Min.

### TRAUMA PATIENT

REPEAT INITIAL ASSESSMENT

- Reassess **AVPU**
- Reassess Airway
- Monitor Breathing
- Reassess Circulation
- Monitor Skin
- Confirm Clinical Priority

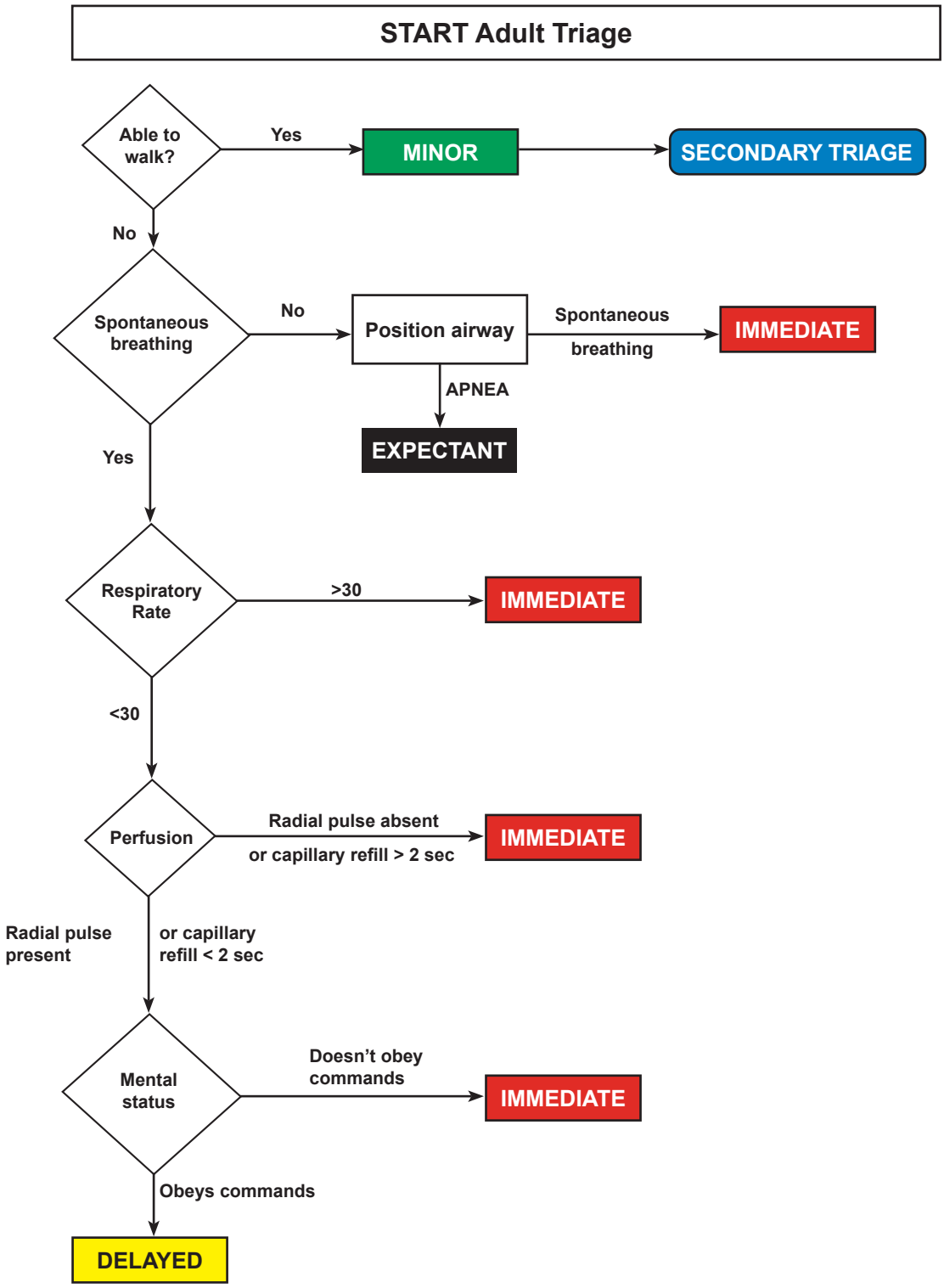
REPEAT & RECORD VITAL SIGNS

REPEAT RAPID TRAUMA ASSESSMENT

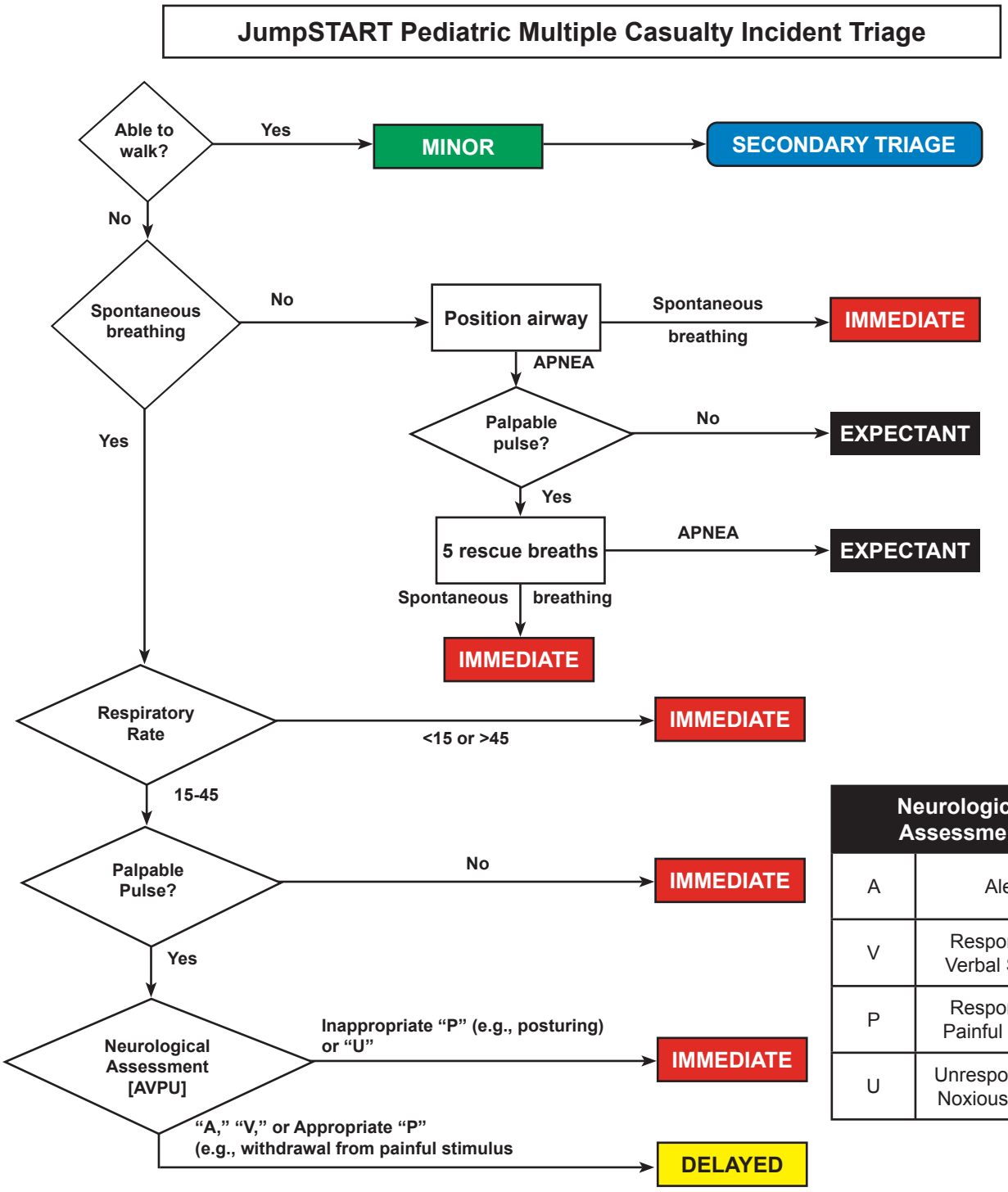
CHECK ALL INTERVENTIONS

- Assure Oxygen Adequacy
- Check Bleeding
- Check Neck Stabilization
- Check Interventions
- Check for Trending
- Stable Pt.- Every 15 Min.
- Unstable Pt.- Recommend Every 5 Min.

CONSIDER ALS, PERFORM INTERVENTIONS, AND TRANSPORT.




Source: U.S. National Library of Medicine




| Neurological Assessment | |
|---|---|
| A | Alert |
| V | Responds to Verbal Stimuli |
| P | Responds to Painful Stimuli |
| U | Unresponsive to Noxious Stimuli |

Use JumpSTART if the Patient appears to be a child.
Use an adult system, such as START, if the Patient appears to be a young adult.

Source: U.S. National Library of Medicine
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## A. INDICATIONS

All patients, regardless of age, who are identified to be in extremis or are at risk for deterioration to cardiac arrest at any point during their care. These patients can include, but are not limited to, patients with:

(1) New onset altered mental status
(2) Airway compromise
(3) Acute respiratory distress
(4) Signs of poor perfusion

**DEFER PATIENT MOVEMENT UNTIL TREATMENT OF EMS-REVERSIBLE CONDITIONS IN THIS PROTOCOL ARE COMPLETE.**

## B. BLS

(1) Consider the need for more resources, if available, including multiple ALS clinicians.
(2) Obtain a complete patient assessment, including pulse oximetry.
(3) Control life-threatening external hemorrhage
(4) Manage the patient's airway (positioning and suctioning) and ventilation (e.g., BVM with or without OPA/NPA) as indicated and tolerated.

PEDIATRIC CONSIDERATIONS:

a) If no sign of trauma, consider using a towel roll under the shoulders for airway positioning.
b) If stridor is present, assess for foreign body.

(5) Treat hypoxia and respiratory distress promptly (e.g., oxygen, albuterol, IM epinephrine as per protocol)
(6) If there is clinical concern for severe head injury (e.g., with hypertension and bradycardia):
   a) Elevate the head of the patient to 30 degrees. If a backboard is indicated, consider propping the backboard up to 30 degrees, if possible.
   b) Maintain neutral position of the neck

## C. ALS

(1) Manage the patient's airway with BLS and advanced maneuvers and devices as appropriate
(2) Consider CPAP as appropriate
(3) Initiate $ETCO_2$ monitoring
(4) Obtain 12-lead EKG if there is concern for brady- or tachy-dysrhythmia, or acute coronary syndrome
(5) Obtain IV or IO access
   a) Support perfusion with IV fluids, refer to *Shock/Hypoperfusion – Adult and Pediatric* protocols
   b) Consider vasoactive medications as indicated
(6) If there is clinical concern for impending brainstem herniation:
   a) Provide ventilations to target an $ETCO_2$ of 30-35 mmHg
   b) Support blood pressure to maintain SBP greater than 110 mmHg for patients 10 years of age and older, including adults, or SBP greater than or equal to 90 + (2 x age in years) for children under 10 years old
(7) Address any other life threats noted on physical exam

## A. PURPOSE

The purpose of this protocol is to define the type of patient an EMS service may transport to a MIEMSS-designated freestanding emergency medical facility.

## B. INDICATIONS

A jurisdiction may allow transport of a patient, who meets one or more of the following indications, to a freestanding emergency medical facility.

(1) A stable Priority 2, 3, or 4 patient as outlined in *The Maryland Medical Protocols for Emergency Medical Services* who does not need a time-critical intervention

(2) Priority 1 patient with an unsecured airway or in extremis, who requires stabilization beyond the capability of the EMS crew (e.g., cardiac or respiratory arrest)

(3) If the freestanding emergency medical facility is a MIEMSS-designated Acute Stroke Ready Facility, patients of all priority that meet stroke criteria may be transported to the Acute Stroke Ready Facility, as long as the transport time to a Primary Stroke, Primary Thrombectomy-capable Stroke, or Comprehensive Stroke Center is greater than 15 additional minutes.

## C. CONTRAINDICATIONS

Except as provided in INDICATIONS, above, the following patients shall not be transported to a freestanding emergency medical facility.

(1) Any patient meeting the criteria for transport to a Trauma Center or Specialty Referral Center as defined in *The Maryland Medical Protocols for Emergency Medical Services*

(2) A pregnant patient complaining of abdominal pain or a patient who is in active labor

(3) Any patient in need of time-critical intervention that can be provided only at a hospital-based emergency department

## D. PROCEDURE

The EMS clinician shall consult with a designated Base Station at the freestanding emergency medical facility, or the nearest Base Station if the freestanding emergency medical facility is not a designated Base Station, prior to arrival on all Priority 1 and 2 transports and when otherwise unclear of the appropriate destination. The designated Base Station shall direct the clinician to the appropriate destination.

## E. SPECIAL CONSIDERATIONS

None

# General Patient Care (GPC) – PATIENT-INITIATED REFUSAL OF EMS



A. Initiate General Patient Care.
For the purposes of this protocol, a patient is defined as any person encountered by in-service rescue or emergency medical personnel with an actual or potential injury or medical problem. (The term "patient," in this protocol only, refers both to patients and to persons who are potential patients. This protocol is not intended to determine the legal status of any person, the establishment of a clinician-patient relationship, or a legal standard of care.)

A minor patient is defined as a patient who has not reached their 18th birthday and is not
(1) Married, **OR**
(2) Parent of a child, **OR**
(3) Requesting:
  (a) Treatment for drug abuse or for alcoholism,
  (b) Treatment for Sexual Transmitted Infection (STI) or for contraception,
  (c) Treatment of injuries from alleged rape or sexual offense
  (d) Treatment for pregnancy-related conditions, **OR**
(4) Living separate and apart from the minor's parent, parents, or guardian, whether with or without consent of the minor's parent, parents, or guardian, and is self-supporting, regardless of the source of the minor's income.

An authorized decision maker for minor patients is defined as an adult who identifies themselves as the parent or guardian, or has written authorization for medical decision making or states that they have written authorization for medical decision making. Clinicians may request the parent or guardian to present identification and will document the name of the individual who identifies themselves as the decision maker.

B. A person may have requested an EMS response or may have had an EMS response requested for them. Because of the hidden nature of some illnesses or injuries, an assessment must be offered and performed, to the extent permitted, on all patients. For patients initially refusing care, attempt to ask them, "Would you allow us to check you out and evaluate whether you are OK?"

IF THE AUTHORIZED DECISION MAKER REFUSES TO PERMIT THE EMS CLINICIAN TO EXAMINE A MINOR PATIENT TO DETERMINE THE SEVERITY OF THE ILLNESS OR INJURY, CONSIDER CONTACTING LAW ENFORCEMENT FOR ASSISTANCE AND CONSULTATION WITH A PEDIATRIC BASE STATION.

C. Each patient's assessment shall include:
(1) Visual assessment – injuries, responsiveness, level of consciousness, orientation, respiratory distress, gait, skin color, diaphoresis
(2) Primary survey – airway, breathing, circulation, and disability
(3) Vital signs – pulse, blood pressure, respiratory rate and effort, pulse oximeter
(4) Secondary survey – directed by the chief complaint
  (a) Medical calls – exam of lungs, heart, abdomen, and extremities. Blood glucose testing for patients with diabetes mellitus. Neurological exam for altered consciousness, syncope, or possible stroke.

(b) Trauma calls – for patients meeting criteria in the *Maryland Medical Protocols Trauma Decision Tree* recommending transport to a Trauma Center: exam of neck and spine, neurological exam, palpation and auscultation of affected body regions (chest, abdomen, pelvis, extremities).

(5) Capability to make medical decisions (complete questions 1 through 3 on the Patient-Initiated Refusal of EMS form):
   (a) Alert and oriented to person, place, time, situation
   (b) Patient's capacity to understand the nature of illness and exercise judgment (see Refusal checklist)

ADDRESS LANGUAGE COMMUNICATION BARRIERS BY ENSURING THAT A "LANGUAGE TRANSLATION LINE" SERVICE IS USED, WHEN INDICATED.

D. Following the assessment, complete items 4 through 9 on the Patient-Initiated Refusal of EMS Form, noting the presence of conditions that may place the patient at higher risk of hidden illness/injury or of worse potential outcome.

E. Management

(1) Patients at the scene of an emergency who meet criteria to allow self-determination shall be allowed to make decisions regarding their medical care, including refusal of evaluation, treatment, or transport. These criteria include:
   (a) Medical capacity to make decisions – the ability to understand and discuss the nature and consequences of the medical care decision
   (b) Adult (18 years of age or greater)
   (c) Those patients who have not reached their 18th birthday and are:
      (i) Married, **OR**
      (ii) Parent of a child, **OR**
      (iii) Requesting:
         a. Treatment for drug abuse or for alcoholism,
         b. Treatment for STI or for contraception,
         c. Treatment of injuries from alleged rape or sexual offense, **OR**
         d. Treatment for pregnancy-related conditions
      (iv) Living separate and apart from the minor's parent, parents, or guardian, whether with or without consent of the minor's parent, parents, or guardian, and is self-supporting, regardless of the source of the minor's income.
   (d) A patient who has been evaluated by EMS clinicians as having 'yes' answers to questions 1, 2, and 3 on the Patient-Initiated Refusal of EMS form shall be considered to be medically capable to make decisions regarding their own care.
   (e) Patients with 'yes' answers to questions 1, 2, and 3 on the Patient-Initiated Refusal of EMS form, but one or more answers in the shaded boxes for questions 4 through 9 (medical conditions) have a higher risk of medical illness. The EMS clinician shall consult medical direction if the patient does not wish transport. The purpose of the consultation is to obtain a "second opinion" with the goal of helping the patient realize the seriousness of their condition and accept transportation.

(2) Any person at the scene of an emergency requesting an EMS response, or for whom an EMS response was requested, and who is evaluated to have any one of the following conditions, shall be considered incapable of making medical decisions regarding care and shall be transported, with law enforcement involvement, to the closest appropriate medical facility for further evaluation:
   (a) Continued altered mental status that impairs the patient's judgment, from any cause, including: influence of drugs or alcohol, metabolic causes (CNS or hypoglycemia), head trauma, or dementia
   (b) Attempted suicide, danger to self or others, or verbalizing suicidal intent
   (c) Acting in an irrational manner, to the extent that a reasonable person would believe that the medical capacity to make decisions is impaired
   (d) Judgment impaired by severe illness or injury to the extent that a reasonable and medically capable person would seek further medical care
   (e) On an Emergency Petition

(3) Further care should be provided according to the *Agitation – Adult* or *Agitation – Pediatric* protocol or other protocol sections as appropriate, based on patient's condition.

F. Base Station Hospital Physician Consultation

Patient refusals are one of the highest risk encounters in clinical EMS. Careful assessment, patient counseling, and appropriate base hospital physician consultation can decrease non-transport of high-risk refusals. Patients who meet any of the following criteria require Base Station hospital physician consultation:

(1) The clinician is unsure if the patient is medically capable of refusing transport.
(2) The clinician disagrees with the patient's decision to refuse transport due to unstable vital signs, clinical factors uncovered by the assessment, or the clinician's judgment that the patient may have a poor outcome if not transported.
(3) The patient was involved in any mechanism included in the *Trauma Decision Tree* that would recommend transportation to a Trauma Center.
(4) Minor patients: No parent, guardian, or authorized decision maker is available or the clinician disagrees with decision made by the parent, guardian, or authorized decision maker.

For patients with significant past medical history, consider consultation with the specialty center that follows the patient if possible.

Patients who do not meet the criteria above but have one or more answers in the shaded boxes for questions 4 through 9 on the Patient-Initiated Refusal of EMS form may have a higher risk of illness. In these situations, clinicians shall consult with the Base Station hospital physician.

G. Documentation
   (1) Complete Section One of the Patient-Initiated Refusal of EMS form, documenting the patient's medical decision-making capability and any "At-Risk" criteria.
   (2) Complete Section Two, which documents clinician assessment and actions.
   (3) Following patient counseling and Base Station hospital consultation, when indicated, complete Section Three: Initial Disposition, Interventions, and Final Disposition.
   (4) Document the assessment, care provided, elements of the refusal, medical decision-making capability, and "At-Risk" criteria in the eMEDS® report. Request that the patient and a witness sign the eMEDS® report to indicate refusal of treatment and/or transport.
   (5) If the patient/authorized decision maker refuses to sign the refusal statement:
      (a) Contact a supervisor.
      (b) Explain the need for a signature and again attempt to have the patient sign the refusal statement.
      (c) If not already done, have a witness sign the refusal statement.
      (d) Transmit the patient's unwillingness to sign the refusal statement on a recorded channel and document all steps taken to convince patient to sign.

# General Patient Care (GPC) – PATIENT-INITIATED REFUSAL OF EMS (continued)



## Section One:

When encountering a patient who is attempting to refuse EMS treatment or transport, assess his/her condition and record whether the patient screening reveals any lack of medical decision-making capability:

| | | | |
|---|---|---|---|
| 1. Alert? | | ❑ Yes | ❑ No |
| 2. Oriented to: | a. Person? | ❑ Yes | ❑ No |
| | b. Place? | ❑ Yes | ❑ No |
| | c. Time? | ❑ Yes | ❑ No |
| | d. Situation? | ❑ Yes | ❑ No |
| 3. The patient has capacity to exercise judgment? | | ❑ Yes | ❑ No |

a. To evaluate judgment:

i. **Advise** the patient of EMS' clinical concern(s).

ii. **Ask** the patient to explain his/her understanding of the medical condition.

iii. **Assess** whether the patient understands the nature of his/her problem and the potential for a worsening condition or complications.

**If ANY shaded boxes marked (above), transport**

| | | | |
|---|---|---|---|
| 4. Adult vital signs – Patient 18 years or older | | | |
| a. Heart rate between 60–120 (inclusive)? | ❑ Yes | ❑ No | ❑ NA |
| b. Systolic BP greater than 90? | ❑ Yes | ❑ No | ❑ NA |
| c. Respirations between 10–30 (inclusive)? | ❑ Yes | ❑ No | ❑ NA |
| 5. Pediatric vital signs – Patient less than 18 years | | | |
| a. Age appropriate heart rate? | ❑ Yes | ❑ No | ❑ NA |
| b. Age appropriate systolic BP? | ❑ Yes | ❑ No | ❑ NA |
| c. Age appropriate respiratory rate? | ❑ Yes | ❑ No | ❑ NA |
| 6. High risk chief complaint (e.g., chest pain, dyspnea)? | ❑ Yes | ❑ No | |
| 7. Head injury with history of loss of consciousness? | ❑ Yes | ❑ No | |
| 8. Significant mechanism of injury or high suspicion of injury? | ❑ Yes | ❑ No | |
| 9. For pediatric patients: ALTE, significant past medical history, or suspected intentional injury? | ❑ Yes | ❑ No | ❑ NA |

**If ANY shaded boxes marked (above), consult**

## Section Two:

For clinicians: Following evaluation, document information and care below:

| | | |
|---|---|---|
| 1. Was an assessment performed (including exam) on this patient? | ❑ Yes | ❑ No |
| ***If yes to #1, skip to #3*** | | |
| 2. If unable to examine, were vital signs attempted? | ❑ Yes | ❑ No |
| 3. Was the patient or guardian convinced to accept transport? | ❑ Yes | ❑ No |
| 4. Was medical direction contacted for a patient who is still refusing service? | ❑ Yes | ❑ No |

Patient Refusal of EMS

I, _____, have been offered the following by _____ (EMS Operational Program) but refuse (check all that apply):

❑ Examination ❑ Treatment ❑ Transport

Patient Name: _____ Phone: _____

Patient Address: _____

Signature: _____Witness: _____

❑ Patient ❑ Parent ❑ Guardian ❑ Authorized Decision Maker (ADM)

If you experience new symptoms or return of symptoms after this encounter, we recommend that you seek medical attention promptly.

## Section Three: (CHECK ALL THAT APPLY)

**Initial Disposition:**

❑ Patient refused exam ❑ Patient refused treatment ❑ Patient refused transport
❑ Patient accepted exam ❑ Patient accepted treatment ❑ Patient accepted transport
❑ ADM refused exam ❑ ADM refused treatment ❑ ADM refused transport
❑ Patient refused transport to the closest appropriate facility (per protocol)

**Interventions:**

❑ Attempt to convince patient ❑ Attempt to convince family member/ADM
❑ Contact Medical Direction (Facility: _____)
❑ Contact Law Enforcement ❑ None of the above available

**Final Disposition:**

❑ Patient refused exam ❑ Patient refused treatment ❑ Patient refused transport
❑ Patient accepted exam ❑ Patient accepted treatment ❑ Patient accepted transport
❑ ADM refused exam ❑ ADM refused treatment ❑ ADM refused transport
❑ Patient refused transport to the closest appropriate facility (per protocol)

**Section Four: (MUST COMPLETE)**

Provide in the patient's own words why they refused the above care/service:

_____
_____
_____
_____
_____
_____
_____

Jurisdiction _____ Incident: _____ Date: _____
Unit #: _____ Clinician Name/EID: _____Time: _____

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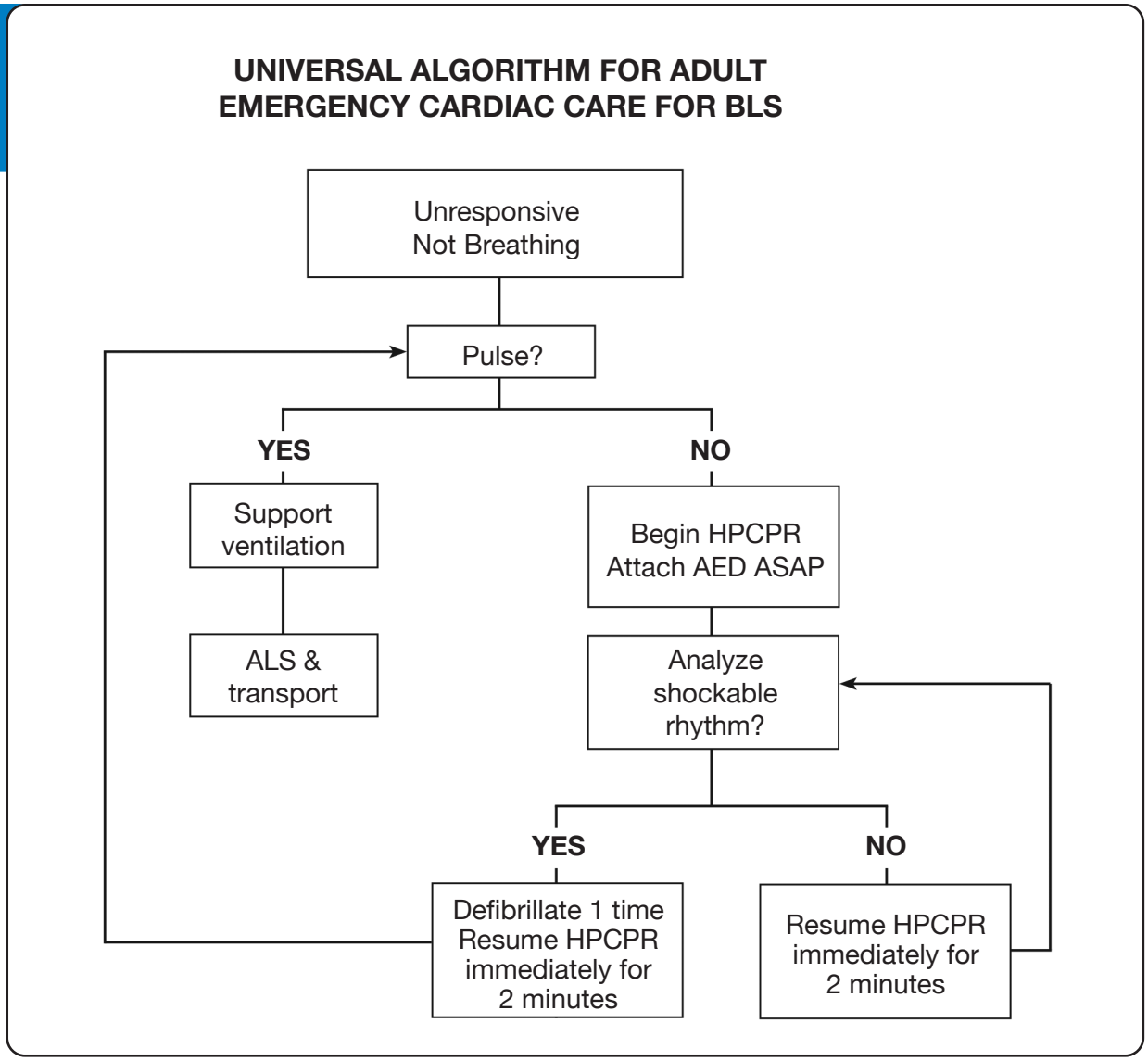
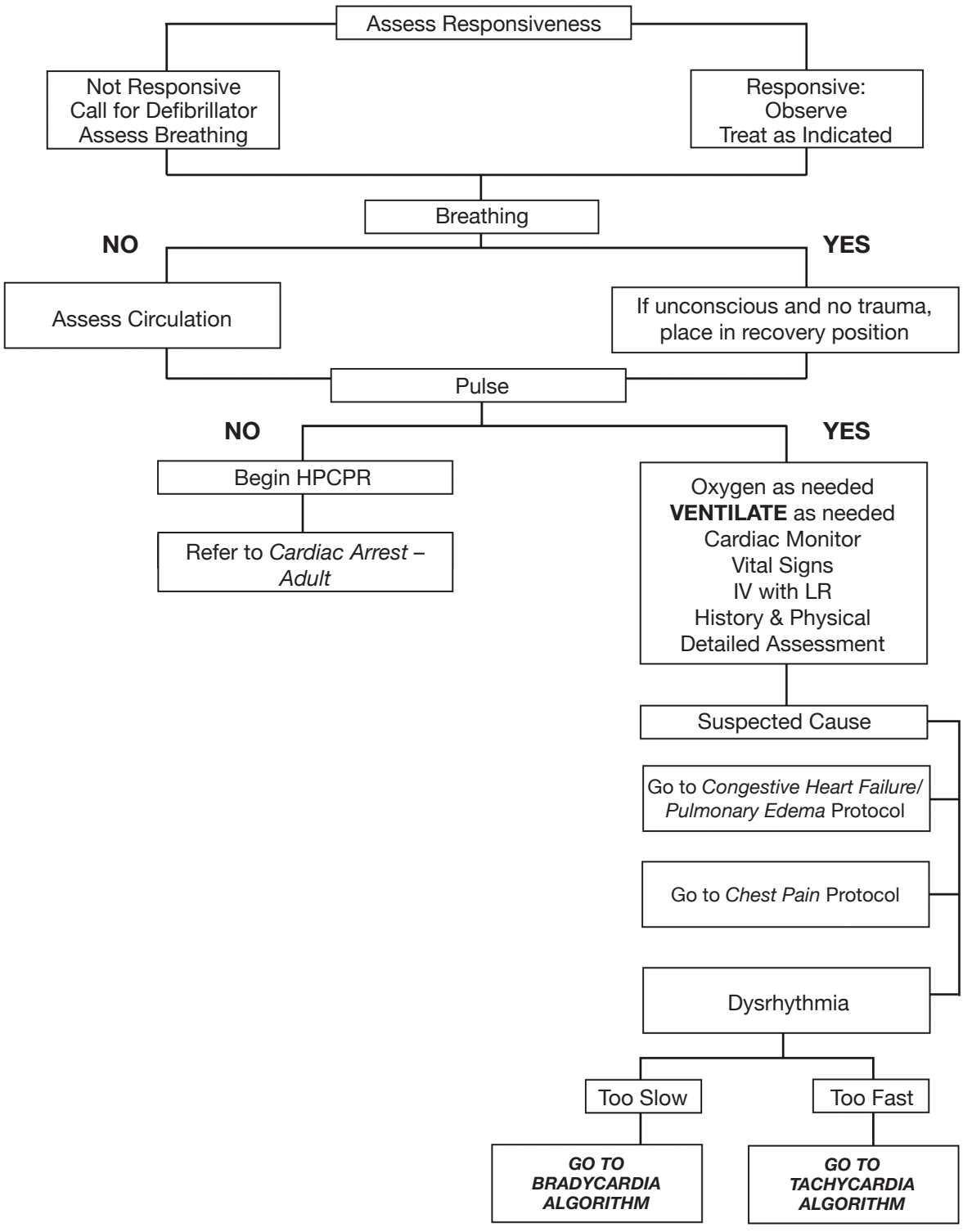
# Treatment Protocols

BLS

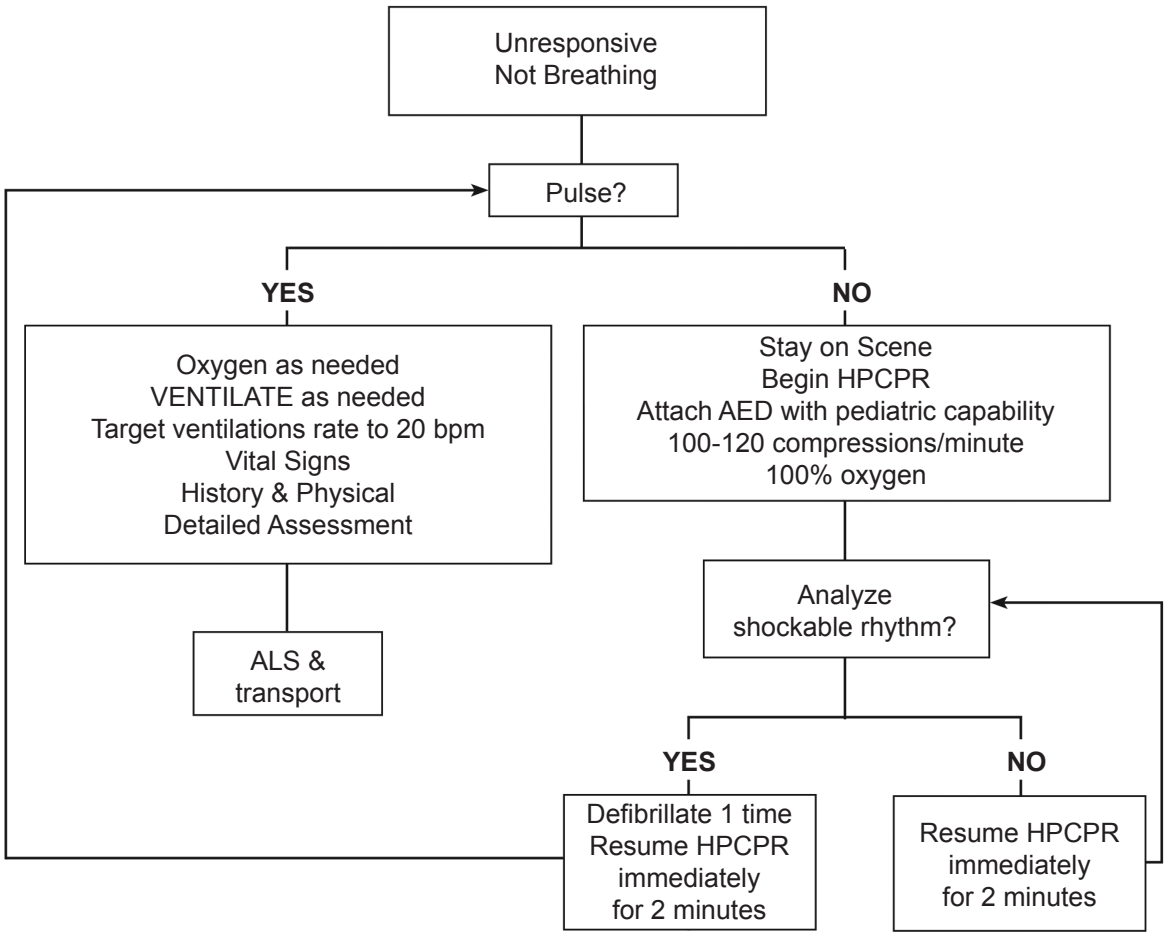

UNIVERSAL ALGORITHM FOR ADULT EMERGENCY CARDIAC CARE FOR BLS
Unresponsive Not Breathing
Pulse?
YES
NO
Support ventilation
ALS & transport
Begin HPCPR Attach AED ASAP
Analyze shockable rhythm?
YES
NO
Defibrillate 1 time Resume HPCPR immediately for 2 minutes
Resume HPCPR immediately for 2 minutes

ALS


UNIVERSAL ALGORITHM FOR ADULT EMERGENCY CARDIAC CARE FOR ALS
Assess Responsiveness
Not Responsive
Call for Defibrillator
Assess Breathing
Responsive:
Observe
Treat as Indicated
Breathing
NO
YES
Assess Circulation
If unconscious and no trauma, place in recovery position
Pulse
NO
YES
Begin HPCPR
Refer to Cardiac Arrest – Adult
Oxygen as needed
VENTILATE as needed
Cardiac Monitor
Vital Signs
IV with LR
History & Physical
Detailed Assessment
Suspected Cause
Go to Congestive Heart Failure/ Pulmonary Edema Protocol
Go to Chest Pain Protocol
Dysrhythmia
Too Slow
Too Fast
GO TO BRADYCARDIA ALGORITHM
GO TO TACHYCARDIA ALGORITHM

BLS

**UNIVERSAL ALGORITHM FOR PEDIATRIC EMERGENCY CARDIAC CARE FOR BLS**
**Greater than 1 hour old and less than 13 years of age**
**If less than 1 hour old, refer to the *Universal Algorithm for the Newly Born***

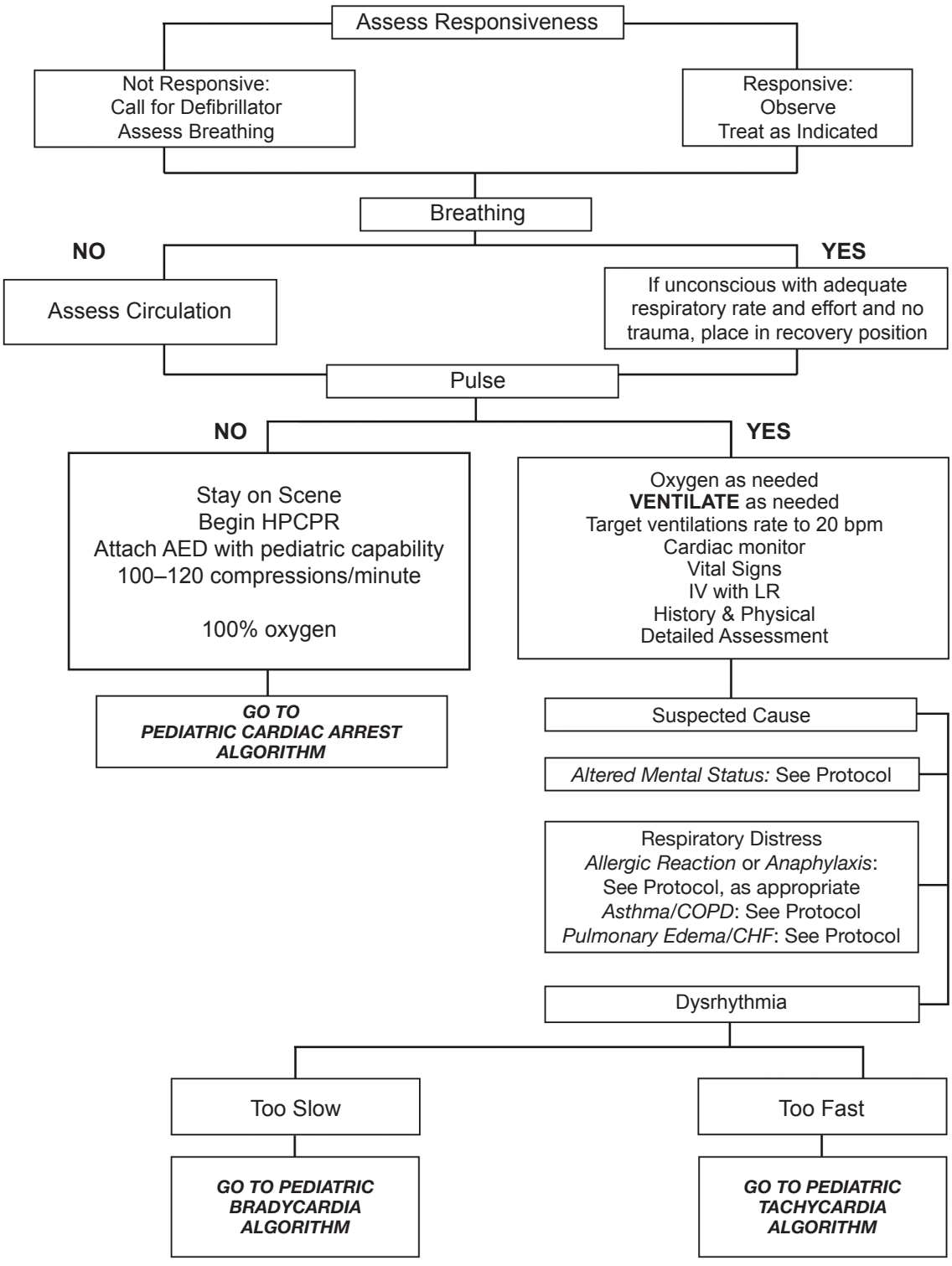


ALS

## UNIVERSAL ALGORITHM FOR PEDIATRIC EMERGENCY CARDIAC CARE FOR ALS

**Greater than 1 hour old and less than 13 years of age**

**If less than 1 hour old, refer to the *Universal Algorithm for the Newly Born***



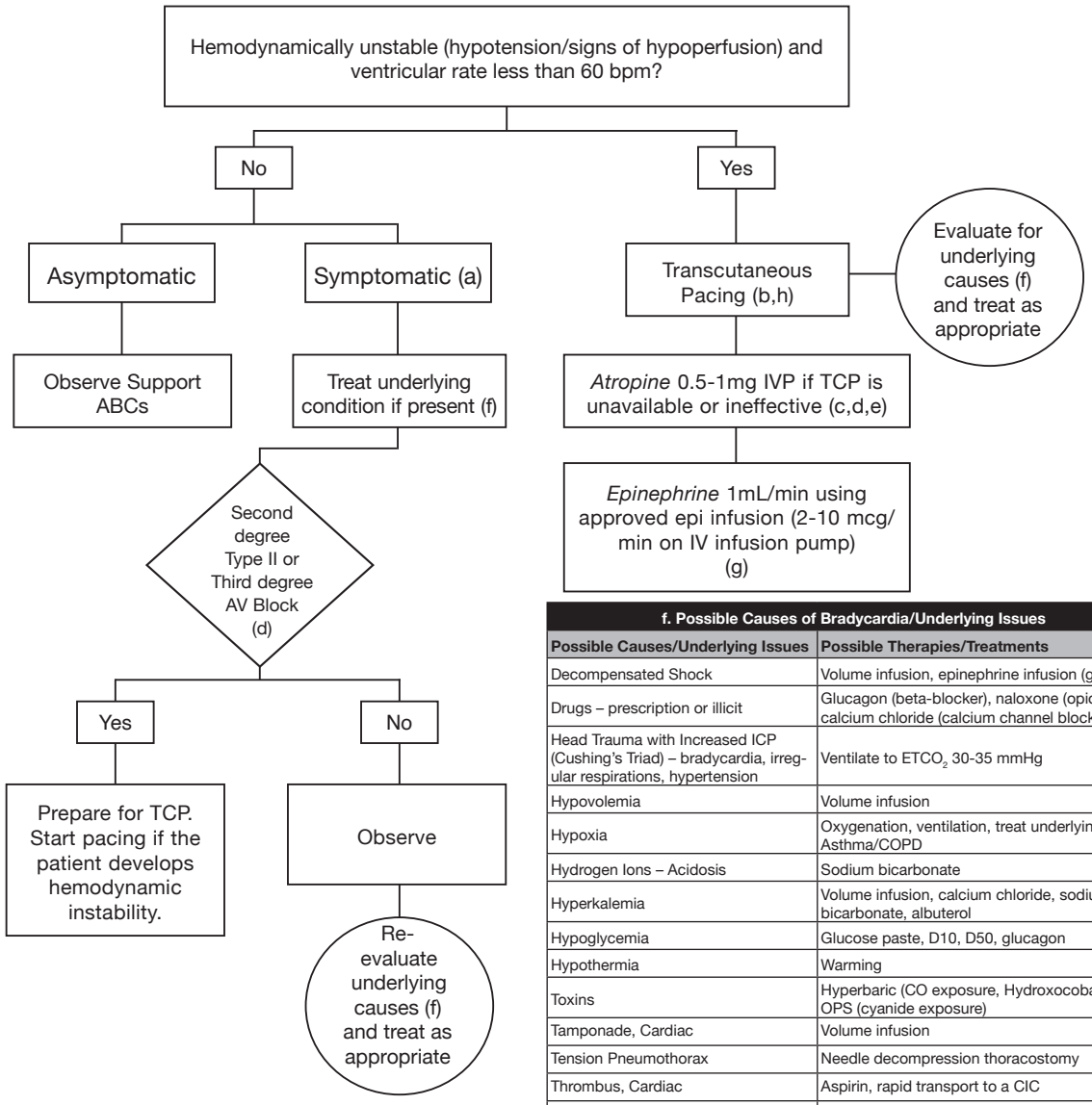
# Adult Bradycardia Algorithm



## BLS

- Assess and treat for shock, if indicated.
- Continuously monitor airway and reassess vital signs every 5 minutes.

## ALS




| f. Possible Causes of Bradycardia/Underlying Issues | |
|---|---|
| **Possible Causes/Underlying Issues** | **Possible Therapies/Treatments** |
| Decompensated Shock | Volume infusion, epinephrine infusion (g) |
| Drugs – prescription or illicit | Glucagon (beta-blocker), naloxone (opioid), calcium chloride (calcium channel blocker) |
| Head Trauma with Increased ICP (Cushing's Triad) – bradycardia, irregular respirations, hypertension | Ventilate to $ETCO_2$ 30-35 mmHg |
| Hypovolemia | Volume infusion |
| Hypoxia | Oxygenation, ventilation, treat underlying CHF, Asthma/COPD |
| Hydrogen Ions – Acidosis | Sodium bicarbonate |
| Hyperkalemia | Volume infusion, calcium chloride, sodium bicarbonate, albuterol |
| Hypoglycemia | Glucose paste, D10, D50, glucagon |
| Hypothermia | Warming |
| Toxins | Hyperbaric (CO exposure, Hydroxocobalamin OPS (cyanide exposure) |
| Tamponade, Cardiac | Volume infusion |
| Tension Pneumothorax | Needle decompression thoracostomy |
| Thrombus, Cardiac | Aspirin, rapid transport to a CIC |
| Trauma | Whole blood, if indicated |
| Vagal Response | Supportive care, supine positioning |

(a) Rate-related signs and symptoms may include: chest pain, shortness of breath, altered/decreased level of consciousness, congestive heart failure, pulmonary congestion, acute myocardial infarction

(b) Do not delay TCP while awaiting IV if patient is symptomatic and hemodynamically unstable.

(c) Denervated transplanted hearts will not respond to *atropine*.

(d) *Atropine* is contraindicated for STEMI patient and ineffective for second-degree type II and third-degree AV blocks.

**ALS**

(e) *Atropine* should be repeated every 3–5 minutes, if appropriate, to max dose of 0.04 mg/kg.
(f) (See chart above for Possible causes of bradycardia/underlying issues)
(g) Initiate *epinephrine infusion* 1mL/min (1 drop/second using 60 drop set).
- Check blood pressure every 5 minutes, if MAP is less than 65 mmHg or systolic blood pressure is less than 90 mmHg, increase to a maximum rate of 2mL/min (120 drops/min).

(h) If patient develops discomfort with TCP, administer opioid or *ketamine* per *Pain Management* protocol or administer *midazolam* 0.1 mg/kg SLOW IVP over 1-2 minutes, in 2 mg increments. Max single dose of 5 mg. Reduce dose by 50% for patients 69 and older.

**MC**

- *Epinephrine infusion:* If blood pressure/MAP goals are not met upon reaching maximum rate above, obtain medical consultation.

**Clinical Pearls**
- Start current (m.a.) as low as possible and gradually increase current until a palpable pulse is present to confirm capture or to a maximum of 200 m.a.

# Pediatric Bradycardia Algorithm
# (If less than 1 hour old, refer to Newly Born Protocol)



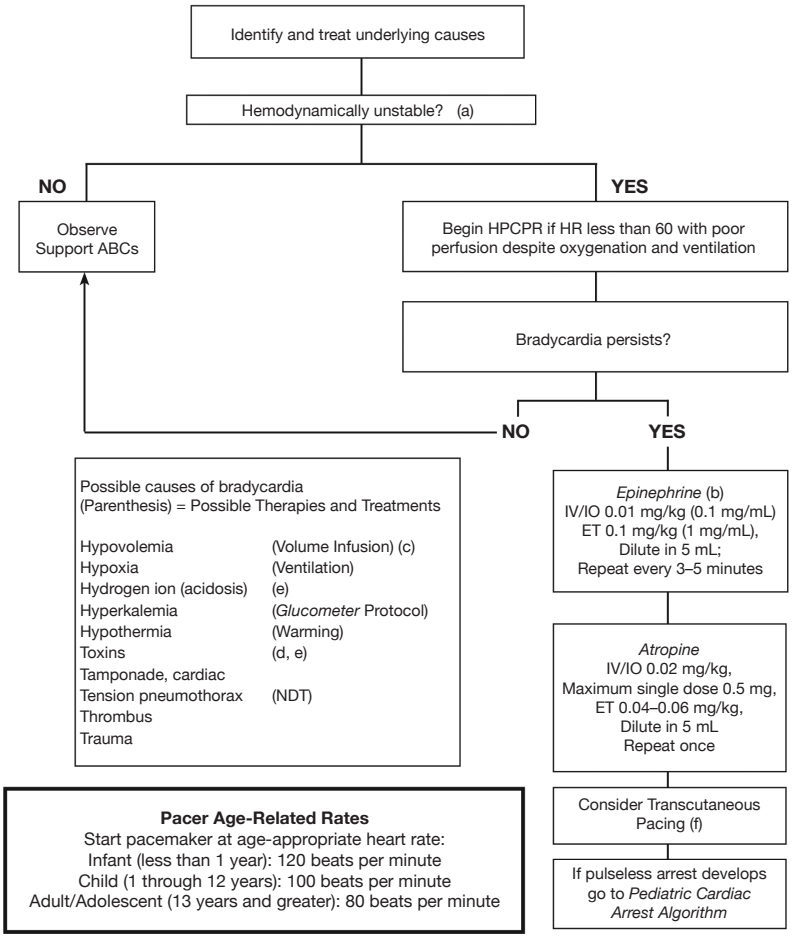
## Indications

- Slow heart rate (refer to *Normal Vital Signs* Chart)

## BLS

- Assess and treat for shock, if indicated.
- Continuously monitor airway and reassess vital signs every 5 minutes.
- Begin CPR if HR less than 60 with signs of poor perfusion despite oxygenation and ventilation

## ALS




(a) Hemodynamically unstable is defined as a systolic blood pressure less than 60 in neonates (patients less than 28 days old), less than 70 in infants (patients less than 1 year of age), and less than [70 + (2 x years) = systolic BP] for patients greater than 1 year of age.

(b) Neonates (0 to 28 days), *epinephrine* ET 0.03 mg/kg (0.1 mg/mL) dilute with 1 mL.

(c) Volume infusion for neonates and volume-sensitive children, 10 mL/kg; for infant and child 20 mL/kg.

(d) *Calcium chloride*, 20 mg/kg (0.2 mL/kg) SLOW IVP/IO over 3–5 minutes. Max dose 1 gram.

(e) *Sodium bicarbonate*, 1 mEq/kg, for suspected sodium channel blocker overdose.

## MC

(f) If patient develops discomfort with TCP, administer opioid or *ketamine* per *Pain Management* protocol OR administer *midazolam* 0.1 mg/kg SLOW IVP over 1-2 minutes, in 2 mg increments. Max single dose of 5 mg.

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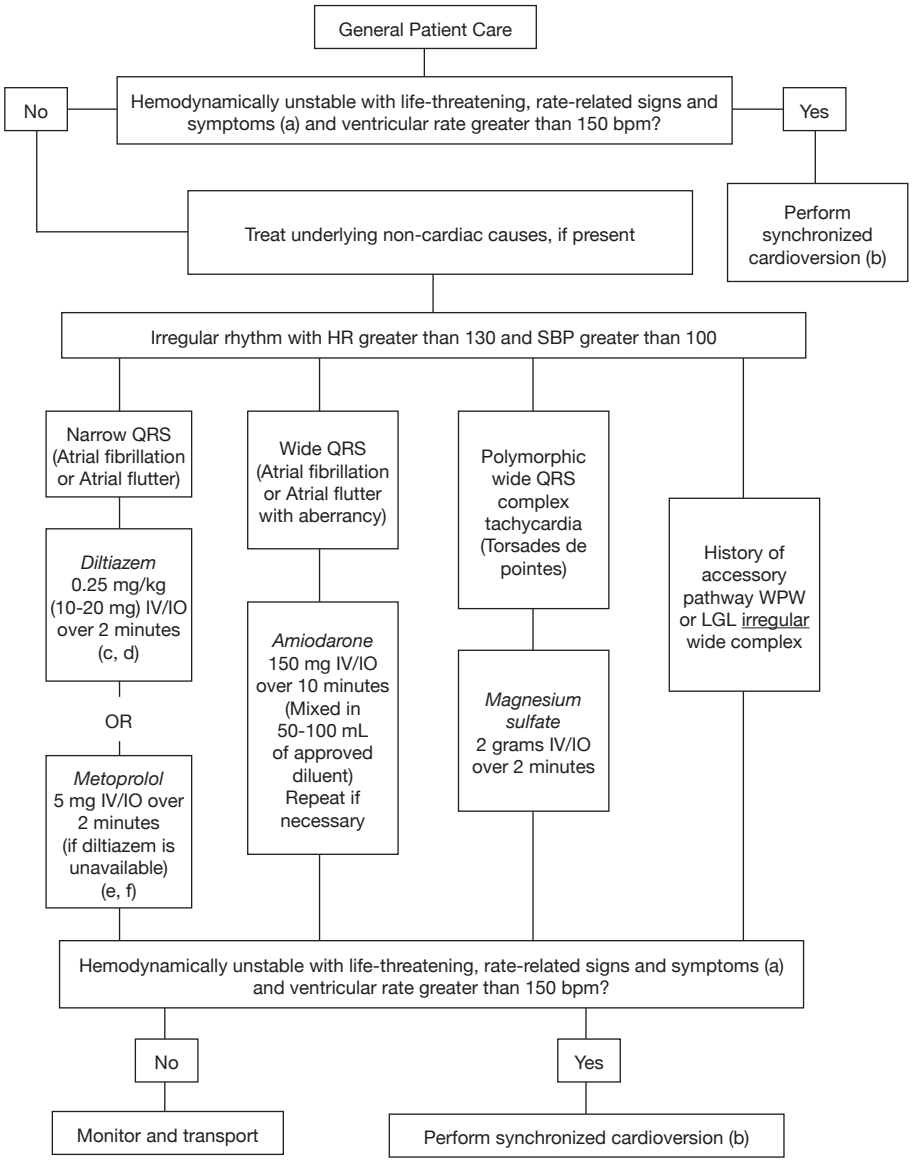
# 3.3-A Adult Tachycardia Algorithm – Irregular Rhythm

## BLS

- Place patient in position of comfort.
- Assess and treat for shock, if indicated.
- Continuously monitor airway and reassess vital signs every 5 minutes.

## ALS




(a) Signs and symptoms related to tachycardia: hypotension, acutely altered mental status, signs of shock, ischemic chest discomfort/AMI, or acute heart failure.
(b) Consider pre-procedural sedation or analgesia (*midazolam, ketamine* OR opioid). However, overall patient status, including BP, may affect ability to administer sedative/analgesia.
(c) Consider *calcium chloride* 500 mg IV/IO over 3–5 minutes for hypotension induced by *diltiazem*. In patients with CHF or decreased ejection fraction, hypotension may occur rapidly following administration. Be prepared with *calcium chloride.*
(d) If rate does not slow in 15 minutes, administer a second dose of *diltiazem* (0.35 mg/kg over 2 minutes, max dose of 25 mg). For patients older than 50 years of age, SBP 100–120, known renal failure or CHF, consider initial 5–10 mg SLOW IV bolus over 2 minutes.
(e) If rate does not slow in 5 minutes, administer a second dose of *metoprolol* 5 mg IV/IO over 2 minutes. Not to exceed 10 mg IV (maximum total patient dose).
(f) For patients with borderline blood pressure (SBP 100-120) or CHF, administer *metoprolol* slowly in 2.5 mg IV/IO increments, not to exceed 10 mg IV/IO (maximum).

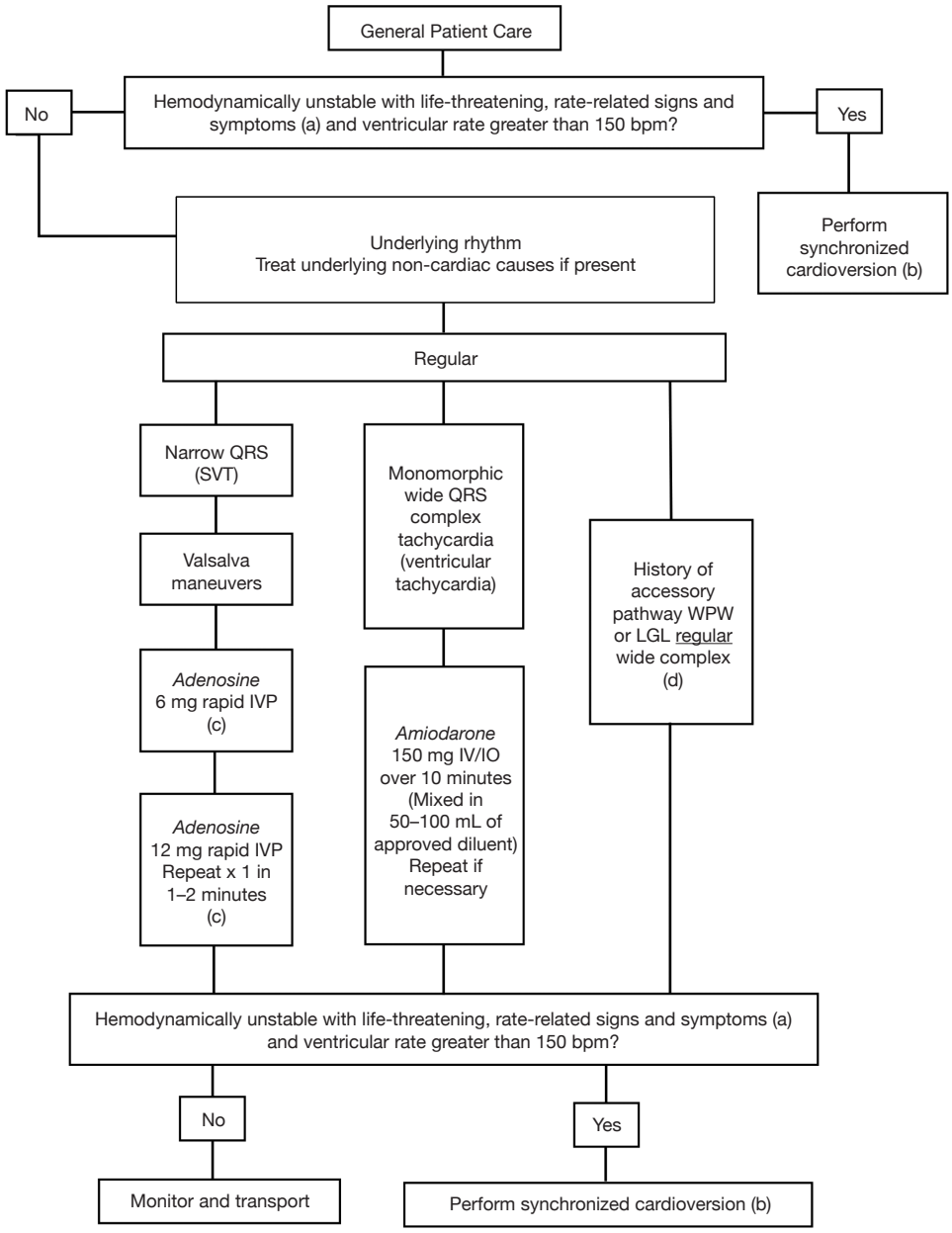
# Adult Tachycardia Algorithm – Regular Rhythm



## BLS

- Place patient in position of comfort.
- Assess and treat for shock, if indicated.
- Continuously monitor airway and reassess vital signs every 5 minutes.

## ALS




(a) Signs and symptoms related to tachycardia: hypotension, acutely altered mental status, signs of shock, ischemic chest discomfort/AMI, or acute heart failure.
(b) Consider pre-procedural sedation or analgesia (*midazolam, ketamine* OR opioid). However, overall patient status, including BP, may affect ability to administer sedative/analgesia.
(c) Be prepared for up to 40 seconds of asystole after administration of *adenosine*.
(d) These rhythms include Wolff-Parkinson White (WPW) syndrome, Lown-Ganong-Levine syndrome (LGL), and Mahaim type.

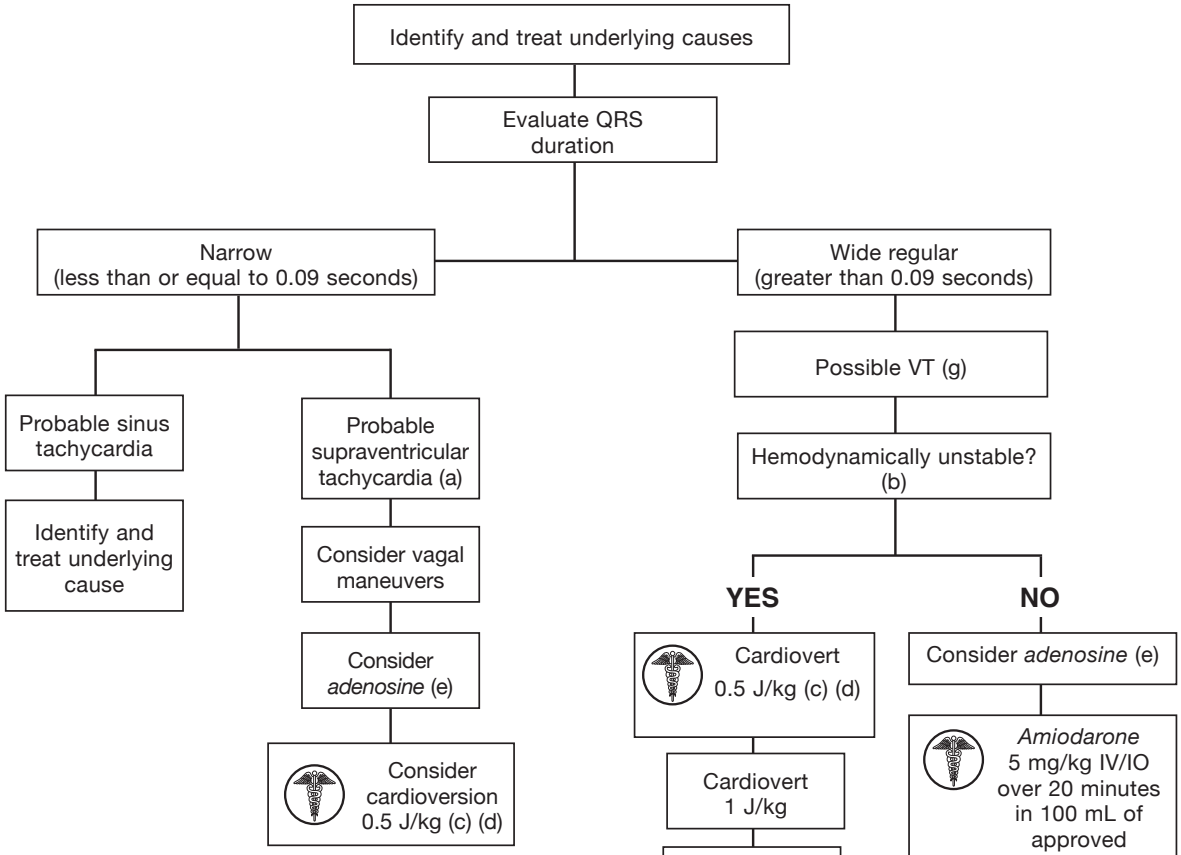
# Pediatric Tachycardia Algorithm
## (If less than 1 hour old, refer to Newly Born Protocol)



**BLS**

- Assess and treat for shock, if indicated.
- Continuously monitor airway and reassess vital signs every 5 minutes.

**ALS**




(a) - Ventricular Heart Rates in excess of: Infant 220 bpm or Pediatric 180 bpm

(b) - Hemodynamically unstable is defined as a systolic blood pressure less than 60 in neonates (patients from birth to 28 days old), less than 70 in infants (patients less than 1 year of age), less than [70 + (2 x years) = systolic BP] for patients greater than 1 year of age, altered mental status with hypoperfusion evidenced by delayed capillary refill, pallor, or peripheral cyanosis.

(c) - If calculated joules setting is lower than cardioversion device is able to deliver, use the lowest joules setting possible or obtain medical consultation.

(d) - If cardioversion was approved by consult, pre-procedural sedation or analgesia (*midazolam*, *ketamine*, OR opioid) may be administered. However, overall patient status, including BP, may affect ability to administer sedative/analgesia.

(e) - *Adenosine*: 0.1 mg/kg rapid IV/IO, maximum 6 mg. Second and third doses 0.2 mg/kg rapid IV/IO, maximum single dose 12 mg. Be prepared for up to 40 seconds of asystole. (Contraindicated in polymorphic or irregular wide complex tachycardia)

(f) - Obtain 12 Lead EKG prior to administration of *amiodarone*.

(g) - If torsades de pointes, administer *magnesium sulfate* (25 mg/kg IV/IO to a maximum of 2 grams over 2 minutes).

**Indications**

- Adult patients (medical arrest: 13 years of age and older; trauma arrest: 15 years of age and older) who are unconscious, apneic, and pulseless

**BLS**

- Perform high-quality uninterrupted chest compressions (manual or mechanical) as soon as possible and until defibrillator available.
- Apply AED as soon as available.
- Follow machine prompts regarding rhythm analyses and shocks.
- Limit breaks in compressions to 10 seconds or less for rhythm analysis periods and during shocks; perform compressions while defibrillator is charging.
- **On-scene resuscitation:** Patients who are found in arrest or who arrest prior to transport and are attended to by BLS clinicians must only be resuscitated in place (with minimal movement, no attempts at patient loading, and no attempts at transport) until the following have been accomplished:
  - **Medical etiology:** the patient has received a minimum of five two-minute cycles of chest compressions and rhythm interpretation
  - **Traumatic etiology:** patient has received treatments for reversible causes per *Trauma Protocol: Trauma Arrest* protocol
- **Exemptions** from on-scene resuscitation:
  - Physical barriers prevent resuscitation
  - Clinicians are in danger
  - Pregnant patients
  - Patients in cardiac arrest thought to be secondary to hypothermia or submersion
- Following the initial on-scene resuscitation above, clinicians may continue on-scene resuscitation until termination of resuscitation or transport the patient at any time. Clinicians should ensure that a mechanical CPR device is in place (if available) prior to transport.
- Pregnancy: For pregnant patients greater than 20 weeks gestation in cardiac arrest, provide constant left lateral uterine displacement.

**ALS**

- Assess for shockable rhythm at next appropriate interval and treat appropriately.
- **On-scene resuscitation:** Patients who are found in arrest or who arrest prior to transport and are attended to by ALS clinicians must remain in place (with minimal movement, no attempts at patient loading, and no attempts at transport) until the following have been accomplished:
  - **Medical Etiology:**
    - **PEA/Asystole:** the patient has received three doses of epinephrine
    - **Ventricular Fibrillation/Pulseless Ventricular Tachycardia:** the patient has been defibrillated three times
  - **Traumatic etiology:** the patient has received treatments for reversible causes per *Trauma Arrest* protocol
- Following the initial on-scene resuscitation above, clinicians may choose to continue the on-scene resuscitation until termination of resuscitation or to transport the patient at any time. Clinicians should ensure the following prior to transport:
  - Mechanical CPR (mCPR) in place (if available)
  - Placement of an airway that facilitates ventilation during transport by a restrained clinician
- If ROSC, refer to *ROSC* protocol.
- Consider *Termination of Resuscitation* when appropriate.

**MC**

- Not applicable.

# Adult Cardiac Arrest Algorithm (BLS)



BLS

## ADULT HIGH PERFORMANCE CPR (HPCPR)

Assess Patient (less than 10 seconds)

Unresponsive
Not Breathing
No pulse

Remain on Scene
Begin HPCPR

**Clinician # 1**
Start continuous chest compressions (100-120/min)
Call for AED/Defibrillator

**Clinician #2**
Attach AED/Defibrillator
Ventilate – 1 breath every 10th compression*
during recoil (up stroke)
Place Airway Adjunct
Suction

2 minute cycles

Continue HPCPR for 2-minute cycle – less than 10 second pause for coordinated activities
•Check pulse
•Check rhythm (AED)
•Shock if indicated
•Change compressors

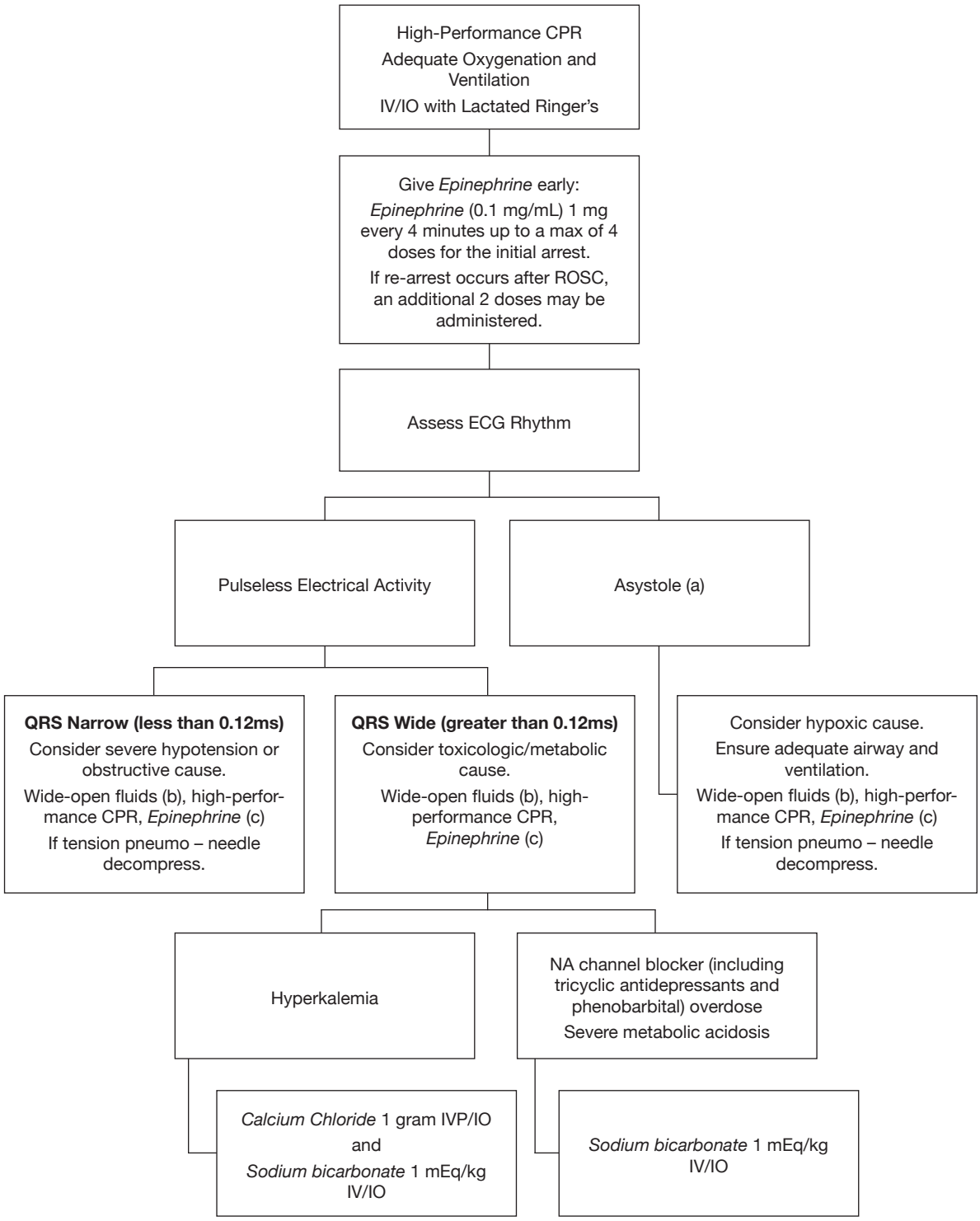
**Additional EMS Clinicians**
ALS – Establish IV/IO
ALS – Administer medications
ALS – Establish ALS airway
BLS/ALS – Assume coach/timekeeper role
BLS/ALS – Family Support

**Essentials of High Performance CPR for Adults**

1. Ensure proper chest compression rate
   • 100-120/min
2. Ensure proper compression depth
   • 2 inches (5 cm)
3. Minimize interruptions (less than 10 second pause)
4. Ensure full chest recoil
5. Coordinate 2 minute cycles
6. Rotate Compressor every 2 minutes

*Once an advanced airway is in place:
• 1 ventilation every 6 seconds interposed asynchronously with uninterrupted compressions

ALS




(a) Confirm asystole in more than one lead.
(b) Volume infusion is *Lactated Ringer's* 20 mL/kg.
(c) *Epinephrine* is not indicated in adult traumatic cardiac arrest.

All hypothermic patients in cardiac arrest shall be rewarmed; see exclusions to *Termination of Resuscitation* (3.6-A).
When the patient's condition changes, indicating transition to a new treatment algorithm, the new treatment shall take into account prior therapy (e.g., previously administered medications).

# Adult Ventricular Fibrillation and Pulseless Ventricular Tachycardia Algorithm



**ALS**

High-Performance CPR
Adequate Oxygenation & Ventilation
VF/VT present on monitor

↓

Defibrillate* 1 time as soon as possible
Resume CPR immediately for 2 minutes

↓

Persistent VF or pulseless VT

↓

Defibrillate* 1 time
Resume CPR immediately for 2 minutes

→ After 2nd shock, assess to determine if patient meets ECPR criteria, and if they do, begin packaging for transport.

↓

IV/IO with LR

↓

*Amiodarone* 300 mg IV/IO push followed by a single dose of *epinephrine* (0.1 mg/mL) 1 mg IV/IO. If arrest occurs after ROSC, an additional dose of *epinephrine* may be administered.

← 1) If torsades de pointes or polymorphic ventricular tachycardia is present, administer *magnesium sulfate* 2 g IV/IO over 2 minutes
2) If hyperkalemia is the suspected cause of cardiac arrest, administer *calcium chloride* 1 gram IVP/IO and *sodium bicarbonate* 1 mEq/kg IV/IO
3) If sodium channel blocker (including tricyclic antidepressants and phenobarbitol) overdose is the suspected cause of cardiac arrest, administer *sodium bicarbonate* 1 mEq/kg IV/IO

↓

Defibrillate* 1 time
Resume CPR immediately for 2 minutes

→ Transport to an ECPR capable center (notifying of an incoming "ECPR Alert") if:

1. Advanced airway established (supraglottic device or endotracheal intubation) & mechanical CPR device in place PRIOR to transport
   AND
2. Yes to ALL of the following:
   - 13-60 years old
   - Witnessed arrest with bystander CPR (includes EMS witnessed arrest)
   - Initial Shockable Rhythm
   - Transport time less than or equal to 15 minutes of ECPR capable hospital

↓

Continue to alternative defibrillation techniques and further medications

↓

*Defibrillate at the highest energy (joules) setting recommended by manufacturer.

*When the patient's condition changes, indicating the transition to a new treatment algorithm, the new treatment shall take into account prior therapy (e.g., previously administered medications).*

(continued on next page)

# Adult Ventricular Fibrillation and Pulseless Ventricular Tachycardia Algorithm (continued)

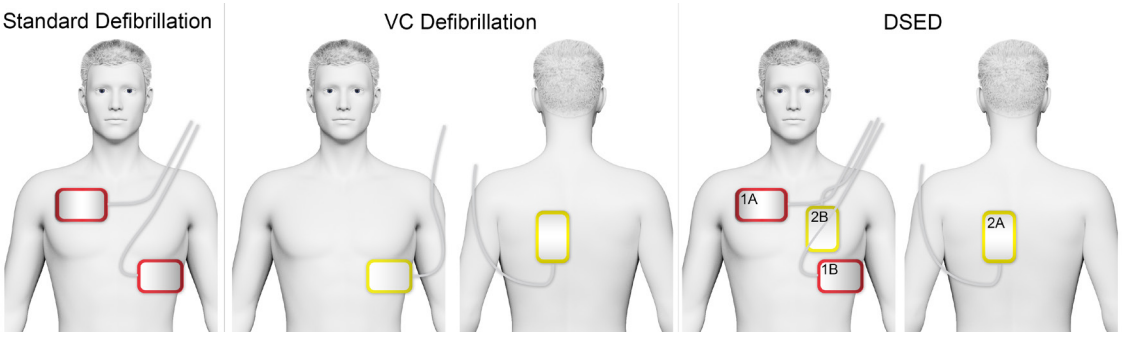
ALS

Alternative defibrillation techniques and further medications

| One defibrillator available | Two defibrillators available (No AED) |
|---|---|
| Vector change defibrillate* 1 time.<br>Resume CPR immediately for 2 minutes.<br>Administer *amiodarone* 150 mg IV/IO push over 2 minutes. | Dual-sequential defibrillate* (a) 1 time.<br>Resume CPR immediately for 2 minutes.<br>Administer *amiodarone* 150 mg IV/IO push over 2 minutes. |
| Vector change defibrillate* 1 time.<br>Resume CPR immediately for 2 minutes.<br>Administer *esmolol* 0.5 mg/kg bolus over 1-2 minutes.<br>Repeat CPR and vector change defibrillation for shockable rhythms until **ROSC** or **TOR**. | Dual-sequential defibrillate* 1 time.<br>Resume CPR immediately for 2 minutes.<br>Administer *esmolol* 0.5 mg/kg bolus over 1-2 minutes.<br>Repeat CPR and dual-sequential defibrillation for shockable rhythms until **ROSC** or **TOR**. |

Go to ***ROSC*** or ***TOR*** protocol.

(a) *Dual Sequential Defibrillation*
One EMS clinician should charge both defibrillators prior to shock delivery and the same EMS clinician should deliver sequential shocks with a short delay (less than 1 second) using the same hand to trigger defibrillation in order to avoid simultaneous defibrillation.




Configuration of pad placement for standard defibrillation, vector change (VC) defibrillation, and dual-sequential external defibrillation (DSED).

*Defibrillate at the highest energy (joules) setting recommended by manufacturer.

*When the patient's condition changes, indicating the transition to a new treatment algorithm, the new treatment shall take into account prior therapy (e.g., previously administered medications).*

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**Indications**

- Pediatric patients (medical arrest: less than 13 years of age; trauma arrest: less than 15 years of age) who are unconscious**,** apneic, and pulseless

**BLS**

- Perform high-quality uninterrupted chest compressions (manual or mechanical) as soon as possible and until defibrillator available.
- Apply AED as soon as available.
- Follow machine prompts regarding rhythm analyses and shocks.
- Limit breaks in compressions to 10 seconds or less for rhythm analysis periods and during shocks; perform compressions while defibrillator is charging.
- **On-scene resuscitation:** Patients who are found in arrest or who arrest prior to transport and are attended to by BLS clinicians must only be resuscitated in place (with minimal movement, no attempts at patient loading, and no attempts at transport) until the following have been accomplished:
  - **Medical etiology:** the patient has received a minimum of fifteen two-minute cycles of chest compressions and rhythm interpretation
  - **Traumatic etiology:** patient has received treatments for reversible causes per *Trauma Protocol: Trauma Arrest* protocol
- **Exemptions** from on-scene resuscitation:
  - Physical barriers prevent resuscitation
  - Clinicians are in danger
  - Pregnant patients
  - Patients in cardiac arrest thought to be secondary to hypothermia or submersion
- Following the initial on-scene resuscitation above, clinicians may continue on-scene resuscitation until termination of resuscitation or transport the patient at any time. Clinicians should ensure that a mechanical CPR device is in place (if available) for patients 13 years of age and older prior to transport.
- Pregnancy: For pregnant patients greater than 20 weeks gestation in cardiac arrest, provide constant left lateral uterine displacement.

**ALS**

- Assess for shockable rhythm at next appropriate interval and treat appropriately.
- Only in a pediatric or neonatal arrest situation, *epinephrine* can be administered via the ET route. Medications administered for pediatric patients via the endotracheal tube route shall be 2–2.5 times the IV dose for *naloxone* and *atropine sulfate*, and 10 times the IV dose for *epinephrine* (1 mg/mL). All ET medications shall be diluted in 5 mL of *Lactated Ringer's* for pediatric patients.
- **On-scene resuscitation:** See BLS section above.
- Following initial on-scene resuscitation, clinicians may choose to continue the on-scene resuscitation until termination of resuscitation or to transport the patient at any time. Clinicians should ensure the following prior to transport:
  - Mechanical CPR (mCPR) in place for patients 13 years of age and older (if available)
  - Placement of an airway that facilitates ventilation during transport by a restrained clinician
- If ROSC, perform 12-lead EKG and transport the patient to Children's National Medical Center or Johns Hopkins Children's Center by ground or medevac. If arrival time is greater than 30 minutes to either of these destinations, transport to the closest appropriate facility.
- If no ROSC, transport to the closest appropriate facility or consider *Termination of Resuscitation* protocol, as appropriate.

**MC**

- Not applicable.

# Pediatric Cardiac Arrest Algorithm (BLS)



BLS

## PEDIATRIC HIGH PERFORMANCE CPR (HPCPR)

Assess Patient (less than 10 seconds)

↓

Unresponsive
Not Breathing
No pulse

↓

Remain on Scene
Begin HPCPR

↓

**Clinician #1**
Start Chest Compressions (100-120/min)
For a single rescuer, provide 2 Breaths: 30 Compressions
Call for AED/Defibrillator

↓

**Clinician #2**
Attach AED/Defibrillator
Assume Ventilation Role - 2 Breaths: 15 compressions*
Ventilate during the recoil of the 14th & 15th compressions
Place Airway Adjunct
Suction

↓

Continue HPCPR for 2-minute cycle – less than 10 second pause for coordinated activities
- Check pulse
- Check rhythm (AED)
- Shock if indicated
- Change compressors

2 minute cycles

↓

**Additional EMS Clinicians**
ALS – Establish IV/IO
ALS – Administer medications
ALS – Establish ALS airway
BLS/ALS – Assume coach/timekeeper role
BLS/ALS – Family Support

**Essentials of High Performance CPR for Pediatrics**

1. Ensure proper chest compression rate
   - 100-120/min
2. Ensure proper compression depth
   - Less than 1 year – 1 ½ inches (4 cm)
   - Greater than or equal to 1 year – 2 inches (5 cm)
3. Minimize interruptions (less than 10 second pause)
4. Ensure full chest recoil
5. Coordinate 2 minute cycles
6. Rotate Compressor

*Once an advanced airway is in place:
- Less than 13 years of age: 1 ventilation every 3 seconds interposed asynchronously
- 13 years and older: 1 ventilation every 6 seconds interposed asynchronously

ALS

Stay on Scene
Begin HPCPR
Assure adequate ventilation
Attach monitor

**VF/VT**

Defibrillate 2 J/kg
Resume CPR immediately
for 2 minutes

IV/IO Access

Defibrillate 4 J/kg
Resume CPR immediately
for 2 minutes

*Epinephrine* (0.1 mg/mL), 1 dose every 4 minutes, **per age-based IV/IO dosing table below**, up to a max of 4 doses for the initial arrest. If arrest occurs after ROSC, an additional 2 doses may be administered (a).

Defibrillate 6 J/kg
Resume CPR immediately
for 2 minutes.

*Amiodarone* 5 mg/kg IV/IO (Max single dose 300 mg) May repeat twice to a maximum total dose of 15 mg/kg per patient (e)

Continue CPR and *epinephrine*, and defibrillate at 8 J/kg; if ineffective increasing to a max of 10 J/kg

**Asystole/PEA**

IV/IO Access

*Epinephrine* (0.1 mg/mL), 1 dose every 4 minutes, **per age-based IV/IO dosing table below**, up to a max of 4 doses for the initial arrest. If arrest occurs after ROSC, an additional 2 doses may be administered (a).

Consider possible causes (f)

**Simplified Epinephrine (0.1 mg/mL) IV/IO Dosing**

| Age | Weight (kg) | Dose (mg) | Dose (mL)* |
|---|---|---|---|
| Neonate 0–28 days | 4 kg | 0.05 mg | 0.5 mL |
| 29 days–11 months | 8 kg | 0.1 mg | 1 mL |
| 1 year–4 years | 15 kg | 0.15 mg | 1.5 mL |
| 5 years–12 years | 30 kg | 0.3 mg | 3 mL |
| 13 years–18th birthday | Under 50 kg | 0.5 mg | 5 mL |
| 13 years–18th birthday | Over 50 kg | 1.0 mg (Adult dose) | 10 mL |

*Must use epinephrine 0.1 mg/mL concentration for IV/IO dosing. The volumes listed in the chart are based on this concentration.

(a) - Neonates (0–28 days), *epinephrine* ET 0.1 mg/kg (1 mg/mL) diluted with 5 mL *LR*.

(b) - *Sodium bicarbonate*, 1 mEq/kg, with medical consultation. See *sodium bicarbonate*.

(c) - *Calcium chloride*, 20 mg/kg (0.2 mL/kg) SLOW IVP/IO over 3–5 minutes. Max dose 1 gram.

(d) - Volume infusion for neonates and volume-sensitive children, 10 mL/kg; for infant and child 20 mL/kg.

(e) - If torsades de pointes, administer *magnesium sulfate* (25 mg/kg IV/IO to a maximum of 2 grams over 2 minutes before *amiodarone*).

When the patient's condition changes, indicating the transition to a new treatment algorithm, the new treatment shall take into account prior therapy (e.g., previously administered medications).

ALS

(f) Consider possible causes of asystole.
(Parenthesis) = Possible Therapies and Treatments

| | |
|---|---|
| Hypovolemia | (Volume Infusion) (d) |
| Hypoxia | (Ventilation) |
| Hydrogen ion (acidosis) | (b) |
| Hypo-/hyperkalemia | (c,b) |
| Hypoglycemia | (Glucometer Protocol) |
| Hypothermia | (Warming) |
| Toxins | (c,b) |
| Tamponade, cardiac | |
| Tension pneumothorax | (NDT) |
| Thrombus | |
| Trauma | |

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# 3.5-A Return of Spontaneous Circulation (ROSC) – Adult

**Indications**

- Patients 18 years of age and older who have been revived from cardiac arrest (return of pulses) due to a medical etiology
- For patients resuscitated from traumatic arrest, refer to *Multiple/Severe Trauma* protocol.

## BLS

- Verify presence of a carotid pulse. If any doubt exists as to whether a carotid pulse is present, initiate HPCPR and refer to appropriate *Cardiac Arrest* protocol.
- If apneic or inadequate respirations, continue to support ventilations.
- Frequently reassess vital signs. Treat any abnormalities in accordance with appropriate shock, respiratory, or cardiac protocols.
- Rendezvous with ALS or transport to the closest ED.
- If available and not already in place, apply mechanical CPR (mCPR) device in standby mode.

## ALS

- Obtain 12-lead EKG; if STEMI, treat according to *STEMI* protocol.
- Establish IV/IO access, if not already obtained.
- Identify cardiac rhythm and treat according to appropriate algorithm.
  - If VF or VT was present during the arrest and *amiodarone* not yet given, consider *amiodarone* 150 mg IV/IO over 10 minutes if the patient has now converted to a supraventricular rhythm.
- Treat hypotension with *Lactated Ringer's* fluid bolus, titrate to systolic blood pressure of 90 mmHg, or, if ineffective, refer to the *Shock: Hypoperfusion* protocol.
- Reassess need for airway management or intubation, if not already addressed.
- Identify and treat underlying causes that contributed to the cardiac arrest.
- Initiate transport to a Cardiac Intervention Center, unless exceptions below apply.
  - Exceptions:
    - Obvious non-cardiac cause for arrest (e.g., submersion, asphyxiation, opiate overdose)
    - Transport time to Cardiac Interventional Center is more than 45 minutes greater than transport time to nearest ED

## MC

- Obtain medical consultation if patient's clinical instability will not allow for safe transport to Cardiac Interventional Center due to extended transport time.
- All post-cardiac arrest patients are priority 1, and require medical consultation.

**Clinical Pearls**

- Consider use of helicopter transport if patient has sustained ROSC and it would provide a time-appropriate arrival at a cardiac intervention center.

# Return of Spontaneous Circulation (ROSC) – Pediatric

3.5-P

**Indications**

- Pediatric patients less than 18 years of age who have been revived from cardiac arrest (return of pulses) due to a medical etiology
- For patients resuscitated from traumatic arrest, refer to *Multiple/Severe Trauma* protocol.

## BLS

- Verify presence of a carotid pulse. If any doubt exists as to whether a carotid pulse is present, initiate HPCPR and refer to appropriate *Cardiac Arrest* protocol.
- If apneic or inadequate respirations, continue to support ventilations.
- Frequently reassess vital signs. Treat any abnormalities in accordance with appropriate shock, respiratory, or cardiac protocols.
- Rendezvous with ALS or transport to the closest ED.
- For patients 13 years of age and older, apply mechanical CPR (mCPR) device in standby mode, if available and not already in place.

## ALS

- Establish IV/IO access, if not already obtained.
- Identify cardiac rhythm and treat according to appropriate algorithm.
- Reassess need for airway management or intubation, if not already addressed.
- If lungs are clear, treat hypotension with *Lactated Ringer's* 20 mL/kg IV fluid bolus per *Shock: Hypoperfusion* protocol, with the following blood pressure goals:
  - For patients 10 years and older (including adults), systolic blood pressure greater than 90 mmHg
  - For patients under 10 years of age, systolic blood pressure greater than 70 + 2x age in years mmHg; or
  - Systolic blood pressure ordered by the Pediatric Base Station. May repeat *Lactated Ringer's* 20 mL/kg fluid bolus one time.
- Transport to Children's National Medical Center or Johns Hopkins Children's Center with the following exceptions:
  - Transport time is 30 minutes greater than transport time to nearest ED, or
  - Patient's clinical instability will not allow for safe transport to one of the above centers due to transport time.

## MC

- If patient's clinical instability will not allow for safe transport to a pediatric center, obtain a medical consult.
- All post-cardiac arrest patients are priority 1, and require medical consultation with a Pediatric Base Station, which may assist with destination determination.
- Third and subsequent fluid boluses, *Lactated Ringer's* 20 mL/kg IV/IO require medical consultation
- Pediatric *epinephrine* infusion dosage
  - The following dosing chart should be used for pediatric patients less than 50 kg, using approved *epinephrine* infusion and 60-drop set:

| Weight range (kg) | Initial epinephrine dose | If goal blood pressure not achieved at 5 min, increase to |
|---|---|---|
| LESS than 10 kg | 6 drops/min (0.1 mL/min) | 12 drops/min (0.2 mL/min) |
| 10-19 kg | 12 drops/min (0.2 mL/min) | 24 drops/min (0.4 mL/min) |
| 20-29 kg | 18 drops/min (0.3 mL/min) | 36 drops/min (0.6 mL/min) |
| 30-39 kg | 24 drops/min (0.4 mL/min) | 48 drops/min (0.8 mL/min) |
| 40-49 kg | 30 drops/min (0.5 mL/min) | 60 drops/min (1.0 mL/min) |

- If blood pressure goal in ALS section has not been met after 10 minutes, obtain medical consultation.

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# Termination of Resuscitation – Adult



**Indications**
- Patients who are in cardiac arrest due to medical or traumatic etiology

**Exclusions**
- The following patients should receive care according to appropriate protocol, without TOR, and transport to the closest appropriate facility:
  - Pregnant patients
  - Patients in cardiac arrest that is suspected to be due to hypothermia

**BLS**

- If the patient meets the criteria listed in the *Pronouncement of Death in the Field* protocol, EMS clinicians should terminate resuscitation efforts.
- BLS clinicians may terminate resuscitation for adult patients (age 18 or older) if:
  - ALS resources are genuinely unavailable, **and**
  - The patient has received a minimum of 15 two-minute cycles of HPCPR, **and**
  - During the five AED analyses immediately prior to TOR there was "no shock advised."

**ALS**

- **Medical etiology:** may terminate resuscitation for adult patients (age 18 years or older) if:
  - Patient has received 15 two minute cycles of HPCPR, **and** the patient is:
    - in asystole, **or**
    - in VF, pulseless VT, or PEA with an $ETCO_2$ of less than 15 mmHg
- **Traumatic etiology:** may terminate resuscitation regardless of total resuscitation time for adult patients (15 years or older) if:
  - Patient presents in asystole, **or**
  - Patient's cardiac rhythm changes to asystole during the resuscitation, **or**
  - Blunt trauma patient remains in VF, pulseless VT, or PEA after 5 two-minute cycles of HPCPR according to the *Trauma Protocol: Trauma Arrest* protocol

**MC**

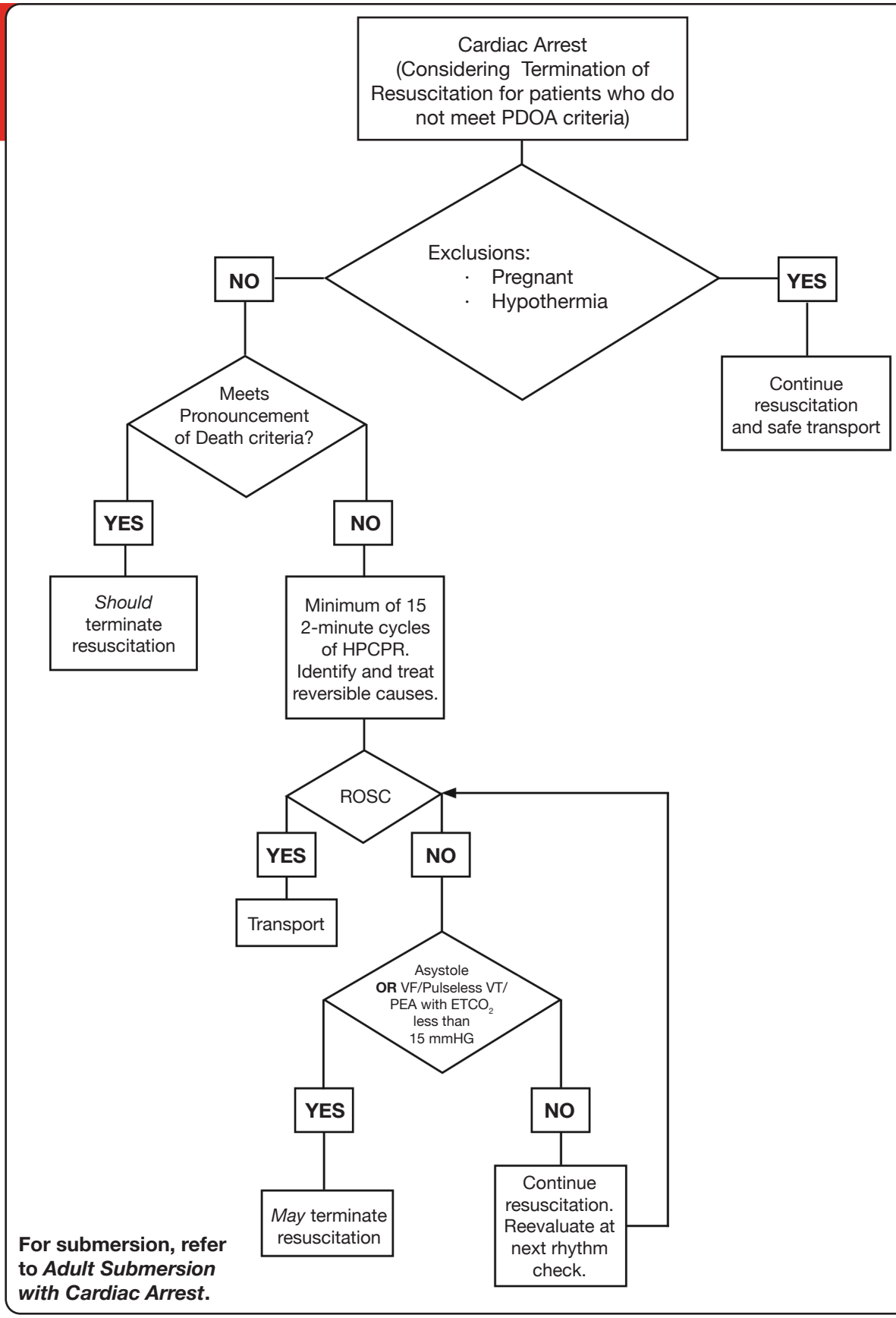
- Not applicable.

**Clinical Pearls**
- If the patient does not meet TOR criteria, continue resuscitation and re-evaluate at the next rhythm check.
- For traumatic arrest patients, asystole and resuscitations lasting longer than 10 minutes are independent predictors of mortality. Treatment of the trauma arrest patient should focus on identifying and treating reversible causes during that narrow resuscitative window. TOR and transport decisions should only be made after administering time-sensitive therapies.

# Adult Termination of Resuscitation: Medical Arrest (Age 18 Years and Older)



ALS

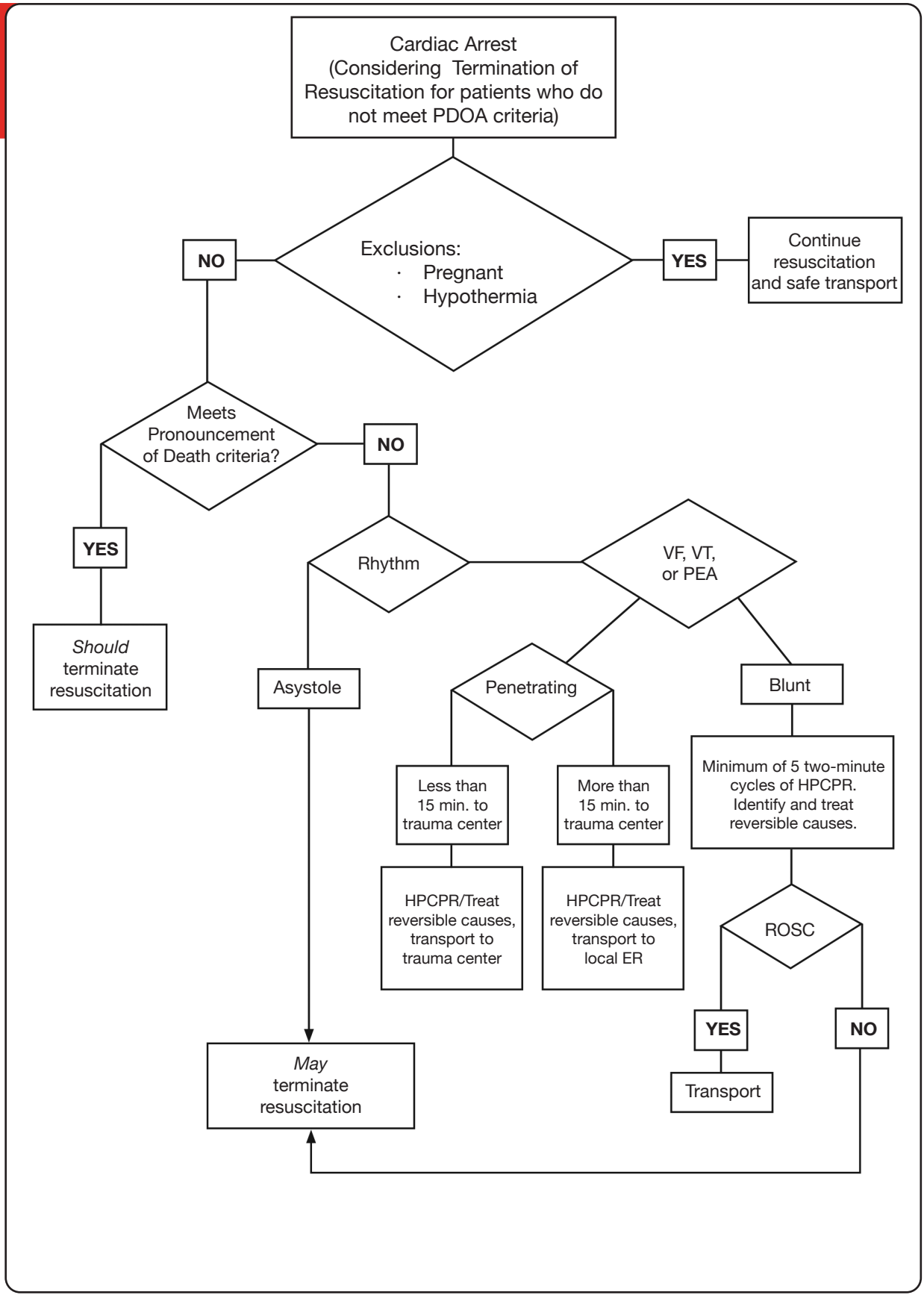



**For submersion, refer to *Adult Submersion with Cardiac Arrest*.**

# Adult Termination of Resuscitation: Trauma Arrest (Age 15 Years and Older)



ALS



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# Termination of Resuscitation – Pediatric

3.6-P

**Indications**
- Patients who are in cardiac arrest due to medical or traumatic etiology

**Exclusions**
- The following patients should receive care according to appropriate protocol, without TOR, and transport to the closest appropriate facility:
  - Pregnant patients
  - Patients in cardiac arrest that is suspected to be due to hypothermia

**BLS**

- If the patient meets the criteria listed in the *Pronouncement of Death in the Field* protocol, EMS clinicians should terminate resuscitation efforts.
- May not terminate resuscitation for pediatric **medical** arrest patients (under age 18 years).
- May terminate resuscitation for pediatric **traumatic** arrest patients (under age 15 years) if:
  - ALS resources are genuinely unavailable, **and**
  - The patient has received a minimum of 15 two-minute cycles of HPCPR, **and**
  - During the five AED analyses immediately prior to TOR there was "no shock advised."

**ALS**

- **Medical etiology:** may terminate resuscitation of pediatric patients (less than 18 years of age) if:
  - Patient has received 15 two-minute cycles of HPCPR, **and** at least 1 dose of *epinephrine* **and**:
    - Patient is in asystole, **and**
    - Patient has a sustained $ETCO_2$ of less than 15 mmHg, **and**
    - In the judgment of EMS and law enforcement on scene, there is adequate social/emotional support and safety for civilians and professionals on scene, **and**
    - In the judgment of EMS and law enforcement, scene is amenable to leaving patient on scene.
- **Traumatic etiology:** may terminate resuscitation for pediatric patients (less than 15 years of age) if:
  - Patient has received 5 two-minute cycles of HPCPR without ROSC according to the *Trauma Protocol: Trauma Arrest* protocol **and**
  - Patient is in asystole, **and**
  - Patient has a sustained $ETCO_2$ of less than 15 mmHg, **and**
  - In the judgment of EMS and law enforcement on scene, there is adequate social/emotional support and safety for civilians and professionals on scene, **and**
  - In the judgment of EMS and law enforcement, scene is amenable to leaving patient on scene.

**MC**

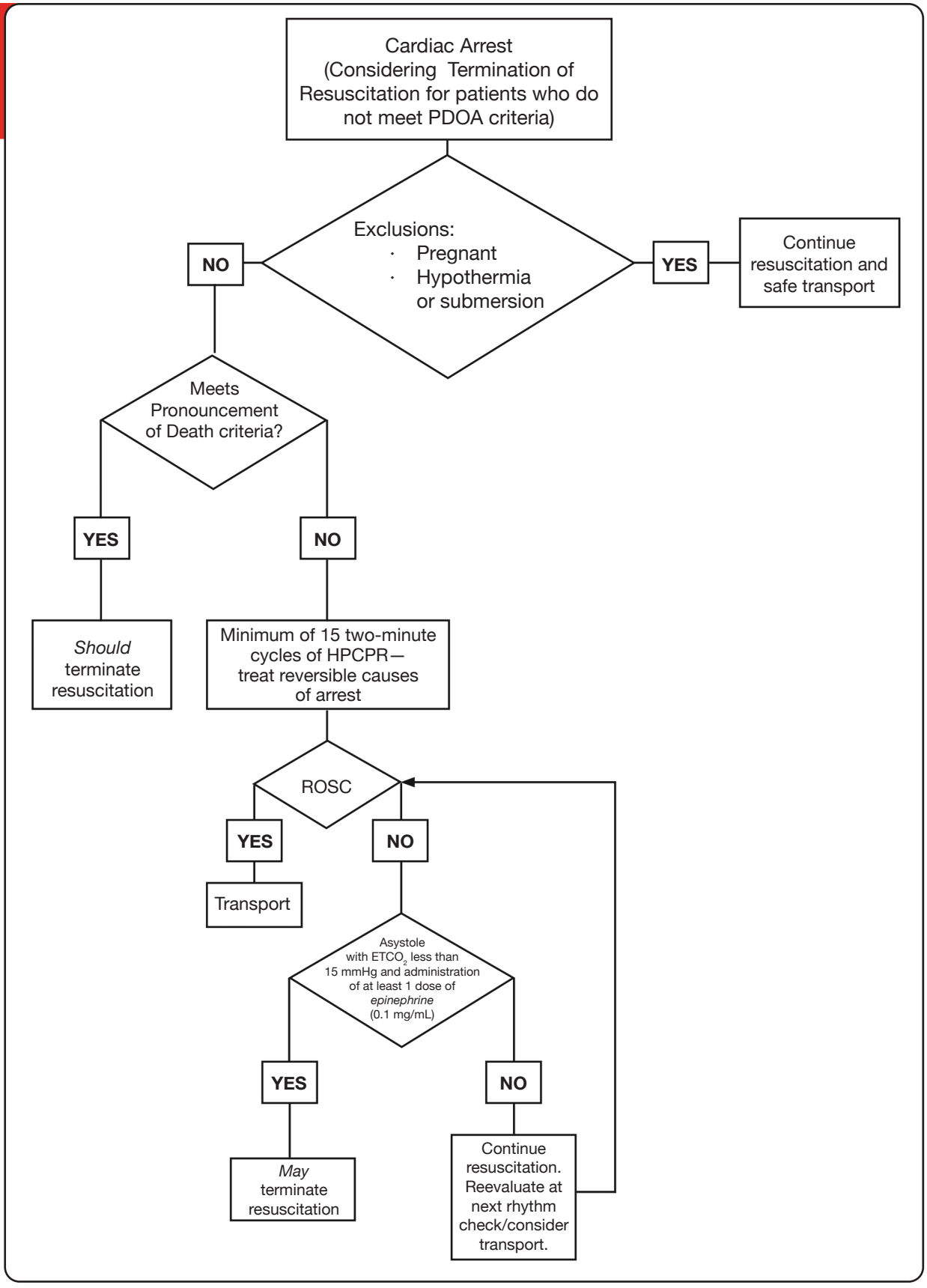
- Not applicable.

**Clinical Pearls**
- If patient does not meet TOR criteria, continue resuscitation and reevaluate at the next rhythm check.

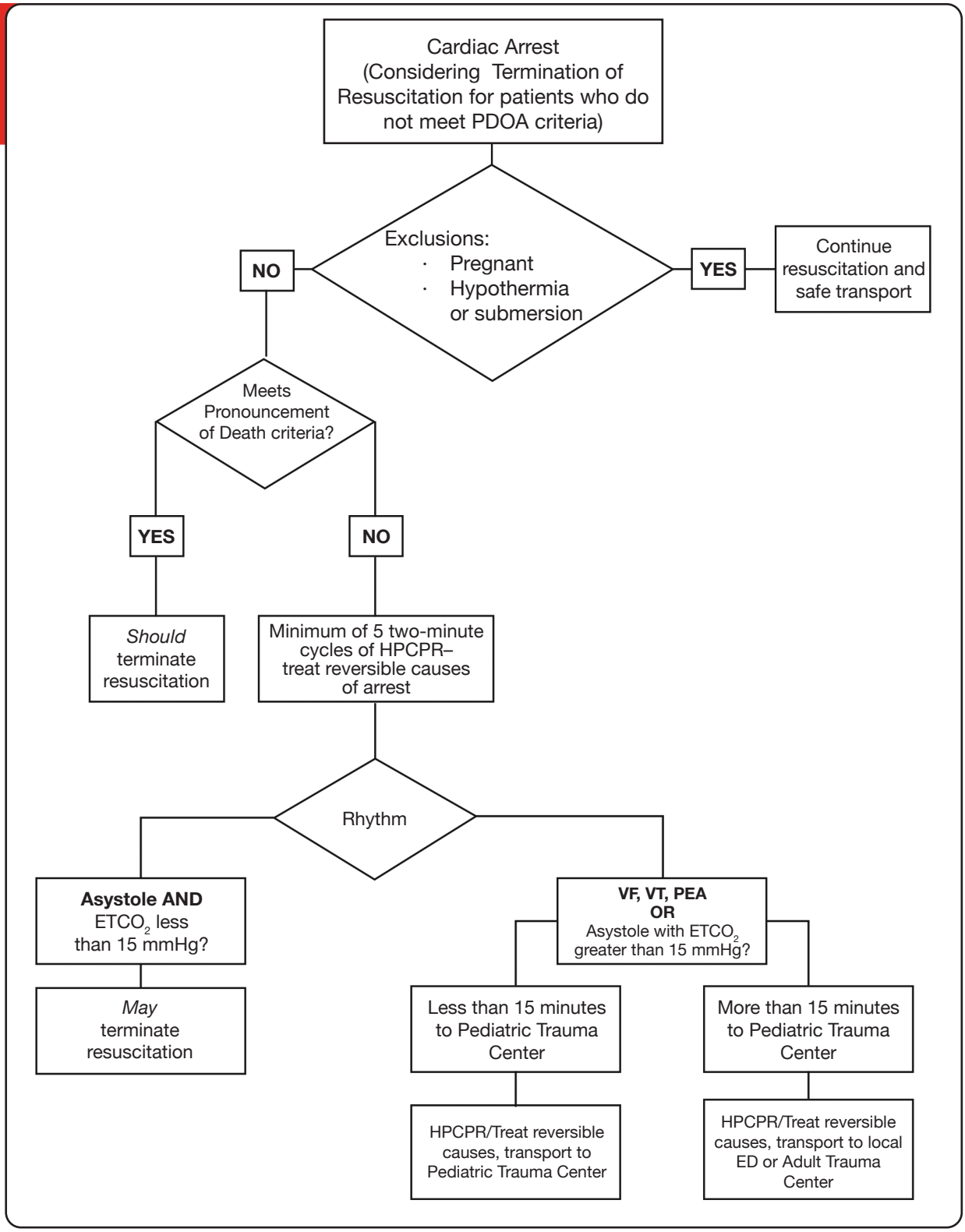
# Pediatric Termination of Resuscitation: Medical Arrest (Patients Under 18 Years of Age)



ALS



ALS


Cardiac Arrest (Considering Termination of Resuscitation for patients who do not meet PDOA criteria)
Exclusions:
· Pregnant
· Hypothermia or submersion
NO
YES
Continue resuscitation and safe transport
Meets Pronouncement of Death criteria?
YES
NO
Should terminate resuscitation
Minimum of 5 two-minute cycles of HPCPR– treat reversible causes of arrest
Rhythm
Asystole AND ETCO2 less than 15 mmHg?
May terminate resuscitation
VF, VT, PEA OR Asystole with ETCO2 greater than 15 mmHg?
Less than 15 minutes to Pediatric Trauma Center
More than 15 minutes to Pediatric Trauma Center
HPCPR/Treat reversible causes, transport to Pediatric Trauma Center
HPCPR/Treat reversible causes, transport to local ED or Adult Trauma Center

# Pronouncement of Death in the Field



**Indications**

- EMS clinicians may use this protocol to pronounce the death of a patient when **one or more** of the following criteria have been met:
  - Decapitation
  - Rigor mortis
  - Decomposition
  - Dependent lividity
  - Pulseless, apneic patient in a multi-casualty incident where system resources are required for the stabilization of living patients
    - ♦ Patient may be "black tagged" by BLS or ALS, but asystole must be confirmed by ALS prior to formal pronouncement of death.
  - Pulseless, apneic patient in confirmed asystole with an injury not compatible with life
    - ♦ Exception: Obviously pregnant female patient should have resuscitation initiated and be transported to the closest appropriate facility.
  - EMS clinician has terminated resuscitation per the *Termination of Resuscitation* protocol

**BLS**

- Confirm that the patient is unresponsive, pulseless, and apneic.
- Document the exact time and location of the pronouncement of death.
- Notify law enforcement and follow local jurisdictional policies.
- Organ donor: If the deceased patient is an organ donor and law enforcement has released the body to the family, please assist the family in calling Infinite Legacy, 800-923-1133.
- If death is pronounced during transport, deliver the patient to the hospital and follow hospital policies. Law enforcement must be notified, as they may need to notify the medical examiner's office.

**ALS**

- Refer to BLS protocol.

**MC**

- Not applicable.

**Clinical Pearls**

- Health General Article §5-202 provides that: an individual is dead if, based on ordinary standards of medical practice, the individual has sustained either:
  - Irreversible cessation of circulatory and respiratory functions; or
  - Irreversible cessation of all functions of the entire brain, including the brain stem

**Indications**

- A MOLST Form or Acceptable EMS DNR Order is presented to EMS by family/caregivers or found on scene, and
  - Patient is in cardiac or respiratory arrest, or
  - Patient is non-verbal or lacks medical decision-making capacity

**BLS**

- **Resuscitation status:**
  - **Attempt CPR** – if cardiac or respiratory arrest occurs: perform CPR, artificial ventilation, and all medical efforts that are indicated during arrest in order to restore or stabilize cardiopulmonary function
  - **MOLST A-1** – if cardiac or respiratory arrest occurs: do not attempt resuscitation (no CPR)
    - Prior to arrest: maximal restorative efforts including intubation
  - **MOLST A-2** – if cardiac or respiratory arrest occurs: do not attempt resuscitation (no CPR)
    - Prior to arrest: comprehensive efforts to prevent arrest excluding intubation
  - **MOLST B** – if cardiac or respiratory arrest occurs: do not attempt resuscitation (no CPR)
    - Prior to arrest: limited, palliative care only
- **Acceptable DNR Orders**
  - Maryland MOLST Form or Bracelet
    - May be an original, copy, or electronic format for patient care decisions, however, sending facility must provide paper copy to EMS prior to patient transport
  - Maryland EMS/DNR Form or Bracelet
    - There is no expiration on older versions of DNR forms.
  - Medic Alert DNR Bracelet or Necklace
  - Out-of-state EMS/DNR Form
  - Oral DNR Order from EMS System Medical Consultation
  - Oral DNR Order from other on-site physician, physician assistant, or nurse practitioner
- **Unacceptable DNR Orders**
  - Advanced directives (without a MOLST or DNR Order) or other oral or written requests shall not be honored by EMS without EMS System Medical Consultation
- **Revocation of DNR Orders**
  - An EMS/DNR Order may be revoked at any time by:
    - Physical cancellation or destruction of all EMS/DNR Order devices; or
    - A verbal statement by the patient made directly to EMS clinicians requesting resuscitation or palliative care only. In this case, EMS/DNR devices do not need to be destroyed. EMS clinicians must thoroughly document the revocation. A verbal revocation by the patient is only good for the current response for which it was issued.
  - An authorized decision-maker, other than the patient, cannot revoke an EMS/DNR Order verbally.
    - Decision-makers with the authority to revoke an EMS/DNR Order must either void or withhold all EMS/DNR Order devices if they wish resuscitation for the patient. If there is any confusion, the EMS clinician should consult a Base Station.

BLS

- **EMS DNR Medical Protocols**
  - Perform limited patient assessment.
    - Check for a palpable pulse.
    - Check for respirations in an unresponsive patient.
    - Check for MOLST form or other acceptable EMS/DNR Order.
  - Resuscitate/Do Not Resuscitate Criteria
    - If MOLST form or other acceptable EMS/DNR Order is present and the patient is in cardiac or respiratory arrest, no resuscitative measures shall be initiated.
    - If MOLST form or other acceptable EMS/DNR Order is not present, revoked, or otherwise void, EMS clinician shall treat and transport the patient, as appropriate.
      - If EMS clinicians believe that resuscitation or further resuscitative efforts are futile, they may initiate the *Termination of Resuscitation* protocol.
    - If the patient is conscious and able to communicate directly to EMS clinicians that they revoke the MOLST or other EMS/DNR Order verbally, then EMS clinicians shall treat and transport the patient, as appropriate.
    - If the EMS/DNR patient (Option A-1, A-2, B) experiences respiratory or cardiac arrest, EMS shall withhold or withdraw further resuscitation and provide support to the family and caregivers.
  - **MOLST A-1** – Maximal Restorative Care, including intubation
    - Prior to respiratory or cardiac arrest: the Option A-1 patient shall receive the full scope of interventions permissible under *The Maryland Medical Protocols for Emergency Medical Services*, including: intubation, CPAP/BiPAP, cardiac monitoring, cardioversion, cardiac pacing, IVs, and medications in attempt to forestall cardiac or respiratory arrest.
    - If respiratory or cardiac arrest occurs: do not initiate CPR or any resuscitative efforts. Withhold or withdraw resuscitative efforts if they were already in progress prior to discovery of the MOLST or EMS/DNR Order.
  - **MOLST A-2** – Comprehensive Efforts, excluding intubation
    - Prior to respiratory or cardiac arrest: same as option A-1, except no intubation is permitted
    - If respiratory or cardiac arrest occurs: no CPR, same as option A-1
  - **MOLST B** – Palliative Care
    - Prior to respiratory or cardiac arrest, provide supportive treatment:
      - Respiratory
        - Open and maintain airway using chin lift, jaw thrust, finger sweep, nasopharyngeal or oropharyngeal airway, Heimlich maneuver, or laryngoscopy with Magill forceps for suspected airway obstruction, but no intubation, cricothyroidotomy, or tracheostomy
        - Oxygen: may provide passive oxygen via nasal cannula or non-rebreather mask, but no positive pressure oxygen via BVM, demand valve or ventilator. Pulse oximetry and capnography may be used.
        - Ventilator patients: if the patient is found on an outpatient ventilator and is not in cardiac arrest, maintain ventilator support during transport to the hospital
          - If the patient on an outpatient ventilator is found in cardiac arrest, contact online medical direction before disconnecting the ventilator.
        - Suction as necessary
        - Position for comfort

**BLS**

- External bleeding
  - Standard treatment; direct pressure, tourniquet
  - No IVs
- Immobilize fractures with devices to minimize pain
- Uncontrolled pain or other symptoms (e.g., severe nausea)
  - Allow patient, family or other health care clinicians to administer patient-prescribed medications. Document this on the PCR.
  - Patient controlled analgesia (PCA) systems shall be maintained and monitored.
  - For the patient with significant pain or pain with prolonged transport, initiate the *Pain Management* protocol.
- Existing IV lines shall be maintained in place.
- Transport: upon request of the patient, family or caregivers, EMS clinicians may transport Option B EMS/DNR patients to a specified inpatient hospice facility for pain control, symptom management or respite care (in lieu of transport to a hospital-based emergency department). EMS clinicians must notify the hospice facility prior to transport.

■ Documentation

- A copy of the MOLST or other acceptable EMS/DNR Order must be transported with the patient to the emergency department or inpatient hospice facility.
- MOLST or EMS/DNR order status must be documented in the patient care report.

■ Non-transported EMS/DNR Patients

- Follow local operational procedures for handling deceased patients.
- Do not remove DNR or Medical Alert Bracelets or Necklaces from the patient; leave the original MOLST or EMS/DNR Order with the patient.
- Law enforcement or medical examiner's office need to be notified only in the case of sudden or unanticipated death that occurs:
  - By violence
  - By suicide
  - As the result of an accident
  - Suddenly, if the deceased was in apparent good health, or
  - In any suspicious or unusual manner

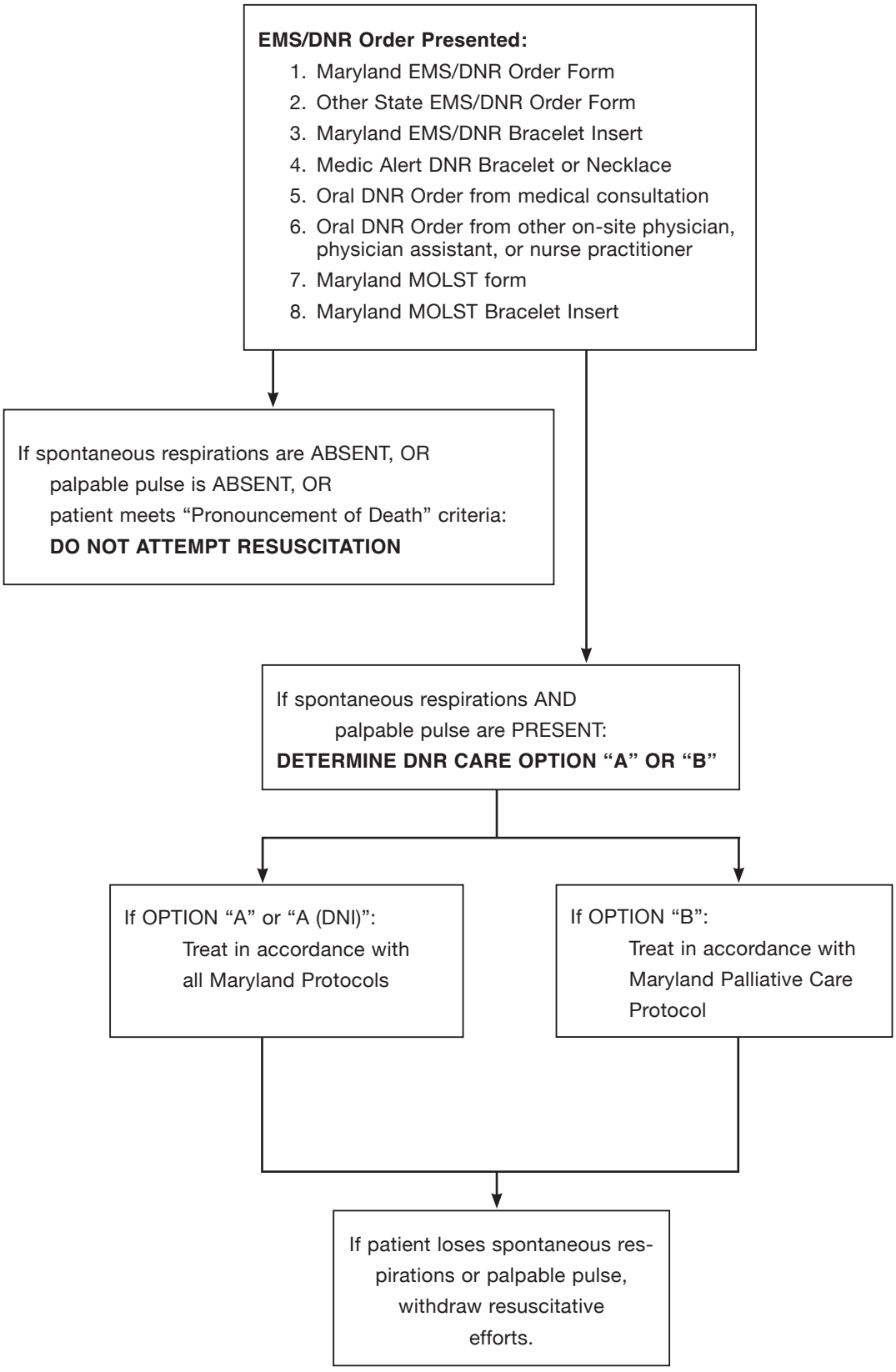
**ALS**

- Refer to BLS protocol

**MC**

- An oral DNR Order from EMS System Medical Consultation is acceptable if a MOLST or DNR form is not present.
- Obtain medical consultation if the MOLST or DNR form instructions are unclear or the form is unreadable.

## EMS DNR Flowchart



**Indications**
- Angina or anginal equivalents
- Chest pain, pressure or discomfort
- Pain or discomfort in the upper abdomen, arm, or jaw
- Shortness of breath
- Unexplained diaphoresis

**BLS**
- Place patient in position of comfort.
- Administer *aspirin* 324 mg or 325 mg chewed, if not given prior to EMS arrival.
- Assist with administration of patient-prescribed *nitroglycerin (BLS)* 0.4 mg SL.
  - May be repeated in 3-5 minutes if chest pain persists, blood pressure is greater than 90 mmHg, and pulse is between 60-150 bpm. Maximum 3 doses total (patient and EMT-assisted)
- Assess and treat for shock if indicated.

**ALS**
- Perform a 12-lead EKG as soon as possible.
  - EKG should occur within 10 minutes of contact with an EKG-capable clinician.
  - Document the patient's last name, first initial, age, and sex on the EKG. These identifiers should be on the transmission copy (if able to transmit) and shall be on the delivered printed copy.
- Establish IV access.
- *Nitroglycerin* 0.4 mg SL. May be repeated if symptoms persist, blood pressure is greater than 90 mmHg and pulse is between 60-150 bpm, to a maximum dose of 1.2 mg SL.
  - If patient does not have a prescription or previous history of *nitroglycerin* use, an IV must be established prior to administration.
- Administer opioid per *Pain Management* protocol.

**MC**
- Medical consultation must be obtained for *nitroglycerin* in the following scenarios:
  - Additional doses of *nitroglycerin*, beyond 3 doses or 1.2 mg SL
  - No IV access
  - If patient's systolic blood pressure drops more than 20 mmHg per dose of *nitroglycerin* given, consult for further doses.
- Pediatrics: Consult a Pediatric Base Station for patients who have not reached their 18th birthday with chest pain with associated dysrhythmias, cardiac disease, or blunt trauma.
- For patients 18 years of age and older with suspected acute aortic syndrome—ripping/tearing chest or back pain, severe chest or back pain with unequal upper extremity BPs (or diagnosed aortic syndrome from a medical facility).
  - Consult with receiving base station for BP target and *labetalol* dosing.

**Clinical Pearls**
- *Nitroglycerin* is contraindicated for any patient having taken medication for pulmonary artery hypertension (e.g., Adcirca® or Revatio®) or erectile dysfunction (e.g., Viagra®, Levitra®, or Cialis®) within the past 48 hours.

# 3.10 Cardiac Emergencies: Implantable Cardioverter Defibrillator (ICD) Malfunction – Adult & Pediatric

**Indications**

- Patient must meet both criteria:
  - Three or more distinct ICD shocks **and**
  - Obvious device malfunction with at least one EMS clinician-witnessed inappropriate shock (e.g., alert patient in atrial fibrillation with rapid ventricular rate or SVT)

**BLS**

- Place patient in position of comfort.
- Assess and treat for shock, if indicated.

**ALS**

- Establish IV/IO access.
- Monitor cardiac rhythm and treat according to appropriate algorithm.
- **Donut magnet:** Place a donut magnet directly over device. Magnet placed directly over ICD will deactivate device and shocks will not be delivered. After defibrillator is deactivated, tape the magnet firmly in place and treat cardiac rhythm according to the appropriate algorithm.
- If ICD deactivation indications are questionable or deactivation is unsuccessful (or a donut magnet is not available) and undesired shocks continue, medications may be administered for patient comfort:
  - Administer opioid per *Pain Management* protocol **or** *midazolam* 0.1 mg/kg SLOW IVP/IN/IM/IO. Maximum single dose is 5 mg. IN administration max 1 mL per nare. IM administration requires consultation.
- If the patient becomes unstable or in the event of a rhythm change where a shock is desired, remove the magnet to reactivate the ICD. If reactivation does not occur, use manual defibrillator in accordance with *Tachycardia* protocol.

**MC**

- *Midazolam* 0.1 mg/kg SLOW IV/IO over 1–2 minutes. Maximum single IV/IN/IO dose 2 mg. Maximum total dose 5 mg. IN administration max 1 mL per nare. If IV cannot be established, administer 0.2 mg/kg IM. Max single IM dose is 5 mg. (IM requires all clinicians to obtain medical consultation.) Maximum total dose 5 mg.
- Consult a Pediatric Base Station for children (who have not reached their 18th birthday) with an ICD device delivering shock therapy or malfunctioning.

**Clinical Pearls**

- If the patient is in cardiac arrest, perform CPR and use the AED as appropriate despite the patient's ICD, which may or may not be delivering shocks.
- If the patient has a combination ICD and pacemaker, deactivating the ICD may or may not deactivate the pacemaker.

# ST Elevation Myocardial Infarction (STEMI) – Adult 3.11

**Indications**

- Patient with acute coronary syndrome (ACS) symptoms, including angina or angina equivalents such as shortness of breath, chest, epigastric, arm or jaw pain or discomfort, diaphoresis, and/or nausea and meets one of the following criteria on diagnostic quality EKG:
  - New ST elevation of 1 mm (or greater) in two or more anatomically contiguous leads
    OR
  - Posterior MI: ST depression greater than 1 mm in V1-V3

**BLS**

- Not applicable; ALS protocol only

**ALS**

- *Aspirin, nitroglycerin, Pain Management* protocol.
- STEMI patients are Priority 1 and require transmission of an EKG and prompt hospital notification with clear communication of an incoming "STEMI Alert" patient. Hospital base station shall ensure that receiving physician is aware of the incoming STEMI patient.
- STEMI patients shall be transported to the closest cardiac interventional center by air or ground as long as the delivery time is not more than 45 minutes greater than transport to the nearest ED.
- STEMI patients may bypass the ED and go directly to the cardiac catheterization lab, as directed by the receiving ED physician.
- If the patient cannot be delivered to a cardiac interventional center within the allotted time, complete the Fibrinolytic Therapy Checklist for STEMI.
  - If patient meets all of the criteria for fibrinolytic therapy, transport to the closest ED.
  - If the patient does not meet all of the criteria for fibrinolytic therapy, consult with the nearest cardiac interventional center and the closest ED to determine the most appropriate receiving facility.
- If inferior MI, obtain a right-sided EKG (V4R) to evaluate for right ventricular involvement. If ST elevation is noted in V4R, do not give nitrates due to risk for hypotension.
- If hypotensive with clear lung sounds, administer *Lactated Ringer's* 250 mL IV.
- If the patient does not have ST elevations greater than 1 mm in two contiguous leads on 12-lead EKG, the patient shall be transported to the closest appropriate ED.

**MC**

- Obtain medical consultation if there is any uncertainty as to whether a patient meets STEMI criteria or for destination determination.
- For STEMI patients with hypotension, obtain medical consultation for *Lactated Ringer's* doses greater than 500 mL.
- Left Bundle Branch Block (LBBB) / Paced Rhythm plus any of the following requires consultation with the closest appropriate EMS base station or cardiac interventional center:
  - Patient presents in cardiogenic shock
  - EKG shows excessive ST segment elevation greater than 5mm
  - EKG shows ST segment deviation (elevation or depression) in the same direction as the QRS complex.

MC

- Other high-risk EKG findings that require consultation with EMS base station or cardiac interventional center:
  - Wellens' wave: biphasic T waves or deeply inverted T waves in the precordial leads (V2-V3 +/- V4).
  - ST segment elevation in aVR: with coexisting multi-lead ST segment depression
  - Hyperacute T waves: peaked, broad-based T waves
- For STEMI patients who have not reached the 18th birthday, consult a pediatric base station for management and destination.

**Clinical Pearls**

- Approximately 40% of inferior STEMIs have right ventricular involvement, which predisposes these patients to hypotension and increased mortality. Avoid nitrates if there is suspected right ventricular involvement. Clinically, patients with RV involvement often have clear lung sounds, hypotension, and JVD.
- ST depressions in V1-V3 may indicate anterior ischemia or a posterior STEMI. Obtain a posterior EKG to differentiate between these two conditions.

### Fibrinolytic Therapy Checklist for STEMI

Use this checklist if a STEMI patient cannot be delivered to a Cardiac Interventional Center within 45 minutes greater than transport to the nearest ED. All of the **"YES"** boxes and all of the **"NO"** boxes must be checked before a patient should be transported to the nearest emergency department.

**INCLUSION CRITERIA**

(**All** of the **"YES"** boxes must be checked)

**YES**

❑ 18 years of age or older
❑ Signs and symptoms of STEMI
❑ Patient cannot be delivered to a Cardiac Interventional Center within 45 minutes greater than transport to the nearest ED

**EXCLUSION CRITERIA**

(If any of the **"NO"** are unchecked, clinician **must consult** with a Cardiac Interventional Center and nearest ED to determine most appropriate receiving facility.)

**PATIENT HAS NO:**

❑ Active internal bleeding (e.g., GI or urinary bleeding within the last 21 days)
❑ Known bleeding disorder
❑ Within 3 months of intracranial surgery, serious head trauma, or stroke
❑ Within 14 days of major surgery or serious trauma
❑ History of intracranial hemorrhage
❑ Witnessed seizure at onset
❑ History of cancer of the brain

# Ventricular Assist Device (VAD) Protocol – Adult & Pediatric 3.12

**Indications**

- Patients who have an implantable ventricular assist device (VAD), including left ventricular assist device (LVAD), right ventricular assist device (RVAD), or biventricular assist device (BiVAD) and have symptoms of cardiovascular compromise or cardiac arrest

**BLS**

- Assess level of consciousness and vitals
  - Note: most VAD patients will not have a palpable pulse or detectable systolic and diastolic blood pressures due to the nature of the pump
  - An automated blood pressure cuff may be used which may obtain a mean arterial pressure (MAP). The normal range for MAP is between 60 and 90 mmHg.
- Check for breathing and assist ventilation if necessary.
- Assess for perfusion: check skin color, skin temperature, capillary refill, MAP, and mental status.
- **Altered mental status/adequate perfusion.** If the patient has altered mental status, but has other signs of adequate perfusion, assess for causes of *altered mental status*.
  - Check blood glucose and refer to *HYPERglycemia* or *HYPOglycemia*.
  - If concern for overdose, refer to *Overdose/Poisoning – Adult* or *Overdose/Poisoning – Pediatric*.
- **Unresponsive/abnormal perfusion.** If the patient is unconscious/unresponsive, not breathing, has delayed capillary refill, and unable to obtain a MAP, initiate manual chest compressions and ventilations per *Cardiac Arrest – Adult* or *Cardiac Arrest – Pediatric*.
- Assess for alarms, which can be audible or reported by the patient/bystander.
- Listen for pump sound “hum” or “whirling sound” over the chest.
- Assess VAD.
  - Check power and connections from the controller to the batteries and driveline.
  - Contact patient’s VAD coordinator, using phone number on the device, and/or VAD-trained companion, who will likely be the best source of information for need to return to tertiary care center.
    - Johns Hopkins (cell phone): 410-382-6885
    - Johns Hopkins Children's Center (Pediatric Cardiologist On-call): 410-955-6070
    - UMMS Pediatrics: 410-328-4348
    - Children's National Hospital (Emergency On-call): 202-860-4215
    - MedStar (pager): 202-801-9796
    - University of Maryland (phone): 410-328-4903
    - Christiana: 1-855-VAD-CCHS (1-855-823-2247) option 1
  - Change VAD batteries and/or controller, if indicated.
    - If VAD batteries require changing, only change ONE at a time.
- Transport the “backup bag” with batteries and a second controller with the patient.
- For VAD-related complications or suspected cardiac/respiratory conditions: transport to the medical facility where the VAD was placed, if patient’s clinical condition and time allows.
- For all other conditions: transport to closest appropriate emergency department without manipulating the device.
- Obtain medical consultation from the receiving Base Station if specific interventions are recommended by the VAD coordinator. VAD coordinators cannot provide medical direction.

# 3.12 Ventricular Assist Device (VAD) Protocol – Adult & Pediatric (continued)

**ALS**

- Initiate cardiac monitoring and end-tidal $CO_2$ monitoring.
- Establish IV/IO access
- Obtain 12-lead EKG.
- For hypoperfusion (MAP less than 60 mmHg) due to hypovolemia with a functioning VAD OR ventricular arrhythmias associated with low-flow alarms:
  - For adults, administer *Lactated Ringer's* (250 mL at a time) to achieve a MAP target of 60 mmHg, if there are no signs of pulmonary edema.
  - For adults, a maximum of 1 liter *Lactated Ringer's* may be given over 15 minutes, using a push-pull method of drawing up the fluid and pushing it through the IV.
  - For pediatric patients, administer *Lactated Ringer's* fluid boluses (10 mL/kg to a maximum of 250 mL at a time) to achieve a target MAP of 60 mmHg, if there are no signs of pulmonary edema.
  - For pediatric patients, a maximum of 2 doses of 10 mL/kg *Lactated Ringer's* may be given over 15 minutes, using a push-pull method of drawing up the fluid and pushing it through the IV.
- Defibrillate or cardiovert, as appropriate for the patient's rhythm. The controller or batteries should not be disconnected to deliver electrical therapy.

**MC**

- For adults, additional IV fluid beyond 1 liter of *Lactated Ringer's* requires medical consultation.
- For pediatric patients, additional IV fluid beyond 2 doses of 10 mL/kg require a medical consultation.

**Clinical Pearls**

- LVAD patients are preload dependent and afterload sensitive.
- VAD patients require both anticoagulation and antiplatelet medication to prevent pump thrombosis, both of which make them high risk for life-threatening bleeding.
- VAD patients are at increased risk of sepsis due to driveline infection.
- Chest compressions must be manual (using hands only); automated chest compression devices may increase the risk of VAD dislodgement.
- VAD patients can be cardioverted and defibrillated without any changes or adjustments to the VAD.
- Always ask VAD patients if they have had any alarms and if their parameters are within normal range.

**Indications**
- Injuries or burns in a pattern suggesting intentional infliction
- Injuries in various stages of healing or injuries scattered over multiple areas of the body
- Patient, parent, or caregiver responding in an inappropriate manner to the situation
- Malnutrition or extreme lack of cleanliness of the patient or environment
- Bulging of fontanels and altered mental status in infants

**BLS**

- Stabilize and treat injuries according to the appropriate protocol
- Discourage patient from washing if sexual abuse is suspected
- Document the following in the patient care report:
  - All statements made by the patient, parent, or caregiver; include verbatim statements in quotation marks
  - Any abnormal behavior on the part of the patient, parent, or caregiver
  - The condition of the environment and other residents present
  - Document the time the police or social service agency was notified along with the name and identifier, if possible
  - Document the name of the receiving health care clinician (RN, PA, or MD)
- Report all cases of **suspected** child or vulnerable adult abuse or neglect by calling the statewide reporting hotline at 1-800-91PREVENT (1-800-917-7383) **as soon as possible**.

**ALS**

- Refer to BLS protocol

**MC**

- As needed

**Clinical Pearls**
- Maryland EMS clinicians are protected from liability if they make a report of child or vulnerable adult abuse and neglect in good faith.
- A vulnerable adult is defined as a person 18 years of age or older who lacks the physical or mental capacity to provide for their daily needs.
- Reporting suspected cases of child or vulnerable adult abuse or neglect is required by the Annotated Code of Maryland Family Law (5-704, 14-101, 14-302 and 14-308). Do not initiate the report in front of the patient, parent, or caregiver.

# Agitation – Adult



**Indications**

- **Mild symptoms** – Patient is agitated but cooperative and making rational decisions. No immediate concern for patient or clinician safety.
- **Moderate symptoms** – Patient is irrational and exhibiting behavior that puts self or clinicians at risk.
- **Severe symptoms** – Patient is physically violent and presents an **immediate** and **imminent** threat to self or others.

## BLS

- Maintain scene safety and have a low threshold for requesting law enforcement.
- Assess patient's capacity and risk for self-harm.
- Place the patient in supine position (face up) as soon as practical.
- Consider causes of agitation (medical, head trauma, psychiatric, drug/alcohol ingestion).
- **Mild Agitation**
  - Attempt verbal de-escalation and provide emotional support by using SAFER Model:
    - **S**tabilize the situation by containing and lowering the stimuli.
    - **A**ssess and acknowledge the crisis.
    - **F**acilitate the identification and activation of resources (chaplain, family, friends, or police).
    - **E**ncourage patient to use resources and take actions in their best interest.
    - **R**ecovery or referral – leave patient in care of responsible person/professional or transport.

## ALS

- **Moderate Agitation**
  - Evaluate for source of agitation and treat as follows:
    - Medical delirium (e.g., infection)
      - *Droperidol* 2.5 mg IM/IV (1.25 mg for patients 69 years of age or older)
    - Psychiatric emergency (e.g., schizophrenia, psychosis)
      - *Droperidol* 2.5 mg IM/IV (1.25 mg for patients 69 years of age or older)
    - Drug or alcohol ingestion
      - *Midazolam* 5 mg IM/IV (2.5 mg for patients 69 years of age or older)
    - Head injury
      - *Midazolam* 5 mg IM/IV (2.5 mg for patients 69 years of age or older)
    - Unknown or other
      - *Midazolam* 5 mg IM/IV (2.5 mg for patients 69 years of age or older)
- **Severe Agitation**
  - *Midazolam* 5 mg IM/IV (2.5 mg for patients 69 years of age or older)
    OR
  - *Ketamine* 1 mg/kg IV/IO (max 100 mg) or *ketamine* 4 mg/kg IM (max 400 mg) if there is **immediate** and **imminent** danger to patient or EMS
- Following sedation, perform the following interventions:
  - Initiate cardiac monitoring, continuous $ETCO_2$, pulse oximetry.
  - Obtain 12-lead EKG to evaluate for prolonged QTc.
  - Evaluate for trauma.
  - Check blood glucose.
  - Check temperature and initiate passive cooling measures (e.g., cold packs), as appropriate.
  - If tachycardic or hyperthermic, initiate *Lactated Ringer's* 20 mL/kg fluid bolus.
  - Apply physical restraints as indicated in *Physical Restraint* protocol, only when imminent and immediate danger to self or others.
  - *Diphenhydramine* 25-50 mg IM/IV may be administered if a dystonic reaction occurs after *droperidol* administration.

MC

- *Ketamine* 1 mg/kg IV/IO (max 100 mg) OR *ketamine* 4 mg/kg IM (max 400 mg) requires medical consultation unless immediate and imminent danger to patient or clinicians
- Additional doses of medication (beyond first dose): *droperidol*, *ketamine*, or *midazolam* require medical consultation

**Clinical Pearls**

Ketamine:

- *Ketamine* should be avoided if possible in agitated elderly patient due to the risk for over-sedation and apnea.
- Advanced airway equipment, BVM, oxygen, and suction must be immediately available at all times for patients receiving *ketamine.*
- All patients that receive *ketamine* must be transported with at least two EMS clinicians, one of which must be an ALS clinician.

Severe agitation:

- Patients with severe agitation should not receive *droperidol* or *diphenhydramine* (Benadryl®) for sedation. These medications may worsen anticholinergic crisis.

Droperidol:

- *Droperidol* may prolong the QTc interval, which increases the risk of cardiac dysrhythmia. Do not administer *droperidol* if QTc is known to be 440 ms or greater.
- Dystonic reactions (extrapyramidal symptoms) may occur after administration of *droperidol*.
- *Droperidol* is contraindicated for pregnant patients.

# Agitation – Pediatric



**Indications**

- **Mild symptoms** – Patient is agitated but cooperative and making rational decisions. No immediate concern for patient or clinician safety.
- **Moderate symptoms** – Patient is irrational and exhibiting behavior that puts self or clinicians at risk.
- **Severe symptoms** – Patient is physically violent and presents an **immediate** and **imminent** threat to self or others.

## BLS

- Maintain scene safety and have a low threshold for requesting law enforcement.
- Assess patient's capacity and risk for self-harm.
- Place the patient in a supine position (face up) as soon as practical.
- Consider causes of agitation (medical, head trauma, psychiatric, drug/alcohol ingestion).
- **Mild Agitation**
  - Attempt verbal de-escalation and provide emotional support by using SAFER Model:
    - **S**tabilize the situation by containing and lowering the stimuli.
    - **A**ssess and acknowledge the crisis.
    - **F**acilitate the identification and activation of resources (chaplain, family, friends, or police).
    - **E**ncourage patient to use resources and take actions in their best interest.
    - **R**ecovery or referral – leave patient in care of responsible person/professional or transport.

## ALS

- **Moderate Agitation**
  - Less than 5 years of age: no medication indicated
  - 5-12 years of age: medical consultation required for *midazolam*
  - 13-18 years of age: *droperidol* 2.5 mg IM/IV or consult for *midazolam* 0.1 mg/kg IV or 0.2 mg/kg IM/IN (max 5 mg). IM route preferred.
- **Severe Agitation**
  - Less than 5 years of age: no medication indicated
  - 5-12 years of age: medical consultation required for *midazolam* or *ketamine*
  - 13-18 years of age:
    - *Ketamine* 1 mg/kg IV/IO (max 100 mg) or *ketamine* 4 mg/kg IM (max 400 mg) if there is **immediate** and **imminent** danger to patient or EMS **OR**
    - *Midazolam* 0.1 mg/kg IV or 0.2 mg/kg IM/IN (max 5 mg). IM route preferred.
- Following sedation, perform the following interventions:
  - Initiate cardiac monitoring, continuous $ETCO_2$, pulse oximetry.
  - Obtain 12-lead EKG to evaluate for prolonged QTc.
  - Evaluate for trauma.
  - Check blood glucose.
  - Check temperature and initiate passive cooling measures (e.g., cold packs), as appropriate.
  - If tachycardic or hyperthermic, initiate *Lactated Ringer's* 20 mL/kg fluid bolus.
  - Apply physical restraints as indicated in *Physical Restraint* protocol, only when imminent and immediate danger to self or others.
  - *Diphenhydramine* 1 mg/kg IM/IV may be administered if a dystonic reaction occurs after *droperidol* administration.

MC

- Less than 13 years of age:
  - *Ketamine* 1 mg/kg IV/IO (max 100 mg) or *ketamine* 4 mg/kg IM (max 400 mg) OR
  - *Midazolam* 0.1 mg/kg IV or 0.2 mg/kg IM/IN (max 5 mg). IM route preferred.
- 13-18 years of age: *ketamine* 1 mg/kg IV/IO (max 100 mg) OR *ketamine* 4 mg/kg IM (max 400 mg) requires medical consultation unless immediate and imminent danger to patient or clinicians
- Additional doses of *droperidol*, *ketamine*, or *midazolam* require medical consultation.

**Clinical Pearls**

Ketamine:

- Advanced airway equipment, BVM, oxygen, and suction must be immediately available at all times for patients receiving *ketamine.*
- All patients that receive *ketamine* must be transported with at least two EMS clinicians, one of which must be an ALS clinician.

Severe agitation:

- Patients with severe agitation should not receive *droperidol* or *diphenhydramine* (Benadryl®) for sedation. These medications may worsen anticholinergic crisis.

Droperidol:

- *Droperidol* may prolong the QTc interval, which increases the risk of cardiac dysrhythmia. Do not administer *droperidol* if QTc is known to be 440 ms or greater.
- Dystonic reactions (extrapyramidal symptoms) may occur after administration of *droperidol*.
- *Droperidol* is contraindicated for pregnant patients.

# Alcohol Withdrawal



**Indications**

- Patients 13 years of age and older with symptoms due to suspected alcohol withdrawal
- Mild Alcohol Withdrawal (BAWS score of less than 3)
- Moderate to Severe Alcohol Withdrawal (BAWS score of 3 or greater)

| Brief Alcohol Withdrawal Scale (BAWS) | | | | |
|---|---|---|---|---|
| **Symptom** | **0 None** | **1 Mild** | **2 Moderate** | **3 Severe** |
| **Tremor** | No tremor | Not visible, but can be felt | Moderate, with arms extended | At rest, without arms extended |
| **Diaphoresis/ Sweats** | No sweats | Mild, barely visible | Beads of sweat | Drenching sweats |
| **Agitation (Richmond Agitation-Sedation Scale)** | RASS = 0 Alert and calm | RASS = +1 Restless, anxious, apprehensive, movement not aggressive | RASS = +2 Agitated, frequent non-purposeful movement | RASS = +3 or +4 Very agitated or combative, violent |
| **Confusion/ Orientation** | Orientation to person, place, time | Disoriented to time (e.g., by more than 2 days or wrong month or wrong year) or to place (e.g., name of building, city, state), but not both | Disorientation to time and place | Disorientation to person |
| **Hallucinations (visual, auditory, tactile)** | None | Mild (vague report, reality testing intact) | Moderate (more defined hallucinations) | Severe (obviously responding to internal stimuli, poor reality testing) |

Rate each symptom in the left column (tremor, diaphoresis/sweats, agitation, confusion/orientation and hallucinations) as either: none (0 points), mild (1 point), moderate (2 points) or severe (3 points). Add the scores for these five symptoms together to determine the BAWS Score.

**BLS**

- Place patient in position of comfort.
- Assess blood glucose levels, if patient condition permits, and treat as indicated.
- Determine BAWS score and request ALS for BAWS score of 3 or greater.

**ALS**

- Establish IV/IO access and apply cardiac monitor, when patient's condition allows.
- For **Mild** alcohol withdrawal (BAWS score less than 3):
  - Administer *ondansetron* as needed for nausea; *droperidol* may be used for patients 18 years of age or older
- For **Moderate** to **Severe** alcohol withdrawal (BAWS score 3 or greater) or known history of severe withdrawal:
  - Administer *Midazolam*: 2–2.5 mg IV. May repeat dosing twice to a maximum of 3 doses (6-7.5 mg IV) titrated to abatement of psychomotor symptoms and anxiety/agitation. Additional doses require medical consultation.
  - If no IV access available, administer *Midazolam*: 5 mg IN/IM. Additional doses require medical consultation.
  - Obtain 12 lead ECG, when patient's condition allows, to assess for long QTc or arrhythmias

**MC**

- Patients less than 13 years of age.
- Additional *Midazolam* beyond 3 separate IV doses (6-7.5 mg), **OR** for any repeat IN/IM doses beyond first dose.

# Allergic Reaction – Adult



**Indications**

- **Mild symptoms:** localized swelling and itching at the site
- **Moderate symptoms:** hives OR mild wheezing
- **Severe symptoms (Refer to Allergic Reaction: Anaphylaxis Protocol):** Acute onset of severe illness after exposure to a known or suspected allergen with **two or more** of the following:
  - Urticaria (hives) or acute swelling of the mucosa (e.g., tongue, airway, stridor, lips)
  - Respiratory compromise
  - Hypotension
  - GI symptoms, such as persistent nausea/vomiting, abdominal pain, or diarrhea
- Hypotension after exposure to a known or suspected allergen

**BLS**

- **Mild symptoms** (if history of life-threatening allergic reaction to same allergen)
  - *Epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh **OR**
  - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.5 mg IM in the lateral thigh.
- **Moderate symptoms**
  - *Epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh **OR**
  - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.5 mg IM in the lateral thigh.
  - *Albuterol (BLS)* inhaler (2 puffs inhaled) or nebulized *albuterol (BLS)*. May repeat dose one time, as needed, within 30 minutes.

**ALS**

- **Mild symptoms**
  - *Diphenhydramine* 25 mg SLOW IV or IM.
    **OR**
  - *Epinephrine* (1 mg/mL) 0.5 mg IM if patient has a history of life-threatening allergic reaction to the same allergen.
- **Moderate symptoms**
  - *Epinephrine* (1 mg/mL) 0.5 mg IM. May repeat every 5 minutes, for a total of 3 doses, for recurrent or worsening symptoms.
  - Establish IV access.
  - *Diphenhydramine* 50 mg SLOW IVP or IM.
  - *Albuterol* 2.5 mg and *ipratropium* 500 **mcg** nebulizer. May repeat *albuterol* one time for recurrent or worsening symptoms.

**MC**

- Additional doses of *epinephrine auto-injector, epinephrine, albuterol, ipratropium, diphenhydramine* beyond those listed above require medical consultation.

**Clinical Pearls**

- Re-check dosing and concentration of *epinephrine* prior to administration.
- *Epinephrine* 1 mg/mL (previously known as 1:1,000) is appropriate for the IM route only.
- *Epinephrine* should never be given by IV route, except for an *epinephrine* infusion for patients in anaphylaxis or for patients in cardiac arrest.

**Indications**

- **Mild symptoms:** localized swelling and itching at the site
- **Moderate symptoms:** hives OR mild wheezing
- **Severe symptoms (Refer to Allergic Reaction: Anaphylaxis Protocol):** Acute onset of severe illness after exposure to a known or suspected allergen with **two or more** of the following:
  - Urticaria (hives) or acute swelling of the mucosa (e.g., tongue, airway, stridor, lips)
  - Respiratory compromise
  - Hypotension
  - GI symptoms, such as persistent nausea/vomiting, abdominal pain, or diarrhea
- Hypotension after exposure to a known or suspected allergen

**BLS**

- **Mild symptoms** (if history of life-threatening allergic reaction to same allergen)
  - Less than 5 years of age: *pediatric epinephrine auto-injector (BLS)* 0.15 mg IM in the lateral thigh **OR**
    - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.15 mg IM in the lateral thigh
  - 5 years of age or greater: *epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh **OR**
    - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.5 mg IM in the lateral thigh
- **Moderate symptoms:**
  - Less than 5 years of age:
    - *Pediatric epinephrine auto-injector (BLS)* 0.15 mg IM in the lateral thigh **OR**
    - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.15 mg IM in the lateral thigh
  - 5 years of age or greater:
    - *Epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh **OR**
    - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.5 mg IM in the lateral thigh
  - *Albuterol (BLS)* inhaler (2 puffs inhaled) or *albuterol (BLS)* nebulizer. May repeat dose one time, as needed, within 30 minutes.
    - For infants and children less than 2 years of age, administer nebulized *albuterol (BLS)* 1.25 mg.
    - For patients 2 years of age or greater, administer nebulized *albuterol (BLS)* 2.5 mg.

**ALS**

- **Mild symptoms**
  - *Diphenhydramine* 1 mg/kg SLOW IV or IM for patients greater than 6 months old. Maximum single dose 25 mg **OR**
  - *Epinephrine* if history of life-threatening allergic reaction to the same allergen.
    - Less than 5 years of age: *epinephrine* (1 mg/mL) 0.15 mg IM in the lateral thigh
    - 5 years of age or greater: *epinephrine* (1 mg/mL) 0.5 mg IM in the lateral thigh

# Allergic Reaction – Pediatric (continued)



**ALS**

- **Moderate symptoms**
  - *Epinephrine*
    - Less than 5 years of age: *epinephrine* (1 mg/mL) 0.15 mg IM in the lateral thigh
    - 5 years of age or greater: *epinephrine* (1 mg/mL) 0.5 mg IM in the lateral thigh
  - Establish IV access.
  - If age-related vital signs and patient's condition indicate hypoperfusion, administer initial fluid bolus of 20 mL/kg LR IV. If patient's condition does not improve, administer the second bolus of fluid at 20 mL/kg LR IV.
  - *Diphenhydramine* 1 mg/kg SLOW IVP or IM for patients greater than 6 months old. Maximum single dose 50 mg.
  - *Albuterol* / *ipratropium* nebulized.
    - For an infant less than 1 year of age: *albuterol* 1.25 mg via nebulizer; *ipratropium* is contraindicated.
    - For a child 1 year of age or greater, but less than 2 years of age: *albuterol* 1.25 mg and *ipratropium* 250 **mcg**.
    - For a patient 2 years of age or greater: *albuterol* 2.5 mg and *ipratropium* 500 **mcg**.
    - May repeat *albuterol* one time for recurrent or worsening symptoms.

**MC**

- Additional doses of *epinephrine auto-injector*, *epinephrine*, *albuterol*, *ipratropium*, *diphenhydramine* beyond those listed above require medical consultation.

# Allergic Reaction: Anaphylaxis – Adult 4.5-A

**Indications**

- Acute onset of severe illness after exposure to a known or suspected allergen with **two or more** of the following:
  - Urticaria (hives) or acute swelling of the mucosa (e.g., tongue, airway, stridor, lips)
  - Respiratory compromise
  - Hypotension
  - GI symptoms, such as persistent nausea/vomiting, abdominal pain, or diarrhea
- Hypotension after exposure to a known or suspected allergen

**BLS**

- *Epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh **OR**
- If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.5 mg IM in the lateral thigh.
- *Albuterol (BLS)* inhaler (2 puffs inhaled) or *albuterol (BLS)* 2.5 mg nebulized for wheezing/bronchospasm/shortness of breath. May repeat dose one time, as needed, within 30 minutes.

**ALS**

- Administer *epinephrine* (1 mg/mL) 0.5 mg IM. May repeat *epinephrine* IM every 5 minutes to a maximum of 3 doses for persistent severe reactions.
- Establish IV/IO access.
- For patients who are in extremis with severe hypotension or impending respiratory failure, initiate an *epinephrine* infusion (after having administered 3 doses of IM *epinephrine*) as follows:
  - Add 1 mg of *epinephrine* (either 1 mg/mL or 0.1 mg/mL) in a 100 mL bag of LR or NS
  - Use a Microdrip set (60 drops/mL) for infusion administration
  - Adult *epinephrine* infusion dosage:
    - Administer infusion through a free-flowing IV, ideally 20 gauge or larger, or by IO
    - Start infusion at 1 mL/min (60 drops/min) IV/IO
    - Check blood pressure every 5 minutes. If MAP is less than 65 mmHg or systolic blood pressure is less than 90 mmHg, increase to a maximum rate of 2 mL/min (120 drops/min).
- Additional treatments **after** administration of the initial dose of *epinephrine*:
  - *Albuterol* 2.5 mg nebulized and *ipratropium* (*Atrovent*®) 500 **mcg** nebulized; may repeat *albuterol* nebulized 2.5 mg one time.
  - *Diphenhydramine* 50 mg SLOW IVP or IM
  - Administer 20 mL/kg bolus *LR* IV/IO for hypotension (MAP less than 65 mmHg or systolic blood pressure less than 90 mmHg)
  - *Dexamethasone* 15 mg IV/IM/IO. IV route preferred.

**MC**

- Additional doses of *epinephrine auto-injector, epinephrine, albuterol, ipratropium, diphenhydramine* beyond those listed above require medical consultation.
- If blood pressure goals are not met upon reaching *epinephrine* infusion rate of 2 mL/min (120 drops/min), obtain medical consultation.

**Clinical Pearls**

- Re-check dosing and concentration of *epinephrine* prior to administration.
- *Epinephrine* 1 mg/mL (previously known as 1:1,000) is appropriate for the IM route only.
- *Epinephrine* should never be given by IV route, except for an *epinephrine* infusion for patients in anaphylaxis or for patients in cardiac arrest.

# Allergic Reaction: Anaphylaxis – Pediatric



**Indications**

- Acute onset of severe illness after exposure to a known or suspected allergen with **two or more** of the following:
  - Urticaria (hives) or acute swelling of the mucosa (e.g., tongue, airway, stridor, lips)
  - Respiratory compromise
  - Hypotension
  - GI symptoms, such as persistent nausea/vomiting, abdominal pain, or diarrhea
- Hypotension after exposure to a known or suspected allergen

## BLS

- *Epinephrine (BLS)*
  - Less than 5 years of age:
    - *Pediatric epinephrine auto-injector (BLS)* 0.15 mg IM in the lateral thigh **OR**
    - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.15 mg IM in the lateral thigh
  - 5 years of age or greater:
    - *Epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh **OR**
    - If BLS *epinephrine* OSP approved, *epinephrine (BLS)* (1 mg/mL) 0.5 mg IM in the lateral thigh
- *Albuterol (BLS)* – for wheezing/bronchospasm/shortness of breath.
  - Less than 2 years of age: *albuterol (BLS)* inhaler (2 puffs) inhaled or *albuterol (BLS)* 1.25 mg nebulized. May repeat dose one time, as needed, within 30 minutes.
  - 2 years of age or greater: *albuterol (BLS)* inhaler (2 puffs) inhaled or *albuterol (BLS)* 2.5 mg nebulized. May repeat dose one time, as needed, within 30 minutes.

## ALS

- Administer *epinephrine* IM. May repeat every 5 minutes for a total of 3 doses.
  - Less than 5 years of age: *epinephrine* (1 mg/mL) 0.15 mg IM in the lateral thigh.
  - 5 years of age or greater: *epinephrine* (1 mg/mL) 0.5 mg IM in the lateral thigh.
- Establish IV/IO access.
- Additional treatments to consider after administration of the initial dose of *epinephrine*:
  - *Albuterol* and *ipratropium* (*Atrovent*®) via nebulizer:
    - Less than 1 year of age: *albuterol* 1.25 mg; *ipratropium* is contraindicated.
    - Greater than 1 year of age but less than 2 years of age: *albuterol* 1.25 mg and *ipratropium* 250 **mcg**.
    - For a patient 2 years of age or greater: *albuterol* 2.5 mg and *ipratropium* 500 **mcg**.
    - For all age groups, one additional dose of *albuterol* only may be given via nebulizer.
  - *Diphenhydramine* 1 mg/kg SLOW IVP or IM to a maximum of 50 mg for patients greater than 6 months old.
  - Administer 20 mL/kg bolus *LR* for hypotension; systolic blood pressure less than 70 + (2 x age in years)
  - *Dexamethasone* 0.5 mg/kg to a maximum of 15 mg IV/IM/IO. IV route preferred.

**MC**

- Additional doses of *pediatric epinephrine auto-injector, epinephrine, albuterol, ipratropium, diphenhydramine* beyond those listed above require medical consultation.
- Consider *pediatric epinephrine infusion* for refractory anaphylactic shock.

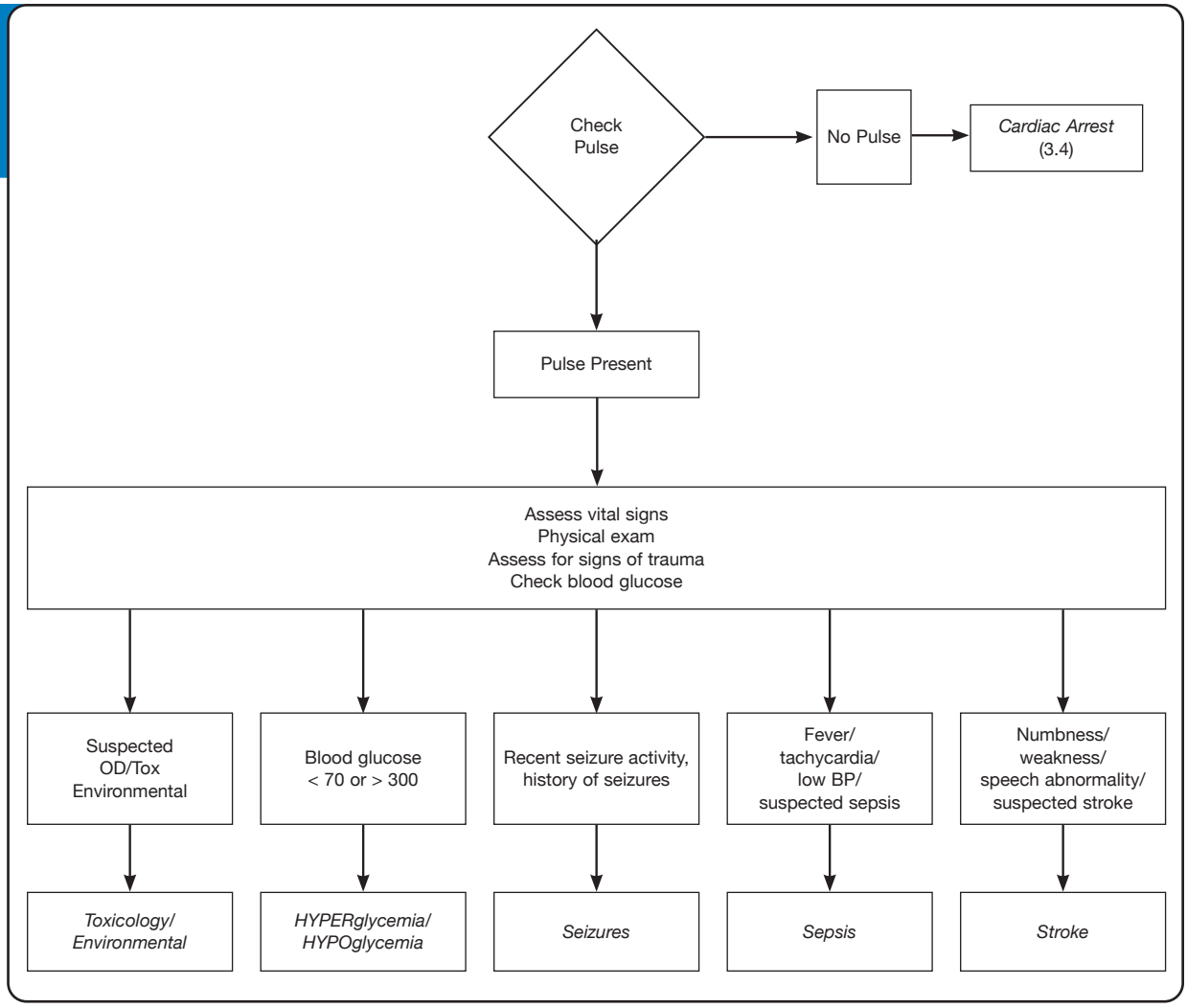
**Clinical Pearls**

- Re-check dosing and concentration of *epinephrine* prior to administration.
- *Epinephrine* 1 mg/mL (previously known as 1:1,000) is appropriate for the IM route only.
- *Epinephrine* should never be given by IV route, except for an *epinephrine* infusion for patients in anaphylaxis or for patients in cardiac arrest.

# Altered Mental Status



BLS



# Apparent Life-Threatening Event/ Brief Resolved Unexplained Event (ALTE/BRUE)



**Indications**

- Infant or child less than 2 years of age
- Episode that is frightening to the observer that includes some combination of the following:
  - Apnea
  - Skin color change (cyanosis, pallor, erythema)
  - Marked change in muscle tone
  - Choking or gagging not associated with feeding or witnessing foreign body aspiration

**BLS**

- Perform assessment using the *Pediatric Assessment Triangle*
- Obtain a description of the event including nature, duration, and severity
- Assess the environment for possible causes
- When obtaining the medical history, include questions to identify any: current medications, chronic diseases, current or recent infections, evidence of seizure activity, gastroesophageal reflux, or recent trauma
- Apply oxygen and be prepared to support ventilation during transport

**ALS**

- Place patient on cardiac monitor
- Establish IV/IO access only if required by patient's clinical condition

**MC**

- If the parent or guardian refuses medical care or transport, clinician SHALL consult with a Pediatric Base Station physician

**Clinical Pearls**

- Most patients will appear stable upon assessment. However, this episode may be a sign of serious underlying illness or injury. All suspected ALTE/BRUE patients should be transported for further medical evaluation.

# Angioedema – Adult



**Indications**

- Gradual onset of severe, isolated swelling of the lips, tongue, soft palate and uvula, over hours to days, in patients 18 years of age or older, AND
- ACE-inhibitor medication use within the past month, AND
- NOT associated with any other allergic reaction/anaphylaxis symptoms, such as urticaria, flushing, wheezing, GI upset or hypotension, or contact with a known/suspected allergen
  - If any of these signs/symptoms are present, refer to *Allergic Reaction: Anaphylaxis – Adult* protocol

**BLS**

- For severe angioedema (swelling) of the tongue and lips that obstructs the view of the posterior pharynx:
  - *Epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh OR
  - If available, *epinephrine* (1 mg/ ml) 0.5 mg IM in the lateral thigh

**ALS**

- For severe angioedema involving the tongue and lips that obstructs the view of the posterior pharynx:
  - *Epinephrine* (1 mg/ml) 0.5 mg IM. May repeat *epinephrine* IM every 5 minutes to maximum of 3 doses for persistent severe reaction.
  - Establish IV/IO access.
  - If there is any change or worsening of condition that suggests anaphylaxis, treat according to the *Allergic Reaction: Anaphylaxis – Adult* protocol.

**MC**

- For patients who take an ACE-inhibitor medication and do not improve with an initial dose of *epinephrine*:
  - Administer *tranexamic acid (TXA)* 1 gram IV/IO over 3-5 minutes.
- Additional doses of *epinephrine auto-injector*, *epinephrine*, and *tranexamic acid (TXA)*

**Clinical Pearls**

- ACE-inhibitors are blood pressure medications that end in "-pril" (e.g., lisinopril, enalapril).
- Patients with recurrent or hereditary angioedema (C1-esterase deficiency) are less likely to benefit from *TXA*.
- Re-check dosing and concentration of *epinephrine* prior to administration.
- *Epinephrine* 1 mg/ml (previously known as 1:1000) is appropriate for the IM route only.
- *Epinephrine* should never be given by IV route, except for the *epinephrine* infusion for patients in anaphylaxis or for patients in cardiac arrest.
- Most patients with ACE-I tongue/lip edema do not require immediate airway intervention or surgical airway. Optimal airway management will likely require flexible nasolaryngoscopy to evaluate serially for laryngeal involvement and intubation if needed. Early receiving facility consultation is advised.

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# HYPERglycemia – Adult & Pediatric



**Indications**

- Blood glucose greater than 300 mg/dL
- Patient-reported high blood glucose
- Diabetic patients with other medical symptoms (e.g., vomiting)
- Altered mental status
- Alcohol intoxication, suspected
- Seizure
- Stroke symptoms
- Unresponsive patients
- Cardiac arrest

**BLS**

- Check blood glucose level

**ALS**

- If blood glucose is greater than 300 mg/dL, administer *Lactated Ringer's* 10 mL/kg IV bolus unless rales, wheezing, pedal edema, history of renal failure or signs of CHF are present.
- If blood glucose is greater than 300 mg/dL, **no fluid bolus** is indicated for pediatric patients. Consult with the receiving hospital.

**MC**

- Not applicable

**Indications**
- Blood glucose less than 70 mg/dL
- Patient-reported low blood glucose
- Diabetic patients with other medical symptoms (e.g., vomiting)
- Altered mental status
- Alcohol intoxication, suspected
- Seizure
- Stroke symptoms
- Unresponsive patients
- Cardiac arrest
- Pediatric bradycardia

**BLS**

- Check blood glucose level

**Patients of all ages:**
- If blood glucose is less than 70 mg/dL, administer 10-15 grams of *oral glucose* between the patient's gum and cheek.
- Administer additional dose of 10-15 grams of *oral glucose* if not improved after 10 minutes.
- If patient is conscious and alert, may assist with administration of juice or carbohydrate-rich food by mouth.

**ALS**

**Patients 18 years and older:**
- If blood glucose is less than 70 mg/dL, administer *10% dextrose* in 50 mL (5 gram) boluses, 1 minute apart, to a maximum of 250 mL OR 25 grams of 50% dextrose IVP/IO (IO route should be used only if already established to give other lifesaving medications), until:
  - the patient has a return to normal mental status, and
  - the patient's blood glucose is at least 90 mg/dL
- If patient has persistently altered mental status and blood glucose less than 90 mg/dL despite treatment, repeat dosing regimen above.
- If unable to initiate an IV and blood glucose is less than 70 mg/dL, administer *glucagon* 1 mg IM/IN.
- If the patient has persistently altered mental status and blood glucose less than 90 mg/dL at 15 minutes, transport to the hospital should not be delayed.

- **Patient less than 28 days:** If blood glucose is less than 40 mg/dL, administer 2 mL/kg of *10% dextrose* IV/IO. Recheck glucose after first dose.
- **Patient 28 days or greater until the 18th birthday:** If blood glucose is less than 70 mg/dL, administer 2–4 mL/kg of *10% dextrose* IV/IO to a maximum of 25 grams. Recheck glucose after first dose.
- If unable to start IV and blood glucose is less than 70 mg/dL:
  - **28 days–4 years of age:** *Glucagon* 0.5 mg IM/IN.
  - **5 years of age until 18th birthday:** *Glucagon* 1 mg IM/IN. Recheck blood glucose.
- If the patient has persistently altered mental status and blood glucose less than 90 mg/dL at 15 minutes, transport to the hospital should not be delayed.

**MC**

- **Patient less than 28 days:** If blood glucose is less than 40 mg/dL, obtain medical consultation to administer second dose of *10% dextrose* IV/IO.
- **Patient 28 days–18 years of age:** If blood glucose is less than 70 mg/dL, obtain medical consultation to administer second dose of *10% dextrose* IV/IO.

# 4.11-A Hyperkalemia/Crush Syndrome – Adult

**Indications**

- Elevated potassium levels, known from blood tests or suspected on EKG (peaked T waves, wide QRS or bradycardia).
  - Risk factors for elevated potassium levels include:
    - History of renal failure or chronic kidney disease
    - Recently missed dialysis appointments
    - Dialysis patients who are hemodynamically unstable
- Crush syndrome: entrapped patients with prolonged extrication time, generally greater than 60 minutes

**BLS**

- Assess and treat for shock, if indicated.
- Continuously monitor airway and mental status.
- Monitor vital signs.
- For crush syndrome: if an extremity is entrapped, assess pulse/motor/sensation above and below the entrapment, if possible, and control any visible hemorrhage.

**ALS**

- Establish IV/IO access.
- Administer *Lactated Ringer's* per *Shock: Hypoperfusion* protocol.
- Continuous cardiac monitoring and obtain a 12-lead EKG, if possible.
- If the patient is bradycardic, refer to the *Bradycardia* protocol.
- **Hyperkalemia without crush syndrome**
  - *Calcium chloride* 1 gram IV/IO over 3-5 minutes.
  - *Sodium bicarbonate* 50 mEq IV/IO over 5 minutes
  - *Albuterol* 20 mg nebulized (high dose)
- **Crush Syndrome**
  - **Immediately before extrication**
    - *Calcium chloride* 1 gram IV/IO over 3-5 minutes
  - **After extrication**
    - *Sodium bicarbonate* 50 mEq IV/IO over 5 minutes
    - *Albuterol* 20 mg nebulized
    - *Calcium chloride* 1 gram IV/IO over 3-5 minutes may be repeated every 30 minutes as needed for EKG signs of hyperkalemia

**MC**

- As needed

**Clinical Pearls**

- Flush IV/IO with 10 mL of NS or LR between *calcium chloride* and *sodium bicarbonate* administration to avoid precipitation in the IV/IO.
- Crush syndrome is the systemic manifestation of a prolonged, severe crushing injury. This is a potentially fatal condition that is primarily characterized by hyperkalemia, hypovolemia, renal injury, and tissue ischemia.
- Patients are at risk of crush syndrome if part of the body or limb is entrapped and crushed under a heavy load, such as during a building collapse, motor vehicle collision, etc. for greater than 60 minutes.

# Hyperkalemia/Crush Syndrome – Pediatric 4.11-P

**Indications**

- Elevated potassium levels, known from blood tests or suspected on EKG (peaked T waves, wide QRS or bradycardia).
  - Risk factors for elevated potassium levels include:
    - History of renal failure or chronic kidney disease
    - Recently missed dialysis appointments
    - Dialysis patients who are hemodynamically unstable
- Crush syndrome: entrapped patients with prolonged extrication time, generally greater than 60 minutes

**BLS**

- Assess and treat for shock, if indicated.
- Continuously monitor airway and mental status.
- Monitor vital signs.
- For crush syndrome: if an extremity is entrapped, assess pulse/motor/sensation above and below the entrapment, if possible, and control any visible hemorrhage.

**ALS**

- Establish IV/IO access.
- Administer *Lactated Ringer's* per *Shock: Hypoperfusion* protocol.
- Continuous cardiac monitoring and obtain a 12-lead EKG, if possible.
- If the patient is bradycardic, refer to the *Bradycardia* protocol.
- **Hyperkalemia without crush syndrome**
  - *Calcium chloride* 20 mg/kg (0.2 mL/kg) IV/IO over 3–5 minutes. Maximum dose 1 gram or 10 mL.
  - *Sodium bicarbonate* 1 mEq/kg IV/IO over 5 minutes. Maximum dose 50 mEq. For patients less than 1 year of age, must be diluted 1:1 with *Lactated Ringer's*.
  - *Albuterol* nebulized
    - For patients less than 2 years of age, administer *albuterol* 1.25mg.
    - For patients 2 years of age or older, administer *albuterol* 2.5 mg.
- **Crush Syndrome**
  - **Immediately before extrication**
    - *Calcium chloride* 20 mg/kg (0.2 mL/kg) IV/IO over 3-5 minutes. Maximum dose 1 gram or 10 mL.
  - **After extrication**
    - *Sodium bicarbonate* 1 mEq/kg IV/IO over 5 minutes. Maximum dose 50 mEq. For patients less than 1 year of age, must be diluted 1:1 with *Lactated Ringer's*.
    - *Albuterol* nebulized
      - For patients less than 2 years of age, administer *albuterol* 1.25mg.
      - For patients 2 years of age or older, administer *albuterol* 2.5 mg.
    - *Calcium chloride* 20 mg/kg (0.2 mL/kg) IV/IO over 3-5 minutes may be repeated every 30 minutes as needed for EKG signs of hyperkalemia. Maximum single dose 1 gram or 10 mL.

**MC**

- As needed

**Clinical Pearls**

- Refer to *4.11-A Hyperkalemia/Crush Syndrome – Adult* protocol Clinical Pearls.

# Nausea/Vomiting – Adult



**Indications**
- Nausea
- Vomiting
- Active motion sickness
- Medication side effect/complication
- Prevention of nausea/vomiting (e.g., penetrating eye injury, high risk for aspiration, opioid administration)

**BLS**
- Place patient in position of comfort or in left lateral position, with consideration for *spinal motion restriction* if required.
- Allow patient to inhale vapor from an isopropyl alcohol wipe 3 times every 15 minutes, as needed and tolerated.

**ALS**
- Establish IV access, if appropriate.
- *Lactated Ringer's* fluid bolus, 20 mL/kg, if appropriate. Titrate to systolic blood pressure of 90 mmHg.
- **Nausea and vomiting (nonspecific):** administer *ondansetron* 8 mg slow IV over 2-5 minutes, OR 4-8 mg IM, OR 8 mg orally disintegrating tablet (ODT). If symptoms persist, a second dose of *ondansetron* OR *droperidol* 1.25 mg IM or IV over 2-5 minutes may be given.
- **Nausea and vomiting secondary to migraines, cannabinoid hyperemesis syndrome or stated history of cyclic vomiting syndrome:** administer *droperidol* 1.25 mg IM or IV over 2-5 minutes. If symptoms persist, *ondansetron* 8 mg slow IV over 2-5 minutes, OR 4-8 mg IM, OR 8 mg orally disintegrating tablet (ODT) may be given.

**MC**
- A third dose of *ondansetron* may be administered, with medical consultation, to a maximum of 24 mg.
- Administration of *ondansetron* for nausea and vomiting secondary to an overdose requires medical consultation.

**Clinical Pearls**
- Higher doses of *ondansetron* may prolong the patient's QTc interval and lead to cardiac dysrhythmias. Initiate cardiac monitoring when repeat doses are administered.
- Dystonic reaction is rarely seen with short-term use of *droperidol*. If suspected, administer *diphenhydramine* per protocol.

**Indications**
- Nausea
- Vomiting
- Active motion sickness
- Medication side effect/complication
- Prevention of nausea/vomiting (e.g., penetrating eye injury, high risk for aspiration, opioid administration)

**BLS**
- Place patient in position of comfort or in left lateral position, with consideration for *spinal motion restriction* if required.
- Allow patient to inhale vapor from an isopropyl alcohol wipe 3 times every 15 minutes, as needed and tolerated.

**ALS**
- Establish IV access, if appropriate.
- *Lactated Ringer's* fluid bolus, 20 mL/kg, if age-related vital signs and patient's condition indicate hypoperfusion. Titrate to systolic blood pressure of (2 x patient's age in years) + 70 mmHg.
- 28 days to 12 years of age: *Ondansetron* 0.1 mg/kg SLOW IV over 2–5 minutes
- 13 to 18 years of age:
  - **Nausea and vomiting (nonspecific):** administer *ondansetron* 8 mg slow IV over 2-5 minutes, OR 4-8 mg IM, OR 8 mg orally disintegrating tablet (ODT). If symptoms persist, a second dose of *ondansetron* OR *droperidol* 1.25 mg IM or IV over 2-5 minutes may be given.
  - **Nausea and vomiting secondary to migraines, cannabinoid hyperemesis syndrome or stated history of cyclic vomiting syndrome:** administer *droperidol* 1.25 mg IM or IV over 2-5 minutes. If symptoms persist, *ondansetron* 8 mg slow IV over 2-5 minutes, OR 4-8 mg IM, OR 8 mg orally disintegrating tablet (ODT) may be given.

**MC**
- A third dose of *ondansetron* may be administered, with medical consultation, to a maximum total dose of 0.3 mg/kg or 24 mg, whichever is lower.
- Administration of *ondansetron* for nausea and vomiting secondary to an overdose requires medical consultation.

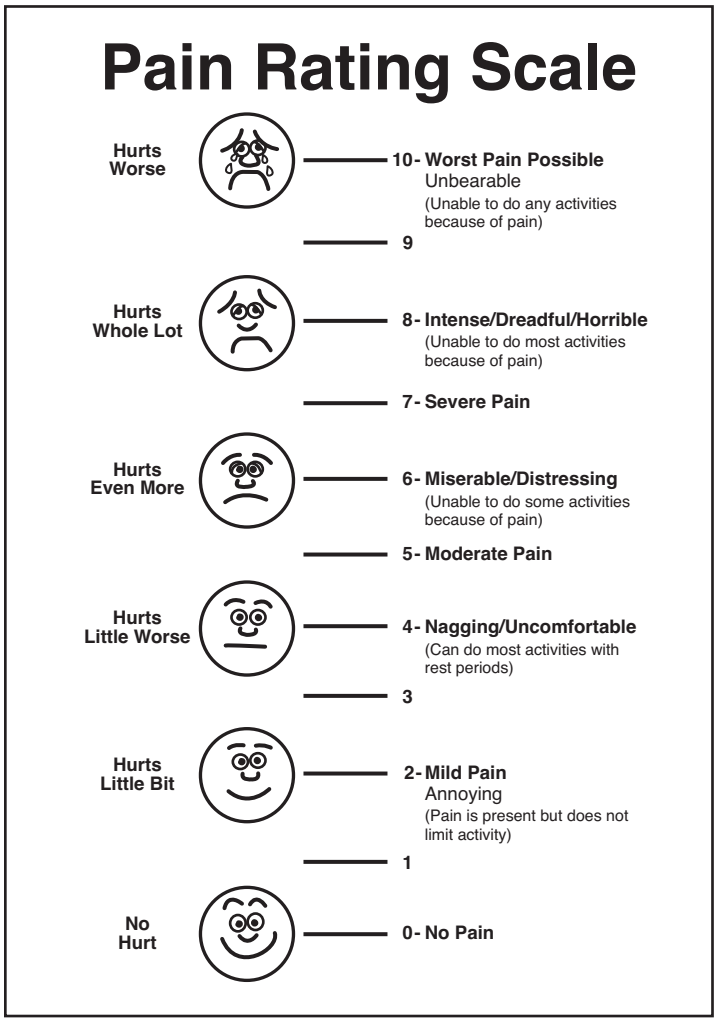
**Clinical Pearls**
- Higher doses of *ondansetron* may prolong the patient's QTc interval and lead to cardiac dysrhythmias. Initiate cardiac monitoring when repeat doses are administered.

**Indications**

- Patient presents with a painful condition that would benefit from treatment with an analgesic. This includes DNR/MOLST patients and patients being pre-medicated for a painful procedure.
  - **Mild to moderate pain:** Pain rated in the 1-5 range on a scale of 1-10. Isolated musculoskeletal injuries such as sprains and strains.
  - **Moderate to severe pain:** Pain rated in the 5-10 range on a scale of 1-10.

**BLS**

- Measure level of pain. Ask patient to rate their pain on a scale from 0 (no pain) to 10 (worst pain imaginable). Patients who have a difficult time communicating their condition can be asked to rate their pain using the FACES scale.




- Allow patient to remain in position of comfort unless contraindicated by patient's condition.
- **Mild to Moderate Pain (1-5 on FACES scale):**
  - *Acetaminophen* for mild to moderate pain.
    - FOUR unit doses of 160 mg/5 mL each for a total of 640 mg/20 mL OR
    - 325 mg pill or tablet X 2 for a total of 650 mg with sips of water as tolerated by the patient. No repeat doses.

**ALS**

- **Moderate to Severe Pain (5-10 on FACES scale):**
  - *Fentanyl* IN (Preferred) or IV/IO/IM: 1 **mcg**/kg to a maximum initial dose of 200 **mcg** (For IN route, dosing may be limited due to volume limitations – administration of max 1 mL per nare).
    - ♦ Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of *fentanyl* 1 **mcg**/kg to a maximum dose of 200 **mcg**. **OR**
  - *Morphine* IV/IO/IM: 0.1 mg/kg maximum single dose of 20 mg.
    - ♦ Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of *morphine* 0.05 mg/kg to a maximum additional dose of 10 mg. **OR**
  - *Ketamine* IV/IO: 0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg. If IV unavailable, administer 0.5 mg/kg IN/IM (If delivery device is available; divide administration of the dose equally between the nares to a maximum of 1 mL per nare).
    - ♦ Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of *ketamine* 0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg. If IV unavailable, and pain remains moderate to severe, then administer a second dose of *ketamine* 0.5 mg/kg IN/IM. **OR**
  - *Ketorolac* IV/IM: single dose of 15 mg IV only. No repeat doses. If IV unavailable, administer single dose of 30 mg IM. No repeat doses.

**MC**

- Obtain medical consultation for additional doses of *fentanyl*, *morphine*, or *ketamine*, based on the patient's level of pain following two doses of medication. *Ketorolac* and *acetaminophen* are single dose-only medications.

**Clinical Pearls**

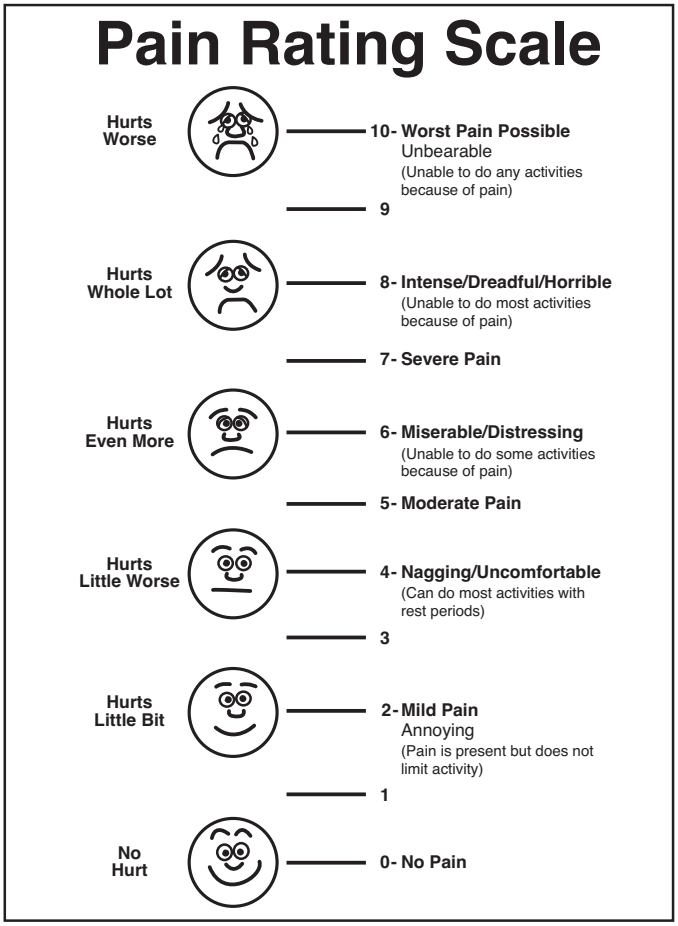
- Administration of pain medication does not eliminate the need for transport of the patient to the hospital to receive a comprehensive evaluation of the cause of their pain and appropriate definitive treatment.
- *Ketamine* is indicated for musculoskeletal, back, abdominal and flank pain (and procedural analgesia). Do not administer for chest pain, eye injury, or headaches.
- Chest pain that is thought to be due to acute coronary syndrome should initially be managed with *nitroglycerin*. If pain remains refractory to *nitroglycerin*, consider the use of opioid analgesia. Avoid opioids for patients with suspected exacerbation of congestive heart failure.
- Use opioid analgesia with caution in the management of the multiple trauma patient. Observe for evidence of hypotension and correct with fluid boluses. Reassess vital signs after administration of the medicine.
- Use analgesia with caution in the management of patients with altered mental status. Observe for respiratory depression and take steps to ensure a stable airway.
- Patients who have received a parenteral (IV/IO/IM/IN) dose of opioid, benzodiazepine, or *ketamine* from sending facility or ALS must be transported by ALS:
  - If any of the above medications were given within the past 1 hour **OR**
  - If the patient has an altered mental status without return to their baseline after receiving any of above medications **OR**
  - If the patient has potential for respiratory compromise (RR less than 14, oxygen saturation less than 94%, clinician judgment) after receiving any of the above medications.

**Indications**

- Patient presents with a painful condition that would benefit from treatment with an analgesic. This includes DNR/MOLST patients and patients being pre-medicated for a painful procedure.
  - **Mild to moderate pain:** Pain rated in the 1-5 range on a scale of 1-10. Isolated musculoskeletal injuries such as sprains and strains. Pain related to childhood illnesses such as headache, ear infection, and pharyngitis.
  - **Moderate to severe pain:** Pain rated in the 5-10 range on a scale of 1-10.

**BLS**

- Measure level of pain. Ask older children to rate their pain on a scale from 0 (no pain) to 10 (worst pain imaginable). Young children can be asked to rate their pain using the FACES scale, which provides 5 levels of pain perception.




- Allow patient to remain in position of comfort unless contraindicated.
- **Mild to Moderate Pain (1-5 on FACES scale):**
  - *Acetaminophen* for mild to moderate pain per child or parent (1–5 on FACES scale)
    - Less than 3 months of age: Not indicated
    - 3 months to 2 years of age:

| **Age** | Under 3 months | 3 months | 4-11 months | 12-23 months |
|---|---|---|---|---|
| **Liquid 160 mg/ 5 mL** | Not indicated | 1.25 mL | 2.5 mL | 3.75 mL |

**BLS**

- 2–4 years: Unit dose 160 mg/5 mL
- 5–12 years: TWO unit doses of 160 mg/5 mL each for a total of 320 mg/10 mL
- 13 years and above: FOUR unit doses of 160 mg/5 mL each for a total of 640 mg/20 mL OR in a form of 325 mg pill or tablet x2 for a total of 650 mg with sips of water as tolerated by the patient.

**ALS**

- **Moderate to Severe Pain (5-10 on FACES scale):**
  - *Fentanyl* IN. If IN route not accessible, then use IV/IO/IM route.
    - Administer 1 **mcg**/kg to a maximum initial dose of 200 **mcg** (For IN route, dosing may be limited due to volume limitations — administration of max 1mL per nare).
    - Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of *fentanyl* 1 **mcg**/kg to a maximum dose of 200 **mcg**.

  **OR**

  - *Morphine* IV/IM 0.1 mg/kg maximum single dose of 20 mg.
    - Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of *morphine* 0.05 mg/kg to a maximum additional dose of 10 mg.

  **OR**

  - *Ketamine* IV/IO 0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg.
    - Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of *ketamine* 0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg.
    - If IV unavailable, administer 0.5 mg/kg IN/IM (If delivery device is available, divide administration of the dose equally between the nares to a maximum of 1 mL per nare). Reassess in 15 minutes. If pain remains moderate to severe, then administer a second dose of *ketamine* 0.5 mg/kg IN/IM.

  **OR**

  - *Ketorolac* IV/IM:
    - Patients who have not yet reached their 2nd birthday: Contraindicated.
    - Age 2 to patients who have not yet reached their 18th birthday: Administer 0.5 mg/kg IV to a maximum total dose of 15 mg. No repeat doses.
      - If IV is unavailable, administer 1 mg/kg IM to a maximum total dose of 30 mg. No repeat doses.

**MC**

- Obtain medical consultation for additional doses of *fentanyl*, *morphine*, or *ketamine*, based on the patient's level of pain following two doses of medication. *Ketorolac* and *acetaminophen* are single dose-only medications.
- *Ketamine* may be used for analgesia prior to pediatric cardioversion only when cardioversion has been approved by consult.

**Clinical Pearls**

- Administration of pain medication does not eliminate the need for transport of the patient to the hospital to receive a comprehensive evaluation of the cause of their pain and appropriate definitive treatment.
- *Ketamine* is indicated for musculoskeletal, back, abdominal and flank pain (and procedural analgesia). Do not administer for chest pain, eye injury, or headaches.

**Indications**

- Seizure: involuntary, repetitive muscle movements, usually abrupt in onset, in patients 18 years or older
  - May be accompanied by decreased mental status, incontinence or head injury

**BLS**

**Seizure has stopped**

- Identify and treat injuries
- Check blood glucose and treat per *Hypoglycemia* protocol
  - If blood glucose is less than 70 mg/dL, administer *oral glucose* paste 10-15 grams between the gum and cheek. May repeat one additional dose of *oral glucose* paste if not improved after 10 minutes.

**Active seizure**

- Do not restrain the patient or place any device into the patient's mouth.
- Protect the patient from injury.
- Administer supplemental oxygen if $SpO_2$ is less than 94% or if unable to obtain pulse oximetry reading.
- Check blood glucose and treat per *Hypoglycemia* protocol.

**ALS**

**Active seizure**

- Administer *midazolam*:
  - IV/IO: 0.1 mg/kg IV/IO over 1-2 minutes, to a maximum single dose of 5 mg. May repeat IV/IO dose one time after 5 minutes for continued seizure activity. **OR**
  - IM/IN: 0.2 mg/kg IN or IM to a maximum single dose of 10 mg. No repeat IM/IN doses.
  - Reduce *midazolam* doses by 50% for patients 69 and older.
  - For continued seizures after max dose of *midazolam*, see MC section.
- **Pregnant patients with seizure**
  - **Less than 20 weeks gestation:** administer *midazolam* followed by *magnesium sulfate* 4 grams IV/IO mixed in 50–100 mL of approved diluent.
  - **Greater than 20 weeks gestation OR up to 6 weeks postpartum:** administer *magnesium sulfate* 4 grams IV/IO over 10 minutes mixed in 50–100 mL of approved diluent. If no IV access is obtainable or if seizures persist after *magnesium sulfate*, administer *midazolam*.

**MC**

- After maximum dose of *midazolam*, for patients with continued seizure at 10 minutes:
  - Administer *ketamine* 1 mg/kg IV/IO over 1 minute in 50-100 mL of approved diluent (normal saline or D5W), or 2 mg/kg IM/IN.
  - Additional doses of *ketamine* require repeat medical consultation.
  - **All patients receiving *ketamine* must have close airway, cardiac rhythm, pulse oximetry monitoring. Be prepared to actively manage the airway with BVM, suction, airway adjuncts, supraglottic airway or endotracheal intubation. A second ALS clinician should accompany the patient for transport.**
- *Magnesium sulfate*: if seizures persist after the first dose of *magnesium sulfate*, consult for an additional dose.

**Indications**

- Seizure: involuntary, repetitive muscle movements, usually abrupt in onset, in patients less than 18 years of age
  - May be accompanied by decreased mental status, incontinence or head injury

## BLS

**Seizure has stopped**

- Identify and treat injuries
- Check blood glucose and treat per *Hypoglycemia* protocol
  - If blood glucose is less than 70 mg/dL, administer *oral glucose* paste 10-15 grams between the gum and cheek. May repeat one additional dose of *oral glucose* paste if not improved after 10 minutes.

**Active seizure**

- Do not restrain the patient or place any device into the patient's mouth.
- Protect the patient from injury.
- Administer supplemental oxygen if $SpO_2$ is less than 94% or if unable to obtain pulse oximetry reading
- Check blood glucose and treat per *Hypoglycemia* protocol.

## ALS

**Active seizure (or seizure lasting more than 10 minutes)**

- Assist patients with the administration of their prescribed benzodiazepine, if available.
  - ALERT If a patient-prescribed benzodiazepine is given, the patient may only receive one dose of *midazolam* from EMS supply.
- Administer *midazolam*:
  - IV/IO: 0.1 mg/kg IV or IO over 1-2 minutes, to a maximum single dose of 5 mg. May repeat dose one time for persistent seizure activity after 5 minutes. **OR**
  - IM/IN: 0.2 mg/kg IN or IM to a maximum single dose of 5 mg. May repeat dose one time for persistent seizure activity after 5 minutes.
  - For continued seizures after max dose of *midazolam*, see MC section.
- **Pregnant patients with seizure**
  - **Less than 20 weeks gestation:** administer *midazolam* followed by *magnesium sulfate* 4 grams IV/IO mixed in 50-100 mL of approved diluent
  - **Greater than 20 weeks gestation OR up to 6 weeks postpartum:** administer *magnesium sulfate* 4 grams IV/IO over 10 minutes mixed in 50–100 mL of approved diluent. If no IV access is obtainable or if seizures persist after *magnesium sulfate*, administer *midazolam*.

## MC

- Consultations for seizure patients who are less than 18 years old should be with a Pediatric Base Station.
- After maximum dose of *midazolam*, for patients with continued seizure at 10 minutes:
  - **Age under 3 years:** consult with a Pediatric Base Station.
  - **Age 3 and older:** Administer *ketamine* 1 mg/kg IV/IO over 1 minute in 50–100 mL of approved diluent (normal saline or D5W), or 1 mg/kg IM/IN.
  - **All patients receiving *ketamine* must have close airway, cardiac rhythm, pulse oximetry monitoring. Be prepared to actively manage the airway with BVM, suction, airway adjuncts, supraglottic airway or endotracheal intubation. A second ALS clinician should accompany the patient for transport.**
- *Magnesium sulfate*: if seizures persist after the first dose of *magnesium sulfate*, consult for an additional dose.

# Sepsis – Adult



**Indications**

- Adult patients (18 years of age and older) with a suspected source of infection **and** present with at least **two** of the following criteria:
  - Temp greater than 100.4°F (38°C) or less than 95.9°F (35.5°C)
  - HR greater than 100 bpm
  - RR greater than 25 (or $ETCO_2$ less than or equal to 32 mmHg)
  - Hypotension (systolic BP less than 90 mmHg)

## BLS

- Place patient in position of comfort, or supine if hypotension is present.
- Monitor airway and respiratory status, manage as required using the appropriate respiratory distress protocol.
- Rendezvous with ALS or transport to the closest appropriate facility. Use the term "sepsis alert" during hospital notification. Patients with suspected sepsis and either altered mental status or hypotension are Priority 1 patients.

## ALS

- Establish large-bore IV access.
- Obtain a second IV, if it will not delay transport.
- If IV access is unsuccessful and transport time will exceed 20 minutes, obtain IO access for Priority 1 or hypotensive (septic shock) patients

**IV Fluids**

- If not fluid-sensitive, infuse *Lactated Ringer's* 2 L IV wide-open. Reassess every 500 mL for shortness of breath, blood pressure, and $SpO_2$ saturation changes. Accurately document IV fluid start time and amount of *Lactated Ringer's* infused.
  - If hypotension persists after 2 L of *Lactated Ringer's*, provide additional *Lactated Ringer's* up to a maximum of 30 mL/kg IV

**OR**

- If fluid-sensitive (i.e., has a history CHF, pulmonary edema, or end-stage renal disease), infuse 250 mL and carefully monitor and reassess. Repeat 250 mL once if no worsening of respiratory status is noted, to a max of 500 mL (consultation may be obtained to provide more fluid).

***Epinephrine* Infusion**

- For significant hypotension (systolic blood pressure less than 70 mmHg or mean arterial pressure less than 50 mm Hg) AND altered mental status; initiate *epinephrine* infusion CONCURRENTLY with *Lactated Ringer's* as outlined above.
  - After *epinephrine* infusion is initiated, prioritize appropriate bolus of *Lactated Ringer's* and titrate down *epinephrine* infusion to maintain MAP greater than 65 mmHg or SBP greater than 90 mmHg
- For persistent hypotension (systolic blood pressure less than 90 mmHg) after 30 mL/kg fluid bolus, initiate *epinephrine* infusion.
- For fluid-sensitive patients, initiate *epinephrine* infusion if the patient remains hypotensive (SBP less than 90, MAP less than 65) after a 500 mL fluid bolus.

**Additional Patient Care**

- Monitor cardiac rhythm and perform 12-lead EKG. Do not delay IV therapy or fluid bolus for these interventions.
- Obtain peripheral blood samples if time permits.

MC

- Additional fluid beyond 30 mL/kg, or a modification to fluid dose may be approved by online medical consultation.
- If above blood pressure goals are not met upon reaching maximum rate (2 mL/min) of *epinephrine* infusion, obtain online medical consultation.

**Clinical Pearls**

- Infection can cause a systemic response resulting in fever, altered mental status, shock (including or excluding hypotension), and death. Early recognition and treatment with aggressive fluids, when not contraindicated, and early hospital notification may improve survival rates and patient outcomes.
- The following patient populations are considered especially high-risk for sepsis and should have their temperature measured:
  - Altered mental status
  - Patients in long-term care facilities (nursing home)
  - Indwelling catheters
  - Oncology patients
  - Solid organ transplant
  - Bed-bound
  - Post-operative
  - Currently on antibiotics
  - Asplenic
  - Left ventricular assist device

**Indications**

- Pediatric patients (less than 18 years of age) with a suspected source of infection **and** present with at least **three** of the Pediatric Sepsis Rule-In Criteria by Age.
- Patients who do not meet at least three criteria may be treated using this protocol with approval from a pediatric base station if sepsis is suspected by EMS clinician.

| **Pediatric Sepsis Rule-In Criteria by Age** | | | | | | |
|---|---|---|---|---|---|---|
| Suspected or known infection plus three criteria | | | | | | |
| | **Less than 28 days** | **1-12 months** | **1 year but less than 2 years** | **2-4 years** | **5-12 years** | **13-17 years** |
| Heart Rate (sustained) | greater than 205 bpm | greater than 205 bpm | greater than 190 bpm | greater than 140 bpm | greater than 140 bpm | greater than 100 bpm |
| Respiratory Rate | greater than 60 rpm | greater than 60 rpm | greater than 40 rpm | greater than 40 rpm | greater than 34 rpm | greater than 25 rpm |
| Temp | greater than 38.0 C° or greater than 100.4 F° | | | | | |
| Cap Refill/Skin | Delayed (greater than 3 seconds), mottled | | | | | |
| Systolic BP (mmHg) | less than 60 | less than 70 | (less than 70+ (age x2)) | (less than 70+ (age x2)) | (less than 70+ (age x2)) | less than 90 |
| Mental Status | Unresponsive, confused, inappropriate, lethargic | | | | | |
| High Risk Condition | Cancer, Asplenia, Sickle Cell Disease, bone marrow or solid organ transplant, central or indwelling line/catheter, immunodeficiency or immunosuppression | | | | | |
| | | | | | | |
| Meeting any of these criteria indicates standing order initiation of a fluid bolus. | | | | | | |

- Patients who meet the sepsis rule-in criteria and have at least one of the High-Risk Sepsis Rule-In Criteria by Age (shaded) should receive aggressive standing order fluid therapy. Other patients meeting the pediatric sepsis rule-in criteria, but not having one of the high-risk signs, may be treated only after contacting a pediatric base station for medical consultation.

**BLS**

- Place patient in position of comfort, or supine if hypotension is present.
- Monitor airway and respiratory status, manage as required using the appropriate respiratory distress protocol.
- If altered mental status, blood glucose check is required.
- Transport to the closest appropriate facility. Use the term “sepsis alert” in consultation with the receiving facility. Patients with suspected sepsis and either altered mental status or hypotension are Priority 1 patients.

**ALS**

- If patient meets the pediatric sepsis rule-in criteria and meets one of the high-risk criteria (shaded), initiate IV/IO access and provide *Lactated Ringer's* 20 mL/kg bolus IV/IO over 5–20 min. Maximum single dose of 2 L. Accurately document IV fluid start time and amount of *Lactated Ringer's* infused.
- Monitor closely for signs of respiratory distress, rales, or delayed capillary refill (greater than 2 seconds). If respiratory status deteriorates rapidly, stop bolus and obtain medical consultation.

  **OR**
- For volume-sensitive children, administer initial fluid bolus of 10 mL/kg *Lactated Ringer's* IV/IO (max of 250 mL). Volume-sensitive children include: neonates (birth to 28 days), congenital heart diseases, chronic lung disease, or chronic renal failure.
- If patient's vital signs do not improve after 20 mL/kg fluid, consider additional 20 mL/kg *Lactated Ringer's* boluses (up to a max of 60 mL/kg total, including first bolus, in one hour).
- Monitor cardiac rhythm.

**MC**

- *Pediatric epinephrine* infusion dosage
  - The following dosing chart should be used for pediatric patients less than 50 kg who do not achieve an age-appropriate BP (70 + 2 x Age) after 60 mL/kg fluid bolus (using approved epinephrine infusion and 60 drop set):

| Weight range (kg) | Initial epinephrine dose | If goal blood pressure not achieved at 5 min, increase to |
|---|---|---|
| LESS than 10 kg | 6 drops/min (0.1 mL/min) | 12 drops/min (0.2 mL/min) |
| 10-19 kg | 12 drops/min (0.2 mL/min) | 24 drops/min (0.4 mL/min) |
| 20-29 kg | 18 drops/min (0.3 mL/min) | 36 drops/min (0.6 mL/min) |
| 30-39 kg | 24 drops/min (0.4 mL/min) | 48 drops/min (0.8 mL/min) |
| 40-49 kg | 30 drops/min (0.5 mL/min) | 60 drops/min (1.0 mL/min) |

  - Blood pressure goal:
    - For patients 10 years and older (including adults), systolic blood pressure greater than 90 mmHg;
    - For patients under 10 years of age, systolic blood pressure greater than 70 + 2x age in years mmHg; **or**
    - Systolic blood pressure ordered by the pediatric base station.
    - If above blood pressure goal not met after 10 minutes, obtain online medical consultation.
- If a pediatric patient meets any of the sepsis rule-in plus one or more shaded areas in the chart, consultation with pediatric base station is required. This should be combined with local base station consultation.
- Additional fluid beyond 60 mL/kg or a modification to fluid dose may be approved by online medical consultation.

# Sepsis – Pediatric (continued)



**Clinical Pearls**

- Infection can cause a systemic response resulting in fever, altered mental status, shock (including or excluding hypotension), and death. Early recognition and treatment with aggressive fluids, when not contraindicated, and early hospital notification may improve survival rates and patient outcomes.
- The pediatric septic patient may be difficult to identify due to a poor history or clinicians may have difficulty identifying an obvious source of infection, as many pediatric sepsis patients are very young children or infants.
- The following pediatric patients are at greater risk for sepsis and should have their temperature measured:
  - Altered mental status
  - Asplenia (spleen removed from treatment of trauma or illness)
  - Bone marrow or solid organ transplant
  - Cancer patients
  - Cerebral Palsy
  - Sickle Cell Disease
  - Central or indwelling catheters
  - Immunodeficiency or immunosuppression
  - Bed-bound
  - Severe mental delay

# Shock/Hypoperfusion – Adult 4.16-A

**Indications**

- Shock is a state of inadequate blood flow to meet the oxygen demands of the cells.
- Patient may exhibit any of the following:
  - Altered mental status; cool, clammy skin; diaphoresis; hypotension, tachycardia or weak pulses; shallow, labored respirations; general weakness; and/or a decreasing pulse pressure.

**BLS**

- Place the patient in supine position with legs elevated.
- Closely monitor airway and vital signs every 5 minutes
- Pregnancy: For pregnant patients greater than 20 weeks gestation with hypotension, provide constant left lateral uterine displacement.

**ALS**

- Establish IV/IO access.
- Initiate treatment based on the suspected cause of shock.
  - **Cardiogenic Shock**
    - If rales are present, administer **small** fluid bolus (maximum bolus of 250 mL *Lactated Ringer's*). Titrate to a systolic blood pressure of 90 mmHg or greater.
    - Additional fluid requires medical consultation.
    - Initiate *epinephrine* infusion.
    - Add 1 mg of *epinephrine* (either 1 mg/mL or 0.1 mg/mL concentration) in a 100 mL bag of *Lactated Ringer's* or NS
    - Use a microdrip set (60 drops/mL) for infusion administration.
    - Adult *epinephrine* infusion dosage:
      - Administer infusion through a free-flowing IV, ideally 20 gauge or larger, or by IO.
      - Start infusion at 1 mL/min (60 drops/min) IV/IO.
      - Check blood pressure every 5 minutes. If MAP is less than 65 mmHg or systolic blood pressure is less than 90 mmHg, increase to a maximum rate of 2 mL/min (120 drops/min).
      - If above blood pressure goals are not met upon reaching maximum rate, obtain online medical consultation.
  - **Hemorrhagic Shock**
    - Administer small boluses of *Lactated Ringer's* (maximum single bolus of 250 mL prior to additional blood pressure check) to achieve and maintain a systolic blood pressure of 90 mmHg or greater (or mean arterial pressure of 65 mmHg).
      - If head injury is suspected, administer small boluses of *Lactated Ringer's* to maintain a systolic blood pressure of 110 mmHg or greater.
    - **Trauma:** For patients 15 years of age and older with suspected hemorrhagic shock (SBP less than 90) due to trauma, administer *TXA* 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes. Injury must have occurred within the past one (1) hour. Do not delay transport to initiate *TXA*.
    - **Postpartum Hemorrhage:** For postpartum hemorrhage (SBP less than 90 or HR greater than 110 AND ongoing blood loss AND within 1 hour of delivery), despite performing uterine massage: administer *TXA* 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes.

**ALS**

- **Hypovolemic or Septic Shock**

  **IV Fluids**
  - If not fluid-sensitive, infuse *Lactated Ringer's* 2 L IV wide-open. Reassess every 500 mL for shortness of breath, blood pressure, and $SpO_2$ saturation changes. Accurately document IV fluid start time and amount of *Lactated Ringer's* infused.
  - If hypotension persists after 2 L of *Lactated Ringer's*, provide additional *Lactated Ringer's* up to a maximum of 30 mL/kg IV

    **OR**
  - If fluid-sensitive (i.e., has a history CHF, pulmonary edema, or end-stage renal disease), infuse 250 mL and carefully monitor and reassess. Repeat 250 mL once if no worsening of respiratory status is noted, to a max of 500 mL (consultation may be obtained to provide more fluid).

  ***Epinephrine* Infusion**
  - For significant hypotension with **suspected sepsis** (systolic blood pressure less than 70 mmHg or mean arterial pressure less than 50 mm Hg) AND altered mental status; initiate *epinephrine* infusion CONCURRENTLY with *Lactated Ringer's* as outlined above.
  - After *epinephrine* infusion is initiated, prioritize appropriate bolus of *Lactated Ringer's* and titrate down *epinephrine* infusion to maintain MAP greater than 65 mmHg or SBP greater than 90 mmHg
  - For persistent hypotension (systolic blood pressure less than 90 mmHg) after 30 mL/kg fluid bolus, initiate *epinephrine* infusion.

- **Anaphylactic shock:** Initiate *epinephrine* infusion for patients who are in extremis with severe hypotension or impending respiratory failure, after having administered 3 doses of IM *epinephrine*. (Refer to *Anaphylaxis* protocol.)

- **Neurogenic shock** (suspected spinal cord injury which typically presents with hypotension and bradycardia)
  - If lungs are clear, administer fluid bolus of 20 mL/kg of *Lactated Ringer's* IV. Titrate to a systolic blood pressure of 110 mmHg (or mean arterial pressure of 85 mmHg). Maximum patient dose of 2,000 mL of *Lactated Ringer's*.
  - Initiate *epinephrine* infusion if systolic blood pressure remains less than 110 mmHg (or mean arterial pressure less than 85 mmHg).

**MC**

- Additional fluid beyond 30 mL/kg, or a modification to fluid dose may be approved by online medical consultation.
- If above blood pressure goals are not met upon reaching maximum rate (2 mL/min) of *epinephrine infusion*, obtain online medical consultation.

**Indications**

- Shock is a state of inadequate blood flow to meet the oxygen demands of the cells.
- Patient may exhibit any of the following:
  - Altered mental status; cool, clammy skin; diaphoresis; tachycardia or weak pulses; shallow, labored respirations; delayed capillary refill greater than 2 seconds, pallor or peripheral cyanosis; general weakness; and/or a decreasing pulse pressure.
  - Hypotension
    - Neonates (birth to 28 days): a systolic blood pressure less than 60 mmHg
    - Infants (less than 1 year of age): a systolic blood pressure less than 70 mmHg
    - Children (1 to 9 years of age): a systolic blood pressure of less than 70 + (2 x age in years)
    - Children (10 to 17 years of age): systolic blood pressure of less than 90 mmHg

**BLS**

- Place the patient in supine position with legs elevated.
- Closely monitor airway and vital signs every 5 minutes
- Pregnancy: For pregnant patients greater than 20 weeks gestation with hypotension, provide constant left lateral uterine displacement.

**ALS**

- Establish IV/IO access.
- If age-related vital signs and patient's condition indicate hypoperfusion, administer initial fluid bolus of *Lactated Ringer's* 20 mL/kg IV/IO.
  - If patient's condition does not improve, administer a second bolus of *Lactated Ringer's* 20 mL/kg IV/IO.

**OR**

- For volume-sensitive children administer initial fluid bolus of *Lactated Ringer's* 10 mL/kg IV/IO. If patient's condition does not improve, administer a second bolus of *Lactated Ringer's* 10 mL/kg *Lactated Ringer's* IV/IO.
  - Volume-sensitive children include: neonates (birth to 28 days), children with congenital heart disease, chronic lung disease, or chronic renal failure.
- For patients with suspected hemorrhagic shock due to trauma or postpartum hemorrhage administer *TXA*:
  - 12 years of age and older with SBP less than 90 mmHg: I gram *TXA* in 100 mL approved diluent (normal saline, *Lactated Ringer's*/D5W) IV/IO over 3-5 minutes
  - 5 through 11 years of age with SBP less than 70+ (2 x age in years): 500 mg *TXA* in 100 mL approved diluent (normal saline, *Lactated Ringer's*/D5W) IV/IO over 3-5 minutes
  - less than 5 years of age: medical consultation required
- For trauma patients, injury must have occurred within the past one (1) hour. Do not delay transport to initiate *TXA*.
- For postpartum patients, delivery must have occurred within the past one (1) hour. Do not delay transport to initiate *TXA*.

MC

- Third and subsequent fluid boluses, *Lactated Ringer's* 20 mL/kg IV/IO require medical consultation
- Administration of *TXA* to patients less than 5 years of age requires medical consultation.
- Pediatric *epinephrine* infusion dosage
  - The following dosing chart should be used for pediatric patients less than 50 kg, using approved *epinephrine* infusion and 60-drop set:

| Weight range (kg) | Initial epinephrine dose | If goal blood pressure not achieved at 5 min, increase to |
|---|---|---|
| **LESS than 10 kg** | 6 drops/min (0.1 mL/min) | 12 drops/min (0.2 mL/min) |
| **10-19 kg** | 12 drops/min (0.2 mL/min) | 24 drops/min (0.4 mL/min) |
| **20-29 kg** | 18 drops/min (0.3 mL/min) | 36 drops/min (0.6 mL/min) |
| **30-39 kg** | 24 drops/min (0.4 mL/min) | 48 drops/min (0.8 mL/min) |
| **40-49 kg** | 30 drops/min (0.5 mL/min) | 60 drops/min (1.0 mL/min) |

- Blood pressure goal:
  - For patients 10 to 17 years of age, systolic blood pressure greater than 90 mmHg;
  - For patients less than 10 years of age, systolic blood pressure greater than 70 + (2 x age in years); OR
  - Systolic blood pressure ordered by the pediatric base station.
  - If above blood pressure goal not met after 10 minutes, obtain online medical consultation.

**Indications**

- Blurred vision (including intermittent loss of vision in one or both eyes, which may have resolved upon arrival of EMS)
- Difficulty speaking
- Numbness or weakness (often one side only)
- Sudden onset of dizziness or loss of balance
- Severe, unexplained headache

**BLS**

- Position patient with head elevated at 30 degrees.
- Check blood glucose level; if less than 70 mg/dL, treat per *Hypoglycemia* protocol.
- Perform Cincinnati Prehospital Stroke Scale (any abnormality is positive for stroke):
  - Facial droop – have patient smile or show teeth
    - Normal – both sides of face move equally
    - Abnormal – one side of the face does not move as well as the other side
  - Arm drift – patient closes eyes and holds both arms straight out for 10 seconds
    - Normal – both arms move the same or both arms do not move at all
    - Abnormal – one arm does not move or one arm drifts down compared with other
  - Speech abnormal – have the patient say "you can't teach an old dog new tricks"
    - Normal – patient uses correct words with no slurring
    - Abnormal – patient slurs words, uses wrong words, or is unable to speak
- Perform Posterior Cerebellar Assessment (any abnormality is positive for stroke):
  - Balance: patient complains of sudden onset of loss of balance or dizziness
  - Eyes: patient has sudden vision loss (including intermittent loss of or blurred vision)
- If either the Cincinnati Prehospital Stroke Scale or Posterior Cerebellar Assessment is positive, then calculate the suspected stroke patient's Los Angeles Motor Scale (LAMS) score:
  - Facial droop
    - Absent 0
    - Present 1
  - Arm drift
    - Absent 0
    - Drifts down 1
    - Falls rapidly 2
  - Grip strength
    - Normal 0
    - Weak grip 1
    - No grip 2
- Obtain and document a telephone number for one or more individuals who have knowledge of the patient's presenting symptoms, last known well time, and medical history. Communicate this information to receiving hospital staff.

# Stroke – Adult & Pediatric (continued)



## BLS

- Destination determination for a suspected stroke patient who can be delivered to the appropriate stroke center within **22 hours** from when patient was last known well:
  - **LAMS score 0-3:** transport the patient to the closest Designated Acute Stroke Ready, Primary, thrombectomy-capable Primary, or Comprehensive Stroke Center.
  - **LAMS score of 4 or greater:** transport the patient to the closest Comprehensive Stroke Center or thrombectomy-capable Primary Stroke Center. If the patient cannot be delivered to an appropriate center within 30 minutes, go to the closest Designated Acute Stroke Ready or Primary Stroke Center.
  - **For suspected stroke patients greater than 30 minutes from *any* stroke center:** transport patient to the closest hospital or request aviation if there would be a time savings.
  - **For suspected pediatric stroke patients (have not reached their 18th birthday):** consult with a Pediatric Base Station for destination determination.
- For all suspected stroke patients within **22 hours** of last known well time, notify the receiving stroke center or hospital as soon as possible. During the notification, the clinician shall use the verbiage, "Priority 1, Stroke Alert patient with a last known well time of XX:XX" as the universal method of notifying the facility that the patient meets the stroke inclusion criteria. Hospital base station shall ensure that receiving physician is aware of the incoming stroke patient.

## ALS

- Establish IV access, preferably on the unaffected side of the body
- Obtain blood sample using a closed system
- If blood glucose is less than 70 mg/dL, treat per *Hypoglycemia* protocol
- For acute stroke patients 18 years of age and older with SBP greater than or equal to 220 **and** DBP greater than or equal to 120:
  - Confirm BP measurements with **two readings**, preferably one manual and one automatic
  - Administer *labetalol* 10 mg IV/IO over 2 minutes.
  - If SBP does not decrease by 15% from initial SBP after 10 minutes, administer a second dose of *labetalol* 10 mg IV/IO over 2 minutes.

If at any time signs of stroke or neurologic deficits worsen, immediately STOP giving *labetalol* and NOTIFY the receiving facility.

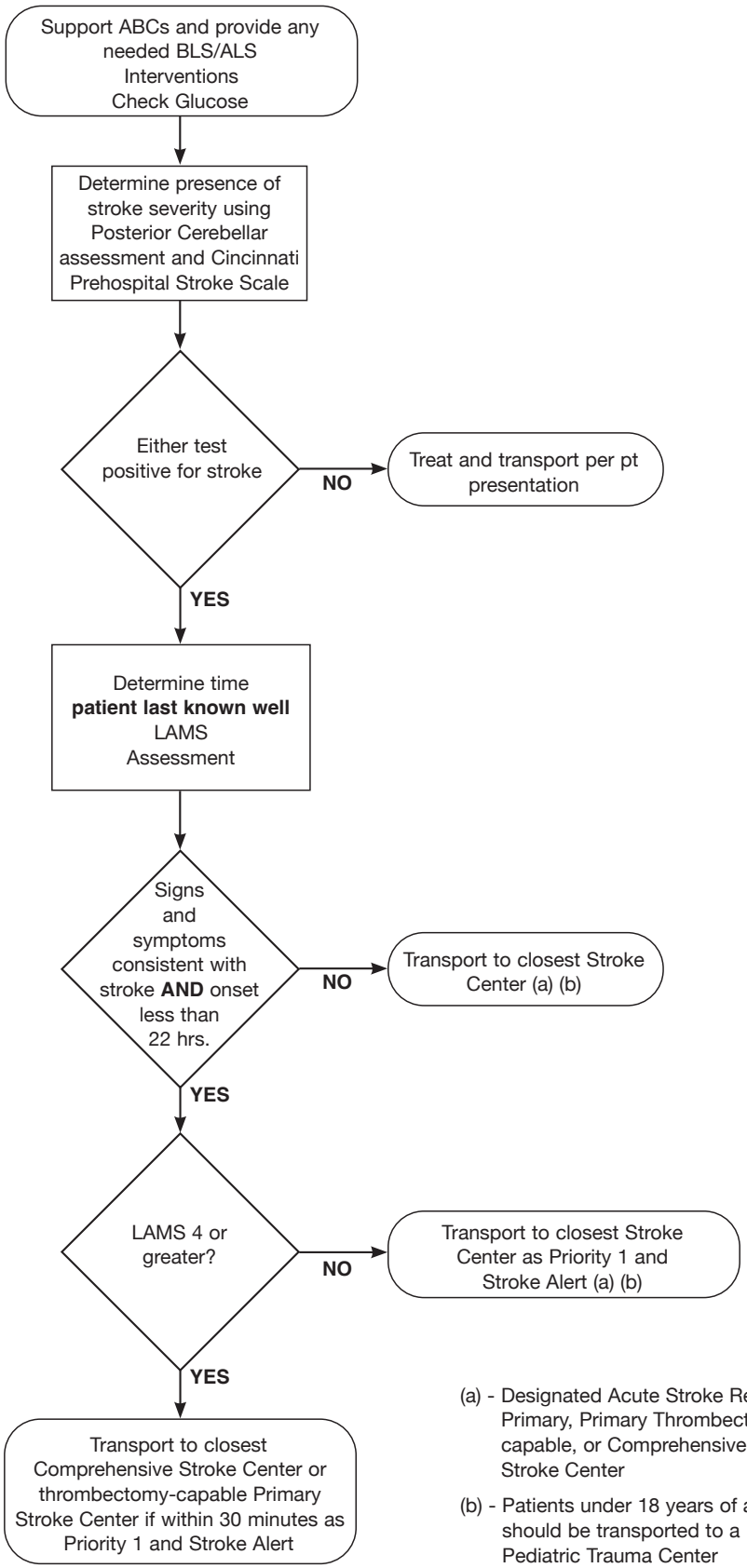
## MC

- Obtain medical consultation if the patient is hypotensive or if the clinician has questions regarding patient management or destination.
- Patients 18 years of age and older: If SBP does not decrease by 15% from initial SBP 10 minutes after the second dose of *labetalol*, additional doses of *labetalol* 20 mg IV/IO over 2 minutes may be given with medical consultation. Maximum total patient dose is 80 mg.

**Clinical Pearls**

- While strokes during pregnancy or shortly after giving birth are rare, there has been a significant rise reported in the literature. Mothers-to-be and postpartum mothers have an increased risk.
- Strokes are less common in children than in adult patients. However, children with the following conditions have a higher risk of stroke: congenital heart defects, brain injury, sickle cell disease (blood disorders), and certain types of infections (meningitis, encephalitis).

## EMS STROKE ALGORITHM




(a) - Designated Acute Stroke Ready, Primary, Primary Thrombectomy-capable, or Comprehensive Stroke Center

(b) - Patients under 18 years of age should be transported to a Pediatric Trauma Center

# Syncope – Adult & Pediatric



**Indications**

- Transient loss of consciousness with an inability to maintain postural tone
- Symptoms may resolve without intervention or prior to EMS arrival.
- Patients who "feel like they are going to pass out" (near-syncope)
- For children less than 24 months of age, refer to *ALTE/BRUE* protocol.

**BLS**

- Place patient in the supine position, with feet elevated.
- Check blood glucose. If less than 70 mg/dL, refer to *Hypoglycemia* protocol.
- Perform Cincinnati Stroke Scale. If any abnormal findings are present, refer to *Stroke* protocol.
- If the patient sustained a fall, assess for trauma and treat injuries per trauma protocols.

**ALS**

- Monitor cardiac rhythm and treat according to appropriate algorithm.
- Obtain 12-lead EKG for patients 13 years of age and older.
- Establish IV access.
- Administer LR as appropriate to maintain a systolic blood pressure of at least 90 mmHg (or MAP of 65 mmHg) for adults.
  - For patients under the age of 18, administer 20 mL/kg LR bolus titrated to age-appropriate blood pressure.

**MC**

- Not applicable.

**Clinical Pearls**

- History, physical examination, and 12-lead EKG should all be used to determine the patient's risk of an adverse outcome. Patients with history or evidence of heart failure, structural cardiac anomaly, and/or abnormal finding on EKG are at higher risk for adverse outcomes.
- Syncope in children may be associated with serious medical conditions such as heart failure or structural cardiac anomalies.

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# Obstetrics/Gynecological Emergencies: Childbirth Algorithm

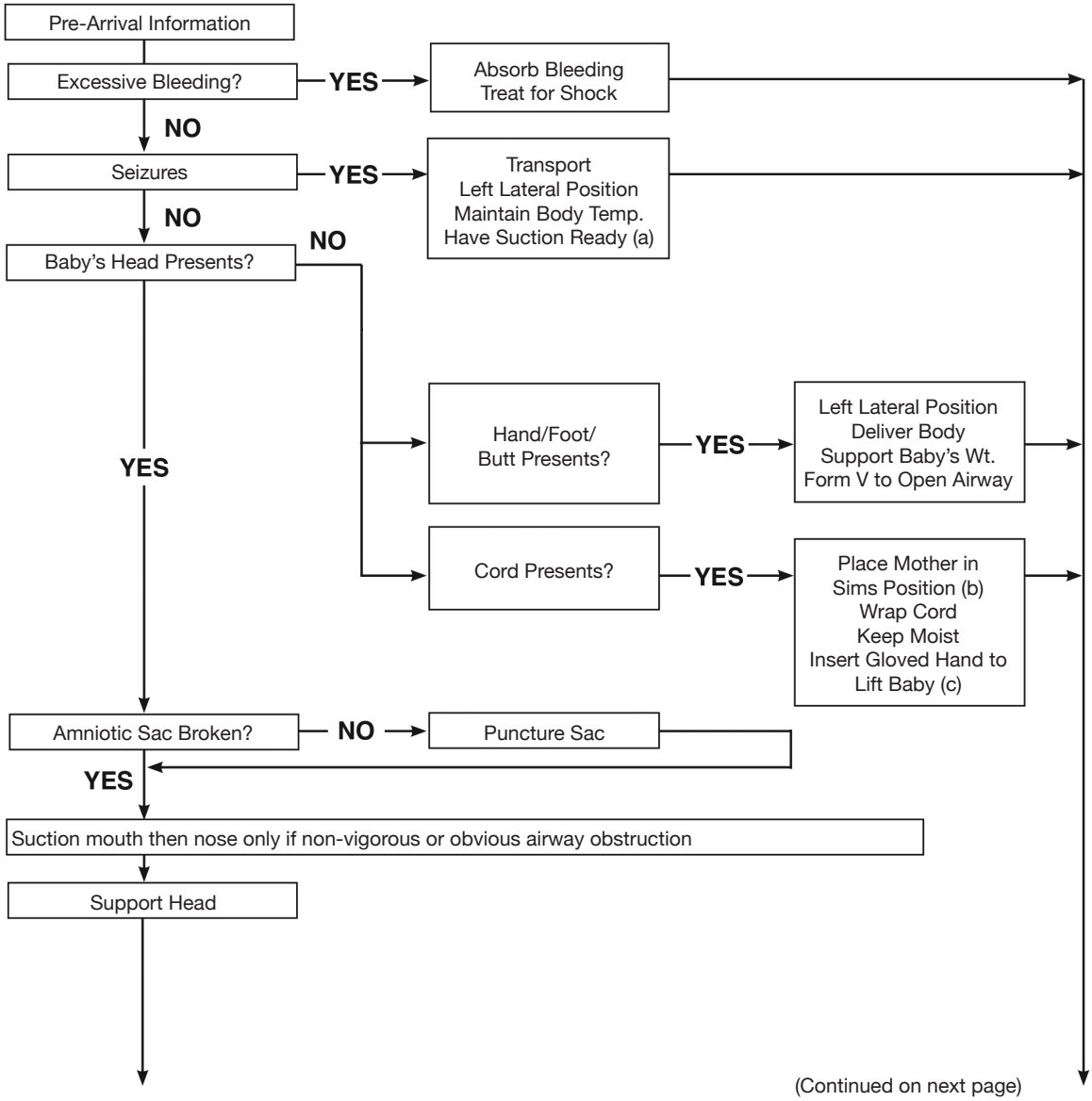


BLS

## 1. Indications

Patient presents pregnant, with contractions and/or pain, accompanied by bleeding or discharge, crowning during contraction, the feeling of an impending bowel movement, and/or a rock-hard abdomen.

## 2. Treatment

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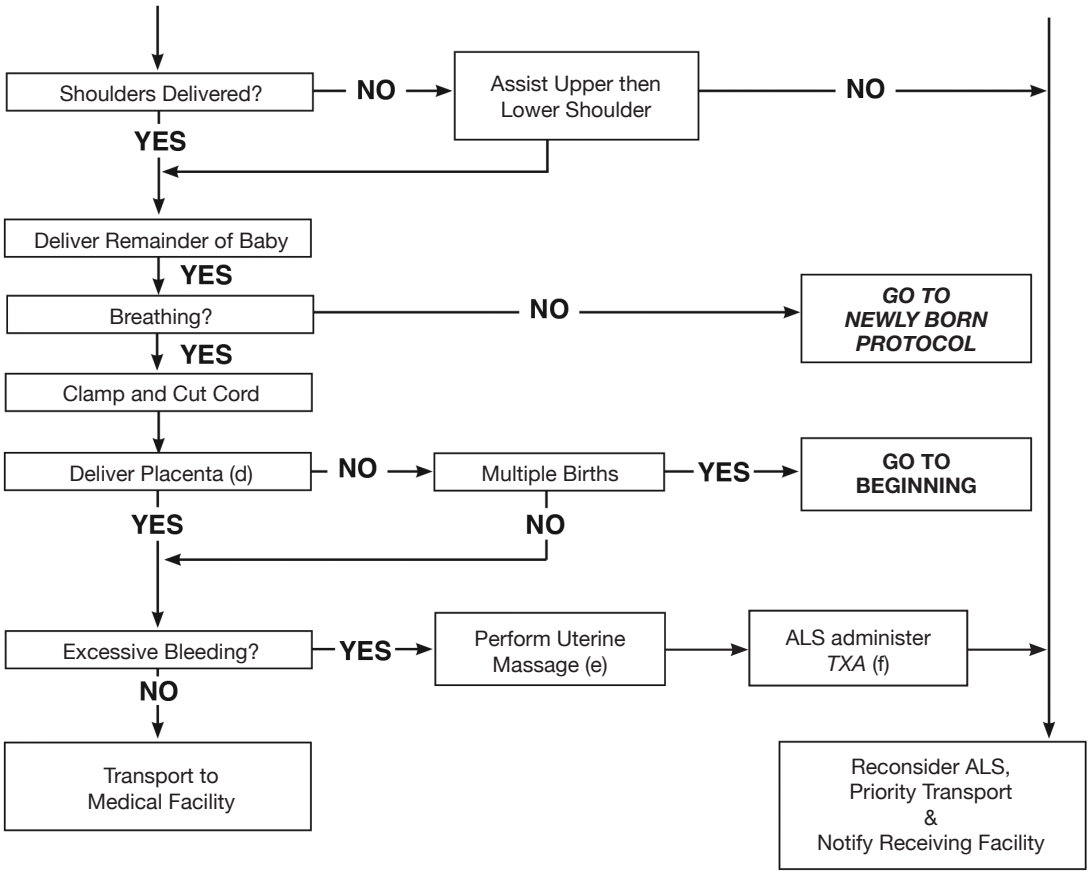
# Obstetrics/Gynecological Emergencies: Childbirth Algorithm (continued)



## BLS




(a) - Go to *Seizure* protocol: Consider *magnesium sulfate*.

(b) - Sims Position: mother on left lateral side with left hip/buttocks elevated using pillow or blankets, right knee drawn toward chest and head low with chest facing the cot.

(c) - Keep presenting part of baby off the cord. Monitor and attempt to maintain the pulse in the cord.

(d) - Allow placenta to deliver spontaneously. Do not apply traction.

(e) - Uterine massage is performed with the heel of the hand applying firm pressure from the pubis toward the umbilicus only. This massage is continued until bleeding diminishes. Transport rapidly.

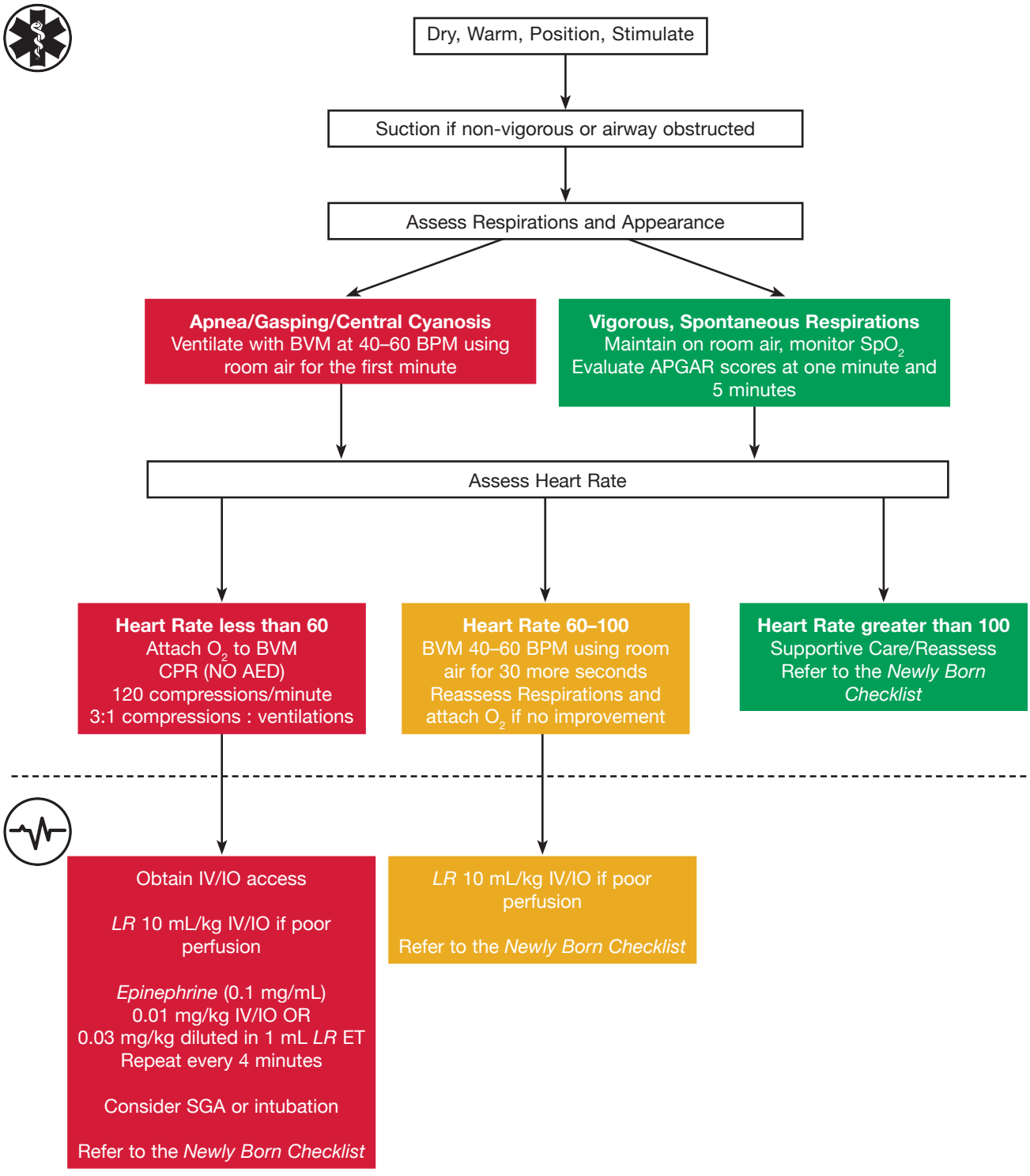
## ALS

(f) • In patients less than 12 years of age, with SBP less than 70 + (2 x age in years) AND ongoing blood loss despite uterine massage AND within 1 hour of delivery: administer *TXA* 500 mg in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes.

• For patients 12 years of age and older with SBP less than 90 or HR greater than 110 AND ongoing blood loss AND within 1 hour of delivery, despite performing uterine massage: administer *TXA* 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3–5 minutes.

# Universal Algorithm for the Newly Born





**NEWLY BORN CHECKLIST**

- Continue respiratory support
- *Glucose* (heel stick) per *Hypoglycemia* protocol
- Maintain body temperature
- Consult and Transport to appropriate facility
- Premature infants less than 32 weeks gestation may need BVM
- Do not administer naloxone

| Normal $SpO_2$ for Newly Born<br>Use right upper extremity to assess | |
|---|---|
| **1 minute** | 60–65% |
| **2 minutes** | 65–70% |
| **3 minutes** | 70–75% |
| **4 minutes** | 75–80% |
| **5 minutes** | 80–85% |
| **10 minutes** | 85–95% |

| APGAR CHART | | | |
|---|---|---|---|
| **SIGN** | **0** | **1** | **2** |
| **Muscle Tone (Activity)** | Limp | Some Flexion | Active, Good Flexion |
| **Pulse** | Absent | Less Than 100/Min | Greater Than 100/Min |
| **Reflex Irritability* (Grimace)** | No Response | Some Grimace or Avoidance | Cough, Cry or Sneeze |
| **Color (Appearance)** | Blue, Pale | Pink Body, Blue Hands/Feet | Pink |
| **Respirations** | Absent | Slow/Irregular, Ineffective | Crying, Rhythmic Effective |

**Nasal or Oral Suction Catheter Stimulus*

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# Obstetrical/Gynecological Emergencies: Vaginal Bleeding



**Indications**

- Heavy vaginal bleeding as a result of pregnancy, miscarriage, postpartum bleeding, or sexual assault
- Patient may exhibit signs or symptoms of shock

**BLS**

- Place absorbent pads under the patient.
- If signs of hypotension, place the patient in the supine position with the patient's feet elevated at a 30-degree angle.
- If postpartum bleeding, perform uterine massage from the pubis toward the umbilicus only.
- Request ALS for patients with signs or symptoms of shock.

**ALS**

- Establish IV/IO access, as appropriate.
- Administer LR fluid bolus 20 mL/kg IV; titrate to systolic blood pressure of 90 mmHg and refer to the *Shock: Hypoperfusion* protocol.
- For postpartum hemorrhage with ongoing blood loss despite uterine massage AND within 1 hour of delivery:
  - Patients 12 years of age and older with systolic blood pressure less than 90 or HR greater than 110: Administer *TXA* 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer*'s/D5W) IV/IO over 3-5 minutes.
  - Patients less than 12 years of age with systolic blood pressure less than 70 + (2 x age in years): Administer *TXA* 500 mg in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes.

**MC**

- Fluid administration beyond 2,000 mL requires medical consultation.

**Clinical Pearls**

- Bring all products of conception to the hospital.
- Do not pull products of conception from vaginal opening without medical consultation.

# 5.4 Hypertensive Disorders of Pregnancy

**Indications**

Pregnant patients greater than 20 weeks gestation OR patients who are up to 6 weeks postpartum presenting with a systolic blood pressure (SBP) of at least 140 mmHg or a diastolic blood pressure (DBP) of at least 90 mmHg, confirmed with two readings obtained at least 15 minutes apart.

- **Moderate Criteria:** SBP between 140-159 mmHg or DBP between 90-109 mmHg with an existing diagnosis of preeclampsia or symptoms/signs of severe preeclampsia. These symptoms/signs include proteinuria, severe new-onset headache, visual disturbances, severe right flank pain, unrelieved epigastric pain).
- **Severe Criteria:** SBP 160 mmHg or greater or DBP 110 mmHg or greater, WITH or WITHOUT symptoms/signs of severe preeclampsia.
- **Eclampsia:** Pregnant patient greater than 20 weeks gestation (or up to 6 weeks postpartum) with preeclampsia who presents with active seizure or postictal state.

**Exclusions**

- Patients with active labor, contractions regularly less than 5 minutes apart, or significant vaginal bleeding.
- Pulmonary Edema/Respiratory Distress: Maternal hypertension with heart failure can occur, resulting in respiratory distress, elevated blood pressure, signs of volume overload, and rales. Refer to the *CHF/Pulmonary Edema* protocol for treatment.

**BLS**

- Place the patient in a left lateral decubitus position or position of comfort that allows for adequate venous return to the heart.
- Obtain blood pressure measurements, at least two readings that are 15 minutes apart. Note: the first blood pressure reading may be obtained prior to EMS arrival by another licensed healthcare clinician.
- Provide oxygen if indicated in the GPC.
- Notify receiving facility as soon as patient care allows. Early notification of labor and delivery units by the hospital base station is critical.
- If not dispatched already, request ALS for patients with Moderate or Severe Criteria and/or Eclampsia, if feasible, to treat the patient prior to arrival at the closest appropriate facility.
- **Destination:** Patients with preeclampsia who have severe symptoms/signs or eclampsia should be transported to a Perinatal Referral Center unless transport time is greater than 30 minutes longer than the closest ED. Otherwise transport to the closest hospital with labor and delivery capabilities.

**ALS**

**Moderate Criteria**

- *Magnesium Sulfate:* 4 grams IV/IO over 10 minutes mixed in 50-100 mL approved diluent (normal saline/*Lacated Ringer's*/D5W)

ALS

**Severe Criteria**

- Lower the blood pressure. Goal range: 120-160 mmHg / 80-110 mmHg.
  - Administer *Labetalol* 20 mg IVP/IO over 2 minutes.
    - After 10 minutes, if SBP is greater than or equal to 160 mmHg or DBP is greater than or equal to 110 mmHg, administer *labetalol* 40 mg IVP/IO over 2 minutes.
    - An additional dose of *labetalol* up to 40 mg IVP/IO may be given with medical consultation.

**AND**

- Administer *magnesium sulfate* 4 grams IV/IO mixed in 50-100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) over 10 minutes for patients with symptoms/signs of severe preeclampsia **or** a preexisting diagnosis of preeclampsia.

**Eclampsia**

- Administer magnesium sulfate 4 grams IV/IO mixed in 50-100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) over 10 minutes as the first-line treatment.
- If IV/IO is not obtainable, or if seizures persist after *magnesium sulfate* is given:
  - *Midazolam:*
    - IM/IN: 5 mg IN or IM. IM route preferred.
    - IV/IO: 0.1 mg/kg in 2 mg increments SLOW IVP/IO over 1–2 minutes with a maximum single dose of 5 mg
  - *Diazepam:* if *midazolam* is not available, administer *diazepam* in 2.5 mg increments SLOW IVP/IO with a maximum single dose of 10 mg.
- Following resolution of seizure activity, if the patient meets **Severe Criteria**, administer *labetalol* per above.

MC

- *Labetalol:* Consult for additional doses of *labetalol* beyond the second dose.
- *Diazepam:* IM doses of *diazepam* for seizures require a medical consultation.
- *Magnesium sulfate:* Consult for additional doses of *magnesium sulfate* if seizures persist.

**Clinical Pearls**

- A sudden onset of respiratory distress without a history of breathing disorders may be the first sign of maternal heart failure. Assess for and treat according to the *CHF/Pulmonary Edema* protocol.
- *Magnesium sulfate* is the most effective medication for the management of eclampsia.
- Always confirm the patient's blood pressure with two readings taken 15 minutes apart before administering antihypertensive medication.
- *Labetalol* is contraindicated with active asthma exacerbation, 2nd or 3rd degree AV node blocks, known heart failure, and pulse below 60 bpm.

# 6.1-A Respiratory: Asthma/COPD – Adult



**Indications**

- Shortness of breath with wheezing or decreased air entry, presumed to be due to bronchospasm from reactive airway disease, asthma, or COPD
- Signs of respiratory distress which may include:
  - Accessory muscle use and/or tripod positioning
  - Cyanosis, mottled skin
  - Nasal flaring, retractions

**BLS**

- *Albuterol (BLS)* inhaler (2 puffs inhaled) or *albuterol (BLS)* 2.5 mg nebulized. May repeat dose one time, as needed, within 30 minutes.
- For severe respiratory symptoms, administer *epinephrine auto-injector (BLS)* 0.3 mg IM or administer *epinephrine (BLS)* (1 mg/mL) 0.5 mg in the lateral thigh.
- Medical consult required for asthma/COPD patient who has a cardiac history or is pregnant.

**ALS**

- *Albuterol* 2.5 mg nebulized and *ipratropium (Atrovent®)* 500 **mcg** nebulized; **Paramedics only:** may repeat *albuterol* 2.5 mg nebulized as needed without medical consultation for recurrent/persistent symptoms; **CRTs: require medical consultation to repeat dosing more than once)**.
- For severe respiratory symptoms, administer *epinephrine auto-injector* 0.3 mg IM via or *epinephrine* (1 mg/mL) 0.5 mg IM. May repeat every 5 minutes for a total of 3 doses, as needed.
- Establish IV/IO access for patients with moderate to severe symptoms.
- For moderate to severe exacerbations, administer *dexamethasone* 15 mg IV/IM/PO. IV route preferred if already established due to patient condition.
- For severe exacerbations or patients whose condition deteriorates despite treatments above, administer nebulized treatments, along with high-flow oxygen, continuous positive airway pressure (CPAP), or bag-valve mask (BVM).
- **Paramedics only:** for moderate to severe exacerbations, following administration of all other indicated medications in the algorithm, consider administration of *magnesium sulfate* 1-2 grams, mixed in 50-100 mL of approved diluent, IV/IO over 10-20 minutes. **CRTs require medical consultation as noted below.**

**MC**

- (BLS) For patients with a cardiac history or pregnancy, obtain medical consultation for *epinephrine* (1 mg/mL) or *epinephrine auto-injector*.
- Additional doses of *albuterol* (CRT/EMT)*, ipratropium, epinephrine* (1 mg/mL) or *epinephrine auto-injector* beyond those listed above require medical consultation. Paramedics may administer additional doses of *albuterol* as needed without medical consultation.
- (CRT) For moderate to severe exacerbations, administer *magnesium sulfate* 1–2 grams, mixed in 50–100 mL of approved diluent, IV/IO over 10–20 minutes. Paramedics may administer without medical consultation.

**Clinical Pearls**

- If respiratory distress is due to a suspected allergic reaction or anaphylaxis, refer to *Allergic Reaction* and *Anaphylaxis* protocols.

# Respiratory: Asthma/COPD – Pediatric

6.1-P

**Indications**

- Shortness of breath with wheezing or decreased air entry, presumed to be due to bronchospasm from reactive airway disease or asthma
- Signs of respiratory distress which may include:
  - Accessory muscle use and/or tripod positioning
  - Cyanosis, mottled skin
  - Nasal flaring, retractions

**BLS**

- *Albuterol (BLS)* inhaler (2 puffs inhaled) or *albuterol (BLS)* nebulizer. May repeat dose one time, as needed, within 30 minutes.
  - For infants and children less than 2 years of age, administer nebulized *albuterol (BLS)* 1.25 mg.
  - For patients 2 years of age or greater, administer nebulized *albuterol (BLS)* 2.5 mg.
- For severe respiratory symptoms:
  - Less than 5 years of age: *pediatric epinephrine auto-injector (BLS)* 0.15 mg IM in the lateral thigh or *epinephrine (BLS)* (1 mg/mL) 0.15 mg IM in the lateral thigh
  - 5 years of age or greater: *epinephrine auto-injector (BLS)* 0.3 mg IM in the lateral thigh or *epinephrine (BLS)* (1 mg/mL) 0.5 mg IM in the lateral thigh
  - Medical consult required for asthma/COPD patient who has a cardiac history or is pregnant

**ALS**

- *Albuterol* and *Ipratropium* (*Atrovent*®) nebulized.
  - For an infant less than 1 year of age: *albuterol* 1.25 mg nebulized; *ipratropium* is contraindicated.
  - For a child 1 year of age or greater, but less than 2 years of age: *albuterol* 1.25 mg and *ipratropium* 250 **mcg** nebulized.
  - For a patient 2 years of age or greater: *albuterol* 2.5 mg and *ipratropium* 500 **mcg** nebulized.
- **Paramedics only:** may repeat *albuterol* as needed without medical consultation for recurrent/persistent symptoms. **CRTs: may repeat *albuterol* once without medical consultation.**
- *Epinephrine* (1 mg/mL)
  - Less than 5 years of age: *epinephrine* (1 mg/mL) 0.15 mg IM in the lateral thigh
  - 5 years of age or greater: *epinephrine* (1 mg/mL) 0.5 mg IM in the lateral thigh
- May repeat *epinephrine* (1 mg/mL) every 5 minutes for a total of 3 doses, as needed.
- For moderate to severe exacerbations, consider the administration of *dexamethasone* 0.5 mg/kg PO/IM/IV, up to a maximum dose of 15 mg. PO route preferred.

# Respiratory: Asthma/COPD – Pediatric (continued)



MC

- (BLS) For patients with congenital heart or lung disease, obtain medical consultation for *epinephrine* (1 mg/mL), *pediatric epinephrine auto-injector*, or *epinephrine auto-injector*.
- Additional doses of *albuterol* (CRT/EMT), *ipratropium, epinephrine* (1 mg/mL) or *epinephrine auto-injector* beyond those listed above require medical consultation. Paramedics may administer additional doses of *albuterol* as needed without medical consultation.
- (ALS) For moderate to severe exacerbations, administer *magnesium sulfate* 50 mg/kg IV/IO to a max of 2 grams given over 10–20 minutes (mixed in 50–100 mL of approved diluent). For children, administer 20 ml/kg fluid bolus of *LR* with magnesium to reduce risk of hypotension.

**Clinical Pearls**

- If respiratory distress is due to a suspected allergic reaction or anaphylaxis, refer to *Allergic Reaction* and *Anaphylaxis* protocols.

# Respiratory: Chlorine/Phosgene Exposure



**Indications**

- Exposure to chlorine or phosgene with respiratory symptoms
- Signs of respiratory distress may include:
  - Wheezing and/or crackles, abnormal respiratory rate, dyspnea, diminished or absent breathing sounds, and/or tripod positioning.
  - Cyanosis or mottled skin
  - Altered mental status
  - Rapid heart rate

**BLS**

- For patients with dyspnea with wheezing or symptoms related to bronchospasm, treat with *albuterol* per *Asthma/COPD* protocol.
- For patients with dyspnea and rales or suspected pulmonary edema, treat supportively with oxygen, as indicated per *CHF* protocol.

**ALS**

- For patients with dyspnea with wheezing or symptoms related to bronchospasm, treat with bronchodilators and *dexamethasone* per *Asthma/COPD* protocol.
- For patients with dyspnea and rales or suspected pulmonary edema, treat supportively with oxygen and CPAP, as indicated per *CHF* protocol.

**MC**

- As noted in *Asthma/COPD* and *CHF* protocols.

**Clinical Pearls**

- Ensure BSI and decontamination of the patient with suspected chlorine or phosgene exposure.
- Symptoms of chlorine or phosgene exposure may be delayed for up to 48 hours. Patients can rapidly deteriorate once symptoms present.

# 6.3-A Respiratory: Congestive Heart Failure/ Pulmonary Edema – Adult



**Indications**

- Shortness of breath (dyspnea) due to suspected pulmonary edema, which may present with some of the following associated signs or symptoms:
  - Pulmonary: rales, wheezing, hypoxia, tachypnea
  - Systemic: peripheral edema, hypertension, jugular venous distention (JVD), orthopnea, paroxysmal nocturnal dyspnea
  - History of CHF or cardiac disease (MI)
- **Mild:** Mild dyspnea at rest, despite oxygen administration and able to speak in full sentences, or dyspnea with minimal exertion
- **Moderate:** Moderate dyspnea, pulse oximetry less than 94% on supplemental oxygen. SBP usually greater than 150 mmHg. Unable to speak in full sentences with a normal mental status.
- **Severe:** Severe dyspnea, respiratory failure, hypoxia with pulse oximetry less than 90% on supplemental oxygen, diaphoresis, SBP usually greater than 180 mmHg. Speaking one word at a time, altered level of consciousness.

## BLS

- Place patient in High Fowler's position.
- Assess the severity of patient's dyspnea on a scale where 0 is "no trouble breathing" and 10 is "the worst trouble breathing."
- For patients with pulse oximetry less than 94%, administer *oxygen* per GPC.

## ALS

- Monitor cardiac rhythm and treat according to appropriate algorithm.
- Perform 12-lead EKG.
- Establish IV access.
- **Mild symptoms:**
  - For patients with pulse oximetry less than 94%, administer *oxygen* per GPC.
  - Administer low-dose *nitroglycerin* 0.4 mg SL every 3-5 minutes, to a maximum dose to a maximum dose of 1.2 mg.
- **Moderate and severe symptoms:**
  - Initiate CPAP. Until CPAP is applied, administer high-dose SL *nitroglycerin* as noted below.
  - Assess BP before each *nitroglycerin* dose.
  - For patients with SBP greater than 150 mmHg, administer high-dose *nitroglycerin* every 3-5 minutes until CPAP is applied or if CPAP is not tolerated:
    - Administer *nitroglycerin* 0.4 mg SL and apply 1 inch of *nitroglycerin* paste.
    - Administer *nitroglycerin* 0.8 mg SL.
    - Continue *nitroglycerin* 0.8 mg SL, every 3-5 minutes, to achieve a 20% reduction in SBP.
  - An IV is not required to start *nitroglycerin* for patients with moderate and severe symptoms, but should be established after acute interventions to stabilize respiratory status.
  - If SBP drops below 90 mmHg, treat with *Lactated Ringer's* fluid bolus of 250 mL; may repeat once, if the patient remains hypotensive.
- **Hypotensive CHF patients:**
  - Administer a small *Lactated Ringer's* fluid bolus of 250 mL.
  - If the patient remains hypotensive, administer *epinephrine* infusion (1 mg *epinephrine* in 100 mL *LR*), starting at 1 mL/min (60 drops/min). Titrate to systolic BP of 90 mmHg or MAP of 65 mmHg. Maximum rate of 2 mL/min (120 drops/min). IV infusion pump preferred.

MC

- If an inferior wall MI is present on EKG, consult prior to administering *nitroglycerin*.
- Additional *Lactated Ringer's* fluid boluses beyond 250 mL for CHF patients require medical consultation.
- If a hypotensive CHF patient continues to have SBP less than 90 mmHg (MAP less than 65 mmHg), despite maximum *epinephrine* infusion dose, obtain medical consultation.

**Clinical Pearls**

- Geriatric patients demonstrating marked hypertension in association with shortness of breath/respiratory distress and wheezing (in the absence of asthma or infection) strongly suggests congestive heart failure/pulmonary edema.
- For CHF patients with **hypertension**, the goals of treatment are to reduce the pressure of blood returning to the heart (preload) and the resistance that the left ventricle must pump against (afterload). The most effective and safe medication for these goals is *nitroglycerin*.
- CPAP is the preferred therapy for moderate to severe CHF patients with **hypertension**. Do not remove CPAP to continue administering NTG.
- Some CHF patients will present with **hypotension** and pulmonary edema. These patients may benefit from small fluid boluses (250 mL) and *epinephrine* infusion, if SBP remains below 90 mmHg or MAP below 65 mmHg. *Nitroglycerin* is contraindicated in these hypotensive patients.

# Respiratory: Congestive Heart Failure/ Pulmonary Edema – Pediatric



**Indications**

- Shortness of breath (dyspnea) with any of the following associated signs or symptoms:
  - Rales
  - Peripheral edema
  - Jugular venous distention (JVD)
  - History of congenital heart or chronic lung disease

**BLS**

- Place patient in semi-Fowler's position.
- For patients with pulse oximetry less than 94%, administer oxygen per GPC.
- Transport to the pediatric specialty center that follows the patient, if clinical condition permits.

**ALS**

- Monitor cardiac rhythm and treat according to appropriate algorithm.
- Establish IV/IO access.
- Patients with moderate to severe respiratory distress may require high flow *oxygen* via non-rebreather mask, CPAP, or BVM while receiving medication via nebulizer.

**MC**

- Medical consultation is required for patients with congenital heart or chronic lung disease.
- (ALS/BLS) Consider *albuterol* nebulized.
  - For children less than 2 years, *albuterol* 1.25 mg nebulized.
  - For children greater than or equal to 2 years, *albuterol* 2.5 mg nebulized.
- (ALS) Consider *morphine* 0.1 mg/kg SLOW IVP/IO/IM (1–2 mg/min). Maximum dose 5 mg.
- (ALS) If hypotensive, consider pediatric *epinephrine* infusion.

**Indications**
- **Mild:** Barky cough without stridor at rest (Priority 2)
- **Moderate:** Barky cough with stridor at rest, without agitation; may exhibit mild respiratory distress (Priority 2)
- **Severe:** Stridor at rest, signs of severe respiratory distress that is associated with agitation or decreased level of consciousness (Priority 1)

**BLS**
- Ensure that the patient has a patent airway and adequate respiratory effort.
- Assess respiratory status, looking specifically for signs and/or symptoms of respiratory distress (nasal flaring, retractions, increased/decreased respirations, skin color, change in level of consciousness).

**ALS**
- Monitor cardiac rhythm.
- **Mild:** Administer *dexamethasone* 0.5 mg/kg PO up to a maximum dose of 15 mg.
- **Moderate:** Administer *dexamethasone* 0.5 mg/kg PO up to a maximum dose of 15 mg. If no change in patient's condition, then administer 2.5 mL of *epinephrine* (1 mg/mL) nebulized. If patient does not improve after 10 minutes, may administer a second dose of nebulized *epinephrine*.
- **Severe:** for severe respiratory distress and imminent respiratory arrest:
  - Administer 0.01 mg/kg of *epinephrine* (1 mg/mL) IM. Max single dose of 0.5 mg IM.
  - Administer *dexamethasone* 0.5 mg/kg IV up to a maximum dose of 15 mg. If IV is not available, administer IM.
  - Administer 2.5 mL of *epinephrine* (1 mg/mL) nebulized. If patient does not improve after 10 minutes, may administer a second dose of nebulized *epinephrine.*

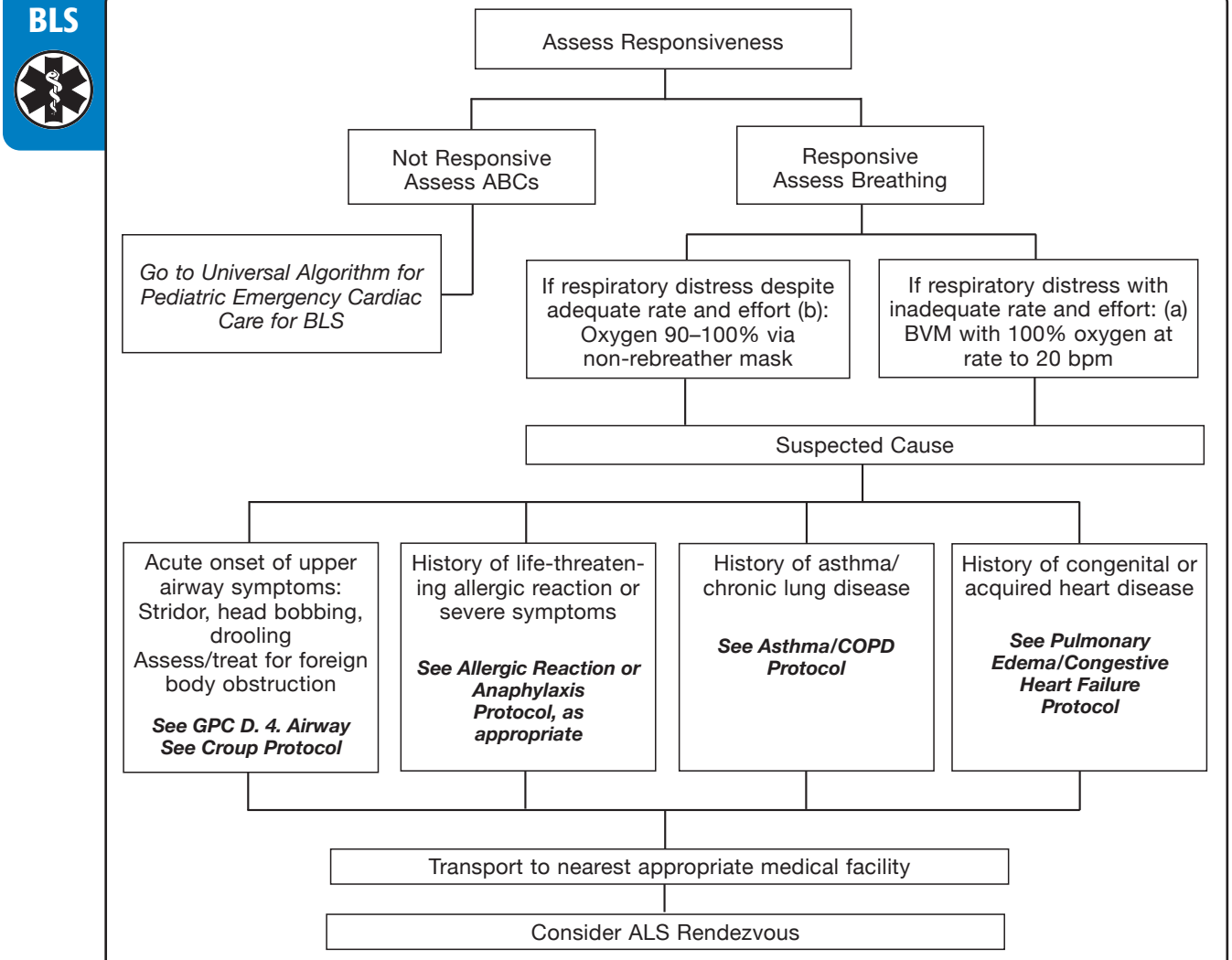
**MC**
- If epiglottitis is suspected (i.e., drooling with above signs and symptoms), obtain medical consultation prior to initiating this protocol.
- Obtain medical consultation for:
  - Patients less than 1 year of age for nebulized *epinephrine* dosing.
  - Additional doses of nebulized epinephrine beyond the two doses noted above, due to ongoing respiratory distress.
  - Additional interventions needed to stabilize the patient

**Clinical Pearls**
- All patients who receive nebulized *epinephrine* **must** be transported by an advanced life support unit to the closest appropriate medical facility.

# Pediatric Respiratory Distress for BLS – Universal Algorithm



**BLS**

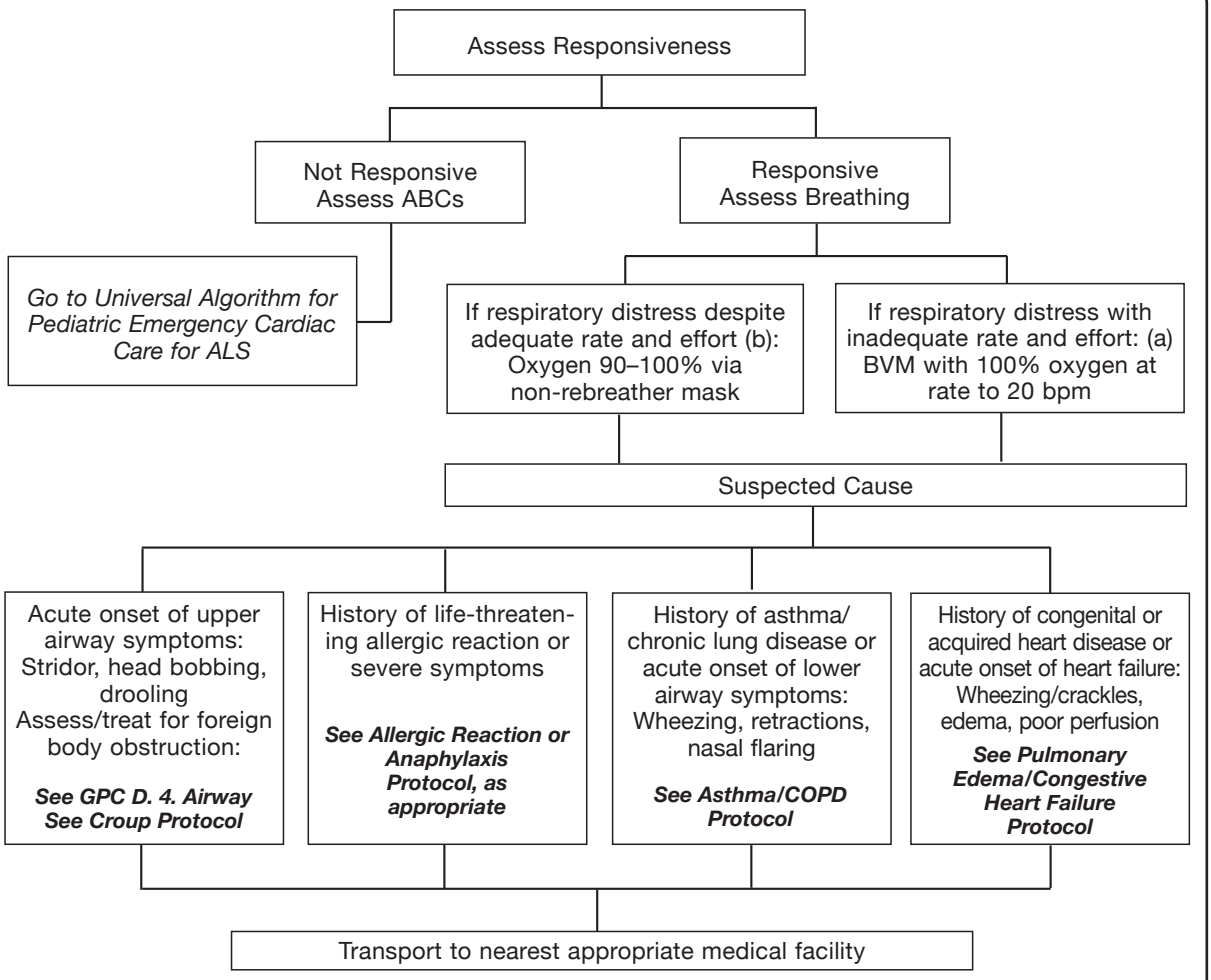



(a) Inadequate RR: Infant less than 20 breaths per minute, Child less than 16 breaths per minute, Adolescent less than 12 breaths per minute. Inadequate effort: Poor chest rise, shallow respirations/ poor air movement, cyanosis, severe retractions, paradoxical breathing.

(b) For children with chronic lung disease or congenital heart disease: Maintain or increase home oxygen to maintain patient's target saturations.

# Pediatric Respiratory Distress for ALS – Universal Algorithm

ALS




(a) Inadequate RR: Infant less than 20 breaths per minute, Child less than 16 breaths per minute, Adolescent less than 12 breaths per minute. Inadequate effort: Poor chest rise, shallow respirations/ poor air movement, cyanosis, severe retractions, paradoxical breathing.

(b) For children with chronic lung disease or congenital heart disease: Maintain or increase home oxygen to maintain patient's target saturations.

# Overdose/Poisoning: Carbon Monoxide Exposure



**Indications**

- Suspected exposure to carbon monoxide (CO), e.g., house fires, malfunctioning furnaces, suicide attempts
- Symptoms are variable, but may include: headache, dizziness, and nausea and vomiting, most frequently. Symptoms can also include: chest pain, altered mental status, dyspnea, and/or seizures.

## BLS

- Remove patient from toxic environment by appropriately trained personnel using proper level PPE.
- Decontaminate as appropriate.
- Administer high-flow *oxygen*.
- Treat respiratory and/or cardiac symptoms per appropriate protocol.
- **Consider transport to the Hyperbaric Medicine Specialty Center**, if indications apply:
  - Patients with exposure to products of combustion (smoke) or carbon monoxide who have a carboxyhemoglobin value of greater than 25%, with or without symptoms OR
  - Patients with proven exposure to products of combustion (smoke) or carbon monoxide who have:
    - **Any** of the following diagnostic indicators:
      - Carboxyhemoglobin value (co-oximeter or blood) of greater than 15%
      - Alarm of EMS or fire agency-maintained passive carbon monoxide monitor
      - Targeted atmospheric carbon monoxide value 100 ppm or greater in the patient environment
    - **And** one or more of the following:
      - History of loss of consciousness during exposure (may have since resolved)
      - GCS persistently less than or equal to 13
      - Rapid decline of neurological symptoms, including actively seizing patients with appropriate airway stabilization
      - Pregnancy
      - Chest pain
      - Extremes of age
      - Per clinician discretion
- **Contraindications** for transport to Hyperbaric Medicine Specialty Center:
  - **Patients with burns:** who meet Burn Center referral criteria (*8.1 Burns - Adult & Pediatric*) should be transported to an adult or pediatric burn center
  - **Patients with burns and trauma:** should be transported to the nearest appropriate trauma center
  - Transport time to a Hyperbaric Medicine Specialty Center is greater than 1 hour
  - **Patients in cardiac arrest or ROSC post-cardiac arrest**
  - Patients who do not meet Hyperbaric Medicine Specialty Center referral criteria should be transported to the nearest hospital-based emergency department

## ALS

- Obtain a blood sample using closed system, particularly if carboxyhemoglobin co-oximeter measurement is not available.
- Establish IV access.
- If shock is present, administer 20 mL/kg bolus of *Lactated Ringer's* and treat per *Shock/Hypoperfusion* protocol.
- For smoke inhalation patients, refer to *OSP: Cyanide* protocol, if jurisdiction is participating.

MC

- Not applicable.

**Clinical Pearls**

- Pulse oximetry may not be accurate for carbon monoxide victims. Patients may have normal $SpO_2$ levels with carbon monoxide toxicity.
- **Pregnant patients and infants:** Fetal hemoglobin has a very high affinity for carbon monoxide. A pregnant mother may be asymptomatic, yet fetal levels may be dangerously high.

# Environmental Emergencies: Cold-Related Emergencies



**Indications**

- **Frostbite:** reddened, mottled, bluish or white-gray appearing skin in a cold-exposed area; pain in the area followed by numbness in later stages
- **Hypothermia:** exposure to cold environment, with symptoms including: shivering, cool mottled or pale skin, stiffness of the muscles, altered gait, shallow respirations, altered level of consciousness, weak pulses, bradycardia, hypotension, cardiac arrest

## BLS

- Remove patient from cold environment and remove any wet clothing.
- Protect from further heat loss.
- For frostbite:
  - Handle potential frostbitten areas gently; do not rub affected areas.
  - Cover affected areas with lightweight gauze.
- For hypothermia:
  - Passively rewarm the patient within a warm environment.
  - Use a thermal blanket to cover the patient and a separate blanket to cover the patient's head, except for the face.
  - Administer warmed oxygen, if available.
  - Handle all hypothermic patients gently; rough handling may precipitate cardiac arrest.
- For hypothermic patients in cardiac arrest:
  - Attempt resuscitation on all hypothermic cardiac arrest patients, unless there is an injury incompatible with life.
  - Administer AED shocks, if indicated.
- Transport patients with severe hypothermia (low blood pressure, heart rate) and patients in cardiac arrest to an ECPR capable center, unless there is an injury incompatible with life.
  - If the patient cannot be delivered to an ECPR capable center within 30 minutes, go to the closest facility.
  - If patient is less than 18 years old and cannot be delivered to a pediatric ECPR capable center within 30 minutes, go to the closest facility.

## ALS

- Establish IV/IO access, if appropriate.
- Administer warmed IV fluids, if available.
- Provide analgesia per *Pain Management* protocol.
- Monitor cardiac rhythm; for patients in cardiac arrest, treat according to the *Cardiac Arrest* protocol.
- Refer to BLS section for transport considerations.

## MC

- Obtain early medical consultation for hypothermic cardiac arrest patients. Drug and defibrillation intervals may change depending on degree of hypothermia.

**Clinical Pearls**

- For patients with severe hypothermia, pulse and respiratory rates may be very slow. Initiate CPR if there is any doubt as to whether the patient is in cardiac arrest.
- Hypothermic patients in cardiac arrest may survive after a prolonged downtime. Hypothermia is a contraindication to the *Termination of Resuscitation* protocol.
- Hypothermic patients who are bradycardic and/or hypotensive may benefit significantly from transport to an ECPR capable center to allow for extracorporeal rewarming.

# Environmental Emergencies: Depressurization/Decompression



**Indications**

- History of SCUBA, breathing in a pressurized environment (flight) or altitude chamber with sudden depressurization
- Confusion, seizure, vertigo, focal weakness, pain (especially in the back or joints), visual disturbances, speech difficulty, marbled rash, numbness, tingling, cardiac arrest

**BLS**

- Remove patient from the water or pressurized environment.
- Treat for hypothermia, as appropriate.
- Apply high-flow *oxygen*, 15 lpm, regardless of initial oxygen saturation.

**ALS**

- Establish IV access and administer *Lactated Ringer's*, as indicated.
- *Pain Management* protocol

**MC**

- Transport to a Hyperbaric Medicine Specialty Center if within a 30-minute transport time. If transport time is greater than 30 minutes, obtain medical consultation with a Hyperbaric Medicine Specialty Center and the closest appropriate facility for a transport destination decision.

**Clinical Pearls**

- Aeromedical transport may be appropriate for patients with barotrauma.

# Environmental Emergencies: Hazardous Materials Exposure



**Indications**

- Exposure to a known or unknown hazardous material
- Signs and symptoms will vary based on the type of substance, route, and duration of exposure.

**BLS**

- Personnel must be trained and appropriately equipped with proper PPE prior to entering a hazardous materials scene.
- Decontaminate patient(s) as indicated.
- If multiple patients are on-scene, triage using *START* / *JumpSTART* Algorithm.
- Protect patient from hypothermia and treat for any signs or symptoms of hypothermia.
- Notify EMRC and receiving hospital(s) with the following information:
  - Number of patients and ETA
  - Type of hazardous material(s) involved
  - Decontamination performed on-scene

**ALS**

- Establish IV/IO access in a clean (decontaminated) area if medication administration is anticipated.
- Administer antidote to specific agent, if available.

**MC**

- Antidote or medication that is outside of the protocols
- Antibiotic specific to agent in mass casualty incident, if available

**Clinical Pearls**

- Ensure medical follow-up within 48 hours for all public safety personnel who come into close contact with hazardous materials. Personnel should be advised of possible delayed symptoms post-exposure.

# Environmental Emergencies: Heat-Related Emergencies



**Indications**

- Exposure to a warm temperature environment with any of the following symptoms:
  - **Heat Cramps:** Moist, cool skin, cramps, normal to slightly elevated body temperature
  - **Heat Exhaustion:** Moist, cool skin, cramps, weakness, dizziness, normal to elevated body temperature, nausea
  - **Heat Stroke:** Hot, dry skin (25% of patients will still be moist), seizures, altered mental status, dilated pupils, rapid heart rate, or arrhythmia

**BLS**

- Remove patient from the warm environment.
- Move patient to air-conditioned ambulance and remove excess clothing, as practical.
- If patient is conscious and alert, without nausea, give electrolyte-rich fluid by mouth, if available.
- If **heat stroke**, aggressively cool patient and place patient in semi-Fowler's position
  - Apply truncal cool packs and wet towels or sheets
  - Misting exposed skin with water from a spray bottle, if available, and air-conditioner running
- If active cooling is in progress by a team/event physician or athletic trainer, allow cooling to continue prior to making an attempt to transport until the patient has an improved mental status or the temperature has decreased to 102 degrees or less.

**ALS**

- Establish IV access.
- Administer *Lactated Ringer's*; titrate to a minimum systolic blood pressure of 90 mmHg, or age-appropriate blood pressure.

**MC**

- If any disagreement in the patient care plan with a team/event physician or an athletic trainer occurs, contact an appropriate Base Station for on-line medical consultation.

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**Indications**

- **Beta-blockers** – bradycardia, hypotension, altered mental status, seizure, hypoglycemia
- **Calcium channel blockers** – bradycardia, hypotension
- **Dystonic reaction** – involuntary, slow, sustained muscular contractions; typical in patients taking an antipsychotic, anti-nausea, or antidepressant medication
- **Opioids** – respiratory depression, apnea, altered mental status/decreased level of consciousness, and/or constricted pupils
- **Organophosphates** – SLUDGE symptoms – salivation, lacrimation, urination, defecation, GI pain/upset, emesis (vomiting); seizures; bradycardia, bronchospasm, bronchorrhea
- **NA channel blockers (including tricyclic antidepressants and phenobarbital)** – altered mental status/decreased level of consciousness, hallucinations, hypotension, dysrhythmias, anticholinergic symptoms (hyperthermia, flushed skin, dilated pupils)
- **Other/Unknown substances** – symptoms are variable; may include nausea, vomiting, diarrhea, altered mental status

**BLS**

- Identify the substance and amount ingested
- **Opioids**: if signs of respiratory depression or hypoventilation are present:
  - Assist ventilations with BVM and provide supplemental oxygen
  - *Naloxone (BLS)* 2 mg IN, dividing the dose equally between the nares to a maximum of 1 mL per nare OR
  - *Naloxone (BLS)* 4 mg/0.1 mL IN in one nare.
  - Administer additional doses of *naloxone (BLS)* to maintain a normal respiratory rate and not necessarily until return of consciousness
  - Monitor patient for recurrent respiratory depression and decreased mental status
- **Other/Unknown substances** – obtain medical consultation and Poison Center recommendations. Medication orders can only be accepted from an approved base station.
- Do not give anything by mouth to a poisoned patient without medical consultation.

**ALS**

- Establish IV access, if appropriate
- **Opioids**: if signs of respiratory depression or hypoventilation are present:
  - *Naloxone (ALS)* 0.4-2 mg IVP/IO (titrated)/IM/IN. For the intranasal route, divide the 2 mg dose equally between the nares to a maximum of 1 mL per nare OR
  - *Naloxone (ALS)* 4 mg/0.1 mL IN in one nare.
  - Administer additional doses of *naloxone (ALS)* to maintain a normal respiratory rate and not necessarily until return of consciousness
  - Monitor patient for recurrent respiratory depression and decreased mental status
- **Calcium channel blocker overdose**: *calcium chloride* 0.5-1 gram IV/IO over 3-5 minutes; maximum dose of 1 gram. Note: *calcium chloride* is contraindicated in calcium channel blocker overdose for a patient taking digoxin.
- **Dystonic reaction**: *diphenhydramine* 25 mg IV or IM
- **NA channel blockers (including tricyclic antidepressants and phenobarbital)**: *sodium bicarbonate* 1 mEq/kg IVP/IO bolus initially. Monitor QRS interval for narrowing. Repeat dose: 0.5 mEq/kg every 10 mins to a maintain narrow QRS (less than 100 msec).

**MC**

- For ingested substances, *activated charcoal* without sorbitol 1 gram/kg PO
- **Beta-blocker overdose**: *glucagon* 1 mg every 5 minutes IVP
- **Organophosphates**: *atropine* 2-4 mg IVP or IM every 5 minutes until the patient has dry secretions and adequate oxygenation
- Specific antidotes or antibiotics, if available

**Opioid Overdose**

**Following patient care for opioid overdose** (whether the patient is transported or not):

- EMS clinicians should provide *naloxone* and necessary supplies to adult patients (18 years of age and older) or other adults on the scene who are at risk of overdose, if available from their EMS operational program.
- **Two doses of *naloxone* and necessary supplies may be given to each person.**
- **Following evaluation by a crisis intervention team, MIH team, or EMS clinician at a Safe Station:** *naloxone* may be given per instructions above.
- Clinicians are encouraged to engage co-responder programs in their jurisdiction to connect patients refusing transport with available recovery resources. For jurisdictions without such programs, refer these patients to 9-8-8.

**Clinical Pearls**

- Call the Poison Center early (preferably via EMRC with a base station also online or 800-222-1222) as the poison specialists may have valuable treatment recommendations.
- For opioid overdoses, patients may become agitated or violent following *naloxone* administration due to opioid withdrawal, hypoxia, or other the effects of other ingested substances.
- The opioid reversal effect of *naloxone* is limited to approximately 1 hour. Extended release opioids (methadone, oxycodone extended-release) may have a longer duration of action. These patients are at a higher risk of recurrent respiratory depression.

**Indications**

- **Beta-blockers** – bradycardia, hypotension, altered mental status, seizure, hypoglycemia
- **Calcium channel blockers** – bradycardia, hypotension
- **Dystonic reaction** – involuntary, slow, sustained muscular contractions; typical in patients taking an antipsychotic, anti-nausea, or antidepressant medication
- **Opioids** – respiratory depression, apnea, altered mental status/decreased level of consciousness, and/or constricted pupils
- **Organophosphates** – SLUDGE symptoms – salivation, lacrimation, urination, defecation, GI pain/upset, emesis (vomiting); seizures; bradycardia, bronchospasm, bronchorrhea
- **NA channel blockers (including tricyclic antidepressants and phenobarbital)** – altered mental status/decreased level of consciousness, hallucinations, hypotension, dysrhythmias, anticholinergic symptoms (hyperthermia, flushed skin, dilated pupils)
- **Other/Unknown substances** – symptoms are variable; may include nausea, vomiting, diarrhea, altered mental status

**BLS**

- Identify the substance and amount ingested
- **Opioids**: if signs of respiratory depression or hypoventilation are present:
  - Assist ventilations with BVM and provide supplemental oxygen
  - Age 28 days to adult: *Naloxone (BLS)* 2 mg IN, dividing the dose equally between the nares to a maximum of 1 mL per nare **or**
  - *Naloxone (BLS)* 4 mg/0.1 mL IN in one nare.
  - Administer additional doses of *naloxone (BLS)* to maintain a normal respiratory rate and not necessarily until return of consciousness
  - Monitor patient for recurrent respiratory depression and decreased mental status
- **Other/Unknown substances** – obtain medical consultation and Poison Center recommendations. Medication orders can only be accepted from an approved base station.

**ALS**

- Establish IV access, if appropriate
- **Opioids**: if signs of respiratory depression or hypoventilation are present:
  - Age 28 days to adult: *Naloxone (ALS)* 0.1 mg/kg IVP/IO (titrated)/IM/IN. For the intranasal route, divide the 2 mg dose equally between the nares to a maximum of 1 mL per nare **or**
  - *Naloxone (ALS)* 4 mg/0.1 mL IN in one nare
  - *Naloxone (ALS)* ET dose: 0.2-0.25 mg/kg via endotracheal tube
  - Administer additional doses of *naloxone (ALS)* to maintain a normal respiratory rate and not necessarily until return of consciousness
  - Monitor patient for recurrent respiratory depression and decreased mental status
- **Calcium channel blocker overdose**: *calcium chloride* 20 mg/kg (0.2 mL/kg) SLOW IVP/IO over 3–5 minutes; maximum dose of 1 gram. Note: *calcium chloride* is contraindicated in calcium channel blocker overdose for a patient taking digoxin.
- **Dystonic reaction**: *diphenhydramine* 1 mg/kg IVP or IM, Maximum single dose 25 mg.
- **NA channel blockers (including tricyclic antidepressants and phenobarbital)**: *sodium bicarbonate* 1 mEq/kg IVP/IO. For less than 1 year, dilute 1:1 with *LR*.

MC

- For ingested substances, *activated charcoal* without sorbitol 1 gram/kg PO
- **Beta-blocker overdose**:
  - 5 years of age and older: *glucagon* 1 mg IVP every 5 minutes, as necessary
  - 28 days to 5th birthday: *glucagon* 0.5 mg IVP every 5 minutes, as necessary
- **Organophosphates**: *atropine* 0.02 mg/kg IVP/IO or IM. May be repeated every 5-10 minutes until the patient has dry secretions and adequate oxygenation.
- Specific antidotes or antibiotics, if available

**Clinical Pearls**

- Do not give anything by mouth to a poisoned patient without medical consultation.
- Call the Poison Center early (preferably via EMRC with a base station also online or 800-222-1222) as the poison specialists may have valuable treatment recommendations.
- For opioid overdoses, patients may become agitated or violent following *naloxone* administration due to opioid withdrawal, hypoxia, or other the effects of other ingested substances.
- The opioid reversal effect of *naloxone* is limited to approximately 1 hour. Extended release opioids (methadone, oxycodone extended-release) may have a longer duration of action. These patients are at a higher risk of recurrent respiratory depression.
- EMS clinicians should emphasize the need for transport to the closest appropriate facility for all suspected overdose cases.

# Environmental Emergencies: Overpressurization



**Indications**

- History of SCUBA, breathing in a pressurized environment or altitude chamber or exposure to blast concussion waves can lead to arterial gas embolism.
- Confusion, seizure, vertigo, focal weakness, visual disturbances, speech difficulty, marbled rash, numbness, tingling, pain (particularly pain in the joints and back pain), bleeding from body orifices, cardiac arrest

**BLS**

- Remove patient from the pressurized environment.
- Treat associated traumatic injuries.

**ALS**

- Establish IV access and administer *Lactated Ringer's*, as indicated.
- *Pain Management* protocol

**MC**

- Transport to a Hyperbaric Medicine Specialty Center if within a 30-minute transport time. If transport time is greater than 30 minutes, obtain medical consultation with a Hyperbaric Medicine Specialty Center and the closest appropriate facility for a transport destination decision.

**Clinical Pearls**

- Associated injuries (ruptured eardrum) may make assessment and communication difficult. Symptoms may be slow to present.
- Aeromedical transport may be appropriate for patients with barotrauma.

# Snakebite – Adult & Pediatric



**Indications**

- Localized pain
- Puncture wounds
- Erythema local edema
- Numbness or tingling
- Nausea, vomiting, or diarrhea
- Altered mental status
- Seizures or muscle twitching
- Hypoperfusion
- Metallic or rubbery taste

## BLS

- For patients with moderate to severe allergic reaction symptoms, or mild symptoms with a history of life-threatening allergic reaction to prior snakebite:
  - Age 5 and older: *Epinephrine (BLS)* (1 mg/mL) 0.5 mg IM or *adult epinephrine auto-injector (BLS)*
  - Less than 5 years of age: *Epinephrine (BLS)* (1 mg/mL) 0.15 mg IM or *pediatric epinephrine auto-injector (BLS)*
  - *Albuterol (BLS)* 2.5 mg nebulized or *albuterol (BLS)* MDI 2 puffs inhaled. For patients less than 2 years of age: *albuterol (BLS)* 1.25 mg nebulized or *albuterol (BLS)* 2 puffs inhaled.
- Remove all jewelry on affected extremity
- Immobilize extremity as soon as possible
- Take a picture of the snake, if possible. Do not attempt to capture the snake or transport it to the hospital due to risk of additional envenomation events.
- For a venomous snakebite, do not: apply distal or proximal constricting bands such as tourniquets, apply ice packs, locally incise the bite, copiously wash the wound, or attempt to remove venom by “sucking” or suctioning

## ALS

- Establish IV access
- *Lactated Ringer’s* 20 mL/kg bolus in uninjured extremity. Titrate to a systolic blood pressure of 90 mmHg for adults or age-appropriate blood pressure for pediatric patients.

## MC

- Not applicable

**Indications**
- Patient with known or suspected stimulant drug use
- Signs and symptoms may include: anxiety, chest pain, hallucinations, hypertension, hyperthermia, respiratory distress, seizures, tachycardia

**BLS**
- Ensure scene is secure and safe from paraphernalia.
- Identify stimulant name, amount, route, and time introduced into the body, if possible.

**ALS**
- Establish IV access with *Lactated Ringer's*.
- For stimulant use associated with severe symptoms or tachycardia (greater than 150 bpm):
  - Administer *midazolam* 0.1 mg/kg in 2 mg increments slow IVP over 1-2 minutes per increment with maximum single dose of 5 mg.
    - Reduce dose by 50% for patients 69 years of age or older.
    - If IV unavailable, 5 mg IN or IM may be administered. IN administration max 1 mL per nare.
  - Administer *midazolam* 0.1 mg/kg in 2 mg increments slow IVP over 1-2 minutes per increment with maximum single dose of 5 mg.
    - If IV unavailable, administer 0.2 mg/kg IN to a maximum single dose of 2 mg or 0.2 mg/kg IM to a maximum single dose of 5mg. IN administration max 1 mL per nare.
- Initiate *Chest Pain* or *STEMI* protocol, as appropriate, for patients with suspected acute coronary syndrome (ACS) and stimulant toxicity.
- For patients with active seizures, refer to *Seizure* protocol.

**MC**
- Additional doses of *midazolam* may be required to treat patients with stimulant toxicity.

**Clinical Pearls**
- Supraventricular tachycardia (SVT) associated with stimulant toxicity may resolve with *midazolam*. Many drugs have longer half-lives than *adenosine*, which renders it ineffective at terminating SVT associated with stimulant toxicity.

# Environmental Emergencies: Submersion Injury – Adult & Pediatric



**Indications**

- Immersion or submersion of a patient **without** cardiac arrest
- Patient may present with altered level of consciousness, dyspnea, cyanosis, vomiting, seizures, wheezing or decreased air entry, presumed to be due to bronchospasm
- **Mild:** Mild dyspnea, alert, no loss of consciousness, involuntary distressed coughing, pulse oximetry greater than 94% without supplemental oxygen, adequate perfusion
- **Moderate:** Moderate dyspnea, pulse oximetry less than 94% on supplemental oxygen, unable to speak in full sentences with normal mental status, previous loss of consciousness, rales/pulmonary edema, normotensive, altered mental status
- **Severe:** Unresponsive, hypotensive, rales/pulmonary edema, respiratory failure, foam in upper airways, pulse oximetry less than 90% on supplemental oxygen

## BLS

- Remove from water
- Treat and prevent hypothermia—refer to *Cold-Related Emergencies* protocol
- Assess the severity of patient's dyspnea
- For patients with pulse oximetry less than 94%, administer oxygen per *GPC*
- Ascertain water temperature and submersion time
- If patient is unresponsive, give 5 rescue breaths and refer to *GPC Section D (5): Breathing* for age-appropriate ventilation rates.
- Consider spinal motion restriction per *Trauma: Spinal Motion Restriction Adult* and *Pediatric* protocols

## ALS

- Monitor cardiac rhythm, capnography, and treat according to appropriate algorithm
- Perform 12-lead EKG
- **Mild:**
  - Administer oxygen, per *GPC*
  - Treat bronchospasm per *Asthma/COPD* protocol
- **Moderate:**
  - Provide appropriate high flow oxygen
  - Assist ventilations with BVM
  - Consider CPAP **(ages 13 and older)** and/or intubation—PEEP may need to be increased (prepare for patient to rapidly progress to severe)
  - Treat bronchospasm per *Asthma/COPD* protocol
  - Establish IV/IO access
- **Severe:**
  - If unconscious, provide 5 rescue breaths
  - For conscious patients 13 years and older, apply CPAP with PEEP of 5–10 cm of $H_20$ or *BiPAP* (OSP)
  - Treat bronchospasm per *Asthma/COPD* protocol
  - Consider advanced airway—if conditions allow, intubation is preferred
  - If unable to intubate, extraglottic airway is acceptable
  - If SBP below 90 mmHg, treat with *Lactated Ringer's* fluid bolus of 250 mL; may repeat once.
  - If the adult patient remains hypotensive despite IVF, administer epinephrine infusion (1 mg epinephrine in 100 mL LR), starting at 1 mL/min (60 drops/min). Titrate to systolic BP of 90 mmHg or MAP of 65 mmHg.
  - For pediatric patients less than 50 kg that remain hypotensive despite IVF, refer to the *Shock/Hypoperfusion – Pediatric* protocol.

**ALS**

- Moderate and severe submersions are considered traumatic injuries to lungs—transport to an ECPR capable center or trauma center, if patient condition allows

**MC**

- If the parent or guardian refuses medical care or transport, clinician shall obtain medical consultation with a Pediatric Base Station physician prior to completing the patient-initiated refusal.

**Clinical Pearls**

- Abdominal thrusts are contraindicated unless the patient has a foreign-body airway obstruction.
- Enter the water only if trained and as a last resort (Reach, Throw, Row, Go with Assistance).
- All submersion victims who are not in cardiac arrest should be transported to the closest appropriate facility even if they appear uninjured or think they have recovered from the incident due to risk of delayed pulmonary edema.

# Environmental Emergencies: Submersion Injury with Cardiac Arrest – Adult



**Indications**

- Cardiac arrest from submersion injury in patients 18 years of age or older
- For patients under 18 years of age, refer to *Pediatric Cardiac Arrest* protocol or if cold water submersion, refer to *Environmental Emergencies: Cold-Related Emergencies* protocol
- No signs of trauma — if trauma is present refer to *Trauma Arrest* protocol

**BLS**

- Remove from water
- Follow *Cardiac Arrest* protocol until arrival of ALS
- Early focus on effective BVM ventilation
- Perform high-quality uninterrupted chest compressions (manual or mechanical)
- Apply AED as soon as available and follow prompts

**ALS**

- Begin full resuscitation while ascertaining the water temperature and suspected length of submersion
  - **Warm Water Submersion**
    - **Submersion time is 30 minutes or less**
      - Full resuscitation
      - Prioritize early intubation and consider increasing PEEP
      - Early placement of NG/OG tube
      - May terminate resuscitation if:
        - Patient has received 15 two minute cycles of HPCPR, and the patient is:
          - in asystole, or
          - in VF, pulseless VT, or PEA with an $ETCO_2$ of less than 15 mmHg
    - **Submersion time is more than 30 minutes**
      - Place patient on cardiac monitor
      - Pronouncement of death can be made if patient is in asystole
      - For rhythms other than asystole, initiate resuscitation
      - May terminate resuscitation if:
        - Patient has received 15 two minute cycles of HPCPR, and the patient is:
          - in asystole, or
          - in VF, pulseless VT, or PEA with an $ETCO_2$ of less than 15 mmHg

ALS

- **Cold Water Submersion**
  - **Submersion time is 90 minutes or less**
    - Initiate resuscitation and transport to ECPR capable center
    - Consider helicopter transport if drive time is greater than or equal to 45 minutes from the closest appropriate facility

      Obtain early medical consultation for hypothermic cardiac arrest patients. Drug and defibrillation intervals may change depending on the degree of hypothermia.
  - **Submersion time is greater than 90 minutes**
    - Place patient on cardiac monitor
    - Pronouncement of death can be made if patient is in asystole
    - For rhythms other than asystole, initiate resuscitation and transport to ECPR capable center
    - Consider helicopter transport if drive time is greater than or equal to 45 minutes from the closest appropriate facility

      Obtain early medical consultation for hypothermic cardiac arrest patients. Drug and defibrillation intervals may change depending on the degree of hypothermia.
- If ROSC is obtained—refer to *ROSC* protocol and transport
- Preferred destination for submersion patients is an ECPR capable center
  - Consider helicopter transport if drive time is greater than or equal to 45 minutes
- If **unknown submersion time**, refer to *Adult Termination of Resuscitation: Medical Arrest*.
  - If the patient does not meet Medical TOR criteria—continue resuscitation and transport

**Clinical Pearls**

- **Warm water submersion:** water temperature above 43 degrees fahrenheit (6°C); Late March–November for most bodies of water in Maryland
- **Cold water submersion:** water temperature below 43 degrees fahrenheit (6°C); December–March for most bodies of water in Maryland

# Burns – Adult & Pediatric



**Indications**

- Burns (electrical, thermal, chemical) as evidenced by any of the following: reddening of the skin, deep and intense pain, blisters, mottled appearance, or charred black or brown areas with severe or no pain.

**BLS**

- Extricate the patient from burning vehicles or buildings when safe.
- Stop the burning process; remove wet clothing and dry the patient to prevent hypothermia; burns greater than 10% BSA are at higher risk for hypothermia.
- Administer high concentration of *oxygen* (if smoke inhalation, refer to *Carbon Monoxide* protocol).
- Treat associated trauma.
- Cover wounds appropriately with a clean sheet or Mylar® blanket.
- Remove all rings, bracelets, and other jewelry.
- Determine burn depth (first, second, third degree).
- Estimate percentage of body surface area (BSA) burned using the Palmar method. Only second- and third-degree burns should be included in the BSA assessment.
- For chemical burns, brush off dry chemical, remove clothing, and flush with water.
- Do not give anything by mouth.
- Do not place ice or ice packs on any patient with burns.
- **Destination Determination for Burn Patients:**
  - Transport patients who meet <u>any</u> of the following criteria to a burn center:
    - All third-degree burns (full thickness)
    - Second-degree burns (partial thickness) greater than 10% BSA
    - Burns of the face, hands, feet, major joints, genitalia, or perineum
    - Electrical burns, including lightning or contact with high voltage (greater than 120 volts)
    - Suspected thermal burns/airway burns from smoke inhalation
    - Circumferential burns involving the extremities or torso
  - Consider aeromedical transport if the patient is more than 30 minutes by ground from a burn center.
  - Chemical burns should be transported to the closest appropriate hospital for decontamination prior to referral to a burn center.
  - Patients with burns and trauma should be transported to the nearest appropriate <u>trauma center</u> for initial care.
  - Children who have not reached 15th birthday who meet burn center criteria should be transported to a <u>pediatric burn center</u>.

**ALS**

- Assess and frequently re-assess the patient's airway.
  - If signs of respiratory failure are present (airway obstruction, shock, altered mental status, hypoxemia while receiving supplemental oxygen, or severe dyspnea), secure the patient's airway.
- Establish IV access, if appropriate.
  - Fluid resuscitation is not indicated for superficial burns or burns under 20% BSA.
  - For visibly large burns, predicted to be 20% or greater BSA, administer *Lactated Ringer's* as follows:
    - 15 years of age and above: 500 mL/hr *LR* (120 drops/min using 15 drop-set). Maximum dose 2,000 mL without medical consultation.
    - Children who have not reached 15th birthday: do not administer IV fluid unless the patient is in shock.
  - For patients in shock, administer small fluid boluses of *LR* (maximum single bolus of 250 mL prior to blood pressure check) to achieve and maintain a systolic blood pressure of 90 mmHg or greater (or mean arterial pressure of 65 mmHg). If a head injury is suspected, administer small boluses of *LR* to maintain a systolic blood pressure of 110 mmHg or greater.
  - Establish IV access with *LR*, if appropriate. For patients in shock, administer small fluid boluses to achieve and maintain a systolic blood pressure of (70 + 2 x age in years) mmHg.
- Administer opioid per *Pain Management* protocol

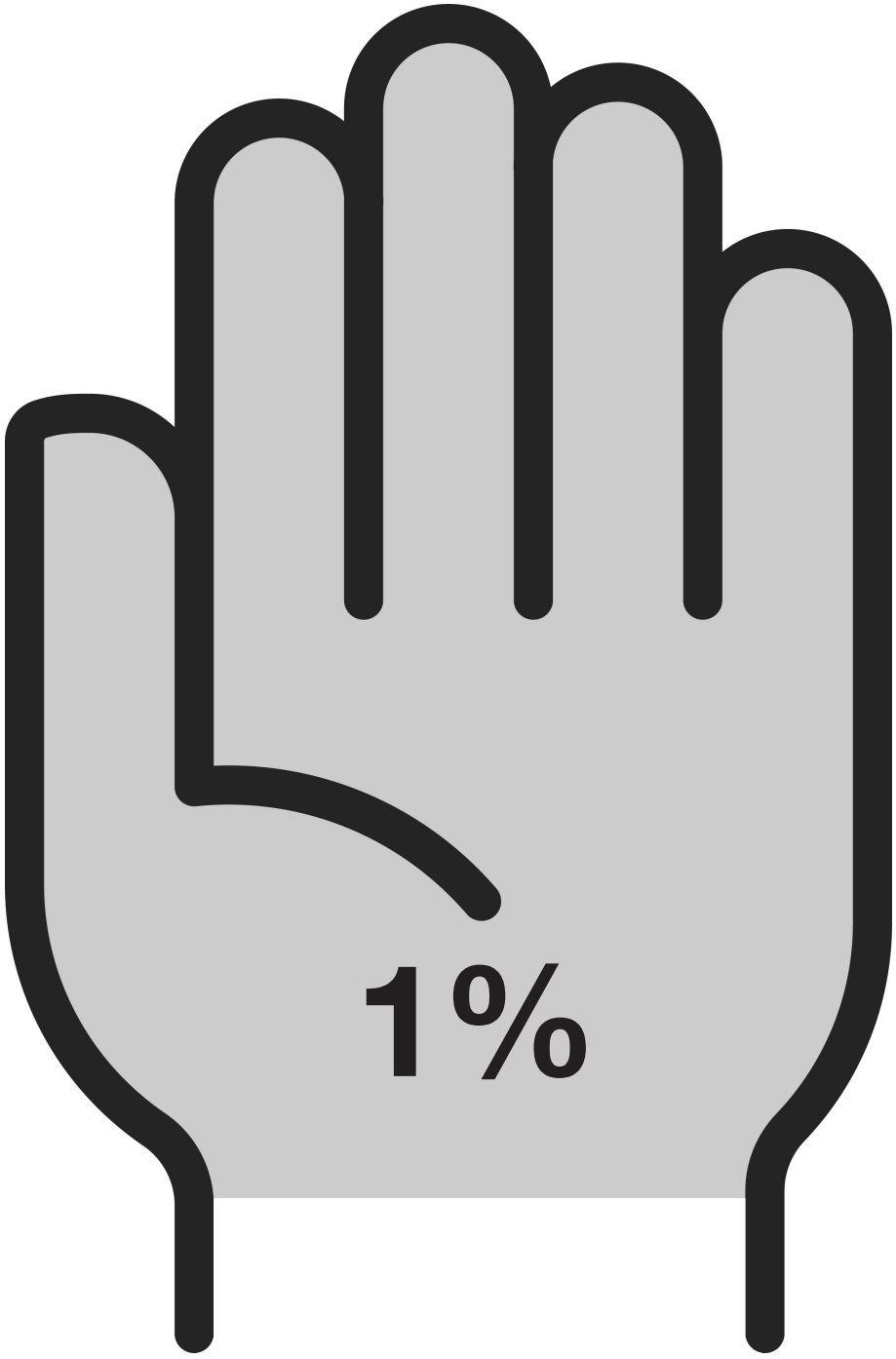
**MC**

- For adults, *Lactated Ringer's* doses greater than 2,000 mL require medical consultation.
- If transport time exceeds 30 minutes, obtain medical consultation for maintenance fluid recommendation.

**Clinical Pearls**

- Pulse oximetry is not reliable in presence of carbon monoxide or cyanide exposure.
- If suspected smoke inhalation, closely monitor the patient's airway for delayed airway obstruction, respiratory distress, or oxygen desaturation. The patient may need emergent airway management.

**NOTE: The Palmar Method – the surface of the patient's hand (palm and 5 fingers) is approximately 1% of their body surface area.**



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**Indications**
- Traumatic injury to the eye
- May include the following signs and symptoms in either eye or surrounding facial area:
  - Profuse bleeding
  - Foreign objects
  - Impaled objects and/or soft-tissue damage
  - Avulsions or lacerations

**BLS**

- **Foreign objects NOT embedded in the eye(s):** Flush with copious amounts of water (preferably sterile), normal saline, or *Lactated Ringer's* from the bridge of the nose outward.
- **Injury to orbits (area around the eye):** Evaluate for need for head stabilization and *Spinal Motion Restriction* protocol.
- **Lacerations/injuries to the eye or globe:** Shield affected eye and dress other eye to reduce movement and protect loss of fluids; consider head stabilization and spinal protection and elevate the head to decrease intraocular pressure.
- **Impaled objects:** Stabilize object, shield affected eye, and dress other eye to reduce movement.
- For isolated eye trauma or injuries, transport to the nearest eye trauma center. If the patient has other associated trauma or burns, transport the patient to the closest appropriate trauma or burn center.

**ALS**

- Establish IV access with *Lactated Ringer's*, if appropriate.
- Administer opioid per *Pain Management* protocol.

**MC**

- Not applicable.

**Clinical Pearls**
- Never apply pressure to the eye or globe.
- Do not use chemical cold packs on the face.

# Trauma: Hand/Upper/Lower Extremity – Adult & Pediatric



**Indications**

- **UPPER EXTREMITY:** Patients should have stable vital signs with an isolated upper extremity injury, and no other major or multiple system traumatic injuries.
  - Stable patients with an isolated upper extremity injury at or below the mid-humerus
  - Complete or incomplete hand or finger amputation (except distal fingertip)
  - Degloving, high pressure injection, or crush injury
  - Compartment syndrome, suspected (excessive swelling and significant pain to extremity)
  - Complicated nerve or vascular injury of the forearm and hand
  - High-pressure injection injuries to hand or upper extremity
  - Complicated nerve, vessel, or compartment syndrome (excessive swelling and pain of extremity with possible evolving nerve deficit) injury of the forearm and hand
- **LOWER EXTREMITY:**
  - Complete or incomplete amputation of the lower extremity, ankle, foot
  - Degloving, high-pressure injection, or crush injury
  - Compartment syndrome, suspected (excessive swelling and significant pain to extremity)
  - Complicated nerve or vascular injury of the lower extremity

**BLS**

- Control bleeding.
  - Apply direct pressure to the area of bleeding.
  - Apply tourniquet early if hypovolemic shock is present and/or bleeding is difficult to control. If bleeding source is unclear, place tourniquet as proximal as possible on the limb.
  - If bleeding from a non-compressible injury (i.e., not able to place a tourniquet to stop bleeding), consider wound packing and/or hemostatic gauze/agents.
- Splint suspected fracture or dislocated extremity or joint. If suspected fracture appears to have compromised perfusion or neurological function, apply gentle traction and splint in anatomic position.
- Package amputated extremity in sealed plastic bag (keep dry) and place on top of ice to keep cool. Do not submerge in water or freeze amputated part.
- **Upper Extremity Destination:**
  - Adult patients with isolated, qualifying upper extremity injuries should be referred to Curtis National Hand Center at MedStar Union Memorial Hospital.
  - Pediatric patients who have not yet reached their 15th birthday with qualifying upper extremity injuries should be referred to the closest appropriate Pediatric Trauma Center.
- **Lower Extremity Destination:**
  - Adult patients with qualifying lower extremity injuries should be referred to the closest appropriate Adult Trauma Center.
  - Pediatric patients with qualifying lower extremity injuries should be referred to the closest appropriate Pediatric Trauma Center.

**ALS**

- Establish IV access with *Lactated Ringer's*, if appropriate.
- If patient develops hypotension or signs of hemorrhagic shock:
  - Reassess the patient for other injuries. If multiple system trauma or neurotrauma, refer to *Multiple/Severe Trauma* protocol and transport to closest appropriate trauma center.
  - Treat per *Shock: Hypoperfusion* protocol.

# Trauma: Hand/Upper/Lower Extremity – Adult & Pediatric (continued)



**ALS**

- For suspected open fracture, amputation, mangled and/or degloved extremity, administer *cefazolin* **AFTER** initial stabilization. Do **NOT** delay transport/resuscitation to administer the medication.
  - For patients 13 years of age and older: Administer 2 grams in 100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 10 minutes.
  - For patients 5 through 12 years of age: Administer 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over10 minutes.
  - For patients 1 through 4 years of age: Administer 500 mg in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 10 minutes.
  - For patients less than 1 year of age: A medical consultation is required.
- Provide pain management per *Pain Management* protocol.
- For a patient with prolonged transport time or tourniquet applied by non-EMS responders: If the patient is not in shock and does not have a partial or full limb amputation, evaluate the continued need for a tourniquet – see *Tourniquet Conversion* procedure.

**MC**

- Additional fluid beyond 2,000 mL requires medical consultation.
- Consultation and acceptance by the Curtis Hand Center (MedStar Union Memorial) is required prior to medevac authorization (before SYSCOM will dispatch the helicopter).
- Administration of *cefazolin* to patients less than 1 year of age requires a medical consultation.

**Clinical Pearls**

- Toe injuries from lawn mower are not candidates for reimplantation and patients should be transported to the closest appropriate facility.
- Use time, distance, weather, and proximity to designated trauma center to determine mode of transport. If estimated ground transport time to designated hand center is less than 30 minutes, use ground transport.

**Indications**

- Multiple or severe traumatic injuries in patients **15 years of age and older**
- Suspected internal bleeding, external bleeding, fractures, or lacerations
- Patients may present with any of the following:
  - Shock or hypotension
  - Hypertension, particularly in head-injured patients
  - Shallow or absent respirations
  - Tachycardia or bradycardia
  - Decreased motor or sensory function in the extremities
- A patient who meets criteria for any category of the Maryland Trauma Decision Tree (Alpha, Bravo, Charlie, Delta)

**BLS**

- **X – C**ontrol hemorrhage
  - Apply direct pressure to the area of bleeding
  - If bleeding is **life-threatening** at any time OR continues despite direct pressure, then attempt wound packing, hemostatic bandages, and/or early tourniquet (extremity or junctional) as appropriate.
- **A – A**irway with Cervical Spine Motion Restriction
  - Apply Spinal Motion Restriction protocol for blunt trauma patients. Patients with isolated penetrating trauma do not require spinal motion restriction.
  - Place an NPA/OPA early, as needed to establish or maintain a patent airway.
- **B – B**reathing and Ventilation
  - Provide ventilatory support and oxygen via appropriate method for the patient.
  - Maintain pulse oximetry ($SpO_2$) greater than or equal to 94%.
  - For a head-injured adult/adolescent (greater than 13 years of age), provide ventilation at a rate of 20 breaths per minute if:
    - Patient has signs of brainstem herniation such as unequal pupils, posturing, or
    - Patient is manifesting a rapidly decreasing GCS
  - Seal open chest wounds with a vented chest seal.
- **C – C**irculation with Hemorrhage Control
  - Re-evaluate and address any areas of bleeding
  - Apply pelvic stabilization if indicated; use a pelvic binder if available.
  - Pregnancy: For pregnant patients greater than 20 weeks gestation with hypotension, provide constant left lateral uterine displacement.

**ALS**

- **XABC** BLS interventions as indicated above (plus additional ALS interventions below)
  - Maintain $ETCO_2$ between 35-40 mmHg for any patient with significant head injury
  - For patients with suspected head injury AND signs of increased intracranial pressure (brainstem herniation), adjust ventilation to achieve an $ETCO_2$ of 30-35 mmHg.
  - If suspected tension pneumothorax, perform *needle decompression thoracostomy*; once catheters are placed, do not remove.
- **C – C**irculation with Hemorrhage Control
  - For patients with a systolic blood pressure **greater** than or equal to 90 mmHg (greater than or equal to 110 mmHg if injuries include a suspected head injury):
    - Establish IV/IO access, KVO.

**ALS**

- For patients with a systolic blood pressure **less** than 90 mmHg (less than 110 mmHg if injuries include a suspected head injury):
  - Establish IV/IO access.
  - Administer small boluses of *Lactated Ringer's* (maximum single bolus of 250 mL prior to additional blood pressure check) to achieve and maintain a systolic blood pressure of greater than or equal to 90 mmHg (110 mmHg if injuries include a suspected head injury).
  - If blood is available, proceed with administration per *Whole Blood* pilot protocol.
- For patients with witnessed loss of central pulses see *Trauma Arrest-Adult* protocol.
- For patients 15 years of age and older with suspected hemorrhagic shock (SBP less than 90) due to trauma, administer *TXA* 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes. Injury must have occurred within the past one (1) hour. Do not delay transport to initiate *TXA*.
- Abdominal aortic compression devices may be used if available.

- Initiate a second IV for Category Alpha and Bravo patients ONLY if it does NOT delay transport.
- Treat per *Pain Management* protocol.
- For suspected open fracture, amputation, mangled and/or degloved extremity, administer cefazolin **AFTER** initial stabilization. Do **NOT** delay transport/resuscitation to administer the medication.
  - Administer cefazolin 2 grams in 100 mL approved diluent (normal saline/*Lactated Ringer's*/ D5W) IV/IO over 10 minutes.
- For a patient with prolonged transport time or tourniquet applied by non-EMS responders: If the patient is not in shock and does not have a partial or full limb amputation, evaluate the continued need for a tourniquet—see *Tourniquet Conversion* procedure.

**MC**

- Additional fluid beyond 2,000 mL requires medical consultation
- Prehospital removal of an abdominal aortic compression device requires medical consultation.

**Clinical Pearls**

- While, time, distance, and proximity are all factors to be considered in the triage decision, the trauma decision tree should be used to determine who should be transported to the nearest appropriate trauma center and the mode of transport.
- For trauma patients who have not reached their 15th birthday, refer to *Trauma: Multiple/Severe – Pediatric* protocol.

**Abdominal Aortic Compression Devices**

- Abdominal aortic compression devices are contraindicated in known or suspected pregnancy, children less than 18 years of age, and in patients with isolated penetrating chest trauma.
- Not all EMS units are equipped with abdominal aortic compression devices. Only EMS clinicians trained in the specific device available should utilize this intervention.
- Abdominal aortic compression devices should be considered for patients with junctional or proximal extremity hemorrhage not controllable by standard tourniquets and patients with suspected massive hemorrhage below the diaphragm.

**Indications**

- Multiple or severe traumatic injuries in patients **less than 15 years of age**
- Suspected internal bleeding, external bleeding, fractures, or lacerations
- Patients may present with any of the following:
  - Shock or hypotension
  - Hypertension, particularly in head-injured patients
  - Shallow or absent respirations
  - Tachycardia or bradycardia
  - Decreased motor or sensory function in the extremities
- A pediatric patient who meets criteria for any category of the Maryland Trauma Decision Tree (Alpha, Bravo, Charlie, Delta)

**BLS**

- **X – C**ontrol hemorrhage
  - Apply direct pressure to the area of bleeding
  - If bleeding is **life-threatening** at any time OR continues despite direct pressure, then attempt wound packing, hemostatic bandages, and/or early tourniquet (extremity or junctional) as appropriate.
- **A – A**irway with Cervical Spine Motion Restriction
  - Apply *Spinal Motion Restriction* protocol for blunt trauma patients. Patients with isolated penetrating trauma do not require spinal motion restriction.
  - Place an NPA/OPA early, as needed to establish or maintain a patent airway.
- **B – B**reathing and Ventilation
  - Provide ventilatory support and oxygen via appropriate method for the patient.
  - Maintain pulse oximetry ($SpO_2$) greater than or equal to 94%.
  - For a head-injured patient with signs of a brainstem herniation (unequal pupils, posturing) or a rapidly decreasing GCS, provide ventilation as follows:
    - Adolescent (13 years of age and older): 20 breaths per minute
    - Child (1–12 years of age): 30 breaths per minute
    - Infant (less than 1 year of age): 35 breaths per minute
  - Seal open chest wounds with a vented chest seal.
- **C – C**irculation with Hemorrhage Control
  - Re-evaluate and address any areas of bleeding
  - Apply pelvic stabilization if indicated; use a pelvic binder if indicated (*Pelvic Stabilization Binder Device*).
  - Pregnancy: For pregnant patients greater than 20 weeks gestation with hypotension, provide constant left lateral uterine displacement.

**ALS**

- **XABC** BLS interventions as indicated above (plus additional ALS interventions below)
- Breathing and Ventilation
  - If suspected **tension** pneumothorax, perform *needle decompression thoracostomy*; once catheters are placed, do not remove.
- Circulation with Hemorrhage Control
- Establish IV/IO access
- If age-related vital signs and patient's condition indicate hypoperfusion, administer initial fluid bolus of 20 mL/kg *LR* IV/IO. If patient's condition does not improve, administer the second bolus of fluid at 20 mL/kg *LR*.
- For patients with suspected hemorrhagic shock due to trauma administer *TXA*:
  - 12 years of age and older with SBP less than 90 mmHg: 1 gram *TXA* in 100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes

**ALS**

- 5 through 11 years of age with SBP less than 70 + (2 x age in years): 500 mg *TXA* in 100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes
- less than 5 years of age: medical consultation required
- Injury must have occurred within the past one (1) hour. Do not delay transport to initiate *TXA*.

- Treat per *Pain Management* protocol
- For suspected open fracture, amputation, mangled and/or degloved extremity, administer *cefazolin* **AFTER** initial stabilization. Do **NOT** delay transport/resuscitation to administer the medication.
  - For patients 13 years of age and older: Administer 2 grams in 100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 10 minutes.
  - For patients 5 through 12 years of age: Administer 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 10 minutes.
  - For patients 1 through 4 years of age: Administer 500 mg in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over10 minutes.
  - For patients less than 1 year of age: A medical consultation is required.
- For a patient with prolonged transport time or tourniquet applied by non-EMS responders: If the patient is not in shock and does not have a partial or full limb amputation, evaluate the continued need for a tourniquet—see *Tourniquet Conversion* procedure.

**MC**

- Third and subsequent fluid boluses at 20 mL/kg *LR* IV/IO.
- Administration of *cefazolin* to patients less than 1 year of age requires a medical consultation.

## Clinical Pearls

- Pelvic fractures in pediatric patients are rare, pelvic binders/splints should be applied with caution

**GLASGOW COMA SCALE**

**Eye Opening**

| | |
|---|---|
| Spontaneously | 4 |
| To Voice | 3 |
| To Pain | 2 |
| No Response | 1 |

**Motor Response**

| | | |
|---|---|---|
| To Verbal Command | - Obeys | 6 |
| To Painful Stimulus | - Localizes Pain | 5 |
| | Flexion - Withdraw | 4 |
| | Flexion - Abnormal | 3 |
| | Extension | 2 |
| | No Response | 1 |

**Verbal Response**

| Less than 2 years old | 2–5 years old | Greater than 5 years old | |
|---|---|---|---|
| **5** SMILES/COOS/CRIES | APPROPRIATE WORDS | ORIENTED AND CONVERSES | 5 |
| **4** CRIES | INAPPROPRIATE WORDS | DISORIENTED AND CONVERSES | 4 |
| **3** INAPPROPRIATE CRIES/SCREAMS | CRIES/SCREAMS | INAPPROPRIATE WORDS | 3 |
| **2** GRUNTS | GRUNTS | INCOMPREHENSIBLE SOUNDS | 2 |
| **1** NO RESPONSE | NO RESPONSE | NO RESPONSE | 1 |

**Glasgow Coma Score** **Total (3–15)**

# Trauma: Sexual Assault – Adult & Pediatric



**Indications**
- Abrasions, contusions, and/or bleeding
- Signs of forcible restraint
- Petechiae of the face and conjunctiva, secondary to strangulation
- Facial injuries, including eye injuries, broken teeth, swollen jaw, or cheekbone
- Vaginal or rectal bleeding or pain
- Some patients may present without visible signs of trauma

**BLS**

- If practical, allow patient to speak with a clinician with whom they are most comfortable.
- Maintain a non-judgmental, caring attitude.
- Preserve the crime scene and clothing articles, if practical.
- Do not perform an examination of the genitals or rectum unless necessary to stabilize the patient.
- Dress wounds (do not attempt to clean).
- Discourage any self-treatment (shower, washing, changing clothes, brushing teeth).
- Treat injuries according to appropriate trauma protocol.
- Destination
  - Patients meeting specialty center criteria or in need of time-sensitive emergent care should be transported to the closest appropriate specialty center or emergency department, even if this is not a Maryland Coalition Against Sexual Assault (MCASA) recognized facility.
  - Patients under 13 years of age should be transported to an MCASA-recognized pediatric facility for a Sexual Assault Forensic Exam (SAFE).
  - For patients 13 years of age and older, transport the patient to the appropriate MCASA-recognized facility for a SAFE exam. Use the term “safe patient” when notifying the receiving facility.
- Reporting
  - All EMS clinicians **must** report cases of suspected child or vulnerable adult abuse or neglect directly to the local police or adult/child protective services. This report is required by law. Do not initiate the report in the presence of the patient, parent, or caregiver.

**ALS**

- Treat with *ketorolac* or opioid, as needed, per *Pain Management* protocol.

**MC**

- Not applicable.

**Clinical Pearls**
- EMS clinicians are protected from liability if they make a report of child or vulnerable adult abuse or neglect in good faith.

# Trauma: Spinal Motion Restriction – Adult



**Indications**

- Patients who have a blunt trauma with a high-energy mechanism of injury that has potential to cause spinal cord injury or vertebral instability **and** one or more the following should receive spinal motion restriction:
  - Midline cervical, thoracic, or lumbar spinal pain, tenderness, or deformity
  - Signs and symptoms of new paraplegia or quadriplegia
  - Focal neurological deficit (sensory or motor)
  - Altered mental status or disorientation
  - Distracting injury: Any injury (e.g., fracture, chest, or abdominal trauma) associated with significant discomfort that could potentially distract from a patient's ability to accurately discern or define spinal column pain or tenderness.
- Indications for referral to an Adult Neurotrauma Center:
  - 15 years of age or older AND
  - Signs and symptoms of new paraplegia or quadriplegia in the presence of trauma AND
  - Patent airway AND
  - Hemodynamically stable
    - ♦ If considering referral to Adult Neurotrauma Center, consult with both the nearest Trauma Center and the Adult Neurotrauma Center, when possible.

**BLS**

- Initiate manual in-line cervical spine stabilization and application of a correctly-sized cervical collar.
- Minimize flexion, extension, and rotation of the spinal column.
- **Cervical collar:** The following patients need application of a cervical collar and do **not** need full immobilization with a backboard. These patients should be assisted with minimal movement to the EMS stretcher and allowed to lie supine on their own accord with head elevated at 30 degrees:
  - Patients who are found by EMS clinicians to be standing or ambulatory,
  - Patients who have a GCS of 15 and are able to safely extricate themselves from the environment (e.g., vehicle seat) without gross movement (flexion, extension, rotation) of the spinal column, and
  - Patients who do not have evidence of a neurological deficit.
- **Cervical collar and backboard:** Patients with neurological deficit or a GCS of less than 15 or who are not able to ambulate on their own accord shall be immobilized with cervical collar and a backboard.
- **Extrication:** Backboards may be used for patient extrication and transfer for patients not meeting the *Spinal Motion Restriction* protocol; however, other devices are preferred (e.g., Reeves™, scoop stretcher).
  - If the backboard is used only for extrication from scene to ambulance, remove the backboard as soon as possible and allow the patient to be supported on the EMS stretcher.
- **Interfacility transport:** Patients who have already been removed from the backboard should not be placed back on one for transport.
- **Found on backboard prior to EMS arrival:** If the patient was immobilized on a backboard prior to EMS arrival, EMS should assess continued need for the device using the criteria above.

**BLS**

- **Helmet Removal**
  - If patient is wearing a helmet, the goals are assessment and management of the airway, breathing, and circulation followed by protection of the spinal column by maintaining neutral alignment of the spinal column.
  - If patient is wearing helmet and no shoulder pads, removal of the helmet is indicated.
  - If patient is wearing helmet with shoulder pads, removal of the helmet is acceptable only with concurrent removal of shoulder pads. Under these conditions, removal of the helmet is indicated for management of the airway or other facial trauma.

**ALS**

- If the patient presents with hypotension and concern for neurogenic shock, refer to the neurogenic shock section of the *Shock/Hypoperfusion* protocol.

**MC**

- Not applicable.

# Trauma: Spinal Motion Restriction – Pediatric



**Indications**

- Patients who have a blunt trauma with a high-energy mechanism of injury that has potential to cause spinal cord injury or vertebral instability **and** the presence of or inability to assess one or more of the following should receive spinal motion restriction:
  - Midline spinal pain, tenderness, or deformity
  - Signs and symptoms of new paraplegia or quadriplegia
  - Focal neurological deficit
  - Altered mental status or disorientation
  - Distracting injury
  - Neck pain or torticollis
  - High-impact diving incident or high-risk motor vehicle crash (i.e., head-on collision, rollover, ejected from the vehicle, death in the same crash, or speed greater than 55 mph)
  - Substantial torso injury
  - Conditions predisposing to spine injury
- Indications for referral to a Pediatric Trauma Center:
  - Patient is less than 15 years of age AND
  - Signs and symptoms of new paraplegia or quadriplegia in the presence of trauma AND
  - Patent airway AND
  - Hemodynamically stable

**BLS**

- Initiate manual in-line cervical spine stabilization and application of a correctly-sized cervical collar.
- Minimize flexion, extension, and rotation of the spinal column
- **Cervical collar:** The following patients need application of a cervical collar and do not need full immobilization with a backboard. These patients should be assisted with minimal movement to the EMS stretcher and allowed to lie supine on their own accord with head elevated at 30 degrees:
  - Patients who are found by EMS clinicians to be standing or ambulatory,
  - Patients who have a GCS of 15 and are able to safely extricate themselves from the environment (e.g., vehicle seat) without gross movement (flexion, extension, rotation) of the spinal column, and
  - Patients who do not have evidence of a neurological deficit.
- **Cervical collar and backboard:** Patients with neurological deficit or a GCS of less than 15 or who are not able to ambulate on their own accord, shall be immobilized with cervical collar and a backboard.
- **Extrication:** Backboards may be used for patient extrication and transfer for patients not meeting the *Spinal Motion Restriction* protocol; however, other devices are preferred (e.g., Reeves™, scoop stretcher).
  - If the backboard is used only for extrication from scene to ambulance, remove the backboard as soon as possible and allow the patient to be supported on the EMS stretcher.
- **Interfacility transport:** Patients who have already been removed from the backboard should not be placed back on one for transport.
- **Found on backboard prior to EMS arrival:** if the patient was immobilized on a backboard prior to EMS arrival, EMS should assess continued need for the device using the criteria above.

**BLS**

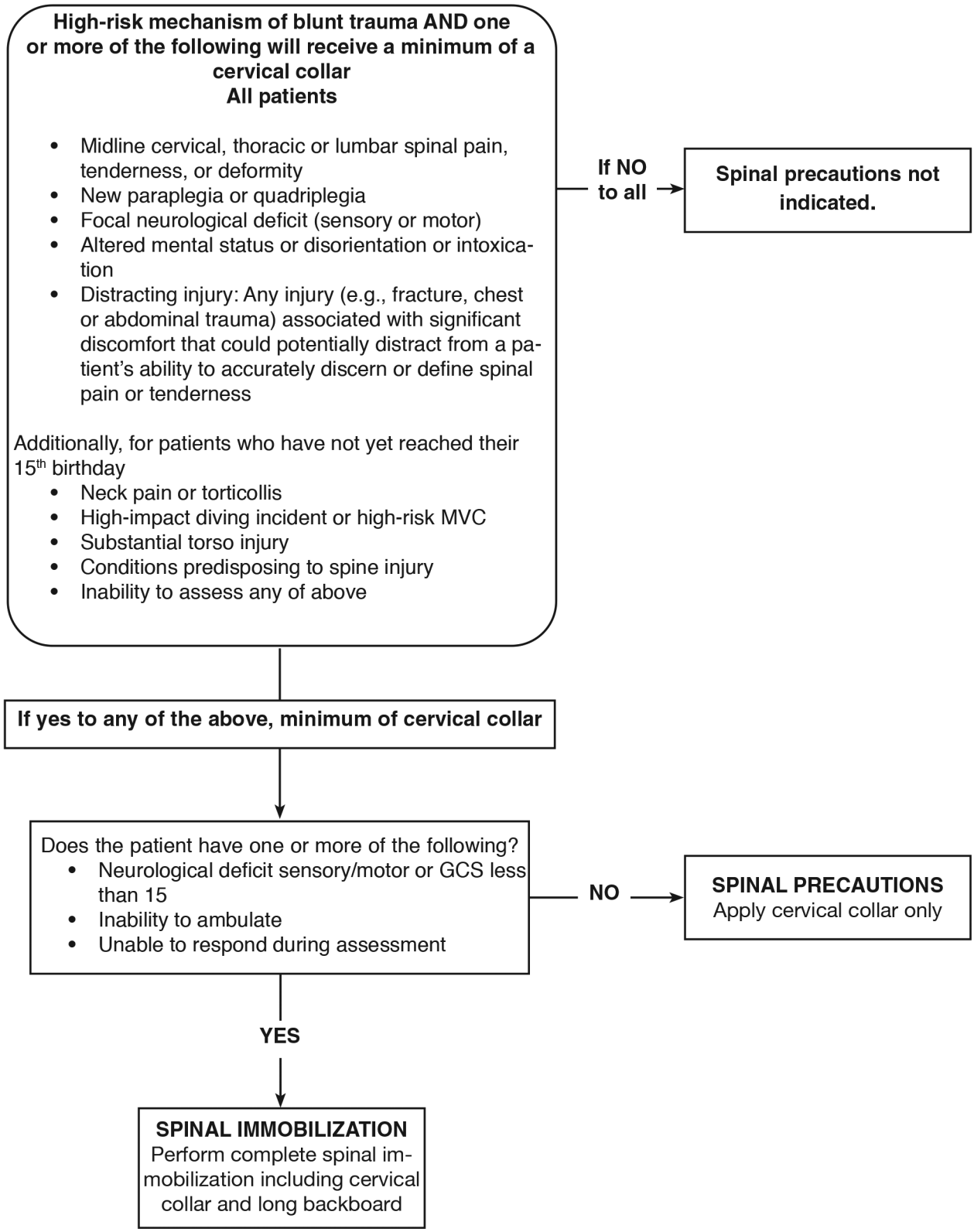
- **Helmet Removal**
  - If patient is wearing a helmet, the goals are assessment and management of the airway, breathing, and circulation followed by protection of the spinal column by maintaining neutral alignment of the spinal column.
  - If patient is wearing helmet and no shoulder pads, removal of the helmet is indicated.
  - If patient is wearing helmet with shoulder pads, removal of the helmet is acceptable only with concurrent removal of shoulder pads. Under these conditions, removal of the helmet is indicated for management of the airway or other facial trauma.

**ALS**

- If the patient presents with hypotension and concern for neurogenic shock, refer to the neurogenic shock section of the *Shock/Hypoperfusion* protocol.

**MC**

- Not applicable.


High-risk mechanism of blunt trauma AND one or more of the following will receive a minimum of a cervical collar
All patients
• Midline cervical, thoracic or lumbar spinal pain, tenderness, or deformity
• New paraplegia or quadriplegia
• Focal neurological deficit (sensory or motor)
• Altered mental status or disorientation or intoxication
• Distracting injury: Any injury (e.g., fracture, chest or abdominal trauma) associated with significant discomfort that could potentially distract from a patient's ability to accurately discern or define spinal pain or tenderness
Additionally, for patients who have not yet reached their 15th birthday
• Neck pain or torticollis
• High-impact diving incident or high-risk MVC
• Substantial torso injury
• Conditions predisposing to spine injury
• Inability to assess any of above
If NO to all
Spinal precautions not indicated.
If yes to any of the above, minimum of cervical collar
Does the patient have one or more of the following?
• Neurological deficit sensory/motor or GCS less than 15
• Inability to ambulate
• Unable to respond during assessment
NO
SPINAL PRECAUTIONS
Apply cervical collar only
YES
SPINAL IMMOBILIZATION
Perform complete spinal immobilization including cervical collar and long backboard

**Indications**

- Cardiac arrest or profound hemodynamic collapse resulting in loss of palpable pulses, with suspected traumatic etiology, in a patient who is **15 years of age or older**

**BLS**

- Extricate the patient if the environment is unsafe; otherwise, initiate care on-scene.
- Determine if the patient meets the criteria for the Pronouncement of Death in the Field protocol. If the criteria are not met, then continue resuscitation.
- Treat reversible causes of traumatic arrest, on-scene, as soon as possible.
  - **X:** Control life-threatening external hemorrhage.
  - **A:** Open airway and ensure adequate ventilation, insert necessary airway adjuncts.
  - **B:** Seal open chest wounds with vented chest seals. Perform ventilations.
  - **C:** Perform HP-CPR and apply an AED.
- Provide spinal motion restriction for blunt trauma patients only.
  - Patients with isolated penetrating trauma do not require spinal motion restriction.
  - If the mechanism of injury includes both blunt and penetrating trauma, perform spinal motion restriction.
- Destination
  - For a penetrating trauma patient who does not meet *BLS TOR* protocol criteria:
    - Within 15 minutes of a trauma center: Treat reversible causes and transport.
    - Greater than 15 minutes from a trauma center: Treat reversible causes and transport to the closest ED or freestanding emergency medical facility.
  - For a blunt trauma patient: All reversible causes of arrest should be performed on-scene before TOR or transport (if ROSC was achieved).
- If ROSC is not achieved, refer to Termination of Resuscitation *BLS TOR* protocol.

**ALS**

- Treat reversible causes of traumatic arrest, on-scene, as soon as possible.
  - **XABC** BLS interventions as indicated above
- Establish IV/IO access.
  - Bilateral needle decompression thoracostomy: For traumatic arrest due to suspected multi-system blunt trauma, or due to penetrating neck, chest, or abdominal trauma, bilateral needle decompressions should be performed. Catheters should not be removed once placed.
  - For traumatic arrest due to suspected hemorrhagic etiology involving the torso below the level of the diaphragm, if a commercially available abdominal aortic compression device is available:
    - Position the patient supine on a firm surface.
    - Expose the abdomen completely.
    - Apply the device according to the manufacturer's recommendations and training.
    - For devices with an inflatable bladder, inflate to the recommended pressure.
    - Document the time of application. Maximum application time: 60 minutes.
    - If ROSC occurs, the absence of a femoral pulse confirms correct application.
    - Check placement and pressure every 5 minutes.
    - The device may only be removed:
      - If ROSC has been achieved, the transport time exceeds 60 minutes, **and** approved by consultation with a trauma center, **or**
      - If required for extrication.
    - Transport to a trauma center capable of definitive hemorrhage control.

**ALS**

- If blood is not available, initiate *Lactated Ringer's* 20 mL/kg IV/IO in 500 mL increments.
- If equipped with blood products, proceed with transfusing blood to patients with a witnessed PEA arrest of less than 5 minutes duration, per *Whole Blood* pilot protocol.
- Identify rhythm and refer to appropriate treatment algorithm.
  - Note: *Epinephrine* is generally not indicated for adult traumatic arrest.
- If ROSC is achieved, for patients 15 years of age and older with suspected hemorrhagic shock (SBP less than 90) due to trauma, administer *TXA* 1 gram in 100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes. Injury must have occurred within the past one (1) hour. Do not delay transport to initiate *TXA*.
- If ROSC is not achieved, refer to *Termination of Resuscitation (Adult Traumatic)* protocol.

**MC**

- Prehospital removal of an abdominal aortic compression device requires medical consultation with a trauma center.

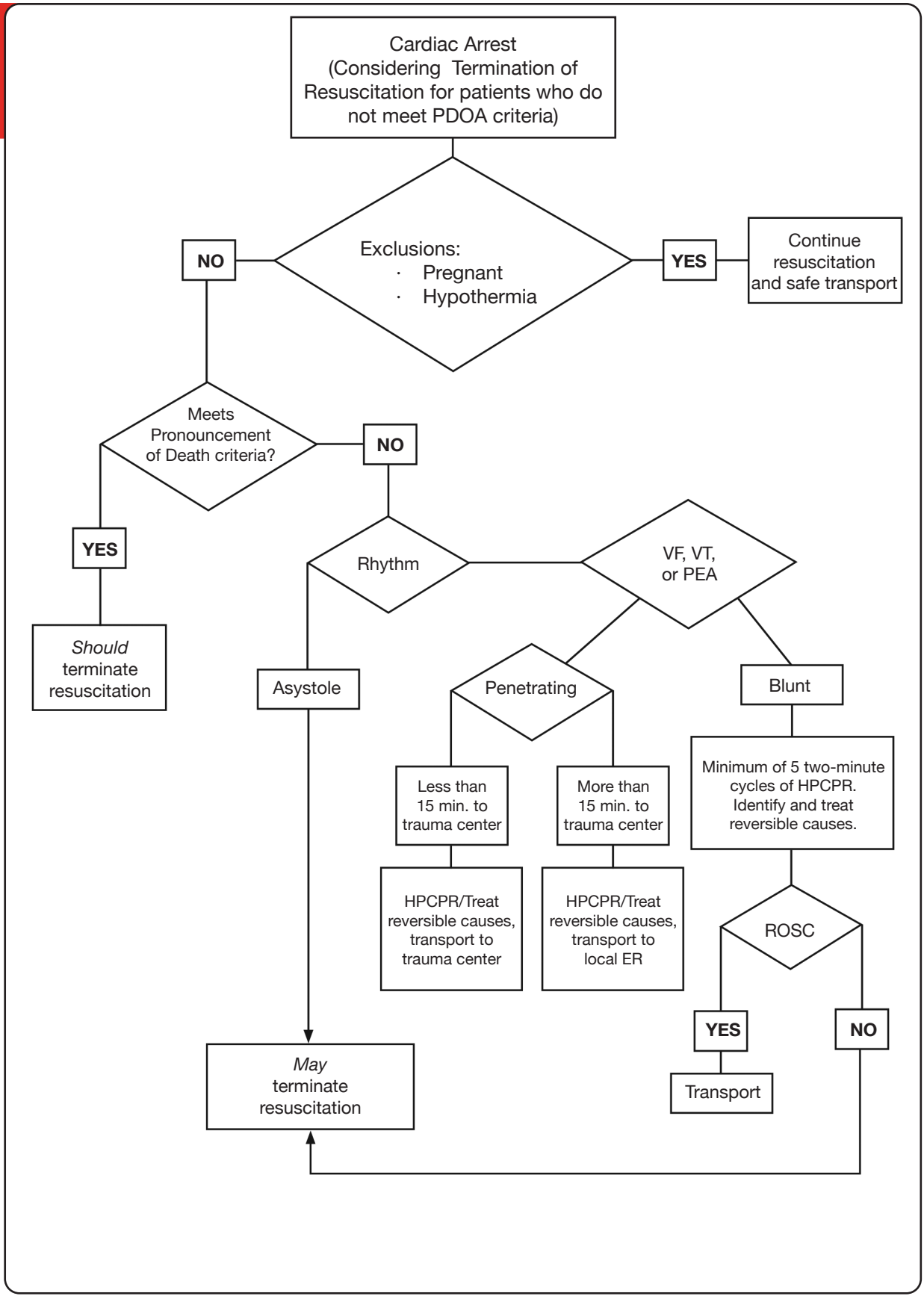
**Clinical Pearls**

- Early cardiac arrest secondary to trauma is usually due to severe hypoxia, neurologic injury, or massive hemorrhage. Address the **XABC**s first.
- Abdominal aortic compression devices are contraindicated in known or suspected pregnancy, children less than 18 years of age, and in patients with isolated penetrating chest trauma.
- Not all EMS units are equipped with abdominal aortic compression devices. Only EMS clinicians trained in the specific device available should utilize this intervention.
- Abdominal aortic compression devices should be considered for patients with junctional or proximal extremity hemorrhage not controllable by standard tourniquets and patients with suspected massive hemorrhage below the diaphragm.

# Trauma Arrest: Adult Termination of Resuscitation (Age 15 Years and Older)



ALS



# Trauma Arrest – Pediatric



**Indications**

- Cardiac arrest with suspected traumatic etiology in a patient who is **less than 15 years of age**

## BLS

- Extricate patient if the environment is unsafe, otherwise initiate care on-scene.
- Determine if patient meets the criteria for *Pronouncement of Death in the Field* protocol. If criteria are not met, then continue resuscitation.
- Treat reversible causes of traumatic arrest, on-scene, as soon as possible.
  - **X:** Control life-threatening external hermorrhage.
  - **A:** Open airway and ensure adequate ventilation, insert necessary airway adjuncts.
  - **B:** Seal open chest wounds with vented chest seals. Perform ventilations.
  - **C:** Perform HPCPR and apply AED.
- Perform *spinal motion restriction* for blunt trauma patients only.
  - Patients with isolated penetrating trauma should not have spinal motion restriction.
  - If the mechanism of injury includes both blunt and penetrating trauma, perform *spinal motion restriction*.
- Destination
  - For a penetrating pediatric trauma patient in a rhythm other than asystole:
    - Within 15 minutes of a Pediatric Trauma Center: Treat reversible causes and transport.
    - Greater than 15 minutes from a Pediatric Trauma Center: Treat reversible causes and transport to the closest Adult Trauma Center, ED, or freestanding emergency medical facility.
  - For a blunt trauma patient: all reversible causes of arrest should be performed on-scene before TOR or transport (if ROSC was achieved).
- If ROSC is not achieved, refer to *Termination of Resuscitation* (Pediatric Traumatic) protocol.

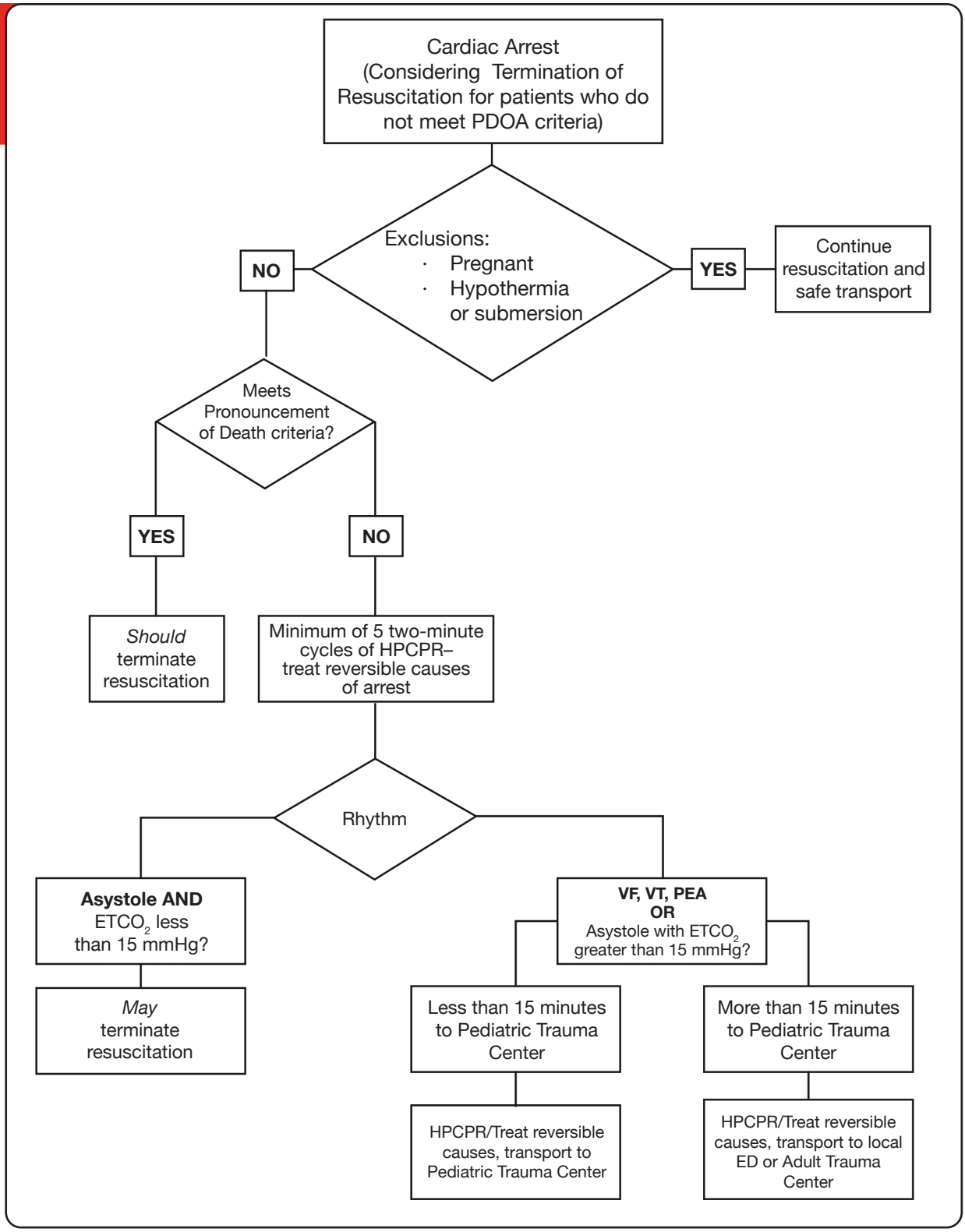
## ALS

- Treat reversible causes of traumatic arrest, on-scene, as soon as possible.
  - **XABC** BLS interventions as indicated above
- Establish IV/IO access.
- If age-related vital signs and patient's condition indicate hypoperfusion, administer initial fluid bolus of *Lactated Ringer's* 20 mL/kg IV/IO. If patient's condition does not improve, administer the second bolus of fluid at *LR* 20 mL/kg IV/IO.
- Treat reversible causes of traumatic arrest, on-scene, as soon as possible.
  - BLS interventions as indicated above
  - Bilateral *needle decompression thoracostomy*: for traumatic arrest due to suspected multi-system blunt trauma, or due to penetrating neck, chest, or abdominal trauma, bilateral needle decompressions should be performed. Catheters should not be removed once placed.
  - *Epinephrine* (0.1 mg/mL) 0.01 mg/kg IVP/IO every 4 minutes to a maximum of 4 doses for initial arrest. If arrest recurs, may administer a maximum of 2 additional doses.
- Identify rhythm and refer to appropriate treatment algorithm.
- If ROSC is not achieved, refer to *Termination of Resuscitation* (Pediatric Traumatic) protocol.

## MC

- As needed.

ALS


Cardiac Arrest (Considering Termination of Resuscitation for patients who do not meet PDOA criteria)
Exclusions:
· Pregnant
· Hypothermia or submersion
NO
YES
Continue resuscitation and safe transport
Meets Pronouncement of Death criteria?
YES
NO
Should terminate resuscitation
Minimum of 5 two-minute cycles of HPCPR– treat reversible causes of arrest
Rhythm
Asystole AND ETCO2 less than 15 mmHg?
May terminate resuscitation
VF, VT, PEA OR Asystole with ETCO2 greater than 15 mmHg?
Less than 15 minutes to Pediatric Trauma Center
More than 15 minutes to Pediatric Trauma Center
HPCPR/Treat reversible causes, transport to Pediatric Trauma Center
HPCPR/Treat reversible causes, transport to local ED or Adult Trauma Center

# Trauma Decision Tree



**Measure vital signs and level of consciousness and assess for major injury**

## Category Alpha

- ❑ Motor GCS less than 6: Adult patients unable to follow commands or pediatric patients without spontaneous or purposeful movement.
- ❑ SBP:
  - Age 65 or older: SBP less than 110 mmHg
  - 10-64 y.o.: SBP less than 90 mmHg
  - Under 10 y.o.: SBP less than 70 + 2 x (age in years) mmHg
- ❑ HR greater than SBP: For patients greater than or equal to 10 y.o.
- ❑ Respiratory rate less than 10 or greater than 29 (less than 20 in infant less than 1 year) or need for ventilatory support.
- ❑ Pulse ox less than 90%.

**YES** → Transport to trauma center or specialty center per protocol, if age less than 15 years should be taken to pediatric trauma center. Alert trauma team; consider helicopter transport if quicker and of clinical benefit (refer to GPC Section I).

**NO**

Assess for other injuries.

## Category Bravo

- ❑ 2 or more proximal long-bone fractures
- ❑ Amputation proximal to wrist or ankle
- ❑ Chest wall instability or deformity (e.g., flail chest)
- ❑ Crushed, degloved, mangled, or pulseless extremity
- ❑ Open or depressed skull fracture
- ❑ Penetrating injuries to head, neck, torso, or extremities proximal to elbow and knee
- ❑ Pelvic fracture
- ❑ Suspected spinal injury with new motor or sensory loss
- ❑ Active bleeding requiring a tourniquet or wound packing with continuous pressure

**YES** → Transport to trauma center or specialty center per protocol, if age less than 15 years should be taken to pediatric trauma center. Alert trauma team; consider helicopter transport if quicker and of clinical benefit (refer to GPC Section I).

**NO**

Evaluate for evidence of mechanism of injury and high-energy impact.

## Category Charlie

- ❑ Child (age 0-9 years) unrestrained or in unsecured child safety seat in high impact crash (high speed, intrusion, head on collision, roll over)
- ❑ Fall from height greater than 10 feet (all ages)
- ❑ Exposure to blast or explosion
- ❑ High Risk Auto Crash
  - Intrusion (including roof) greater than 12 in. into occupant site; or greater than 18 in. at any site
  - Need for extrication for patients who are pinned (excluding straightforward door opening or "door pops")

*High Risk Auto Crash (continued)*

- Ejection (partial or complete) from vehicle
- Death in same passenger compartment
- Vehicle telemetry data consistent with high risk of injury
- Rollover without restraint
- Auto v. pedestrian/bicyclist thrown, run over, or with significant (greater than 20 mph) impact
- Visible seat belt sign
- Rider separated from transport vehicle with significant impact (e.g., motorcycle, ATV, horse, watercraft, etc.)

**YES** → Transport to Trauma Center; consider pediatric trauma center if age less than 15 years; alert trauma team. Patients within a **30-minute drive time** to the closest appropriate trauma/specialty center shall go by ground unless there are extenuating circumstances. Receiving Trauma Center medical consultation required when considering whether helicopter transport is of clinical benefit (refer to GPC Section I).

**NO**

Evaluate for other considerations.

## Category Delta

- ❑ Older adults (greater than 55 years old)
  - Risk of injury/death increases after age 55
  - Low-impact mechanisms (e.g., ground-level falls) may result in severe injury
- ❑ Low-level falls in young children (age less than or equal to 5 years) with significant head impact; symptoms may include: Altered Mental Status, prolonged LOC, seizures, non-frontal hematoma, or vomiting.
- ❑ Burns*
  - Without trauma mechanism, triage to Burn Center
  - With trauma mechanism, triage to Trauma Center
- ❑ Pregnancy greater than 20 weeks
- ❑ EMS clinician judgment
- ❑ Anticoagulants and bleeding disorders (Patients with head injury are at high risk for rapid deterioration)

**YES** → Consider transport to trauma center; obtain medical direction if uncertain; consider pediatric trauma center if age less than 15 years. Patients within a **30-minute drive time** to the closest appropriate trauma/specialty center shall go by ground unless there are extenuating circumstances. Receiving Trauma Center medical consultation required when considering whether helicopter transport is of clinical benefit (refer to GPC Section I).

**NO**

Transport according to protocol.

*Patients who meet criteria for transport to a burn center do not require medical consultation for use of the Medevac.

**Pharmacology**
**Procedures**
**Interfacility Protocols**
**Pilots**
**Optional Supplemental Protocols**
**Research Protocols**

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**AED:** Automated External Defibrillation or Automated External Defibrillator

**AMI:** Acute Myocardial Infarction

**APGAR score:** An acronym and method of scoring to determine the condition of a newly born infant (see APGAR Chart in the *Universal Algorithm for the Newly Born* protocol)

**Apnea:** An absence of spontaneous respirations

**Aspiration:** The act of taking fluid (e.g., vomitus, mucus, or blood) from the body via a suction device or the act of taking foreign material or vomit into the lungs

**Asymptomatic:** The lack of any evidence or indication of illness, disease, or physical disturbance of patient's condition

**AVPU:** A method of determining and recording a patient's mental status or level of consciousness where "A" stands for Alert, "V" stands for responsive to Verbal stimuli, "P" stands for responsive to Painful stimuli, and "U" stands for Unresponsive

**Barotrauma:** Injury sustained as a result of exposure to excessive environmental pressure changes (e.g., blast injury or underwater pressure injury)

**BPM:** Breaths per minute

**BSI:** Body Substance Isolation

**BVM:** Bag-Valve-Mask

**Carte blanche:** Full discretionary power

**Children with Special Healthcare Needs (CSHN):** Children with chronic illness or conditions requiring specialized assessment, treatment, technology, or transport destination

**CISM:** Critical Incident Stress Management

**Clinician:** Includes EMR, EMT, CRT, and paramedic

**Commercial ambulance:** Ambulance licensed by the State Office of Commercial Ambulance Licensing and Regulation

**Continuous CPR:** Chest compressions asynchronous with ventilation and infrequent, minimal interruptions (less than 10 seconds each)

**COPD:** Chronic Obstructive Pulmonary Disease (e.g., asthma, emphysema, bronchitis)

**Cricothyroidotomy (needle or surgical):** A syringe with a needle attached or a scalpel is used to make a puncture hole or surgical incision through the cricothyroid membrane that overlies the trachea. A needle catheter or ET tube is passed into the trachea and then attached to a jet insufflation device or bag-valve device to ventilate the patient.

**Critical:** Approaching death or having the nature of a crisis (e.g., time-critical, critical injury)

**CRT:** Cardiac Rescue Technician

**CVA:** Cerebral Vascular Accident/Stroke

**Cyanotic:** Bluish color of the skin or mucus membranes caused by lack of oxygen to the tissue

**DCAP BTLS:** Acronym for signs of injuries to assess during a physical examination of patients: D = Deformity, C = Contusions, A = Abrasions, P = Punctures/penetrations, B = Burns, T = Tenderness, L = Lacerations, S = Swelling

**Defibrillation:** Administration of electrical current(s) to the heart in an effort to normalize rhythm

**Distracting Injury:** Any injury (e.g., fracture, chest, or abdominal trauma) associated with significant discomfort that could potentially distract from a patient's ability to accurately discern or define spinal column pain or tenderness

**DNR:** Do Not Resuscitate

**Dystonic:** Any impairment of muscle tone, which may be manifested by prolonged muscle contractions that may cause twisting and repetitive movements or abnormal posture. These movements may be in the form of rhythmic jerks. Symptoms that "appear" to be of a focal seizure-like nature in an awake and alert person with no history of seizures but who probably has a recent history of anticholinergic medication use (e.g., anti-psychotic, anti-vomiting).

**ECPR:** Extracorporeal Cardiopulmonary Resuscitation

**EJ:** External Jugular vein of the neck; peripheral IV access site

**Emergency Information Form:** A two-page form, designed by the American Academy of Pediatrics and American College of Emergency Physicians (AAP and ACEP, respectively), that provides a brief summary of special health care needs including: diagnosis, usual pattern of disease, emergency action plan, primary and specialty doctors and hospitals. Can be downloaded and data entered at *http://www.aap.org/advocacy/eif.doc*.

**eMEDS®:** electronic Maryland EMS Data System (a patient care reporting system)

**EMR:** Emergency Medical Responder

**EMS:** Emergency Medical Services

**EMT:** Emergency Medical Technician

**EOC:** Emergency Operations Center

**Erythema:** Redness or inflammation of the skin or mucous membranes that is the result of dilatation and congestion of superficial capillaries

**ETA:** Estimated Time of Arrival

**ETCO$_2$:** Non-invasive measurement (numeric and/or waveform) of carbon dioxide ($CO_2$) levels in exhaled breaths (end-tidal $CO_2$)

**Extraglottic Airway Device:** a device inserted to establish an airway for oxygenation and ventilation that does not enter the trachea or larynx. Examples include: iGel®, King LTS-D™, LMA®.

**Extrapyramidal:** Pertaining to tissues and structures outside of the cerebrospinal pyramidal tracts of the brain that are associated with movement of the body, excluding stimulation from the motor neurons, the motor cortex, and the corticospinal and corticobulbar tracts. Symptoms that "appear" to be of a focal seizure-like nature in an awake and alert person with no history of seizures but who probably has a recent history of anticholinergic medication use (e.g., anti-psychotic, anti-vomiting).

**Fluid Bolus:** The administration of a fluid dose as rapidly as possible, usually over five to twenty minutes, to a patient with clinical signs of shock

**GCS:** Glasgow Coma Scale (a tool to evaluate injury and illness severity)

**Hemodynamically Stable:** When a patient's vital signs (including pulse oximeter or EKG if available) are all within normal for the patient's age range, the patient does not have active bleeding, and there are no signs of distress (skin conditions or capillary refill are normal) as observed over time

**Hemodynamically Unstable:** When a patient exhibits any of the following: abnormal vitals signs for age range (including pulse oximeter or EKG if available), active bleeding, or there are signs of distress (skin conditions or capillary refill are abnormal)

**Hemostatic Dressing:** A bandage or gauze with impregnated hemostatic agent that hastens the hemostasis/clotting process

**HTN:** Hypertension

**Hypoxia:** Too little oxygen in the cells

**IM:** Intramuscular injection

**IN:** Intranasal administration

**IV:** Intravenous line or administration of medication through IV

**IVP:** Intravenous Push

**IWMI:** Inferior Wall Myocardial Infarction

**J:** Joules or watts-seconds of electrical energy for defibrillation or cardioversion

**JVD:** Jugular Vein (external) Distention

**kg:** Kilogram, metric measure of weight equal to 1,000 grams (1 kg = 2.2 pounds)

**KVO:** Keep Vein Open. A slow IV flow rate.

**Laryngectomy:** The removal of the larynx and separation of the airway from the mouth, nose, and esophagus. Patients with a laryngectomy breathe through an opening in the neck called a stoma. Patients with a laryngectomy are not able to breathe or be intubated through the mouth or nose.

**Lividity:** Venous pooling in dependent body parts

**LOC:** Level of Consciousness

**LR:** Lactated Ringer's (a type of isotonic IV solution)

**MCI:** Mass Casualty Incident. Occurs when the number of victims exceeds the number of medical personnel or resources immediately available and is declared by the local jurisdiction.

**Meconium:** The first feces of an infant

**Medical Consultation (On-Line Medical Direction):** With an atmosphere of courtesy and respect, direct voice/data communication between a clinician and an EMS Base Station physician, or a jurisdictionally affiliated physician, or with an "on-scene physician." This communication is bi-directional and provides the clinician with medical direction while providing the physician or the receiving hospital with valuable information on the patient. This exchange can take place on-scene, over a telecommunications device, or in the hospital setting.

**Medical Protocol:** A guideline for the provision of patient care

**mL:** Milliliter (the symbol for a metric measure of volume)

**MOI:** Mechanism of Injury

**MOLST:** Medical Orders for Life-Sustaining Treatment

**NDT:** Needle Decompression Thoracostomy

**Neonatal (also neonate):** A term that describes an infant from 1 hour to 28 days of life

**Newly Born (also called newborn):** A term that describes an infant within the first hour after delivery

**NOI:** Nature of Illness

**Notification:** An "information only call" directly to the receiving hospital through the jurisdictional EOC or EMS communication system not requiring medical consultation and that may follow local standing operational procedures

**NRB:** Non-Rebreather Mask

**NTG:** Nitroglycerin

**Nurse Practitioner:** An individual who has been licensed as a Registered Nurse and certified as a Nurse Practitioner by the Maryland Board of Nursing. This does not include individuals who are only Registered Nurses or Licensed Practical Nurses.

**OIC:** Officer in Charge

**On-Scene Physician:** On-Scene Physician may be the patient's identified private physician or a bystander physician who is physically on location. Care rendered or orders given by the on-scene physician should be documented, including the identification of the physician. All on-scene medical direction shall be consistent with *The Maryland Medical Protocols for Emergency Medical Services*. Any medical procedure that is not consistent with the protocols shall only be rendered by the on-scene physician, who shall also accompany the patient to the hospital. Any extraordinary care by EMS clinicians pursuant to the protocols may be approved only by the EMS Base Station physician or a system medical director (based on COMAR 30.02.03.02A.).

**OPQRST:** Used to recall pertinent questions (**O**nset, **P**rovocation, **Q**uality, **R**adiation, **S**everity, **T**ime) to ask when obtaining a patient history for medical emergencies

**Optional Supplemental Program (OSP):** A voluntary jurisdictional program that requires MIEMSS approval

**Pallor:** An unnatural paleness or absence of color in the skin

**PCM:** Patient Controlled Medications (a medication delivery system under a patient's control)

**PCR:** Patient Care Report (equivalent to MAIS) document used to record pertinent patient information regarding assessment, treatment, and transport (this is a confidential medical record)

**Pilot Program (PP):** A program designed to test a new project or procedure in order to determine its effect on EMS (requires MIEMSS approval and reporting all uses to MIEMSS)

**Plethora:** A term applied to the beefy red coloration of a newborn

**PMD:** Program Medical Director

**PO:** By mouth *(per os)*

**PPE:** Personal Protective Equipment

**Pulse Oximetry:** A non-invasive measurement of arterial oxygen saturation using infrared absorption frequencies

**PVC:** Premature Ventricular Contraction

**Recovery Position:** The position (patient flat on left lateral side) or placement of patients to reduce risk of aspiration

**RMD:** Regional Medical Director

**RVMI:** Right Ventricular Myocardial Infarction

**SAFER: S**tabilize, **A**ssess and acknowledge, **F**acilitate, **E**ncourage, and **R**ecovery OR **R**eferral

**SAMPLE:** Used to aid in obtaining pertinent patient history (S = Symptoms and signs patient is exhibiting, A = patient Allergies, M = patient Medications (prescription and non-prescription), P = Past medical history, L = what and when was the patient's Last oral intake, E = Events prior to arrival, or simply, the history of the current emergency)

**SC:** Subcutaneously

**Sign:** Any objective evidence or indication of illness, disease, or physical disturbance of patient's condition

**SL:** Sublingual (under the tongue)

**SMOI:** Significant Mechanism Of Injury

**SOP:** Standard Operational Procedure (defined by local jurisdiction or region)

**Standing Orders:** Orders, rules, regulations, or procedures prepared as guidelines in the preparation and carrying out of medical and surgical procedures

**Sublingually:** Under the tongue

**Symptom:** Any subjective evidence of disease or of a patient's condition (such as evidence perceived by the patient)

**Symptomatic:** The subjective evidence or indication of illness, disease, or physical disturbance of patient's condition

**Syncope:** A fainting spell. It usually follows a feeling of lightheadedness and may often be prevented by lying down. Syncope may also result from any number of heart, neurologic, or lung disorders.

**System Medical Director:** Means any of the following: Executive Director of MIEMSS, State EMS Medical Director, Associate State Medical Director for Pediatrics, Regional Medical Directors, Associate Regional Pediatric Medical Directors, EMS Operational Program Medical Directors, and Assistant EMS Operational Program Medical Directors

**TOI:** Type of Incident to which EMS clinicians may be called upon to respond (e.g., ill and/or injured patients, hazardous materials incidents, fires, mass casualty incidents)

**Tracheostomy:** An incision into the trachea (windpipe) that forms a temporary or permanent opening called a stoma. A tube is inserted through the opening to allow passage of air and removal of secretions.

**Vagal:** Pertaining to the vagus nerve (the tenth cranial nerve, which is essential for speech, swallowing, and slowing of the heart rate)

**VF:** Ventricular Fibrillation

**Volume-Sensitive Children:** Children who need smaller fluid bolus volumes due to special needs including: neonates (1 hour to 28 days of age), congenital heart diseases, chronic lung disease, or chronic renal failure

**VT:** Ventricular Tachycardia

**Vulnerable Adult:** An adult who lacks the physical or mental capacity to provide for his or her daily needs (Digest of Criminal Law)

| PROCEDURE | EMR | EMT | CRT | PM |
|---|---|---|---|---|
| **ADMINISTRATION OF MEDICATIONS** | | | | |
| Buccal, Oral, Sublingual | – | SO | SO | SO |
| SC, IV, Rectal | – | – | SO | SO |
| Nebulizer | – | SO | SO | SO |
| Intramuscular | – | OSP | SO | SO |
| Intranasal | SO | SO | SO | SO |
| Intraosseous | – | – | SO | SO |
| Intradermal PPD (Public Safety Personnel only) | – | – | – | OSP |
| **AIRWAY MANAGEMENT** | | | | |
| Alternative Airway Device (Extraglottic Airway) | – | – | SO | SO |
| BiPAP | – | – | – | OSP |
| Carbon Dioxide Detector (ALS required) | – | SO | SO | SO |
| Capnograph **(ALS required since 2015)** | – | – | SO | SO |
| CPAP | – | – | SO | SO |
| Cricothyroidotomy | – | – | – | OSP |
| Direct Laryngoscopy | – | – | SO | SO |
| Gastric Tube (BLS "Burp," ALS insert) | – | – | SO | SO |
| Nasotracheal Intubation | – | – | – | SO |
| Oropharyngeal/Nasopharyngeal Airway | SO | SO | SO | SO |
| Orotracheal Intubation | – | – | SO | SO |
| Needle Decompression Thoracostomy (NDT) | – | – | SO | SO |
| Pulse Oximeter | – | SO | SO | SO |
| Suction | SO | SO | SO | SO |
| Ventilator | – | – | – | OSP |
| Video Laryngoscopy | – | – | SO | SO |
| **ELECTROCARDIOGRAM** | | | | |
| Standard Limb Leads | – | – | SO | SO |
| 12-Lead | – | OSP | SO | SO |
| **ELECTRICAL THERAPY** | | | | |
| Automated External Defibrillator | SO | SO | SO | SO |
| Cardioversion | – | – | SO/MC | SO/MC |
| Defibrillation | – | – | SO | SO |
| Transcutaneous Cardiac Pacing | – | – | SO | SO |
| **GLUCOMETER** | – | SO | SO | SO |
| **HIGH PERFORMANCE CPR** | SO | SO | SO | SO |
| **INTRAVENOUS THERAPY** | | | | |
| Exteneral Jugular Access & Maintenance | – | – | SO | SO |
| Intraosseous Infusion & Maintenance | – | – | SO | SO |
| Peripheral IV Access/Saline Lock/Blood Drawn | – | OSP | SO | SO |
| Peripheral IV Maintenance | – | SO | SO | SO |
| **PRONOUNCEMENT OF DEATH** | – | SO | SO | SO |
| **SKELETAL STABILIZATION/IMMOBILIZATION** | SO | SO | SO | SO |
| **BLEEDING MANAGEMENT** | | | | |
| Tourniquet | SO | SO | SO | SO |
| Hemostatic Agent/Dressing – Chitosan or Kaolin Based | SO | SO | SO | SO |
| Wound Packing | SO | SO | SO | SO |
| TR Band (no adjustments) | – | – | – | SO |

**SO** Standing Order
**OSP** Optional Supplemental Program
**MC** Medical Consultation Required
**PP** Pilot Program
**REA** Research

| PROCEDURE | EMR | EMT | CRT | PM |
|---|---|---|---|---|
| **VALSALVA MANEUVER** | – | – | SO | SO |
| Apnea Monitors | – | SO | SO | SO |
| Arterial Lines and Cardiac Sheaths | – | – | – | – |
| Chemotherapy Administration/Drip | – | – | – | – |
| Chest tubes on suction | – | – | – | – |
| Chest tubes off suction | – | – | SO | SO |
| Colostomy Bag | – | SO | SO | SO |
| External Orthopedic Fixators | – | SO | SO | SO |
| Foley Catheter or external urinary catheter | – | SO | SO | SO |
| Foley Catheter with Continuous Bladder Irrigation | – | – | SO | SO |
| Gastrostomy and Jejunal Feeding Tubes (Non-infusing) | – | SO | SO | SO |
| HALO Cervical Immobilization | – | SO | SO | SO |
| IABP InterAortic Balloon Pump | – | – | – | – |
| Ileostomy Tube (Non-infusing) | – | SO | SO | SO |
| iStat | – | – | – | REA |
| **PICC** – peripherally inserted central catheter or **CVA** – central venous access line, capped only | – | SO | SO | SO |
| **PICC** – peripherally inserted central catheter or **CVA** – central venous access line, subclavian/femoral or internal jugular may be monitored if fluid/medication being administered meets protocol. The ALS clinician may access the line in a life-threatening emergency. | – | – | SO | SO |
| Intraventricular/Intracranial Monitor | – | – | – | – |
| Left Ventricular Assist Device (LVAD) Scene (BLS & ALS) | – | SO | SO | SO |
| Left Ventricular Assist Device (LVAD) Interfacility* | – | – | * | * |
| Nasogastric and Orogastric Tubes (Existing and Capped) | – | SO | SO | SO |
| Nasogastric and Orogastric Tubes (On Continuous Suction) | – | – | SO | SO |
| Nephrostomy Tubes | – | SO | SO | SO |
| Peak Expiratory Flow Meter | – | – | SO | SO |
| Pelvic Binder Device | OSP | OSP | OSP | OSP |
| Portable Outpatient Fixed Medication Pump/PCA Pump | – | SO | SO | SO |
| Peritoneal Dialysis (Non-active, Capped) | – | SO | SO | SO |
| Physical Restraint | – | SO | SO | SO |
| Sengstaken-Blakemore Tube | – | – | – | – |
| Suprapubic Catheter | – | SO | SO | SO |
| Surgical Drains | – | SO | SO | SO |
| Swan-Ganz | – | – | – | – |
| Tracheostomy (Existing) | – | SO | SO | SO |
| Transtracheal $O_2$ (Outpatient/Existing) | – | SO | SO | SO |
| Transvenous Pacemaker (Temporary Transvenous) | – | – | – | – |
| Ventilators (Acute, Chronic, Scene) | – | – | – | OSP |
| Ventricular Peritoneal Shunt | – | SO | SO | SO |
| Wound Vacuum Device | – | SO | SO | SO |

**SO** Standing Order
**OSP** Optional Supplemental Program
**MC** Medical Consultation Required
**PP** Pilot Program
**REA** Research

*If being transported to routine outpatient appointment, or if being discharged to home or rehab, may go by ALS.

Most of the procedures and devices listed on this page may be monitored during transport, but not initiated by EMS clinicians, unless specifically stated in another protocol. ALS clinicians may initiate NG/OG tubes and Ventilators. BLS and ALS clinicians may initiate Pelvic Binders or Physical Restraints.

| MEDICATIONS | EMR | EMT | CRT | PM |
|---|---|---|---|---|
| Acetaminophen | – | SO | SO | SO |
| Activated Charcoal (Without Sorbitol) | – | MC | MC | MC |
| Adenosine | – | – | SO | SO |
| Albuterol/Fast-acting Bronchodilator MDI | – | SO/MC | SO/MC | SO/MC |
| Albuterol Sulfate Nebulizer | – | SO/MC | SO/MC | SO/MC |
| Amiodarone | – | – | SO/MC | SO/MC |
| Antimicrobial (Pre-established interfacility only) | – | – | – | OSP |
| Aspirin | – | SO | SO | SO |
| Atropine Sulfate | – | – | SO/MC | SO/MC |
| Atrovent | – | – | SO | SO |
| Buprenorphine | – | – | OSP | OSP |
| Calcium Chloride (10% Solution) | – | – | SO | SO |
| Cefazolin | – | – | SO | SO |
| Dexamethasone | – | – | SO | SO |
| Dextrose | – | – | SO | SO |
| Diazepam | – | – | MC | SO/MC |
| Diltiazem | – | – | SO/MC | SO/MC |
| Diluent D5W, NS, LR | – | – | SO | SO |
| Diphenhydramine Hydrochloride | – | – | SO | SO |
| Dopamine Hydrochloride | – | – | SHORT | SHORT |
| Droperidol | – | – | SO | SO |
| Epinephrine Auto-Injector | OSP | SO/MC | SO | SO |
| Epinephrine Infusion | – | – | SO/MC | SO/MC |
| Epinephrine Nebulizer | – | – | MC | MC |
| Epinephrine (1:1,000) Vial or Syringe | – | OSP | SO | SO |
| Epinephrine 1:10,000 | – | – | SO | SO |
| Etomidate (Amidate) | – | – | – | PP |
| Fentanyl | – | – | SO/MC | SO/MC |
| Glucagon | – | – | SO/MC | SO/MC |
| Glycoprotein IIb/IIIa | – | – | – | OSP |
| Haloperidol | – | – | SHORT | SHORT |
| Hemophilia Blood Factor (VIII or IX) | – | – | SO | SO |
| Heparin (Interfacility transport only) | – | – | – | OSP |
| Hydroxocobalamin | – | – | OSP | OSP |
| Ketamine | – | – | SO/MC | SO/MC |
| Ketorolac | – | – | OSP | OSP |
| Labetalol | – | – | SO/MC | SO/MC |
| Lactated Ringer's | – | OSP | SO | SO |
| Lidocaine | – | – | SO | SO |
| Magnesium Sulfate | – | – | SO/MC | SO/MC |
| MARK I/DuoDote (Atropine & 2 PAM) | OSP | OSP | OSP | OSP |
| Midazolam (Versed) | – | – | SO/MC | SO/MC |
| Metoprolol | – | – | SHORT | SHORT |
| Morphine Sulfate | – | – | OSP | OSP |
| Morphine Sulfate (Infusion) | – | – | MC | MC |
| Naloxone (IN) Public Safety | SO | SO | SO | SO |
| Naloxone (IV, IM, ET) | – | – | SO | SO |

**SO** Standing Order
**OSP** Optional Supplemental Program
**SHORT** Jurisdictional Option with State EMS Medical Director Approval
**MC** Medical Consultation Required
**PP** Pilot Program
**REA** Research

| MEDICATIONS | EMR | EMT | CRT | PM |
|---|---|---|---|---|
| Nitroglycerin Paste | – | – | SO | SO |
| Nitroglycerin (tablet / spray) (patient's prescribed) | – | SO | SO | SO |
| Nitroglycerin (tablet / spray) | – | – | SO | SO |
| Ondansetron | – | – | SO/MC | SO/MC |
| Oral Glucose | – | SO | SO | SO |
| Oxygen | SO | SO | SO | SO |
| Peripheral Parenteral Nutrition (PPN) or Total Parenteral Nutrition (TPN) non-medicated | – | SO | SO | SO |
| Purified Protein Derivative (Public Safety Personnel only) | – | – | – | OSP |
| Sodium Bicarbonate | – | – | SO | SO |
| Sodium Bicarbonate (Infusion) | – | – | MC | MC |
| Succinylcholine (Anectine) | – | – | – | OSP |
| Terbutaline Sulfate (Jurisdictional option only when approved by the State EMS Medical Director) | – | – | SHORT | SHORT |
| Tranexamic Acid (TXA) | – | – | SO/MC | SO/MC |
| Vaccines (Hepatitis B, Influenza, and COVID-19) | – | – | – | OSP |
| Vecuronium (Norcuron) | – | – | – | OSP |

**SO** Standing Order
**OSP** Optional Supplemental Program
**SHORT** Jurisdictional Option with State EMS Medical Director Approval
**MC** Medical Consultation Required
**PP** Pilot Program
**REA** Research

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**TRADE NAMES: Tylenol®**

**a) Indications**

Patients 3 months of age and older with:

(1) Mild to moderate discomfort (e.g., 1–5 on FACES scale) or

(2) Fever (EMS-documented temperature greater than or equal to 100.4 F / 38 C)

**b) Adverse Effects**

Not clinically significant

**c) Precautions**

(1) Administration of acetaminophen for mild to moderate pain does not eliminate the need for transport of the patient to an appropriate facility capable of conducting a comprehensive evaluation of the cause of the pain and appropriate definitive treatment.

(2) A 3 mL, 5 mL, or 6 mL syringe must be used to measure doses of acetaminophen.

**d) Contraindications**

(1) Head Injury

(2) Hypotension

(3) Administration of acetaminophen or medications containing acetaminophen within the previous 4 hours. Many common cold preparations contain acetaminophen.

(4) Inability to swallow or take medications by mouth

(5) Respiratory distress

(6) Persistent vomiting

(7) Known or suspected liver disease (including patients suspected of current alcohol ingestion)

(8) Allergy to acetaminophen

(9) Patients less than 3 months of age

**e) Preparations Use Unit Dose Only**

(DO NOT USE MULTIDOSE BOTTLE OF LIQUID)

Unit dose 160 mg/5 mL liquid

Unit dose 325 mg pill or tablet

**f) Dosage**

(1) Less than 3 months of age: Not indicated

(2) 3 months to 2 years of age:

| **Age** | Under 3 months | 3 months | 4-11 months | 12-23 months |
|---|---|---|---|---|
| **Liquid 160 mg/ 5 mL** | Not indicated | 1.25 mL | 2.5 mL | 3.75 mL |

(3) 2–4 years: Unit dose 160 mg/5 mL

(4) 5–12 years: TWO unit doses of 160 mg/5 mL each for a total of 320 mg/10 mL

(5) 13 years and above: FOUR unit doses of 160 mg/5 mL each for a total of 640 mg/ 20 mL OR in a form of 325 mg pill or tablet x2 for a total of 650 mg with sips of water as tolerated by the patient.

# BLS Pharmacology – ACTIVATED CHARCOAL (WITHOUT SORBITOL)



**TRADE NAMES: Not Applicable**

**a) Indications**

Poisoning by mouth

**b) Adverse Effects**

May indirectly induce vomiting and cause nausea

**c) Precautions**

Does not adsorb all drugs and toxic substances

**d) Contraindications**

(1) Altered mental status
(2) Patients who have received an emetic

**e) Preparations**

(1) 25 grams/125 mL bottle
(2) 50 grams/250 mL bottle

f) **Dosage**

(1) Adult: Administer 1 gram/kg PO
(2) Pediatric: Administer 1 gram/kg PO

ALERT

POISON INFORMATION CENTER RECOMMENDATIONS SHOULD BE SOLICITED IN CONJUNCTION WITH MEDICAL CONSULTATION, BUT MEDICATION ORDERS CAN ONLY BE ACCEPTED FROM AN APPROVED BASE STATION OR CONSULTATION CENTER.

**TRADE NAMES: PROVENTIL®, VENTOLIN®**

**a) Indications**

(1) Signs and symptoms of respiratory distress
(2) Bronchospasm/wheezing associated with:
  (a) Asthma
  (b) COPD/emphysema
  (c) Allergic reactions (anaphylaxis)

**b) Adverse Effects**

(1) Tachycardia/palpitations
(2) Hypertension
(3) Angina
(4) Nervousness/anxiety
(5) Tremors
(6) Dizziness
(7) Headache
(8) Sweating
(9) Nausea/vomiting
(10) Sore throat

**c) Precautions**

May cause severe bronchospasm from repeated excessive use.

**d) Contraindications**

Known hypersensitivity

**e) Preparations**

(1) Hand-held (unit dose) aerosol inhaler
(2) Ampule for nebulizer

**f) Dosage**

Inhaler

(1) Adult: Patient may receive a maximum of 2 doses (4 puffs) over a 30-minute period
(2) Pediatric: Patient may receive a maximum of 2 doses (4 puffs) over a 30-minute period

Nebulizer

(1) Adult: 2.5 mg by nebulized aerosol connected to 6–8 lpm of oxygen; may repeat one time
(2) Pediatric: May repeat one time; connect to 6–8 lpm of oxygen
  (a) **Age 2 or older:** 2.5 mg by nebulized aerosol
  (b) **Age less than 2 years:** 1.25 mg by nebulized aerosol
(3) Additional doses may be administered with medical consultation.

# BLS Pharmacology – ASPIRIN



**TRADE NAMES: Not Applicable**

**a) Indications**

Suspected Acute Coronary Syndrome and/or ST Elevation MI (STEMI)

**b) Adverse Effects**

(1) Heartburn
(2) Nausea and vomiting
(3) Wheezing

**c) Precautions**

GI bleeding and upset

**d) Contraindications**

(1) Known hypersensitivity.
(2) Patients who receive a full dose (324 mg) of aspirin prior to EMS arrival.

**e) Preparations**

Tablets

**f) Dosage**

(1) Adult: 324 mg or 325 mg chewed
(2) Pediatric: Not indicated

**TRADE NAMES: Not Applicable**

***Optional Supplemental Protocol: BLS manual draw-up epinephrine from vial or preloaded syringe (non-auto injector)***

**a) Indications**

(1) Moderate to severe allergic reaction with respiratory distress or mild allergic reaction with history of life-threatening allergic reaction
(2) Patients with severe asthma

**b) Adverse Effects**

(1) Tachycardia/palpitations
(2) Angina
(3) Headache
(4) Nausea/vomiting
(5) Dizziness
(6) Hypertension
(7) Nervousness/Anxiety
(8) Tremors

**c) Precautions**

Medical consultation must be obtained before administering the EMS service's manual epinephrine or EMS service's auto-injector to asthma patients with pregnancy or cardiac history. However, medical consultation is not required for any patients who have severe allergic reactions with respiratory distress.

**d) Contraindications**

None in the presence of anaphylaxis

**e) Preparations**

Epinephrine
(Patient prescribed or EMS supplied)
(1) Vial: 1 mg in 1 mL
(2) Preloaded Syringe
  (a) Adult: 0.5 mg in 0.5 mL
  (b) Pediatric: 0.15 mg in 0.15 mL

**f) Dosage**

(1) **Patients 5 years of age or greater:**
Adult: 0.5 mg in 0.5 mL IM in lateral thigh
(2) **Patients less than 5 years of age:**
Pediatric: 0.15 mg in 0.15 mL IM in lateral thigh

(3) Additional doses may be administered with medical consultation.

# BLS Pharmacology – EPINEPHRINE AUTO-INJECTOR



**TRADE NAMES: Not Applicable**

**a) Indications**

(1) Moderate to severe allergic reaction with respiratory distress or mild allergic reaction with history of life-threatening allergic reaction

(2) Patients with severe asthma

**b) Adverse Effects**

(1) Tachycardia/palpitations
(2) Angina
(3) Headache
(4) Nausea/vomiting
(5) Dizziness
(6) Hypertension
(7) Nervousness/anxiety
(8) Tremors

**c) Precautions**

Medical consultation must be obtained before administering the EMS service's manual epinephrine or EMS service's auto-injector to asthma patients with pregnancy or cardiac history. However, medical consultation is not required for any patients who have severe allergic reactions with respiratory distress.

**d) Contraindications**

None in the presence of anaphylaxis

**e) Preparations**

Epinephrine Auto-injector (single or multi-dose) only
(Patient prescribed or EMS supplied)

(1) Adult: 0.3 mg
(2) Pediatric: 0.15 mg

**f) Dosage**

(1) Less than 5 years of age: 0.15 mg IM in the lateral thigh via epinephrine auto-injector.
(2) 5 years and greater: administer 0.3 mg IM in the lateral thigh via epinephrine auto-injector.
(3) Additional doses may be administered with medical consultation.

**TRADE NAMES: Narcan®**

**a) Indications**

To reverse respiratory depression induced by opioid/narcotic agent.

**b) Adverse Effects**

Opioid withdrawal

**c) Precautions**

(1) Naloxone may induce opiate withdrawal in patients who are physically dependent on opioids.
(2) Certain drugs may require much higher doses of naloxone for reversal than are currently used.
(3) Should be administered and titrated so respiratory efforts return, but not intended to restore full consciousness.
(4) Intranasal naloxone must be administered via nasal atomizer.
(5) Naloxone has a duration of action of 40 minutes; the effect of the opioid/narcotic may last longer than naloxone and patients should be encouraged to be transported.

**d) Contraindications**

Patients under 28 days of age

**e) Preparations**

(1) Intranasal device.
(2) Pre-filled syringe.

**f) Dosage**

(1) Adult: Administer 2 mg IN, dividing administration of the dose equally between the nares to a maximum of 1 mL per nare, **OR** administer 4 mg/0.1 mL IN in one nare.
(2) Pediatric (child aged 28 days to adult): Administer 2 mg IN, dividing administration of the dose equally between the nares to a maximum of 1 mL per nare, **OR** administer 4 mg/0.1 mL IN in one nare.
(3) Repeat as necessary to maintain respiratory activity.

CLINICIANS MUST OBTAIN MEDICAL CONSULTATION WITH A BASE STATION PHYSICIAN FOR PATIENTS WISHING TO REFUSE TRANSPORT AFTER BLS ADMINISTRATION OF NALOXONE.

# BLS Pharmacology – NITROGLYCERIN



**TRADE NAMES: Not Applicable**
*(Patient Prescribed, Patient Assisted)*

**a) Indications**

Chest pain

**b) Adverse Effects**

(1) Hypotension
(2) Headache
(3) Dizziness
(4) Tachycardia

**c) Precautions**

(1) BLS clinician may only administer patient prescribed sublingual nitroglycerin.
(2) Reassess blood pressure before and after administration.
(3) If systolic blood pressure drops more than 20 mmHg per dose of nitroglycerin given, obtain medical consultation before further administration.

**d) Contraindications**

(1) Blood pressure below 90 mmHg systolic
(2) Heart rate less than 60 or greater than 150 bpm
(3) Medication not prescribed for the patient
(4) Pediatric patient under age 13
(5) Any patient having taken medication for Pulmonary Artery Hypertension (e.g., Adcirca® or Revatio®) or erectile dysfunction (e.g., Viagra®, Levitra®, or Cialis®) within the past 48 hours. Medical consultation is required to override this contraindication.

**e) Preparations**

Spray or tablet

**f) Dosage**

(1) Adult: 0.4 mg sublingually (one tablet or one spray)
  (a) Repeat in 3 to 5 minutes if chest pain persists.
  (b) Maximum of three doses (a combination of patient-administered and EMT-administered) of nitroglycerin
(2) Pediatric: (nitroglycerin contraindicated for children under age 13)
(3) Additional doses may be administered with medical consultation.

**TRADE NAMES: Not Applicable**

**a) Indications**

(1) Altered mental status with known diabetic history
(2) Unconscious for an unknown reason
(3) Measured blood glucose less than 70 mg/dL

**b) Adverse Effects**

Not clinically significant

**c) Precautions**

Patient without gag reflex may aspirate.

**d) Contraindications**

Not clinically significant

**e) Preparations**

10–15 grams of glucose (contained in 24, 30, or 37.5 gram tube)

**f) Dosage**

(1) Adult: Administer 10–15 grams of oral glucose between the gum and cheek. Consider single additional dose of oral glucose if not improved after 10 minutes.
(2) Pediatric: Administer 10–15 grams of oral glucose between the gum and cheek; this may be accomplished through several small administrations. Consider single additional dose of oral glucose if not improved after 10 minutes.

# BLS Pharmacology – OXYGEN



**TRADE NAMES: Not Applicable**

**a) Indications**

(1) If evidence of hypoxia (Less than 94% $SpO_2$)
(2) Respiratory distress
(3) Cardiopulmonary arrest
(4) Trauma
(5) Suspected CO exposure
(6) Dyspnea

**b) Adverse Effects**

High concentrations of oxygen will reduce the respiratory drive in some COPD patients; these patients should be carefully monitored.

**c) Precautions**

(1) Never withhold oxygen from those who need it.
(2) Oxygen should be given with caution to patients with COPD.
(3) Simple or partial rebreather face masks must be supplied with a minimum 6 lpm.
(4) Non-breather (NRB) face masks must be supplied with a minimum 12 lpm.

**d) Contraindications**

Not clinically significant

**e) Dosage**

(1) Adult: Administer 12–15 lpm via NRB mask or 2–6 lpm via nasal cannula, as needed.
CO exposure: Administer oxygen via NRB mask. Maintain $SpO_2$ at 100%
(2) Pediatric: Administer 12–15 lpm via NRB mask or 2-6 lpm via nasal cannula, as needed.
CO exposure: Administer oxygen via NRB mask. Maintain $SpO_2$ at 100%

| Percent $O_2$ Saturation | Ranges | General Patient Care |
|---|---|---|
| 94–100% | Normal | Give oxygen as necessary |
| 91–93% | Mild Hypoxia | Give oxygen as necessary |
| 86–90% | Moderate Hypoxia | Give 100% oxygen<br>Assisting Ventilations if necessary |
| less than or equal to 85% | Severe Hypoxia | Give 100% oxygen<br>Assist Ventilations<br>If indicated, Intubate |

ALERT INACCURATE OR MISLEADING $SpO_2$ READINGS MAY OCCUR IN PATIENTS WITH: HYPOTHERMIA, HYPOPERFUSION (SHOCK), CO POISONING, HEMOGLOBIN ABNORMALITY, ANEMIA, VASOCONSTRICTION, AND DARK SKIN COLOR.

**TRADE NAMES: Tylenol®**

**a) Indications**

Patients 3 months of age and older with:

(1) Mild to moderate discomfort (e.g., 1–5 on FACES scale) or

(2) Fever (EMS-documented temperature greater than or equal to 100.4 F / 38 C)

**b) Adverse Effects**

Not clinically significant

**c) Precautions**

(1) Administration of acetaminophen for mild to moderate pain does not eliminate the need for transport of the patient to the hospital to receive a comprehensive evaluation of the cause of the pain and appropriate definitive treatment.

(2) A 5 cc or 6 cc syringe must be used to measure doses of acetaminophen.

**d) Contraindications**

(1) Head Injury

(2) Hypotension

(3) Administration of acetaminophen or medications containing acetaminophen within the previous 4 hours. Many common cold preparations contain acetaminophen.

(4) Inability to swallow or take medications by mouth

(5) Respiratory distress

(6) Persistent vomiting

(7) Known or suspected liver disease (including patients suspected of current alcohol ingestion)

(8) Allergy to acetaminophen

(9) Patients less than 3 months of age

**e) Preparations Use Unit Dose Only**

(DO NOT USE MULTIDOSE BOTTLE OF LIQUID)

Unit dose 160 mg/5 mL liquid

Unit dose 325 mg pill or tablet

**f) Dosage**

(1) Less than 3 months of age: Not indicated

(2) 3 months to 2 years of age:

| **Age** | Under 3 months | 3 months | 4-11 months | 12-23 months |
|---|---|---|---|---|
| **Liquid 160 mg/ 5 mL** | Not indicated | 1.25 mL | 2.5 mL | 3.75 mL |

(3) 2–4 years: Unit dose 160 mg/5 mL

(4) 5–12 years: TWO unit doses of 160 mg/5 mL each for a total of 320 mg/10 mL

(5) 13 years and above: FOUR unit doses of 160 mg/5 mL each for a total of 640 mg/ 20 mL OR in a form of 325 mg pill or tablet x2 for a total of 650 mg with sips of water as tolerated by the patient.

# ALS Pharmacology – ACTIVATED CHARCOAL (WITHOUT SORBITOL)



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

Variable drug or toxin absorption when ingested

**b) Pharmacokinetics**

Adsorbs poisons and prevents toxins from entering body systems

**c) Indications**

Poisoning by mouth

**d) Contraindications**

(1) Altered mental status
(2) Patients who have received an emetic

**e) Adverse Effects**

Not clinically significant

**f) Precautions**

Does not adsorb all drugs and/or toxic substances

**g) Dose**

(1) Adult: Administer 1 gram/kg PO
(2) Pediatric: Administer 1 gram/kg PO

ALERT

POISON INFORMATION CENTER RECOMMENDATIONS SHOULD BE SOLICITED IN CONJUNCTION WITH MEDICAL CONSULTATION, BUT MEDICATION ORDERS CAN ONLY BE ACCEPTED FROM AN APPROVED BASE STATION OR CONSULTATION CENTER.

**TRADE NAMES: ADENOCARD®**

**a) Pharmacology**

(1) Naturally occurring purine nucleoside
(2) Used to treat narrow complex tachycardia, PSVT with WPW
(3) Slows conduction through the AV node
(4) No effect on ventricular contractility
(5) Causes peripheral vasodilatation (often dramatic)

**b) Pharmacokinetics**

Onset of action within 5–20 seconds following an IV dose; half-life is 10 seconds

**c) Indications**

(1) To slow the rate of narrow complex tachycardia
(2) Is only effective on SVT/PSVT
(3) No effect on VT, atrial fibrillation, or flutter
(4) In stable, wide complex tachycardia (possible VT) for pediatric with caution

**d) Contraindications**

(1) Known hypersensitivity
(2) History of moderate to severe asthma or active bronchospasm
(3) Polymorphic or irregular wide complex tachycardia

**e) Adverse Effects**

Flushing, dyspnea, chest pressure, nausea, headache, dizziness, and hypotension

**f) Precautions**

(1) Effects antagonized by theophylline
(2) Effects enhanced by dipyridamole (Persantine®), digitalis, carbamazepine, calcium channel blockers, and benzodiazepines
(3) Be prepared for up to 40 seconds of asystole.

**g) Dosage**

(1) Adult:
6 mg rapid IVP bolus followed by a rapid flush
Give 12 mg if no response within 2 minutes.
Give 12 mg more if no response within another 1–2 minutes.

ALERT REDUCE DOSAGE BY HALF FOR PATIENTS WITH TRANSPLANTED HEARTS AND THOSE TAKING DIPYRIDAMOLE OR CARBAMAZEPINE.

(2) Pediatric: 0.1 mg/kg rapid IVP/IO; maximum initial dose 6 mg
Second and third doses: 0.2 mg/kg rapid IVP/IO; maximum single additional dose 12 mg

# ALS Pharmacology – ALBUTEROL



**TRADE NAMES: PROVENTIL®, VENTOLIN®**

**a) Pharmacology**

Stimulates beta-2 adrenergic receptors of the bronchioles; bronchodilator

**b) Pharmacokinetics**

(1) Bronchodilation begins within 5–15 minutes after inhalation.
(2) Peak effect occurs in 30–120 minutes.
(3) Duration of action is usually 3–4 hours.

**c) Indications**

(1) Signs and symptoms of respiratory distress
(2) Bronchospasm/wheezing associated with:
  (a) Asthma
  (b) COPD/emphysema
  (c) Allergic reaction (anaphylaxis)
(3) Hyperkalemia/Crush Syndrome

**d) Contraindications**

Known hypersensitivity

**e) Adverse Effects**

Tachycardia, palpitations, peripheral vasodilation, tremors, nervousness, headache, sore throat, PVCs, nausea, and vomiting

**f) Precautions**

May cause severe bronchospasm from repeated excessive use

**g) Dosage**

(1) Bronchospasm

Inhaler

(a) Adult: Patient may receive a maximum of 2 doses (4 puffs) over a 30-minute period
(b) Pediatric: Patient may receive a maximum of 2 doses (4 puffs) over a 30-minute period

Nebulizer

(a) Adult: 2.5 mg by nebulized aerosol connected to 6–8 lpm of oxygen; **Paramedics only** may repeat as needed without medical consultation for recurrent/persistent symptoms; **CRTs** require medical consultation to repeat dosing more than once.
(b) Pediatric: **Paramedics only** may repeat as needed without medical consultation for recurrent/persistent symptoms; **CRTs** require medical consultation to repeat dosing more than once; connect to 6–8 lpm of oxygen
  (i) **Age 2 or older:** 2.5 mg by nebulized aerosol
  (ii) **Age less than 2 years:** 1.25 mg by nebulized aerosol

(2) Hyperkalemia/Crush Syndrome
  (a) Adult: 20 mg (if available) by nebulized aerosol connected to 6–8 lpm of oxygen
  (b) Pediatric
    (i) **Age 2 or older:** 2.5 mg by nebulized aerosol
    (ii) **Age less than 2 years:** 1.25 mg by nebulized aerosol

# ALS Pharmacology – AMIODARONE



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

Prolongs duration and refractory period of action potential. Slows electrical conduction, electrical impulse generation from sinoatrial node, and conduction through accessory pathways. Also dilates blood vessels.

**b) Pharmacokinetics**

Amiodarone primarily alters/blocks the potassium and sodium ion permeability across the myocardial membrane, which in effect, stabilizes the ion channels and changes impulse conduction through the myocardium. Amiodarone also has some effects on beta receptors and calcium channels.

**c) Indications**

(1) Prevent recurrence of ventricular fibrillation/tachycardia after defibrillation and conversion to supraventricular rhythm
(2) Ventricular tachycardia (VT)
(3) Ventricular fibrillation (VF)
(4) Atrial fibrillation/Atrial Flutter with aberrancy (Wide QRS), for HR greater than 130 and SBP greater than 100.

**d) Contraindications**

(1) Second or third degree AV blocks
(2) Sensitivity to amiodarone
(3) Idioventricular escape rhythms
(4) Accelerated idioventricular rhythm
(5) Sinus bradycardia or arrest or block
(6) Hypotension
(7) Cardiogenic shock
(8) Ventricular conduction defects
(9) Iodine hypersensitivity

**e) Adverse Effects**

(1) Bradycardia
(2) Hypotension
(3) Prolonged QT interval

**f) Precautions**

May prolong the QT interval increasing risk of torsades de pointes, and VF.
Amiodarone inhibits atrioventricular conduction and decreases myocardial contractility, increasing the risk of AV block or of hypotension with any calcium channel blocker.

**g) Dosing**

(1) Adult with pulse (including Afib/Aflutter with aberrancy): 150 mg IV/IO over 10 minutes (mixed in 50 - 100 mL of approved diluent). May repeat once.

(2) Adult without pulse VF/VT/(torsades after magnesium sulfate): 300 mg IV/IO. May repeat one time at 150 mg IV/IO

(3) Pediatric with pulse: 5 mg/kg IV/IO over 20 minutes (mixed in 50 - 100 mL of approved diluent)

(4) Pediatric without pulse: 5 mg/kg IV/IO; max single dose 300 mg. May repeat twice to a maximum of 15 mg/kg.

# ALS Pharmacology – ASPIRIN



**TRADE NAMES: Not Applicable**

**a) Pharmacology**
(1) Platelet inhibitor
(2) Anti-inflammatory

**b) Pharmacokinetics**
Blocks platelet aggregation

**c) Indications**
(1) Suspected Acute Coronary Syndrome and/or
(2) ST Elevation MI (STEMI)

**d) Contraindications**
(1) Known hypersensitivity.
(2) Patients who receive a full dose (324 mg) of aspirin prior to EMS arrival.

**e) Adverse Effects**
(1) Heartburn
(2) Nausea and vomiting
(3) Wheezing

**f) Precautions**
GI bleeding and upset

**g) Dosage**
(1) Adult: 324 mg or 325 mg chewed
(2) Pediatric: Not indicated

**TRADE NAMES: Not Applicable**

**a) Pharmacology**

(1) Parasympatholytic (vagolytic action)
(2) Anticholinergic (accelerates the heart rate)

**b) Pharmacokinetics**

(1) Accelerated heart rate within minutes of IV injection.
(2) Peak effect is seen within the first 15 minutes.
(3) Atropine disappears rapidly from the blood.
(4) Excreted in the urine within the first 12 hours.

**c) Indications**

(1) Symptomatic bradycardia, if pacing is unavailable or ineffective
(2) Organophosphate poisoning
(3) Nerve agents

**d) Contraindications**

(1) Known hypersensitivity
(2) Dysrhythmias in which enhancement of conduction may accelerate the ventricular rate and cause decreased cardiac output (e.g., atrial fibrillation, atrial flutter, or PAT with block)
(3) Relative Contraindications (weigh risk/benefits):
   (a) AV block at His-Purkinje level (second-degree Type II AV Block and third-degree AV Block)
   (b) Suspected acute myocardial infarction or ischemia
   (c) Glaucoma

**e) Adverse Effects**

(1) Excessive doses of atropine can cause delirium, restlessness, disorientation, tachycardia, coma, flushed and hot skin, ataxia, blurred vision, dry mucous membranes.
(2) Ventricular fibrillation and tachycardia have occurred following IV administration of atropine.

**f) Precautions**

Not clinically significant

# ALS Pharmacology – ATROPINE SULFATE (continued)



**g) Dosage**

(1) Adult:
Bradycardia: Administer 0.5–1 mg IVP repeated every 3–5 minutes to a total dose of 0.04 mg/kg

(2) Pediatric:
Bradycardia: Administer 0.02 mg/kg IV/IO; maximum single dose 0.5 mg; ET 0.04–0.06 mg/kg, dilute 5 mL; repeat once

(3) Organophosphate poisoning:
   (a) Adult: Administer 2–4 mg IVP or IM every 5–10 minutes.
   (b) Pediatric: Administer 0.02 mg/kg IVP/IO or IM every 5–10 minutes.

(4) Nerve agent exposure
See *MARK I / DuoDote* protocol.

**TRADE NAMES: Not Applicable**

**a) Pharmacology**

(1) Increase cardiac contractile state and ventricular automaticity
(2) Is useful in reversing cardiac arrhythmias due to hyperkalemia (often seen in renal dialysis patients)

**b) Pharmacokinetics**

Rapid onset of action with IV administration

**c) Indications**

(1) Hyperkalemia/Crush Syndrome
(2) Hypocalcemia
(3) To treat adverse effects caused by calcium channel blocker overdose
(4) Hypotension secondary to diltiazem or verapamil
(5) Respiratory depression, decreased reflexes, flaccid paralysis, and apnea following magnesium sulfate administration

**d) Contraindications**

(1) Not indicated in cardiac arrest except when hyperkalemia, hypocalcemia, or calcium channel toxicity is highly suspected
(2) Patient currently taking digoxin with suspected calcium channel blocker overdose

**e) Adverse Effects**

(1) Bradycardia may occur with rapid injection.
(2) Syncope, cardiac arrest, arrhythmia, bradycardia

**f) Precautions**

(1) Use with caution on patients taking digitalis, as calcium may increase ventricular irritability and precipitate digitalis toxicity.
(2) If given with sodium bicarbonate, calcium will precipitate.
(3) Calcium salts may produce coronary and cerebral artery spasm.

**g) Dosage**

(1) Adult:
  (a) Hyperkalemia/Crush Syndrome, Hypocalcemia, Calcium Channel Blocker Overdose: administer 0.5-1 gram SLOW IVP/IO over 3–5 minutes. Maximum dose 1 gram. Refer to *Hyperkalemia/Crush Syndrome – Adult* protocol for repeat dosing.
  (b) For hypotension following diltiazem administration OR respiratory depression, flaccid paralysis, decreased reflexes and apnea after magnesium sulfate administration: administer 500 mg SLOW IVP/IO over 3–5 minutes.
(2) Pediatric: Administer 20 mg/kg (0.2 mL/kg) SLOW IVP/IO over 3–5 minutes. Maximum dose 1 gram or 10 mL. Refer to *Hyperkalemia/Crush Syndrome – Pediatric* protocol for repeat dosing.

# ALS Pharmacology – CEFAZOLIN

**TRADE NAMES: Ancef**

**a) Pharmacology**

Cephalosporin antibiotic

**b) Pharmacokinetics**

(1) Rapid onset of action with IV administration
(2) Cefazolin (Ancef) is excreted unchanged in the urine. In the first six hours, approximately 60% of the drug is excreted in the urine, increasing to 70-80% within 24 hour.

**c) Indications**

(1) Suspected open fracture
(2) Amputations
(3) Mangled or degloved extremity

**d) Contraindications**

Known allergy or hypersensitivity to a medication in the penicillin or cephalosporin class of antibiotics

**e) Adverse Effects**

(1) Diarrhea
(2) Allergic reaction to include anaphylaxis

**f) Precautions**

(1) Do **NOT** delay transport /resuscitation to administer medication
(2) Administer after initial stabilization

**g) Dosage**

(1) For patients 13 years of age and older: Administer 2 grams in 100 mL of approved diluent IV/IO over 10 minutes
(2) For patients 5 through 12 years of age: Administer 1 gram in 100 mL of approved diluent IV/IO over 10 minutes
(3) For patients 1 through 4 years of age: Administer 500 mg in 100 mL of approved diluent IV/IO over 10 minutes
(4) For patients less than 1 year of age: a medical consultation is required

Approved diluents include normal saline, *Lactated Ringer's*, D5W

**TRADE NAMES: Decadron®**

**a) Indications**
(1) Moderate to severe asthma/COPD exacerbation
(2) Croup
(3) Anaphylaxis
(4) Adrenocortical insufficiency

**b) Adverse Effects**
(1) Headache
(2) Edema
(3) Vertigo
(4) Fluid retention
(5) HTN
(6) CHF
(7) Nausea and vomiting
(8) Dyspepsia
(9) Anaphylaxis

**c) Precautions**
(1) Caution with diabetes
(2) Known TB
(3) Osteoporosis
(4) Hepatic impairment
(5) CHF
(6) Seizure disorder

**d) Contraindications**
(1) Hypersensitivity to drug
(2) Known systemic fungal infection
(3) Premature infants

**e) Dosage (IV solution is also used for PO administration)**
(1) Adult: 15 mg IV/IM/PO/IO with no repeat doses. If an IV has already been established due to patient condition, IV route is preferred. IO route may be used if it has already been established to give other lifesaving medications but should not be established for the sole purpose of giving dexamethasone.
(2) Pediatric:
(a) Asthma: 0.5 mg/kg PO (preferred), IM or IV to a maximum of 15 mg. No repeat doses.
(b) Croup: 0.5 mg/kg PO/IM/IV to a maximum of 15 mg. No repeat doses. For mild-moderate croup, PO route preferred. For severe croup, IV route preferred; IM route may be used if IV unavailable.
(c) Anaphylaxis, Adrenocortical insufficiency: 0.5 mg/kg IV/IM/IO to a maximum of 15 mg. No repeat doses. IV route preferred; IM route may be used if IV unavailable. IO route may be used if it has already been established to give other lifesaving medications but should not be established for the sole purpose of giving dexamethasone.

# ALS Pharmacology – DEXTROSE



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

Dextrose is a water-soluble monosaccharide found in corn syrup and honey.

**b) Pharmacokinetics**

(1) Dextrose restores circulating blood sugar and is rapidly utilized following IV injection.

(2) Excess dextrose is rapidly excreted unchanged in the urine.

**c) Indications**

Correction of altered mental status due to low blood sugar (hypoglycemia) seizures and cardiac arrest

**d) Contraindications**

Known hyperglycemia

**e) Adverse Effects**

May worsen hyperglycemia (high blood sugar)

**f) Precautions**

(1) May worsen preexisting hyperglycemia

(2) Tissue necrosis if extravasation occurs

**g) Dosage**

(1) Adult:

(a) If blood glucose is less than 70 mg/dL, administer 10% dextrose in 50 mL (5 grams) boluses, one minute apart, to a maximum of 250 mL **OR** 25 grams of 50% dextrose IVP/IO, until:

(i) the patient has a return to normal mental status, and

(ii) the patient's blood glucose is at least 90 mg/dL.

(iii) If, following 250 mL of 10% dextrose or 25 grams of 50% dextrose, patient has persistently altered mental status and blood glucose less than 90 mg/dL, repeat dosing regimen in (a).

(b) IV route for dextrose is strongly preferred. If unable to start an IV:

(i) Administer glucagon 1 mg IM/IN.

(ii) IO route may be used if it has already been established to give other lifesaving medications. IO should not be established for the sole purpose of giving dextrose.

(2) Pediatric:

(a) **Patient less than 28 days** — if blood glucose is less than 40 mg/dL administer 2 mL/kg of 10% dextrose IV/IO.

**D10W is prepared by mixing one part of D50W with four parts LR.**

Recheck glucose after first dose.

If blood glucose is less than 40 mg/dL, obtain medical consultation to administer second dose of D10W.

(b) **Patients 28 days up to 4 years** — if blood glucose is less than 70 mg/dL, administer 2–4 mL/kg of 10% dextrose IV/IO to a maximum of 25 grams.
Recheck glucose after first dose.

If blood glucose is less than 70 mg/dL, obtain medical consultation to administer second dose of D10W.

(i) If unable to start IV and blood glucose is less than 70 mg/dL, administer 0.5 mg glucagon IM/IN.

(ii) Medical consultation for additional dosing to a maximum of 3 mg IM/IN

(c) **Patients 5 years up to patient's 18th birthday** — if blood glucose is less than 70 mg/dL, administer 2–4 mL/kg of 10% dextrose IV/IO to a maximum of 25 grams.
Recheck glucose after first dose.

If blood glucose is less than 70 mg/dL, obtain medical consultation to administer second dose of D10W.

(i) If unable to start IV and blood glucose is less than 70 mg/dL, administer 1 mg glucagon IM/IN.

(ii) Medical consultation for additional dosing to a maximum of 3 mg IM/IN

# ALS Pharmacology – DIAZEPAM



**TRADE NAMES: VALIUM®**

**a) Pharmacology**
(1) Sedation, hypnosis, alleviation of anxiety, muscle relaxation, anticonvulsant activity
(2) Little cardiovascular effect

**b) Pharmacokinetics**
(1) Onset of action is extremely rapid following IV administration.
(2) Half-life ranges from 20–90 minutes.

**c) Indications**
(1) Sustained and/or recurrent seizures
(2) Severe nerve agent exposure

**d) Contraindications**
(1) Known hypersensitivity, head injury
(2) Should be used with caution in patients with altered mental status, hypotension, or acute narrow angle glaucoma

**e) Adverse Effects**
(1) Lightheadedness, motor impairment, ataxia, impairment of mental and psychomotor function, confusion, slurred speech, amnesia
(2) Additive effect with ethanol
(3) Irritability and excitation may be seen paradoxically.

**f) Precautions**
(1) Respiratory depression may occur with IV administration, especially if given too rapidly.
(2) Respiratory support may be required.
(3) Use with caution in pregnant patients, persons ingesting alcohol, or persons ingesting sedatives.

**g)** **Dosage (paramedic may perform without consultation for patients with active seizures if *Midazolam* is not available.)**
(1) Adult: Administer 2.5–10 mg in 2.5 mg increments SLOW IVP/IM (IM requires all clinicians to obtain medical consultation.)
Maximum total dose 10 mg
(2) Pediatric: Administer 0.1 mg/kg in 2.5 mg increments SLOW IVP/IO/IM (IM requires all clinicians to obtain medical consultation.)
Maximum total dose 5 mg
Rectal Dose: Administer up to 0.2 mg/kg; maximum total dose 10 mg

Severe nerve agent exposure (clinicians may administer without consultation):
(3) Adult: Administer 10 mg IM.
(4) Pediatric: greater than 30 kg: Administer 10 mg via auto-injector or 0.1 mg/kg IM, maximum of 10 mg.

**TRADE NAMES: CARDIZEM®**

**a) Class**

Calcium channel blocker

**b) Actions**

(1) Inhibits the movement of calcium ions across cardiac muscle cells
(2) Decreases conduction velocity and ventricular rate

**c) Indications**

Symptomatic atrial fibrillation and atrial flutter with a ventricular rate greater than or equal to 130 bpm

**d) Contraindications**

(1) Hypotension: SBP less than 100 mmHg
(2) Heart rate: less than 130 bpm
(3) Second or third degree heart block
(4) Hypersensitivity to the drug
(5) Patients less than 18 years of age

**e) Precautions**

(1) Use caution in patients with renal failure.
(2) In patients with stated history of CHF or decreased ejection fraction (EF less than 30%), hypotension may occur rapidly following administration. Be prepared with *calcium chloride*.

**f) Side effects**

(1) Headache
(2) Nausea
(3) Vomiting
(4) Bradycardia
(5) Hypotension

**g) Significant interactions**

Congestive heart failure may result if used along with beta blockers.

**h) Dosage**

(1) Adult
  (a) 0.25 mg/kg (maximum dose 20 mg) by IV bolus administered SLOW IV over 2 minutes; if response is not adequate, repeat in 15 minutes with a dosage of 0.35 mg/kg (maximum dose 25 mg) over 2 minutes.
  (b) For patients older than 50 years of age, borderline blood pressure (SBP 100 - 120), known renal failure, or CHF, consider initial bolus 5–10 mg administered IV

over 2 minutes.

(2) Pediatric:
Contraindicated for patients less than 18 years of age. If needed, consult Pediatric Base Station.

**i) Overdose or Toxicity Presentation**

Generally consists of exaggeration of side effects, including severe hypotension and symptomatic bradycardia

**j) Treatment of Overdose or Other Adverse Reactions**

(1) Give general supportive measures, monitor vitals, administer oxygen.
(2) Hypotension:
  (a) If lungs are clear, administer *Lactated Ringer's* 20 mL/kg IV/IO; titrate to a systolic blood pressure of 100 mmHG.
  (b) If rales are present, administer fluid bolus, maximum of 250 mL of *Lactated Ringer's*. Titrate to a systolic of 100 mmHg.
  (c) Administer calcium chloride 500 mg IV/IO over 3-5 minutes.
(3) Bradycardia: Consider atropine 0.5 to 1 mg IV/IO; if necessary, consider pacing.

**TRADE NAMES: BENADRYL®**

**a) Pharmacology**
Antihistamine

**b) Pharmacokinetics**
(1) Effect begins within 15 minutes of IV dose.
(2) Peak effect 1–4 hours
(3) Metabolized by the liver
(4) The half-life ranges from 2–10 hours.

**c) Indications**
(1) Allergic reaction
(2) Anaphylaxis
(3) Dystonic reactions

**d) Contraindications**
Known allergy to diphenhydramine

**e) Adverse Effects**
Drowsiness, loss of coordination, blurred vision, headache, hypotension, tachycardia, palpitations, thickening of bronchial secretions leading to chest tightness, and wheezing

**f) Precautions** - Should be used with caution in patients with:
(1) Severe vomiting
(2) Alcohol intoxication
(3) Nursing mothers

**g) Dosage**
(1) Adult: Administer 25–50 mg SLOW IVP or IM
(2) Pediatric (for patients greater than 6 months old): Administer 1 mg/kg SLOW IV or IM

# ALS Pharmacology – DOPAMINE HYDROCHLORIDE



**TRADE NAMES: INTROPIN®**
**(JURISDICTIONAL OPTION ONLY WHEN APPROVED BY THE STATE EMS MEDICAL DIRECTOR)**

**a) Pharmacology**
(1) Alpha and beta adrenergic receptor stimulator
(2) Dopaminergic receptor stimulator
(3) Precursor of norepinephrine
(4) At low doses, less than 2 **mcg**/kg/min
  (a) Dilates renal and mesenteric blood vessels
  (b) Venoconstricts
  (c) Arterial resistance varies
(5) At moderate doses, 2–6 **mcg**/kg/min beta1 stimulating effect on heart
  Results in increased cardiac output
(6) High dose, 6–10 **mcg**/kg/min
  Exhibits alpha1 effects; peripheral vasoconstriction including renal and mesenteric vessels, increases left and right ventricular preload
(7) Doses greater than or equal to 10 **mcg**/kg/min
  Alpha1 stimulating effects may reverse mesenteric and renal artery dilatation resulting in decreased blood flow, causing increased preload due to effects on venous system

**b) Pharmacokinetics**
(1) Extremely rapid onset of action
(2) Extremely brief duration of action
(3) The rate of administration may be used to control the effect of dopamine.

**c) Indications**
(1) Cardiogenic shock
(2) Septic shock
(3) Anaphylactic shock
(4) Hypovolemic shock (after sufficient volume replacement)

**d) Contraindications**
(1) Preexisting tachydysrhythmias
(2) Uncorrected hypovolemia

**e) Adverse Effects**
(1) Anginal pain
(2) Tachydysrhythmias
(3) Nausea and vomiting
(4) Hypertension
(5) Undesirable degree of vasoconstriction

**f) Precautions**

(1) Extravasation should be reported to the hospital staff on arrival.
(2) Patients receiving monoamine oxidase (MAO) inhibitors are extremely sensitive to the effects of dopamine and should receive a much lower dosage than is usually given.
(3) Patients with pheochromocytoma are extremely sensitive to dopamine and may develop profound hypertension in response to minimal doses.

**g) Dosage**

(1) For IV/IO infusion only. The preferred route of administration is IV.
(2) In general, the infusion rate is adjusted to blood pressure and clinical response.
(3) Adult: Administer 2–20 **mcg**/kg/min IV drip titrated to BP of 100 systolic or medical consultation selected BP; initial infusion rate 2–5 **mcg**/kg/min
(4) Pediatric: Administer 2–20 **mcg**/kg/min IV drip titrated age specific BP or medical consultation selected BP; initial infusion rate is 2 **mcg**/kg/min

# ALS Pharmacology – DROPERIDOL



**TRADE NAMES: INAPSINE®**

**a) Pharmacology**

Antipsychotic; anti-emetic

**b) Pharmacokinetics**

Onset of action is within 10 minutes of the IM administration.

**c) Indications**

(1) Moderate agitation (defined as behavior that puts the patient or clinician at risk of harm) due to suspected psychiatric emergency (e.g., schizophrenia) or medical delirium

(2) Nausea and vomiting

(a) Preferred for treatment of nausea and vomiting secondary to migraines, cannabinoid hyperemesis syndrome or patient stated history of cyclic vomiting syndrome.

(b) For nonspecific causes of nausea and vomiting, in cases where symptoms do not improve after the first dose of ondansetron.

**d) Contraindications**

(1) For agitation, children under 13 years of age

(2) For nausea and vomiting, children under 18 years of age

(3) Pregnancy

(4) Parkinson's disease

(5) CNS depression or acute CNS injury

(6) Severe agitation (see *midazolam* and *ketamine*)

(7) Prolonged QT

**e) Adverse Effects**

(1) Dystonic reaction

(a) Rarely seen with short-term use

(b) ADULT: administer a single dose of *diphenhydramine* 25–50 mg IV/IM

(c) PEDIATRIC: Administer a single dose of *diphenhydramine* 1 mg/kg IV/IM (max of 25 mg)

(2) Hypotension and tachycardia

(a) Administer *Lactated Ringer's* fluid bolus if hypotension occurs

(3) Torsades de pointes (polymorphic ventricular tachycardia)

(a) Patients receiving droperidol should be monitored for cardiac dysrhythmias.

**f) Precautions**

(1) Violent patients may require *physical restraint* while the medication is administered.

(2) Patients receiving droperidol should be monitored for cardiac dysrhythmias.

(3) For patients who receive 2 or more doses of an anti-emetic, perform 12-lead ECG and cardiac monitoring, if feasible.

**g) Dosage**

(1) Moderate Agitation

(a) Adult

(i) Patient 18–68 years of age: 2.5 mg IM/IV

(ii) Patient 69 years and older: 1.25 mg IM/IV

(iii) Medical consultation required for additional dose

(b) Pediatric

(i) Patient 13–18 years of age: 2.5 mg IM/IV

(ii) Patient less than 13 years of age: contraindicated

(iii) Medical consultation required for additional dose

(2) Nausea and Vomiting

(a) Adult and Pediatric 13 years of age and older

(i) For nausea/vomiting secondary to migraines, cannabinoid hyperemesis or patient stated history of cyclic vomiting syndrome, administer droperidol 1.25 mg IM or IV over 2-5 minutes; no repeat dosage. If continued symptoms after droperidol, may administer ondansetron 8 mg IV/4-8mg IM/8 mg ODT.

(ii) For nonspecific nausea/vomiting, for persistent symptoms after ondansetron 8 mg IV/IM/ODT, administer droperidol 1.25 mg IM or IV over 2-5 minutes; no repeat dosage.

(b) Pediatric

Contraindicated for patients less than 13 years of age.

# ALS Pharmacology – EPINEPHRINE (0.1 mg/mL and 1 mg/mL)



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

(1) The administration of epinephrine causes increases in:
  (a) Systemic vascular resistance
  (b) Systemic arterial pressure
  (c) Heart rate (positive chronotropic effect)
  (d) Contractile state (positive inotropic effect)
  (e) Myocardial oxygen requirement
  (f) Cardiac automaticity
  (g) AV conduction (positive dromotropic effect)

(2) Causes bronchial dilation by smooth muscle relaxation

**b) Pharmacokinetics**

(1) IV administered epinephrine has an extremely rapid onset of action, and is rapidly inactivated by the liver.

(2) Topically applied nebulizer within the respiratory tract, epinephrine has vasoconstrictor properties that result in reduction of mucosal and submucosal edema. It also has bronchodilator properties that reduce airway smooth muscle spasms.

**c) Indications**

(1) Medical cardiac arrest and pediatric traumatic arrest
(2) Moderate to severe allergic reaction/anaphylaxis
(3) IV push epinephrine should be reserved for cardiac arrest patients
(4) Epinephrine infusion (IV/IO) should be reserved for patients in shock refractory to fluid bolus or for patients in anaphylactic shock
(5) Severe asthma
(6) Respiratory stridor (suspected croup)

**d) Contraindications**

(1) Hypertension
(2) Preexisting tachydysrhythmias with a pulse (ventricular and supraventricular)
(3) IV push epinephrine should not be administered to any patient with a pulse

**e) Adverse Effects**

(1) Tachydysrhythmias (supraventricular and ventricular)
(2) Hypertension
(3) May induce early labor in pregnant women
(4) Headache
(5) Nervousness
(6) Decreased level of consciousness
(7) Rebound edema may occur 20–30 minutes after administration to croup patients.

**f) Precautions**

(1) Do not mix with sodium bicarbonate as this deactivates epinephrine.
(2) Epinephrine causes a dramatic increase in myocardial oxygen consumption.
(3) Its use in the setting of an acute MI should be restricted to cardiac arrest.

(4) Medical consultation must be obtained before administering the EMS service's manual epinephrine or EMS service's auto-injector to asthma patients with pregnancy or cardiac history. However, medical consultation is not required for any patients who have severe allergic reactions with respiratory distress.

**g) Dosage**

(1) Cardiac Arrest

(a) Adult:

(i) PEA/Asystole: Administer epinephrine (0.1 mg/mL) 1 mg IVP/IO every 4 minutes to a maximum of 4 doses for the initial arrest. If arrest recurs following any period of ROSC, administer a maximum of 2 additional doses.

(ii) Ventricular Fibrillation/Pulseless Ventricular Tachycardia: Administer a single dose of epinephrine (0.1 mg/mL) 1 mg IVP/IO following the initial dose of amiodarone. If arrest recurs following any period of ROSC, administer one additional dose.

(b) Pediatric and Neonate:

(i) Administer epinephrine (0.1 mg/mL) with dosing from the following age-based table every 4 minutes to a maximum of 4 doses for the initial arrest. If arrest recurs following any period of ROSC, administer a maximum of 2 additional doses.

**Simplified Epinephrine (0.1 mg/mL) IV/IO Dosing**

| Age | Weight (kg) | Dose (mg) | Dose(mL)* |
|---|---|---|---|
| Neonate 1 hour–28 days OR 0-28 days OR birth-28 days | 4 kg | 0.05 mg | 0.5 mL |
| 29 days–11 months | 8 kg | 0.1 mg | 1 mL |
| 1 year–4 years | 15 kg | 0.15 mg | 1.5 mL |
| 5 years–12 years | 30 kg | 0.3 mg | 3 mL |
| 13 years–18th birthday | Under 50 kg | 0.5 mg | 5 mL |
| 13 years–18th birthday | Over 50 kg | 1.0 mg (Adult dose) | 10 mL |

*Must use epinephrine 0.1 mg/mL concentration for IV/IO dosing. The volumes listed in the chart are based on this concentration.

(ii) ET: Administer epinephrine (1 mg/mL) 0.1 mg/kg, diluted with 5 mL of *LR*; repeat every 4 minutes to a maximum of 4 doses for the initial arrest. If arrest recurs following any period of ROSC, administer a maximum of 2 additional doses.

(2) Bradycardia

(a) Adult: Using epinephrine infusion (1 mg epinephrine in 100 mL *LR* or NS), administer 1 mL/min (60 drops/min) using a 60 drop-set. If systolic blood pressure remains less than 90 mmHg, obtain medical consultation for further dosing.

(b) Pediatric:

(i) Administer epinephrine (0.1 mg/mL) 0.01 mg/kg IVP/IO; repeat every 3–5 minutes. 0.01 mg/kg is equivalent to 0.1 mL/kg.

(ii) ET: Administer epinephrine (1 mg/mL) 0.1 mg/kg, diluted with 5 mL of *LR*; repeat every 3–5 minutes.

(c) Neonate:
(i) Administer epinephrine (0.1 mg/mL) 0.01 mg/kg IVP/IO; repeat every 3–5 minutes. 0.01 mg/kg is equivalent to 0.1 mL/kg.
(ii) ET: Administer epinephrine (0.1 mg/mL) 0.03 mg/kg, diluted with 1 mL of *LR*.

(3) Allergic Reaction/Anaphylaxis/Asthma/COPD
(a) ADULT
(i) For mild allergic reaction (with history of life-threatening allergic reaction to the same allergen), moderate allergic reaction, or anaphylaxis: administer epinephrine (1 mg/mL) 0.5 mg IM, every 5 minutes up to a total of 3 doses, as needed for patient condition.
(ii) For patients who remain hypotensive or with impending respiratory failure despite IM epinephrine, administer epinephrine infusion per instructions below in (5)(c) Cardiogenic Shock. Refer to *Anaphylaxis* protocol).
(b) PEDIATRIC
(i) Administer epinephrine
Less than 5 years of age: administer epinephrine (1 mg/mL) 0.15 mg IM
5 years and greater: administer epinephrine (1 mg/mL) 0.5 mg IM
(ii) May repeat IM dose every 5 minutes for a total of 3 doses for severe reactions
(iii) Refer to pediatric infusion dosage in (8) on the next page

(4) Croup
(a) Adult: not indicated
(b) Pediatric
(i) Moderate/Severe: administer 2.5 mL of epinephrine 1 mg/mL via nebulizer. If patient does not improve, administer a second dose of 2.5 mL of epinephrine 1 mg/mL via nebulizer.
(ii) Severe croup/imminent respiratory arrest: Administer 0.01 mg/kg of epinephrine (1 mg/mL) IM. Max single dose of 0.5 mg IM.
(iii) For patients less than one year of age, consult for nebulized epinephrine dosing.

ALL PATIENTS WHO RECEIVE NEBULIZED EPINEPHRINE MUST BE TRANSPORTED BY AN ALS UNIT.

(5) Cardiogenic Shock
(a) If rales are present, administer fluid bolus, titrate to a systolic blood pressure of 90 mmHg or greater. Maximum single of bolus of 250 mL of *LR* IV.

(b) Additional fluid requires medical consultation.

(c) Initiate epinephrine infusion
(i) Add 1 mg of epinephrine (either 1 mg/mL or 0.1 mg/mL) in a 100 mL bag of *LR* or NS.
(ii) Use a Microdrip set (60 drops/mL) for infusion administration.
(iii) Adult epinephrine infusion dosage:
(1) Administer infusion through a free-flowing IV, ideally 20 gauge or larger, or by IO
(2) Start infusion at 1 mL/min (60 drops/min) IV/IO.

(3) Check blood pressure every 5 minutes. If MAP is less than 65 mmHg or systolic blood pressure is less than 90 mmHg, increase to a maximum rate of 2 mL/min (120 drops/min).
(4) If above blood pressure goals are not met upon reaching maximum rate, obtain online medical consultation.

(6) Hypovolemic or Septic Shock
(a) Initiate epinephrine infusion if systolic blood pressure remains less than 90 mmHg (or mean arterial pressure less than 65 mmHg) after IV fluid bolus of 30 mL/kg *LR*.
(b) For significant hypotension (SBP less than 70 mmHg or MAP less than 50 mmHg) AND altered mental status, initiate epinephrine infusion CONCURRENTLY with *Lactated Ringer's*. After epinephrine infusion is initiated, prioritize appropriate fluid bolus of *Lactated Ringer's* and titrate down epinephine infusion to maintain MAP greater than 65 mmHg or SBP greater than 90 mmHg.

(7) Neurogenic shock (suspected spinal cord injury which typically presents with hypotension and bradycardia)
(a) If lungs are clear, administer fluid bolus of 20 mL/kg of *LR* IV. Titrate to a systolic blood pressure of 110 mmHg (or mean arterial pressure of 85 mmHg). Maximum patient dose of 2,000 mL of *LR*.
(b) Initiate epinephrine infusion if systolic blood pressure remains less than 110 mmHg (or mean arterial pressure less than 85 mmHg).

**(8) Pediatric shock**
(a) The following dosing chart should be used for pediatric patients less than 50 kg (using approved epinephrine infusion and 60 drop set):
(b) Blood pressure goal:

| Weight range (kg) | Initial epinephrine dose | If goal blood pressure not achieved at 5 min, increase to |
|---|---|---|
| LESS than 10 kg | 6 drops/min (0.1 mL/min) | 12 drops/min (0.2 mL/min) |
| 10-19 kg | 12 drops/min (0.2 mL/min) | 24 drops/min (0.4 mL/min) |
| 20-29 kg | 18 drops/min (0.3 mL/min) | 36 drops/min (0.6 mL/min) |
| 30-39 kg | 24 drops/min (0.4 mL/min) | 48 drops/min (0.8 mL/min) |
| 40-49 kg | 30 drops/min (0.5 mL/min) | 60 drops/min (1.0 mL/min) |

(c) For patients 10 years and older (including adults), systolic blood pressure greater than 90 mmHg;
(d) For patients under 10 years of age, systolic blood pressure greater than 70 + 2x age in years mmHg; OR
(e) Systolic blood pressure ordered by the pediatric base station.

(9) If above blood pressure goal not met after 10 minutes, obtain online medical consultation.

# ALS Pharmacology – ESMOLOL



**TRADE NAMES: Brevibloc**

**a) Pharmacology**
Beta Blocker

**b) Pharmacokinetics**
(1) Rapid onset of action; within 1-2 minutes
(2) Short duration; half-life approximately 10 minutes

**c) Indications**
Persistent VF or pulseless VT after the second dose of amiodarone

**d) Contraindications**
Known allergy or hypersensitivity

**e) Adverse Effects**
(1) Bradycardia
(2) Bronchospasm
(3) Hypotension
(4) Vomiting

**f) Precautions**
Should only be used for persistent VF and pulseless VT per algorithm; not for use in PEA/asystole

**g) Dosage**
(1) Adult (age 13 and older): 0.5 mg/kg IV/IO over 1-2 minutes. No repeat dosing.
(2) Pediatric (patients less than age 13 years): Not indicated

**TRADE NAMES: Not Applicable**
*(Required unless Morphine OSP approved)*

**Pharmacology**

(1) Synthetic opioid binds with opiate receptors in the CNS, altering both perception and emotional response to pain.
(2) Fentanyl is significantly more potent than morphine. 100 **mcg** of fentanyl is equivalent to 10 mg of morphine.

**a) Pharmacokinetics**

Onset of action is 2–3 minutes after IV dose and effects last 30 minutes to 1 hour.

**b) Indications**

(1) The patient reports moderate to severe pain.
(2) In the clinician's judgment the patient will benefit from treatment with an opioid analgesic, including patients who are MOLST and/or EMS/DNR patients or being pre-medicated for a procedure.

**c) Contraindications**

(1) Hypersensitivity or known allergy to fentanyl
(2) Uncorrected respiratory distress or hypoxemia refractory to supplemental *oxygen*
(3) Uncorrected hypotension, defined as a persistent systolic pressure less than 90 mmHg

**d) Adverse Effects**

(1) Respiratory depression/arrest
(2) Altered mental status
(3) Increased vagal tone due to suppression of sympathetic pathways (slowed heart rate)
(4) Constricted pupils (pinpoint)
(5) Increased cerebral blood flow
(6) Chest wall rigidity if given too rapidly via IVP

**e) Precautions**

*(1)* *Naloxone* reverses all effects.
(2) To reduce the risk of chest wall rigidity (especially in children), fentanyl should be administered slowly and titrated to effect.
(3) Vital signs should be monitored frequently.
(4) Hypotension is a greater possibility in volume-depleted patients.
(5) Elderly patients and those with impaired renal function may be more sensitive to the medication's effects.

**f) Dosage**

(1) Adult: Fentanyl IN (Preferred) or IV/IO/IM

(a) Administer 1 **mcg**/kg to a maximum initial dose of 200 **mcg** (For IN route, dosing may be limited due to volume limitations – administration of max 1mL per nare).

(b) Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of fentanyl 1 **mcg**/kg to a maximum dose of 200 **mcg**.

(c) Obtain on-line medical direction for additional doses, if required.

(2) Pediatric: Fentanyl IN. If IN route not accessible, IV/IO/IM

(a) Administer 1 **mcg**/kg to a maximum initial dose of 200 **mcg** (For IN route, dosing may be limited due to volume limitations – administration of max 1mL per nare).

(b) Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of fentanyl 1 **mcg**/kg to a maximum dose of 200 **mcg**.

(c) Obtain on-line medical direction for additional doses, if required.

**TRADE NAMES: Not Applicable**

**a) Pharmacology**
(1) Hormone synthesized by the pancreas
(2) Increases blood glucose concentration
(3) Inhibits gastric and pancreatic secretions
(4) May increase heart rate and cardiac output
(5) May decrease blood pressure
(6) Increases metabolic rate

**b) Pharmacokinetics**
(1) Destroyed by the GI tract and is not effective orally
(2) Maximum hyperglycemic activity occurs within 30 minutes and disappears after 1–2 hours.
(3) Relaxation of smooth muscle occurs within 8–10 minutes and persists for 12–27 minutes.
(4) The half-life is 3–10 minutes.
(5) Degraded in liver and kidneys

**c) Indications**
(1) Patients with altered mental status who are suspected of being hypoglycemic where IV access is not obtainable
(2) Beta blocker overdose

**d) Contraindications**
Known hypersensitivity

**e) Adverse Effects**
Nausea and vomiting

**f) Precautions**
Glucagon only works if liver has significant glycogen stores.

**g) Dosage**
(1) For suspected hypoglycemia without IV access:
(a) Adult: Administer 1 mg IM/IN (Medical consultation for additional dosing to a maximum of 3 mg IM)
(b) Pediatric:
(i) 1 mg IM/IN (5 years of age up to patient's 18th birthday)

(Medical consultation for additional dosing to a maximum of 3 mg IM/IN)
(ii) 0.5 mg IM/IN (28 days–4 years of age)

(Medical consultation for additional dosing to a maximum of 3 mg IM/IN)
(2)
For suspected beta blocker overdose:
(a) Adult: Administer 1 mg IVP every 5 minutes
(b) Pediatric: Administer every 5 minutes
(i) 1 mg IVP (5 years of age up to patient's 18th birthday) every 5 minutes
(ii) 0.5 mg IVP (28 days–4 years of age) every 5 minutes

# ALS Pharmacology – HALOPERIDOL



**TRADE NAMES: HALDOL®**

**JURISDICTIONAL OPTION ONLY WHEN APPROVED BY THE STATE EMS MEDICAL DIRECTOR.**

**a) Pharmacology**

Antipsychotic

**b) Pharmacokinetics**

Onset of action is within 10 minutes of the IM administration.

**c) Indications**

Moderate agitation (defined as behavior that puts the patient or clinician at risk of harm) due to suspected psychiatric emergency (e.g., schizophrenia) or medical delirium

**d) Contraindications**

(1) Children under 5 years of age
(2) Parkinson's disease
(3) CNS depression
(4) Acute CNS injury
(5) Severe agitation (see *midazolam* and *ketamine*)

**e) Adverse Effects**

(1) Dystonic reaction
  (a) Rarely seen with short-term use
  (b) ADULT: administer a single dose of *diphenhydramine* 25–50 mg IV/IM
  (c) PEDIATRIC: Administer a single dose of *diphenhydramine* 1 mg/kg IV/IM (max of 25 mg)
(2) Hypotension and tachycardia
  (a) Administer *Lactated Ringer's* fluid bolus if hypotension occurs
(3) Torsades de pointes (polymorphic ventricular tachycardia)
  (a) Patients receiving haloperidol should be placed on the cardiac monitor to evaluate for dysrhythmias.

**f) Precautions**

(1) Violent patients may require *physical restraint* while the medication is administered.
(2) Patients receiving haloperidol should be placed on cardiac monitor to evaluate for dysrhythmias.

**g) Dosage**

(1) ADULT
  (a) Patient 18–68 years of age: 5 mg IM
  (b) Patient 69 years and older: 2.5 mg IM
(2) PEDIATRIC
  (a) Child less than 5 years of age: Contraindicated
  (b) Child 5–12 years of age: 0.05 mg/kg IM, max of 2.5 mg IM
  (c) Patient 13 up to 18th birthday: 2.5–5 mg IM

**TRADE NAMES: ATROVENT®**

**a) Pharmacology**
(1) Anticholinergic (parasympatholytic) bronchodilator
(2) Bronchodilator is site-specific, not systemic
(3) Dries respiratory tract secretions
(4) Most effective in combination with a beta-adrenergic bronchodilator

**b) Pharmacokinetics**
(1) Improved pulmonary function in 15–30 minutes
(2) Peak effects occur in 1–2 hours.
(3) Duration of action is usually 4–5 hours.

**c) Indications**
(1) Allergic reactions/anaphylaxis
(2) Bronchial asthma
(3) Reversible bronchospasms associated with chronic bronchitis and emphysema

**d) Contraindications**
(1) Hypersensitivity to the drug
(2) Hypersensitivity to *atropine*
(3) Less than 1 year of age

**e) Adverse Effects**
(1) More common: dry mouth, cough, or unpleasant taste
(2) Less common: vision changes, eye burning or pain, dizziness, headache, nervousness, palpitations, sweating, trembling, chest tightness, rash, hives, or facial sweating

**f) Precautions**
(1) Use with caution in patients with congestive heart failure, heart disease, hypertension, glaucoma, and with elderly patients.
(2) May worsen the condition of glaucoma if it gets into the eyes. Having the patient close their eyes during nebulization may prevent this.
(3) Not to be used as a single agent—must be used in combination with a beta-agonist.

**g) Dosage**
(1) Adult:
Single administration ONLY, 500 **mcg** (2.5 mL) by nebulized aerosol connected to 6–8 lpm of oxygen in combination with *albuterol* 2.5 mg.

# ALS Pharmacology – IPRATROPIUM (continued)

(2) Pediatric:
Single administration ONLY. In combination with *albuterol*, nebulized aerosol is connected to 6–8 lpm of *oxygen*.
(a) **Less than 1 year of age:** contraindicated
(b) **Age 1 year but less than 2 years:**
250 **mcg** (1.25 mL) by nebulized aerosol
(c) **Age 2 and older:**
500 **mcg** (2.5 mL) by nebulized aerosol

**TRADE NAMES: KETANEST®, KETASET®, KETALAR®**

**a) Pharmacology**
Sedative-hypnotic; analgesic

**b) Pharmacokinetics**
A rapid-acting, non-barbiturate, sedative-hypnotic analgesic agent characterized by normal pharyngeal-laryngeal reflexes, normal or enhanced skeletal muscle tone, and possible cardiovascular and respiratory stimulation. It may occasionally produce transient respiratory depression.

ONSET OF ACTION FOR IV/IO *KETAMINE* MAY BE 5–10 MINUTES.
ONSET OF ACTION FOR IN/IM *KETAMINE* MAY BE UP TO 15–20 MINUTES.

**c) Indications**
(1) Moderate to severe pain; musculoskeletal, extremity, back, abdominal and flank pain
(2) Severe agitation
(3) Ventilatory difficulty secondary to bucking or combativeness in intubated patients
(4) CPR-induced awareness
(5) Pain management for synchronized cardioversion and transcutaneous pacing
(6) Seizures that have not resolved or that recur after the maximum dose of *midazolam*

**d) Contraindications**
(1) Known hypersensitivity to *ketamine*
(2) Penetrating eye injury
(3) Chest pain or headache

**e) Adverse Effects**
(1) Although respiration is frequently stimulated, respiratory depression may occur with rapid IV administration. Laryngospasm has been known to occur.
(2) Although hypotension may occur, blood pressure and heart rate are frequently stimulated.
(3) Involuntary myoclonus that may mimic seizure activity – these movements should not be confused for seizures of emergence from sedation.
(4) Possible enhanced secretions
(5) Possible unpleasant dreams and delirium upon emergence from sedation

**f) Precautions**
(1) Cardiac and respiratory function should be continuously monitored when *ketamine* has been administered.
(2) All patients that receive *ketamine* for severe agitation or seizures may require advanced airway management. ALS clinicians should be prepared to support the patient's airway needs.
(3) *Ketamine* is supplied in multiple concentrations (10 mg/mL, 50 mg/mL, and 100 mg/mL). To avoid dosing errors, ALS clinicians must check the concentration carefully and confirm that it is the proper dose for the patient prior to administering *ketamine*.

(4) *Ketamine* 100 mg/mL concentration is generally more appropriate for IM or IN administration, as there are maximum volume considerations with these routes. *Ketamine* 10 mg/mL concentration is preferable for IV administration for analgesia.
(5) All patients that receive ketamine for severe agitation or seizures must be transported with at least two EMS clinicians, one of which must be an ALS clinician

**g) Dosage**

(1) Pain Management: moderate-severe musculoskeletal, extremity, back, abdominal and flank pain; pain management for synchronized cardioversion and transcutaneous pacing
  (a) Adult: Administer 0.2mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg.
    (i) Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of *ketamine* 0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg.
    (ii) If IV unavailable, administer 0.5 mg/kg IN/IM (if delivery device is available, divide administration of the dose equally between the nares to a maximum of 1 mL per nare).
    (iii) Reassess in 15 minutes. If pain remains moderate to severe, then administer a second dose of *ketamine* 0.5 mg/kg IN/IM.
  (b) Pediatric: Administer 0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg.
    (i) Reassess in 5-10 minutes. If pain remains moderate to severe, then administer a second dose of *ketamine* 0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 20 mg.
    (ii) If IV unavailable, administer 0.5 mg/kg IN/IM (if delivery device is available, divide administration of the dose equally between the nares to a maximum of 1 mL per nare).
    (iii) Reassess in 15 minutes. If pain remains moderate to severe, then administer a second dose of *ketamine* 0.5 mg/kg IN/IM.
(2) Severe agitation
  Medical consultation is required for the first dose of *ketamine* for severe agitation in all patients, unless there is immediate or imminent danger to the patient or EMS. Additional doses of *ketamine* always require medical consultation for all patients.
  (a) Adult
    (i) IV dosing: Administer 1 mg/kg IV/IO. Maximum single IV/IO dose 100 mg. If severe agitation persists, administer 1 mg/kg IV/IO. Maximum single IV/IO dose 100 mg. Maximum total IV/IO dose 200 mg.
    (ii) IM dosing: 4 mg/kg IM. Maximum total IM dose 400 mg. Additional dose of 4 mg/kg IM *ketamine* for persistent agitation requires medical consultation.
  (b) Pediatric
    (i) IV dosing: For patients 13–18 years of age, administer 1 mg/kg IV/IO. Maximum single IV/IO dose 100 mg. If severe agitation persists, administer 1 mg/kg IV/IO. Maximum single IV dose 100 mg. Maximum total IV/IO dose 200 mg.

(ii) IM dosing: For patients 13–18 years of age, administer 4 mg/kg IM. Maximum IM dose 400 mg. Additional dose of 4 mg/kg IM *ketamine* for persistent agitation requires medical consultation.

(iii) For patients 5–12 years of age: medical consultation required for dosing

(iv) Patients less than 5 years of age: Contraindicated

(3) Ventilatory difficulty secondary to bucking or combativeness in intubated patients or those with an approved alternative airway device or cricothyroidotomy

*(a)* *Ketamine* may be preferred for patients who have hypotension or possible hypovolemia, or if ventilatory difficulty is thought to be the result of pain response.

(i) Dose: Administer 2 mg/kg IVP/IO over 60 seconds. May repeat 2 additional doses of 1 mg/kg for IVP/IO every 10–15 minutes to a total of 3 doses, as needed. Additional doses require medical consultation.

(ii) If the patient is on a ventilator and an IV infusion pump is available, consider a *ketamine* infusion.

(4) CPR-induced awareness

(a) Adult

(i) Administer *ketamine* 1 mg/kg IV/IO up to a maximum of 3 doses.

(ii) Additional doses require medical consultation.

(b) Pediatric

(i) Obtain medical consultation from a Pediatric Base Station.

(5) Seizures

After maximum dose of *midazolam*, for patients with continued seizures at 10 minutes. Medical consult required for all doses.

(a) Adult

(i) 1 mg/kg IV/IO over 1 minute in 50–100 mL of approved diluent (normal saline or D5W), or 2 mg/kg IM/IN

(ii) Additional doses require repeat medical consultation.

(b) Pediatric

**(i) Age 3 and older:** 1 mg/kg IV/IO over 1 minute in 50–100 mL of approved diluent (normal saline or D5W), or 1 mg/kg IM/IN

**(ii) Age less than 3 years:** consult with a Pediatric Base Station.

# ALS Pharmacology – KETOROLAC



**TRADE NAMES: TORADOL®**

***Optional Supplemental Protocol***

## 1. Pharmacology

a) Inhibits synthesis of prostaglandin, which, in turn, reduces pain and inflammation
b) Antipyretic agent
c) Does not affect CNS, peripheral acting analgesic, therefore, it does not possess the same sedative properties as a narcotic

## 2. Pharmacokinetics

a) Onset: Approximately 30 minutes
b) Peak effects: 1-2 hours
c) Half-life: 4-6 hours

## 3. Indications

a) Management of moderate to severe acute pain
b) Consider as a first line medication for renal stones/colic
c) Burns – mild to moderate
d) Non-traumatic neuromuscular pain

## 4. Contraindications

a) Hypersensitivity to ketorolac, *aspirin*, and other NSAIDs
b) Current usage of *aspirin* or NSAIDs within 6 hours
c) Use of oral anticoagulants (blood thinners)
d) Severe headache or head injury
e) Bleeding or clotting disorder
f) Chronic renal insufficiency or transplant
g) Active or history of peptic ulcer disease (PUD), active or recent history of GI bleed, and active or history of GI perforation
h) Pregnancy or breast feeding
i) Suspected ACS
j) Trauma with suspected bleeding
k) Patients who have not yet reached their 2nd birthday

## 5. Adverse Effects

a) Burning or pain at the injection site
b) Rash / itching
c) GI distress
d) Nausea / vomiting

## 6. Dosage

a) Adult: Administer single dose of 15 mg IV only. No repeat doses.
If IV is unavailable: Administer single dose of 30 mg IM. No repeat doses.

b) Pediatric:

(1) Newly born to 2 years of age: Contraindicated

(2) Age 2 to patients who have not reached their 18th birthday: Administer 0.5 mg/kg IV only to a maximum total dose of 15 mg. No repeat doses.
If IV is unavailable: Administer 1 mg/kg IM to a maximum total dose of 30 mg. No repeat doses.

# ALS Pharmacology – LABETALOL HYDROCHLORIDE



**TRADE NAMES: Trandate and Normodyne**

## 1. Pharmacology

a) Beta-blocker with Alpha-blocking properties
b) Antihypertensive

## 2. Pharmacokinetics

a) Onset within 5 minutes with IV administration
b) Peak effect at 5 to 15 minutes
c) Duration of 4-6 hours

## 3. Indications

a) Pregnant patients greater than 20 weeks gestation OR up to 6 weeks postpartum with SBP greater than or equal to 160 mmHg or DBP greater than or equal to 110 mmHg.
b) Stroke: Patients with SBP greater than or equal to 220 mmHg AND DBP greater than or equal to 120 mmHg AND focal neurological deficit or positive stroke assessment resulting in Stroke Alert activation.
c) Chest Pain: Patients with SBP greater than or equal to 220 mmHg AND DBP greater than or equal to 120 mmHg with strong suspicion (tearing/ripping chest or back pain, unequal upper extremity BP) or diagnosis via imaging of acute aortic aneurysm or dissection WITH CONSULTATION.

## 4. Contraindications

a) Hypersensitivity to Beta-blockers
b) Heart rate under 60 bpm
c) 2nd or 3rd degree AV Block
d) Active asthma exacerbation
e) Decompensated heart failure
f) Acute head trauma

## 5. Adverse Effects

a) Hypotension
b) Nausea
c) Dizziness

## 6. Precautions

a) If a patient has an anaphylactic reaction to labetalol or other beta-blockers, treatment with epinephrine may be ineffective
b) Use with caution or withold if there are any signs of respiratory distress. Beta-blockers impede treatment with beta-agonists and can worsen heart failure
c) Use with caution in patients with myasthenia gravis and any peripheral vascular disease

**7. Dosage**

a) Pregnant patients greater than 20 weeks gestation OR up to 6 weeks postpartum with SBP greater than or equal to 160 mmHg or DBP greater than or equal to 110 mmHg:
   (1) 1st Dose: 20 mg IV/IO over 2 minutes
   (2) 2nd Dose: 40 mg IV/IO over 2 minutes, if SBP greater than or equal to 160 mmHg or DBP greater than or equal to 110 mmHg ten minutes after the initial dose
   (3) After the second dose, an additional dose up to 40 mg IV/IO requires medical consultation

b) Hypertensive patients with SBP greater than or equal to 220 mmHg AND DBP greater than or equal to 120 mmHg, with focal neurologic deficit or signs/symptoms resulting in a Stroke Alert:
   (1) 1st Dose 10 mg IV/IO over 2 min
   (2) 2nd Dose 10 mg IV/IO over 2 min
   (3) 3rd Dose of 20 mg IV/IO over 2 minutes, and any subsequent doses of 20 mg, require medical consultation. MAX total patient dose of 80 mg.

c) Hypertensive patients with SBP greater than or equal to 220 mmHg AND DBP greater than or equal to 120 mmHg, and chest pain with suspected/diagnosed aortic syndromes: medical consultation required for dosing and blood pressure targets.

# ALS Pharmacology – LACTATED RINGER'S



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

(1) Isotonic crystalloid solution

(2) Lactated Ringer's (LR) contains:

(a) Sodium (Na+) . . . . . 130 mEq/liter

(b) Potassium (K+) . . . . . 4 mEq/liter

(c) Calcium (Ca++) . . . . . 3 mEq/liter

(d) Chloride (Cl-) . . . . . 109 mEq/liter

(e) Lactate . . . . . 28 mEq/liter

**b) Pharmacokinetics**

Lactated Ringer's is a water and electrolyte replacement.

**c) Indications**

(1) Hypovolemia (limitation in multiple/severe trauma without head injury)

(2) Keep vein open

(3) Fluid boluses

**d) Contraindications**

Fluid overload states

**e) Adverse Effects**

Rare in therapeutic doses

**f) Precautions**

(1) Patients receiving Lactated Ringer's should be monitored to prevent circulatory overload.

(2) Lactated Ringer's should be used with caution in patients with congestive heart failure or renal failure.

**g) Dosage**

(1) Adult:

(i) For patients with multiple/severe trauma but **without head injury**: Administer small boluses of LR (maximum single bolus of 250 mL prior to additional blood pressure check) to achieve and maintain a systolic blood pressure of greater than or equal to 90 mmHg.

(ii) For multiple/severe trauma **with head injury**: Administer small boluses of LR (maximum single bolus of 250 mL prior to additional blood pressure check) to achieve and maintain a systolic blood pressure greater than or equal to 110 mmHg.

(iii) For all other patients: Titrate to a systolic pressure of 90 mmHg.

(iv) Maximum dose 2,000 mL without medical consultation.

(2) Pediatric:
   (a) KVO
   (b) If age-related vital signs and patient's condition indicate hypoperfusion, administer initial fluid bolus of 20 mL/kg LR IV/IO. Fluid boluses for neonates and volume-sensitive children are 10 mL/kg.
   (c) If patient's condition does not improve, administer the second fluid bolus of 20 mL/kg LR IV/IO.
   (d) Third and subsequent fluid boluses at 20 mL/kg LR IV/IO with medical consultation.

# ALS Pharmacology – LIDOCAINE



**TRADE NAMES: XYLOCAINE®**

**UPDATE Effective March 20, 2025. If amiodarone is unavailable, lidocaine may be used for Indications 1-3 at Dosages 1-4.**

**a) Pharmacology**
- (1) Antiarrhythmic
- (2) Local anesthetic

**b) Pharmacokinetics**
- (1) Extremely rapid (within minutes) onset following IV administration and lasts approximately 10–20 minutes
- (2) Mucosal anesthesia with onset in 1–5 minutes

**c) Indications**
- (1) Ventricular tachycardia (VT)
- (2) Ventricular fibrillation (VF)
- (3) Prevent recurrence of VF/VT after defibrillation and conversion to supraventricular rhythm
- (4) Anesthesia for IO infusions
- (5) Nasotracheal intubation

**d) Contraindications**
- (1) AV blocks
- (2) Sensitivity to lidocaine
- (3) Idioventricular escape rhythms
- (4) Accelerated idioventricular rhythm
- (5) Sinus bradycardia or arrest or block
- (6) Hypotension
- (7) Shock
- (8) Ventricular conduction defects

**e) Adverse Effects**
- (1) Lidocaine may cause clinical evidence of toxicity usually related to the central nervous system.
- (2) Toxicity:
  - (a) Early: muscle twitching, slurred speech, altered mental status, decreased hearing, paresthesia (pins and needles), anxiety, apprehension, visual disturbances, nausea, numbness, difficulty breathing or swallowing, decreased heart rate
  - (b) Late: convulsions, hypotension, coma, widening of QRS complex, prolongation of the P-R interval, hearing loss, hallucinations

**f) Precautions**
- (1) Reduce the dosage in patients with decreased cardiac output, liver dysfunction, and patients over age 70.
- (2) Bolus doses should be administered over a 1-minute period, except in VF/VT, when they are administered IVP.

**g) Dosage**

(1) Adult with pulse: Administer 1–1.5 mg/kg IVP/IO bolus followed by 0.5–0.75 mg/kg every 8–10 minutes, as needed, up to 3 mg/kg total.

(2) Adult without pulse: Administer 1.5 mg/kg IVP/IO bolus initially followed by an additional 1.5 mg/kg IVP bolus in 3-5 minutes, as needed, to a maximum of 3 mg/kg.

(3) Pediatric with pulse: Administer 1 mg/kg initial bolus and 0.5 mg/kg IVP/IO bolus every 8–10 minutes, as needed, to a maximum of 3 mg/kg total.

(4) Pediatric without pulse: Administer 1 mg/kg initial bolus IVP/IO bolus followed by 1 mg/kg IVP boluses in 3–5 minutes to a maximum of 3 mg/kg.

(5) Adult and Pediatric with an IO infusion: To prevent or treat pain during an IO infusion, administer lidocaine using the following dosing chart. Slowly infuse lidocaine and allow it to dwell in the IO space for 60 seconds. Flush with IV fluid.

| LIDOCAINE 2% (PRESERVATIVE-FREE) DOSING | | |
|---|---|---|
| **Age** | **Weight** | **Lidocaine** |
| **Less than 5 years** | 10-20 kg | Medical Consultation Required |
| **5-12 years** | 20-40 kg | 10 mg (0.5 mL) |
| **13-17 years** | 40-80 kg | 20 mg (1 mL) |
| **Greater than 18 years** | Greater than 80 kg | 20–40 mg (1–2 mL) |

(6) Nasal Pharyngeal Anesthesia (age 13 years and greater)
Draw up 4 mL of lidocaine 4% (40 mg/mL) and using mucosal atomization device, administer 2 mL per nare. The patient IV, gel, and intranasal dosing should not exceed 3 mg/kg.

**h) Interfacility Transport Only**

(1) IV Infusion

(2) Maintain the IV infusion of lidocaine at the rate established by the sending physician and record vital signs every 15 minutes.
(See *Lidocaine Infusion for Interfacility Transport*.)

# ALS Pharmacology – MAGNESIUM SULFATE



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

Physiologic calcium channel blocker and also blocks neuromuscular transmission. Hypomagnesemia can cause cardiac dysrhythmias. It is also a CNS depressant effective in the management of seizures during pregnancy. It does this by decreasing the amount of acetylcholine liberated from motor nerve terminals. Magnesium is necessary for many biochemical processes and plays a role in the transmission of electrical impulses.

**b) Pharmacokinetics**

With intravenous administration the onset of anticonvulsant action is immediate and lasts about 30 minutes. Magnesium is excreted solely by the kidney at a rate proportional to the plasma concentration and glomerular filtration rate.

**c) Indications**

(1) Torsades de pointes or polymorphic ventricular tachycardia
(2) Pregnant patients greater than 20 weeks gestation OR patients who are up to 6 weeks postpartum, who have hypertensive disorders of pregnancy (moderate/severe criteria) or eclampsia (seizures).
(3) Moderate to severe asthma/bronchospasm exacerbation

**d) Contraindications**

(1) Heart blocks
(2) Renal impairment
(3) Hypermagnesemia

**e) Adverse Effects**

(1) Respiratory depression
(2) Flushing
(3) Sweating
(4) Hypotension
(5) Depressed reflexes

**f) Precautions**

(1) May exaggerate effects of CNS depressants and neuromuscular blocking agents
(2) Due to concern of hypotension, IV fluid bolus should be initiated if hypovolemia is suspected.
(3) Magnesium toxicity is a concern with higher doses and would present with respiratory depression, decreased reflexes, flaccid paralysis, and apnea. *Calcium chloride* 500 mg IV/IO over 3–5 minutes for above indications of toxicity.

**g) Dosage**

(1) Adult:

(a) Moderate to severe asthma/bronchospasm exacerbation: 1–2 grams IV/IO over 10–20 minutes mixed in 50–100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W).
**Paramedics only** may administer without medical consultation following administration of all other indicated medications in the algorithm.

(b) Torsades de pointes or polymorphic ventricular tachycardia: 2 grams IV/IO over 2 minutes

(c) Seizure activity associated with pregnancy from 20 weeks gestation until delivery OR up to 6 weeks postpartum: 4 grams IV/IO over 10 minutes mixed in 50–100 mL of approved diluent (normal saline/*Lacated Ringer's*/D5W).

(d) Hypertensive disorders of pregnancy (moderate/severe criteria): 4 grams IV/IO over 10 minutes mixed in 50-100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W)

(2) Pediatric (under 18-years-old):

(a) Moderate to severe asthma/bronchospasm exacerbation: consider magnesium sulfate 50 mg/kg IV/IO mixed in 50–100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W) to max of 2 grams given over 10–20 minutes

(b) Torsades de pointes: 25 mg/kg to a max of 2 grams IV/IO over 2 minutes

(c) Seizure activity associated with pregnancy from 20 weeks gestation until delivery OR up to 6 weeks postpartum: 4 grams IV/IO over 10 minutes mixed in 50–100 mL of approved diluent (normal saline/*Lacated Ringer's*/D5W).

(d) Hypertensive disorders of pregnancy (moderate/severe criteria): 4 grams IV/IO over 10 minutes mixed in 50-100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W)

ALERT MAGNESIUM ADMINISTRATION OFTEN CAUSES HYPOTENSION IN CHILDREN. CONSIDER ADMINISTERING BOLUS 20 ML/KG OF *LACTATED RINGER'S* WITH THE ADMINISTRATION OF MAGNESIUM.

**h) Interfacility Transport**

(1) A paramedic may administer continuous infusion established by a sending facility, not to exceed the ordered total dose, and monitoring the patient for signs and symptoms of magnesium toxicity.

(2) Magnesium sulfate used for tocolytic control is an RN-level indication.

# ALS Pharmacology – METOPROLOL TARTRATE



**Metoprolol *may be used only when* diltiazem *is unavailable.*** (EMSOPs must notify the State EMS Medical Director of diltiazem shortages.)

**a) Class**
Beta blocker

**b) Actions**
(1) Blocks beta-1 receptors in the heart
(2) Decreases ventricular rate and contractility

**c) Indications**
Symptomatic atrial fibrillation and atrial flutter with a ventricular rate greater than or equal to 130 bpm

**d) Contraindications**
(1) Hypotension: SBP less than 100 mmHg
(2) Heart rate: less than 130 bpm
(3) Wheezing, bronchospasm, asthma/COPD exacerbation
(4) Second or third degree heart block
(5) Hypersensitivity to the drug
(6) Patients less than 18 years of age

**e) Precautions**
(1) Use caution in patients with renal failure

(2) In patients with stated history of CHF or decreased ejection fraction (EF less than 30%), hypotension may occur rapidly following administration. Be prepared with IV fluid bolus (250 ml).

**f) Adverse effects**
(1) Bradycardia
(2) Nausea or Vomiting
(3) Hypotension

**g) Significant interactions**
Congestive heart failure may result if used along with calcium channel blockers

**h) Dosage**
(1) Adult
  (a) 5 mg IV given over 1-2 minutes. May repeat dose once in 5 minutes if heart rate remains greater than 130 bpm and no contraindications are present. Not to exceed 10 mg IV maximum total patient dose.
  (b) For patients with borderline blood pressure (SBP 100-120) or CHF, administer metoprolol slowly in 2.5 mg IV/IO increments, not to exceed 10 mg IV/IO (maximum).
(2) Pediatric – contraindicated for patients less than 18 years of age unless approved by consultation with a Pediatric Base Station.

**i) Overdose or Toxicity**

Typically presents with severe hypotension and symptomatic bradycardia

**j) Treatment of Overdose or Other Adverse Reactions**

(1) Give general supportive measures, monitor vitals, administer oxygen

(2) Hypotension:

(a) If lungs are clear, administer *Lactated Ringer's* 20 mL/kg IV/IO; titrate to a systolic blood pressure of 100 mmHg

(b) If rales are present, administer fluid bolus, maximum of 250 mL of *Lactated Ringer's*. Titrate to a systolic blood pressure of 100 mmHg.

(c) Treat with *glucagon* per beta *Overdose/Poisoning-Adult*

# ALS Pharmacology – MIDAZOLAM



**TRADE NAMES: VERSED®**

**a) Pharmacology**
(1) Sedative
(2) Hypnotic
(3) Anticonvulsant

**b) Pharmacokinetics**
(1) A short-acting benzodiazepine with strong hypnotic, anticonvulsant activity, and amnestic properties
(2) Onset of action is extremely rapid following IV administration; approximately 1.5 minutes, and for IM approximately 15 minutes.
(3) Duration of effect is 1–4 hours with half-life of 1.5 to 3 hours in healthy adult.

**c) Indications**
(1) Sustained and/or recurrent seizures
(2) Precardioversion to reduce anxiety
(3) Awake patient requiring transcutaneous pacing (TCP)
(4) Nasal Tracheal Intubation
(5) Implanted Cardioverter Defibrillator (ICD) Malfunction
(6) Nerve/organophosphate exposure
(7) Bucking Endotracheal Intubated patient
(8) Moderate or severe stimulant toxicity
(9) Moderate or severe agitation
(10) Moderate or severe alcohol withdrawal

**d) Contraindications**
(1) Hypotension (See below for ET bucking)
(2) Known hypersensitivity to midazolam

**e) Adverse Effects**
(1) Respiratory depression or apnea
(2) Hypotension

**f) Precautions**
(1) The effects of midazolam can be accentuated and significantly potentiated by CNS depressants, such as opioids or alcohol.
(2) Midazolam is five times as potent per milligram as *diazepam* and there is an increased risk of respiratory depression.

**g) Dosage**
(1) Indications 2 through 6 above.
(a) Adult:

REDUCE THE DOSAGE BELOW IV/IO/IN/IM BY 50% FOR PATIENTS 69 YEARS OR OLDER.

(i) 0.1 mg/kg in 2 mg increments SLOW IVP over 1–2 minutes per increment with maximum single dose 5 mg.

(ii) If IV unavailable, 5 mg IN/IM may be administered. IN administration max 1 mL per nare.

(iii) Additional doses up to a maximum total dose 10 mg require medical consultation for all clinicians.

(iv) If suspected severe nerve agent exposure, clinicians may administer midazolam 5 mg IM without medical consultation.

(b) Pediatric:

(i) 0.1 mg/kg in 2 mg increments. SLOW IVP over 1–2 minutes per increment to a maximum single dose of 5 mg.

(ii) If IV unavailable, 0.2 mg/kg IN/IM. IN administration max 1 mL per nare. Maximum total dose 5 mg.

(iii) Additional doses up to a maximum total dose 5 mg require medical consultation for all clinicians.
For life-threatening conditions, consider IO administration of midazolam.

(iv) If suspected severe nerve agent exposure, clinicians may administer midazolam as above without medical consultation.

(2) Sustained and/or Recurrent Seizures

(a) Adult

(i) IV/IO: 0.1 mg/kg IV/IO over 1–2 minutes, to a maximum single dose of 5 mg. May repeat IV/IO dose one time for persistent seizure activity after 5 minutes.

(ii) IM/IN: 0.2 mg/kg IN or IM to a maximum single dose of 10 mg. No repeat IM/IN doses.

(iii) Reduce the dosage by 50% for patients 69 and older.

(b) Pediatric

(i) IV/IO: 0.1 mg/kg IV/IO over 1–2 minutes, to a maximum single dose of 5 mg. May repeat dose one time for persistent seizure activity after 5 minutes.

(ii) IM/IN: 0.2 mg/kg IN or IM to a maximum single dose of 5 mg. May repeat dose one time for persistent seizure activity after 5 minutes.

ALERT If a patient prescribed benzodiazepine is given, the patient may only receive one dose of midazolam from EMS supply.

(3) Moderate to Severe Agitation or Stimulant Toxicity

(a) Patient 18–69 years: midazolam 5 mg IM/IV
Patient greater than 69 years: midazolam 2.5 mg IM/IV

(b) For patients 18 years and older, if severe agitation persists after giving one dose of *ketamine*, consider midazolam 2.5 mg IV/IO.

(c) For patients 18 years and older, if IV/IO unavailable:
If severe agitation persists after IM *ketamine* dose, administer midazolam 5 mg IM.

(d) For patients aged 5–12 years of age: medical consultation is required for midazolam 0.1 mg/kg IV or 0.2 mg/kg IM/IN (max 5 mg). IM route preferred.

(e) For patients age 13 to those who have not yet reached their 18th birthday:

(i) Medical consultation is required for midazolam 0.1 mg/kg or 0.2 mg/kg IM/IN (max 5 mg). IM route preferred. For severe agitation where there is immediate and imminent risk to the patient or EMS, no consult is required.

(ii) If severe agitation persists after giving one dose of *ketamine* IV/IO, consider midazolam 2.5 mg IV/IO.

(iii) If IV/IO unavailable:
If severe agitation persists after IM *ketamine* dose, administer midazolam 5 mg IM.

(4) Bucking Endotracheal Intubated Patient

(a) Adult: Administer 0.1 mg/kg SLOW IVP over 1–2 minutes, while maintaining systolic BP greater than 90 mmHg (110 mmHg if injuries include a suspected head injury). STOP ONCE BUCKING HAS RESOLVED AND VENTILATION IS RELAXED. Maximum single dose is 5 mg.
Additional doses require medical consultation.

(b) Pediatric: Administer 0.05 mg/kg SLOW IVP over 1–2 minutes, while maintaining systolic BP greater than 60 in neonates, 70 in infants, [70 + (2 x years) = systolic BP] for patients greater than 1 year of age. Maximum total dose 5 mg.

(5) Moderate to Severe Alcohol Withdrawal

(a) Administer Midazolam: 2–2.5 mg IV. May repeat dosing twice to a maximum of 3 doses (6-7.5 mg IV) titrated to abatement of psychomotor symptoms and anxiety/agitation. Additional doses require medical consultation.

(b) If no IV access available, administer Midazolam: 5 mg IN/IM. Additional doses require medical consultation.

**TRADE NAMES: Not Applicable**

*(Optional Supplemental Protocol, which allows for jurisdictional selection of both* fentanyl *and morphine OR replacement of* fentanyl *by morphine as the opioid of choice)*

**Pharmacology**

(1) Decreases pain perception and anxiety
(2) Relaxes respiratory effort
(3) Causes peripheral dilation, which decreases preload
(4) Decreases left ventricular afterload

**a) Pharmacokinetics**

(1) Binds with opiate receptors in the CNS, altering both perception and emotional response to pain
(2) Onset of action is in less than 5 minutes after IV dose and effects last 4–5 hours.
(3) Causes peripheral arterial and venous vasodilation

**b) Indications**

(1) The patient reports moderate to severe pain.
(2) In the clinician's judgment the patient will benefit from treatment with an opioid analgesic, including patients who are MOLST and/or EMS/DNR patients or being pre-medicated for a procedure.
(3) Pulmonary Edema/Congestive Heart Failure (Pediatric only)

**c) Contraindications**

(1) Hypersensitivity or known allergy to morphine
(2) Uncorrected respiratory distress or hypoxemia refractory to supplemental *oxygen*
(3) Uncorrected hypotension, defined as a persistent systolic pressure less than 90 mmHg

**d) Adverse Effects**

(1) Respiratory depression/arrest
(2) Altered mental status (decreased level of consciousness)
(3) Increased vagal tone due to suppression of sympathetic pathways (slowed heart rate)
(4) Nausea and vomiting
(5) Constricted pupils (pinpoint)
(6) Increased cerebral blood flow

**e) Precautions**

(1) Naloxone reverses all effects.
(2) Should be administered slowly and titrated to effect.
(3) Vital signs should be monitored frequently.
(4) Hypotension is a greater possibility in volume-depleted patients.

**f) Dosage**

(1) Adult: IV/IM
  (a) Administer 0.1 mg/kg to a maximum initial dose of 20 mg.
  (b) Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of morphine 0.05 mg/kg to a maximum additional dose of 10 mg.
  (c) Obtain on-line medical direction for additional doses, if required.
(2) Pediatric: IV/IM
  (a) Administer 0.1 mg/kg to a maximum initial dose of 20 mg.
  (b) Reassess in 5–10 minutes. If pain remains moderate to severe, then administer a second dose of morphine 0.05 mg/kg to a maximum additional dose of 10 mg.
  (c) Obtain on-line medical direction for additional doses, if required.
(3) Pediatric Pulmonary Edema/CHF
  (a) 0.1 mg/kg SLOW IVP/IO/IM (1–2 mg/min). Maximum dose 5 mg.

**TRADE NAMES: NARCAN®**

**a) Pharmacology**
Reverses all effects due to opioid (morphine-like) agents. This drug will reverse the respiratory depression and all central and peripheral nervous system effects.

**b) Pharmacokinetics**
(1) Onset of action is within a few minutes if administered IVP and within 5 minutes if administered IN.
(2) Intramuscular and pediatric/neonatal endotracheal administration results in a slower onset of action.
(3) Patients responding to naloxone may require additional doses and transportation to the hospital since most opioids last longer than naloxone.
(4) Has no effect in the absence of opioids

**c) Indications**
To reverse respiratory depression induced by opioids

**d) Contraindications**
Patients under 28 days of age.

**e) Adverse Effects**
Opioid withdrawal

**f) Precautions**
(1) Naloxone may induce opioid withdrawal in patients who are physically dependent.
(2) Certain drugs may require much higher doses of naloxone for reversal than are currently used.
(3) Should be administered and titrated so respiratory efforts return, but not intended to restore full consciousness

**g) Dosage**
(1) Adult: Administer 0.4–2 mg IVP/IO (titrated)/IM/IN (if delivery device is available, divide administration of the dose equally between the nares to a maximum of 1 mL per nare); **OR** administer 4 mg/0.1 mL IN in one nare. Repeat as necessary to maintain respiratory activity.
(2) Pediatric: Administer 0.1 mg/kg IVP/IO (titrated)IM/IN (if delivery device is available, divide administration of the dose equally between the nares to a maximum of 1 mL per nare); **OR** administer 4 mg/0.1 mL IN in one nare. May be repeated as necessary to maintain respiratory activity. ET dose: 0.2–0.25 mg/kg

# ALS Pharmacology – NITROGLYCERIN



**TRADE NAMES: Not Applicable**

**a) Pharmacology**
(1) Vasodilator-effect on veins more than arteries
(2) Decreases right heart return (preload) by venous pooling, thereby decreasing myocardial workload and oxygen consumption

**b) Pharmacokinetics**
(1) Absorbed through oral mucosa
(2) Antianginal and vasodilation effects within 1–2 minutes after administration. Half-life is 1–4 minutes.
(3) Duration of action is less than 5 minutes.

**c) Indications**
(1) For treatment of angina
(2) Congestive heart failure, acute pulmonary edema

**d) Contraindications**
(1) Known hypersensitivity
(2) Pediatric patient under the age of 13
(3) Any patient having taken medication for Pulmonary Artery Hypertension (e.g., Adcirca® or Revatio®) or erectile dysfunction (e.g., Viagra®, Levitra®, or Cialis®) within the past 48 hours. Medical consultation is required to override this contraindication.
(4) Asymptomatic hypertension
(5) Blood pressure below 90 mmHg systolic
(6) Heart rate less than 60 or greater than 150 bpm

**e) Adverse Effects**
Headache, hypotension, nausea, vomiting, dizziness, and decreased level of consciousness

**f) Precautions**
(1) May cause hypotension
(2) If systolic blood pressure drops more than 20 mmHg per dose, obtain a medical consultation for further doses.

**g) Dosage**
(1) Adult: Chest pain
(a) If patient has a prescription or previous history of nitroglycerin use, administer nitroglycerin: 0.4 mg SL (may repeat dose 2 times at 3–5 minute intervals) May be repeated if symptoms persist, BP is greater than 90 mmHg, and pulse is between 60-150 bpm, to a maximum dose of 1.2 mg
(b) If patient does **not** have a prescription or previous history of nitroglycerin use, establish IV prior to the administration of nitroglycerin, then administer nitroglycerin as above.
(c) Additional doses may be administered with medical consultation.

(2) Adult: Pulmonary Edema/Congestive Heart Failure
  (a) Low dose – Administer 0.4 mg SL at 3–5 minute intervals to a maximum dose of 1.2 mg.
  (b) High dose – (until CPAP is applied or if CPAP is not tolerated)
    (i) Administer 1 dose of 0.4 mg SL and apply 1 inch of NTG paste.
    (ii) Administer 1 dose of 0.8 mg SL.
    (iii) Continue 0.8 mg NTG dosing to achieve a 20% reduction in systolic blood pressure.
(3) Pediatric: Requires medical consultation from Pediatric Base Station.

# ALS Pharmacology – NITROGLYCERIN PASTE



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

Nitroglycerin paste contains a 2% solution of nitroglycerin in a special absorbent paste. When placed on the skin, nitroglycerin is absorbed into the systemic circulation. In many cases, it may be preferred over nitroglycerin tablets because of its longer duration of action.

**b) Pharmacokinetics**

Nitroglycerin is a rapid smooth-muscle relaxant that reduces cardiac work and, to a lesser degree, dilates the coronary arteries. This results in increased coronary blood flow and improved perfusion of the ischemic myocardium. Relief of ischemia causes reduction and alleviation of chest pain. Pain relief following transcutaneous nitroglycerin administration usually occurs within 5 to 10 minutes, and therapeutic effects can be observed up to 30 minutes later. Nitroglycerin also causes vasodilation, which decreases preload. Decreased preload leads to decreased cardiac work. This feature, in conjunction with coronary vasodilation, reverses the effects of angina pectoris.

**c) Indications**

Patients in respiratory distress with moderate or severe symptoms and elevated systolic blood pressure.

**d) Contraindications**

(1) Known hypersensitivity
(2) Pediatric patient under the age of 13
(3) Any patient having taken medication for Pulmonary Artery Hypertension (e.g., Adcirca® or Revatio®) or erectile dysfunction (e.g., Viagra®, Levitra®, or Cialis®) within the past 48 hours. Medical consultation is required to override this contraindication.
(4) Asymptomatic hypertension
(5) Blood pressure below 90 mmHg systolic
(6) Heart rate less than 60 or greater than 150 bpm

**e) Adverse Effects**

Headache, dizziness, weakness, tachycardia, hypotension, orthostasis, skin rash, dry mouth, nausea, and vomiting.

**f) Precautions**

Patients taking the drug routinely may develop a tolerance and require an increased dose. Headache is a common side effect of nitroglycerin administration and occurs as a result of vasodilation of the cerebral vessels.

Postural syncope sometimes occurs following the administration of nitroglycerin. This should be anticipated and the patient kept supine when possible. It is important to monitor the blood pressure continuously.

**g) Dosage**

(1) Adult: 1 inch of the NTG paste is applied. Measuring applicators are supplied.
(2) Pediatric: Requires medical consultation from Pediatric Base Station.

**TRADE NAMES: ZOFRAN®**

**a) Pharmacology**

A selective blocking agent of the serotonin 5-HT3 receptor type

**b) Pharmacokinetics**

Anti-nausea and anti-emetic with onset of action within 5–15 minutes IV and 30 minutes IM

**c) Indications**

(1) Prevention and control of nausea and/or vomiting

(2) Ondansetron can be administered in an effort to reduce the nausea or vomiting complications associated with certain existing injuries, medical illness, or medication side effects (e.g., penetrating eye injury, high risk for aspiration, or following opioid administration).

**d) Contraindications**

(1) Known hypersensitivity to ondansetron

(2) Patients less than 28 days

**e) Adverse Effects**

(1) Hypotension

(2) Tachycardia

(3) Extrapyramidal reactions

(4) Seizures

(5) QT interval prolongation

**f) Precautions**

(1) Monitor EKG, pulse oximetry, and blood pressure.

(2) Have emesis basin and suction ready.

**g) Dosage**

(1) Adult: 8 mg SLOW IV over 2–5 minutes OR 4-8 mg IM OR 8 mg orally disintegrating tablet (ODT)

May repeat once without medical consultation.

For third repeat dose to a patient with maximum total dose of 24 mg.

Administration of ondansetron for nausea and vomiting secondary to an overdose requires medical consultation.

(2) Pediatric:

Patients 28 days to 12 years old: 0.1 mg/kg SLOW IV over 2–5 minutes

Patients who are 13 to 18 years old: 8 mg ODT OR 8 mg SLOW IV over 2–5 minutes OR

If no IV: 0.1 mg/kg IM (with max single dose of 8 mg);

May repeat once without medical consultation.

For third repeat dose to a patient with maximum total dose of 0.3 mg/kg or 24 mg, whichever is lower.

Administration of ondansetron for nausea and vomiting secondary to an overdose requires medical consultation.

# ALS Pharmacology – OXYGEN



**TRADE NAMES: Not Applicable**

**a) Pharmacology**

(1) Increases oxygen content of the blood
(2) Improves tissue oxygenation
(3) Decreases energy expended for respirations

**b) Pharmacokinetics**

Changing the percentage of inspired oxygen results in an increased blood and tissue level equilibration within 5–20 minutes.

**c) Indications**

(1) If evidence of hypoxia (Less than 94% $SpO_2$)
(2) Respiratory distress
(3) Cardiopulmonary arrest
(4) Trauma
(5) Suspected CO exposure
(6) Dyspnea

**d) Contraindications**

Not clinically significant

**e) Adverse Effects**

High concentrations of oxygen will reduce the respiratory drive in some COPD patients; these patients should be carefully monitored.

**f) Precautions**

(1) Never withhold oxygen from those who need it.
(2) Oxygen should be given with caution to patients with COPD.
(3) Simple or partial rebreather face masks must be supplied with a minimum 6 lpm.
(4) Non-breather (NRB) face masks must be supplied with a minimum 12 lpm.

**g) Dosage**

(1) Adult: Administer 12–15 lpm via NRB mask or 2–6 lpm via nasal cannula, as needed.
CO exposure: Administer oxygen via NRB mask. Maintain $SpO_2$ at 100%
(2) Pediatric: Administer 12–15 lpm via NRB mask or 2-6 lpm via nasal cannula, as needed.
CO exposure: Administer oxygen via NRB mask. Maintain $SpO_2$ at 100%

| Percent $O_2$ Saturation | Ranges | General Patient Care |
|---|---|---|
| 94–100% | Normal | Give oxygen as necessary |
| 91–93% | Mild Hypoxia | Give oxygen as necessary |
| 86–90% | Moderate Hypoxia | Give 100% oxygen<br>Assisting Ventilations if necessary |
| less than or equal to 85% | Severe Hypoxia | Give 100% oxygen<br>Assist Ventilations<br>If indicated, Intubate |

ALERT INACCURATE OR MISLEADING $SpO_2$ READINGS MAY OCCUR IN PATIENTS WITH: HYPOTHERMIA, HYPOPERFUSION (SHOCK), CO POISONING, HEMOGLOBIN ABNORMALITY, ANEMIA, VASOCONSTRICTION, AND DARK SKIN COLOR.

**TRADE NAMES: Not Applicable**

**a) Pharmacology**

Sodium bicarbonate corrects acidosis; raises blood pH

**b) Pharmacokinetics**

(1) Rapid onset of action in the blood
(2) Delayed onset of action in the tissues

**c) Indications**

(1) Acidosis, pre-existing (documented)
(2) Cardiac arrest ***only*** with a high clinical suspicion of acidosis, hyperkalemia, or NA channel blocker (including tricyclic antidepressant and phenobarbital) overdose as a ***cause*** of the arrest
(3) Hyperkalemia/Crush Syndrome
(4) NA channel blocker (including tricyclic antidepressant and phenobarbital) overdose

**d) Contraindications**

Preexisting alkalosis

**e) Adverse Effects**

(1) CHF exacerbation/volume overload
(2) Hypernatremia (high sodium)
(3) Hypokalemia
(4) Intracellular acidosis due to carbon dioxide formation
(5) Metabolic alkalosis
(6) Shifting the oxyhemoglobin dissociation curve, inhibiting the release of oxygen to the tissues

**f) Precautions**

Inactivates simultaneously-administered catecholamines (*epinephrine*)

**g) Dosage**

(1) Cardiac arrest only with a high clinical suspicion of acidosis, hyperkalemia or NA channel blocker (including tricyclic antidepressant and phenobarbital) overdose as the cause:
  (a) Adult: Administer 1 mEq/kg IVP/IO.
  (b) Pediatric: Administer 1 mEq/kg IVP/IO; for patients less than 1 year of age, must be diluted (1:1) with *Lactated Ringer's*.
(2) Hyperkalemia/Crush Syndrome:
  (a) Adult: Sodium bicarbonate 50 mEq IV/IO, slow over 5 minutes. Flush the IV with 5 mL of *Lactated Ringer's* between calcium and sodium bicarbonate administration.
  (b) Pediatric: Sodium bicarbonate 1 mEq/kg IV/IO, slow over 5 minutes. For patients less than 1 year of age, must be diluted 1:1 with *Lactated Ringer's*.

(3) NA channel blocker (including tricyclic antidepressant and phenobarbital) overdose (sodium channel blockade):
   (a) Adult: Administer 1 mEq/kg IVP/IO bolus initially. Monitor QRS interval for narrowing. Repeat dose: 0.5 mEq/kg every 10 mins to a maintain narrow QRS (less than 100 msec).
   (b) Pediatric: Administer 1 mEq/kg IVP/IO; for patients less than 1 year of age, must be diluted (1:1) with *Lactated Ringer's*.

**TRADE NAMES: Not Applicable**
**(JURISDICTIONAL OPTION ONLY WHEN APPROVED BY STATE EMS MEDICAL DIRECTOR)**

**a) Pharmacology**
(1) Stimulates beta-2 receptors located in the smooth bronchioles
(2) Causes relaxation of bronchospasm

**b) Pharmacokinetics**
Relieves bronchospasm in acute and chronic airway disease with minimal cardiovascular effect

**c) Indications**
(1) Asthma
(2) Reversible airway obstruction associated with bronchitis or emphysema

**d) Contraindications**
(1) Patients under 12 years of age

**e) Adverse Effects**
(1) Tachycardia
(2) Palpitations
(3) Nervousness
(4) Tremors
(5) Dizziness
(6) Nausea
(7) Vomiting

**f) Precautions**
(1) Exercise caution when administering to patients with hypertension or cardiac history
(2) Monitor EKG

**g) Dosage**
(1) Patients 12 years of age and older:
Administer 0.25 mg IM. May repeat one time after 15 minutes if there is not adequate improvement. Maximum total dose 0.5 mg IM.
(2) Patients less than 12 years of age: Not indicated

# ALS Pharmacology – TRANEXAMIC ACID (TXA)



**a) Pharmacology**

(1) Anti-fibrinolytic: prevents conversion of plasminogen to plasmin, which promotes the stability of fibrin in blood clots

(2) Interruption of bradykinin-induced angioedema: decreases bradykinin levels, which are the mediator of bradykinin-induced angioedema.

**b) Pharmacokinetics**

Onset: variable; Peak effect: 2 hours; Duration: 10 hours

**c) Indications**

(1) Suspected hemorrhagic shock due to traumatic mechanism; injury must have occurred within the past 1 hour.
   (a) 12 years of age and older: SBP less than 90 mm Hg
   (b) Less than 12 years of age: SBP less than 70 + (2 x age in years)

(2) Prior to onset of shock, positive e-FAST prehospital US indicating intra-abdominal or intra-thoracic fluid following traumatic injury occurring within the past 1 hour.

(3) Postpartum hemorrhage with ongoing blood loss despite uterine massage; delivery must have occurred within the past 1 hour.
   (a) 12 years of age and older: SBP less than 90 or HR greater than 110
   (b) Less than 12 years of age: SBP less than 70 + (2 x age in years)

(4) Severe angioedema mediated by bradykinin pathway (ACE-inhibitor angioedema) in patients 18 years of age and older who do not improve after an initial dose of *epinephrine*.

**d) Contraindications**

(1) Hypersensitivity or allergy to TXA

(2) Known arterial or venous thromboembolism (PE, DVT)

(3) For anti-fibrinolysis: Patients more than one (1) hour from time of injury, or more than one (1) hour from childbirth/delivery for postpartum hemorrhage.

**e) Adverse Effects**

(1) Hypotension

(2) Seizures

**f) Precautions**

(1) Do not delay transport to administer TXA.

**g) Dosage**

(1) Suspected hemorrhagic shock
   (a) For patients 12 years of age and older: Administer 1 gram in 100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes
   (b) For patients 5 through 11 years of age: Administer 500 mg in 100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes
   (c) For patients less than 5 years of age: a medical consultation is required

(2) Severe angioedema (18 years of age and older)

(a) Administer 1 gram in 100 mL approved diluent (normal saline/*Lactated Ringer's*/D5W) IV/IO over 3-5 minutes

**a) PURPOSE**

Accessing a preexisting central venous catheter or device may be required for fluid volume resuscitation and/or medication administration for critically ill/injured patients when peripheral IV access cannot be established.

**b) INDICATIONS**

**Life-Threatening Emergency**

A preexisting central venous access catheter or device may be accessed by a paramedic for resuscitation medication administration or fluid volume administration.

A CRT may access these devices **WITH MEDICAL CONSULTATION**.

**Non–Life-Threatening Emergency**

Medical consultation is required for all ALS (CRT and paramedic) clinicians.

**c) CONTRAINDICATIONS**

None

**d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

(1) Infection (local site and in the central bloodstream)
(2) Air in the catheter line (air embolism)
(3) Damage to catheter line
(4) Obstruction in the line
(5) Dislodge the catheter

**e) PROCEDURE: PORTS (e.g., Port-a-Cath®, Mediport®, Bard®, Infuse-a-Port®)**

A port (reservoir) is a disc about an inch in diameter that is just under the skin, usually on the upper chest. Under the skin, it is connected to a catheter line that lies in a large vein just above the heart.

(1) Explain the procedure to the patient whenever possible.
(2) Obtain assistance as needed.
(3) Position the patient supine.
(4) Using a 10 mL syringe or larger, draw up TWO 5 mL flushes with NS/RL.
NOTE: 10 mL syringes are used because they have lower pressure when flushing fluids than smaller volume syringes (1 mL, 3 mL, or 5 mL). The smaller volume syringes may deliver enough pressure to break the catheter.
(5) Open the right-angle, non-coring (Huber® or Gripper®) needle package and flush with NS/RL. Be sure there are **no air bubbles in the tubing.**
(6) Clean the skin site at the port with cleaning material from patient/family, or use alcohol or other **approved antibacterial agent (e.g., ChloraPrep®)**, using a circular motion.
(7) Use sterile latex-safe gloves. Using the non-dominant hand, palpate the area over the port to stabilize the port and locate the center.
(8) With other hand, insert the non-coring needle into the center of the port with firm, steady pressure until you feel the needle reach the back of the port. Do not rock the non-coring needle back and forth in the port.

(9) Aspirate 5 mL of blood and/or heparinized solution and discard. If unable to aspirate blood, verify needle position by gently pushing the needle farther against the backstop of the port.

If you are still unable to aspirate blood or fluid, contact MEDICAL CONSULTATION prior to use.

(10) Flush with 5 mL NS/RL while assessing for swelling at the site. **Be sure there are no air bubbles in the syringe or tubing**. Do not force flush if resistance is met. Verify the non-coring needle position by gently pushing the needle further against the backstop of the port, and attempt to flush again.

(11) After assessing patency, clamp the tubing, and remove the syringe.

(12) Apply needleless injection cap, if available, and cleanse with alcohol.

(13) IV fluids, tubing, and connectors must be assembled and primed in the cleanest area possible with **all air eliminated** prior to connecting to the patient.

(14) Attach the completely flushed IV line, unclamp the needle tubing, and begin infusion of fluid/medication. NOTE: IV fluids may not infuse by gravity.

(15) Secure the non-coring needle with sterile 2x2 or 4x4 and tape or occlusive dressing, being careful not to tape over the insertion site.

(16) Tape or loop extension tubing to outside of dressing.

**f) PROCEDURE: TUNNELED AND NON-TUNNELED LINES**

TUNNELED LINES (e.g., Hickman®, Groshong®, Broviac®, Cook®)
A tunneled central line is a catheter that is inserted under the skin of the chest, and the tip of the catheter is in a large vein just above the heart. A tunneled catheter has a cuff below the skin that the soft tissue grows into, reducing the risk of dislodgement and infection. These can be single or multiple-lumen catheters.

NON-TUNNELED LINES: PICC and MLC (e.g., Cook®, Neo-PICC®)
A PICC (Peripherally Inserted Central Catheter) line is a thin catheter that is inserted into one of the large veins, usually in the arm near the bend of the elbow, but may be in the neck or a lower extremity, and is threaded in a large vein just above the heart. A MLC (Mid-Line Catheter) is a thin peripheral catheter that is inserted into a large vein in the elbow and ends in the vein before the shoulder. Both of these catheters have a very small lumen and are considered “low volume lines” and not appropriate for volume resuscitation.

(1) Explain the procedure to the patient whenever possible.

(2) Obtain assistance as needed.

(3) Position the patient supine.

(4) Using a 10 mL syringe or larger, draw up 5 mL flushes with NS/RL. **Be sure there are no air bubbles in the syringe.** Attach a stopcock if available.
**NOTE:** 10 mL syringes are used because they have lower pressure when flushing fluids than smaller volume syringes (1 mL, 3 mL, or 5 mL). The smaller volume syringes may deliver enough pressure to break the catheter.

(5) Use sterile latex-safe gloves.

(6) If multiple lumens or ports, determine from patient/family which catheter is most appropriate for use, if possible, or refer to the EIF Form. This is usually the **white** port.

(7) Clean the existing cap on catheter with alcohol for 30 seconds.
(8) Clamp all lines with special clamps that do not have teeth, which might damage the catheter.
(9) Access the appropriate catheter port with a 10 mL syringe.
(10) Unclamp the catheter line to be accessed and aspirate 5 mL of blood/heparinized solution and discard to confirm placement and access patency. Delete this step if less than 2 Fr PICC catheter, as this may damage the catheter (the lumen is very small and the catheter wall may collapse and any blood in the catheter will form a clot).
**NOTE:** Contact MEDICAL CONSULTATION if unable to aspirate blood/fluid, or less than 2 Fr catheter.
(11) Reclamp the catheter any time you are changing lines or syringes.
Remember that regular clamps may damage the central line tubing.
(12) Attach the flush syringe and unclamp.
(13) Flush with 5 mL NS/RL. ***Be sure there are no air bubbles in the syringe or tubing.***
(14) Clamp this line again with the special clamp.

# Procedures – AIRWAY MANAGEMENT: BAG-VALVE-MASK VENTILATION



## a) PURPOSE

(1) Bag-valve-mask (BVM) ventilation is the technique of providing rescue breathing for patients with inadequate respiratory effort or cardiac arrest. Patients in respiratory failure may respond to BVM ventilation and not require endotracheal intubation.
(2) A BVM may also be used to administer inhaled medications for patients with severe respiratory failure.

## b) INDICATIONS

(1) Inadequate respiratory rate

| | | | |
|---|---|---|---|
| (a) | Adult | less than | 8 |
| (b) | Adolescent (13–18 years of age) | less than | 12 |
| (c) | Child (1–12 years of age) | less than | 16 |
| (d) | Infant/Toddler (less than 1 year of age) | less than | 20 |

(2) Inadequate respiratory effort
   (a) Absent or diminished breath sounds
   (b) Paradoxical breathing (chest and abdomen moving in opposite directions)
   (c) Cyanosis or oxygen saturation less than 90% on 100% oxygen by nonrebreather with the exception of patients with chronic hypoxemia
(3) Symptomatic Bradycardia

| | | |
|---|---|---|
| (a) | Adult/Adolescent (greater than 13 years of age) | Heart rate less than 60 |
| (b) | Child (1–12 years of age) | Heart rate less than 80 |
| (c) | Infant (less than 1 year of age) | Heart rate less than 100 |

(4) Cardiac arrest
(5) Altered mental status
   Glasgow Coma Scale of 8 or less

## c) CONTRAINDICATIONS

None

## d) POTENTIAL ADVERSE EFFECTS / COMPLICATIONS

(1) Gastric distension
(2) Vomiting
(3) Increased intracranial pressure as a result of increased vagal stimulation if mask applied over the patient's eyes

## e) PRECAUTIONS

(1) Have suction available since vomiting may occur.
(2) Use an appropriate size airway adjunct with BVM.

(3) Use an appropriate size mask to avoid pressure over the eyes (pediatric patient), which may cause vagal stimulation.
(4) For single clinician BVM use the "E-C clamp" technique to achieve an adequate seal and avoid pressure on the soft tissues of the face or neck: Place the third, fourth, and fifth fingers along the jaw to provide a chin lift (forming an E); use the thumb and index finger to hold the mask on the child's face (forming a C).
(5) If the patient does not have adequate chest rise and breath sounds with BVM, consider the following interventions:
  (a) Use 2-hand jaw lift and oral airway to relieve tongue obstruction.
  (b) Use a larger bag to increase the volume of air delivered into the patient.
  (c) Evaluate and treat the patient for gastric distension. Clinicians may manually decompress the stomach and/or open an existing gastric tube or button and/or place NG or OG tube.

### f) SUGGESTED SIZES FOR RESUSCITATION MASKS

| Age | Mask Size |
|---|---|
| Premature infants | Neonatal |
| Newborn to 1 year | Infant |
| 1–4 years | Toddler |
| 5–12 years | Pediatric |
| Greater than 13 years of age | Small adult |
| Adult | Adult |

### g) SUGGESTED SIZES FOR RESUSCITATION BAGS

| Age | Bag Size |
|---|---|
| Infant to less than 1 year of age | Infant (450–500 mL) |
| Child 1-12 years | Pediatric (750 mL) |
| Adolescent/Adult | Adult (1,000–1,200 mL) |

# Procedures – AIRWAY MANAGEMENT: CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)



## a) INDICATIONS

(1) Respiratory distress or failure, due to cardiogenic pulmonary edema or COPD/ asthma, in which the patient demonstrates spontaneous respirations and a patent, self-maintained airway
(2) Patients who are 13 years of age or older
(3) Exception: EMT may transport a patient who is chronically on CPAP who is going for routine medical care and has in attendance a patient provided attendant who can manage the patient's own CPAP.

ALERT

CLINICIAN MUST ASSURE THAT THE CPAP MASK FITS THE PATIENT APPROPRIATELY.

## b) CONTRAINDICATIONS

(1) Circumstances in which endotracheal intubation or a surgical airway is indicated to secure a patent airway
(2) Facial deformity or trauma which prevents the use of the device
(3) Patient has significantly decreased level of consciousness or an inability to protect their airway
(4) Patient has a tracheostomy
(5) Patient is vomiting
(6) Circumstances in which the patient does not improve or continues to deteriorate despite CPAP administration
(7) Known intolerance for noninvasive airway procedures (CPAP)

## c) PROCEDURE

(1) Assure patent airway.
(2) Administer 100% $O_2$ via appropriate delivery system.
(3) Perform appropriate patient assessment, including obtaining vital signs, pulse oximeter ($SpO_2$) reading, and cardiac rhythm.
(4) Apply CPAP device per manufacturer's instructions.
(5) Continuously reassess the patient.
(6) Monitor continuous pulse oximetry.
(7) Monitor continuous $ETCO_2$ with nasal prongs (if available).
(8) Follow the appropriate set of standing orders for continued treatment.
(9) Contact medical control as soon as possible to allow for prompt availability of hospital CPAP equipment and respiratory personnel.

ALERT

FOR CIRCUMSTANCES IN WHICH THE PATIENT DOES NOT IMPROVE OR CONTINUES TO DETERIORATE DESPITE CPAP AND/OR MEDICATIVE THERAPY, TERMINATE CPAP ADMINISTRATION AND PERFORM BVM VENTILATION AND ENDOTRACHEAL INTUBATION IF NECESSARY.

CPAP MAY BE CONSIDERED FOR NON-CARDIOGENIC PULMONARY EDEMA.

## a) INDICATIONS

To provide ventilation and oxygenation to a patient with a compromised airway, including:

(1) Patient without a gag reflex and unable to maintain own airway
(2) Patients who cannot be intubated following the administration of paralytic medication
(3) Pediatric patients; EGA is preferred over endotracheal tube placement for pediatric patients

## b) CONTRAINDICATIONS

(1) Responsive patients with an intact gag reflex
(2) Known esophageal disease or ingestion of caustic substances

## c) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

(1) The EGA does not protect against the effects of regurgitation and aspiration.
(2) High airway pressures may divert gas either to the stomach or to the atmosphere.
(3) A potential complication of the King LTS-D airway is inadvertent tracheal intubation. After placement, perform standard checks for breath sounds and utilize an appropriate carbon dioxide ($ETCO_2$) monitor.

## d) PROCEDURE

**King LTS-D**

(1) Inspect all components of the LTS-D for visible damage.
(2) Select appropriately sized LTS-D airway as specified by manufacturer.
(3) Test cuffs by injecting the maximum volume of air (by size) as specified by manufacturer and lubricate with water-soluble jelly.
(4) Maintain cervical immobilization (if indicated) and lift tongue and jaw upward with one hand. Ideal position of the head is in the “sniffing position”; however, the LTS-D airway can be inserted with the head in neutral position.
(5) Insert LTS-D airway using a lateral approach and advance the tip behind the base of the tongue while rotating the tube back to midline so the blue line faces the patient’s chin.
(6) Without exerting excessive force, advance tube until base of connector is aligned with teeth and gums.
(7) Inflate cuff and ventilate patient. Gently withdraw the tube until ventilation becomes easy and free-flowing.
(8) Adjust cuff inflation to obtain a seal of the airway.
(9) Ventilate and evaluate for appropriate placement (bilateral lungs sounds, absence of gastric sounds, chest rise, $ETCO_2$ waveform/value, oxygen saturation).
(10) Once effective ventilation has been confirmed, secure the LTS-D and continue to monitor oxygen saturation and ventilate to desired $ETCO_2$ level.

**Supraglottic Airway (LMA®, Air-Q®, iGel®)**

(1) Inspect all components of the supraglottic airway for damage.
(2) Select appropriately sized supraglottic airway as per manufacturer's specifications.
(3) Lubricate with water-soluble jelly per manufacturer's specifications.
(4) Maintain cervical immobilization, if indicated, and lift tongue.
(5) Inflate cuff, if applicable, per manufacturer specifications.
(6) Ventilate and evaluate for appropriate placement (bilateral lungs sounds, absence of gastric sounds, chest rise, $ETCO_2$ waveform/value, oxygen saturation).
(7) Adjust cuff inflation (if applicable) and position as needed to obtain a seal of the airway.
(8) Once effective ventilation is confirmed, secure the supraglottic airway and continue to monitor oxygen saturation and ventilate to desired $ETCO_2$ level.

**Inability to Ventilate with EGA Devices**

If unable to achieve adequate ventilation using an EGA, remove the device and resume BVM ventilation with an NPA/OPA, then attempt placement again. If unable to place the EGA a second time, repeat the steps above and consider obstructed airway maneuvers, if not already performed, and refer to *Cricothyroidotomy* protocol.

**EMSOP Requirements**

An EMSOP must carry at least one type of extraglottic airway referenced in this protocol in sizes appropriate for all patients from newborn through adult.

### a) PURPOSE

A naso/orogastric tube is passed to relieve the gastric distension or pressure in an effort to reduce the risk of aspiration and increase the intrathoracic volume.

### b) INDICATIONS

(1) All pediatric intubated patients
(2) Pediatric patients with gastric distension complicating Bag Valve Mask Ventilation
(3) Intubated adult patients exhibiting signs and symptoms of gastric distension that compromise ventilation or circulation

### c) CONTRAINDICATIONS

(1) History of esophageal varices
(2) Esophageal or gastric surgery within the past 6 weeks
(3) Anatomical deformity complicating nasal passage of the tube (nasogastric)
(4) Suspected basilar skull fracture

### d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

(1) Tracheal intubation with gastric tube
(2) Epistaxis
(3) Coiling or knotting of tube in the stomach or esophagus
(4) Trauma to the nose, esophagus, or stomach
(5) Triggering vomiting
(6) Intracranial placement of gastric tube in patients with unidentified skull fractures

### e) PRECAUTIONS

Have suction available since vomiting may be induced.

# Procedures – AIRWAY MANAGEMENT: NASOTRACHEAL INTUBATION



**PARAMEDIC ONLY**

## a) PURPOSE

Nasal intubation is the technique of passing an endotracheal tube through the nose and pharynx into the trachea. This is done without using a laryngoscope to visualize the vocal cords (blind technique). The procedure is limited to breathing patients in whom oral intubation is difficult.

## b) INDICATIONS

(1) Use is primarily for hypoxemic CHF and COPD patients and is allowed for closed head injury patients with clenched teeth
(2) An oxygen saturation of less than or equal to 90% in a patient on 100% oxygen by face mask and respiratory distress
(3) A respiratory rate of 8 or less per minute or 35 or greater per minute
(4) A Glasgow Coma Score of 8 or less, **or**
(5) Loss of gag reflex

## c) CONTRAINDICATIONS

(1) Patient receiving anticoagulants, such as Coumadin (warfarin)
(2) Patient with upper airway hemorrhage, significant mid-facial trauma, or laryngeal trauma
(3) Patient with cerebral spinal fluid leakage or evidence of basilar skull fracture

## d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

(1) Epistaxis
(2) Intubation of the esophagus
(3) Trauma to the oral pharynx, vocal cords, esophagus, or trachea
(4) Right mainstem bronchus intubation
(5) Vomiting
(6) Increased intracranial pressure, as result of increased vagal stimulation
(7) Pneumothorax/tension pneumothorax from high pressure ventilation or underlying preexisting trauma
(8) Intracranial tube placement through basal skull fracture

## e) PRECAUTIONS

(1) Topical anesthesia (lidocaine 4% spray or gel) should be applied to both nares to minimize discomfort.
(2) Confirmation of ET placement
  (a) Utilization of the Beck Airway Airflow Monitor (BAAM) device when available
  (b) Auscultation of all lung fields to confirm air exchange

(c) Auscultation of the epigastrium to deny disturbance of gastric fluids upon ventilation
(d) Observation of bilateral expansion of the thorax
(e) $ETCO_2$ detection device required. A colorimetric device may be used for initial confirmation, but should be converted to waveform capnography as soon as practical.
(f) The esophageal detection device
(g) Documentation of tube depth at the nares
(h) Other clinical signs of improved perfusion and ventilation (e.g., pupillary response, skin color, etc.)

(3) Nasal intubation may require facilitation with sedation. When hypovolemia is unlikely and hypotension is not present, morphine/fentanyl or midazolam, or a combination of both, may be given by direct medical consultation to achieve mild sedation.

# Procedures – AIRWAY MANAGEMENT: NEEDLE DECOMPRESSION THORACOSTOMY (NDT)



## a) PURPOSE

Needle Decompression Thoracostomy is the procedure of introducing a needle/catheter into the pleural space of the chest to provide temporary relief for the patient suffering from a tension pneumothorax.

## b) INDICATIONS

(1) Patients who are assessed to have a life-threatening tension pneumothorax in extremis with absent lung sounds AND clear evidence of hemodynamic compromise to include hypotension (systolic blood pressure less than 100 mmHg), and/or arrest

(2) If traumatic arrest is suspected due to multi-system blunt trauma, or due to penetrating neck, chest, or abdominal trauma, bilateral needle decompression should be performed. Once catheters are placed, **do not remove**.

## c) CONTRAINDICATIONS

Patients whose tension pneumothorax can be relieved by the removal of an occlusive dressing from an open chest wound

## d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

(1) Intercostal vascular or nerve injury
(2) Pneumo/hemothorax
(3) Direct damage to the lung
(4) Pericardial/cardiac injury
(5) Infection

## e) PRECAUTIONS

(1) Reassessment of catheter patency
(2) Second decompression may need to be performed if reaccumulation, catheter occlusion, or dislocation is evident.

## f) PROCEDURE

(1) For adult patients and pediatric patients 15 years of age and older, use a needle/catheter with a minimum length of 3.25 inches and a minimum diameter of 14 gauge (with optional add-on flutter valve attached)
   (a) Insert the catheter in the fifth (5th) intercostal space at the anterior axillary line
   (b) If the fifth (5th) intercostal space site is not available, use the second (2nd) intercostal space at the mid-clavicular line on the anterior chest wall

(2) For pediatric patients between 4 and 15 years of age, use a 3.25 inch needle/catheter with a diameter of 14 gauge
   (a) Insert the catheter in the second intercostal space at the mid-clavicular line on the anterior chest wall

(3) For pediatric patients less than 4 years of age, use a standard 16 gauge IV catheter (generally 1.16, 1.2, or 1.25 inches)
   (a) Insert the catheter in the second intercostal space at the mid-clavicular line on the anterior chest wall

### a) PURPOSE

The attempted correction of a foreign-body airway obstruction through direct laryngoscopy should be accomplished only by a Maryland licensed CRT or paramedic. This is accomplished after the ALS clinician has determined (by noting repeated unsuccessful attempts at dislodging the object by applying the standard basic method of foreign body removal by BLS clinicians or the ALS clinician) that the object cannot be dislodged by these means. The patient must be unconscious and supine before this method is attempted.

### b) INDICATIONS

Patient must be unconscious due to foreign body upper airway obstruction that has not resolved with standard basic methods for foreign body removal.

### c) CONTRAINDICATIONS

None

### d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

Trauma to the oral pharynx, vocal cords, esophagus, or trachea

### e) PRECAUTIONS

It is important to distinguish the foreign body from portions of the patient's anatomy.

# Procedures – AIRWAY MANAGEMENT: OROTRACHEAL INTUBATION



## a) PURPOSE

(1) Orotracheal intubation consists of passing an endotracheal tube through the oropharynx, into the trachea, using direct or video laryngoscopy (or digital manipulation) to provide ventilatory support for a patient.
(2) Specific video laryngoscopy equipment should be FDA-approved and authorized by the EMSOP medical director.

## b) INDICATIONS

(1) Cardiac arrest
(2) Respiratory arrest, patient without gag reflex
(3) Deep coma, patient without gag reflex
(4) Patient in extremis, in severe respiratory distress with extremely poor air exchange, or agonal respirations (gag reflex may be present)

## c) CONTRAINDICATIONS

Upper airway obstruction due to foreign objects

## d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

(1) Intubation of the esophagus
(2) Trauma to the oral pharynx, vocal cords, esophagus, or trachea
(3) Right mainstem bronchus intubation
(4) Vomiting
(5) Increased intracranial pressure as a result of increased vagal stimulation
(6) Pneumothorax/tension pneumothorax from high pressure ventilation or underlying preexisting trauma

## e) PRECAUTIONS

(1) When the patient cannot be intubated (following no more than two tracheal intubation attempts), avoid future intubation attempts until the patient reaches the hospital, unless otherwise directed by the physician.
(2) Confirmation of ET placement
As it has been determined that no single method of assessment is 100% reliable, the position of the endotracheal tube must be assessed to be properly in the trachea by all means available to the EMS clinician. The following methods may be used to confirm proper placement of the endotracheal tube:
(a) Visualization of the ET tube protruding adequately past the vocal cords and into the trachea
(b) Auscultation of all lung fields to confirm adequate air exchange
(c) Auscultation of the epigastrium to deny disturbance of the gastric fluids upon ventilation

(d) Observation of the bilateral expansion of the thorax
(e) $ETCO_2$ detection device required. A colorimetric device may be used for initial confirmation, but should be converted to waveform capnography as soon as practical.
(f) The esophageal detection device
(g) Documentation of tube depth at the lip
(h) Other clinical signs of improved perfusion and ventilation (e.g., pupillary response, skin color, etc.)

(3) Once initial placement is confirmed:
(a) The tube must be adequately secured
(b) The patient must be prepared for transport in such a fashion as to minimize movement of the head and neck.

(4) Placement of the tube should be verified by all means possible (as in (2) above) and as often as possible as part of the clinicians' ongoing assessments. It has been further noted that flexion of the neck can cause 3–5 cm displacement of the ET tube dislodging the tube from the trachea. At a minimum this reconfirmation should occur
(a) Once the patient is prepared for transport,
(b) Anytime the patient is moved,
(c) Anytime dislodgment of the tube is suspected, and
(d) When responsibility for care is transferred to any other clinician.

(5) During routine reporting procedures, documentation of proper placement should include which methods were utilized and at which points, in the care of the patient, verification was accomplished.

(6) Maintain neutral alignment of head and neck with cervical stabilization when intubating trauma patients.

(7) The Blind Digital method may be utilized for intubation of a patient in whom hyper-extension of the cervical spine may be contraindicated. It may also benefit patients with severe facial trauma. However, it must be emphasized that this can be a diffi-

cult procedure, and the clinician must be certain that the patient cannot bite.

**f) SUGGESTED SIZES FOR ENDOTRACHEAL TUBES AND SUCTION CATHETERS**

## Equipment Sizes

| AGE | ORAL AIRWAY | BAG-VALVE-MASK | ETT SIZE | ETT BLADE | SUCTION CATHETER | GASTRIC TUBE |
|---|---|---|---|---|---|---|
| Premature | 0 | NEONATAL | 2.5–3.0 | 0 | 6F | 5F |
| Newborn | 0 | NEONATAL | 3.0–3.5 | 0–1 | 6F | 5–8F |
| 3 mo. | 1 | INFANT | 3.5 | 1 | 6–8F | 5–8F |
| 6 mo. | 1 | INFANT | 3.5–4.0 | 1 | 8F | 8F |
| 1 yr. | 1 | INFANT | 4.0 | 1 | 8F | 8F |
| 2 yrs. | 2 | CHILD | 4.0–4.5 | 1–2 | 8–10F | 8–10F |
| 3 yrs. | 2 | CHILD | 4.5 | 2 | 10F | 10F |
| 4 yrs. | 3 | CHILD | 4.5–5.0 | 2 | 10F | 10–12F |
| 6 yrs. | 4 | CHILD | 5.0–5.5 | 2 | 10F | 12–14F |
| 8 yrs. | 4 | CHILD | 5.5–6.0 | 2 | 10–12F | 14F |
| 10 yrs. | 5 | CHILD | 5.5–6.5 | 3 | 12F | 14F |
| 12 yrs. | 5 | ADULT SMALL | 6.5–7.0 | 3 | 12F | 14–18F |
| 14 yrs. | 5 | ADULT | 6.5–7.5 | 3 | 12–14F | 16–18F |
| ADULT | 5 | ADULT | 7.0–10.0 | 4 | 12–14F | 16–18F |

ALERT

ENDOTRACHEAL TUBE SELECTION FOR A CHILD SHOULD BE BASED ON 16 PLUS CHILD'S AGE DIVIDED BY FOUR [ (16 + YEAR) / 4 = TUBE SIZE ] OR SIZE RECOMMENDED BY LENGTH-BASED RESUSCITATION TAPE (E.G., BROSLOW TAPE).

AGE IN THE CHART IS A QUICK REFERENCE. GIVEN INDIVIDUAL VARIATIONS IN AIRWAY SIZE, MAY CONSIDER ONE TUBE SIZE LARGER AND ONE TUBE SIZE SMALLER. USE A LENGTH-BASED TAPE IF AVAILABLE.

**a) PURPOSE**

Changing a tracheostomy tube may be required to reestablish a patent airway in patients who present with respiratory distress secondary to tracheostomy tube occlusion or obstruction that has not been relieved through suctioning.

**b) INDICATIONS**

(1) Inability to ventilate with BVM
(2) Ineffective spontaneous ventilations (poor chest rise, decreased breath sounds bilaterally)
(3) Hypoxia, cyanosis, or decreased $O_2$ saturation levels, not relieved by suctioning
(4) Increased work of breathing
(5) Altered mental status secondary to hypoxia

**c) CONTRAINDICATIONS**

None

**d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

(1) Inability to reinsert a tracheostomy tube
(2) Edema at stoma site
(3) Inability to maintain adequate chest rise and fall with assisted ventilations due to air leak around uncuffed tracheostomy tube

ALERT

PATIENTS GREATER THAN EIGHT YEARS OF AGE WHO REQUIRE ASSISTED VENTILATIONS WILL NEED TO HAVE A CUFFED TUBE INSERTED TO PREVENT AIR LEAK AROUND THE TUBE AND ENSURE ADEQUATE CHEST RISE. IF AN APPROPRIATE SIZED CUFFED TRACHEOSTOMY TUBE IS NOT AVAILABLE, THEN ALS CLINICIANS MAY USE AN ET TUBE.

**e) PROCEDURE**

(1) Two clinicians or clinician and trained family member
(2) Use latex-safe sterile gloves and equipment.
(3) Position patient with the head and neck hyperextended to expose the tracheostomy site.
(4) Explain procedure to patient/family.
(5) Have new tracheostomy tube nearby.
(6) To remove the tracheostomy tube:
    (a) If a double cannula tracheostomy tube is in place, attempt to change inner cannula first and reassess the patient to see if the obstruction is relieved. If the patient continues to have respiratory distress, change the entire tracheostomy tube. If cuffed, deflate using a 10 mL syringe.
    (b) Carefully cut the tracheostomy ties.
    (c) Remove the tracheostomy tube, outward and backward towards the chest.
    (d) Lubricate the new tracheostomy tube with lubricating jelly or saline/water.
    (e) Insert new tracheostomy tube into stoma, inward and downward towards the lungs.

**NOTE: STOP** IF YOU MEET RESISTANCE (see (7) below).

(f) If cuffed tracheostomy tube is used, once the tube has been inserted, inflate the cuff with an appropriate amount of air to avoid air leak around the tube (1–3 mL for pediatric tubes and 5–10 mL for adult tubes).
(g) Reassess the patient.
(h) With good chest rise and fall and improved skin color, secure the tracheostomy tube with ties or Velcro® at the back of the neck, so only one fingertip fits between the neck and the ties.

(7) If you meet resistance inserting the tracheostomy tube, do NOT force the tube into the stoma. Request ALS rendezvous, if appropriate. Assess the patient:
(a) Reposition the patient, hyperextend the neck area.
(b) Reoxygenate using BVM to stoma site, with infant mask and appropriate size reservoir bag for the patient's size. Assess for chest rise and fall.
(c) If inadequate rise and fall of the chest, AND the patient has not had a laryngectomy, attempt BVM orally while placing an occlusive dressing over the stoma site. If a laryngectomy patient, you will only be able to ventilate with BVM at the stoma site.
(d) Attempt to insert a half-size smaller tracheostomy tube after lubricating with lubricating jelly or saline/water.
(e) Proceed with (6) f-g-h above.
(f) If you meet resistance, reassess the patient. Reoxygenate as needed.
(g) Insert a suction catheter through the tracheostomy tube, and use the suction catheter as a guide to insert the tracheostomy tube.
(h) Proceed with (6) f-g-h above.
(i) If ALS, attempt to insert a similar sized endotracheal tube into the stoma. If cuffed endotracheal tube is used, inflate the cuff with an appropriate amount of air to avoid air leak around the tube (1–3 mL for pediatric tubes and 5–10 mL for adult tubes).
(j) If ALS and unable to insert the ET tube into the stoma, AND the patient has not had a laryngectomy, attempt to intubate orally and apply an occlusive dressing over the stoma site.
(k) If you continue to have problems, STOP, consult the Base Station and continue BVM ventilations orally, or BVM to tracheostomy site ventilations if a laryngectomy patient, while en route to the closest appropriate hospital.

**a) PURPOSE**

Tracheostomy suctioning may be required to maintain a patent airway in patients who present with respiratory distress secondary to tracheostomy tube occlusion or obstruction.

**b) INDICATIONS**

(1) Increased secretions from tracheostomy site or a mucous plug
(2) Hypoxia, cyanosis, or decreased oxygen saturation levels
(3) Increased work of breathing
(4) Altered mental status secondary to hypoxia

**c) CONTRAINDICATIONS**

None

**d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

(1) Bleeding at tracheal stoma site
(2) Dislodgment of tracheostomy tube
(3) Exaggerated cough reflex with introduction of saline
(4) Increased hypoxia/respiratory distress
(5) Infection

**e) PROCEDURE**

(1) Two clinicians or clinician and trained family member
(2) Use latex-safe sterile gloves and equipment.
(3) Position patient with the head and neck hyperextended to expose the tracheostomy site.
(4) Pre-oxygenate patient at the tracheostomy site:
    (a) NRB mask if patient has adequate effective spontaneous respirations
    (b) BVM if ventilator-dependent or there are ineffective spontaneous respirations
(5) Select appropriately sized suction catheter (2 x internal diameter of tracheostomy tube).
(6) Insert suction catheter:
    (a) Measure from the tracheostomy site to the sternal notch.
    **OR**
    (b) Insert until there is a cough reflex.
(7) Apply suction ONLY as the catheter is withdrawn, rotating the catheter in a twisting motion between thumb and finger.
(8) Suction for maximum of 10 seconds.
(9) Reoxygenate and reevaluate patient.
(10) Repeat suction procedure as needed (for thick secretions instill 3–5 cc sterile saline/water prior to repeat suctioning).

# 12.12 Procedures – AIRWAY MANAGEMENT: VENTILATORY DIFFICULTY SECONDARY TO BUCKING OR COMBATIVENESS



**a) INDICATIONS**

Patients successfully intubated with an endotracheal tube, an approved alternative airway device, or cricothyroidotomy, for whom the ability to provide manual or mechanical ventilation is impaired secondary to bucking or combativeness

**b) CONTRAINDICATIONS**

Unsecured airway

**c) PROCEDURE**

(1) Ventilatory difficulty secondary to bucking or combativeness in intubated patients. *Ketamine* may be preferred for patients who have hypotension or possible hypovolemia, or if ventilatory difficulty is thought to be the result of pain response.
   (a) Dose: Administer 2 mg/kg IVP/IO over 60 seconds. May repeat 2 additional doses of 1 mg/kg for IVP/IO every 10-15 minutes to a total of 3 doses as needed. Additional doses require medical consultation.
   (b) If the patient is on a ventilator and an IV infusion pump is available, consider a *ketamine* infusion. (See Optional Supplemental Protocol *IV Infusion Pump Pharmacology*)

*(2)* *Midazolam* up to 0.1 mg/kg IVP/IO/(over 1–2 minutes)/IM, titrated to abate bucking and relax ventilation while maintaining systolic blood pressure greater than 90 mmHg (110 mmHg if injuries include a suspected head injury). Maximum single dose is 5mg.

(3) If ventilatory difficulty is thought to be the result of pain response, opioid may be used per *Pain Management* protocol in addition to or instead of *midazolam*: Titrate to abate bucking and relax ventilation while maintaining systolic BP greater than 90 mmHg.

(4) Continue to monitor oxygen saturation and ventilate to desired $ETCO_2$ level.

(5) Obtain on-line medical direction if further problems present.

*(6)* *Midazolam* up to 0.05 mg/kg IVP over 1–2 minutes, titrated to abate bucking and relax ventilation while maintaining systolic BP: greater than 60 in neonates, 70 in infants, and [70 + (2 x years) = systolic BP] for patients greater than 1 year of age. Maximum single dose is 5 mg.

(7) If ventilatory difficulty is thought to be the result of pain response, opioid may be used per *Pain Management* protocol in addition to or instead of *midazolam*: Titrate to abate bucking and relax ventilation while maintaining systolic BP: greater than 60 in neonates, 70 in infants, and [70 + (2 x years) = systolic BP] for patients greater than 1 year of age.

(8) Continue to monitor oxygen saturation and ventilate to desired $ETCO_2$ level.

(9) Obtain on-line medical direction if further problems present.

**a) PURPOSE**

(1) Manual ventilation using a bag-valve-mask (BVM) or mechanical (machine) ventilation can be an effective method for managing a patient in the prehospital environment when performed correctly. Ventilatory management is important at both the BLS and ALS levels.

(2) Special considerations such as etiology of respiratory failure and method of achieved airway management, including intubation (e.g., rapid sequence intubation), may require the advanced life support clinician to provide additional care.

**b) INDICATIONS**

(1) Any condition requiring assisted or artificial ventilation with a bag-valve-mask or mechanical (machine) ventilation

(2) All patients will require manual ventilation after the placement of an advanced airway. Inadequate respiratory rate may be secondary to underlying respiratory pathology or the result of pharmacologic intervention secondary to medications used in rapid sequence intubation.

**c) CONTRAINDICATIONS**

None

**d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

(1) Gastric distension, vomiting, and/or aspiration
(2) Hypoxemia
(3) Secretions and tube/bag obstruction
(4) Barotrauma
(5) Patient agitation
(6) Equipment failure

**e) PROCEDURE/PRECAUTIONS:**

(1) Have suction available and ensure a patent airway using a BLS airway adjunct (OPA or NPA).

(2) Rate of **initial** ventilation by single hand bag-valve technique should generally be the following:
   (a) For patients 13 years of age and older, deliver 1 breath every 6 seconds (10 breaths per minute).
   (b) For neonates until the 13th birthday, deliver 1 breath every 3 seconds (20 breaths per minute).
   (c) For newly born patients (first hour after delivery), refer to the *Universal Algorithm for the Newly Born*.

(3) AVOID hyperventilating unless patient exhibits signs of brainstem herniation (e.g., unequal pupils, posturing). Hyperventilation is associated with increased mortality.

(4) In the absence of contraindications (e.g., CPR or spinal trauma), consider elevating the head of the bed to 30 degrees.

(5) Continuous pulse oximetry shall be used. If a sudden drop in $SpO_2$ is observed, assess airway patency and consider obstruction (e.g., tongue, vomitus, blood), poor seal around BVM, and flow of oxygen being administered (LPM).

(6) A gastric tube should be considered for gastric decompression whenever distention is caused by BVM ventilation. Gastric distention can reduce effectiveness of ventilations.

(7) Waveform capnography and patient-specific considerations:
   (a) Continuous $ETCO_2$ shall be used whenever an advanced airway has been placed.
   (b) Continuous $ETCO_2$ monitoring is encouraged for all other manually-ventilated patients.
   (c) The waveform shape and reading can contribute to an understanding of the underlying pathology.
   (d) Waveform capnography is utilized to optimize manual ventilation. Deliver ventilations to achieve a target $ETCO_2$ level of 35–40 mmHg if patient has a pulse.
   (e) $ETCO_2$ can be used to assess trends during a cardiac arrest and may contribute to understanding the pathology. A sudden substantial increase in $ETCO_2$ may indicate ROSC.
   (f) Hypercapnia is seen in patients experiencing respiratory failure as a result of obstructive disease, such as asthma and COPD. Chronic baseline hypercapnia should be considered when ventilating to a target $ETCO_2$.
   (g) A target $ETCO_2$ of 30–35 mmHg should be used for the rare patient who exhibits signs of brainstem herniation. Lower $ETCO_2$ has been associated with increased mortality.

(8) If advanced airway is placed and patient does not have adequate chest rise, absent or significantly diminished breath sounds, or decreased $SpO_2$ or abnormal $ETCO_2$ levels, consider the **DOPES** mnemonic:
   **"D":** Is the tube **d**isplaced? Assess for bilateral breath sounds and reassess tube depth and compare to initial depth noted after insertion.
   **"O":** Is an **o**bstruction present? Suction the tube with a flexible suction catheter.
   **"P":** Are there signs of a tension **p**neumothorax? If present, perform needle decompression thoracostomy.
   **"E":** Is there an **e**quipment malfunction? Check oxygen flow in tubing and level in portable cylinder, determine whether $SpO_2$ and $ETCO_2$ devices are working correctly, and ensure the cuff is adequately inflated.
   **"S":** If history of asthma or COPD is known, consider extending the interval between ventilations to avoid **s**tacked ventilations.

(9) Consider using a positive end expiratory pressure (PEEP) valve on the BVM, especially if the patient is hypoxemic (start at 5 cm $H_2O$).

(10) If combativeness or bucking prevents the delivery of adequate ventilations, management shall be guided by the *Ventilatory Difficulty Secondary to Bucking* protocol.

### a) INDICATIONS

Sudden cardiac arrest (patients with no pulse and not breathing).

| | |
|---|---|
| Neonate (1 hour to 28 days of life) to less than 1 year of age | Manual defibrillator preferred. (If unavailable, an AED with pediatric capability is preferred over an adult AED.) |
| 1 year of age to 8 years of age | AED with pediatric capability, using the pediatric capability, is preferred over an adult AED. |
| Child 8 years of age or greater | Adult AED |

### b) CONTRAINDICATIONS

Patient exhibiting signs of life
Newly born patients (up to one hour after birth)

ALERT USE OF THE AED IN THE MANUAL MODE IS RESERVED FOR ALS.

### c) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

(1) Burns to skin
(2) Deactivation of patient's implanted pacemaker
(3) Injury to patient, self, and/or bystanders

### d) PRECAUTIONS

(1) Make sure the patient and the environment are dry.
(2) Avoid placing pads over cardiac pacemakers/defibrillators or nitroglycerin patches.
(3) DO NOT touch the patient while the AED is analyzing the patient or discharging energy.
(4) ENSURE that no one is touching the patient when the shock button is pushed.
(5) Never defibrillate while moving the patient or when in a moving ambulance.

### e) PROCEDURE

(1) Initiate analysis of rhythm.
(2) If shock is indicated:
  (a) Ensure all individuals are clear of the patient.
  (b) Initiate shock to the patient.
  (c) Immediately perform 5 cycles of CPR between shocks, then initiate analysis of rhythm.
  (d) If patient remains pulseless, continue this cycle of CPR and shocks until the AED prompt states "no shock advised," or ROSC is achieved or ALS arrives or the patient is transported or the *Termination of Resuscitation* protocol is initiated.
(3) If shock is not indicated and the patient remains in cardiac arrest:
  (a) Perform 5 cycles of CPR.
  (b) Initiate analysis of rhythm.
  (c) If shock is indicated, see "If shock is indicated" section above.

(d) If shock is not indicated, continue CPR until ALS arrives or ROSC is achieved or the patient is transported or the *Termination of Resuscitation* protocol is initiated.

(4) If shock is not indicated and patient regains pulse, treat per *Return of Spontaneous Circulation* (ROSC) protocol.

**f) SPECIFIC DOCUMENTATION**

(1) Document the number of analyses and shocks delivered, times of assessments and treatments, and the patient's response to shocks/CPR. Specify the type of AED, location of AED, bystander and clinician contact, and the triggering event.
(2) If using an AED with EKG strip recorder, generate 2 recordings.
(3) Give one to the ALS clinician or hospital and attach the other to your patient care report.
(4) Record the name of the contact for accessing AED data download summary.
(5) Consider bringing the AED to the hospital for downloading.

### a) INDICATIONS

Hemodynamically unstable with life-threatening, rate-related signs and symptoms including hypotension, acutely altered mental status, signs of shock, ischemic chest discomfort/AMI, or acute heart failure.

### b) DOSAGE

(1) Adult
- (a) For SVT or VT or atrial flutter:
  - (i) Initial 100 J, or follow manufacturer's recommendations
  - (ii) Subsequent 200 J, 300 J, 360 J, or follow manufacturer's recommendations
- (b) For atrial fibrillation:
  - (i) Initial 200 J, or follow manufacturer's recommendations
  - (ii) Subsequent 300 J, 360 J, or follow manufacturer's recommendations

(2) Pediatric

Symptomatic tachydysrhythmias
- (a) Initial 0.5 J/kg; if the calculated joules setting is lower than the defibrillation device is able to deliver, use the lowest joules setting possible or obtain medical consultation.
- (b) Subsequent 1 J/kg; repeat at 2 J/kg

(3) If the patient exhibits ventricular fibrillation following emergency cardioversion, immediately turn off the synchronizer and defibrillate with appropriate delivered energy (200 to 360 J for adults and 2 to 4 J/kg for pediatric patients) and refer to defibrillation and/or other appropriate protocol.

### c) CONTRAINDICATIONS

Tachydysrhythmias due to digitalis toxicity

### d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

An unsynchronized shock can result in ventricular fibrillation.

**e) PRECAUTIONS**

(1) If the calculated joules setting is lower than the cardioversion device is able to deliver, use the lowest joules setting possible or obtain medical consultation.

(2) Adult pre-procedural sedation or analgesia:

(a) Patient may experience moderate to severe discomfort during cardioversion. Consider pre-medication by administering opioid or *ketamine* per *Pain Management* protocol.

**OR**

(b) Administer *midazolam* 0.1 mg/kg in 2 mg increments SLOW IVP over 1–2 minutes per increment, with maximum single dose 5 mg. (Reduce by 50% for patients 69 years or older.)

(3) Pediatric pre-procedural sedation or analgesia (with consult)

(a) Patient may experience moderate to severe discomfort during cardioversion. Consider pre-medication by administering opioid or *ketamine* per *Pain Management* protocol.

**OR**

(b) Administer *midazolam* 0.1 mg/kg in 2 mg increments SLOW IVP over 1–2 minutes per increment, with maximum single dose 5 mg.

### a) PURPOSE

Defibrillation delivers non-synchronized direct electric current to the myocardium of a patient exhibiting ventricular fibrillation or ventricular tachycardia without palpable pulses/blood pressure, with the intent to restore a perfusing cardiac rhythm.

### b) INDICATIONS

(1) Ventricular fibrillation
(2) Ventricular tachycardia without palpable pulse

### c) DOSAGE

(1) Adult – 13 years of age and older
  (a) Initial and subsequent energy: Deliver all shocks at the highest joule setting permitted by the device manufacturer (200 OR 360 J for most devices)

(2) Pediatric – less than 13 years of age
  (a) Initial delivered energy: 2 J/kg
  (b) Subsequent delivered energy at increasing dosage: 4 J/kg, 6 J/kg, 8 J/kg, to a maximum of 10 J/kg.

### d) CONTRAINDICATIONS

None

### e) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

(1) Burns to the skin
(2) Deactivation of patient's implanted pacemaker

### f) PRECAUTIONS

Ensure that no rescuers are touching the patient while delivering energy

# Procedures – ELECTRICAL THERAPY: EXTERNAL TRANSCUTANEOUS CARDIAC PACING



## a) PURPOSE

Non-invasive cardiac pacing, also referred to as external or transcutaneous pacing, involves the temporary application of externally applied electrodes to deliver an adjustable electrical impulse directly across an intact chest wall for the purpose of rhythmically stimulating the myocardium to increase the mechanical heart rate.

## b) INDICATIONS

(1) It is indicated for the treatment of hemodynamically compromised patients in settings where cardiac output is compromised due either to the complete failure of cardiac rhythm or to an insufficient rate of the patient's intrinsic pacemaker.

(2) Bradycardia (EKG other than second-degree Mobitz Type II or third-degree AV block)

(3) Second-degree Mobitz Type II and third-degree AV block with a systolic BP of less than 80 mmHg, or 80–100 mmHg with shock-like signs or symptoms

In the presence of Mobitz II and third-degree AV block, medical consultation is required for atropine administration.

(4) Pacing may be indicated in certain instances in which the heart rate is 60–75 BPM and shock-like symptoms persist. Pacing in these instances requires medical consultation from a physician

(5) Pediatric patients with profound symptomatic bradycardia unresponsive to optimal airway management, oxygenation, epinephrine, and atropine

## c) DOSAGE

Start pacemaker at age appropriate heart rate:

- Infant (less than 1 year): 120 beats per minute
- Child (1 through 12 years): 100 beats per minute
- Adult/Adolescent (13 years and greater): 80 beats per minute

Start milliamperes (m.a.) as low as possible and gradually increase m.a. until palpable pulse to confirm capture or 200 m.a.

ALERT

CONTINUE CHEST COMPRESSIONS FOR PEDIATRIC PATIENTS WHO REMAIN POORLY PERFUSED DESPITE PACEMAKER CAPTURE.

**d) CONTRAINDICATIONS**

(1) Non-witnessed cardiopulmonary arrest with asystole
(2) Patient not meeting blood pressure criteria

**e) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

(1) Adult pre-procedural sedation or analgesia. Patient may experience moderate to severe discomfort during pacing.
   (a) Administer opioid or *ketamine* per *Pain Management* protocol.
   **OR**
   (b) Administer *midazolam* 0.1 mg/kg in 2 mg increments SLOW IVP over 1–2 minutes per increment, with maximum single dose 5 mg. (Reduce by 50% for patients 69 years or older.)

(2) Pediatric pre-procedural sedation or analgesia (with consult). Patient may experience moderate to severe discomfort during pacing.
   (a) Administer opioid or *ketamine* per *Pain Management* protocol.
   **OR**
   (b) Administer *midazolam* 0.1 mg/kg in 2 mg increments SLOW IVP over 1–2 minutes per increment, with maximum single dose 5 mg. (Reduce by 50% for patients 69 years or older.)

**f) PRECAUTIONS**

When properly applied, chest compressions can be performed directly over the insulated electrodes while the pacer is operating.

# Procedures – GO-TEAM ACTIVATION



## a) PURPOSE

The University of Maryland Medical System, R Adams Cowley Shock Trauma Center (STC) maintains a deployable advanced surgical team (Go-Team) that includes an attending physician with surgical skills and an anesthetist capable of assisting EMS clinicians with the care of seriously injured patients when extrication times are anticipated to be more than 1 hour. On-scene incident commanders may request the Go-Team by contacting SYSCOM.

## b) INDICATIONS

The on-scene incident commander may contact SYSCOM and request the Go-Team for seriously injured patients with potentially life or limb threatening injuries when extrication times are anticipated to be more than 1 hour and who may require advanced resuscitative or surgical services that are beyond the scope of prehospital emergency services.

Examples include:

(1) During a prolonged extrication, assist rescue personnel with planning the type and pace of the rescue by assessing the extent of injury and determine potential consequences that delays in time to definitive care might have on patient outcome.
(2) A patient trapped in heavy machinery requiring anesthesia/pain management to perform extrication
(3) A patient surviving a building collapse requiring an amputation to enable extrication
(4) A patient with a prolonged extrication requiring advanced fluid resuscitation including the administration of blood products
(5) Insertion of chest tubes or gastric and urinary catheters during the course of prolonged extrication

## c) PROCEDURE

(1) On-scene incident commander will request the Go-Team by contacting SYSCOM. SYSCOM will coordinate the Go-Team's transport to and from the scene with Maryland Express Care.
(2) If the Go-Team is dispatched by air, then SYSCOM will notify the Go-Team when the aircraft is landing on the STC helipad. If the Go-Team is dispatched by land, then Maryland Express Care will coordinate the Team's response.
(3) Prior to the Go-Team's departure to the scene, SYSCOM will notify the on-scene incident commander for the Go-Team's ETA and reconfirm the need for the Go-Team.
(4) If the Go-Team is dispatched, the EMS medical commander will contact them using the "Trauma Line" (or other radio) to update them about the circumstances of the entrapment and the patient's condition.
(5) When the Go-Team arrives on the scene, they are to report to the on-scene incident commander and operate within the Incident Command System.
(6) Once the patient is extricated, the EMS system will transport the patient to the appropriate facility under established EMS guidelines with consultation by the Go-Team physician.
(7) The Go-Team will document the care they provide and file a patient care report with the State EMS Medical Director at MIEMSS.

**a) PURPOSE**

The external jugular vein is a large vessel in the neck that may be used by a CRT or paramedic for intravenous cannulation.

**b) INDICATIONS**

EJs are appropriate when IV access is emergently indicated, but an extremity vein cannot be catheterized.

**c) CONTRAINDICATIONS**

(1) Inability to visualize the vein
(2) Suspected spinal trauma

**d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

Hematoma, pain, infiltration, infection, dislodged catheter, nerve injury, thrombosis, air embolism, airway occlusion, and pneumothorax

**e) PRECAUTIONS**

Carefully secure EJ catheter and tubing.

# Procedures – INTRAOSSEOUS INFUSION



**a) PURPOSE**

The administration of fluids and medications via intraosseous (IO) infusion has long been known to be a relatively safe and effective procedure in the treatment of critically ill patients.

**b) INDICATIONS**

Patients in which the following conditions are present:

(1) Cardiac arrest
   (a) In adult patients without an apparent/available IV site,
   (b) In pediatric patients, go directly to IO
   **OR**
(2) No available vascular access or following two unsuccessful peripheral IV attempts for patients with any other life-threatening illness or injury requiring pharmacological or volume intervention.

**c) CONTRAINDICATIONS**

(1) Conscious patient with stable vital signs
(2) Peripheral vascular access readily available
(3) Suspected or known fractures in the extremity targeted for IO infusion
(4) Previous attempt in the same bone within 48 hours
(5) Cellulitis at the intended site of the procedure
(6) Patient with known bone disorder
(7) Prior knee or shoulder joint replacement in the targeted extremity
(8) Inability to identify landmarks

**d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

(1) Extravasation of fluid
(2) Infection
(3) Compartment syndrome

**e) PRECAUTIONS**

Humeral site: Stabilize the needle prior to any attempt at removing the driver. The humeral cortex can be considerably less dense, and failure to stabilize the needle may cause inadvertent dislodgement. Also, as patients advance in age, bone density continues to decrease and the proximal humeral needle's stability must be routinely assessed.

**f) PLACEMENT**

| | Preferred Site | Second Choice | Third Choice | Fourth Choice |
|---|---|---|---|---|
| **Adult** (Greater than or equal to 13 years of age, greater than 40 kg) | Proximal Humerus (mechanical) | Proximal Tibia (mechanical) | Distal Tibia (preferred if manual insertion) | |
| **Pediatric** (Less than 13 years of age, 3-39 kg) | Proximal Tibia (preferred for both mechanical and manual insertion) | Distal Femur | Distal Tibia | Proximal Humerus |
| **Neonate** (Less than 3 kg) | Proximal Tibia (manual insertion with 18 ga IO needle) | Distal Femur (manual insertion with 18 ga IO needle) | | |

Estimate tissue depth at selected site and select appropriate needle (15 mm, 25 mm, 45 mm or manual 18 ga). Flush the IO catheter with 5-10 mL IV fluid.

TWO ATTEMPTS WITHIN FIVE MINUTES ARE PERMITTED. MEDICAL CONSULTATION SHOULD BE OBTAINED FOR FURTHER ATTEMPTS.

Pain due to infusion via IO

To prevent or treat pain during an IO infusion, administer lidocaine using the following dosing chart. Slowly infuse lidocaine and allow it to dwell in the IO space for 60 seconds. Flush with IV fluid.

| LIDOCAINE 2% (PRESERVATIVE-FREE) DOSING | | |
|---|---|---|
| **Age** | **Weight** | **Lidocaine** |
| **Less than 5 years** | 10-20 kg | Medical Consultation Required |
| **5-12 years** | 20-40 kg | 10 mg (0.5 mL) |
| **13-17 years** | 40-80 kg | 20 mg (1 mL) |
| **Greater than 18 years** | Greater than 80 kg | 20–40 mg (1–2 mL) |

**a) CLINICIAN-CONTROLLED IV SOLUTIONS**

(1) The EMT is authorized to be the primary caregiver for patients with established intravenous (IV) therapy ONLY when the reason for transport is not related to complications associated with the IV line, and:
   (a) The IV Solution **DOES NOT** contain:
      (i) **MEDICATIONS**,
      (ii) **WHOLE BLOOD**, or
      (iii) **BLOOD PRODUCTS** (such as plasma, platelets, or packed red blood cells)
   (b) The IV catheter is placed in a **PERIPHERAL LIMB VEIN**, or
   (c) The IV catheter is a capped (e.g., heparin-locked) peripheral or central line, and
   (d) No other ALS interventions are required.

(2) IV fluids
   The EMT is authorized to perform IV maintenance of **NON-MEDICATED** IV solutions that contain only:
   (a) LR solution
   (b) 2.5%–10.0% dextrose in water
   (c) 0.25%–0.9% saline solution **OR**
   (d) Peripheral Parenteral Nutrition (PPN) or Total Parental Nutrition (TPN)

ALERT

IF IV FLUIDS OR PPN ARE BEING ADMINISTERED VIA INFUSION PUMP AND NOT PATIENT-CONTROLLED, THE PATIENT MUST BE ACCOMPANIED BY A NURSE OR APPROPRIATELY TRAINED ALS CLINICIAN.

**b) PATIENT-CONTROLLED MEDICATIONS OR IV SOLUTIONS**

The EMT is authorized to be the primary caregiver for patients with established intravenous (IV) therapy ONLY when the reason for transport is not related to complications associated with the IV line or the medications being infused and the patient has been caring for the line, IV fluids, and/or IV medications at home without the assistance of a health care clinician.

ALERT

UNDER NO CIRCUMSTANCES SHALL THE EMT CLINICIAN ATTEMPT TO MAKE ANY ADJUSTMENTS TO IV INFUSION PUMPS, NOR SHOULD THE EMT CLINICIAN ADMINISTER ANY ADDITIONAL MEDICATIONS OR IV FLUIDS.

c) Provide patient care according to appropriate protocol.

d) Routine IV maintenance procedures
   (1) Ensure IV solution and catheter placement meets criteria above.
      (a) Request assistance of appropriate level health care clinician if IV solution and/or IV catheter placement do not meet criteria above, or
      (b) Request authorized personnel at health care facility to:
         (i) Replace IV solution with an appropriate IV solution, or
         (ii) Discontinue the IV prior to departing the scene.
   (2) Confirm appropriate IV solution drip rate prior to transport.
   (3) Ensure IV bag contains adequate volume of solution for duration of patient transport.

If IV solution is not adequate, request authorized personnel at health care facility to:
(a) Replace IV solution with an adequate volume, or
(b) Discontinue the IV prior to departing the scene.

(4) Ensure IV solution is flowing at appropriate rate.
(5) Ensure patient has no signs or symptoms specifically related to complications of IV therapy prior to transport.

If patient has signs or symptoms related to complications of IV therapy: Request authorized personnel at health care facility to correct the complication.

**e) COMPLICATIONS OF IV THERAPY**

(1) During patient transport, many possible complications of IV therapy may occur that the EMT must be prepared to manage.
(a) Local complications may include: pain, hematoma, infiltration, infection, dislodged catheter, and tissue sloughing.

ALERT DO NOT ATTEMPT TO REINSERT DISLODGED IV CATHETER.

(b) Central complications may include: syncope, sepsis (infection), air embolism, pulmonary edema, pulmonary thromboembolism, congestive heart failure, over-hydration, and catheter embolism.
(c) General complications may include: restricted flow (e.g., bent tubing, fluid-filled air chamber, inappropriate bag placement), and empty IV solution bag.

(2) Obtain medical direction and prepare to discontinue the IV if any of the complications described above are assessed and/or observed.
(3) If medical direction is genuinely not obtainable, the EMT shall discontinue the IV as soon as possible.

ALERT THE EMT IS AUTHORIZED TO DISCONTINUE PERIPHERAL LIMB VEIN IVs ONLY.

(4) Specific documentation includes:
(a) Type of clinician-controlled IV solution
(b) Type of patient-controlled IV solution
(c) Type of patient-controlled IV medication
(d) Volume administered
(e) Complications encountered

# Procedures – MEDEVAC UTILIZATION



**a) PURPOSE**

Summarize Medevac Utilization Protocol indications, contraindications, principles for consideration of medevac request, medevac request process, standardized medevac request dataset, optimal landing zone setup, and safety recommendations when interacting with helicopters

**b) INDICATIONS FOR "MEDEVAC REQUEST"**

The following indications must meet the specific criteria of the indicated protocol(s)

(1) Trauma Category Alpha, Bravo, Charlie*, Delta*
(2) Specialty Category
  (a) Burn
  (b) Hand*
  (c) Eye
  (d) Head
  (e) Spinal
(3) Medical Category
  (a) Stroke
  (b) STEMI
  (c) Hyperbaric (CO, Toxic Inhalation, or SCUBA)
(4) Consult-Approved Critical/Unstable (Time-critical illness or disease requiring specialized care)*

All of the above requests containing an asterisk (*) (adult or pediatric) require acceptance at the Trauma/Medical/Specialty Center for medevac authorization before SYSCOM can dispatch the helicopter.

**c) PRINCIPLES FOR CONSIDERATION OF MEDEVAC TRANSPORT MEETING ABOVE INDICATIONS:**

(1) Priority 1 Patients (critically ill or injured person requiring immediate attention: unstable patients with life-threatening injury or illness)
  (a) Consider air transportation if the patient will **ARRIVE** at the appropriate receiving facility more quickly than could be accomplished by ground transportation.
  (b) The clinician should consider all of the following:
    (i) Time for helicopter response
    (ii) Patient turnover (loading time)
    (iii) Flight time to appropriate facility
    (iv) Weather conditions
(2) Priority 2 Patients (less serious condition yet potentially life-threatening injury or illness, requiring emergency medical attention but not immediately endangering the patient's life)

Consider medevac transport if drive time is greater than 30 minutes.

**Special Consideration:**
**Consider medevac transport if ground transport greater than 60 minutes to a trauma or specialty center would deplete limited EMS resources in the community.**

**d) CONTRAINDICATION FOR MEDEVAC REQUEST**
EMS/DNR-B or MOLST B patients are not candidates for field medevac transport.

ALERT ALL REQUESTS FOR SCENE HELICOPTER TRANSPORTS SHALL BE MADE THROUGH SYSCOM.

**e) FORMAL REQUEST PROCESS**
The Systems Communications Center (SYSCOM) at MIEMSS serves as the communications center for the dispatching and management of Maryland's public safety helicopter resources. This mission is accomplished through the partnership between jurisdictional 9-1-1 call-centers and SYSCOM operations at MIEMSS. All helicopter requests must be routed through SYSCOM. The Medevac Request Data form is designed to provide a consistent standard by which SYSCOM receives "request" information. Considering the variety in the types of requests received by SYSCOM (e.g., medevac, search-and-rescue, law enforcement tracking) the information requested will vary, depending on the nature of the request. The county communications centers and the EMS clinicians that make the request should be familiar with the Medevac Data Request form to provide essential data to SYSCOM for prompt dispatch of the requested helicopter support.

EMS clinician and 9-1-1 center medevac request process:

(1) Decision made to request medevac based on indication and principles above (if 9-1-1 center has enough information from phone interrogation of call, and trauma indications meet Trauma Decision Tree Category Alpha or Bravo, the 9-1-1 center operator does not have to wait for EMS clinician to arrive on scene to make medevac request).
(2) If indicated, consult with trauma/specialty center for physician authorization to use medevac for transport and acceptance of the patient.
(3) Essential information gathered to complete the Medevac Data Request form (most of this is handled by 9-1-1 center).
(4) Contact SYSCOM for formal medevac request.
(5) Select and secure landing zone following optimal landing zone setup and safety tips.

**Medevac Data Request Form**

***Maryland Helicopter Dispatch Request***

| | |
|---|---|
| | 1 Identify Call Origin & Operator ID |
| | 2 Identify Request Type: **Medevac, Search & Rescue, Airborne Law Enforcement** |
| | 3 Jurisdictional Incident Number & 9-1-1 Dispatch Time |

***Medevac Dispatch***

| | |
|---|---|
| | 1 Incident Type |
| | 2 Incident Location: Community & Site |
| | 3 Landing Zone |
| | 4 ADC Map Page/Grid OR Lat/Lon |
| | 5 Primary Condition |
| | 6 Severity, Category & Priority |
| | 7 Adult or Pediatric or Estimated Age? |
| | 8 Multiple Patients? |
| | 9 ALS Unit & LZ Contact Info |
| | 10 Additional Relevant Information |

***Search & Rescue Dispatch***

| | |
|---|---|
| | 1 Incident Type |
| | 2 Incident Location: Community & Site |
| | 3 ADC Map Grid OR Lat/Lon Info for LZ |
| | 4 Primary Target Description |
| | 5 Time Last Observed |
| | 6 Ground Contact Unit |
| | 7 Additional Relevant Information |

***Airborne Law Enforcement Dispatch***

| | |
|---|---|
| | 1 Incident Type |
| | 2 Incident Location: Community & Site |
| | 3 ADC Map Grid OR Lat/Lon Info for LZ |
| | 4 Primary Target |
| | 5 Time Last Observed |
| | 6 Ground Contact Unit |
| | 7 Additional Relevant Information |

**f) HELICOPTER SAFETY**

(1) OPTIMAL LANDING ZONE (LZ) SETUP

(a) **150 x 150-foot area close to the incident scene and free from obstructions is the minimum required, with a 175 x 175-foot area preferred.**
(In mass casualty incident, identify a large enough area to land multiple large helicopters.)

(b) The landing zone should be a flat surface that is firm, free of overhead obstructions, and free of any debris that can blow up into the rotor system. The maximum allowable slope is 10 degrees.

(c) Obstacles such as wires, poles, signs, etc. can be difficult to see from the aircraft. If wires are present at or near the scene, this information must be relayed to the flight crew prior to landing.

(d) Advise the flight crew on overhead radio contact if there are any obstructions in the area, obstructions at the edge of the LZ, or any obstructions in-line with the departure or approach path.

(e) The landing zone will not be located near fixed objects that may be susceptible to wind damage or unsecured objects (e.g., patio furniture, small boats) that may become airborne as the AW-139 aircraft produces a significant amount of main and tail rotor wash.

(f) If the roadway is too narrow, or numerous trees or other obstacles are present, another area must be selected as an alternate LZ and checked for obstacles and other unsafe conditions. After the LZ Officer has evaluated all areas, the best unobstructed landing site must be secured and the flight crew advised of any unsafe conditions they may encounter during the landing.
**NOTE:** In determining landing zones, be aware that helicopter take-offs and landings can be done in a vertical manner; however, these landings limit the pilot's visibility of the LZ. Increased power requirements on the helicopter may eliminate land-back areas should an engine malfunction occur, making the approach slower and causing extended periods of rotor wash.

(2) ADDITIONAL LANDING ZONE TIPS

(a) The LZ Officer should walk the area on both sides of the LZ and check for hazards. During night operations, walk the LZ with a flashlight that is directed up and down to detect wires in and around the LZ.

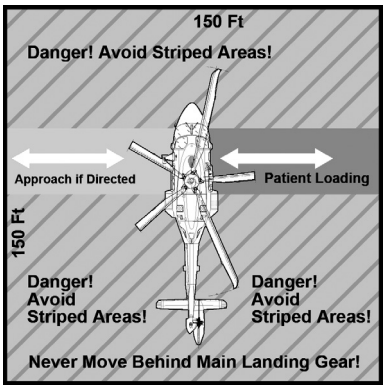
(b) 45-Degree Test—The LZ Officer should stand in the middle of the LZ with one arm extended at a 45-degree angle in front of him/her. Any objects at or above this line are obstacles and need to be reported to the incoming aircraft. This test is done for the full 360 degrees.

(c) Do not recommend landing zones that contain loose material such as gravel. The rotor wash will cause stones or gravel to become airborne, striking personnel and/or damaging vehicles.

(d) When a roadway is to be used as an LZ, all traffic must be stopped in both directions of the roadway, even on multi-lane highways or interstates.

(e) The LZ Officer will ensure that enough personnel is available to prevent any breach of LZ security by pedestrians while the helicopter is approaching, on the ground, or while departing. Failure to do so may cause injuries and/or delay patient transport.
(f) Do not allow traffic to use the roadway until after the aircraft has departed. Traffic will be stopped at least 200 feet in both directions from the landing zone.
(g) Do not use flares or cones to mark the landing zone: they will become airborne during the landing. (Weighted cones/lights that are designed for aircraft operations are generally acceptable.)
(h) The flightcrew is the final authority when selecting an LZ. On some occasions, the flightcrew may not choose to utilize the ground personnel's suggested LZ and choose an alternate LZ. This decision is usually based on information that is unknown to the ground personnel (e.g., wind, aircraft performance limitations).

(3) APPROACHING THE AIRCRAFT
*Personnel should only approach MSP aircraft under the following conditions:*



**AW-139**

(a) Hearing and eye protection shall be utilized at all times when approaching the aircraft.
(b) Only when accompanied by an MSP flight crew member to the aircraft Response personnel are usually limited to four when loading patients. The crew will provide additional guidance prior to these personnel approaching the aircraft.
(c) In an emergency situation when it becomes necessary to render assistance or rescue occupants of the helicopter. In such cases: ***DO NOT APPROACH THE AIRCRAFT UNLESS THE MAIN ROTOR HAS STOPPED!***
(d) Only approach the aircraft from the Safe Zone (see diagram).
    (i) Never approach the aircraft from the rear areas due to the hazards existing from the tail rotor.

***REMAIN CLEAR OF THE REAR AND TAIL ROTOR AT ALL TIMES!***

(ii) If it becomes necessary to go from one side of the aircraft to the other, this will be done by walking around the front of the aircraft; however, do not walk under the rotor blades.
(iii) Personnel shall not wear hats and loose clothing when approaching the aircraft. Do not lift anything above shoulder height (e.g., IV bags).

(e) If the aircraft has landed on a slope or hill, care must be taken when approaching the aircraft from the downhill side. Uphill side approaches should be avoided, as the main rotor blade is spinning and is lower to the ground on one side of the aircraft. The Trooper/Flight Paramedic will provide additional guidance in this situation.

(f) Never bring the patient to the aircraft prior to advising the Trooper/Flight Paramedic of the patient's information. Very high noise levels found in the general proximity of the aircraft make communication and patient turnover impossible.

(g) If debris gets in the eyes and it impairs the vision, do not continue to approach or egress from the aircraft. Personnel will immediately "take a knee," and the Trooper/Flight Paramedic will provide assistance.

(4) MISCELLANEOUS SAFETY TIPS

(a) **Aircraft Doors**
Personnel should not attempt to open or close any aircraft doors. If a person is in the aircraft, they should remain inside until the flight crew member opens the door, thus preventing damage to the door and greatly reducing the risk of an aircraft door opening inadvertently in flight.

(b) **Vehicles**
(i) No vehicles or personnel shall be permitted within 200 feet of the aircraft.
(ii) Do not direct spotlights onto the landing area or at the aircraft, but keep vehicle's emergency lights displayed until the aircraft is overhead. Once the LZ has been confirmed and verified by the flight crew, vehicle lighting can be reduced to running lights or parking lights for night vision purposes.

**a) PURPOSE**

IV access is an invasive skill reserved for ALS clinicians and "Program Approved Option" EMTs with IV Technician training. The purpose of establishing an IV line, or a saline-lock, is to provide direct venous access for the possible administration of fluids and ALS medications (ALS only), if necessary and appropriate.

**b) INDICATIONS**

(1) See treatment protocols for initiation of IV.

(2) If the protocol indicates to start an IV, the "Program Approved Option" EMT may initiate an IV or saline-lock, if appropriate, per *Optional Supplemental Protocol – Intravenous Access for EMT (EMT-IV)*.

(3) **Saline locks** may be substituted for IV KVO anywhere in the protocol with the understanding that if the patient needs a fluid bolus or medication, the saline lock is converted to an IV of LR.

(4) ALS clinicians, in the event of a life-threatening emergency (CRTs with medical consult) or cardiac arrest, may access indwelling or implanted, central or peripheral venous catheters for medication administration.

(5) When a patient is a **Hemophiliac A or B** (Factor VIII or IX) and the family or patient states that the patient must have factor concentrate administered, the ALS clinician may assist the patient in the IV administration of the patient's own factor concentrate (VIII or IX). Notify the receiving hospital of the administration of blood factor concentrate.

(6) All ALS clinicians may access lower extremity IV sites. The CRT and paramedic should consider lower extremity IV sites prior to IO attempts (EMT-IV technicians may not access lower extremity IV sites).

(7) The ALS clinician may establish a peripheral IV in a patient whose vasoactive medication has been interrupted due to a malfunctioning long-term access device that cannot be repaired by the home health caregiver. The ALS clinician can assist in re-establishment of an existing vasoactive infusion at the same dose or setting. Patient shall be transported to the nearest appropriate facility to access patient's long-term device. When in doubt, obtain medical consultation.

(8) Maximum 2,000 mL LR without medical consultation.

(9) Second IV requires medical consultation except when initiating the *Sepsis* protocol and for ALS clinicians who have Priority 1 patient. Initiation of the second IV shall not delay transport.

**c) CONTRAINDICATIONS**

See treatment protocols.

**d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**

See IV Maintenance Therapy for EMT.

**e) PRECAUTIONS**

All sharps must be properly disposed of in an appropriate container.

**a) PURPOSE**
To prevent harm to patient or others

**b) INDICATIONS**
(1) Patient physical restraints should be utilized only when necessary and only in situations where the patient is exhibiting behavior that the EMS clinician believes will present a danger to the patient or others.
(2) The procedure applies to patients treated under implied consent.

**c) PROCEDURE**
(1) The physical restraint procedure applies to patients greater than 1 year of age.
  (a) Ensure that the scene is safe.
  (b) Ensure sufficient personnel are present to control the patient while restraining. Use police assistance when available.
  (c) Position the patient for safe transport:
    (i) Place patient face up or on their side, if at all possible.
    (ii) Secure extremities:
    ADULT: For adults, use 4-point restraints (ideally with one arm up and the opposite arm down) or use a sheet to carefully wrap the patient before applying a Reeves™-type stretcher.

    PEDIATRIC: For patients less than 13 years of age, use 3-point restraints (two arms, one leg) or use a sheet to carefully wrap the patient before applying a Reeves™-type stretcher.
    (iii) If police have handcuffed the patient, reposition the patient in face-up position with hands anterior and secured to the stretcher (jointly with police).
    (iv) If necessary, utilize cervical-spine precautions to control violent head or body movements.
    (v) Place padding under patient's head. Pad any other area needed to prevent the patient from further harming himself or herself or restricting circulation.
    (vi) Secure the patient onto the stretcher for transport, using additional straps if necessary. Be prepared at all times to logroll, suction, and maintain airway, especially in the event of vomiting.
  (d) Monitor airway status continuously, utilize pulse oximetry, vital signs, and reassess pulse/capillary refill, motor, and sensory status distal to the restraints. Document findings every 15 minutes, along with reason for restraint.
  (e) Assess for traumatic or medical causes for the patient's agitation. Refer to *Agitation* protocol.
  (f) For interfacility transfers, obtain a written physician's order for use of restraints.

**d) PHYSICAL RESTRAINT GUIDELINES:**
(1) Use the minimum restraint necessary to accomplish necessary patient care and ensure safe transportation; soft restraints may be sufficient in some cases. If law enforcement or additional personnel are needed, call for assistance prior to attempting restraint procedures. Do not endanger yourself or your crew.

(2) Avoid placing restraints in such a way as to preclude evaluation of the patient's medical status (airway, breathing, and circulation). Consider whether placement of restraints will interfere with necessary patient-care activities or will cause further harm.
    (i) Patient positioning should be modified when restraining patients with limited mobility, previous injury, or preexisting conditions (e.g., osteoporosis or contracture) to maintain extremities in a neutral position.
(3) Patients shall not be restrained in a prone, hobbled, or "hog-tied" position.
(4) Once restraints have been placed, do not remove them until you arrive at the hospital unless there is a complication from their use. If possible, take extra personnel during transport to hospital to deal with potential complications.

## a) PURPOSE

Coronary heart disease is the single largest cause of death in US men and women. Early identification and treatment of patients with acute myocardial infarction (AMI) has proven to reduce myocardial damage and decrease morbidity and mortality. Clinicians should be aware of both typical and atypical presentations.

## b) INDICATIONS

(1) Chest pain that may radiate to the arm, shoulders, jaw, or back. Generally described as a crushing pain or toothache. May be accompanied by shortness of breath, sweating, nausea, or vomiting.
(2) Chest discomfort. Some heart attacks involve discomfort in the center of the chest that lasts for more than a few minutes or that goes away and comes back. This discomfort can feel like uncomfortable pressure, squeezing, or fullness.
(3) Discomfort in other areas of the upper body. Symptoms can include discomfort in one or both arms or in the back, neck, jaw, or stomach.
(4) Shortness of breath. This symptom often accompanies chest discomfort. However, it can also occur prior to the chest discomfort.
(5) Other anginal equivalents, such as: unexplained diaphoresis, nausea, lightheadedness, syncope, or a sense of impending doom.
(6) Post cardiac arrest with ROSC.

## c) PROCEDURE

(1) Position patient.
(2) Place chest and limb leads.
(3) Acquire 12-lead (15-lead, if trained) and document the patient's last name, first initial, age, and sex. These identifiers should be on the transmission copy (if able to transmit) and shall be on the delivered printed copy.
(4) Continue patient care.

ALERT

EARLY ASSESSMENT OF PATIENTS WITH ACS LEADS TO EARLY IDENTIFICATION OF A STEMI AND INFLUENCES DOWNSTREAM CARE AND PATIENT DESTINATION. 12-LEAD EKG SHOULD BE ACQUIRED WITHIN 10 MINUTES OF CONTACT WITH AN EKG-CAPABLE CLINICIAN.

SHOULD AN ALS CLINICIAN INITIATE TRANSFER OF CARE/RENDEZVOUS AND TRANSITION OF PATIENT CARE ALS TO BLS, IT SHALL BE IMPORTED INTO THE PATIENT CARE REPORT AND A COPY SHALL BE SENT WITH THE BLS UNIT TO THE RECEIVING FACILITY.

# Procedures – MULTIPLE CASUALTY INCIDENT/UNUSUAL EVENT



A Multi-Casualty Incident (MCI) or Unusual Event is any event where the number of injured persons exceeds the normal capabilities of the EMS Operational Program in whose jurisdiction the event takes place. Due to the size of the incident, the responding EMS Operational Program may require additional resources and/or must distribute patients to multiple hospitals.

Local EMS Operational programs should have a plan or operational procedures that address response to multiple patient incidents or unusual events. This protocol does not supersede those plans. There are some general practices and procedures that must be followed to ensure the EMS system can be prepared to respond appropriately to support a local response.

ALERT: THIS PROTOCOL IS SIMPLY A LIST OF REQUIRED TASKS IN THE EVENT OF AN UNUSUAL EVENT. IT IS NOT ALL-INCLUSIVE. ALL CLINICIANS ARE ENCOURAGED TO REVIEW LOCAL EMERGENCY RESPONSE PLANS, THE MARYLAND TRIAGE SYSTEM TRAINING PROGRAM, START/JUMPSTART, AND NIMS PRACTICES AND PROCEDURES ON AT LEAST AN ANNUAL BASIS.

**Procedure**

a) Assess scene and recognize that the incident is an MCI or Unusual Event. The definition of MCI or Unusual Event for the purposes of this protocol is an incident that causes more than 5 patient encounters or that involves unusual circumstances that suggest it could place an extraordinary strain on EMS or health care resources. The following events are **examples** of an MCI or Unusual Event.
   (1) More than five patients from one or related incidents
   (2) Multi-patient events that require specialized rescue
   (3) Three or more immediate (Priority 1) patients
   (4) Multiple pediatric patients requiring specialty resources
   (5) More than one burn patient meeting burn center referral criteria
   (6) Use of more than two medevac helicopters
   (7) Use of Medical Ambulance Bus (MAB)
   (8) Multiple patients with unusual signs and symptoms
   (9) Unresolved WMD related activity that could result in multiple patients (active shooter, bomb threat, intentional WMD agent release, etc.)
   (10) Decontamination of more than 5 patients resulting in at least one transport
   (11) Unresolved hazardous material incident that has the potential to affect multiple patients
   (12) Evacuation of a licensed health care facility or housing complex for individuals requiring special assistance
b) Notify EMRC or the Regional EMRC as soon as the incident is recognized to be an MCI or Unusual Event. Use the specific terms “MCI” or ”Unusual Event” when communicating with EMRC to be clear this protocol is being enacted. This should be done as early in the incident as possible when there is a strong suspicion that such an event has occurred so that EMRC may begin to notify hospitals and response partners of the

incident. Responding units can request their dispatchers notify EMRC before the scene is fully assessed if there is reasonable information to suggest that the incident meets the criteria above. As soon as available, the following information should be relayed to EMRC.

(1) Type and general description of the incident
(2) General location or address of the incident
(3) Age range of patients
(4) Estimated number of patients by priority
(5) Approximate number of patients involved
(6) Any hazardous agents involved

c) Initiate the incident command structure according to local SOPs and/or the National Incident Management System. Update EMRC with more details about the incident as they become available.

d) Consider utilization of the *MCI Communications* protocol.

e) Triage patients using the *START* / *JumpSTART* methods.
   (1) Identify the patient's triage category by utilizing the appropriately colored triage ribbon and securely attach a MIEMSS-approved Triage Tag.

f) Do not delay transport of patients for extensive patient care procedures. Provide only the care required to sustain life and limb during transport to the hospital.

g) Track the care, movement, and disposition of EVERY patient utilizing the locally approved triage/treatment/transport logs. Patient information should be written on the triage tag.

h) Consider the need for and request specialty resources through the local dispatch center and/or emergency management as per local procedures. These may include,
   (1) Mass Casualty Support Units (MCSU) – (Medical Supply Caches)
   (2) Medical Ambulance Buses
   (3) CHEMPACK (Organophosphate antidotes - contact EMRC)
   (4) Ambulance Strike Teams or EMS Taskforces
   (5) Shock Trauma Go-Team

i) The Transportation Group Supervisor and Medical Communications Coordinator responsibilities should be assigned as early as possible. They are the critical link to EMRC, hospitals, and the health care system. Their duties include:
   (1) Establish a final checkpoint through which all transport units MUST pass to ensure accountability of all patients.
   (2) EMRC will have notified hospitals and acquired their bed availability based on the information originally received and will transmit that information to the scene when requested.

(3) Coordinate through EMRC the patient destination, and communicate the number of patients, general illnesses, ages, and triage category on each transport unit as they leave the scene to the receiving facilities.
(4) If a central point of contact cannot be established, individual transport units MUST communicate the above information individually through EMRC to the receiving hospitals during transport. Those units must announce that they are associated with the MCI or Unusual Event.

j) Coordinate with law enforcement and, if requested, assist the Coroner or Medical Examiner with identification and disposition of deceased casualties.

k) After the last patient has been transported, notify 9-1-1 dispatch center and EMRC that last patient has been transported. Demobilize scene, stand down or release resources dedicated to incident, and complete appropriate documentation. Cooperate with local officials, EMRC, hospitals, and emergency management to complete a final accounting of the disposition of all the patients.

**a) BACKGROUND**

(1) A review of past active assailant incidents has shown that the conventional prehospital practice of not entering the scene until it is deemed safe by law enforcement (LE) has been associated with additional loss of life.

(2) This protocol is designed to be all-hazards in nature. It is meant to provide a clinical concept of operations that empowers trained and equipped, but not necessarily tactical, EMS prehospital clinicians, to access casualties and expedite life-sustaining interventions closer to the point and time of injury. For active assailant and other LE-related incidents, EMS clinicians shall be under LE escort. EMS clinicians shall use appropriate personal protective equipment as defined by local jurisdiction.

(a) Examples of such potentially volatile environments include, but are not limited to:

(i) Active assailant (active shooter/IED) situations
(ii) Post-blast detonations
(iii) Intentional release of a chemical agent
(iv) Industrial accident/explosion
(v) Hazardous materials incident
(vi) Structural collapse/urban search and rescue situations
(vii) Transportation mishaps with limited scene access
(viii) In the immediate aftermath of a natural disaster such as a tornado

**b) INTRODUCTION**

(1) This protocol provides guidelines for the type of intervention and care that should be rendered at various proximities to a threat in a potentially volatile environment.

(2) By definition, potentially volatile environments are dynamic in nature. Scene conditions may change and emergent evacuation of responders and patients may interfere with the delivery of interventions described in this protocol.

**c) INDICATIONS**

(1) This protocol does not replace or supersede the general patient care practices in *The Maryland Medical Protocols for Emergency Medical Services*, which are still to be followed once the concern of active threat has been mitigated.

(2) Use of this protocol is an acknowledgement by the EMS clinician that the situation is:

(a) Unique, austere, and different than the conventional environment of care in which EMS medicine is usually rendered AND

(b) The application of standard prehospital emergency practices could unnecessarily jeopardize the safety of the patient and/or medical clinician.

(3) An active assailant incident or Potentially Volatile Environments with Life-Sustaining Interventions (PVE/LSI) protocol is declared.

**d) CONTRAINDICATIONS**

(1) Absent the presence of perceived or actual threat, standard general patient care practices should be followed.

**e) ZONES OF CARE/OPERATIONS**

(1) The zones described below are intended to standardize the terminology used by responding emergency medical clinicians in Maryland and to establish a common understanding of the interventions to be performed within each zone.

(2) **Hot Zone (Direct Threat):** (Integrated Tactical EMS) Operational area with a direct and immediate threat to personal safety or health

(a) The overarching priority in the Hot Zone is mitigation of active threat. Medical care is a secondary function to threat mitigation.

(b) Medical clinicians must be an integrated tactical medic (i.e., TEMS) to operate in this environment. Medical priorities are to prevent casualties and responders from sustaining additional injuries and include prompt evacuation to a more secure zone.

(i) If at all possible, casualties should self-evacuate.

(ii) Goals of care include keeping the response team engaged in neutralizing the threat, minimizing public harm, and controlling life-threatening extremity hemorrhage.

a. Control of severe hemorrhage in the direct threat environment is best accomplished with commercially available tourniquets.

b. Tourniquet should be placed as high up on the limb as possible without taking the time to expose the area.

c. For full or partial amputation, immediately place a tourniquet if possible.

d. Cardiopulmonary resuscitation (CPR) is not indicated in this environment.

(iii) In circumstances of chemical agent exposure, administration of Nerve Agent Antidote Kits (NAAK/MARK-1) might be warranted if available.

(3) **Warm Zone (Indirect Threat):** (Limited LSI) Area with a potential threat to personal safety or health

(a) **Evacuation of patients to a completely safe area is the primary objective of care in this area. The following care guidance is dependent on the availability of equipment, supplies, and the appropriate level clinicians. Extrication should NOT be delayed to provide advanced or involved treatment measures.**

(i) The Warm Zone typically exists between the Hot Zone and Cold Zone, but is not geographic and depends on the evolving situation.

(ii) Responders must remain cognizant that scene security can change instantly.

(iii) A focused and deliberate approach to providing patient care should occur.

(iv) The potential benefits of providing medical care in these zones must outweigh the risks of the ongoing tactical operation and/or delaying opportunity to evacuate the patient.

(v) Care in the Warm Zone typically occurs at or near the point of injury once scene stabilizing measures have occurred. Care may also take place at a casualty collection point (CCP).

(vi) A CCP is a location concealed and covered from immediate threat where victims can be assembled for movement from areas of risk to the triage/

treatment area. Multiple CCPs may be required, which may be located in the Warm or Cold Zone. CCPs should be established and locations communicated as early as possible through operations to ALL responders.

(vii) If possible, an abbreviated triage system should be set up to identify the priority for the extrication of patients. The use of ribbons or markers to clearly identify immediate and delayed (red and yellow, respectively) patients is highly recommended. Deceased individuals should also be labeled/tagged appropriately to prevent repeat assessments by multiple clinicians.

(viii) Medical care in the Warm Zone should be limited to essential interventions only and is guided by the mnemonic **"MARCHED"**

a. M – Massive Hemorrhage Control
   i. Massive hemorrhage remains the greatest threat to life in most trauma patients. Attaining hemorrhage control is the top priority.
   ii. Tourniquets remain the preferred means of hemorrhage control for life-threatening bleeding in this environment.
      1. If a tourniquet was applied in the Hot Zone, it should be reassessed.
      2. Tourniquets applied over clothing are not as effective and may need to be adjusted.
      3. Tourniquets should only be discontinued by an appropriately trained ALS clinician in consultation with medical control.
      4. Other methods of hemorrhage control include deep wound packing with either sterile gauze or hemostatic impregnated gauze.
      5. Vascular injuries in the neck, groin, and axilla (i.e., junctional zones) are not amenable to traditional extremity tourniquets. In addition, effective pressure dressings are often extremely difficult to apply. Hemostatic impregnated dressings with direct pressure (minimum 5 minutes with continuous pressure is preferred) have shown useful in such situations.

(b) A – Airway management

(i) Patients in the Warm Zone with airway issues are high priority for evacuation due to their often intense resource requirements.

(ii) Consider applying oxygen if available and indicated.

(iii) Unconscious casualty without airway obstruction:
   a. Chin lift or jaw thrust maneuver
   b. Nasopharyngeal airway
   c. Place casualty in the recovery position

(iv) Casualty with airway obstruction or impending airway obstruction:
   a. Chin lift or jaw thrust maneuver
   b. Nasopharyngeal airway
   c. Allow casualty to assume position that best protects the airway, including sitting up or leaning forward
   d. Place unconscious casualty in the recovery position

(v) If previous measures unsuccessful, if time and resources permit, consider per protocol:
   a. Supraglottic Devices (e.g., King LT™, EASYTube®, or Combitube™).
   b. Oro/nasotracheal intubation
   c. Surgical cricothyroidotomy

(c) R – Respirations
   (i) The chest/upper abdomen should be assessed for any evidence of an open chest wound and an occlusive dressing should be applied accordingly.
   (ii) Tension pneumothorax remains a significant cause of preventable death in trauma patients.
      a. In suboptimal environments that interfere with complete physical assessment, any patient with significant blunt or penetrating chest trauma who displays dyspnea should be treated as a developing tension pneumothorax and receive needle decompression, if appropriate.
      b. To be effective, needle decompression needs to be performed using at least a 3.25 inch, 14g needle/catheter or needle decompression thoracostomy kit.

(d) C – Circulation
   (i) In general, healthy adult trauma patients with a radial pulse and normal mentation do not need IV therapy in the Warm Zone.
   (ii) Patients with evidence of hypotension:
      a. If the patient displays signs of a closed head injury, IV fluid therapy is indicated to maintain at least a radial pulse or SBP of at least 90 mmHg.
      b. Patients in hypovolemic shock should receive a one-time 500 mL bolus of IV fluid.
   (iii) Patients in traumatic cardiac arrest should be considered deceased and no CPR should be performed in this zone.

(e) H – Hypothermia
   (i) Hypothermia in trauma patients has been associated with increased mortality. Hypothermia is easier to prevent than treat.
      a. Patients should be moved to a warmed location if possible.
      b. Efforts should be made to minimize heat loss.

(f) E – Everything else
   (i) Consider *Mark I*/*DuoDote*® for suspected organophosphate/nerve agent exposure.
   (ii) Dependent upon resource availability, burns, eye injuries, and acute pain should be managed per *The Maryland Medical Protocols for Emergency Medical Services*.

(g) D – Documentation
   (i) Key findings and interventions should be conveyed to the next phase of care.

(4) **Cold Zone:** (Traditional Patient Care Protocols) Area surrounding the Warm Zone. Responders can operate without concern of danger or threat to personal safety or health.
   (a) Casualties are moved from the Warm Zone to the Cold Zone by way of an evacuation corridor(s).
      (i) Evacuation Corridor: An area transitioning between the Warm and Cold Zone that is secured from immediate threat and allows for a mitigated risk in transporting victims from the CCP to the triage/treatment area beyond the outer perimeter.
   (b) Once in the Cold Zone, casualties will require re-triage, particularly assessing for the development of a life-threatening condition and effects of Warm Zone therapy.
      (i) If massive hemorrhage has not been addressed or has been ineffectively managed, it should be immediately readdressed with strategies mentioned above.
   (c) Patients should be triaged and transported per standard practices.
   (d) Medical care in the Cold Zone should be dictated by resource availability and, when possible, equate to the general patient care standards in *The Maryland Medical Protocols for Emergency Medical Services.*
   (e) CPR may have a larger role during the evacuation phase especially for patients with electrocution, hypothermia, non-traumatic arrest, or submersion with cardiac arrest; however, it is still casualty count/resource dependent.

**a) Indications**

(1) A high consequence infectious disease (HCID) generally: has a high mortality rate, is transmissible person-to-person, and has no known prevention or cure.
The origin of these pathogens may include:
  (a) New clinical presentation of a known infectious agent resulting from changes or evolution of existing organisms
  (b) Known infectious agents spreading to new geographic areas or populations
  (c) Previously unknown (new) infectious agents
  (d) Known, eradicated infections re-emerging in a non-immune population

(2) Emerging infectious diseases that meet the inclusion criteria for this protocol will be posted on the MIEMSS web site (www.miemss.org).

(3) Signs and symptoms:
  (i) Signs and symptoms are variable and unique to individual emerging infectious diseases. MIEMSS will post the CDC case definition and specific guidance on the identification, isolation/quarantine, PPE, treatment, and appropriate transport of these patients on the MIEMSS web site. If the patient meets the clinical and epidemiologic case definition for the HCID, they will be considered a Patient Under Investigation (PUI) until confirmatory testing can be performed.

**b) Infection Control Precautions**

(1) If the presence of an HCID is known or suspected, EMS clinician should take appropriate isolation precautions prior to patient contact. If an HCID is suspected during patient assessment, EMS clinicians should immediately don appropriate PPE and inform the state or local health department of the situation. At minimum, standard precautions apply to all patient encounters. Specific guidance is disease-specific, but a few general principles apply:
  (a) Practice appropriate donning and doffing of PPE, hand hygiene, and decontamination as recommended by specific HCID guidance.
  (b) Contact precautions: disease spreads through skin-to-skin or skin to mucus membrane contact
    (i) PPE may include use of gloves or gowns. Eye protection may be indicated if contact with bodily secretions is possible.
  (c) Droplet precautions: large, short-range aerosols containing infectious particles may travel 3-6 feet; produced by sneezing, coughing or talking.
    (i) PPE may include protective surgical masks and eye protection (in addition to contact precautions).
  (d) Airborne precautions: infectious agents carried by small particles that may be suspended in air for prolonged periods
    (i) PPE may include a fit-tested N-95 mask and eye protection (in addition to contact precautions).
  (e) Limit scene entry to essential personnel only.
  (f) Contain bodily fluids or secretions. A surgical mask (not an N-95) may be placed on the patient to limit respiratory droplet spread.

(2) Treat the patient based on presenting signs and symptoms per MIEMSS treatment protocols and specific guidance issued for the HCID. Procedures that increase risk of distributing fluids or secretions should be limited to those necessary to maintain life and provide the patient with reasonable comfort.

**c) Transport**

(1) Transport of patients from scene to appropriate hospital

**(a) HCID Treatment Hospital** — a facility determined by ASPR to have the capability to admit and provide comprehensive care for a patient with an HCID.

**(b) Frontline Hospital** — all hospitals with emergency departments must have the capability to accept, identify, and isolate a PUI for a designated HCID, then follow the approved procedures to notify the local health department to arrange for transfer to an HCID Treatment Hospital, as appropriate. These patients will typically be transferred within 24 hours.

(c) Destination Decision

(i) If transport time is no longer than 45 minutes greater than transport to the closest hospital-based ED, transport patients meeting the case definition to the closest HCID Treatment Hospital.

(ii) Patients whose transport time is longer than 45 minutes greater than transport to the closest HCID Treatment Hospital should be transported to the closest Frontline Hospital.

(iii) Priority 1 patients with severe symptoms that cannot be controlled outside the hospital, should be transported to the closest hospital-based ED (Frontline or Treatment Hospital).

(iv) Notify the receiving hospital of all suspected PUI patients as early as possible to allow time for hospital staff to prepare.

(v) Helicopter should not be used to transport PUI patients.

(2) Transport of health department monitored patients

(a) Some individuals who have been exposed to an HCID may be monitored or quarantined by the health department. MIEMSS will be notified by MDH if these patients become ill and require transportation by EMS to hospitals and will contact the local jurisdictional or waivered commercial EMS Operational Program to arrange that transport. MDH will determine the destination hospital.

(3) Interfacility Transfer Transfers between hospitals

(a) Will be completed by EMSOPs who have been granted a waiver from licensing to modify an ambulance specifically to transport an HCID patient and have specific plans, training and quality assurance processes in place to do so. Public Safety EMSOPs may be called upon as a backup if the waivered commercial services are not available. MDH, CDC, ASPR, and the Regional Treatment Centers will determine the destination hospital in these cases.

(4) Communication

(a) EMS clinicians transporting PUIs for designated HCIDs MUST obtain medical consultation with the receiving hospital via EMRC prior to beginning that transport and enter the hospital through the entrance designated by the receiving hospital. The term PUI and the identity of the suspect infectious agent must be used to ensure the hospital understands and is prepared to receive the patient.

Obtaining medical consultation from the closest HCID Frontline and Treatment Hospitals is always an option to determine the appropriate destination.

(5) Refusal of transport
   (a) If a PUI for a designated HCID refuses care or transport, the EMS clinician should remove him/herself from the immediate presence of the patient and contact the local health department through their dispatch center or locally defined procedures and provide as much of the following information about the patient that is available.
      (i) Full name, age, sex, home address, contact phone numbers, current location, recent travel history, presenting signs and symptoms.
      (ii) The EMS clinician should expect to be involved in a discussion of the situation with local health officers, health departments, and law enforcement officials, and if a quarantine/isolation order is issued, should be prepared to assist law enforcement in carrying out that order.

Pediatric patients (patients who have not reached their 15th birthday) who are at the home or in a non–health care environment should be transported to a Treatment Hospital that is also a Pediatric Trauma Center if transport times are not longer than 45 minutes greater than transport to the nearest Frontline Hospital ED. If transport times are longer than 45 minutes greater than transport to the nearest Frontline Hospital ED, the patient should be taken to the closest Frontline Hospital.

### a) INDICATIONS

For a patient who has a prolonged transport time or tourniquet(s) placed by non-EMS responders, evaluate the continued need for the tourniquet(s) if:

(1) The tourniquet(s) has been in place for less than 6 hours, and
(2) The patient is not in shock, and
(3) There are no partial or full limb amputations

### b) PROCEDURE

(1) Remove outer dressing to allow inspection of the wound
(2) If no active bleeding, slowly release tourniquet by unwinding, but do not remove the tourniquet from the extremity
(3) Inspect for bleeding
(4) If no bleeding, pack wound, apply pressure dressing for 3 minutes and observe.
(5) Leave loosened tourniquet in place to facilitate re-application if necessary.
(6) If recurrent severe (pulsatile) bleeding:
    (a) Reapply the initial tourniquet at the most distal location on the extremity that controls bleeding.
    (b) If bleeding persists, apply a second tourniquet.

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## a) INDICATIONS

During interfacility transports, a CRT or paramedic may monitor a patient on a continuous IV amiodarone infusion provided that:

(1) Amiodarone maintenance infusion must have been started by the hospital staff prior to the interfacility transfer. An IV amiodarone maintenance infusion may NOT be started by the prehospital clinician in the prehospital setting.

## b) CONTRAINDICATIONS

Patients who have not yet reached their 18th birthday.

## c) PROCEDURE

(1) Follow the appropriate ALS Algorithm and maintain the infusion as directed by the sending physician.
(2) The sending physician must document the infusion to be administered on the patient's transport record or transport note, including the concentration of the medication and the infusion rate.
(3) The infusion must be maintained on an infusion pump designed for transport, and the clinician must be trained in the appropriate use of that specific make and model infusion pump. The ambulance must have an inverter to power the pump while in the vehicle.
(4) The total volume of amiodarone infused must be recorded on the patient care report.
(5) The patient must be on a cardiac monitor and vital signs should be documented on the patient care report at least every 15 minutes.
(6) When in doubt, contact the **sending** physician for medical direction.

# Interfacility – DILTIAZEM MAINTENANCE INFUSION FOR INTERFACILITY TRANSPORT



## a) INDICATIONS

During interfacility transports, a CRT or paramedic may monitor a patient on a continuous IV *diltiazem* infusion provided that:

*Diltiazem* maintenance infusion must have been started by the hospital staff prior to the interfacility transfer. An IV *diltiazem* maintenance infusion may NOT be started by the ALS clinician in the 9-1-1/prehospital setting.

## b) CONTRAINDICATIONS

(1) Patients who have not yet reached their 18th birthday.
(2) Infusion rates exceeding 15mg/hr.

## c) PROCEDURE

(1) Follow the appropriate ALS algorithm and maintain the infusion as directed by the sending physician, to a dose up to but not exceeding 15mg/hr.
(2) The sending physician must document the infusion to be administered on the patient's transport record or transport note, including the concentration of the medication and the infusion rate.
(3) **Service orientation and credentialing by an SCT service**: The infusion must be maintained on an infusion pump designed for transport, and the ALS clinician must be trained in the appropriate use of that specific make and model infusion pump. The ambulance must have an inverter to power the pump while in the vehicle.
(4) The total volume of *diltiazem* infused must be recorded on the patient care record.
(5) The patient must be on a cardiac monitor and vital signs should be documented on the patient care report at least every 15 minutes.
(6) When in doubt, contact the sending physician for medical direction.

**a) INDICATIONS**

(1) Patient currently enrolled in a hospice program OR patient being transported to a destination where they will be enrolled in a hospice program AND
(2) Patient with a valid Maryland MOLST B

**b) CONTRAINDICATIONS**

Patients who have not yet reached their 18th birthday.

**c) PROCEDURE**

(1) Patient has been screened by sending physician and the service's SCT nursing staff as appropriate for inclusion
(2) Patients with the following interventions/medications may be transported at the BLS level of care:
    Any medication running through a Portable Outpatient Fixed Medication Pump/ PCA pump, or fixed-rate CADD pump, even if being administered through a central venous line AND no other ALS interventions present. The pump settings may not be adjusted by patient or EMS clinician.
(3) Patients with the following interventions/medications may be transported at the ALS level of care:
    (a) Chest tube
    (b) Patients on a ventilator, including:
        (i) Tracheostomy less than 7 days since insertion
        (ii) Intubated patients
        (iii) Patients with recent vent setting changes within the past 24 Hours
    (c) Fix-rate intravenous infusion NOT on a Portable Outpatient Fixed Medication Pump/PCA pump, or computerized ambulatory delivery device (CADD) pump.
(4) Death during transport
    (a) In the event of patient death during transport to a destination in Maryland, continue to the destination and contact the patient's hospice agency for next steps.
    (b) For transport to a destination outside of Maryland:
        (i) If the patient death occurs in Maryland, the body should be transported back to the sending facility. The deceased should not be transported outside the state of Maryland. If the transport originates outside of a medical facility, contact local law enforcement from the scene of the patient's death prior to continuing transport.
        (ii) If the patient death occurs outside of Maryland, contact local authorities for direction.

# Interfacility – LIDOCAINE INFUSION FOR INTERFACILITY TRANSPORT



## a) INDICATIONS

During interfacility transports, a CRT or paramedic may monitor a patient on a continuous IV lidocaine infusion provided that:

(1) The lidocaine infusion must have been started by the hospital staff prior to an interfacility transfer. IV lidocaine infusions may NOT be started by the prehospital clinician in the prehospital setting.

## b) CONTRAINDICATIONS

Patients who are clinically unstable, including but not limited to, unstable vital signs and blood pressure, current arrhythmia, and active chest pain

## c) PROCEDURE

(1) Follow the appropriate ALS algorithm and maintain the infusion as directed by the sending physician.
(2) The sending physician must document the infusion to be administered on the patient's transport record or transport note, including the concentration of the medication and the infusion rate.
(3) The infusion must be maintained on an infusion pump designed for transport, and the clinician must be trained in the appropriate use of that specific make and model infusion pump. The ambulance must have an inverter to power the pump while in the vehicle.
(4) The total volume of lidocaine infused must be recorded on the patient care report.
(5) The patient must be on a cardiac monitor and vital signs should be documented on the patient care report at least every 15 minutes.
(6) When in doubt, contact the **sending** physician for medical direction.

### a) INDICATIONS

A CRT or a paramedic may monitor a patient on a continuous morphine sulfate infusion as long as the infusion was started by hospital staff prior to interfacility transfer (it may NOT be initiated by EMS).

### b) CONTRAINDICATIONS

Patients who are clinically unstable, including but not limited to, unstable vital signs and blood pressure (exception: patients being transported for hospice care)

### c) PROCEDURE

(1) Maintain the infusion as directed by the sending physician.
(2) The sending physician must document the infusion to be administered on the patient's transport record or transport note, including the infusion rate.
(3) The infusion must be maintained on an infusion pump designed for transport, and the clinician must be trained in the appropriate use of that specific make and model infusion pump. The ambulance must have an inverter to power the pump while in the vehicle.
(4) The total volume of morphine infused must be recorded on the patient care report.
(5) The patient must be on a cardiac monitor and vital signs should be documented on the patient care report at least every 15 minutes.
(6) When in doubt, contact the **sending** physician for medical direction.

# Interfacility – PROTON PUMP INHIBITOR FOR INTERFACILITY TRANSPORT



## a) INDICATIONS

A CRT or a paramedic may monitor a patient on a PPI infusion as long as the infusion was started by hospital staff prior to interfacility transfer (it may NOT be initiated by EMS).

## b) CONTRAINDICATIONS

(1) Patients who have unstable vital signs or are being transferred to an intensive care environment
(2) Patients with allergic reaction to infusing agent
(3) Patients who have not yet reached their 18th birthday

## c) PROCEDURE

(1) Follow the appropriate ALS algorithm and maintain the infusion as directed by the sending physician/practitioner.
(2) The paramedic will review the sending physician's order and will review the specific PPI agent to ensure appropriate administration, indications, and absence of contra-indications.
(3) The PPI infusion must be maintained on an infusion pump designed for transport, and the clinician must be trained in the appropriate use of that specific make and model infusion pump. The ambulance must be equipped to power the pump while the pump is in the vehicle.
(4) The administration of the PPI infusion will be recorded on the patient care report to include the agent's name, dose, rate, and volume infused during transport.
(5) When in doubt, contact the sending physician/practitioner for medical direction.

1. **INDICATIONS***
   a) Abdominal pain (severe, age 55 and older)
   b) Cardiac arrest
   c) Dyspnea, undifferentiated
   d) Pulseless extremity
   e) Trauma, thoraco-abdominal
   f) Tension pneumothorax, suspected

*Indications/use cases must be authorized by EMSOP after appropriate training.

2. **CONTRAINDICATIONS**
   Prehospital ultrasound exam shall not delay patient transport.

3. **PROCEDURE**
   a) Initiate appropriate medical or trauma protocol, including all BLS/ALS interventions.
   b) The credentialed ALS clinician will complete the appropriate prehospital ultrasound exam recording for at least 6 seconds.
   c) Exam will be interpreted, findings relayed, and images will be transmitted consistent with EMSOP guidelines established by the EMSOP medical director in coordination with consulting facilities, as appropriate for specific-use cases.
   d) Ultrasound (US) exams:
      **(1) Abdomen**: for patients aged 55 and older, with a high clinical suspicion for abdominal aortic aneurysm (abdominal pain radiating to the back or flank), perform a US of the abdominal aorta.
      **(2) Cardiac arrest (general):** for patients in cardiac arrest, perform US for:
         (a) Patients who have PEA as initial rhythm: obtain a cardiac view to determine presence or absence of cardiac activity.
            (i) If cardiac activity is absent, consider hyperkalemia or drug toxicity and treat appropriately.
            (ii) If cardiac activity is present, evaluate for pericardial effusion/tamponade and perform lung US to evaluate for pneumothorax.
            (iii) For traumatic arrest patients, if cardiac activity is present, administer whole blood (if available) and transport to closest appropriate trauma center. If cardiac activity is absent, provide care per *Trauma Arrest – Adult* or *Pediatric* protocols.
         (b) During CPR, use color flow US to monitor for ROSC, limiting interruptions in CPR for pulse checks.
         (c) During CPR, to evaluate for endotracheal tube placement
         (d) Prior to termination of resuscitation, perform cardiac US to verify absence of cardiac activity.
      **(3) Cardiac arrest (to inform transport timing):**
         (a) For patients in PEA following the administration of the third dose of *epinephrine*, perform carotid ultrasound to evaluate blood flow during pulse check.

(i) If carotid blood flow is detected in the absence of a palpable pulse:
- continue chest compressions
- consider early transport to CIC
- consider treatment of profound hypotension including more *epinephrine*, IV fluid boluses, and *epinephrine* drip

**(4) Cardiac arrest (to inform TOR decision):**

(a) For cardiac arrest patients with suspected medical etiology, in a rhythm other than asystole, who have an $ETCO_2$ greater than or equal to 15 mmHg after at least 15 two (2) minute rounds of CPR, perform carotid ultrasound to evaluate blood flow during pulse check:

(i) If carotid blood flow is present, clinicians may not terminate resuscitation.

(ii) In the absence of carotid blood flow, clinicians may terminate resuscitation regardless of $ETCO_2$ reading.

**(5) Dyspnea:** for patients with undifferentiated dyspnea, perform lung US:

(a) to evaluate for presence of abnormal "b-lines", indicating increased interstitial fluid (CHF/pneumonia), using accepted criteria

(b) to evaluate for the absence of lung sliding (pneumothorax)

**(6) Pulseless extremity:** for patients with high suspicion for vascular occlusion, evaluate for color flow of affected limb

**(7) Trauma:** for patients presenting with torso or abdominal pain or who present with high-impact, high-mechanism trauma, a prehospital e-FAST exam will be performed. Patients with an e-FAST exam indicating intra-abdominal or intra-thoracic fluid following a traumatic injury occurring within the past 1 hour may receive treatment with *TXA*.

(a) Morison's perihepatic view

(b) Pelvic view

(c) Perisplenic view

(d) Cardiac view

(e) Lung view (to evaluate for pleural sliding artifact)

1. **Indications**
   Patients eligible for entry into the Stabilization Center must be without an acute medical or traumatic complaint. If the patient is not requesting evaluation for an emergency medical condition and substance use is suspected, including suspected opioid patients who have improved with naloxone, patient must consent to be evaluated and transported to the Stabilization Center. Then the EMS clinician must complete the Stabilization Inclusion Checklist.

2. **Treatment**
   Initiate patient screening. All answers must be "YES" for the referral protocol to continue. For any "NO" answers, consultation with an adult Base Station is required.

| | | |
|---|---|---|
| Patient without acute medical or traumatic complaint | YES | NO |
| Patient is age 18 or older | YES | NO |
| Patient is willing and able to cooperate with examination | YES | NO |
| Systolic BP greater than 80 mmHg and less than 220 mmHg | YES | NO |
| Diastolic BP greater than 50 mmHg and less than 120 mmHg | YES | NO |
| Pulse less than 120 | YES | NO |
| Pulse greater than 50 | YES | NO |
| Respiratory rate less than 22 | YES | NO |
| Respiratory rate greater than 10 | YES | NO |
| Blood glucose less than 300 mg/dl | YES | NO |
| Blood glucose greater than 70 mg/dl | YES | NO |
| Pulse oximetry greater than 92% and no supplemental oxygen required | YES | NO |
| Patient accepts transport to Stabilization Center | YES | NO |
| NO evidence of significant head or truncal trauma | YES | NO |
| NO evidence of new head trauma (ecchymoses, hematomas) | YES | NO |
| NO evidence of uncontrolled bleeding | YES | NO |
| Patient can walk with no more than minimal assistance<br>→No assistive devices (cane, walker permitted)<br>→No assistance/stabilization of more than one limb required | YES | NO |

3. **Medical consultation is required for any "NO" response.**
4. **If all answers are "YES" or medical consultation approves if a "NO" occurs, the patient shall be transported to the Stabilization Center.**

# Alternative Destination (AD) Protocol

- Low Acuity / Priority 3 Patient
- Patient is 18 years of age or older
- Able to Communicate with EMS
- Understands Consent Form/Process
- Agrees to be transported to AD

Yes

Vital Signs Acceptable?

**ACCEPTABLE VITAL SIGNS**
- **Respirations:** 10-20
- **Pulse:** 50-120
- **Pulse Ox:** >92%
- **Temperature:** 96-102 F
- **Blood Glucose:** 70-300

**ACCEPTABLE BLOOD PRESSURES:**
- **Urgent Care/PCP:** Systolic 100-160 & Diastolic 60-100
- **Stabilization/Crisis Center:** Systolic 80-220 & Diastolic 50-120

Yes

High Risk Conditions Absent?

**High Risk Conditions**
- Abdominal Pain, Unexplained
- Altered Mental Status
- Back Pain, Unexplained
- Chest Pain
- Dyspnea/Shortness of Breath
- Focal Neurological Deficits (Acute)
- Seizures
- Sepsis, Suspected
- Syncope
- **Requires more than minimal assistance to walk**
- **Unable to Cooperate with History and Exam**

Yes

Physical Exam without Time Dependent Needs.

**Physical Exam/Time Dependent Needs**
- Airway
- Breathing
- Circulation (Including to Extremity)
- Disability (Deficit) or Deformity
- Severe Tenderness with Palpation/Exam
- Significant Head or Truncal Trauma
- Uncontrolled Bleeding
- **Require ALS Monitoring or Interventions**
- **Concern for Potential Deterioration in Condition**

Yes

Obtain Consent from Patient

Contact & Obtain Acceptance of Patient from AD

Transport to AD

**IF ANY HIGH RISK CONDITIONS OR PHYSICAL EXAM/TIME DEPENDENT NEEDS, EMS SHALL TRANSPORT TO CLOSEST APPROPRIATE ED/FEMF**

**IF PATIENT IS EXCLUDED BASED ON VITALS ALONE, TRANSPORT TO CLOSEST APPROPRIATE ED/FEMF UNLESS MEDICAL DIRECTION FROM APPROVED BASE STATION AUTHORIZES TRANSPORT TO ALT DESTINATION**

*Rev. 06/10/2019 – Approved EMS Board 06/11/2019*

**Examples of Low Acuity Chief Complaints**

- Allergy or hay fever
- Back pain, mild; able to walk without assistance
- Contusions or abrasions, minor
- Cough, mild; without hemoptysis or respiratory impairment
- Non-traumatic dental problems
- Diarrhea, without dizziness or other signs of dehydration
- Dizziness, chronic (recurrent or known history)
- Dysuria, mild; female
- Ear pain
- Ingrown toenails
- Itching without systemic rash
- Eye irritation without signs of active infection, minor
- Fracture, distal extremity (forearm, lower leg), isolated injury, not open, With neuro/ vascular intact
- Headache, minor without neurological impairment
- Injury follow-up (minor injury, treated previously)
- Joint pain
- Mouth blisters
- Muscle aches
- Nausea, vomiting
- Neck pain (no history of acute trauma)
- Nosebleed (resolved)
- Painless urethral discharge
- Physical exam requests (except patients with diabetes, CHF, kidney failure, cancer)
- Plantar warts
- Rectal pain/itching, minor
- Sexual disease exposure
- Simple localized rash
- Sinusitis, chronic
- Skin infection or sores, minor
- Sore throat without stridor
- Sunburn (localized without blisters)
- Vaginal discharge
- Vaginal bleeding (Hx non-pregnant, not postpartum, and requires less than one pad in 5 hours)
- Upper respiratory infection
- Work release or disability
- Wound checks

# Pilot Protocol – MINOR DEFINITIVE CARE



**Note: This document does not contain all of the material approved by the EMS Board. For the entire text of the protocol, contact the Office of the Medical Director.**

## 1. PURPOSE

The objective of this pilot program is to assess the impact, accuracy and safety of providing low-acuity patients, identified as Alpha patients by IAED criteria (Basic Life Support), with immediate on-scene care by a two-person team composed of a BCFD Minor Definitive Care Now (MDCN) paramedic clinician, and one of the following Advanced Level Clinicians (ALC): a Nurse Practitioner (NP), a Maryland-licensed physician with board certification in emergency medicine ("Physician"), or Physician Assistant (PA). This will be referred to as the MDCN Team.

## 2. INDICATIONS

a) Low-acuity patients, identified by the IAED™ MPDS® protocol as an 'Alpha determinant code Basic Life Support,' who meet additional criteria outlined in the MDCN protocol below; AND
b) Patients who consent to participate in the MDCN Pilot Program.

## 3. CONTRAINDICATIONS

a) Patients who decline enrollment in MDCN Pilot Program;
b) Patients who are deemed clinically inappropriate for on-scene treatment by the MDCN Team following assessment;
c) Individuals who refuse participation by revoking written consent, verbal refusal of care at time of visit;
d) Patients who possess a language or communication barrier that inhibits the MDCN Team's ability to appropriately address the patient's needs at the scene;
e) Patients who are not able to or lack the capacity to understand the informed consent process; and
f) Patients who have not yet reached their 18th birthday.

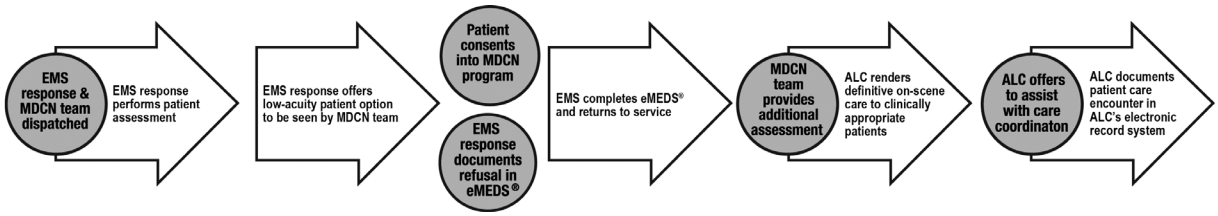
## 4. GENERAL PROCEDURES

a) When a 9-1-1 call response for EMS service is dispatched, the MDCN Team will respond to the scene concurrently with the typical EMS response unit to Alpha-level calls within the EMS jurisdiction.
b) If a patient refuses EMS care and transport, a patient refusal form and eMEDS® should be completed per *The Maryland Medical Protocols for Emergency Medical Services* while on scene.
c) If the patient is determined to be a low-acuity candidate for MDCN program (as defined in Section VI below), the EMS response personnel will offer the patient the option to be seen by the MDCN Team.
d) The MDCN Team will request patient consent (see MDCN Consent Form) to provide minor definitive treatment on scene.
e) Once consent is provided, patient information, including information collected by the EMS response personnel can be shared with the ALC.
f) The EMS response personnel will return to service. If the MDCN Team determines that the patient needs to be transported and the patient decides they want to be transported, or if for any reason, the patient decides they want to be transported, the MDCN

Paramedic will radio PSAP for an EMS transport unit. After requesting the unit, the BCFD MDCN Paramedic will perform any advanced life support skills, as defined by the MIEMSS Protocols for EMS Clinicians, to provide all necessary care within their scope of practice, until additional EMS clinicians arrive on scene and assume patient care and transport to the closest appropriate hospital. Any care rendered under the MIEMSS Protocols will be documented in eMEDS.

g) The MDCN Team performs any additional assessment and if indicated, the ALC will render treatment. The MDCN Paramedic may assist with patient assessment (e.g., vital signs, pulse oximetry), the ALC will provide treatment associated with the MDCN Pilot Program.
h) The ALC may also offer to assist patients with setting up clinic appointments.
i) The MDCN Team documents the patient care encounter in the ALC's electronic health record system. If at any time during the encounter the patient refuses further assessment or treatment, the refusal must be documented in the ALC's electronic health record system.
j) The ALC and MDCN Paramedic clinicians will be restricted to their respective scopes of practice set by the Maryland Board of Nursing, Maryland Board of Physicians and MIEMSS.

## 5. ADVANCED LEVEL CLINICIAN PROCEDURES




a) This protocol may only be used by the Advanced Level Clinician (ALC).
b) MDCN Paramedics will follow *The Maryland Medical Protocols for Emergency Medical Services*.
c) Under the MDCN Pilot Program, all eligible patients will be offered the choice to "opt in" to receive on-scene definitive care. Participation in this pilot program is voluntary and will require patients to provide signed, informed consent. The on-scene treatment provided by the ALC will be in accordance with the medication and procedure list as approved by MIEMSS.
d) Inclusion Criteria: the patient must provide consent and must not have any of the following exclusion criteria:
   (1) A chief complaint consistent with evaluation that would indicate a need for the capabilities of a full service ED
      (a) High risk chief complaints are currently defined as dyspnea, altered mental status, syncope, chest pain, focal neurological deficits, unexplained back or abdominal pain, seizures, and sepsis (see vital sign criteria listed in 8. Medical Consultation (see below).
   (2) Physical findings consistent with time-dependent needs for emergent assessment or stabilization

(a) Signs on exams that indicate a threat to airway, breathing, circulation, circulation to an extremity, disability (deficit) or deformity, as well as severe tenderness (as indicated by an assessment of airway, breathing, circulation, disability, exposure (ABCDE), etc.).

(3) Reasonably foreseeable signs or suspicion of any deterioration of condition (e.g., airway, breathing, hemodynamic, or neurologic compromise)

(4) Any requirement for any advance life support (ALS) monitoring or ALS interventions

e) In order to include the patient in the MDCN Pilot Program, the MDCN Team will obtain a complete set of vital signs, medical history, and the ALC will obtain a signed MDCN Pilot Program Consent Form.

f) If the patient is stable and deemed by the ALC to meet the criteria of the MDCN protocol, and has an injury or disease process, which can be safely treated on-scene:

(1) The consenting patient will receive definitive on-scene care by the ALC member of the MDCN Team.

(2) If the patient refuses to participate in the MDCN Pilot Program, the patient's condition deteriorates, or while on scene the patient changes their mind and declines to participate, the patient will be taken to the closest appropriate ED via ambulance. See 4. General Procedures above for response steps.

g) The MDCN Team will provide discharge instructions for each patient who participates in the MDCN Pilot Program.

h) In the event that the MDCN Team evaluates the consented patient and recommends ED transfer but the patient refuses, see 4. General Procedures above for appropriate actions.

**6. MEDICATION MANAGEMENT**

The ALC is authorized to manage drugs and devices under the following protocols:

a) The management of drugs or devices includes evaluating, initiating, altering, discontinuing, furnishing and ordering of prescriptive and over-the-counter medications.

b) Medication evaluation includes assessment of:

(1) Other medications being taken

(2) Prior medications used for current condition

(3) Medication allergies and contraindications, including appropriate labs and exams

c) The drug or device is appropriate to the condition being treated, and:

(1) Accepted dosages per references.

(2) Generic medications are ordered if appropriate.

d) A plan for follow-up is written in the patient's chart and provided to the patient.

e) The prescription must be written in patient's electronic health record chart, including name of drug, strength, instructions and quantity, and signature of the ALC.

**7. DISPENSING MEDICATIONS**

The ALC may dispense prescription drugs and devices, under the following protocols:

a) They have current prescriptive authority, including Maryland CDS registrations.

b) All drugs and devices ordered are limited to the Formulary OR are per the recommendations in the Resources listed in this document.

c) The drugs and devices ordered are consistent with the ALC's educational preparation or

for which clinical competency has been established and maintained.

d) The drug or device ordered is appropriate to the condition being treated.
e) Patient education is given regarding the drug or device.
f) The name, title, and licensing number of the ALC is written on the transmittal order.
g) A physician affiliated with the MDCN Pilot Program is available during hours of operation for in person or telephone medical consultation.
h) The drug or device utilizes required pharmacy containers and labeling.
i) All appropriate record keeping practices of the dispensary are performed.
j) All other applicable Standardized Procedures in this document are followed during health care management.
k) All General Policies regarding Review, Approval, Setting, Education, Evaluation, Patient Records, Supervision and Consultation in these Standardized Procedures are in force.

**8. MEDICAL CONSULTATION**

While it is the intent of MDCN Pilot Program to respond to low-acuity calls, if immediate patient deterioration should occur, EMS transport resources shall be utilized.

*MDCN Medical Director notification and/or emergent ALS transport to the closest appropriate ED with the following being examples of patients and scenarios that shall generate ALS transport:*

a) Acute myocardial infarction (AMI) or symptoms consistent with AMI
b) Acute central nervous system or focal neurologic deficits
c) Severe CHF
d) Severe respiratory distress
e) $O_2$ Saturation less than 90% on room air, if acute
f) Hypotension
g) Acute altered mental status, unless intoxicated
h) Adult heart rate greater than or equal to 140
i) Emergency hypotension
j) Moderate to severe CHF
k) SBP greater than or equal to 240 or DBP greater than or equal to 140 at presentation (asymptomatic) with preexisting hypertension history
l) Adult heart rate greater than or equal to 110 at time of disposition
m) The MDCN Team responds in less than 14 days for same acute complaint *Does not apply to chronic recurrent complaints unless there is a change in the complaint*
n) Elevated BP or heart rate in pregnancy or less than or equal to 6 weeks post-partum
o) Pregnancy complications
p) Chest pain (potentially consistent with angina or angina equivalent symptoms)
   (1) Nonspecific chest pain age greater than or equal to 30 with history of:
      - Hypertension
      - Diabetes
      - Smoking
      - Coronary artery disease
      - Hyperlipidemia
      - Family history of coronary artery disease by age of 60; OR

      Nonspecific chest pain age greater than or equal to 50 without risk factors

- Abdominal pain
- Requiring analgesic

Nonspecific chest pain age greater than or equal to 70

- Diabetic
- Uncertain diagnosis

(2) Lab Criteria:

- D-Stick – less than 70 or greater than 300
- Oxygen Sat 2% less than chronic levels

(3) Vital sign and age consult criteria

- Heart rate/minute
  - Adult heart rate greater than or equal to 110
- Hypertension
  - Adult asymptomatic hypertension of SBP greater than 220 or DBP greater than 120 at time of disposition with history of hypertension
  - Adult asymptomatic SBP greater than 195 or DBP greater than 115 at disposition without history of hypertension

# Pilot Protocol – LOW TITER O+ WHOLE BLOOD (LTO+ WB) TRANSFUSION





1. **Indications**

Clinical suspicion for major blood loss WITH evidence of significant physiologic compromise

**Clinical suspicion for major blood loss, such as:**

- Penetrating trauma to the trunk
- Unstable pelvic fracture or multiple long bone fractures
- Blunt trauma mechanism consistent with major internal blood loss
- Observed major external blood loss
- Signs and symptoms of massive GI bleed, ruptured aortic aneurysm, or ruptured ectopic pregnancy

**WITH**

**Evidence of significant physiologic compromise:**

Age-defined hypotension* **PLUS** at least **one** of the following:

- Age-defined tachycardia**
- $ETCO_2$ less than 25
- Positive eFAST exam (if available)
- Lactate greater than 4 (if available)
- Capillary reperfusion greater than 3 sec
- Altered sensorium thought not secondary to intoxication or head trauma
- Witnessed PEA cardiac arrest less than 5 min duration

| *Age-Defined Hypotension |
|---|
| Ages less than 10 Yrs: systolic BP less than [70 + 2 x years)] |
| Ages 10-65: systolic BP less than 90 |
| Ages greater than 65: systolic BP less than 100 |
| Any age: absent radial pulses |

| **Age-Defined Tachycardia |
|---|
| Age 1 year: greater than 190 |
| Ages 2-12 yrs: greater than 140 |
| Ages greater than 12 years: 120 |

**On-line medical direction required for patients under 1 year of age.**

2. **Contraindications**

a) Patient indicates refusal to receive blood
b) Medic alert tag indicating patient objection to receiving blood

3. **Procedure**

a) Ensure applicable hemorrhage and shock interventions: tourniquet, wound-packing, pelvic binder, thoracic decompression
b) Assess for contraindications to administration of LTO+ WB
c) Obtain IV access (18 gauge or larger, if possible), and keep IV catheter hub accessible to allow direct connection of blood tubing. A large-bore IV extension set and large-bore stopcock may be utilized if available. Obtain pre-transfusion blood sample, if possible.
d) IV infusion is preferable to IO infusion for optimal flow rates.
e) Transfuse LTO+ WB

(1) Patients less than 35 kg: Administer 10 mL/kg IV/IO
(2) Patients greater than or equal to 35 kg: Administer 1 unit IV/IO

f) Apply Whole Blood identification bracelet to patient's wrist or ankle
g) Assess for signs of transfusion reaction***
h) Assess for clinical improvement
   For patients with non-compressible hemorrhage: Look for signs of improved perfusion with presence of central pulses, but use permissive hypotension approach. Target a systolic BP of:
   - 90 mmHg for patients less than 35 kg
   - 100 mmHg for patients greater than or equal to 35 kg
   - 110 mmHg for patients greater than or equal to 35 kg with significant TBI
i) If inadequate clinical improvement, transfuse additional LTO+ WB
   (1) Patients less than 35 kg: Administer 10 mL/kg IV/IO
   (2) Patients greater than or equal to 35 kg: Administer 1 unit IV/IO
j) If inadequate clinical improvement, also administer *calcium chloride* through a separate line or following the second LTO+ WB dose.
   (1) Patients less than 35 kg: 20 mg/kg slow IV/IO
   (2) Patients greater than or equal to 35 kg: 1 gram slow IV/IO
k) Assess for signs of transfusion reaction***
l) Upon hospital arrival, inform receiving team of patient's receipt of whole blood, and provide empty whole blood bags and pre-transfusion blood sample (if obtained) for hospital blood bank evaluation.

***Possible transfusion reaction signs and symptoms: Hives, wheezing, rigors, fevers, abdominal pain, vomiting, sudden worsening of hypotension or tachycardia that is not consistent with patient's underlying condition

If transfusion reaction is suspected:
- Immediately discontinue the transfusion
- Administer dexamethasone IV/IO AND diphenhydramine IV/IO in age appropriate doses

A new transfusion from a different unit of LTO+ WB may be initiated if patient reassessment indicates continued need for blood.

# Pilot Protocol – INTRAVENOUS NITROGLYCERIN FOR SEVERE CHF (Paramedic Only)





1. **Indications**
   Severe acute pulmonary edema (CHF), with SBP of 150 mmHg or greater (or MAP greater than 90 mmHg), following the application of CPAP or BiPAP

2. **Pharmacokinetics**
   a) Antianginal and vasodilation effects within 1-2 minutes after administration. Half-life is 1-4 minutes.
   b) Duration of action is less than 5 minutes.

3. **Contraindications**
   a) Known hypersensitivity
   b) Patients under 18 years of age
   c) Patient with mild or moderate symptoms that are well-controlled with sublingual *nitroglycerin*
   d) Systolic blood pressure less than 150 mmHg (or MAP less than 90 mmHg)

4. **Adverse effects:**
   Headache, hypotension, nausea, vomiting, dizziness, and decreased level of consciousness

5. **Precautions:**
   a) IV bolus *nitroglycerin* should be diluted to 100 **mcg** /1 mL with D5W or normal saline prior to administration
   b) IV bolus *nitroglycerin* may induce severe hypotension, particularly in preload-dependent conditions
   c) IV bolus *nitroglycerin* may induce rebound hypertension
   d) Obtain 12-lead ECG prior to administering IV NTG
   e) Withhold IV nitrates with inferior STEMI with known right-sided involvement, as patients may be preload-dependent

6. **Dosage:**

   **Adult:**

   a) While IV *nitroglycerin* may be started by paramedics without medical direction, online medical consultation must be obtained for any patient treated using this protocol at the earliest possible opportunity.
   b) IV Bolus
      (1) Use a 25mg/250ml vial (100 **mcg**/mL), OR a high dose vial which has been diluted to 100 **mcg**/mL in D5W or normal saline
      (2) Administer 400 **mcg** SLOW IV every 5 minutes, titrated to achieve a 20% reduction in SBP
      (3) Medical consultation required for further administration beyond 2 separate dosages of IV bolus *nitroglycerin*

c) IV Infusion pump
   (1) Only for use in EMSOPs approved for IV infusion pump OSP
   (2) Start at 40 **mcg**/min, increase rate by 5 **mcg**/min every 5 minutes, to achieve a 20% reduction in SBP; maximum rate of 100 **mcg**/min.
   (3) If SBP decreases by more than 20%, reduce infusion rate by 5 **mcg**/min every 5 minutes until goal SBP is attained.

**Pediatric:**
Contraindicated for patients less than 18 years of age

# Optional Supplemental Protocol – AIRWAY MANAGEMENT: BI-LEVEL POSITIVE AIRWAY PRESSURE (BiPAP) – CHRONIC





## 1. PURPOSE

To define the indications for the use of BiPAP by a paramedic for the continuation of BiPAP airway management which has been initiated prior to EMS arrival.

a) The level of care required for the interfacility transport of a "Chronic BiPAP Patient" is within the scope of a practice of a paramedic who has been credentialed, is competent, and received adequate training specific to the patient's condition and equipment necessary to provide care.
b) Exception: A CRT or EMT may transport a chronically ventilated patient who is going for routine medical care and has in attendance a patient provided attendant who can manage the patient's specific BiPAP equipment.

## 2. INDICATIONS

a) Patient has established BiPAP settings that have no changes within 6 hours or changes reflecting improvement in the patient's condition.
b) Patients who are 13 years of age or older. If less than 13 years of age, patients shall be screened by SCT service (medical director or nurse) to determine the crew composition.
c) Exception: A CRT or EMT may transport patients of any age who are chronically on BiPAP if they are being transported for routine appointments, which are not related to a respiratory complaint. A patient-provided attendant who can manage the patient's specific BiPAP equipment must be present during the transport.

## 3. CONTRAINDICATIONS

Circumstances in which endotracheal intubation or a surgical airway is indicated

## 4. PROCEDURE

a) Assure patent airway.
b) Perform appropriate patient assessment, including obtaining vital signs, pulse oximeter ($SpO_2$) reading, and cardiac rhythm.
c) Apply BiPAP device per manufacturer's instructions.
d) Program the device to match the settings of the BiPAP machine that the patient is currently using.
e) Assess the patient after placing the BiPAP device selected for transfer. If respiratory distress occurs, support the patient with a BVM and supplemental oxygen until facility personnel reestablish therapy with original BiPAP device.
f) Continuously reassess the patient.
g) Monitor continuous pulse oximetry.
h) Monitor continuous $ETCO_2$ with nasal prongs, if available. (Adults only)
i) Follow the appropriate set of standing orders for continued transport.
j) Confirm the availability of a BiPAP device at the destination facility.
k) Continuation of BiPAP that exceeds the settings in (e) above requires a sending physician order prior to leaving the sending facility

FOR CIRCUMSTANCES IN WHICH THE PATIENT DOES NOT IMPROVE OR CONTINUES TO DETERIORATE DESPITE BIPAP AND/OR MEDICAL THERAPY, TERMINATE BIPAP ADMINISTRATION AND PERFORM BVM VENTILATION AND ENDOTRACHEAL INTUBATION IF NECESSARY.

# 15.2 Optional Supplemental Protocol – AIRWAY MANAGEMENT: BI-LEVEL POSITIVE AIRWAY PRESSURE (BiPAP) – ACUTE



**1. PURPOSE**

To define the indications for the initiation of BiPAP by a paramedic

**2. INDICATIONS**

Patients who are 13 years of age or older, presenting with respiratory distress or failure, due to respiratory infection, pulmonary edema, COPD or asthma. The patient must have a patent, self-maintained airway and spontaneous respirations.

**3. CONTRAINDICATIONS**

a) Circumstances in which endotracheal intubation or a surgical airway is indicated
b) Patients under 13 years of age

**4. PROCEDURE**

a) Ensure emergency equipment is immediately available and an alternate airway management plan has been established.
b) Assure patient airway.
c) Perform appropriate patient assessment, including obtaining vital signs, pulse oximeter ($SpO_2$) reading, and cardiac rhythm.
d) Apply BiPAP device per manufacturer's instructions.
e) Set initial inspiratory positive airway pressure (IPAP) and expiratory positive airway pressure (EPAP) to decrease patient respiratory effort and adjust as needed.
   (1) Start with EPAP at 5 cm of water (max 8 cm of water).
   (2) Start with IPAP at 10 cm of water (max 15 cm of water).
f) Reassess the patient after placing the BiPAP device.
g) Monitor continuous pulse oximetry.
h) Monitor continuous $ETCO_2$ with nasal prongs, if available. (Adults only)
i) Notify the receiving facility that the patient is on a BiPAP device.
j) If the patient is located within a healthcare facility, observe the patient on BiPAP at the referring facility. If the patient is not tolerating BiPAP, consult with the sending or receiving physician prior to transport.

ALERT FOR CIRCUMSTANCES IN WHICH THE PATIENT DOES NOT IMPROVE OR CONTINUES TO DETERIORATE DESPITE BIPAP, TERMINATE BIPAP ADMINISTRATION AND PERFORM BVM VENTILATION AND ENDOTRACHEAL INTUBATION IF NECESSARY.

# Optional Supplemental Protocol – AIRWAY MANAGEMENT: HEATED/HUMIDIFIED HIGH-FLOW NASAL CANNULA (HHFNC) 15.3-A



## 1. PURPOSE

To define the indications for the initiation or continuation of HHFNC by an appropriately trained paramedic for patients 13 years of age and older.

## 2. INDICATIONS

Patients with hypoxic respiratory failure, which may be due to the following causes: pulmonary edema, pneumonia, pulmonary embolism, pulmonary hypertension, or interstitial lung disease.

## 3. CONTRAINDICATIONS

a) Inability to provide continuous, heated humidification using an approved delivery device.
b) Inability to provide therapy through an appropriate sized nasal prongs
c) Insufficient supply of oxygen to complete the transport
d) Basilar skull fracture or severe facial trauma
e) Circumstances in which BiPAP/CPAP, endotracheal intubation or surgical airway is indicated
f) Patient cannot tolerate transport on 100% $FiO_2$ (if blended air is not available)

## 4. PROCEDURE

a) Ensure that an adequate supply of oxygen is available for the transport.
   (1) Calculate the amount of oxygen available to transport the patient with current therapy:

$$\text{Minutes of available oxygen} = \frac{\text{Tank PSI} \times \text{Tank Factor}}{\text{Flow rate} \times FiO_2}$$

   Tank PSI: pounds
   Tank Factor: D size = 0.16; E size = 0.28; G size = 2.41; H and K size = 3.14; M size = 1.56
   Flow rate: liters per minute
   $FiO_2$: expressed as a fraction (e.g., 40% = .40)
   (2) Estimate total duration of transport and ensure there is either 60 minutes of reserve oxygen above the projected need or twice the amount of necessary oxygen available, whichever amount is less.
b) Perform appropriate patient assessment, including obtaining vital signs, pulse oximeter ($SpO_2$) reading, and cardiac rhythm.
c) Set $FiO_2$ to maintain $SpO_2$ at or above 94% (or to patient's baseline oxygen saturation, if known).
d) Set flow rate in liters per minute (L/min) to decrease work of breathing.
   (1) Flow calculation: 2 L/kg/min up to the first 12 kg, plus 0.5 L/kg/min for each kg thereafter, up to a maximum flow rate of 60 L/min.
e) Reassess vital signs, work of breathing, mental status and breath sounds.
f) Consider the need for escalation of respiratory support if patient remains in respiratory failure on more than 2 L/kg/min of flow or maximum settings for the delivery device.

ALERT

FOR CIRCUMSTANCES IN WHICH THE PATIENT DOES NOT IMPROVE OR CONTINUES TO DETERIORATE ON HHFNC, TERMINATE HHFNC ADMINISTRATION AND ESCALATE RESPIRATORY SUPPORT TO PROVIDE POSITIVE PRESSURE VENTILATION VIA CPAP, BIPAP, BVM OR ENDOTRACHEAL INTUBATION, IF NECESSARY.

## 1. PURPOSE

To define the indications and contraindications for continuation of HHFNC for patients less than 13 years of age undergoing interfacility transport by an appropriately trained paramedic, who is credentialed and operating as part of a specialty care transport service. The SCT service must routinely transport pediatric patients and have age-appropriate HHFNC equipment.

## 2. INDICATIONS

Patients with hypoxic respiratory failure who meet **all** of the following criteria:

a) Patient age: 3 months (corrected gestational age) to 12 years
b) Patient started on HHFNC flow prior to transport for support of respiratory illness
c) Patient has been on stable or decreasing rate of flow for at least 6 hours prior to transport
d) HHFNC rate is ≤2L/kg/min, up to 24 L/min maximum rate of flow, and $FiO_2$ is ≤ 50%
e) Patient has been screened by a specialty care transport team medical director or RN and has been approved for paramedic only transport

## 3. CONTRAINDICATIONS

a) Inability to provide continuous HHFNC using approved delivery device
b) Inability to provide therapy through appropriate sized nasal prongs
c) Insufficient supply of oxygen to complete the transport
d) Basilar skull fracture or severe facial trauma
e) Circumstances in which BiPAP/CPAP, endotracheal intubation or surgical airway is indicated
f) Patient cannot tolerate transport on 100% $FiO_2$ (if blended air is not available)

## 4. PROCEDURE

a) Ensure that an adequate supply of oxygen is available for the transport.
   (1) Calculate the amount of oxygen available to transport the patient with current therapy:
   $$\text{Minutes of available oxygen} = \frac{\text{(Tank PSI x Tank Factor)}}{\text{(Flow rate x } FiO_2\text{)}}$$
   Tank PSI: pounds
   Tank Factor: D size = 0.16; E size = 0.28; G size = 2.41; H and K size = 3.14; M size = 1.56
   Flow rate: liters per minute
   $FiO_2$: expressed as a fraction (e.g., 40% = .40)
   (2) Estimate total duration of transport and ensure there is either 60 minutes of reserve oxygen above the projected need or twice the amount of necessary oxygen available, whichever amount is less.
b) Perform appropriate patient assessment, including obtaining vital signs, pulse ox ($SpO_2$) and breath sounds.
c) If using blended air, set $FiO_2$ to match the $FiO_2$ on which patient has been maintained in the sending facility. Goal $SpO_2$ of ≥ 94% or per medical direction.
d) Set flow rate (L/min) to match the flow rate the patient is currently receiving. If the flow rate cannot be matched exactly, round up to next closest flow rate setting on the transport HHFNC device.
e) Reassess vital signs, work of breathing, mental status and breath sounds.
f) If patient appears unstable for transport (e.g., hypoxic, agitated) on current HHFNC settings, consult the SCT service medical direction.

# Optional Supplemental Protocol – ANTIMICROBIAL INFUSION FOR INTERFACILITY TRANSPORT





**1. PURPOSE**

During interfacility transports, a paramedic may monitor a patient on a continuous IV antimicrobial medication infusion as long as the following criteria have been met.

**2. INDICATIONS**

The antibiotics infusion must have been started by the hospital staff prior to an interfacility transfer. IV antimicrobial infusions may NOT be initiated by the prehospital clinician.

**3. CONTRAINDICATIONS**

a) Patients who have unstable vital signs or are being transferred to an intensive care environment
b) Patients with allergic reaction to infusing antibiotic agent or class
c) Pediatric patients

**4. PROCEDURE**

a) Follow the appropriate ALS algorithm and maintain the infusion as directed by the sending physician/practitioner.
b) The paramedic will review the sending physician's antibiotics order and will review the specific antibiotic agent to ensure appropriate administration, indications, and absence of contraindications.
c) Unless not indicated per the medication profile, the antimicrobial infusion must be maintained on an infusion pump designed for transport, and the clinician must be trained in the appropriate use of that specific infusion pump. The ambulance must have an inverter to power the pump while in the vehicle.
d) The administration of the antibiotics infusion will be recorded on the patient care report to include the antibiotic agent's name, dose, rate, and volume infused during transport.
e) When in doubt, contact the sending physician/practitioner for medical direction.

**5. SPECIAL CONSIDERATIONS**

a) The ALS service or jurisdiction must provide and document training of the ALS clinicians on the operation of infusion pump(s) being used.
b) The ALS service or jurisdiction must provide and document training of the ALS clinicians on the general administration of antimicrobials. However, due to the vast array of antimicrobials, the paramedic must utilize a practice of evaluating each patient care situation with the use of current medication reference materials to ensure appropriate administration of the infusion.
c) The ALS service or jurisdiction must also have a quality improvement (QI) program monitoring the appropriateness and quality of care provided. The QI program should be directed or coordinated by, at minimum, an ALS clinician.

1. **PHARMACOLOGY**
   Antimicrobials are agents that kill microorganisms or suppress their multiplication or growth.

2. **PHARMACOKINETICS**
   Antimicrobial agents are classified functionally according to the manner in which they adversely affect a microorganism.

3. **INDICATIONS**
   Treatment of known or suspected infectious disease, or as prophylaxis for an infectious process

4. **CONTRAINDICATIONS**
   a) Patients who have unstable vital signs or are being transferred to an intensive care environment
   b) Patients with allergic reaction to specific antibiotic agent or class
   c) Pediatric patients

5. **ADVERSE EFFECTS AND PRECAUTIONS**
   Antimicrobials have various adverse effects depending on the specific agent's mechanism of action. Current medication reference materials should be consulted for specific patient situation.

6. **DOSAGE**
   a) Adult: Administer per practitioner order.
   b) Pediatric: Not indicated.

## 1. INDICATIONS

Depending on its form, cyanide can enter the body through inhalation, ingestion, or absorption through the skin. Cyanide should be suspected in occupational or smoke exposures (e.g., firefighting), industrial accidents, natural catastrophes, suicide and murder attempts, chemical warfare, and terrorism (whenever there are multiple casualties of an unclear etiology).

Non-specific and early signs of cyanide exposure (inhalation, ingestion, or absorption) include the following signs and symptoms: anxiety, vertigo, weakness, headache, tachypnea, nausea, dyspnea, vomiting, and tachycardia.

**"High concentrations of cyanide" will produce:**

- Markedly altered level of consciousness
- Seizure
- Respiratory depression or respiratory arrest or
- Cardiac dysrhythmia (other than sinus tachycardia)

The rapidity of onset is related to the severity of exposure (inhalation or ingestion) and may have dramatic, immediate effects causing early hypertension with subsequent hypotension, sudden cardiovascular collapse, or seizure/coma.

PATIENTS WHO HAVE SUSTAINED A BURN AND/OR TRAUMATIC INJURY SHOULD BE GIVEN TREATMENT SPECIFIC TO THOSE INJURIES, INCLUDING APPLYING SPINAL PROTECTION, IF INDICATED. THE SMELL OF (BITTER) ALMONDS IS NOT A RELIABLE SIGN AND THE CLINICIAN SHOULD NOT ATTEMPT TO INHALE LOCAL AIR NOR PATIENT BREATH TO DETERMINE IF THE ALMOND SMELL IS PRESENT.

BE SURE TO ASSESS FOR EVIDENCE OF TRAUMATIC OR MEDICAL CAUSES FOR PATIENT'S ALTERED MENTAL STATUS.

## 2. TREATMENT

a) Remove the patient from the source of exposure. (In the smoke inhalation victim, maintain appropriate clinician respiratory protection, SCBA.)
b) Restore or maintain airway patency.
c) Administer 100% oxygen via non-rebreather mask or bag-valve-mask.
d) Provide aggressive advanced airway management.

e) Establish IV access with LR.
f) Use glucometer and treat patient accordingly.
g) There is no widely available, rapid, confirmatory cyanide blood test. Treatment decisions must be made on the basis of clinical history and signs and symptoms of cyanide intoxication. For the patient with an appropriate history and manifesting one or more of "high concentrations of cyanide" signs or symptoms:

(1) Collect a pre-treatment blood sample in the appropriate tube for lactate and cyanide levels.

(2) If patient history is suggestive of CO inhalation, follow *Carbon Monoxide/Smoke Inhalation* protocol

(3) If patient (adult or pediatric) has a reported oral cyanide ingestion and does not manifest signs and symptoms meeting administration criteria, medical consultation is required for administration of hydroxocobalamin (consider simultaneous consultation with poison control and medical consultation).

(4) ADULT: Administer hydroxocobalamin. Initial dose is 5 grams administered over 15 minutes SLOW IV. Each 2.5 gram vial of hydroxocobalamin for injection is to be reconstituted with 100 mL of LR and administered at 10–15 mL/minute.
An additional 5 gram dose may be administered with medical consultation.

(5) PEDIATRIC: Administer hydroxocobalamin 70 mg/kg (reconstitute concentration is 25 mg/mL). Each 2.5 gram vial of hydroxocobalamin for injection is to be reconstituted with 100 mL of LR and administered at 10–15 mL/minute. Maximum single dose is 5 grams.

ALERT

HYDROXOCOBALAMIN MAY CAUSE TEMPORARY RED DISCOLORATION OF THE SKIN, URINE, AND MUCOUS MEMBRANES (WHICH IS NOT TO BE CONFUSED WITH THE RARE SIGN OF CARBON MONOXIDE POISONING). THE DEVICES THAT RELY ON COLORIMETRY (E.G,. PULSE OXIMETER AND CO LEVEL) WILL BE INTERFERED WITH BY THE COLOR CHANGE AND ARE NOT RELIABLE FOR PATIENT ASSESSMENT.

NOTIFY HOSPITAL OF ADMINISTRATION OF HYDROXOCOBALAMIN AND DO NOT ADMINISTER SODIUM THIOSULFATE THROUGH THE SAME IV, AS THIS MAY CAUSE CRYSTALLINE PRECIPITATION.

**HYDROXOCOBALAMIN**

**1. PHARMACOLOGY**

Hydroxocobalamin is a form of Vitamin B-12.

**2. PHARMACOKINETICS**

Hydroxocobalamin binds to the cyanide ion, forming cyanocobalamin, which is excreted in the urine.

**3. INDICATIONS**

Signs and symptoms of high concentrations of cyanide exposure with an appropriate clinical history are indications for treatment as there is no widely available, rapid, confirmatory cyanide blood test.

**"High concentrations of cyanide" will produce:**

- Markedly altered level of consciousness
- Seizure
- Respiratory depression or respiratory arrest or
- Cardiac dysrhythmia (other than sinus tachycardia)

Mechanism of action of **cyanide** in the body

Effects begin within seconds of inhalation and within 30 minutes of ingestion. The rapidity of onset is related to the severity of exposure (inhalation or ingestion) and may have dramatic, immediate effects causing sudden cardiovascular collapse or seizure/coma.

Initial effects of poisoning include headache, faintness, vertigo, excitement, anxiety, a burning sensation in the mouth and throat, breathing difficulty, increased heart rate, and hypertension. Nausea, vomiting, and sweating are common.

Smell of almonds is not a reliable sign and the clinician should not attempt to inhale local air nor patient breath to determine if the almond smell is present.

**4. CONTRAINDICATIONS**

Patients with known anaphylactic reactions to hydroxocobalamin or cyanocobalamin

**5. ADVERSE EFFECTS**

a) Reddish discoloration of the skin and urine (which is not to be confused with the rare sign of carbon monoxide poisoning). The devices that rely on colorimetry (e.g., pulse oximeter and CO level) will be interfered with by the color change and are not reliable for patient assessment.
b) Rash
c) Increased blood pressure
d) Nausea
e) Headache
f) Decreased white cell count

g) Injection site reactions
h) Allergic reactions have been observed.

**6. PRECAUTIONS**

a) Notify hospital of administration of hydroxocobalamin and do not administer sodium thiosulfate through the same IV, as this may cause crystalline precipitation.
b) Administer slowly over 15 minutes.
c) Watch for administration sight reactions.
d) Monitor for hypertensive response to administration.

ALERT BE SURE TO ASSESS FOR EVIDENCE OF TRAUMATIC OR MEDICAL CAUSES FOR PATIENT'S ALTERED MENTAL STATUS.

**7. DOSAGE**

a) Collect a pre-treatment blood sample in the appropriate tube to assess cyanide level.
b) ADULT: Administer hydroxocobalamin. Initial dose is 5 grams administered over 15 minutes SLOW IV/IO. (Each 2.5 gram vial of hydroxocobalamin for injection is to be reconstituted with 100 mL of LR and administered at 10–15 mL/minute.).

An additional 5 gram dose may be administered with medical consultation.

c)

PEDIATRIC: Administer hydroxocobalamin 70 mg/kg (reconstitute concentration is 25 mg/mL) SLOW IV/IO. Each 2.5 gram vial of hydroxocobalamin for injection is to be reconstituted with 100 mL of LR and administered at 10–15 mL/minute. Maximum single dose 5 grams.

d)

If patient (adult or pediatric) has a reported oral cyanide ingestion and does not manifest signs and symptoms meeting administration criteria, consider medical consultation for administration of hydroxocobalamin.

# DIRECT TO TRIAGE PROTOCOL

- LOW ACUITY / PRIORITY 3 PATIENT
- PATIENT IS 18 YEARS OR OLDER
- ABLE TO COMMUNICATE W/ EMS
- UNDERSTANDS PROCESS
- ABILITY TO SIT INDEPENDENTLY IN A WHEELCHAIR

**START**

**VITAL SIGNS ACCEPTABLE? (SEE CHART – 1)**
IF YES, MOVE ON

**HIGH RISK CONDITIONS? (SEE CHART – 2)**
IF ANY PRESENT, STOP
IF NONE, MOVE ON

**TIME DEPENDENT NEEDS? (SEE CHART – 3)**
IF ANY PRESENT, STOP
IF NONE, MOVE ON

**DISCUSSION TAKES PLACE WITH PATIENT ABOUT PLACEMENT IN TRIAGE**

**PATIENT PLACED DIRECTLY IN WAITING ROOM VIA WHEELCHAIR, AT REGISTRATION. SIGNATURES OBTAINED AND PATIENT IS LEFT WITH MIEMSS APPROVED SHORT FORM**

**END OF CALL**
- SHORT FORM COPIED AND GIVEN TO APPROPRIATE NURSE FOR RN SIGNATURES
- PATIENT TRANSFERRED OFF STRETCHER
- REPORT GIVEN

**IF THERE IS EVER ANY DOUBT AS TO WHERE TO PLACE THE PATIENT; ALWAYS GO THROUGH ROUTINE AMBULANCE ED REGISTRATION AND TRIAGE PROCEDURE.**

**1 ACCEPTABLE VITAL SIGNS:**
- RESPIRATIONS: 10-20
- PULSE: 60-100
- PULSE OX: >92% (room air)
- TEMPERATURE: 96-101°F
- BLOOD GLUCOSE (if indicated): 71-299 MG/DL
- BLOOD PRESSURES:
  - BETWEEN 110 AND 180 - SYSTOLIC
  - BETWEEN 60 AND 100 – DIASTOLIC

**2 HIGH RISK CONDITIONS**
- UNEXPLAINED ABDOMINAL PAIN
- ALTERED MENTAL STATUS
- UNEXPLAINED BACK PAIN
- CHEST PAIN
- DYSPNEA / SHORTNESS OF BREATH
- (ACUTE) FOCAL NEUROLOGICAL DEFICITS
- SEIZURES
- SEPSIS (SUSPECTED)
- SYNCOPE
- SUICIDAL / HOMICIDAL IDEATIONS
- **REQUIRES MORE THAN MINIMAL ASSISTANCE TO WALK**
- **UNABLE TO COOPERATE WITH HISTORY AND EXAM**

**3 TIME DEPENDENT NEEDS**
- AIRWAY
- BREATHING
- CIRCULATION (INCLUDING TO EXTREMITY)
- DISABILITY (DEFICIT) OR DEFORMITY
- SEVERE TENDERNESS WITH PALPATION / EXAM
- SIGNIFICANT HEAD OR TRUNCAL TRAUMA
- UNCONTROLLABLE BLEEDING
- **REQUIRES ALS MONITORING OR INTERVENTIONS**
- **CONCERN FOR POTENTIAL DETERIORATION**

Approved 10.12.2021

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## 1. INTRODUCTION

a) This protocol is intended for use by EMS clinicians providing standby medical coverage for dive operations and guide the evaluation and/or resuscitation of public safety divers. This includes both operational and training dives performed by divers associated with military, law enforcement, and fire department activities. Furthermore, this protocol can be used in the evaluation and treatment of all dive related emergencies including those related to recreational and occupational dive activities.

b) These protocols supplement the current version of the *Maryland Medical Protocols for Emergency Medical Services* and may incorporate other EMS protocol components such as *Wilderness Emergency Medical Services*, *Tactical EMS*, and *Pilot/Optional Supplemental* protocols.

c) For most dive related injuries/illnesses, recompression in a hyperbaric chamber that is capable of treating dive related emergencies is of critical importance. Other BLS and ALS interventions should be performed en route to receiving hyperbaric capable facilities if time permits and should not delay this time sensitive intervention.

## 2. REGIONAL HYPERBARIC REFERRAL CENTERS AND IMPORTANT CONTACT INFORMATION

a) SYSCOM
(410) 783-7525

b) Divers Alert Network (DAN)
(919) 684-9111

c) University of Maryland/R Adams Cowley Shock Trauma Center – Center for Hyperbaric Medicine
22 S. Greene Street
Baltimore, MD 21201
(410) 328-1234

d) University of Pennsylvania Health System – Department of Hyperbaric Medicine
John Morgan Building
3620 Hamilton Walk, Room 1
Philadelphia, PA 19104
(215) 662-4000

e) Sentara Leigh Hospital – Hyperbaric Medicine Unit
830 Kempsville Road
Norfolk, VA 23502
(757) 261-6000

f) Duke University Medical Center – Center for Hyperbaric Medicine & Environmental Physiology
200 Trent Drive
Durham, NC 27710
(919) 684-8111

g) Jacobi Hyperbaric Center – Hyperbaric Medicine
West 20/J
1400 Pelham Parkway South, Room 1
Bronx, NY 10461
(718) 918-5800

**3. DIVE EMS CLINICIAN MINIMUM TRAINING REQUIREMENTS**

a) The Dive EMS Clinician shall be a Maryland certified EMT for Maryland licensed ALS clinician who has successfully completed appropriate education in the prehospital emergency care of divers which includes instruction and training on the following topics:
   (1) Otoscopy
   (2) Comprehensive neurological assessments
   (3) Oxygen administration
   (4) Airway management
   (5) Submersion, with and without cardiac arrest
   (6) Dive physics and decompression illness
   (7) Oxygen toxicity

**4. TREATMENT PROTOCOLS**

a) Pre-Dive Assessments
   (1) Criteria for Fitness to Dive
      (a) No known medical or psychiatric conditions that would limit a diver's ability to perform their job as public safety diver or that would otherwise jeopardize the safety of the team.
         (i) Includes conditions that affect the ability to swim, communicate, manage responsibility, and mental fitness.
      (b) No known medical conditions that may be exacerbated by the effects of barometric pressure changes on the human body (without proper medical clearance).
         (i) Includes but is not limited to a history of spontaneous pneumothorax, Type II Decompression Illness, pregnancy, coronary artery disease, heart failure, seizure disorder, diabetes, perforated tympanic membrane.
      (c) Not currently under the influence of any substances (including prescription medications) that would impair a diver's judgment or ability to perform dive related tasks.
         (i) Includes but is not limited to alcohol, illicit substances, medications that may cause sedation.
      (d) Vital signs should be taken prior to each dive day. Consider restriction from diving if:
         (i) HR greater than 100
         (ii) SBP less than 90 or greater than 160
         (iii) RR less than 12 or greater than 20
         (iv) $SpO_2$ less than 94%

b) Sea Sickness

Motion sickness due to the real or perceived movement of a vessel in water. May present with dizziness, nausea, vomiting, headache, diaphoresis, and/or fatigue.
   (1) Management:
      (a) Focus on the stable horizon
      (b) If feasible and safe to do so, have the diver get out of the boat and into the water on the surface
      (c) Avoid hyperthermia
      (d) Encourage PO fluid intake and advanced diet as tolerated

(e) Monitor VS
(f) Check finger stick glucose and treat appropriately

(2) BLS
(a) Scopolamine transdermal patch 1 mg every 3 days (if previously tolerated)
(b) Ondansetron ODT 8 mg, may repeat x 1 (max total dose of 16 mg)

(3) ALS
(a) If the patient develops signs of hypovolemia (PO intolerance, lethargy, hypotension)
(b) Obtain IV/IO access
(c) Ondansetron 4-8 mg IV/IM, may repeat x 1 (max total dose of 16 mg)
(d) Administer crystalloid IVF to maintain SBP greater than 90

(4) Medical Control
Consult medical control if symptoms are not controlled with two ODT/IV/IM doses of ondansetron.

c) Otitis Externa (Swimmer's Ear)
Erythema, edema, and dermatitis of the external ear canal. Symptoms are due to retained moisture resulting in bacterial infection. Presents with itching, sensation of pressure or fullness in the ear, pain, purulent discharge from the external auditory canal and/or diminished hearing.

(1) Management:
(a) Provide pain control as needed
(b) Acetaminophen 650-1000 mg PO Q 6 hours
(c) Ibuprofen 400-600 mg PO Q 4 to 6 hours or 600-800 PO Q 6 to 8 hours
(d) Ciprodex (ciprofloxacin 0.3% and Dexamethasone 0.1%) Sterile Otic Suspension 4 gtts BID x 7 days (requires medical consult)
(e) Evaluate for tympanic membrane (TM) perforation
(f) Divers with a perforated TM should abstain from diving until cleared by a physician due to the increased risk of middle ear infection

(2) Medical Control
Consult medical control to discuss the need for topical or oral antibiotics.

(3) Clinical Pearls
(a) Prevention is key so encourage divers to keep the ears clean and dry.
(b) Instillation of a 3% hydrogen peroxide solution or a 50:50 mixture of hydrogen peroxide and isopropyl alcohol at the end of each dive day may be helpful.

d) Otic and Sinus Barotrauma
Occurs when the pressure differential between the middle ear and/or sinuses cannot be neutralized during descent. Typically presents with ear and/or facial pain over the maxillary sinuses. May result in perforation of the tympanic membrane.

(1) Management
(a) Provide pain control as needed
(i) Acetaminophen 650-1000 mg PO Q 6 hours
(ii) Ibuprofen 400-600 mg PO Q 4 to 6 hours or 600-800 PO Q 6 to 8 hours
(b) Evaluate for tympanic membrane perforation
(c) Divers with a perforated TM should abstain from diving until cleared by a physician due to the increased risk of middle ear infection

e) Inner Ear Barotrauma
Damage to the fragile inner ear structures responsible for balance and hearing which usually occurs during a forceful Valsalva. Typically presents with roaring tinnitus, vertigo and/or hearing loss. Focal neurologic deficits should not be present.
(1) Management
(a) Elevate the head of the bed to at least 30 degrees
(b) Avoid nose blowing or additional attempts at Valsalva as this will worsen the symptoms
(c) Meclizine 25-50 mg Q 4 hours may be trialed for vertigo
(d) Transport to the nearest emergency department for urgent ENT evaluation
(e) Avoid hyperbaric therapy as this will worsen the pressure differentials that caused the problem initially
(2) Clinical Pearls
It can be very difficult to distinguish inner ear barotrauma from vestibular decompression sickness (DCS). The key difference is that inner ear barotrauma typically occurs on descent after a forceful attempt to clear their ears. Vestibular DCS occurs on ascent and is often associated with other neurological deficits. Obtaining this history from the diver is critical.

f) Mask Squeeze
Occurs when a diver fails to add air to their mask upon descent. This can lead to epistaxis, bruising of the face and subconjunctival hemorrhage.
(1) Management
(a) Provide pain control as needed
(i) Apply ice packs to the affected area
(ii) Acetaminophen 650-1000 mg PO Q 6 hours
(iii) Ibuprofen 400-600 mg PO Q 4 to 6 hours or 600-800 mg PO Q 6 to 8 hours
(b) Evaluate patient's visual acuity
(2) Clinical Pearls
Most cases of mask squeeze are self-resolving with only pain control and supportive measures required. Patients with a subconjunctival hemorrhage involving 100% of the whites of their eye, those with severe pain, vision changes, or who are on blood thinners should be transported to the emergency department for further evaluation.

g) Barodontalgia
Occurs as the result of air trapped within a tooth after a dental procedure performed prior to diving. Presents as severe pain, fractured tooth, and/or dislodged implant.
(1) Prevention
Avoid diving for at least one week after invasive dental procedures or until cleared by a dentist.
(2) Management
(a) Provide pain control as needed
(i) Acetaminophen 650-1000 mg PO Q 6 hours
(ii) Iburprofen 400-600 mg PO Q 4 to 6 hours or 600-800 mg PO Q 6 to 8 hours
(iii) Consider applying clove oil to the site of dental pain

h) Immersion Pulmonary Edema (IPE)
Respiratory distress incited by submersion in water. Upon submersion in water, the lack of gravity and neutrally buoyant state causes fluid redistribution and as much as 500 mL

blood to be shunted back to the heart and lungs. This is exacerbated in cold water due to peripheral vasoconstriction. The patient will present the flash pulmonary edema.

(1) Management
Treat via the *Congestive Heart Failure/Pulmonary Edema* protocol.

(2) Clinical Pearls
(a) Experienced most commonly by individuals engaged in strenuous exercise in water, especially cold water (triathletes in the swim phase, open water endurance swimmers, military recruits, or public safety/recreational SCUBA divers).
(b) While hypertension, congestive heart failure, and underlying structural heart disease may predispose patients to IPE, like conventional pulmonary edema, IPE can and often does occur in otherwise "very fit" and active patients without known cardiac disease.
(c) Often, but not always, resolves rapidly and does not require recompression in a hyperbaric chamber.

i) Nitrogen Narcosis
An intoxication phenomenon due to the increased partial pressures of nitrogen at depth. May occur at depths less than 30 meters (100 ft), but risk increases significantly as depth increases.

(1) Early Presentation
Euphoria, diminished reaction times, impaired judgement, disregard for personal safety

(2) Later Presentation
Paresthesias, hallucinations, impaired concentration and memory

(3) Final Presentation
Lethargy, loss of consciousness

(4) Management:
Ascend immediately in a controlled manner with appropriate decompression stops. Symptoms should resolve completely within minutes of ascent to a shallower depth with no long-term effects. If symptoms persist on the surface consider the following interventions:
(a) If symptoms are worsening or persistent, evaluate for other etiologies of symptoms
(b) Administer 100% $O_2$ via a NRB at 15 LPM regardless of $SpO_2$
(c) Perform VS and a comprehensive neurologic assessments Q 5 minutes
(d) Perform fingerstick glucose and treat appropriately
(e) Transport to nearest emergency department

j) Decompression Illness

(1) Ambient pressure changes such as those that occur at depth or altitude increase the risk of inert gases, most commonly nitrogen, becoming liberated from the tissues and forming bubbles. These gas bubbles can affect many different organ systems. The term Decompression Illness (DCI) is used to describe both Decompression Sickness (DCS) and Arterial Gas Embolism (AGE) as the initial presentations in the field may be similar and the initial treatment approaches are the same.

(2) DCS, commonly known as "the bends" or Caisson disease, is due to the nitrogen saturation of tissues at depth without sufficient off gassing time on ascent. DCS is further classified as mild (Type I DCS) and severe (Type II DCS). AGE, is close-

ly related to Pulmonary Overinflation Syndrome (POIS) and caused by the sudden expansion of gas bubbles leading to alveolar rupture. Gas bubbles then enter the arterial system leading to air emboli. This generally results from rapid or uncontrolled ascent.

(3) Type I DCS Presentation:
  (a) Joint pain:
    (i) Classically only affects a single joint
    (ii) Most commonly in the shoulder, elbow, or knee
    (iii) Deep aching pain that is not worsened with movement
  (b) Skin changes:
    (i) Mottling, itching, burning or color changes
    (ii) Usually occurs over fatty tissues
    (iii) Fine scarlet-like rash
  (c) Lymphedema:
    (i) Pitting edema
    (ii) May involve the trunk or a single extremity
(4) Type II DCS Presentation:
  (a) Spinal Cord:
    (i) Truncal constriction in a girdle-like distribution
    (ii) "Woody" sensation in the feet followed by ascending paralysis
    (iii) Limb weakness, paresthesias, or paralysis
    (iv) Urinary or fecal retention/incontinence
    (v) Priapism or erectile dysfunction
  (b) Vestibular:
    (i) Dizziness or vertigo
    (ii) Hearing loss
    (iii) Tinnitus
  (c) Pulmonary:
    (i) Cough and/or hemoptysis
    (ii) Dyspnea, shortness of breath, hypoxia
    (iii) Substernal chest pain
(5) Arterial Gas Embolism (AGE):
  (a) Suspect in any diver that surfaces unconscious or becomes unconscious within 10 minutes of surfacing or with focal neurological deficits
    (i) Focal neurological deficits, confusion, ataxia, vision changes, seizure
    (ii) Cardiac arrythmias, myocardial infarction, cardiac arrest
    (iii) May have concurrent POIS, pneumothorax or pneumomediastinum
(6) Management:
  (a) BLS:
    (i) Place patient in the supine position
    (ii) Perform trauma survey and place cervical collar if there are signs of head injury
    (iii) If pulseless, refer to the *Cardiac Arrest* protocol
    (iv) Maintain airway patency
    (v) Administer supplemental oxygen via a NRB at 15 LMP or BVM regardless of $SpO_2$

(vi) Perform frequent VS and comprehensive neurologic reassessments
(vii) Check fingerstick glucose and treat appropriately
(viii) Prevent hypothermia

(b) ALS:
(i) Perform BLS interventions as above
(ii) Establish IV/IO access for patients if signs of Type II DCS and/or AGE are present
(iii) Administer crystalloid IVF bolus to maintain a SBP greater than 90 (greater than 110 if concern for head injury)
(iv) Administer Toradol (ketorolac) 15 mg IV/IM if no contraindications
(v) In cases of Type II DCS and AGE consider neuroprotective agents
(vi) Transport to the nearest hyperbaric oxygen capable facility for recompression

(c) Medical Control:
If symptoms of Type II DCS or AGE are present consult medical control to discuss mode of transport and additional potential therapeutic options (see also Neuroprotective Agents, below)

(d) Clinical Pearls:
(i) Document the gas composition in the diver's tank and secure tank for investigation
(ii) Bring the patient's dive computer or dive profile to the receiving facility with the patient as it contains vital information
(iii) Ask the diver or their dive partner about unusual events such as difficulty equalizing, rapid ascent, missed decompression stops, out of air indicators or evidence of distress
(iv) The increase in atmospheric pressure associated with flight may worsen the symptoms of DCS and AGE. If helicopter transport is necessary, every effort should be made to maintain the minimum altitude required to reach the transport destination (typically 500-1000 feet). This will likely require discussion of the risks and benefits of air transport between the dive medic, medevac crew, medical control, and the receiving hyperbaric facility
(v) DSC types II and II may also occur with aviation activities due to the decreased atmospheric pressure experienced at altitude. The risk of aviation DCS increases with increased altitudes (greater than 18,000 ft.), faster rates of ascent and increased time at altitude, and SCUBA diving within 24 hrs of flight. Aviation DCS is treated in the same way as other forms of DCS with a focus on emergent hyperbaric recompression if symptoms persist and do not entirely resolve with ground level oxygen ($GLO_2$)

k) Pulmonary Over Inflation Syndrome (POIS)
Results from gas expansion in a diver's lungs during ascent with a closed glottis leading to alveoli rupture. May result in a pneumothorax and/or pneumomediastimum

(1) Management:
(a) BLS:
(i) Maintain airway patency
(ii) Administer 100% $O_2$ via a NRB at 15 LPM regardless of $SpO_2$
(iii) Perform frequent reassessments of VS and respiratory status

(iv) Perform comprehensive neurological exams Q5 minutes to evaluate for concomitant DCS Type II

(b) ALS:

(i) Perform BLS interventions as above

(ii) If signs of tension pneumothorax exist, perform needle decompression via the Needle Decompression Thoracostomy protocol

(iii) Obtain IV/IO access and administer crystalloid IVF bolus to maintain an SBP of greater than 90 (greater than 110 if concern for head injury)

(iv) Transport to the nearest emergency department if needle decompression is required, otherwise transport to hyperbaric capable facility

l) Oxygen Toxicity

High partial pressures of oxygen can be toxic to the central nervous system (CNS) and pulmonary systems. Pulmonary oxygen toxicity typically takes several days to develop, therefore is not an issue for public safety divers. CNS oxygen toxicity can develop in minutes to hours at relatively low partial pressures of oxygen, thus is a major concern for divers. Breathing increased partial pressures of oxygen (greater than 21% $FiO_2$) increases the risk of CNS oxygen toxicity and is most likely to occur in divers utilizing hyperoxic gas mixtures (Enriched air and technical divers using rebreathing systems). Risk of oxygen toxicity increases with both depth and duration of dive.

(1) Central Nervous System (CNS) Presentation:

(a) Tunnel vision, blurry vision

(b) Tinnitus

(c) Nausea

(d) Facial twitching

(e) Increased irritability and personality changes, anxiety, confusion

(f) Seizure

(2) Management:

(a) BLS:

(i) Remove all sources supplemental of $O_2$

(ii) Monitor for resolution of symptoms

(iii) Perform frequent VS and comprehensive neurologic reassessments

(iv) If symptoms are not resolving, evaluate for other etiologies of symptoms

(v) Check fingerstick glucose and treat appropriately

(vi) Consult medical control for transport considerations

(b) ALS:

(i) Perform BLS interventions, as above

(ii) Obtain IV/IO access

(iii) If patient continues to seize after removal of oxygen sources or there is concern for status epilepticus, treat via the Seizure protocol

(c) Clinical Pearls:

If a diver suffers a seizure underwater, every effort should be made to keep their regulator in their mouth and/or full-face mask on to prevent aspiration. The dive partner should assist the diver with a controlled ascent. Once on the surface and the risk of aspiration is gone, remove all sources of supplemental oxygen from the patient. Symptoms should resolve without further intervention after a 2-3 minutes of breathing room air.

**5. SUPPLEMENTAL FORMULARY FOR DIVE MEDICINE**

The EMS clinician, with medical director approval, may administer the following medications to maintain and support operational dive personnel. **Bolded** medications are required as part of the standardized dive medicine load-out at the BLS and ALS level.

| Intervention | EMT | ALS |
|---|---|---|
| Provision to access to medications: scopolamine patch, ondansetron ODT, meclizine, pseudoephedrine, acetaminophen, ibuprofen, ciprofloxacin/dexamethasone otic suspension | • | • |
| Administration of medications in protocol, not listed above | | • |

a) Antiemetics

**(1) Scopolamine Transdermal**

(a) Availability: 1 mg patch
(b) Actions: Antiemetic/Anti-motion sickness
(c) Indications: Nausea/vomiting, motion-sickness prevention
(d) Contraindications: Known hypersensitivity, hx of angle closure glaucoma, seizure, urinary retention
(e) Precautions: May cause sedation, disorientation underwater (requires previous ground trial for operational use)
(f) Side Effects: Sedation
(g) Interactions: Use caution when taking other anti-cholinergic or potentially sedating medications
(h) Dosing: 1 patch every 3 days as needed per MD/DO

**(2) Ondansetron (Zofran) ODT**

(a) Availability: 8 mg oral disintegrating tablets
(b) Actions: Antiemetic/Anti-motion sickness
(c) Indications: Nausea/vomiting, motion-sickness prevention/treatment
(d) Contraindications: Known hypersensitivity
(e) Precautions: Hx of long QT
(f) Side Effects: NA
(g) Interactions: Other QT prolonging medications
(h) Dosing: 8 mg ODT, may repeat x 1, max dose of 16 mg

**(3) Ondansetron (Zofran) IM/IV**

(a) Availability: 4 mg/2 mL
(b) Actions: Antiemetic/Anti-motion sickness
(c) Indications: Nausea/vomiting, motion-sickness prevention/treatment
(d) Contraindications: Known hypersensitivity
(e) Precautions: Hx of long QT
(f) Side Effects: NA
(g) Interactions: Other QT prolonging medications
(h) Dosing: 4-8 mg IM/IV, may repeat x 1, max dose of 16 mg

**(4) Meclizine (Antivert)**

(a) Availability: 25 or 50 mg tablets
(b) Actions: Antiemetic/Anti-vertigo

(c) Indications: Nausea/vomiting, vertigo
(d) Contraindications: Known hypersensitivity
(e) Precautions: May cause sedation
(f) Side Effects: Sedation
(g) Interactions: NA
(h) Dosing: 25-50 mg PO Q 4 hours PRN vertigo

b) Analgesics:

**(1) Acetaminophen (Tylenol)**
(a) Availability: 325 and 500 mg tablets
(b) Actions: Analgesic
(c) Indications: Mild to moderate pain
(d) Contraindications: Known hypersensitivity, liver disease, PUD/GERD/GI bleed
(e) Precautions: NA
(f) Side Effects: GI upset
(g) Interactions: NA
(h) Dosing: 650-1000 mg PO Q 6 hours

**(2) Clove Oil (for topical dental analgesia)**
(a) Availability: Topical liquid
(b) Actions: Topical dental analgesic
(c) Indications: Dental pain/injury
(d) Contraindications: Known hypersensitivity
(e) Precautions: Penetrating/open intra-oral wounds
(f) Side Effects: NA
(g) Interactions: NA
(h) Dosing: Topical application to site of dental pain

**(3) Ibuprofen (Motrin/Advil)**
(a) Availability: 200-800 mg tablets
(b) Actions: Nonsteroidal anti-inflammatory medication
(c) Indications: Mild to moderate pain
(d) Contraindications: Known hypersensitivity, renal insufficiency, PUD/GERD/GI bleed
(e) Precautions: Do not use with other NSAIDs, caution with concomitant steroid use
(f) Side Effects: GI upset/nausea, GI bleeding risk
(g) Interactions: NA
(h) Dosing: 400-600 mg PO Q 4-6 hours or 600-800 mg PO Q 6-8 hours

**(4) K (Motrin/Advil)**
(a) Availability: 30 mg/mL IV/IM
(b) Actions: Nonsteroidal anti-inflammatory medication
(c) Indications: Mild to moderate pain, DCI
(d) Contraindications: Known hypersensitivity, renal insufficiency, PUD/GERD/GI bleed, head injury
(e) Precautions: Do not use with other NSAIDs, caution with concomitant steroid use
(f) Side Effects: GI upset/nausea, GI bleeding risk
(g) Interactions: NA

(h) Dosing: 15 mg IM/IV Q 6-8 hours

c) Antibiotics:
   (1) Ciprofloxacin/Dexamethasone Otic Suspension (Ciprodex)
      (a) Availability: 0.42 mg ciprofloxacin/0.14 mg dexamethasone otic solution
      (b) Actions: Quinolone antmicrobial
      (c) Indications: Otitis externa
      (d) Contraindications: known hypersensitivity, TM perforation
      (e) Precautions: NA
      (f) Side Effects: Local irritation
      (g) Interactions: NA
      (h) Dosing: 4 gtts in the affected ear BID x 7 days (requires medical consult)
d) Neuroprotective Agents (Medical Director Option):
   (1) Lidocaine (Xylocaine)
      (a) Availability: 2% 100 mg/5 mL IV/IO
      (b) Actions: Antiarrhythmic, neuroprotection in Type 2 DCS
      (c) Indications: Type 2 DCS and AGE
      (d) Contraindications: Known hypersensitivity, AV block, intraventricular rhythm, sinus bradycardia, ventricular conduction delays, hypotension
      (e) Precautions: NA
      (f) Side Effects: May cause lidocaine toxicity, seizures
      (g) Interactions: NA
      (h) Dosing: 1 mg/kg IV/IO over 1-2 minutes followed by 0.5 mg/kg IV/IO every 10 minutes to a max of 3 mg/kg (requires medical consult)

# Appendix

## Comprehensive Neurologic Assessment

(Adapted from Divers Alert Network)

**MENTAL FUNCTION**

Consciousness:

☐ Alert Verbal ☐ Responds to painful stimuli ☐ Unresponsive

Orientation:

☐ Person ☐ Place ☐ Time

Ability to follow commands: Ask the diver to "stick out their tongue and close their eyes"

☐ Yes ☐ No

Expression: Ask diver to say "no ifs, ands, or buts"

☐ Yes ☐ No

Name Three Objects: (e.g., fin, mask, scuba cylinder)

☐ Yes ☐ No

Read and interpret a sentence: (e.g, The small boy walked to the yard with a large dog.)

☐ Yes ☐ No

Judgement: Ask diver "why are you here?" and assess appropriateness of response

☐ Yes ☐ No

Memory: Ask diver to recall three objects from earlier after three minutes

☐ Yes ☐ No

Calculations: Ask diver to count backwards from 100 by 7s

☐ Yes ☐ No

Abstract Resoning: Ask diver to explain the saying "a bird in the hand is worth two in the bush"

☐ Yes ☐ No

**CRANIAL NERVES**

Eye Movement: Diver's eyes move equally left, right, up and down

☐ Yes ☐ No (if no, circle direction of restriction)

Nystagmus:

☐ Yes ☐ No

Facial Symmetry: Ask diver to raise eyebrows and smile

☐ Yes ☐ No

Light Touch Perception:

Forhead: ☐ Left ☐ Right

Cheek: ☐ Left ☐ Right

Jaw: ☐ Left ☐ Right

Chin: ☐ Left ☐ Right

Hearing: Diver can hear fingers being rubbed together equally next to both ears

☐ Left ☐ Right

**MOTOR FUNCTION**

*Grading scale: No movement (0), Movement but weak (3), Normal strength (5)*

Upper Extremities:

Shoulders: _____ Left _____ Right

Biceps: _____ Left _____ Right

Triceps: _____ Left _____ Right

Wrist Flexion: _____ Left _____ Right

Grip Strength: _____ Left _____ Right

Lower Extremities:

Hip Flexors: _____ Left _____ Right

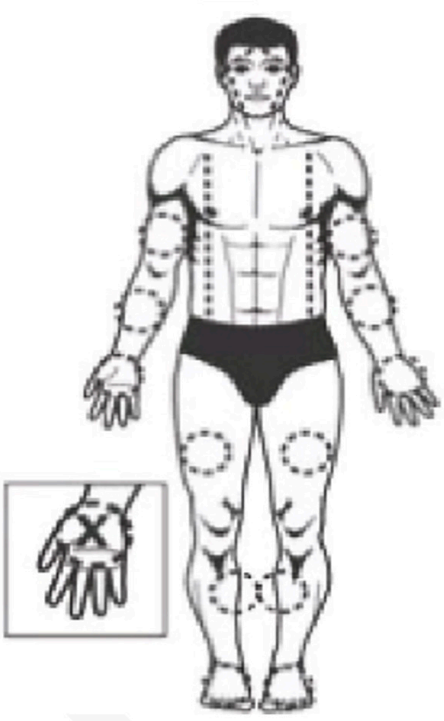
Knee Flexion: _____ Left _____ Right

Dorsiflexion: _____ Left _____ Right

Plantarflexion: _____ Left _____ Right

**SENSATION**

Indicate any areas of decreased or abnormal sensation



**COORDINATION AND BALANCE**

Steady Gait:

☐ Yes ☐ No

Normal Finger-Nose-Finger: (if no, indicate abnormal on the left or right)

☐ Yes ☐ No

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# Optional Supplemental Protocol – EMT ACQUISITION OF 12-LEAD ELECTROCARDIOGRAM





## 1. PURPOSE

The goal of the protocol is to allow an EMT to acquire and transmit a 12-lead (15-lead if trained) electrocardiogram (ECG) to the receiving facility. An ECG should be obtained within 10 minutes of presentation, when indicated.

## 2. INDICATIONS

Patient 18 years of age or older with any of the following signs and symptoms of acute coronary syndrome:

a) Angina or anginal equivalents
b) Chest pain, pressure, or discomfort
c) Pain or discomfort in the upper abdomen, arm, or jaw
d) Shortness of breath
e) Unexplained diaphoresis
f) Syncope
g) Post Cardiac Arrest with ROSC

## 3. CONTRAINDICATIONS

No absolute contraindications. Prioritize life-saving interventions (e.g., CPR or assisting respirations) before obtaining an ECG.

## 4. PROCEDURE

a) Initiate *Cardiac Emergencies: Chest Pain/Acute Coronary Syndrome, Suspected* protocol.
b) Position patient – supine or semi-fowler, if breathing is compromised.
c) Expose skin of chest area, arms and lower legs. Prep the skin as needed by wiping with alcohol for sweating, or shaving for excessive hair.
d) Remove electrodes from an unopened package immediately before use.
e) Place electrodes and attach leads to the limbs and chest. When placing electrodes on female patients, always place leads V3-V6 under the breast rather than on the breast.
f) Turn on the monitor, set patient identifiers (name and sex).
g) Acquire the 12-lead ECG.
h) Notify and transmit the 12-lead ECG to the nearest hospital. If the receiving facility is unable to receive ECGs, notify and transmit to the nearest cardiac interventional center.

## 5. ONGOING DEMONSTRATION OF PROFICIENCY

After the initial training program is completed, the EMT will participate in an annual refresher training program.

# Optional Supplemental Protocol – GLYCOPROTEIN IIb/IIIa ANTAGONIST INFUSION



**(Paramedic only)**

## 1. PURPOSE

During interfacility transports, a paramedic may monitor a patient on a continuous IV glycoprotein IIb/IIIa infusion as long as the following criteria have been met.

## 2. INDICATIONS

The glycoprotein IIb/IIIa infusion must have been started by the hospital staff prior to an interfacility transfer. IV glycoprotein IIb/IIIa transports may NOT be started by the prehospital clinician in the prehospital setting.

## 3. CONTRAINDICATIONS

a) Patients who are clinically unstable, including but not limited to unstable vital signs and blood pressure, or current arrhythmia
b) Pediatric patients

## 4. PROCEDURE

a) Maintain the infusion as directed by the sending physician.
b) The sending physician must document the infusion to be administered on the patient's transport record or transport note. This includes the concentration of the medication and the infusion rate.
c) The infusion must be maintained on an infusion pump designed for transport. The clinician must be trained in the appropriate use of the specific infusion pump. The ambulance must have an inverter to power the pump while in the vehicle.
d) The total volume of glycoprotein IIb/IIIa infused must be recorded on the patient care report.
e) The patient must be on a cardiac monitor and vital signs should be documented on the patient care report at least every 15 minutes.
f) When in doubt, contact the sending physician for medical direction.

## 5. SPECIAL CONSIDERATIONS

The ALS service or jurisdiction must provide and document training of the ALS clinicians on the operation of the infusion pump(s) being used. They must also have a quality improvement (QI) program monitoring the appropriateness and quality of care provided. The QI program should be directed or coordinated by, at minimum, a paramedic.

**(Paramedic only)**

**1. PHARMACOLOGY**

Platelet glycoprotein antagonist. This agent reversibly prevents fibrinogen and von Willenbrand's factor from binding to the glycoprotein IIb/IIIa receptor, inhibiting platelet aggregation.

**2. PHARMACOKINETICS**

Glycoprotein IIb/IIIa has a half-life of 2.5 hours. Metabolism of this drug is limited and is excreted via the kidneys.

**3. INDICATIONS**

Patients with acute coronary syndrome including those with Percutaneous Coronary Intervention (PCI)

**4. CONTRAINDICATIONS**

a) Hypersensitivity, active internal bleeding, history of bleeding, stroke within one month, major surgery with severe trauma, severe hypotension, history of intracranial bleeding, intracranial neoplasm, arteriovenous malformation/aneurysm, aortic dissection, or dependence on renal dialysis
b) Pediatric patients

**5. SIDE EFFECTS/ADVERSE REACTIONS**

a) Cardiovascular: Stroke, hypotension
b) Systemic: Bleeding, anaphylaxis
c) Other: Hematuria, thrombocytopenia

**6. PRECAUTIONS**

Glycoprotein IIb/IIIa is a medication designed to inhibit the clotting factor in blood. Patients on this medication should be protected from further injuries that may cause bleeding. Attempts to start IVs should not be made without a doctor's orders.

**7. DOSAGE**

a) INITIAL BOLUS: Given at sending facility and should be documented.
b) MAINTENANCE IV DRIP: Follow Standard Dosing. Maintain drip based on patient weight and sending physician's orders.

ALERT IF CHEST PAIN OR HYPOTENSION DEVELOPS DURING TRANSPORT, THE PARAMEDIC MUST CONSULT WITH EITHER THE SENDING OR RECEIVING PHYSICIAN FOR FURTHER INSTRUCTIONS.

# 15.10 Optional Supplemental Protocol – HEPARIN INFUSION FOR INTERFACILITY TRANSPORT



**(Paramedic only)**

## 1. PURPOSE

During interfacility transports, a paramedic may monitor a patient on a continuous IV heparin infusion as long as the following criteria have been met.

## 2. INDICATIONS

The heparin infusion must have been started by the hospital staff prior to an interfacility transfer. IV heparin infusions may NOT be started by the prehospital clinician in the prehospital setting.

## 3. CONTRAINDICATIONS

a) Patients who have had trauma or surgery to the brain, eye, spinal cord, urinary tract, joints, or retroperitoneum within the last 7 days
b) Patients with active bleeding
c) Third trimester pregnancy

## 4. PROCEDURE

a) Follow the appropriate ALS algorithm and maintain the infusion as directed by the sending physician.
b) The sending physician must document the infusion to be administered on the patient's record or transport note, including the concentration of the units per hour.
c) The infusion must be maintained on an infusion pump designed for transport, and the clinician must be trained in the appropriate use of that specific infusion pump. The ambulance must have an inverter to power the pump while in the vehicle.
d) The total volume of heparin infused must be recorded on the patient care report.
e) The patient must be on a cardiac monitor and vital signs should be documented on the patient care report every 15 minutes.
f) When in doubt, contact the sending physician for medical direction.

## 5. SPECIAL CONSIDERATIONS

The ALS service or jurisdiction must provide and document the training of ALS clinicians on the operation of the infusion pump(s) being used.
They must also have a quality improvement (QI) program monitoring the appropriateness and quality of care provided. The QI program should be directed or coordinated by, at minimum, an ALS clinician.

**(Paramedic only)**

1. **PHARMACOLOGY**
   Heparin is an anticoagulant that works by neutralizing several of the clotting factors (XIII, XII, XI, X, IX, and II).

2. **PHARMACOKINETICS**
   a) Heparin inhibits the coagulation mechanism in 3 sites:
      (1) activation of factor X
      (2) formation of thrombin from prothrombin
      (3) conversion of fibrinogen to fibrin
   b) Heparin's effect, which is to retard or prevent blood clotting, is immediate. The half-life of intravenous heparin is 1–1.5 hours.

3. **INDICATIONS**
   a) Thromboembolic disease, such as pulmonary embolism deep vein thrombophlebitis, and arterial embolization
   b) Acute myocardial infarction. (Heparin may be given alone or in conjunction with thrombolytic therapy.)

4. **CONTRAINDICATIONS**
   a) Patients who have had trauma or surgery to the brain, eye, spinal cord, urinary tract, joints, or retroperitoneum within the last 7 days
   b) Patients with active bleeding
   c) Third trimester pregnancy

5. **ADVERSE EFFECTS**
   Increased potential for bleeding

6. **PRECAUTIONS**
   a) Inadvertent infusion of too much heparin can result in over-anticoagulation and the potential for bleeding complications.
   b) If it is necessary to draw blood or start an IV while a patient is receiving heparin, extra time to hold pressure over the puncture site will be necessary to stop the bleeding.
   c) Use with caution for patients with extreme hypertension.

7. **DOSAGE**
   a) Adult: Follow the written order from the sending physician. Paramedic may transport patients at a maximum heparin drip rate of 18 units/kg per hour or 2,000 units per hour, whichever is higher. For doses exceeding the maximum, a SCT Paramedic or nurse is required for transport.
   b) Pediatric: Not indicated.

# 15.11 Optional Supplemental Protocol – HYDROFLUORIC (HF) ACID EXPOSURE



## 1. INDICATIONS

An exposure to hydrofluoric acid presenting with any of the following:

a) Severe throbbing pain at sites of exposure
b) Redness, edema, blistering burns to the skin or blanched white areas of skin
c) Cough, stridor, bronchospasm, pulmonary edema
d) Hypotension
e) Dysrhythmias or electrolyte imbalances (hypocalcemia, hypomagnesemia, hyperkalemia)

## 2. BLS

a) Maintain scene safety.
b) Remove patient from toxic environment using appropriate PPE.
c) Decontaminate and remove patient's clothing, if contaminated.
d) Thoroughly irrigate all affected areas with copious water, normal saline, or *Lactated Ringer's* for a minimum of 15 minutes.
e) Evaluate for trauma.
f) Check blood glucose and treat per *Hypoglycemia* protocol.

## 3. EYE EXPOSURE

Continuously flush eyes with *Lactated Ringer's*, normal saline, or sterile water for a minimum of 15 minutes (or 1 liter) via nasal cannula tubing or manual irrigation.

## 4. TOPICAL EXPOSURE

a) Apply 2.5% USP calcium gluconate gel (Calgonate®) to affected area(s) until cessation of pain, if available. Reapply to affected area of skin every 15 minutes.
b) If hands or fingers are involved, apply the calcium gluconate gel to the hand. Place additional calcium gluconate gel into a medical glove, and then insert the affected hand into the glove and massage.

## 5. ALS

a) Establish IV access, if possible, in an unaffected area of the body.
b) Assess for and treat hypotension and hypoxia.
c) Perform continuous cardiac monitoring and treat any dysrhythmias associated with electrolyte imbalance (hypocalcemia, hypomagnesemia, hyperkalemia).
d) Obtain 12-lead EKG, if situation allows.
e) Consult with poison control and burn center (or trauma center, if traumatic injury is also present).

## 6. EYE EXPOSURE

Irrigate with *Lactated Ringer's*, normal saline, or sterile water via nasal cannula tubing or manual irrigation.

**7. RESPIRATORY EXPOSURE**

If respiratory distress, cough and/or wheezing, administer 4mL of nebulized 2.5% calcium gluconate solution every 5 minutes as needed (2.5mL 10% calcium gluconate solution in 7.5mL normal saline), if available.

**8. SYSTEMIC TOXICITY**

If signs of systemic toxicity, including hypotension, altered mental status, severe respiratory distress, ventricular dysrhythmia, or signs of hypocalcemia or hyperkalemia:

***Calcium gluconate***

a) Adult dosing: *Calcium gluconate* 3 grams IV/IO of a 10% solution over 5 minutes. If symptoms persist, may repeat a dose of *calcium gluconate* once in 10 minutes.

b) Pediatric dosing: *Calcium gluconate* 60 mg/kg IV/IO of a 10% solution (max dose: 2,000 mg) over 5 minutes. If symptoms persist, may repeat a dose of *calcium gluconate* once in 10 minutes.

May repeat dose of *calcium gluconate* once in 10 minutes, if symptoms persist

and

***Magnesium sulfate***

a) Adult dosing: 2 grams IV/IO over 10 minutes

b) Pediatric dosing: 50 mg/kg/dose IV/IO (max dose: 2,000 mg) over 10 minutes

**9. CLINICAL PEARLS**

a) Pain may be disproportionate to physical exam findings.
b) Effects from more dilute HF acids or its vapors may be delayed. Relief of pain is an excellent indication of the success of treatment.
c) *Calcium chloride* and *calcium gluconate* are NOT the same medication and are NOT interchangeable.
d) HF exposure may result from industrial incidents, fires involving lithium ion batteries, glass etching, metal cleaning and electronics manufacturing, or exposure to rust remover solutions or brick cleaning solutions.
e) HF differs from other acids because the fluoride ion quickly penetrates the skin, causing destruction of deep tissue layers.
f) Burns larger than 25 square inches (160 square cm) may result in serious systemic toxicity.
g) The Immediately Dangerous to Life or Health level of hydrofluoric acid is **30 ppm**.

**Calcium Gluconate**

1. **Pharmacology**
   a) Increases serum calcium
   b) Combines with hydrofluoric acid (HF) to prevent extraction of calcium from tissues and bones
   c) Reduces risk of cardiac arrhythmias due to hyperkalemia

2. **Pharmacokinetics**
   Rapid onset of action with IV administration

3. **Indications**
   Hydrofluoric acid exposure; see specific indications under "dosing" below

4. **Contraindications**
   Hypercalcemia

5. **Adverse Effects**
   a) Bradycardia, hypotension and cardiac arrhythmias, leading to syncope or cardiac arrest, may occur with rapid administration
   b) Tissue necrosis and calcinosis, particularly with extravasation from intravenous catheter

6. **Precautions**
   a) Use with caution on patients taking digitalis, as calcium may increase ventricular irritability and precipitate digitalis toxicity.
   b) If given with sodium bicarbonate, calcium will precipitate; flush IV between administering these medications.

7. **Dosage**
   a) Respiratory exposure / distress
      If respiratory distress, cough and/or wheezing: administer 4 mL of nebulized 2.5% calcium gluconate solution every 5 minutes as needed up to a maximum of 3 doses (2.5 mL 10% calcium gluconate solution in 7.5 mL normal saline), if available.

   b) Systemic toxicity
      If signs of systemic toxicity, including hypotension, altered mental status, severe respiratory distress, ventricular dysrhythmia, or signs of hypocalcemia or hyperkalemia:
      (1) Adult dosing: Calcium gluconate 3 grams IV/IO of a 10% solution over 5 minutes. If symptoms persist, may repeat a dose of calcium gluconate once in 10 minutes.

(2) Pediatric dosing: Calcium gluconate 60 mg/kg IV/IO of a 10% solution (max dose: 2,000 mg) over 5 minutes. If symptoms persist, may repeat a dose of calcium gluconate once in 10 minutes.

c) Topical exposure
   (1) Apply 2.5% USP calcium gluconate topical (Calgonate®) to affected area(s) until cessation of pain, if available. Reapply to affected area of skin every 15 minutes.
   (2) If hands or fingers are involved, apply the calcium gluconate gel to the hand. Place additional calcium gluconate gel into a medical glove, and then insert the affected hand into the glove and massage.

# Optional Supplemental Protocol – INTRAVENOUS ACCESS FOR EMT (EMT-IV)



1. **PURPOSE**
   An EMT who has taken MIEMSS-approved jurisdictional IV technician training may establish intravenous access. The EMT-IV may establish an IV line or saline lock for a CRT or Paramedic to administer IV fluids or medications, as appropriate.

2. **INDICATIONS**
   See treatment protocols for initiation of IV

3. **PROCEDURE**
   a) If a treatment protocol appropriate to the patient's condition indicates to start an IV, the EMT-IV may initiate an IV or saline-lock.
   b) EMT-IV technicians are permitted to obtain IV access in upper extremities, only from the elbow to the hand. An EMT-IV may not access IV sites elsewhere on the body.
   c) Saline locks may be substituted for IV KVO anywhere in the protocol with the understanding that if the patient needs a fluid bolus or medication, the saline lock is converted to an IV of LR or NS by a CRT or Paramedic.
   d) An EMT-IV may not administer any intravenous medications.
   e) An EMT-IV may initiate an IVF bolus of LR or NS with medical consultation only. The volume of LR or NS administered may not exceed 2,000 mL.
   f) Initiation of a second IV requires medical consultation or request from an ALS clinician providing care for a Priority 1 patient. Initiation of a second IV shall not delay transport.

4. **CONTRAINDICATIONS**
   See treatment protocols.

5. **POTENTIAL ADVERSE EFFECTS/COMPLICATIONS**
   See IV Maintenance Therapy for EMT.

6. **PRECAUTIONS**
   All sharps must be properly disposed of in an appropriate container.

7. **ONGOING DEMONSTRATION OF PROFICIENCY**
   The EMT will maintain proficiency with intravenous access according to guidelines established by the jurisdictional EMS medical director.

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# 15.13 Optional Supplemental Protocol – IV INFUSION PUMP (ALS Only)



**For jurisdictional and commercial ALS services.**

## 1. PURPOSE

In order to provide precise medication dosing, a paramedic with ALS service approved training may administer select medications and crystalloid fluids via an IV infusion pump.

## 2. INDICATIONS

a) An IV infusion pump, when available, should be used for infusion of weight-based medications in *The Maryland Medical Protocols for Emergency Medical Services*, including but not limited to vasopressors and antiarrhythmics.
b) It may also be used to administer specific volumes of crystalloid fluids.

## 3. CONTRAINDICATIONS

The clinician has not completed appropriate device-specific training.

## 4. PROCEDURE

a) Verify IV infusion pump has sufficient battery charge and that a charging cable is readily accessible.
b) Select medication to be administered from IV infusion pump drug library.
c) If medication is weight-based, ensure that accurate weight has been entered.
d) Confirm appropriate drug concentration.
e) If medication is not in drug library, enter required fields manually; this should be confirmed by a second EMS clinician whenever possible.
f) Check that IV tubing is primed, either manually or via IV infusion pump.
g) Confirm that there is no air in the line prior to attaching tubing to patient.
h) Attach tubing to patient.
i) Infuse medication or crystalloid fluid.

## 5. SPECIAL CONSIDERATIONS

a) The clinician should be familiar and comfortable with how to troubleshoot all alarms.
b) Slow IV push medications may be administered via syringe attached to pump tubing.

**For ALS services with Protocol 15.13: IV Infusion Pump OSP**

1. **Amiodarone**
   a) Adult
      (1) Patient with a pulse (including Afib/Aflutter with aberrancy):
         (a) 15 mg/min IV/IO over 10 minutes; total dose: 150 mg
   b) Pediatric
      (1) Patient with a pulse (Consult only):
         (a) 0.5 **mg/kg/min** IV/IO over 10 minutes; total dose: 5 mg/kg

2. **Calcium chloride**
   a) Adult
      (1) Hyperkalemia, hypocalcemia, calcium channel blocker overdose:
         (a) 50-100 mg/min IV/IO over 3–6 minutes; total dose: 0.5-1 gram
   b) Pediatric
      (1) Hyperkalemia, hypocalcemia, calcium channel blocker overdose:
         (a) 2 **mg/kg/min** IV/IO over 3–5 minutes; max total dose: 1 gram

3. **Cefazolin**
   a) Adults and patients 13 years of age and older: 200 mg/min (2000 mg over 10 minutes)
   b) Patients 5-12 years of age: 100 mg/min (1000 mg over 10 minutes)
   c) Patients 1-4 years of age: 50 mg/min (500 mg over 10 minutes)
   d) Patients less than 1 year of age: consult for dosing

4. **Dextrose (D10%)**
   a) Adult
      (1) Hypoglycemia (blood glucose less than 70 mg/dL):
         (a) 50 mL/min (5 grams/min) over 5 minutes; max single dose: 250 mL or 25 grams. Repeat dose if the patient has persistent altered mental status and blood glucose less than 90 mg/dL.
   b) Pediatric
      (1) Hypoglycemia
         (a) Patient less than 28 days (blood glucose less than 40 mg/dL):
            (i) 0.4 mL/kg/min over 5 minutes
            (ii) Consult for repeat dosing if blood glucose remains less than 40 mg/dL
         (b) Patient 28 days up to 18th birthday (blood glucose less than 70 mg/dL):
            (i) 0.4-0.8 mL/kg/min over 5 minutes; max single dose 250 mL or 25 grams.
            (ii) Consult for repeat dosing if blood glucose remains less than 70 mg/dL

5. **Diltiazem**
   a) Adult
      (1) Symptomatic atrial fibrillation and atrial flutter
         (a) Initial: 5 mg/hour, increase infusion rate by 2.5 mg/hour every 15 minutes to a maximum of 15 mg/hour to achieve HR less than 110, while maintaining systolic blood pressure greater than 100 mmHg.
         (b) If hypotension develops (systolic blood pressure less than 100 mmHg), stop the

infusion, and treat according to treatment of overdose or other adverse reactions (see ALS Pharmacology: *Diltiazem*).

**6. Dopamine**

a) Adult
   (1) Shock (anaphylactic, cardiogenic, hypovolemic-after volume resuscitation, or septic)
      (a) Administer 2-20 **mcg**/kg/min IV drip titrated to systolic blood pressure of 100 mmHg or medical consultation selected BP; initial infusion rate 2-5 **mcg**/kg/min.

b) Pediatric
   (1) Shock (anaphylactic, cardiogenic, hypovolemic-after volume resuscitation, or septic)
      (a) Administer 2-20 **mcg**/kg/min IV drip titrated to age-specific BP or medical consultation selected BP; initial infusion rate is 2 **mcg**/kg/min.

**7. Epinephrine**

a) Adult
   (1) Shock (anaphylactic, cardiogenic, hypovolemic-after volume resuscitation, or septic)
      (a) Administer 0.1 to 0.5 **mcg**/kg/min; titrate to MAP of 65 mmHg or systolic blood pressure of 90 mmHg

b) Pediatric
   (1) Shock (anaphylactic, cardiogenic, hypovolemic-after volume resuscitation, or septic)
      (a) Administer 0.1 to 0.5 **mcg**/kg/min. For patients under 10 years of age, titrate to systolic blood pressure of [70 + (2 x age in years)]. For patients 10 years of age and older, titrate to systolic blood pressure of 90 mmHg.

**8. Ketamine**

a) Adult and Pediatric
   (1) Ventilatory difficulty secondary to bucking or combativeness: for extended transports with patients on a ventilator after intubation with an endotracheal tube, an approved alternative airway device, or cricothyroidotomy, administer 1-2 mg/kg/**hr** following a *Ventilatory Difficulty* procedure bolus of *ketamine*.

**9. Lactated Ringer's**

a) Adult and Pediatric
   (1) An infusion pump may be used to administer LR at a given infusion rate or as a bolus. See ALS Pharmacology: *Lactated Ringer's*.

**10. Magnesium sulfate**

a) Adult
   (1) Seizure activity associated with pregnancy: 400 mg/min IV/IO over 10 minutes; total dose 4 grams mixed in 50-100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W).
   (2) Moderate to severe asthma exacerbation: 100 mg/min IV/IO over 20 minutes mixed in 50-100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W).

b) Pediatric (under 18 years of age)
   (1) Seizure activity associated with pregnancy: 400 mg/min IV/IO over 10 minutes; total dose 4 grams mixed in 50-100 mL of approved diluent (normal saline/*Lactated Ring-*

*er's*/D5W).
(2) Moderate to severe asthma exacerbation: 2.5 mg/kg/min IV/IO over 20 minutes mixed in 50-100 mL of approved diluent (normal saline/*Lactated Ringer's*/D5W). Max total dose of 2 grams.

c) Interfacility transport
(1) A paramedic may administer continuous infusion established by a sending facility, not to exceed the total dose ordered. Patient must be monitored for signs and symptoms of magnesium toxicity.
(2) Magnesium sulfate used for tocolytic control is an RN-level indication.

**11. Nitroglycerin (Pilot Only)**

a) Adult - Patients 18 years of age and older
(1) Severe acute pulmonary edema (CHF) with systolic blood pressure of 150 mmHg or greater (or MAP greater than 90 mmHg), following application of CPAP or BiPAP. For dosing, refer to *Intravenous Nitroglycerin for Severe CHF (Paramedic Only)* protocol.

**12. Norepinephrine (OSP Only)**

a) Adults – Patients 18 years of age and older
(1) For patients with hypotension (systolic blood pressure less than 90 mmHg) despite fluid resuscitative efforts per shock protocols. For dosing, refer to *Norepinephrine for Treatment of Hypotension/Shock* protocol.

**13. Sodium Bicarbonate**

a) Adults – Patients 18 years of age and older with Crush Syndrome
(1) Sodium bicarbonate 100 mEq/L – administer 2-4 mEq/minute IV/IO.

**14. Tranexamic Acid (TXA)**

a) Adult – Patients 12 years of age and older
(1) Suspected hemorrhagic shock (systolic blood pressure less than 90 mmHg) due to traumatic mechanism; injury must have occurred within the past 1 hour, OR Postpartum hemorrhage (systolic blood pressure less than 90 mmHg or HR greater than 110 AND ongoing blood loss within 1 hour of delivery), despite performing uterine massage:
(a) Administer 166 mg/min IV/IO over 3-6 minutes. Maximum total dose of 1 gram in approved diluent (normal saline, D5W, LR).

b) Pediatric – Patients 5-11 years of age
(1) Suspected hemorrhagic shock (systolic blood pressure less than 90 mmHg) due to traumatic mechanism; injury must have occurred within the past 1 hour, OR Postpartum hemorrhage (systolic blood pressure less than 90 mmHg or HR greater than 110 AND ongoing blood loss within 1 hour of delivery), despite performing uterine massage:
(a) Administer 83 mg/min IV/IO over 3-6 minutes. Maximum total dose of 500 mg in approved diluent (normal saline, D5W, LR).

c) Pediatric – Patients less than 5 years of age
(1) Medical consultation is required.

## 1. INDICATIONS

a) Nerve agents are a group of highly toxic chemicals that may be released in a WMD event. These agents act to inhibit cholinesterase, and therefore prolong the effects of acetylcholine. These agents are potent, long-acting, and all bind to acetylcholine irreversibly unless an oxime is given.

b) Nerve agents include Tabun (GA), Sarin (GB), Soman (GD) and GF. There are also V agents, such as VX.

c) The G-type agents evaporate (become vapor) or may be dispersed in the air by weapons. When a person inhales this vapor, effects begin within seconds to minutes.

d) The V-type agents are oily and evaporate very slowly. They persist on the ground, foliage, etc., for long periods. Exposure to this liquid on the skin causes effects to start as soon as 10 minutes or as long as 18 hours after contact. The vapor hazard from these is not as great as from the G-type agents.

e) Many insecticides currently in use are organophosphates and are chemically related to nerve agents. The organophosphate insecticides may have a slower onset and a longer lasting effect compared with nerve agents.

f) Characteristic signs and symptoms may identify nerve agent poisoning. After vapor exposure, early manifestations of poisoning occur in the eyes, nose, and airway. With liquid/dermal contact exposure, early manifestations occur in the skin and the GI tract. Thus, when looking at the chart below, consider the mechanism of release and the associated signs and symptoms (refer to the chart below with the mnemonic P-SLUDGE-MC). (NOTE: This mnemonic is used for all organophosphate toxicity. Pupillary response occurs only with vapor exposure and will not be seen unless there is direct liquid contact with the eye. Urinary incontinence is also very rare.)

**Nerve Agents**
Signs and Symptoms of Chemical Agents

| | | Vapor Exposure | Liquid Exposure |
|---|---|---|---|
| Mild | **P -** Pinpointing pupils | ✓ | Not Seen |
| | **S -** Salivation | ✓ | Not Seen |
| | **L -** Lacrimation (tearing) | ✓ | Not Seen |
| Severe | **U -** Urination | ✓ | ✓ |
| | **D -** Defecation | ✓ | ✓ |
| | **G -** Gastrointestinal; pain/gas | ✓ | ✓ |
| | **E -** Emesis (vomiting) | ✓ | ✓ |
| | **M -** Muscle twitching | ✓ | ✓ |
| | **C -** Convulsions | ✓ | ✓ |
| | **B -** Bradycardia | ✓ | ✓ |
| | **B -** Bronchospasm | ✓ | ✓ |
| | **B -** Bronchorrhea | ✓ | ✓ |

g) EMS clinicians must know the following MILD, MODERATE, and SEVERE signs and symptoms of nerve agent poisoning. When clinicians recognize most or all of the symptoms listed below, they must IMMEDIATELY receive treatment (first aid or buddy aid).
   (2) MILD poisoning (self-aid). Casualties with mild symptoms may experience most or all of the following:
      (a) Unexplained runny nose
      (b) Unexplained sudden headache
      (c) Sudden drooling
      (d) Difficulty in seeing (dimness of vision, constricted pupil)
      (e) Tightness in the chest or difficulty in breathing
      (f) Wheezing and coughing
      (g) Localized sweating and muscular twitching in the area of the contaminated skin
      (h) Stomach cramps
      (i) Nausea without vomiting
   (2) MODERATE effects would be the above, but also include more severe effects such as diarrhea, moderate to severe difficulty breathing, and some skeletal-muscular twitching/fasciculations. The progression of symptoms from mild to moderate indicates either inadequate treatment or continuing exposure to the nerve agent.
   (3) SEVERE symptoms. Clinicians with severe symptoms will not be able to treat themselves and must receive prompt buddy aid and medical treatment. Casualties with severe symptoms may experience most or all of the MILD symptoms plus most or all of the following:
      (a) Impaired thinking
      (b) Increasing wheezing and increased difficulty breathing
      (c) Severe pinpoint pupils
      (d) Red eyes with tearing
      (e) Vomiting
      (f) Severe muscular twitching and general weakness
      (g) Involuntary defecation
      (h) Convulsions
      (i) Unconsciousness
      (j) Respiratory Failure
      (k) Bradycardia

h) Prevention of poisoning
   (1) In the setting of an exposure to a nerve agent, the most rapid absorption occurs through the respiratory tract. When it is suddenly determined that clinicians are in the “hot zone”, do not look for the invisible vapor cloud. Clinicians should hold their breath until they don and clear their breathing apparatus or protective masks. Once masked, a clinician will then give the alarm to other clinicians. This may be done with hand signals or through the mask. If a fellow clinician is severely poisoned with altered consciousness in the hot zone, the initial, less-poisoned masked clinician should mask the casualty.

# CHEMPACK

## Adult Nerve Agent Exposure Treatment

| Mild Exposure | Moderate Exposure | Severe Exposure |
|---|---|---|
| Patients who can walk and talk who may present with miosis, rhinorrhea, increased salivation, nausea | Patients with mild dyspnea, ataxia, miosis, or muscle cramping | Patients who may have severe respiratory distress, seizures, extreme SLUDGEM (See below) |
| Atropine **2mg** IM + Pralidoxime **600mg** IM | Atropine **4mg** IM + Pralidoxime **1200mg** IM | Atropine **6mg** IM + Pralidoxime **1800mg** IM + [Diazepam **10mg** IM **OR** Midazolam **10mg** IM] |
| **May repeat 3-5 minutes until symptoms resolve** | **May repeat 3-5 minutes until symptoms resolve** | **May repeat 3-5 minutes until symptoms resolve** |

*****AUTO-INJECTORS SHOULD BE USED FOR ALL ADULT EMS PATIENTS*****

**Medications may come packaged as either DuoDotes, Mark I Kits, ATNAA kits, individual Atropen + 600mg Pralidoxime Autoinjectors, or in individual medication vials**

**2mg Atropens are not available in all CHEMPACK caches**

**Adult Vial Medication Directions:**

**Atropine** (0.4mg/ml in 20mL): Draw up medication in 5mL syringe (5mL)

**Pralidoxime** (300mg/mL): For Intramuscular (IM) injection: Add 3.3mL of sterile water into a single 1-gram vial, which results in a 300mg/mL concentration. Do not exceed 2mL per IM injection

**Diazepam & Midazolam** (5mg/mL in 10mL): draw up 2mL in 3mL syringe for IM administration for initial dose of 10mg IM

S– Salivation
L– Lacrimation (tear production)
U– Urination
D– Defecation
G– Gastrointestinal distress
E– Emesis
M- Muscle Twitching & Miosis (constricted pupils)

# CHEMPACK
## Pediatric Nerve Agent Exposure Treatment

**Mild Exposure**
Patients who can walk and talk who may present with miosis, rhinorrhea, increased salivation, and nausea

| Weight (Kg) | Atropine Dose (IM) |
|---|---|
| Less than 10 kg | **0.5mg** |
| 10 kg – 25 kg | **1 mg** |
| 26 - 50 kg | **2 mg** |
| Over 50 kg | **2 mg** |

**May repeat 3-5 minutes until symptoms resolve**

**Moderate Exposure**
Patients with mild dyspnea, ataxia, miosis, or muscle cramping

| Weight (Kg) | Dose (IM)) |
|---|---|
| Less than 10 kg | Atropine **1mg** + Pralidoxime **600mg** |
| 10 kg – 25 kg | Atropine **2mg** + Pralidoxime **600mg** |
| 26 kg - 50 kg | Atropine **2mg** + Pralidoxime **1200mg** |
| Above 50kg | Atropine **2mg** + Pralidoxime**1200mg** |

**May repeat 3-5 minutes until symptoms resolve**

**Severe Exposure**
Patients who may have severe respiratory distress, seizures, extreme SLUDGEM (See below)

| Weight (Kg) | Dose (IM) |
|---|---|
| Up to 25kg | Atropine **2mg** + Pralidoxime **600mg** + [Diazepam **2.5mg** **OR** Midazolam **2.5mg**] |
| 26 kg - 50kg | Atropine **4mg** + Pralidoxime **1200mg** + [Diazepam **5mg** **OR** Midazolam **5mg**] |
| Above 50kg | Atropine **6mg** + Pralidoxime **1800mg** + [Diazepam **10mg** **OR** Midazolam **10mg**] |

**May repeat 3-5 minutes until symptoms resolve**

Atropine/ Pralidoxime may come packaged as either DuoDotes, Mark I Kits, ATNAA kits, individual Atropen + Pralidoxime autoinjectors, or in individual medication vials.

Treatment via Atropine & Pralidoxime Autoinjectors is preferred

CANA autoinjectors are not indicated for pediatric patients less than 50kg

**Color Coding and unit amount for Atropens**

| | |
|---|---|
| | 0.5 mg auto-injector (blue) |
| | 1 mg auto-injector (red) |
| | 2 mg auto-injector (green) (May not be available in all CHEMPACK caches) |

**Pediatric Vial Medication Instructions:**

**Atropine** (0.4mg/mL, 20mL): Draw-up medication in 3mL, 5mL, or 10mL syringe as indicated

**Pralidoxime** (300mg/ mL) Add 3.3mL of sterile water into a single 1 gram vial, which results in a 300mg/mL concentration. Do not exceed 2mL per IM injection

**Diazepam & Midazolam** (5mg/mL, 10mL) Draw 0.2mg/kg IM to a maximum 10mg

S– Salivation
L– Lacrimation (tear production)
U– Urination
D– Defecation
G– Gastrointestinal distress
E– Emesis
M- Muscle Twitching & Miosis (constricted pupils)

# 15.16 Optional Supplemental Protocol – MECHANICAL CPR



**1. PURPOSE**

Mechanical CPR (mCPR) devices perform chest compressions at a consistent and reliable rate and depth, never fatigue, and are not susceptible to other human factors that degrade resuscitation quality. Additionally, the use of an mCPR device while transporting an in-progress resuscitation allows for effective CPR and increases safety by allowing clinicians to be restrained during transport.

**2. PRESENTATION**

Patients in cardiac arrest who have an established resuscitation in progress

**3. INDICATIONS**

a) Active cardiac arrest resuscitation
b) Applied in a standby mode for transport to any patient
   (1) who achieves ROSC, OR
   (2) who clinicians believe will progress to cardiac arrest

**4. CONTRAINDICATIONS**

a) Patients who have not yet reached their 13th birthday
b) LVAD patients

**5. PROCEDURE:**

a) Application of an mCPR device may not begin until after two 2-minute cycles of manual chest compressions.
b) Any mCPR device must be applied in a manner that limits any break in compressions to less than 10 seconds.
c) The 10-second breaks for device application must only occur around a normal 2-minute compression interval and simultaneously while performing rhythm interpretation and defibrillation.
d) Apply the mCPR device according to manufacturer instructions, keeping in mind that minimizing breaks in compressions to less than 10 seconds may require that an mCPR device be applied over two or more 2-minute cycles of chest compressions.
e) Once applied, devices must be used in accordance with manufacturer recommendations, but the goal should be to limit breaks in compressions as little as possible. This goal can be accomplished by:
   (1) Only pausing the mCPR device for rhythm interpretation
   (2) Pausing only long enough to identify the rhythm, and then starting again
   (3) Delivering defibrillations while chest compressions are in progress
f) An mCPR device (if available) should be applied in a standby mode for transport to any patient who achieves ROSC or patients who clinicians believe will progress to cardiac arrest.

**6. PRECAUTIONS**

Application of an mCPR device shall not cause delays in assessing for a shockable rhythm or the initiation of manual CPR.

**7. INITIAL TRAINING**

The jurisdictional medical director must certify that personnel have received a locally-approved training program prior to implementation.

**8. ONGOING DEMONSTRATION OF PROFICIENCY**

The jurisdictional medical director must reaffirm that EMSOP clinicians have received annual training with the mCPR device.

# Optional Supplemental Protocol – MOBILE INTEGRATED HEALTH



## 1. INDICATIONS

Patients who may qualify for a home visit by the MIH team include:

a) Patients who have called 9-1-1 for any medically-related reason five times in any six-month interval (patient's consent required) or

b) Patients who are referred to the MIH team by other allied health professionals or EMS clinicians (patient's consent required)

## 2. PRECAUTIONS

a) Upon initiation of the home visit, if any patient exhibits any signs or symptoms that would require transport to an emergency department, the MIH team will contact the county dispatch center and request an emergent response.

(1) MIH paramedic will perform all assessments and care based upon current *Maryland Medical Protocols for Emergency Medical Services* until the appropriate 9-1-1 EMS resource's arrival. Patient care may then be transferred to that EMS unit.

(2) MIH paramedic will not provide ALS medications or interventions unless an immediate life-threatening condition has been identified and the local 9-1-1 Center has been notified of need for an emergent response.

b) MIH home visits may be conducted by a paramedic (MIH service-credentialed) or a paramedic/RN team or a paramedic/NP team.

## 3. CONTRAINDICATIONS

Patients who will not qualify for this program include:

a) Patients already receiving care from established individual home health care or use a visiting nurse agency (unless the MIH program is partnered with a home health agency)

b) Patients who refuse participation by revoking written consent, verbal refusal of care at time of visit, or are already enrolled in another home health care program

c) Patients who have not reached their 18th birthday

## 4. PROCEDURE

After an individual has consented to be included in this program, the MIH paramedic will:

a) Provide a recognized uniformed presence for individual reassurance and familiarity

b) Assess the individual's home environment

(1) Assess for signs of neglect or abuse

(2) Assess for safety issues (e.g., slip/fall risk, smoke detector, fire hazards, exposed electrical wiring)

c) Obtain vital signs and patient's weight

d) Obtain and review the patient's past medical, family, and social history

e) Conduct a basic physical assessment

f) Review medication list (with NP/RN team or telemedicine support)

g) Review behavioral health needs (with NP/RN team or telemedicine support)

h) Assess the patient's overall health status using an approved survey tool (e.g., EQ-5D)

i) Make appropriate health professional contacts and provide medication education (with NP/RN team or telemedicine support) and referrals

**5. MEDICAL CONSULTATION**

a) Online medical consultation may be obtained from a jurisdictional/commercial EMS medical director or through a designated base station.

b) Paramedics cannot accept orders from primary care physicians on the phone or on-scene unless individual has an immediate life-threatening condition and the physician is going to the hospital with the patient on EMS unit.

c) Nurse practitioners (NP) and registered nurses (RN) may not direct an EMS clinician to perform any skill or medical intervention that is not within his or her scope of practice nor provide "Medical Consultation" as referenced in *The Maryland Medical Protocols for Emergency Medical Services*.

**6. DOCUMENTATION**

a) MIH paramedic will complete an eMEDS® report using the MIH module.

b) Other MIH team members (NP/RN) will document in an electronic health record approved by their home agency.

c) MIH teams will establish policies and procedures for sharing of protected health information across allied health, social services, and community organizations, with resources available for patients.

d) In the event that an immediate life-threatening condition is identified and the MIH paramedic initiated urgent/emergent EMS care:

(1) MIH paramedic will complete an eMEDS® report in the standard (emergency response) eMEDS® system or Commercial EMSOP equivalent.

## 1. INDICATIONS

Patients who have been referred for lab specimen collection or 12 lead ECG acquisition as a part of a scheduled MIH visit. A Maryland-licensed practitioner (MD, DO, NP, PA) must order the lab tests and/or ECG, and agree to review the results with the patient. Patient consent for specimen collection and ECG acquisition is required.

## 2. PRECAUTIONS

a) Upon initiation of the home visit, if any patient exhibits any signs or symptoms that would require transport to an emergency department, the MIH team will contact the emergency communications center for the jurisdiction and request an EMS response.
   (1) MIH paramedic will perform all assessments and care based upon current *Maryland Medical Protocols for Emergency Medical Services* until the appropriate 9-1-1 EMS resource's arrival. Patient care may then be transferred to that unit.
   (2) MIH paramedic will not perform medication administration unless an immediate life-threatening condition has been identified and the local 9-1-1 center has been notified of the need for an emergency response.

b) MIH home visits may be conducted by a paramedic (MIH service-credentialed) or a paramedic/RN team or a paramedic/NP team.

## 3. CONTRAINDICATIONS

Patients who will not qualify for this program include:

a) Patients who have not been referred to the MIH team by a community-health office, hospital, or medical office with an order for lab or 12 lead ECG.

b) Patients who have not reached their 18th birthday.

## 4. PROCEDURE

During the visit, the MIH paramedic/team:

a) Will conduct an MIH visit in accordance with the *Mobile Integrated Health* protocol

b) May initiate a telehealth visit between the patient and ordering practitioner

c) May acquire specimens for the purpose of laboratory testing. Permissible speciment types must either be blood draws (venous or capillary only), urine/fecal samples, or oral/nasal swabs.
   (1) The patient's treating /ordering practitioner shall provide a written or electronic order for laboratory testing (specimen collection) or 12 lead ECG.
   (2) Prior to specimen collection, the MIH team must provide education to the patient regarding the indication for the collection, process to obtain the specimen, and any applicable follow-up procedures.
   (3) The patient must be appropriately registered or confirmed with the receiving laboratory to ensure that the provided specimens can be processed.
   (4) Delivery of the specimen must be coordinated with a medical laboratory and transported in accordance with applicable and relevant safety precautions as defined by the laboratory and Federal and State regulatory agencies.
   (5) Specimen collection may only be conducted by clinicians who are duly trained in specimen acquisition.

**5. MEDICAL CONSULTATION**
Shall be obtained in accordance with the *Mobile Integrated Health* protocol

**6. DOCUMENTATION**
MIH visits shall be documented in accordance with the *Mobile Integrated Health* protocol

# 15.19 Optional Supplemental Protocol – MODEL-T (MEDICATIONS FOR OPIOID USE DISORDER BY EMS AND LINKAGE TO TREATMENT)



## 1. PURPOSE

To define the indications for Paramedics and CRTs to administer buprenorphine for patients with opioid withdrawal symptoms.

## 2. INDICATIONS

In addition to providing expressed consent for treatment with buprenorphine, the patient must:

a) Have experienced an opioid overdose which required the administration of *naloxone* (either prior to arrival of EMS clinicians, or as a treatment provided by responding EMS clinicians) **and** have a Clinical Opiate Withdrawal Scale (COWS) score that is equal to or greater than 8, or;

b) Is experiencing symptoms associated with opioid withdrawal, **and** has a COWS score that is equal to or greater than 5, **and** reports no opioid use within the past 36 hours.

## 3. PRECAUTIONS

a) Buprenorphine is a partial agonist at the mu opioid receptor site and, as such, may produce symptoms similar to opioids, such as respiratory depression. If respiratory depression occurs, Paramedics and CRTs should be prepared to provide ventilatory support and initiate emergency response and transport.

b) Buprenorphine should be administered with the intent to continue receiving treatment with the medication from a local treatment program. Caution should be used when administering the medication to a person preparing to enter an institutional setting, such as incarceration, where continued administration of the medication may not be possible.

c) Patients that are currently enrolled in a treatment program should be evaluated for barriers to accessing care, with focus on abating barriers, while evaluating for appropriateness of treatment with this protocol.

d) When administering buprenorphine via the sublingual route, it may take 5-10 minutes to dissolve. During this time, the patient should not talk or do other things that might lead to them inadvertently swallowing the buprenorphine before it can be absorbed.

## 4. CONTRAINDICATIONS

a) Superseding medical or trauma condition:
   (1) Altered mental status
   (2) Unstable vital signs/hemodynamic instability

b) Complex substance use:
   (1) Current evidence of intoxication due to alcohol or other non-opioid substances
   (2) Current long-acting opioid use, including methadone (whether illicit or prescribed), in the past 36 hours (does not apply for patients who have been administered *naloxone* as a result of an acute opioid overdose prior to treatment with buprenorphine).

c) Chronic pain patients with prescribed opioid medications

d) Patients who have not reached their 18th birthday

e) Patients with an allergy to buprenorphine

f) Patients unwilling to share name and date of birth

g) Patients who are unable to provide consent for treatment

**5. PROCEDURE**

a) Determine eligibility for treatment under the MOUD Protocol.
   (1) Assess COWS score.
   (2) Assess for indications and contraindications.
b) If *any* indications are met **and** *none* of the contraindications are present, obtain signed expressed patient consent for treatment.
   (1) If the patient does not consent for treatment, or is unable to consent for treatment due to an altered level of consciousness or impairment, the patient shall not be treated under this protocol. Treat according to applicable *Maryland Medical Protocols for Emergency Medical Services*, and make recovery-oriented referrals as appropriate.
c) Assess patient interest in locally available treatment, recovery, and harm-reduction resources.
   (1) Assist with scheduling follow up appointments.
   (2) Provide documentation with information regarding treatment provided and upcoming appointments.
d) Give water to moisten mucous membranes.
e) Administer 16 mg buprenorphine SL.
f) For patients complaining of nausea, administer ondansetron 8 mg ODT.
   (1) Evaluate for contraindications listed in the *ALS Pharmacology – Ondansetron* protocol. Do not administer if any contraindications are present.
g) For patients complaining of mild to moderate pain or discomfort, administer *acetaminophen* (640 mg liquid **or** 650 mg pill/tablet).
   (1) Evaluate for contraindications listed in the *ALS Pharmacology – Acetaminophen* protocol. Do not administer if any contraindications are present.
h) Reassess condition in 15-20 minutes
   (1) If symptoms persist, or if there is no COWS score reduction, administer an additional 8 mg buprenorphine SL, for a maximum total dose of 24 mg.
   (2) If nausea persists, administer an additional 8 mg *ondansetron*.
i) Provide the patient with leave-behind *naloxone*.

# Optional Supplemental Protocol – MODEL-T PHARMACOLOGY: BUPRENORPHINE



1. **Pharmacology**
   a) Partial agonist at the mu opioid receptor site
   b) Displaces morphine, methadone, and other full opioid agonists from receptors and blocks the effects of other opioids
   c) Has a slow dissociation rate from the mu opioid receptor, which gives rise to its prolonged suppression of opioid withdrawal and blockade

2. **Pharmacokinetics**
   Onset of action within 10-20 minutes

3. **Indications**
   a) Patients who have been recently resuscitated with *naloxone* **and** have a COWS score that is equal to or greater than 8, or;
   b) Patients experiencing symptoms associated with opioid withdrawal **and** has a COWS score that is equal to or greater than 5 **without** reported opioid use within the past 36 hours.

4. **Contraindications**
   a) Superseding medical or trauma condition:
   b) Altered mental status
   c) Unstable vital signs/hemodynamic instability
   d) Complex substance use:
   e) Current evidence of intoxication due to alcohol or other non-opioid substances
   f) Current long-acting opioid use, including methadone (illicit or prescribed), in the past 36 hours.
   g) Chronic pain patients with prescribed opioid medications
   h) Patients who have not reached their 18th birthday
   i) Patients with an allergy to buprenorphine
   j) Patients unwilling to share name and date of birth
   k) Patients who are unable to provide consent for treatment

5. **Adverse Effects**
   a) Respiratory depression may be experienced in patients where buprenorphine is administered in the presence of other sedative drugs.
   b) Precipitated withdrawal may be experienced in patients who still have opioids present at the mu opioid receptor site, although precipitated withdrawal is likely to be mild in intensity and easily tolerated.

6. **Precautions**
   a) Buprenorphine is a partial agonist at the mu opioid receptor site and, as such, may elicit symptoms consistent with opioid medication administration, such as respiratory depression. If respiratory depression occurs, Paramedics and CRTs should be prepared to provide ventilatory support and initiate emergency response and transport.
   b) Buprenorphine should be administered with the intent to continue receiving treatment with the medication from a local treatment program. Caution should be used when administering the medication to a person preparing to enter an institutional setting, such

as incarceration, where continued administration of the medication may not be possible.

c) Patients that are currently enrolled in a treatment program should be evaluated for barriers to accessing care, with focus on abating barriers, while evaluating for appropriateness of treatment with this protocol.

**7. Dosage**

a) Adult:
Administer 16 mg SL after providing water to moisten mucous membranes. Give 8 mg SL if symptoms persist or there is no COWS score reduction after 10 minutes.

b) Pediatric: Not indicated for patients under 18 years of age.

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## Clinical Opiate Withdrawal Scale

For each item, circle the number that best describes the patient's signs or symptom. Rate on just the apparent relationship to opiate withdrawal. For example, if heart rate is increased because the patient was jogging just prior to assessment, the increase pulse rate would not add to the score.

Patient's Name:_____ Date and Time ____/____/____:_____

**Reason for this assessment**:_____

| | |
|---|---|
| **Resting Pulse Rate**: _____beats/minute<br>*Measured after patient is sitting or lying for one minute*<br>0 pulse rate 80 or below<br>1 pulse rate 81-100<br>2 pulse rate 101-120<br>4 pulse rate greater than 120 | **GI Upset**: *over last 1/2 hour*<br>0 no GI symptoms<br>1 stomach cramps<br>2 nausea or loose stool<br>3 vomiting or diarrhea<br>5 multiple episodes of diarrhea or vomiting |
| **Sweating:** *over past 1/2 hour not accounted for by room temperature or patient activity.*<br>0 no report of chills or flushing<br>1 subjective report of chills or flushing<br>2 flushed or observable moistness on face<br>3 beads of sweat on brow or face<br>4 sweat streaming off face | **Tremor** *observation of outstretched hands*<br>0 no tremor<br>1 tremor can be felt, but not observed<br>2 slight tremor observable<br>4 gross tremor or muscle twitching |
| **Restlessness** *Observation during assessment*<br>0 able to sit still<br>1 reports difficulty sitting still, but is able to do so<br>3 frequent shifting or extraneous movements of legs/arms<br>5 unable to sit still for more than a few seconds | **Yawning** *Observation during assessment*<br>0 no yawning<br>1 yawning once or twice during assessment<br>2 yawning three or more times during assessment<br>4 yawning several times/minute |
| **Pupil size**<br>0 pupils pinned or normal size for room light<br>1 pupils possibly larger than normal for room light<br>2 pupils moderately dilated<br>5 pupils so dilated that only the rim of the iris is visible | **Anxiety or Irritability**<br>0 none<br>1 patient reports increasing irritability or anxiousness<br>2 patient obviously irritable or anxious<br>4 patient so irritable or anxious that participation in the assessment is difficult |
| **Bone or Joint aches** *If patient was having pain previously, only the additional component attributed to opiates withdrawal is scored*<br>0 not present<br>1 mild diffuse discomfort<br>2 patient reports severe diffuse aching of joints/muscles<br>4 patient is rubbing joints or muscles and is unable to sit still because of discomfort | **Gooseflesh skin**<br>0 skin is smooth<br>3 piloerrection of skin can be felt or hairs standing up on arms<br>5 prominent piloerrection |
| **Runny nose or tearing** *Not accounted for by cold symptoms or allergies*<br>0 not present<br>1 nasal stuffiness or unusually moist eyes<br>2 nose running or tearing<br>4 nose constantly running or tears streaming down cheeks | Total Score _____<br>The total score is the sum of all 11 items<br>Initials of person completing assessment: _____ |

Score: 5-12 = mild; 13-24 = moderate; 25-36 = moderately severe; more than 36 = severe withdrawal

This version may be copied and used clinically.

*Journal of Psychoactive Drugs* Volume 35 (2), April - June 2003

Source: Wesson, D. R., & Ling, W. (2003). The Clinical Opiate Withdrawal Scale (COWS). *J Psychoactive Drugs,* 35(2), 253–9.

# Optional Supplemental Protocol – NOREPINEPHRINE FOR TREATMENT OF HYPOTENSION/SHOCK





1. **Purpose**
   For patients experiencing sustained hypotension (SBP less than 90 mmHg) despite fluid resuscitative efforts per existing shock protocols

2. **Pharmacology**
   a) Medication class: Vasopressor (alpha/beta agonist)
   b) Route: Intravenous (IV) via pump
   c) Pharmacodynamics
      (1) Mechanism of action
         (a) Potent α-1 agonist with moderate β-1 agonist activity
         (b) Little to no activity at α-2 or β-2 receptors
         (c) More pronounced β effect at lower doses (less than 2µg/min); at higher doses (greater than 3µg/min), α effects predominate
      (2) Increases vasoconstriction (α-1 effect) with mild increase in cardiac output (β-1 effect)
   d) Pharmacokinetics
      (1) Onset: rapid
      (2) Duration of action: 1–2 minutes
      (3) Half-life: 2–4 minutes

3. **Indications**
   Patients 18 years and older who remain hypotensive (SBP less than 90 mmHg or MAP less than 65 mmHg) refractory to maximum fluid bolus as described in the shock protocol for the specific type of suspected shock.

4. **Contraindications**
   a) Do not initiate or continue the norepinephrine infusion under the following circumstances:
      (1) If non-ultrasound capable, for patients who are pulseless
      (2) If ultrasound capable, for patients who have no evidence of carotid blood flow or cardiac contractility
   b) Patients who have not reached their 18th birthday
   c) Known or reported hypersensitivity to norepinephrine
   d) Patients with anaphylactic shock should receive epinephrine per the the anaphylaxis protocol

5. **Adverse Effects**
   a) Excessive vasoconstriction resulting in:
      (1) Decreased end-organ perfusion
      (2) Decreased perfusion to distal extremities (fingers and toes)
      (3) Potential reflex bradycardia
   b) Arrhythmias

6. **Precautions**
   Increased myocardial oxygen demand

7. **Procedure for mixing**
   a) Add 4 mg of 1 mg/mL (4 mL) norepinephrine to 250 mL of dextrose 5% (D5W) solution

or normal saline, resulting in 250 mL of 16 mcg/mL solution of norepinephrine
b) Prime infusion tubing with mixed solution
c) Label bag with medication name, concentration (4 mg/250 mL or 16 mcg/mL), time mixed, and initials of mixing clinician

**8. Storage**
a) Vials: Store intact vials in original container at 20°C to 25°C (68°F to 77°F); excursion permitted to 15°C to 30°C (59°F to 86°F). Protect from light.
b) If diluted medication is not immediately used, please discard.

**9. Administration and Dosing**
a) Must be delivered by an IV pump
b) Administer through largest gauge, most proximal peripheral IV/IO available
c) Dosing Range: 0.05 mcg/kg/min – 2 mcg/kg/min
d) Start infusion at 0.1 mcg/kg/min
e) Anaphylactic Shock
(1) *Epinephrine* should be initiated as the first line vasopressor
f) Cardiogenic Shock
(1) Check blood pressure every 2 minutes
(a) If MAP is less than 65 mmHg or systolic BP is less than 90 mmHg, titrate up by 0.1 mcg/kg/min every 2 minutes
(b) If MAP is between 65 and 90 mmHg or systolic BP is between 90 and 140 mmHg, maintain infusion rate.
(c) If MAP is greater than 90 mmHg or systolic BP is greater than 140 mmHg, titrate down by 0.1 mcg/kg/min every 2 minutes
g) Hypovolemic or Septic Shock
(1) Check blood pressure every 2 minutes
(a) If MAP is less than 65 mmHg or systolic BP is less than 90 mmHg, titrate up by 0.1 mcg/kg/min every 2 minutes
(b) If MAP is between 65 and 90 mmHg or systolic BP is between 90 and 140 mmHg, maintain infusion rate.
(c) If MAP is greater than 90 mmHg or systolic BP is greater than 140 mmHg, titrate down by 0.1 mcg/kg/min every 2 minutes
h) Neurogenic Shock
(1) Check blood pressure every 2 minutes
(a) If MAP is less than 85 mmHg or systolic BP is less than 110 mmHg, titrate up by 0.1 mcg/kg/min every 2 minutes
(b) If MAP is between 85 and 100 mmHg or systolic BP is between 110 and 140 mmHg, maintain infusion rate.
(c) If MAP is greater than 100 mmHg or systolic BP is greater than 140 mmHg, titrate down by 0.1 mcg/kg/min every 2 minutes
i) If the maximum dose of norepinephrine is reached, obtain medical consultation to discuss initiation of epinephrine infusion.
j) For patients who experience cardiac arrest (patient with absent pulse or ultrasound findings compatible with cardiac arrest) while receiving norepinephrine infusion, discontinue the infusion and refer to the cardiac arrest protocol.

All levels of EMS clinicians, if appropriately trained in the device

1. **INDICATIONS**
   All of the following blunt trauma patients with physical findings indicative of pelvic fracture should have a Pelvic Stabilization Binder Device applied.
   a) Evidence of pelvic instability on examination of the pelvis
   b) Patients complaining of pelvic pain on examination of the pelvis
   c) Pain on iliac compression
   d) Pain on compression of the pubic symphysis
   e) Blood at the urethral meatus
   f) Vaginal bleeding
   g) Perineal or scrotal hematoma
   h) All blunt trauma patients with an unreliable physical exam and significant mechanism of injury may be considered for application of a Pelvic Stabilization Binder Device.

PREGNANCY IS NOT A CONTRAINDICATION TO THE APPLICATION OF THE PELVIC STABILIZATION BINDER DEVICE WHEN INDICATED.

2. **CONTRAINDICATIONS**
   a) Patient for whom the smallest available pelvic stabilization binder is too wide and places pressure on abdomen or chest
   b) Children under 144 cm (4'8") will generally NOT fit small-size adult pelvic stabilizing devices.

3. **PROCEDURE**
   a) Assess for pelvic instability.
      In order to not increase bleeding, only one exam should be performed to evaluate for pelvic fracture. Multiple exams will disrupt clot formation.
   b) Identify the greater trochanter of each femur.
      The greater trochanter is the bony prominence of the lateral upper thigh.
   c) Identify the anterior superior iliac spine.
   d) Check size with estimating stabilization device and center at the greater trochanter. Ensure the top of the binder does not go above the anterior superior iliac spine.
   e) The patient should be placed in a supine position prior to application of the pelvic stabilization binder device.
   f) Place pelvic binder around the patient, centered at the level of the greater trochanter.
   g) If a backboard is used, place the binder on the backboard prior to placing the patient on the backboard.
   h) Ensure patient has been undressed and adequate exposure is provided.
   i) Tighten the binder as directed by the manufacturer's instructions for the specific stabilization binder.
   j) Once pelvic stabilization binder device is applied, do not remove until directed to do so by a physician.

**4. PRECAUTIONS**

a) Incorrectly placing the pelvic stabilization binder device at the level of the iliac wing could cause harm by widening the pelvic fracture.
Assess after application of the pelvic stabilization binder device.

b) Continue with patient care.

c) EMS clinicians should also assess distal pulses before and after the application of the pelvic stabilization binder device.

d) For EMS units with long transport times and with patients requiring large volumes of fluid resuscitation, the patient will need to be periodically monitored to make sure that the device is not becoming too tight due to expansion of the pelvic area from accumulation of fluids that have third spaced to the pelvic area.

e) If clinicians feel the device is becoming too tight, it should be slowly loosened and then reapplied.

## 1. INDICATIONS

a) Inability to tolerate laryngoscopy, and:
   (1) GCS less than or equal to 8 with respiratory rate less than or equal to 8 or greater than or equal to 35 or
   (2) GCS less than or equal to 8 with oxygen saturation less than or equal to 90% on non-rebreather face mask

b) On-line medical direction for RSI may be requested in the following situations:
   (1) GCS less than or equal to 8 with clenched jaw or inability to adequately suction airway, and without above respiratory parameters
   (2) Respiratory extremis with contraindication to noninvasive ventilation (CPAP)
   (3) Burns: inhalational burn with objective signs of developing airway compromise
   (4) Critically ill or severely injured patient with imminent airway compromise

## 2. CONTRAINDICATIONS

Patients who have not yet reached their 15th birthday
Caution – inferior STEMI patients who may be preload-dependent

## 3. PREPARATION

a) Pre-oxygenate with nasal cannula oxygen 15 lpm and bag valve mask attached to high-flow oxygen
b) Monitor vital signs q5min, continuous pulse oximetry, $ETCO_2$, and cardiac rhythm
c) Ensure functioning IV/IO and fluid therapy as per protocol.
d) Evaluate for difficult airway.
e) Perform focused RSI neurologic exam.
f) Prepare equipment
   (1) Intubation equipment
   (2) Bag-Valve-Mask (BVM)
   (3) ET tube introducer (bougie)
   (4) Suction
   (5) RSI medications
   (6) Alternative airway device
   (7) Cricothyroidotomy equipment
   (8) Video laryngoscopy equipment

## 4. RSI PROCEDURE

a) Sedation
   Adequate sedation must be provided to prevent awareness during paralysis from neuromuscular blockade.
   ***Etomidate*** may be used for sedation in patients who are aware of their surroundings.
      Initial dose: Administer 0.3 mg/kg IVP/IO over 30–60 seconds. If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP/IO over 30–60 seconds.
      Repeat dose: May repeat 0.15 mg/kg IVP/IO in 2–3 minutes if inadequate sedation.
   **OR**

***Ketamine*** is preferred for patients who are aware of their surroundings or have hypotension or possible hypovolemia.
Initial dose: Administer 2 mg/kg IVP/IO over 60 seconds.
Repeat dose: May repeat dose of 2 mg/kg IVP/IO over 60 seconds in 2-3 minutes if inadequate sedation.

**OR**

***Midazolam*** can be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. *Midazolam* should not be used for patients with hypotension, and should be avoided with possible hypovolemia.

Dose: Administer 0.1 mg/kg IVP/IO over 1–2 minutes.
Maximum single dose is 5 mg.

Only one sedative agent should be administered prior to *succinylcholine* unless otherwise directed by medical consultation.

b) In-line cervical spine stabilization shall be maintained by second caregiver for trauma patients.

c) Administer paralytic medication.

***Succinylcholine*****:** Administer 1.5 mg/kg rapid IVP/IO. Maximum single dose is 200 mg. If inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat *succinylcholine* 1 mg/kg IVP/IO. Maximum single dose is 200 mg.
Contraindications for *succinylcholine*:

(1) Burns greater than 24 hours old
(2) Spinal cord injury greater than 24 hours old
(3) Known neuromuscular disease (Guillain-Barre syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
(4) Chronic renal failure on hemodialysis/Presence of hemodialysis access
(5) Malignant hyperthermia

**OR**

***Rocuronium:*** 1 mg/kg IVP/IO (ideal body weight). If inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat *Rocuronium* dose 0.5 mg/kg IVP/IO. Maximum single dose is 125 mg.

**OR**

***Vecuronium*****:** 0.1 mg/kg IVP/IO; if inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat *vecuronium* 0.05 mg/kg IVP/IO. *Vecuronium* is the preferred paralytic for patients with a history of malignant hyperthermia or contraindications for succinylcholine.

WHEN ROCURONIUM OR VECURONIUM IS USED, MAINTENANCE OF SEDATION MUST BE ASSURED. THE PATIENT MAY NOT SHOW TRADITIONAL SIGNS OF VENTILATORY BUCKING.

d) Intubate trachea and verify ET placement.

**5. SUCCESSFUL ENDOTRACHEAL TUBE PLACEMENT**

(1) Secure ET.
(2) Ventilate the patient at a rate that maintains an $ETCO_2$ of 35-40 mmHg. For the head-injured patient with signs/symptoms of herniation, target $ETCO_2$ of 30 mmHg.

(3) If significant resistance to ventilation occurs as succinylcholine wears off (4–5 minutes), refer to *Ventilatory Difficulty Secondary to Bucking* protocol.

**6. UNSUCCESSFUL ENDOTRACHEAL TUBE PLACEMENT**

a) Place an airway adjunct (OPA or NPA) and apply high-flow oxygen by nasal cannula (no desat).
b) Resume BVM ventilation for at least 30 seconds and attempt to correct hypoxia, if present. If unable to ventilate, see "If Unable to Ventilate" below.
c) Reevaluate airway strategies and consider additional oral ET intubation attempt.
d) If unsuccessful, resume BVM ventilation.
e) Insert an approved alternative airway device (refer to *Extraglottic Airway* protocol).
f) Attach capnography and ventilate to $ETCO_2$ level of 35-40 mmHg. For head-injured patients with signs/symptoms of herniation, target $ETCO_2$ of 30 mmHg.
g) If significant resistance to ventilation occurs as *succinylcholine* wears off (4–5 minutes), or if patient exhibits difficulty in tolerating an approved alternative airway device as *succinylcholine* wears off, refer to *Ventilatory Difficulty Secondary to Bucking* protocol.

**7. IF UNABLE TO VENTILATE**

Insert an approved alternative airway device (refer to *Extraglottic Airway* protocol).

**8.** If still unable to ventilate using an approved alternative airway device, remove it and perform cricothyroidotomy (refer to *Cricothyroidotomy* protocol).

**Administrative note:** RSI jurisdictions must carry *succinylcholine* and either *rocuronium* or *vecuronium*.

**1. INDICATIONS**

Patients successfully intubated with an endotracheal tube, an approved alternative airway device, or cricothyroidotomy, for whom the ability to provide manual or mechanical ventilation is impaired secondary to bucking or combativeness

**2. CONTRAINDICATIONS**

Unsecured airway

**3. PROCEDURE**

a) Consider additional sedation

***Etomidate***

Dose: Administer 0.3 mg/kg IVP/IO over 30–60 seconds. If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP over 30–60 seconds.

May repeat 0.15 mg/kg IVP/IO every 15 minutes to a total of 3 doses.

**OR**

***Ketamine*** may be preferred for patients who have hypotension or possible hypovolemia, or if ventilatory difficulty is thought to be the result of pain response.

Dose: Dose: Administer 2 mg/kg IVP/IO over 60 seconds. May repeat additional doses of 1 mg/kgIVP/IO every 10-15 minutes, based on patient responsiveness, for duration of patient contact to facilitate ongoing sedation during transport.

For extended transports with patients on a ventilator, consider *Ketamine* infusion at 1-2 mg/kg/hr administered via intravenous medication pump following a *Ventilatory Difficulty* protocol bolus of *Ketamine*.

Additional doses require medical consultation.

**OR**

***Midazolam*** can be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. *Midazolam* should not be used for patients with hypotension, and should be avoided with possible hypovolemia.

Dose: Administer 0.1 mg/kg IVP/IO over 1–2 minutes, titrated to abate bucking and relax ventilation while maintaining systolic BP greater than 90 mmHg (110 mmHg if injuries include a suspected head injury). Maximum single dose is 5 mg. May repeat two additional doses of 0.05 mg/kg IVP/IO as needed for effect (with same BP parameters as initial dosing). Maximum of 2.5 mg per each additional dose.

b) If ventilatory difficulty is thought to be the result of pain response,

***Ketamine* may be used as above.**

**OR**

Opioid may be used per *Pain Management* protocol in addition to, or instead of, midazolam, ketamine, or etomidate. Titrate to abate bucking and relax ventilation while maintaining systolic BP greater than 90 mmHg.

ALERT SEDATION MUST BE PROVIDED PRIOR TO ROCURONIUM OR VECURONIUM FOR A PATIENT WHO IS EITHER RESPONSIVE TO STIMULUS, OR WHO MAY BECOME RESPONSIVE TO STIMULUS DURING NEUROMUSCULAR BLOCKADE. USE OF ROCURONIUM OR VECURONIUM REQUIRES FUNCTIONING $ETCO_2$ MONITORING. ROCURONIUM OR VECURONIUM MAY ONLY BE USED IF CONTINUOUS, BREATH TO BREATH $ETCO_2$ MONITORING CAN BE PROVIDED.

c) If significant resistance to ventilation continues despite adequate sedation and analgesia, the paramedic may administer:
   *(1) Vecuronium*: 0.05 mg/kg IVP/IO. Maximum single dose is 10 mg. Dose may be repeated in 2-3 minutes, if necessary.
   **OR**
   *(2) Rocuronium*: 1 mg/kg IVP/IO (ideal body weight). Maximum single dose is 125 mg.
   (3) **Maintenance of amnesia**
   Follow above dosing of either ***etomidate*** or ***ketamine*** with required repeat dosing every 10–15 minutes.
d) Continue to monitor oxygen saturation and ventilate to desired $ETCO_2$.
e) Obtain on-line medical direction if further problems present.

# 15.25 Optional Supplemental Protocol – RSI – ADULT: PROTOCOL FOR CRICOTHYROIDOTOMY (SURGICAL AND NEEDLE)

## 1. INDICATIONS

a) Inability to ventilate despite having tried BVM with oropharyngeal/nasopharyngeal airway, ET placement, and an alternative airway device (if not contraindicated)
b) Inability to place ET in the setting of life-threatening upper airway hemorrhage
c) Foreign body completely obstructing upper airway that cannot be removed via BLS maneuvers or Magill forceps with direct visualization

## 2. CONTRAINDICATIONS

Patients under the age of 8 should not receive surgical cricothyroidotomy. They may receive only needle cricothyroidotomy.

## 3. PREPARATION

a) Prepare suction and cricothyroidotomy kit.
b) Begin at sternal notch and locate cricoid cartilage.
c) Palpate cricothyroid membrane anteriorly between cricoid cartilage and thyroid cartilage.
d) Prepare skin with betadine or alcohol swabs.

## 4. SURGICAL CRICOTHYROIDOTOMY

a) Clinicians must use a designated technique and procedure for establishing the airway through the cricothyroid membrane that has been approved by the program medical director.
b) Insert a 6.0 mm cuffed ET tube, using the natural curve of tube.
c) Insert ET tube to just beyond cuff.
d) Inflate cuff and ventilate patient.
e) Monitor oxygen saturation and $ETCO_2$ level.
f) Secure ET tube. (Do not cut or trim ET tube.)
g) If significant resistance to ventilation develops, or if patient develops difficulty in tolerating successful cricothyroidotomy, refer to *Ventilatory Difficulty Secondary to Bucking or Combativeness* protocol.

## 5. NEEDLE CRICOTHYROIDOTOMY

a) Insert 12- or 14-gauge over-the-needle catheter through the cricothyroid membrane at a 45-degree angle toward the feet. Aspiration of air with a syringe indicates tracheal entry.
b) Hold needle in place and advance catheter, then remove needle.
c) Attach catheter hub to intermittent jet oxygen insufflator valve.
d) Manually secure catheter at hub at all times to prevent kinking or displacement.
e) Monitor oxygen saturation.
f) If significant resistance to ventilation develops, or if patient develops difficulty in tolerating cricothyroidotomy, refer to *Ventilatory Difficulty Secondary to Bucking or Combativeness* protocol.

**(For children who have not yet reached their 15th birthday)**

## 1. INDICATIONS

a) Inability to tolerate laryngoscopy and have the following:
   (1) GCS less than or equal to 8, indicated by a patient that will not: open eyes, cry, say words, or show purposeful movement in response to painful stimulus.
   **AND**
   (2) Respiratory insufficiency, demonstrated by oxygen saturation less than or equal to 90% on non-rebreather face mask, respiratory rate less than or equal to 8, or respiratory rate greater than or equal to 45 (age less than 1 yr), greater than or equal to 40 (age 1–5 yrs), greater than or equal to 35 (age 6–9 yrs) with signs of air hunger and accessory muscle use.

PATIENTS WITH AN IDENTIFIED DIFFICULT AIRWAY WHO CAN BE BAGGED TO AN OXYGEN SATURATION GREATER THAN 90% REQUIRE ON-LINE MEDICAL DIRECTION FOR RSI, PREFERABLY FROM A PEDIATRIC BASE STATION.

b) On-line medical direction for RSI may be requested (preferably from a Pediatric Base Station), in the following situations:
   (1) GCS less than or equal to 8 with clenched jaw, inability to adequately suction airway, and without above respiratory parameters
   (2) Respiratory extremis with contraindications to nasotracheal intubation (respiratory rate greater than or equal to 35 with air hunger, use of accessory muscles, and oxygen saturation less than or equal to 90% on non-rebreather face mask)
   (3) Identified difficult airway patient with a GCS less than or equal to 8 and signs of respiratory insufficiency who cannot tolerate laryngoscopy but is able to be bagged to an oxygen saturation greater than 90%

## 2. CONTRAINDICATIONS

a) Conditions that may cause hyperkalemia:
   (1) Burns greater than 24 hours old
   (2) Spinal cord injury greater than 24 hours old
   (3) Known neuromuscular disease (Guillain-Barré Syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
   (4) Chronic renal failure on hemodialysis/presence of hemodialysis access
b) History of malignant hyperthermia

## 3. PREPARATION

a) Pre-oxygenate with 90–100% oxygen.
b) Monitor oxygen saturation with pulse oximetry and EKG.
c) Ensure functioning IV and fluid therapy as per protocol.
d) Evaluate for difficult airway.
e) Perform focused RSI neurologic exam.

f) Prepare equipment
   (1) Intubation kit: Recommended to carry both cuffed and uncuffed ET tubes for patients less than 8 years of age or 25 kg.
   (2) Bag-Valve-Mask (BVM) with manometer. (Manometer may be part of the BVM or separate.)
   (3) Suction
   (4) RSI kit
      (a) Prepare medications
      (b) Alternative airway device, cricothyroidotomy equipment
   (5) Capnograph

**4. RSI PROCEDURE**

a) Adequate sedation must be provided to prevent awareness during paralysis from neuromuscular blockade.

***Etomidate***, if available, will be the preferred agent for patients who are aware of their surroundings and do not have hypotension or possible hypovolemia.

Dose: Administer 0.3 mg/kg IVP/IO over 30–60 seconds. If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP/IO over 30–60 seconds. May repeat 0.15 mg/kg IVP/IO in 2–3 minutes if inadequate sedation.

***Ketamine*** may be used if *etomidate* is unavailable, and may be preferred for patients who have hypotension or possible hypovolemia.

Dose: Administer 2 mg/kg IVP/IO over 60 seconds.

***Midazolam*** should be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. *Midazolam* should not be used for patients with hypotension, and should be avoided with possible hypovolemia.

Dose: Administer 0.05 mg/kg IVP/IO over 1–2 minutes. Maximum single dose is 5 mg.

**Hold for** BP less than 60 in neonates (patients less than 28 days old), less than 70 in infants (patients less than 1 year of age), less than [70 + (2 x years) = systolic BP] for patients greater than 1 year of age.

b) For patients with head injury or suspected increased intracranial pressure, administer *lidocaine* 1 mg/kg IVP/IO over 1–2 minutes.
c) If patient is less than 8 years of (or if age unknown and using ET tube smaller than 6.0), pretreat patient with atropine 0.02 mg/kg IVP/IO.
d) In-line cervical spine stabilization by second caregiver (in trauma setting)
e) Apply cricoid pressure (by third caregiver).
f) Administer paralytic medication

***Succinylcholine:*** Administer 1.5 mg/kg IVP/IO. If inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat *succinylcholine* 1.0 mg/kg IVP/IO.

Contraindications for *succinylcholine*:
   (1) Burns greater than 24 hours old
   (2) Spinal cord injury greater than 24 hours old

(3) Known neuromuscular disease (Guillain-Barre Syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
(4) Chronic renal failure on hemodialysis/Presence of hemodialysis access
(5) Malignant hyperthermia

**OR**

***Rocuronium:*** 1 mg/kg IVP/IO (ideal body weight). If inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat *rocuronium* dose 0.5 mg/kg IVP/IO. Maximum single dose 125 mg.

g) Intubate trachea and verify ET placement.

**5. SUCCESSFUL ENDOTRACHEAL TUBE PLACEMENT**

a) Release cricoid pressure and secure ET.
b) Ventilate to $ETCO_2$ of 30–32 mmHg.
c) If significant resistance to ventilation occurs as succinylcholine wears off (4–5 minutes), refer to *Ventilatory Difficulty Secondary to Bucking* protocol.

**6. UNSUCCESSFUL ENDOTRACHEAL TUBE PLACEMENT**

a) Maintain cricoid pressure and resume BVM ventilation for 30 seconds.
b) If unable to ventilate, see "If Unable to Ventilate" below.
c) Reattempt oral ET intubation.
d) If unsuccessful, resume BVM ventilation for 30 seconds.
e) Insert an extraglottic airway (see *Airway Management: Extraglottic Airway* protocol).

**7. IF UNABLE TO VENTILATE**

If unable to ventilate, verify appropriate oropharyngeal airway placement and reposition BVM for optimal mask seal. If still unable to ventilate, refer to *Needle Cricothyroidotomy* protocol.

1. **INDICATIONS**
   Patients successfully intubated with an endotracheal tube, or needle cricothyroidotomy, for whom the ability to provide manual or mechanical ventilation is impaired secondary to bucking or combativeness

2. **CONTRAINDICATIONS**
   Unsecured airway

3. **PROCEDURE**
   ***a) Etomidate***
   Dose: Administer 0.3 mg/kg IVP/IO over 30–60 seconds. If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP/IO over 30–60 seconds. May repeat 0.15 mg/kg IVP/IO in 2–3 minutes if inadequate sedation.

   **OR**

   *Ketamine*
   Dose: 2 mg/kg IVP/IO over 60 seconds. May repeat 1 mg/kg IVP/IO every 15 minutes, based on patient responsiveness, for the duration of patient contact to facilitate ongoing sedation during transport.
   For extended transports, consider *Ketamine* infusion at 1-2 mg/kg/hr administered via intravenous medication pump following a *Ventilatory Difficulty* protocol bolus of *Ketamine*.
   Additional doses require medical consultation.

   **OR**

   ***Midazolam*** may be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. *Midazolam* should not be used for patients with hypotension, and should be avoided with possible hypovolemia.
   Dose: Administer 0.05 mg/kg IVP/IO over 1–2 minutes, titrated to abate bucking and relax ventilation while maintaining systolic BP: greater than 60 in neonates, 70 in infants, [70 + (2 x years) = systolic BP] for patients greater than 1 year of age. Maximum single dose is 5 mg.
   After 5 minutes, may titrate an additional 0.05 mg/kg IVP/IO as needed to abate bucking, using the same BP parameters as above.

   b) If ventilatory difficulty is thought to be the result of pain response,
   ***Ketamine***: Dose: Follow above dosing of *ketamine* with required repeat dosing every 10-15 minutes OR by continuous *ketamine* infusion.
   Additional doses require medical consultation.

   **OR**

   Opioid may be used per *Pain Management* protocol in addition to, or instead of, *midazolam*, *ketamine*, or *etomidate*. Titrate to abate bucking and relax ventilation while maintaining systolic BP greater than 60 in neonates, 70 in infants, [70 + (2 x years) = systolic BP] for patients greater than 1 year of age.

c) If significant resistance to ventilation continues, the paramedic may administer:
   *(1) Vecuronium* 0.05 mg/kg IVP/IO (may not be used for patients with needle cricothyroidotomy because of inability to monitor breath to breath $ETCO_2$). Maximum single dose is 10 mg. Dose may be repeated in 2-3 minutes, if necessary.

ALERT PRE-SEDATION MUST BE PROVIDED WHEN ROCURONIUM OR VECURONIUM IS ADMINISTERED TO A PATIENT WHO IS EITHER RESPONSIVE TO STIMULUS OR MAY BECOME RESPONSIVE TO STIMULUS DURING NEUROMUSCULAR BLOCKADE. VECURONIUM MAY ONLY BE USED IF CONTINUOUS, BREATH TO BREATH $ETCO_2$ MONITORING CAN BE PROVIDED.

**OR**

*(2) Rocuronium* 1mg/kg IVP/IO (ideal body weight). Maximum single dose 125 mg.

(3) **Maintenance of Amnesia**
Follow above dosing of either ***etomidate*** or ***ketamine*** with required repeat dosing every 10-15 minutes OR by continuous ketamine infusion.

d) Continue to monitor oxygen saturation and ventilate to desired $ETCO_2$.

e) Obtain on-line medical direction (preferably from a Pediatric Base Station), if further problems present.

## Surgical (for 8 years old or greater) and Needle

### 1. INDICATIONS

a) Inability to ventilate despite having tried BVM with oropharyngeal/nasopharyngeal airway, ET placement, and alternative airway device (if not contraindicated)
b) Inability to place ET in the setting of life-threatening upper airway hemorrhage
c) Completely obstructing upper airway foreign body that cannot be removed via BLS maneuvers or Magill forceps with direct visualization

### 2. PREPARATION

a) Prepare suction and cricothyroidotomy kit.
b) Begin at sternal notch and locate cricoid cartilage.
c) Palpate cricothyroid membrane anteriorly between cricoid cartilage and thyroid cartilage.
d) Prepare skin with betadine or alcohol swabs.

### 3. SURGICAL CRICOTHYROIDOTOMY FOR 8 YEARS OLD OR GREATER

a) Stabilize thyroid cartilage and make vertical incision (1–1 1/2 inches) over cricothyroid membrane. Alternatively, a needle puncture dilator device may be utilized.
b) Palpate cricothyroid membrane with gloved finger and carefully make transverse incision through membrane. Insert scalpel handle and rotate 90 degrees.
c) Insert a 5 to 6.0 mm cuffed ET tube, using the natural curve of tube.
d) Insert ET tube to just beyond cuff.
e) Inflate cuff and ventilate patient.
f) Monitor oxygen saturation and $ETCO_2$ carbon dioxide level.
g) Secure ET tube. (Do not cut or trim ET tube.)
h) If significant resistance to ventilation develops, or if patient develops difficulty in tolerating successful cricothyroidotomy, refer to *Ventilatory Difficulty Secondary to Bucking or Combativeness* protocol.

ALERT ONLY NEEDLE CRICOTHYROIDOTOMY SHOULD BE PERFORMED FOR PATIENTS LESS THAN AGE 8 WHO MAY REQUIRE CRICOTHYROIDOTOMY.

### 4. NEEDLE CRICOTHYROIDOTOMY

a) Insert 12- or 14-gauge over-the-needle catheter through the cricothyroid membrane at a 45-degree angle toward the feet. Aspiration of air with a syringe indicates tracheal entry.
b) Hold needle in place and advance catheter, then remove needle.
c) Attach catheter hub to intermittent jet oxygen insufflator valve.
d) Manually secure catheter at hub at all times to prevent kinking or displacement.
e) Monitor oxygen saturation.
f) If significant resistance to ventilation develops, or if patient develops difficulty in tolerating cricothyroidotomy, refer to *Ventilatory Difficulty Secondary to Bucking or Combativeness* protocol.

## ETOMIDATE (AMIDATE)

1. **PHARMACOLOGY**
   Hypnotic

2. **PHARMACOKINETICS**
   A short-acting nonbarbiturate hypnotic agent without analgesic properties

3. **INDICATIONS**
   Pre-sedation of responsive patients prior to administration of neuro-muscular blocking agents

4. **CONTRAINDICATIONS**
   Known hypersensitivity to etomidate

5. **ADVERSE EFFECTS**
   a) Respiratory depression or apnea
   b) Hypotension (infrequent)
   c) Involuntary myoclonus
   d) Adrenal suppression (possible with repeated dosing)

6. **PRECAUTIONS**
   a) The effects of etomidate can be accentuated by CNS depressants such as opioids and alcohol.
   b) Myoclonic movements are common and should not be confused for fasciculations due to a depolarizing neuromuscular blocking agent or seizure activity.

7. **DOSAGE**
   a) Adult:
      Administer 0.3 mg/kg IVP/IO over 30–60 seconds.
      If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP/IO over 30–60 seconds.
      **Ventilatory Difficulty Secondary to Bucking or Combativeness in Intubated Patients:**
      Administer 0.3 mg/kg IVP/IO over 30–60 seconds. If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP/IO over 30–60 seconds.
      May repeat 0.15 mg/kg IVP/IO every 15 minutes to a total of three doses.
   b) Pediatric:
      Administer 0.3 mg/kg IVP/IO over 30–60 seconds.
      If the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP/IO over 30–60 seconds. May repeat 0.15 mg/kg IVP/IO after succinylcholine effects resolve and patient is bucking or combative. May repeat 0.15 mg/kg IVP/IO every 15 minutes to a total of three doses.

      Additional doses require medical consultation.

## KETAMINE (KETANEST®, KETASET®, KETALAR®)

1. **PHARMACOLOGY**
   Hypnotic Analgesic

2. **PHARMACOKINETICS**
   A rapid-acting hypnotic analgesic agent characterized by normal pharyngeal-laryngeal reflexes, normal or enhanced skeletal muscle tone, and possible cardiovascular and respiratory stimulation.

3. **INDICATIONS**
   a) Pre-sedation of responsive patients prior to administration of neuromuscular blocking agents
   b) Sedation of intubated patients with ventilatory difficulty secondary to bucking or combativeness

4. **CONTRAINDICATIONS**
   Known hypersensitivity to ketamine

5. **ADVERSE EFFECTS**
   a) Although respiration is frequently stimulated, respiratory depression may occur with rapid IV administration. Laryngospasm has been known to occur.
   b) Although hypotension may occur, blood pressure and heart rate are frequently stimulated.
   c) Involuntary myoclonus that may mimic seizure activity
   d) Possible enhanced secretions
   e) Possible unpleasant dreams and delirium upon emergence from sedation

6. **PRECAUTIONS**
   a) The likelihood of respiratory depression and undesired pressor effects is increased by too rapid IV administration.
   b) Myoclonic movements are possible and should not be confused for fasciculations due to a depolarizing neuromuscular blocking agent, seizure activity, or emergence from sedation.

7. **DOSAGE**
   a) Adult:
   Administer 2 mg/kg IVP/IO over 60 seconds.
   May repeat 2 mg/kg IVP/IO after succinylcholine effects resolve if patient is bucking or combative.
   May repeat 1 mg/kg for IVP/IO every 10–15 minutes to a total of 3 doses, as necessary.

   Additional doses require medical consultation.

   b) Pediatric:
   Administer 2 mg/kg IVP/IO over 60 seconds.
   May repeat 2 mg/kg IVP/IO after succinylcholine effects resolve if patient is bucking or combative.
   May repeat 1 mg/kg for IVP/IO every 10–15 minutes to a total of 3 doses as necessary.

   Additional doses require medical consultation.

## MIDAZOLAM (VERSED®)

1. **PHARMACOLOGY**
   a) Sedative
   b) Hypnotic

2. **PHARMACOKINETICS**
   A short-acting benzodiazepine with strong hypnotic and amnestic properties

3. **INDICATIONS**
   a) Pre-sedation of responsive patients prior to administration of neuro-muscular blocking agents
   b) Sedation of intubated patients with ventilatory difficulty secondary to bucking or combativeness

4. **CONTRAINDICATIONS**
   a) Hypotension
   b) Acute narrow-angle glaucoma
   c) Known hypersensitivity to midazolam

5. **ADVERSE EFFECTS**
   a) Respiratory depression or apnea
   b) Hypotension
   c) Amnesia

6. **PRECAUTIONS**
   The effects of midazolam can be accentuated by CNS depressants such as opioids and alcohol

7. **DOSAGE**
   a) Adult:
   Administer 0.1 mg/kg, SLOW IVP/IO over 1–2 minutes, while maintaining systolic BP greater than 90 mmHg (110 mmHg if injuries include a suspected head injury). Maximum single dose is 5 mg.
   b) Pediatric:
   Administer 0.05 mg/kg SLOW IVP/IO over 1–2 minutes, while maintaining systolic BP greater than 60 in neonates, 70 in infants,
   [70 + (2 x years) = systolic BP] for patients greater than 1 year of age. Maximum single dose is 5 mg.

ADMINISTER UP TO 0.05 MG/KG IV WHEN TREATING ENDOTRACHEAL TUBE BUCKING, STOPPING ONCE BUCKING HAS RESOLVED AND VENTILATION IS RELAXED.

## ROCURONIUM

1. **PHARMACOLOGY**
   Neuromuscular blocking agent (nondepolarizing)

2. **PHARMACOKINETICS**
   Paralyzes skeletal muscles, including respiratory muscles

3. **INDICATIONS**
   a) Rapid Sequence Intubation – at a dosing of 1 mg/kg (ideal body weight), the drug has an almost as quick onset of paralysis as succinylcholine
   b) For treatment of ventilatory difficulty secondary to bucking or combativeness in intubated patients
   c) Patients with a history of malignant hyperthermia or if the patient could have a potential contraindication to succinylcholine

4. **CONTRAINDICATIONS**
   Known hypersensitivity to the drug

5. **ADVERSE EFFECTS**
   Prolonged paralysis

6. **PRECAUTIONS**
   a) Sedation must be provided before administering rocuronium when administered to a patient who is either responsive to stimulus or who may become responsive to stimulus during the neuromuscular blockade.
   b) Paralysis occurs within 1–3 minutes and generally lasts 20–35 minutes but can be longer depending on dose, patient age, and renal function, among other factors

7. **DOSAGE**
   a) RSI procedure: 1 mg/kg IVP/IO (ideal body weight); if inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat rocuronium dose 0.5 mg/kg IVP/IO. Maximum single dose of 125 mg.
   b) Ventilatory difficulty secondary to bucking or combativeness (after sedation): 1 mg/kg IVP/IO (ideal body weight). Maximum single dose 125 mg.

## SUCCINYLCHOLINE (ANECTINE®)

1. **PHARMACOLOGY**
   Neuromuscular blocking agent (depolarizing)

2. **PHARMACOKINETICS**
   Paralyzes skeletal muscles, including respiratory muscles, and removes gag reflex

3. **INDICATIONS**
   To achieve paralysis to facilitate endotracheal intubation in patients as per *Rapid Sequence Intubation* protocol

4. **CONTRAINDICATIONS**
   a) Conditions that may cause hyperkalemia:
      (1) Burns greater than 24 hours old
      (2) Spinal cord injury greater than 24 hours old
      (3) Known neuromuscular disease (Guillain-Barré syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
      (4) Chronic renal failure on hemodialysis or presence of hemodialysis access
   b) History of malignant hyperthermia
   c) Patients with known hypersensitivity to the drug

5. **ADVERSE EFFECTS**
   a) Bradycardia
   b) Prolonged paralysis

6. **PRECAUTIONS**
   Paralysis occurs in 1–2 minutes and generally lasts 4–6 minutes.

7. **DOSAGE/ROUTE**
   a) Adult:
      Administer 1.5 mg/kg rapid IVP/IO to a maximum single dose of 200 mg.
      If relaxation is inadequate after 2–3 minutes, a repeat dose of
      1 mg/kg rapid IVP/IO may be given to a maximum single dose of 200 mg.
   b) Pediatric:
      Administer 1.5 mg/kg rapid IVP/IO to a maximum dose of 200 mg.
      If relaxation is inadequate after 2–3 minutes, a repeat dose of
      1 mg/kg rapid IVP/IO may be given to a maximum dose of 200 mg.

## VECURONIUM (NORCURON®)

1. **PHARMACOLOGY**
   Neuromuscular blocking agent (non-depolarizing)

2. **PHARMACOKINETICS**
   Paralyzes skeletal muscles, including respiratory muscles

3. **INDICATIONS**
   a) For treatment of ventilatory difficulty secondary to bucking or combativeness in intubated patients
   b) Patients with a history of malignant hyperthermia or contraindications to succinylcholine

4. **CONTRAINDICATIONS**
   Patients with known hypersensitivity to the drug

5. **ADVERSE EFFECTS**
   a) Bradycardia
   b) Prolonged paralysis

6. **PRECAUTIONS**
   a) Sedation must be provided prior to administering vecuronium when administered to a patient who is either responsive to stimulus or who may become responsive to stimulus during neuromuscular blockade.
   b) Paralysis occurs within 2–4 minutes and generally lasts 25–40 minutes.

7. **DOSAGE/ROUTE**
   a) RSI procedure
      Adult:
      0.1 mg/kg IVP/IO; if inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat vecuronium 0.05 mg/kg IVP/IO.
   b) Ventilatory bucking or combativeness
      Adult:
      (1) Administer vecuronium 0.05 mg/kg IVP/IO. Maximum single dose is 10 mg.
      (2) Dose may be repeated once in 2-3 minutes, if necessary.
   c) Pediatric:
      (1) Administer vecuronium 0.05 mg/kg IVP/IO (may not be used for patients with needle cricothyroidotomy because of inability to monitor breath to breath $ETCO_2$). Maximum single dose is 10 mg.
      (2) Dose may be repeated once in 2-3 minutes, if necessary.

## SPECIALTY CARE PARAMEDIC
**(Paramedic only)**

**Specialty care paramedic:** a paramedic who has successfully completed a paramedic specialty care transport course approved by the EMS Board or equivalent as determined by MIEMSS, or holds current Critical Care Paramedic or Flight Paramedic certification through the International Board of Specialty Certification, and is credentialed by a specialty care transport service under COMAR 30.03.03.06.

**Scope of Practice:** The scope of practice for the specialty care paramedic (SP) is defined by a floor and a ceiling of care. The entry level for this program is Maryland licensed paramedic. The floor of the SP is the existing *The Maryland Medical Protocols for Emergency Medical Services*, including the Optional Supplemental Protocols: CPAP, Glycoprotein II/III Antagonist, Heparin, Scene/Chronic Ventilator, and Mark I/DuoDote. (The Optional Supplemental protocols Wilderness and Transport of Acute Ventilator Interfacility Patient are not included as part of ALS transports.) The medications and procedures listed within *The Maryland Medical Protocols for Emergency Medical Services* may be administered by the SP based on the written interfacility transfer orders of the sending medical director of the commercial specialty care service (without manipulation of *The Maryland Medical Protocols for Emergency Medical Services*) or receiving physician without having to request online base station medical consultation.

The ceiling for the SP is defined by the medications and procedures that are defined as “RN” or are not listed within the tables below. Those medications or skills that are listed as “RN” require familiarization by the SP but are the responsibility of the transport nurse or physician constituting the patient care team.

If a medication or procedure is listed within the scope of practice for the SP, it applies to both adult and pediatric patients unless otherwise noted.

The practice environment for these medications and procedures will be strictly for the interfacility transfer of patients and not extended into the realm of the 9-1-1 response unless otherwise noted.

**Required Staffing:**

**Single specialty care intervention:** If the care required is within the scope of practice of Specialty Care Paramedic and the patient requires **no more than one specialty care intervention**, as defined in this protocol.

(1) A driver who meets the requirements of COMAR 30.09.07.02A(4)(a); and
(2) A Specialty Care Paramedic.

**Multiple specialty care interventions:** If the care required is within the scope of practice of a Specialty Care Paramedic and the patient requires **two or more specialty care interventions**, as defined in this protocol:

(1) A driver who meets the requirements of COMAR 30.09.07.02A(4)(a);
(2) At least one individual who is:
  (a) A Specialty Care Paramedic; or
  (b) A registered nurse with advanced training and certification in the care of specialty care patients and current knowledge of the EMS system as defined in Regulation .02G(3) of this chapter; and
(3) At least one individual who:
  (a) Is one of the following:
    (i) A CRT initially licensed after July 1, 2001 or who has completed the CRT update program;
    (ii) A paramedic; or
    (iii) If the individual under C(2) is a Specialty Care Paramedic and one of the specialty care interventions involves ventilator management, a respiratory therapist, who has completed an orientation to specialty care transport.

| Classification of Drugs and Procedures | |
|---|---|
| SP | A specialty care paramedic (SP) may administer medications or perform procedures and monitor the patient during transport without a nurse. |
| RN | A transport nurse or physician is present for the transport. SP needs to have familiarity with the medication or procedure, but may not perform or administer the intervention. |

| Medications and Procedures | Specialty Care Paramedic (SP) | Team with Nurse (RN) |
|---|---|---|
| **A. Medications** | | |
| **1. Sedatives** | | |
| a. Dexmedetomidine (Precedex) | | **RN** |
| b. Etomidate (Amidate) | **SP** | |
| c. Lorazepam (Ativan) | **SP** | |
| d. Midazolam (Versed) | **SP** | |
| e. Propofol (Diprivan) | | **RN** |
| **2. Analgesics** | | |
| a. Fentanyl (infusion) | **SP** | |
| **3. Paralytics** | | |
| a. All types | | **RN** |
| **4. Antihypertensives** | | |
| a. Clevidipine (Cleviprex) | **SP** | |
| b. Esmolol (Brevibloc) | **SP** | |
| c. Labetalol | **SP** | |
| d. Metoprolol (Lopressor) | **SP** | |
| e. Nicardipine (Cardene) | **SP** | |
| f. Nitroglycerin (Tridil) IV | **SP** (adults only) | |
| **5. Volume Expanders** | | |
| a. Albumin | **SP** | |
| b. Blood products (exc whole blood pilot) | **SP** | |
| c. Hespan | **SP** | |
| **6. Vasopressors** | | |
| a. Epinephrine infusion | **SP** | |
| b. Norepinephrine (Levophed) | **SP** | |
| c. Phenylephrine | | **RN** |
| d. Vasopressin | **SP** | |
| **7. Inotropes** | | |
| a. Dobutamine (Dobutrex) | | **RN** |
| **8. Bronchodilators** | | |
| a. Theophylline - IV | | **RN** |
| b. Terbutaline (Brethine) infusion | **SP** | |
| **9. Fibrinolytics / Thrombolytics** | | |
| a. All types | | **RN** |

| Medications and Procedures | Specialty Care Paramedic (SP) | Team with Nurse (RN) |
|---|---|---|
| **A. Medications (continued)** | | |
| **10. Anticoagulants / Antiplatelets** | | |
| a. Heparin* | **SP** (adults only) | |
| b. Glycoprotein IIb/IIa inhibitors* | **SP** (adults only) | |
| **11. Antiemetics** | | |
| a. All types | **SP** | |
| **12. Miscellaneous** | | |
| a. Insulin - IV | | **RN** |
| b. Hypertonic saline (3%) | | **RN** |
| c. Mannitol | | **RN** |
| d. Potassium – containing solutions, with K+ of 20 mEq/L or less | **SP** | |
| e. Sodium bicarbonate infusion** | **SP** | |
| f. Solumedrol - IV (only maintenance infusions) | **SP** | |
| g. Tocolytics (including magnesium sulfate) | | **RN** |
| h. Octreotide infusion | **SP** | |
| i. Oxytocin (uterine stimulants) | | **RN** |
| j. TPN/PPN (medicated) | **SP** | |
| **13. Antiarrhythmics** | | |
| a. Esmolol (Brevibloc) | **SP** | |
| b. Metoprolol (Lopressor) | **SP** | |
| c. Procainamide | | **RN** |
| **14. Anticonvulsants** | | |
| a. Barbiturates | | **RN** |
| b. Phenytoin / Fosphenytoin | **SP** | |
| c. Levetiracetam (Keppra) | **SP** | |
| d. Other non-benzodiazepine anticonvulsants | | **RN** |
| **15. Diuretics** | | |
| a. All types | **SP** | |

* May go by paramedic if ALS OSP conditions are met.
** May go by paramedic (non-SP) if concentration is less than or equal to 150 mEq/L.

| Medications and Procedures | Specialty Care Paramedic (SP) | Team with Nurse (RN) |
|---|---|---|
| **B. Invasive Procedures** | | |
| 1. Chest Escharotomies | | **RN** |
| 2. Chest Tubes - Insertion | | **RN** |
| 3. Chest Tube or Surgical Drain with vacuum system/placed to suction | **SP** | |
| 4. Needle Cricothyroidotomy | **SP** | |
| 5. Rapid Sequence Intubation | | **RN** |
| 6. Urinary Catheter Insertion | **SP** | |
| **C. Non-Invasive Procedures** | | |
| 1. Ostomy Care | **SP** | |
| **D. System Monitoring** | | |
| 1. Arterial line | | **RN** |
| 2. Cardiac sheath | **SP** | |
| 3. CVP line | | **RN** |
| 4. Intracranial Pressure Monitor/Line | | **RN** |
| 5. Swan-Ganz | | **RN** |
| 6. Radial compression device (TR Band), if adjustments anticipated | **SP** | |
| **E. Specialized Equipment** | | |
| 1. Acute Ventilated Interfacility Patient - Transport Service Ventilator (except E4) | **SP** | |
| 2. Intra-aortic balloon pump (IABP), counterpulsation device (Impella) | | **RN** |
| 3. Peritoneal Dialysis Systems | **SP** | |
| 4. Specialty Ventilator (pediatric or when hospital ventilator must accompany patient) | | **RN** |
| 5. Transport isolette (electrically-powered) / incubator | | **RN** |
| 6. Transvenous pacemaker | | **RN** |
| 7. Ventricular Assist Devices | * | |

* = May go by ALS for routine outpatient transports (e.g., office visits), or if being discharged to home or rehab (otherwise SP call)

# Optional Supplemental Protocol – SURGICAL CRICOTHYROIDOTOMY – ADULT



## 1. INDICATIONS

Patients must have reached their 15th birthday and may present with any of the following conditions:

a) Inability to oxygenate despite having tried BVM with oropharyngeal/nasopharyngeal airway, ET placement, and supraglottic airway (if not contraindicated)
b) Inability to place ET in the setting of life-threatening upper airway hemorrhage
c) Completely obstructing upper airway foreign body that cannot be removed via BLS maneuvers or Magill forceps with direct visualization

## 2. EQUIPMENT

ALERT CLINICIANS MAY USE PRE-ASSEMBLED EQUIPMENT OR AN FDA-APPROVED KIT, AS PRESCRIBED BY THE PROGRAM MEDICAL DIRECTOR.

## 3. PROCEDURE

a) Clinicians must use a designated technique and procedure for establishing the airway through the cricothyroid membrane that has been approved by the program medical director as part of this Optional Supplemental protocol.
b) Upon completion of the skill (or at an appropriate time during the sequence of patient care) the clinician will obtain medical direction and also notify the receiving physician/emergency department with the following information:
   (1) Patient condition
   (2) Reason for surgical cricothyroidotomy
   (3) Complications arising from procedure (if any)
   (4) Patient response to treatment

## 1. INTRODUCTION

a) Scope and Applicability

(1) These protocols are intended for use during high-risk, large-scale, and extended law enforcement or homeland security operations.

(2) The Tactical Emergency Medical Services (TEMS) clinician is not directly responsible for any person(s) outside the direct field of operations, whose care may safely be provided by the local EMS Operational Program.

(3) These protocols supplement the current version of *Maryland Medical Protocols for Emergency Medical Services* and, at the Tactical Physician's discretion, may incorporate other EMS protocol components such as: Wilderness, Interfacility, Pilot/Optional, and WMD sections.

(4) The Tactical Emergency Medical Services Protocols shall be used only by Tactical EMS clinicians sponsored by a law enforcement agency and operating under law enforcement command.

(5) To be approved, there must be a written, integrated relationship between the EMS Operational Program and the TEMS program, with both the EMS Operational Program Medical Director and the TEMS Medical Director having signed off on the agreement.

(6) Tactical EMS Clinicians at the EMT or ALS levels may administer the medications and perform the procedures listed in these protocols only after receiving specific training on their use and only under the medical direction of a Tactical Physician.

(7) The primary function of the Tactical EMS Clinician is to support law enforcement or homeland security operations by facilitating the health and safety of critical public safety personnel inside the perimeter of high-risk, large-scale, and extended operations.

(8) Once the patient is removed from the law enforcement perimeter of operations, the TEMS Protocol will end, *The Maryland Medical Protocols for Emergency Medical Services* will be implemented, and the transition of care will be made to the local EMS agency.

(9) An exception may be made when the Tactical EMS Clinician's specialized training is needed to manage a specific illness/injury.

(a) If the Tactical EMS Clinician's specialized training is needed to manage the patient's illness/injury, then the highest-trained Tactical EMS Clinician shall ride to the hospital with the patient to maintain medications that are not allowed by *The Maryland Medical Protocols for Emergency Medical Services*.

(b) If, during transport, Tactical EMS personnel encounter a significant conflict between TEMS Protocols and those of the transporting EMS agency, they should attempt to contact their own Tactical Physician and request a dual consult with the local Base Station Physician.

(c) If they cannot reach a Tactical Physician, they should contact the local EMS Base Station for on-line medical consultation.

b) Definition of Tactical Environment

(1) Any law enforcement or homeland security operation where deployed personnel are in a large-scale operation or where the risk of injury is sufficiently high as to warrant the presence of on-scene emergency medical services clinicians.

(2) Types of operations may include: high-risk warrant service, hostage-barricade situ-

ations, emergency ordinance disposal, executive protection details, civil demonstration or protest, dynamic training operations, aquatic operations, high-angle, search and rescue missions, and acts of terrorism.

(3) Any prolonged law enforcement deployment, where performance decrement or environmental issues may arise and the safety of the public and deployed law enforcement personnel would benefit from the presence of a Tactical EMS Clinician to monitor these circumstances.

c) Demonstration of Need
   (1) Jurisdictions that seek approval for a Tactical EMS Program shall submit a demonstration-of-need letter outlining the necessity for the program.
   (2) The letter shall be submitted to the State EMS Medical Director for approval and include the following:
      (a) Name of organization and scope of the proposed Tactical EMS Team
      (b) Name and qualifications of the Tactical Medical Director and other Tactical Physicians
      (c) Name and qualifications of the Tactical EMS Coordinator and other Tactical EMS Clinicians

d) Sponsoring Law Enforcement Agency Requirements
   (1) Sponsoring Law Enforcement Agencies shall be responsible for
      (a) Completing background investigations appropriate for medical clinicians working in and around law enforcement operations
      (b) Providing appropriate personal protective equipment, to accommodate conditions that the team may reasonably encounter, to the Tactical EMS Clinicians and Tactical Physician(s) and ensure adequate training in the equipment's use and capabilities
      (c) Providing written documentation to MIEMSS that addresses the medical liability and personal injury considerations of the Tactical EMS Clinicians/ Physician(s)

e) Tactical EMS Clinician/Tactical Physician Minimum Training Requirements
   (1) The Tactical EMS Clinician shall be a Maryland-certified EMT or Maryland-licensed ALS clinician and have successfully completed a nationally-recognized Counter-Narcotic Tactical Operation Medical Support/Integrated Force Health Clinician Program (CONTOMS/IFHP) or equivalent Tactical Clinician course that includes instruction and training in
      (a) Team wellness and health management, including preventive medicine
      (b) Providing care under fire/basic weapons safety
      (c) Officer rescue
      (d) Planning medical operations and medical intelligence
      (e) Response to the active shooter
      (f) Orientation to specialized medical gear personal protective equipment used in tactical medical operations
      (g) Remote medical assessment ("medicine across the barricade")
      (h) Response and management of WMD events, including field-expedient decontamination ("hasty decon") procedures
      (i) Operational security, light and sound discipline, helicopter operations, pyrotechnic and other chemical agents, as utilized by law enforcement teams

(j) Less-than-lethal weaponry, the injuries they may cause, and any specific interventions required

(2) The Tactical EMS Clinician shall have responsibilities for part or all of these protocols, as summarized as follows, based on either EMT or ALS (CRT or paramedic) level certification.

| INTERVENTION | EMT | ALS |
|---|---|---|
| Conducted electrical weapon (CEW) dart removal | • | • |
| Cyanoacrylate tissue adhesive | • | • |
| Extraglottic Airway (iGel) | • | • |
| Field expedient wound closure (stapling) | | • |
| TEMS Medications: ibuprofen, naproxen, fexofenadine, cetirizine, pseudoephedrine, oxymetazoline nasal spray, Mylanta®, cimetidine, loperamide, clove oil, acetaminophen, tramadol, caffeine, modafinil, ondansetron ODT, scopolamine patch, ophthalmologic proparacaine/tetracaine and fluorescein, prednisone PO, dexamethasone PO, albuterol MDI, aspirin, epinephrine 1 mg/mL IM, naloxone IN, glucose PO | • | • |

(3) The Tactical EMS Clinician shall document each patient contact utilizing a patient care report (PCR) (eMEDS®). The documentation must be consistent with current MIEMSS regulations for interventions, as summarized in the above table.

(4) The Tactical Physician shall possess an unrestricted Maryland License (preferred Emergency Medicine, General/Orthopedic/Trauma Surgery, or Critical Care), have experience in on-line medical direction, and have completed a nationally-recognized (CONTOMS/IFHP or equivalent) tactical medical director's course that includes instruction and training in the following topics:
(a) History of/need for tactical EMS provision
(b) Administrative/command concerns and responsibilities
(c) Care under fire
(d) Special equipment/hazards in the tactical environment
(e) Forensic examination
(f) Medicine "across the barricade"
(g) Medical threat assessment

f) Quality Assurance Properties
(1) Individual Tactical EMS Clinicians must be approved for TEMS Program Participation by the TEMS Medical Director.
(2) Classroom lecture
(3) Mannequin instruction
(4) Must demonstrate proficiency through skills testing and written test
(5) Ongoing demonstration of proficiency
(6) A verification of all TEMS skills and review of TEMS principles of safety will be performed on an annual basis by the Medical Director, or the clinician may document utilization of skills in the field

(7) Review of each call
  (a) Upon completion of the tactical incident, notification of any implementation of the TEMS Protocol will be made to your jurisdictional TEMS supervisor, who will ensure notification to TEMS Medical Director.
  (b) TEMS Medical Director will review and evaluate all TEMS interventions within 48 hours of resolution of the tactical incident and provide feedback.
(8) The TEMS program will maintain a detailed TEMS database and will provide an annual report to the State EMS Medical Director.

**2. GENERAL PROTOCOLS**

a) Medical Direction
  (1) Tactical EMS Clinicians may provide medical care using Tactical Medical Protocols only under the medical direction of a Tactical Physician.
  (2) Immediately available telephone or radio contact during an operation shall be considered a reasonable substitute for in-person supervision of Tactical EMS Clinicians.
  (3) In the absence of medical direction by a Tactical Physician, jurisdictional trained and designated Tactical EMS Clinicians should defer to their usual EMS protocols.

b) Operational Command
  (1) Operational command within a law enforcement perimeter of operation lies with the law enforcement commander. At times, the safety and success of the law enforcement objectives may override the need to care for casualties. The law enforcement commander is responsible for the care and movement of casualties within a law enforcement operation.

**3. SPECIAL CONSIDERATION FOR TACTICAL EMS**

a) The execution of some law enforcement operations may require that minor illness or injury in essential public safety personnel be treated and, to the extent that it is medically safe to do so, that those treated personnel return to duty. Fitness for duty of public safety personnel with minor injuries or illnesses shall be determined by the law enforcement commander in consultation with a Tactical Physician.

b) Prescription and over-the-counter (OTC) medications may be used for the treatment (or "symptomatic relief") of constitutional symptoms as required to promote the health, safety, and functionality of persons necessary to the operation. The Tactical EMS Clinician(s) under the Tactical Physician will know the indications/contraindications for the medications available to them (as will be delineated under "Additional Medications for Tactical EMS," to follow). At the EMT level, medications will be made available to those persons under the Tactical Clinician's care to self-select and self-medicate at the individual requesting person's own discretion regarding appropriateness of use.

c) The Tactical EMS Clinician may provide care to all persons associated with the operation, and shall be responsible for initial access, assessment, and stabilization (within the scope of *The Maryland Medical Protocols for Emergency Medical Services*) of those victims, bystanders, and suspects within the "warm" or "hot" zones until they may be extracted to local EMS clinicians. The Tactical EMS clinician is not directly responsible for any person(s) outside the direct field of operations, whose care may safely be provided by the local EMS Operational Program.

**4. SPECIFIC PROCEDURES**

a) Cyanoacrylate tissue adhesive
   (1) Purpose: To limit blood loss, pain, and risk of secondary contamination/injury to a minor open wound
   (2) Indications
      (a) Clean wounds
      (b) Minor bleeding wounds difficult to control with other interventions
      (c) Wounds in personnel who must remain operational
   (3) Contraindications
      (a) Grossly contaminated wounds
      (b) Greater than two hours since infliction of wound
      (c) Macerated/crushed surrounding tissue
      (d) Wounds near the eyes
   (4) Potential adverse effects/complications
      (a) This is not intended to constitute definitive wound closure; however, if properly cleaned prior to procedure, may be reviewed by physician without further intervention.
      (b) Transient local pain at application site may be reported.
   (5) Precautions
      (a) Ask regarding previous reaction/exposure to agent.
      (b) Advise patient of requirement for further evaluation by physician.

b) "Field expedient" wound closure (stapling)
   (1) Purpose: To limit blood loss and risk of secondary contamination injury to an open wound.
   (2) Indications
      (a) Clean wounds
      (b) Delay in transportation to definitive care will be or is anticipated to be several hours
      (c) Bleeding wounds difficult to control with other interventions
      (d) Wounds in personnel who must remain operational
   (3) Contraindications
      (a) Grossly contaminated wounds
      (b) Greater than six hours since infliction of wound
      (c) Macerated/crushed surrounding tissue
      (d) Situations with less than two hours anticipated time to transportation to definitive care
      (e) Facial wounds
   (4) Potential adverse effects/complications
      (a) This is not intended to constitute definitive wound closure—this will minimize the risk for increased infection and increased foreign body retention.
   (5) Precautions
      (a) Ask regarding local anesthetic allergies.
      (b) Advise patient of requirement for further evaluation by physician.

c) Impaled conducted electrical weapon dart removal
   (1) ANY conducted electrical weapon dart impalement to the head, neck, hands, feet, or genitalia must be stabilized in place and evaluated by a physician.

(2) In order to safely transport the patient, attempted extraction may be made one time by a Tactical EMS Clinician as long as the dart is not lodged in a location listed in (1) above and is not fully embedded up to the hub in tissue.
(3) All patients receiving conducted electrical weapon intervention will need to be transported to the emergency department for assessment.

**5. SUPPLEMENTAL FORMULARY FOR TACTICAL EMS**

a) Tactical EMS clinicians may administer the following medications to support and maintain Tactical personnel in the operation environment. Bolded medications are required as part of the standardized TEMS load-out at the EMT or ALS level; the others are optional.

(1) Antihistamines/Decongestants
**(a) Pseudoephedrine (Sudafed®)**
**(b) Cetirizine (Zyrtec®)**
**(c) Diphenhydramine (Benadryl®)**
(d) Fexofenadine (Allegra®)
(e) Oxymetazoline nasal spray (Afrin®)

(2) Gastrointestinal
**(a) Antacid (Mylanta® or other equivalent antacid)**
**(b) Cimetidine (Tagamet®—or other equivalent H2 blocker)**
**(c) Loperamide (Imodium®)**
**(d) 5-HT3 Antagonist (Zofran® ODT/Ondansetron, 5-HT3 antagonist)**
(e) Metoclopramide (Reglan®) (injectable)
(f) Dimenhydrinate (Dramamine®)
(g) Meclizine (Antivert®) (for motion sickness)
(h) Scopolamine transdermal

(3) Opthalmologicals
**(a) Proparacaine or tetracaine (Alcaine®) ophthetic**
**(b) Fluorescein stain (and blue light)**
**(c) Eye irrigation solution**
**(d) Erythromycin ophthalmic ointment**
**(e) pH paper**

(4) Antimicrobials/antiviral (agent-specific training)
**(a) Ciprofloxacin (following exposure or prophylaxis)**
**(b) Triple Antibiotic Ointment (Bacitracin®/Polymyxin®/Neomycin®)**
(c) Amoxicillin/clavualic acid (Augmentin®)
(d) Cefazolin (Ancef®) (IV) (for trauma applications when transport is delayed)
(e) Cephalexin (Keflex) (for trauma applications when transport is delayed)
(f) Clindamycin (Cleocin®)
(g) Trimethoprim/sulfamethoxazole (Bactrim®)
(h) Azithromycin (Zithromax®)
(i) Doxycycline
(j) Mupirocin topical ointment (Bactroban®)
(k) Emtricitabine and tenofovir (Truvada®) (high-risk post-exposure management)

(5) Steroids
**(a) Prednisone (PO)**

(b) Dexamethasone (Decadron®) (IV/IM and/or PO)

(6) Analgesics/anesthetics
- **(a) Acetaminophen (PO)**
- **(b) Ibuprofen (Motrin®/Advil®)**
- **(c) Naproxen (Aleve®/Naprosyn®) (PO)**
- **(d) Tramadol (Ultram®) (PO)**
- **(e) Ketamine**
- **(f) Naloxone (Narcan®) (IN and/or IV)**
- (g) Lidocaine (transdermal for muscular relief, or IM/SQ for stapling as temporizing measure only, alternate dosing regimen)
- (h) Fentanyl transmucosal (PO)
- (i) Clove oil (for topical dental analgesia)
- (j) Ketorolac (Toradol®) (injectable)

(7) Sleep/wake
- **(a) Caffeine (No-Doz®)**
- (b) Zaleplon (Sonata®) (sleeper)
- (c) Modafinil (Provigil®)

(8) Wound management
- **(a) Cyanoacrylate tissue adhesive (Dermabond®)**
- **(b) Topical hemostatic agent**
- **(c) Steri-strips**
- (d) Staples

(9) ACLS/resuscitation
- **(a) Albuterol MDI**

(10) Anti-hypoglycemics
- **(a) Oral glucose**

(11) Additional Medications for Tactical EMS: The following is a list of medications from the Maryland Medical Protocols that is strongly encouraged to be readily accessible to complement the Tactical Medic's Formulary.

Aspirin (EMT, ALS)..... Non-Operational
Atropine multi-dose (ALS)..... Non-Operational
Dexamethasone (ALS) .....Operational
Dextrose (ALS) ..... Non-Operational
Droperidol (ALS)..... Non-Operational
Epinephrine (1 mg/mL) (EMT, ALS) ..... Non-Operational
Morphine or fentanyl for injection (ALS)..... Non-Operational
Midazolam (ALS)..... Non-Operational
Nitroglycerin (ALS) ..... Non-Operational
TAX (ALS) .....Non-Operational

ALERT

OPERATIONAL: THE MEDICATION MAY BE GIVEN TO A LAW ENFORCEMENT MEMBER WHO MAY CONTINUE TO PERFORM THEIR ASSIGNED DUTIES.

NON-OPERATIONAL: ONCE THE MEDICATION HAS BEEN ADMINISTERED, THE LAW ENFORCEMENT MEMBER IS REMOVED FROM THEIR ASSIGNED DUTIES SINCE THE MEDICATION OR THE ASSOCIATED MEDICAL/TRAUMATIC COMPLAINT FOR WHICH THE MEDICATION IS INDICATED MAY IMPAIR THEIR ABILITY TO PERFORM CRITICAL LAW

ENFORCEMENT TASKS AND DUTIES.

b) Tactical EMS Medical Formulary

(1) Antihistamines/Decongestants

**(a) Pseudoephedrine (Sudafed®)**

(i) AVAILABILITY.....30 mg or 60 mg tablets (OTC)
(ii) ACTION.....Decongestant
(iii) INDICATIONS.....Nasal congestion; rhinorrhea
(iv) CONTRAINDICATIONS.....Known hypersensitivity; hypertension
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS. .....Operational
(vii) SIDE EFFECTS.....Insomnia
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....30–60 mg, every 4–6 hours, as needed

**(b) Cetirizine (Zyrtec®)**

(i) AVAILABILITY.....10 mg tablet
(ii) ACTION.....Non-sedating antihistamine
(iii) INDICATIONS.....Allergic symptoms
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Hypertension; liver/kidney dx
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....Dry mouth, urinary retention
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....10 mg/once daily

**(c) Diphenhydramine (Benadryl®)**

(i) AVAILABILITY.....IV/IM or tablets
(ii) ACTION .....Sedating antihistamine
(iii) INDICATIONS .....Allergic symptoms
(iv) CONTRAINDICATIONS .....Known hypersensitivity
(v) PRECAUTIONS.....Hypertension; liver/kidney dx
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS.....Dry mouth, urinary retention, somnolence
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....25–50 mg PO/IV/IM every 4–6 hours, as needed; per MD/DO

**(d) Fexofenadine (Allegra®)**

(i) AVAILABILITY.....60 mg tablet
(ii) ACTION .....Non-sedating antihistamine
(iii) INDICATIONS .....Allergic symptoms
(iv) CONTRAINDICATIONS .....Known hypersensitivity
(v) PRECAUTIONS .....Hypertension history
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS .....Dry mouth, urinary retention
(viii) INTERACTIONS.....N/A

(ix) DOSAGE ..... 60mg once or twice daily

**(e) Oxymetazoline nasal spray (Afrin®)**

(i) AVAILABILITY ..... Nasal spray 0.05%
(ii) ACTION ..... Nasal vasoconstriction; decongestant
(iii) INDICATIONS ..... Rhinorrhea; sinus congestion and pain
(iv) CONTRAINDICATIONS ..... Known hypersensitivity
(v) PRECAUTIONS ..... Hypertension
(vi) OPERATIONAL STATUS ..... Operational
(vii) SIDE EFFECTS ..... Nosebleed (minor) possible; often used in treatment of nosebleed
(viii) INTERACTIONS ..... N/A
(ix) DOSAGE ..... Two sprays per nare, 2–3 times per day

(2) Gastrointestinal

**(a) Antacid (Mylanta® or other equivalent antacid)**

(i) AVAILABILITY ..... Liquid (OTC)
(ii) ACTION ..... Antacid
(iii) INDICATIONS ..... GI upset, GERD, PUD, gastritis, esophagitis
(iv) CONTRAINDICATIONS ..... Known hypersensitivity
(v) PRECAUTIONS ..... Some medications require acidic pH and should not be taken at same time with this medication
(vi) OPERATIONAL STATUS ..... Operational
(vii) SIDE EFFECTS ..... N/A
(viii) INTERACTIONS ..... Loose stools possible
(ix) DOSAGE ..... 15–45 mL every 4–8 hours

**(b) Cimetidine (Tagamet®—or other equivalent H2 blocker)**

(i) AVAILABILITY ..... 200/300/400 mg tablets; 300 mg IV/IM
(ii) ACTION ..... H2 blocker
(iii) INDICATIONS PUD, GERD, esophagitis, gastritis
(iv) CONTRAINDICATIONS ..... Known hypersensitivity; concomitant Proton Pump Inhibitor (PPI) use
(v) PRECAUTIONS ..... N/A
(vi) OPERATIONAL STATUS ..... Operational
(vii) SIDE EFFECTS ..... N/A
(viii) INTERACTIONS ..... N/A
(ix) DOSAGE ..... 300 mg IV/IM/PO every 6–8 hours; 400 mg twice daily

**(c) Loperamide (Imodium®)**

(i) AVAILABILITY ..... 2 mg tablet (OTC) and 1mg/5mL suspension
(ii) ACTION ..... Anti-diarrheal

(iii) INDICATIONS.....Diarrhea
(iv) CONTRAINDICATIONS.....Known hypersensitivity; hypertension; bloody diarrhea
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....ENT dryness
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....4 mg first dose; 2 mg each subsequent episode until stool formed; maximum 16 mg per day

**(d) 5-HT3 Antagonist (Zofran® ODT/Ondansetron, 5-HT3 antagonist)**

(i) AVAILABILITY.....IM/IV injectable; tablets; ODT
(ii) ACTION.....Anti-emetic; anti-motion sickness
(iii) INDICATIONS.....Nausea/vomiting
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Long QT history
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....QTC prolongation
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Per MD/DO

**(e) Metoclopramide (Reglan®) (injectable)**

(i) AVAILABILITY.....IM/IV injectable; 10 mg tablets
(ii) ACTION.....Anti-emetic; promotes GI motility
(iii) INDICATIONS.....Nausea/vomiting
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS Dystonic reaction risk (treat with diphenhydramine); may see sedation
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS.....Sedation; dystonia
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....10–20 mg IM/IV/PO every 4 hours, as needed; per MD/DO

**(f) Dimenhydrinate (Dramamine®)**

(i) AVAILABILITY.....IM/IV injectable; 50 mg tablet
(ii) ACTION.....Anti-emetic; anti-motion sickness
(iii) INDICATIONS.....Nausea/vomiting
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....May see sedation
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS.....Sedation
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....50–100 mg IM/IV/PO every 4 hours, as needed; per MD/DO

**(g) Meclizine (Antivert®) (for motion sickness)**

(i) AVAILABILITY.....25–50 mg tablet
(ii) ACTION.....Anti-emetic; anti-motion sickness
(iii) INDICATIONS.....Nausea/vomiting
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....May see sedation
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS.....Sedation
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....25–50 mg PO every 4 hours, as needed; per MD/DO

**(h) Scopolamine transdermal**

(i) AVAILABILITY.....1 mg patch
(ii) ACTION.....Anti-emetic; anti-motion sickness
(iii) INDICATIONS.....Nausea/vomiting/motion sickness prevention
(iv) CONTRAINDICATIONS.....Known hypersensitivity, hx angle closure glaucoma; hypersensitivity to belladonna alkaloids, seizures, urinary retention
(v) PRECAUTIONS.....May cause sedation, disorientation underwater
(vi) OPERATIONAL STATUS.....Operational (if previously tolerated scopolamine)
(vii) SIDE EFFECTS.....Sedation
(viii) INTERACTIONS.....Use with caution when taking other potentially sedative drugs or anticholinergics
(ix) DOSAGE.....1 mg patch every 3 days, as needed; per MD/DO

(3) Opthalmologicals

**(a) Proparacaine or Tetracaine (Alcaine®) ophthetic**

(i) AVAILABILITY.....Ocular anesthetic solution
(ii) ACTION.....Topical anesthetic
(iii) INDICATIONS.....To facilitate eye exam; relieve eye pain; per MD/DO
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Ensure eye protection from foreign objects after exam
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS.....Eye pain
(ix) DOSAGE.....1–2 drops per eye; per MD/DO

**(b) Fluorescein stain (and blue light)**

(i) AVAILABILITY.....Single application strips
(ii) ACTION.....Dye to facilitate eye exam
(iii) INDICATIONS.....Suspected eye injury (foreign body/ corneal abrasion)
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....One drop per eye

**(c) Eye irrigation solution**

(i) AVAILABILITY.....100 mL, 200 mL bottles (other sizes may also be available)
(ii) ACTION.....To facilitate irrigation of contaminants from the eye
(iii) INDICATIONS.....Following exposure of foreign body or chemical to eye
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Not be used in penetrating eye trauma
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Irrigate until an eye pH of 7.4 is achieved

**(d) Erythromycin ophthalmic ointment**

(i) AVAILABILITY.....0.5% ointment
(ii) ACTION.....Macrolide antibiotic
(iii) INDICATIONS.....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity to PCN
(v) PRECAUTIONS.....Topical use only
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....Minor eye irritation, blurred vision
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Per MD/DO

**(e) pH paper**

(i) AVAILABILITY.....Rolls or precut pieces of paper
(ii) ACTION.....To measure baseline and repeat pH during decontamination/ irrigation
(iii) INDICATIONS.....Following exposure of foreign body or chemical to eye or skin
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Not be used in penetrating eye trauma
(vi) OPERATIONAL STATUS.....Operational

(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....One strip approximately 1–2 inches; per MD/DO

(4) Antimicrobials/antiviral (agent-specific training)

**(a) Ciprofloxacin (following exposure or prophylaxis)**

(i) AVAILABILITY.....250/500/750 mg tablets; 400 mg IVPB; 250 or 500/5 suspension
(ii) ACTION.....2nd generation quinolone antimicrobial agent
(iii) INDICATIONS.....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....GI upset, nausea/vomiting, diarrhea, yeast infection
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Per MD/DO

**(b) Triple antibiotic ointment or equivalent (Bacitracin®/Polymyxin®/Neomycin®)**

(i) AVAILABILITY.....Topical ointment
(ii) ACTION.....Polypeptide antibiotic
(iii) INDICATIONS.....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Topical use only
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....Local irritation, GI upset
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Apply to superficial scrapes, burns, wounds, prior to dry sterile dressing.

**(c) Amoxicillin/clavulanate (Augmentin®)**

(i) AVAILABILITY.....875 or 125 mg tablets
(ii) ACTION.....Beta-lactamase inhibitors
(iii) INDICATIONS.....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity to penicillins
(v) PRECAUTIONS.....Liver/Kidney dx
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....GI upset; nausea/vomiting; diarrhea
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Per MD/DO

**(d) Cefazolin (Ancef®) (IV) (for trauma applications when transport is delayed)**

(i) AVAILABILITY.....500 mg or 1000 mg IM/IV
(ii) ACTION.....1st generation Cephalosporin antimicrobial agent

(iii) INDICATIONS .....Per MD/DO—infectious exposures/ trauma
(iv) CONTRAINDICATIONS.....Known hypersensitivity to PCN or Cephalosporins
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS .....GI upset, nausea/vomiting, diarrhea, yeast infection
(viii) INTERACTIONS .....N/A
(ix) DOSAGE .....Per MD/DO

**(e) Cephalexin (Keflex®) (PO) (for trauma applications when transport is delayed)**

(i) AVAILABILITY .....500 mg capsules
(ii) ACTION .....1st generation Cephalosporin antimicrobial agent
(iii) INDICATIONS .....Per MD/DO—infectious exposures/ trauma
(iv) CONTRAINDICATIONS.....Known hypersensitivity to PCNs or Cephalosporins
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS .....GI upset, nausea/vomiting, diarrhea, yeast infection
(viii) INTERACTIONS .....N/A
(ix) DOSAGE .....Per MD/DO

**(f) Clindamycin (Cleocin®)**

(i) AVAILABILITY.....150 or 300 mg tablets; reconstituted liquid 75mg/5mL
(ii) ACTION.....Antibiotic
(iii) INDICATIONS.....Suspected pharyngitis or respiratory Infection, cellulitis
(iv) CONTRAINDICATIONS.....Hypersensitivity to clindamycin
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS .....Diarrhea
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Pediatrics – 10 mg/kg every 8 hours Adult – 300 mg every 8 hours

**(g) Trimethoprim/Sulfadiazine (Bactrim®)**

(i) AVAILABILITY.....800/160 mg DS tablet
(ii) ACTION .....Sulfonamide antibiotic
(iii) INDICATIONS .....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS .....Liver/kidney dx, anemia, thrombocytopenia
(vi) OPERATIONAL STATUS.....Operational

(vii) SIDE EFFECTS .....GI upset, nausea/vomiting, diarrhea
(viii) INTERACTIONS .....N/A
(ix) DOSAGE .....Per MD/DO

**(h) Azithromycin (Zithromax®)**

(i) AVAILABILITY.....250 mg tablet
(ii) ACTION .....Macrolide antibiotic
(iii) INDICATIONS .....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity to PCNs
(v) PRECAUTIONS.....Liver/kidney dx
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS .....GI upset, nausea/vomiting, diarrhea
(viii) INTERACTIONS .....N/A
(ix) DOSAGE.....Per MD/DO

**(i) Doxycycline**

(i) AVAILABILITY .....100 mg tablet
(ii) ACTION.....Tetracycline antibiotic
(iii) INDICATIONS .....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity to tetracyclines, pregnancy
(v) PRECAUTIONS.....Liver/kidney dx, photoreactivity rash
(vi) OPERATIONAL STATUS .....Operational
(vii) SIDE EFFECTS .....GI upset, nausea/vomiting, diarrhea
(viii) INTERACTIONS .....N/A
(ix) DOSAGE.....Per MD/DO

**(j) Mupirocin topical ointment (Bactroban®)**

(i) AVAILABILITY.....2% topical ointment
(ii) ACTION.....Other antibiotic
(iii) INDICATIONS .....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Avoid eyes, limit prolonged use
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS .....Local irritation
(viii) INTERACTIONS .....N/A
(ix) DOSAGE.....Per MD/DO

**(k) Emtricitabine and tenofovir (Truvada) (high-risk post-exposure management)**

(i) AVAILABILITY.....Tablet containing tenofovir DF 300 mg; emtricitabine 200 mg
(ii) ACTION .....Antiretroviral
(iii) INDICATIONS .....Per MD/DO—infectious exposures
(iv) CONTRAINDICATIONS .....Known hypersensitivity
(v) PRECAUTIONS .....Liver/kidney dx
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....GI upset, nausea/vomiting, diarrhea
(viii) INTERACTIONS .....N/A
(ix) DOSAGE .....Per MD/DO

(5) Steroids

**(a) Prednisone (PO)**

(i) AVAILABILITY .....1/5/10/20/50 mg tablets
(ii) ACTION .....Corticosteroid, anti-inflammatory
(iii) INDICATIONS .....Allergic reaction, asthma/COPD, auto-immune condition; per MD/DO
(iv) CONTRAINDICATIONS .....Known hypersensitivity
(v) PRECAUTIONS .....PUD/GERD/GI bleed history
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....GI upset/nausea
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....40 mg to 60 mg once daily; per MD/DO

**(b) Dexamethasone (Decadron®) (IV/IM and/or PO)**

(i) AVAILABILITY.....IV/IM; 4 and 6 mg tablets
(ii) ACTION .....Corticosteroid, anti-inflammatory
(iii) INDICATIONS .....Allergic reaction, asthma/COPD auto-immune condition; per MD/DO
(iv) CONTRAINDICATIONS .....Known hypersensitivity
(v) PRECAUTIONS .....PUD/GERD/GI bleed history
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....GI upset/nausea
(viii) INTERACTIONS.....
(ix) DOSAGE.....15 mg IV/IM/PO once daily; per MD/DO

(6) Analgesics/Anesthetics

**(a) Acetaminophen (PO)**

(i) AVAILABILITY.....Tablet: 325 and 500 mg
(ii) ACTION .....Pain medication
(iii) INDICATIONS.....Mild to moderate pain
(iv) CONTRAINDICATIONS .....Known hypersensitivity, liver disease, PUD/GERD/GI bleed history
(v) PRECAUTIONS .....N/A
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....GI upset
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....650–1,000 mg / 6 hours

**(b) Ibuprofen (Motrin®/Advil®)**

(i) AVAILABILITY.....200 mg tablet (OTC) and 100 mg/5mL suspension; 600 mg and 800 mg tablets
(ii) ACTION.....Non-steroidal anti-inflammatory pain medication
(iii) INDICATIONS.....Mild to moderate pain
(iv) CONTRAINDICATIONS.....Known hypersensitivity, renal

insufficiency (not failure), PUD/GERD/GI bleed history

(v) PRECAUTIONS.....Do not use with other NSAIDs; caution with concomitant steroid use

(vi) OPERATIONAL STATUS.....Operational

(vii) SIDE EFFECTS.....GI upset/nausea, GI bleeding risk

(viii) INTERACTIONS.....N/A

(ix) DOSAGE.....400–600 mg / 4–6 hours or 600–800 mg / 6–8 hours

**(c) Naproxen (Aleve®/Naprosyn®) (PO)**

(i) AVAILABILITY.....Tablet: 220/375/500 mg PO tablets

(ii) ACTION.....Non-steroidal anti-inflammatory pain medication

(iii) INDICATIONS.....Mild to moderate pain

(iv) CONTRAINDICATIONS.....Known hypersensitivity, renal insufficiency (not failure), PUD/GERD/GI bleed history

(v) PRECAUTIONS.....Do not use with other NSAIDs; caution with concomitant steroid use

(vi) OPERATIONAL STATUS.....Operational

(vii) SIDE EFFECTS.....GI upset/nausea, GI bleeding risk

(viii) INTERACTIONS.....N/A

(ix) DOSAGE.....220–500 mg every 12 hours

**(d) \Tramadol (Ultram®) (PO)**

(i) AVAILABILITY.....50 and 100 mg PO tablets

(ii) ACTION.....Pain medication

(iii) INDICATIONS.....Moderate to moderately severe pain

(iv) CONTRAINDICATIONS.....Known hypersensitivity, seizure disorder, SSRI/TCA/MAOI use, renal or hepatic insufficiency

(v) PRECAUTIONS.....Caution with concomitant opioid use

(vi) OPERATIONAL STATUS.....Operational (if no side effects reported)

(vii) SIDE EFFECTS.....Potential dizziness/nausea

(viii) INTERACTIONS.....Antidepressants, antipsychotics, Warfarin, Digoxin, Tegretol, Quinidine

(ix) DOSAGE.....50–100 mg every 4–6 hours; 400 mg per day maximum

**(e) Ketamine**

*Formulary per General Patient Care Protocols*

**(f) Naloxone (Narcan®) (IN and/or IV)**

*Formulary per General Patient Care Protocols*

**(g) Lidocaine (transdermal for muscular relief, or IM/SQ for stapling as temporizing measure only, alternate dosing regimen)**

(i) AVAILABILITY.....1% (10 mg/mL) ampules/vials
(ii) ACTION.....Injectable anesthetic
(iii) INDICATIONS.....Local pain/injury
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Should not exceed 4 mg/kg or 300 mg
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....With high doses: seizures, lightheadedness, ringing in ears
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Per MD/DO

**(h) Fentanyl Transmucosal (PO)**

(i) AVAILABILITY.....Lozenge / lollipop 800 **mcg**
(ii) ACTION.....Opioid analgesic
(iii) INDICATIONS.....Severe pain/injury
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Controlled substance. Patient should not bite or chew the lozenge, but rather allow it to dissolve slowly in the mouth.
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS.....Patient must be monitored for CNS/ respiratory depression
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Oral application for patient directed analgesia; patient should remove the lollipop once pain is controlled

**(i) Clove oil (for topical dental analgesia)**

(i) AVAILABILITY.....Topical liquid (OTC)
(ii) ACTION.....Topical (dental) anesthetic
(iii) INDICATIONS.....Dental pain/injury
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Penetrating/open intra-oral wounds
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS.....N/A
(ix) DOSAGE .....Topical application to site of dental pain

**(j) Ketorolac (Toradol®) (injectable)**

(i) AVAILABILITY.....30 mg/mL IV/IM
(ii) ACTION.....Non-steroidal anti-inflammatory pain medication
(iii) INDICATIONS.....Mild to moderate pain
(iv) CONTRAINDICATIONS .....Known hypersensitivity, renal

insufficiency (not failure), PUD/GERD/GI bleed history
(v) PRECAUTIONS.....Do not use with other NSAIDs; caution with concomitant steroid use
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....GI upset/nausea; GI bleeding risk
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....15–30 mg IM/IV every 6–8 hours

(7) Sleep/Wake

**(a) Caffeine (No-Doz®)**

(i) AVAILABILITY.....200 mg tablet
(ii) ACTION.....Enhances alertness
(iii) INDICATIONS.....Suspected caffeine withdrawal headache; to facilitate functioning with limited rest periods
(iv) CONTRAINDICATIONS .....Known hypersensitivity
(v) PRECAUTIONS .....N/A
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....Insomnia
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....200 mg / 3–4 hours as needed

**(b) Zaleplon (Sonata®) (sleeper)**

(i) AVAILABILITY.....10 mg capsule
(ii) ACTION.....Anxiolytic/hypnotic; shortest t-1/2 of agents available
(iii) INDICATIONS.....Facilitate rest during non-operational periods in prolonged deployment/transportation; minimum 4-hour block required for usage (6 hours preferred)
(iv) CONTRAINDICATIONS .....Known hypersensitivity, unsecure location, lack of assured 4-hour non-operational period
(v) PRECAUTIONS.....May not drive/operate machinery/use weapons for minimum 4 hours post-administration
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL (x 4 hours after administration)
(vii) SIDE EFFECTS.....Sedation
(viii) INTERACTIONS.....Alcohol/other sedatives potentiate effect
(ix) DOSAGE.....10–20 mg with assured 4-hour non-operational block, as approved by MD/DO and Team Commander

**(c) Modafinil (Provigil®)**

(i) AVAILABILITY.....200 mg tablet
(ii) ACTION.....Enhances alertness/concentration
(iii) INDICATIONS.....To facilitate functioning with limited rest periods
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....N/A
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....Insomnia, mild blood pressure elevation
(viii) INTERACTIONS.....N/A
(ix) DOSAGE .....200 mg once daily

(8) Wound Management

**(a) Cyanoacrylate tissue adhesive (Dermabond®)**

(i) AVAILABILITY.....Single use ampoules
(ii) ACTION.....Tissue adhesive
(iii) INDICATIONS.....Minor trauma
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Avoid near eyes
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....Transient local discomfort
(viii) INTERACTIONS .....N/A
(ix) DOSAGE .....As required for wound closure, 2–4 layered applications

**(b) Topical hemostatic dressing**

(i) AVAILABILITY.....Individual use packages
(ii) ACTION.....Promotes blood clotting
(iii) INDICATIONS.....Hemorrhage
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Standard/universal precautions for wound care
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL
(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS .....N/A
(ix) DOSAGE.....Single or multiple dressings applied to bleeding wound

**(c) Steri-strips**

(i) AVAILABILITY.....Individual use packages
(ii) ACTION.....Facilitates closure of wounds
(iii) INDICATIONS.....Superficial wounds
(iv) CONTRAINDICATIONS.....Known hypersensitivity to adhesive
(v) PRECAUTIONS.....Standard/universal precautions for wound care
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....N/A

(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Single or multiple dressings applied for wound closure; per MD/DO

**(d) Staples**
(i) AVAILABILITY.....Individual use staple dispensers
(ii) ACTION.....Facilitates closure of wounds
(iii) INDICATIONS.....Wounds
(iv) CONTRAINDICATIONS.....Contaminated wounds, wounds with foreign body material
(v) PRECAUTIONS.....Standard/universal precautions for wound care
(vi) OPERATIONAL STATUS.....Operational
(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....Single or multiple dressings applied for wound closure; per MD/DO

(9) ACLS/Resuscitation

**(a) Albuterol MDI**
(i) AVAILABILITY.....0.83 **mcg** metered dose inhaler
(ii) ACTION.....Bronchodilator
(iii) INDICATIONS.....Respiratory distress/bronchospasm
(iv) CONTRAINDICATIONS.....Known hypersensitivity
(v) PRECAUTIONS.....Standard/universal precautions for respiratory patient
(vi) OPERATIONAL STATUS.....NON-OPERATIONAL (without MD/DO consult)
(vii) SIDE EFFECTS.....N/A
(viii) INTERACTIONS.....N/A
(ix) DOSAGE.....2 puffs, may be repeated two additional times. Additional doses per MD/DO

(10) Anti-hypoglycemics

**(a) Oral glucose**

*Formulary per General Patient Care Protocols*

**1. PURPOSE**

To define the indications for use of a mechanical ventilator by a paramedic for the acute ventilated patient

a) The level of care required for the interfacility transport of the **"acute ventilated interfacility patient"** is beyond the routine training curriculum for a paramedic; this type of patient must be transported by a higher level health care clinician who is credentialed, educated, and competent in dealing with the ventilator and the ventilated patient. **OR**

b) When a critical interfacility transfer is needed and a credentialed, educated, and competent higher level health care clinician is **genuinely unavailable**, a credentialed, educated, and competent paramedic (through a MIEMSS-approved training program) may attend the ventilator and the ventilated patient with the addition of a second ALS clinician or advanced airway trained health care clinician when determined appropriate by the sending/referring physician.

**2. INDICATIONS**

**ACUTE VENTILATED PATIENTS** for the interfacility transport are defined as:

a) Intubated **OR**

b) Tracheostomy patient when the reason for transport is:
   (1) For increased level of care from a hospital, **OR**
   (2) To continue the same level of care in an acute care setting, **OR**
   (3) The new tracheostomy patient, within the last 7 days

**3. VENTILATOR STANDARDS**

a) **ACUTE VENTILATOR DEVICE STANDARDS**
   (1) The ventilator that the service is to use for the acute ventilated patient should be able to match the existing ventilator settings. The following minimum device features (including circuit) must be present for this category of patient:
      (a) Set rate of ventilations
      (b) Adjust delivered Tidal Volume
      (c) Adjustable Pressure Support Settings
      (d) Adjustable Inspiratory and Expiratory ratios (I:E ratio)
      (e) Positive End-Expiratory Pressure (PEEP)
      (f) Peak airway pressure gauge
      (g) Continuous Expiratory Volume measurement (Required)
      (h) Modes
         (i) Assist Control (AC)
         (ii) Synchronized Intermittent Mandatory Ventilation (SIMV)
         (iii) Controlled Mechanical Ventilation (CMV)
      (i) Alarms
         (i) Peak airway pressure
         (ii) Disconnect
   (2) Strongly recommended options are:
      Blend percentage oxygen

(3) Must perform periodic maintenance (including calibration) meeting the manufacturer's specifications

b) **ACUTE VENTILATOR USAGE**

(1) A ventilator maintained by the ambulance service or health care facility must be specifically designed for transport use and capable of providing the required settings.
(2) Continuous pulse oximeter and continuous capnography monitoring equipment must be used on all acute ventilated interfacility patients.
(3) Tracheal suctioning kits/catheters must be available.
(4) A tracheostomy replacement tube the same size and one size smaller shall be transported with the patient ventilated through a tracheostomy. (The endotracheal tube equivalent may be substituted.)

**4. POTENTIAL ADVERSE EFFECTS**

a) Pneumothorax
b) Barotrauma
c) Hypoxemia
d) Hyperventilation
e) Hypoventilation
f) Extubation of endotracheal or tracheostomy tube

**5. PRECAUTIONS**

If any problems arise with mechanical ventilation, the patient shall be disconnected from the ventilator and manually ventilated.

**6. OPTIONAL PROGRAM REQUIREMENTS**

a) A special "Ventilated Patient" report form will be completed for each mechanically ventilated patient and will include vital signs, pulse oximeter readings, and lung sounds (recorded a minimum of every 5 minutes), and documentation of any of the following:
(1) cardiac arrest during transport,
(2) dislodgment of tracheostomy tube or endotracheal tube,
(3) equipment failure (with FDA report),
(4) discontinuance of ventilator and conversion to BVM,
(5) deterioration of patient, or
(6) the upgrading of patient care to critical care.

b) The Optional Program will require a training program that meets or exceeds the "Acute Ventilated Interfacility Patient" curriculum and is approved by the operational program medical director with skills validation. A copy of the training program shall be reviewed and be approved or disapproved by MIEMSS.

## 1. PURPOSE

To define the indications for use of a mechanical ventilator:

a) Chronic ventilated patient

The level of care required for the interfacility transport of **"chronic ventilated patients"** is within the scope of practice of a paramedic who has been credentialed, is competent, and received adequate training specific to the patient's condition and the equipment necessary to provide care. Exception: A CRT or EMT may transport a chronically ventilated patient who is going for routine medical care and has in attendance a patient provided attendant who can manage the patient's own ventilator.

b) Patient ventilated at the scene of an emergency

The level of care required for the transport of a ventilated patient from the "**scene of an emergency**" is within the scope of practice of a paramedic who has been credentialed, is competent, and received adequate training specific to the patient's condition and the equipment to provide care.

## 2. INDICATIONS

a) **CHRONIC VENTILATED PATIENTS** are defined as:

(1) Tracheostomy is more than 7 days old. If tracheostomy has been in place for 7 days or less, see *Transport of Acute Ventilated Interfacility Patients* protocol.

(2) Ventilator settings that have no changes within 24 hours or changes reflecting improvement in the patient; **and**

(3) Point of origin or destination is:

(a) Long-term care facility,

(b) Home,

(c) Outpatient setting,

(d) Hospital; **and**

(4) Reason for transport is:

(a) Return from or transport to a scheduled appointment, **or**

(b) For extended care, **or**

(c) For emergency treatment (but not complication of airway or respiratory distress); **and**

(5) Ventilator settings are:

(a) Positive End-Expiratory Pressure (PEEP) less than or equal to 10

(b) Peak pressures less than or equal to 30, and

(c) No changes in the ventilator settings are required during the transport.

**b) SCENE OF AN EMERGENCY** – Out-of-Hospital

(1) Point of origin is at the scene of an out-of-hospital emergency

(2) A paramedic may utilize mechanical ventilation once the patient is intubated.

(3) Reason for mechanical ventilation is respiratory arrest or when the patient is intubated and not bucking the ventilator.

(4) Once the patient is on a ventilator, a second clinician (EMT or higher) is required to assist with patient care.

(5) Destination – closest appropriate hospital

(6) Contraindicated in children 8 years of age or less.

**3. VENTILATOR STANDARDS**

a) **CHRONIC VENTILATOR DEVICE STANDARDS**

(1) The ventilator that the service is to use for the acute or chronically ventilated patient should be able to match the existing ventilator settings. The following minimum device features (including circuit) must be present for this category of patient:
- (a) Set rate of ventilations
- (b) Adjust delivered Tidal Volume
- (c) Adjustable Pressure Support Settings
- (d) Adjustable Inspiratory and Expiratory ratios (I:E ratio)
- (e) Positive End-Expiratory Pressure (PEEP)
- (f) Peak airway pressure gauge
- (g) Modes
  - (i) Assist Control (AC)
  - (ii) Synchronized Intermittent Mandatory Ventilation (SIMV)
  - (iii) Controlled Mechanical Ventilation (CMV)
- (h) Alarms
  - (i) Peak airway pressure
  - (ii) Disconnect

(2) Strongly recommended options are:
- (a) Continuous Expiratory volume measurement
- (b) Blend percentage oxygen

(3) Must perform periodic maintenance (including calibration) meeting the manufacturer's specifications

b) **CHRONIC VENTILATOR USAGE**

(1) Ventilator used is:
- (a) The patient's own ventilator intended for home/transport use and have the patient, home-care clinician, or staff member from the health care facility manage the ventilator, **or**
- (b) A ventilator maintained by the ambulance service or health care facility specifically designed for transport use and capable of providing the required settings. If the patient's ventilator is the same as the company ventilator, the paramedic may manage the ventilator without the home-care clinician accompanying patient. Exception: A CRT or EMT may transport a chronically ventilated patient who is going for routine medical care and has in attendance a patient provided attendant who can manage the patient's own ventilator.

(2) Monitoring equipment must include pulse oximeter (provided by family or service).

(3) Tracheal suctioning kits/catheters must be available.

(4) A replacement tracheostomy tube the same size and one size smaller shall be transported with the patient ventilated through a tracheostomy. (The endotracheal tube equivalent may be substituted.)

c) **SCENE OF AN EMERGENCY VENTILATOR DEVICE STANDARDS**
Mechanical ventilator used must:
(1) Be intended for transport use,
(2) Deliver 100% oxygen, and
(3) Have minimal parameters to set rate and volume (both adjustable to meet the needs of pediatric and adult patients)

**4. POTENTIAL ADVERSE EFFECTS**

a) Pneumothorax
b) Barotrauma
c) Hypoxemia
d) Hyperventilation
e) Hypoventilation
f) Extubation of endotracheal or tracheostomy tube

**5. PRECAUTIONS**

a) Any acutely ill or injured **breathing** patient at the "scene of an emergency" requiring assisted ventilation shall be manually ventilated.
b) If any problems arise with mechanical ventilation, the patient shall be disconnected from the ventilator and manually ventilated.
c) The Optional Program will require a training program that meets or exceeds the "Chronic and Scene Ventilated Patient" curriculum and be approved by the operational program medical director. A copy of that training program shall be reviewed and be approved or disapproved by MIEMSS.

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# 15.40 Optional Supplemental Protocol – VACCINATION AND TESTING PROGRAM



Scope of practice for paramedic personnel has been expanded to allow select immunization and Purified Protein Derivative (PPD) testing by paramedic personnel. The immunizations that are allowed to be performed include Hepatitis B, Influenza, COVID-19, and PPD. This program is an optional supplemental protocol requiring the EMSOP medical director and the EMSOP to authorize select trained paramedic personnel to perform these functions. There are program requirements below. Please note that you must have a written memorandum of understanding between your EMS service and the local health department or hospital before this program can be instituted.

In order to become recognized and authorized to implement the immunization and testing program for paramedics, you must complete the application and submit a copy of the health department memorandum of understanding to the Office of the State EMS Medical Director. At that time, you will receive a copy of all of the pertinent documents and instructional material. Your jurisdiction will then be recognized as an authorized optional immunization and testing jurisdiction.

When you are implementing this program, we strongly encourage you to advise EMS personnel at risk to seek vaccination where possible.

**REQUIREMENTS**

1. Medical Director: Must have a jurisdictional medical director who is willing to take responsibility for the program.
2. Must be under the Infection Control Program for the Jurisdiction.
3. Immunization record form with documentation of all pertinent information about vaccination or test, including the patient's primary care practitioner.
4. Direct linkage with occupational medicine/employee health and a memorandum of understanding (MOU) with local public health service/department.
5. Statewide protocol approved by the EMS Board.
6. ALS resuscitation equipment (refer to *The Maryland Medical Protocols for Emergency Medical Services*) must be available on-site during vaccinations.
7. Must use the comprehensive training curriculum developed by MIEMSS Infection Control Committee.
8. Physician does not have to be physically present for the administration of vaccinations or tests by the trained paramedic (Vaccination and Testing Officer (VTO)).
9. Program instruction must be directed by and have participation by the jurisdictional medical director to select paramedics who will become the VTOs.
10. This is not for post-exposure prophylaxis (patient must be seen by occupational medicine/physician for consent and treatment).
11. Mechanism for meeting FDA storage and refrigeration standards for vaccines and testing with the use of the Maryland Inventory Control Sheet.
12. Mechanism for follow-up
    a) For additional vaccinations for completion of series
    b) For potential complications of vaccinations or symptoms noted on adverse event form (meeting federal reporting requirements)
    c) Patient contact phone number for complications (e.g., bad vaccine "lot")

13. Must have a standardized informed consent form and standardized vaccine pre-screening questionnaire form.
14. Vaccinations allowable are:
    a) Influenza - Commercial and 9-1-1
    b) Hepatitis B
    c) COVID-19 - Commercial and 9-1-1
15. Testing
    PPD Screening (Intradermal) - 9-1-1 only
16. Recommend 30-minute observation period (to be determined by the jurisdictional medical director) post-immunization administration with ALS personnel and equipment available.

## HEPATITIS B VACCINATION

1. **INDICATIONS**
   Pre-exposure: preventive

2. **CONTRAINDICATIONS**
   History of anaphylactic reaction to baker's yeast

3. **ADVERSE EFFECTS**
   Not clinically significant

4. **PRECAUTIONS**
   (1) Recipients must read and sign consent form.
   (2) CDC recommends antibody testing 1–2 months after the third dose to determine immunity.

5. **DOSE**
   (three total, using a 3 mL syringe with 1" 25 gauge needle)
   Initial 1 mL IM (deltoid)
   2nd dose 4 weeks after initial; 1 mL IM (deltoid)
   3rd dose 5–6 months after 2nd dose; 1 mL IM (deltoid)

## INFLUENZA VACCINATION

1. **INDICATIONS**
   (1) Persons who attend to patients at high risk for complications (e.g., the elderly)
   (2) Persons with chronic medical conditions
   (3) Pregnant women who will be in the second or third trimester of pregnancy during influenza season
   (4) Clinicians of essential community services

2. **CONTRAINDICATIONS**
   History of anaphylactic hypersensitivity to eggs

3. **ADVERSE EFFECTS**
   (1) More common: soreness at the injection site that lasts up to 2 days
   (2) Less common: fever, malaise, myalgia beginning 6–12 hours after vaccination and persisting for 1 to 2 days.

4. **PRECAUTIONS**
   (1) Vaccine should be delayed in the presence of acute febrile illness; administer after symptoms have abated.
   (2) It takes two weeks to develop adequate antibodies against the vaccine virus strain.
   (3) Optimal time for organized vaccination campaigns is usually the period from October through mid-November.
   (4) Because influenza vaccine contains only noninfectious viruses, it cannot cause influenza.
   (5) Recipients must read and sign consent or refusal form.

**5. DOSE**
(using a 3 mL syringe with 1" 25 gauge needle)
0.5–1 mL IM (deltoid)

## PURIFIED PROTEIN DERIVATIVE (PPD) TEST

**1. INDICATIONS**
Yearly administration for health care clinicians

**2. CONTRAINDICATIONS**
(1) Previous positive reaction to PPD
(2) History of TB

**3. ADVERSE EFFECTS**
Not clinically significant

**4. PRECAUTIONS**
Recipients must read and sign consent form.

**5. PROCEDURE**
(1) Injection is given intradermally and should be read 48–72 hours post injection.
(2) Feel the induration with your fingertips.
(3) Measure with approved device in millimeters (mm).
  (a) Less than 5 mm is negative.
  (b) Equal to or greater than 5 mm requires clinical correlation and evaluation by jurisdictional medical director or other appropriate physician.

**NOTE**
Do not use erythema as margins; measure only the induration.

# Viral Syndrome Pandemic Triage Protocol

**EFFECTIVE March 17, 2020, until rescinded or superseded**

**For Use by BLS and ALS Clinicians**

| YES | NO | |
|---|---|---|
| ☐ | ☐ | Patient is between 2 and 55 years |
| ☐ | ☐ | Patient has a suspected viral syndrome with at least two **(2)** of the following symptoms: fever, cough, body aches, or sore throat |
| ☐ | ☐ | Patient has a history of immunosuppression, or is taking medicines that depress the immune system (cancer undergoing chemotherapy, transplant patient, HIV, etc.) |
| ☐ | ☐ | Patient has a history of diabetes |
| ☐ | ☐ | Patient has a history of heart disease |
| ☐ | ☐ | Patient has a history of COPD or lung disease |
| ☐ | ☐ | Patient has a heart rate between: 50 - 110 bpm (age 13 - 55 years); (age 2-5 years: 80 - 140 bpm; age 6 - 12 years: 70 - 120 bpm) |
| ☐ | ☐ | Patient has a systolic blood pressure between: 110 - 180 mmHg (age 13 - 55 years); (age 2 - 5 years: > 80 mmHg; age 6 - 12 years: > 90 mmHg) |
| ☐ | ☐ | Oxygen saturation (SpO2) greater than or equal to 94% |
| ☐ | ☐ | Clear lung sounds |
| ☐ | ☐ | Respiratory rate between 12 - 22 breaths per minute, and the patient does not complain of shortness of breath |
| ☐ | ☐ | Patient is able to ambulate without difficulty |
| ☐ | ☐ | Patient is agreeable to home self-care |

**ANY CHECKS in a shaded box indicate that patient trainsport should be encouraged.**

**If ALL CHECKS are in non-shaded boxes, patient may provide self-care at home. Refer to no-transport instructions for patients.**

**Any patient may be transported at the EMS Clinician's discretion.**

**This emergency protocol was issued by the Maryland Institute for Emergency Medical Services Systems, after approval by the Executive Director and Chairman of the State Emergency Medical Services Board, in response to the COVID-19 pandemic, and in accordance with Education Article Section 13-516(d)(1) and COMAR 30.03.05.02(I) and a catastrophic health emergency proclamation.**

## Maximize the Use of Limited Resources Alternative Dispatch Protocols

| **Dispatch Priority Level** (match vendor or call center based dispatch protocol/tiered algorithm) | **Response** (Standard Operating Mode) | Level 1(A)<br>Activation of Card 36 and ONLY for use in 6, 10, 18, and 26<br>DSS1<br>BELOW IS BACK UP STRATEGY FOR EMD WITHOUT CARD 36 | Level 2(B)<br>Implement Declining Response / Configuration CAD Table (Moderate) + Card 36 (6,10,18 & 26)<br><br>DSS2 | Level 3(C)<br>Implement Declining Response / Configuration CAD Table (Severe) + Card 36 (6,10,18 & 26)<br><br>DSS 3 |
|---|---|---|---|---|
| **Classification 1 (*Echo)**<br>Confirmed Cardiac Arrest (Not Breathing, Unresponsive per 911 call) (MPD cards - 2, 6, 9, 11,15, 31) | Closest AED Unit and Closest 1st Responder and Closest ALS Ambulance | Closest AED Unit and Closest 1st Responder and Closest BLS Ambulance if available | -Closest AED Unit and<br>-Closest 1st Responder if available | - Closest AED Unit if available<br>- If no unit available, no response |
| **Classification 2 (*Delta)**<br>Life Threatening Emergency/Potentially Life Threatening/Confirmed Unstable Patient(s) | Closest 1st Responder and Closest ALS Ambulance | - Closest 1st Responder and Closest ALS Ambulance if available;<br>- BLS ambulance if ALS unit not available | Closest 1st Responder and Closest Ambulance available (ALS or BLS) | - Closest 1st Responder and<br>- Closest Ambulance if available (ALS or BLS) |
| **Classification 3 (*Charlie)**<br>Non-Critical/Currently Stable Patient(s) Requiring ALS Assessment | Closest ALS Ambulance | Closest Ambulance available (ALS or BLS) | Closest Ambulance available (ALS or BLS) | - Closest 1st Responder if available or<br>- Closest stand-in responder unit |
| **Classification 4 (*Bravo)**<br>BLS Assessment for unknown/possibly dangerous scenes | Closest 1st Responder and Closest BLS Ambulance | Closest 1st Responder and Closest BLS Ambulance if available | Closest 1st Responder | - Trauma<br>Closest 1st Responder<br>- Medical<br>Referral to Nurse or Health Department Advice Phone service if available; or self-transport to Alternate Care Site |
| **Classification 5 (*Alpha)**<br>BLS Treatment | BLS Ambulance | Alternate Care Referral | Alternate Care Referral | Alternate Care Referral |
| **Classification 6 (*Omega)**<br>Non-Ambulance Care | Alternate care such as Poison Control Center; Police/Fire service call, etc. | Alternate care such as Poison Control Center; Police/Fire service call, etc. | Alternate care such as Poison Control Center; Police/Fire service call, etc. | Alternate care such as Poison Control Center; Police/Fire service call, etc. |

## A. INTRODUCTION

These protocols are complementary to *The Maryland Medical Protocols for Emergency Medical Services*. They are to be utilized only under the following conditions:

1. The protocols are being utilized in a defined wilderness environment.
2. The EMS jurisdiction has been authorized to utilize wilderness EMS protocols.
3. The EMS clinician has been credentialed as a wilderness EMS clinician (see B.1.b).
4. The EMS clinician is functioning under appropriate wilderness EMS medical direction.

## B. DEFINITIONS

1. Wilderness Environment
   a) A wilderness environment is defined as "any geographic area where the typical urban resources are not adequate for the management of an injured or sick patient." Some examples include woodland areas, mountainous terrain, uneven terrain where traditional urban EMS equipment and stretchers are not able to safely function, rivers, and ski hills.
   b) In order to be considered a Wilderness EMS (WEMS) clinician, the clinician needs to have completed additional training beyond that required to function in the urban environment. This training can be completed by any of the following methods:
      (1) Completion of the State of Maryland Wilderness EMS Course
      (2) Alternatively, the clinician may demonstrate proficiency in the skills of wilderness EMS after providing proof of completion of a nationally recognized wilderness EMS program. Six programs that are nationally recognized are:
         (a) National Outdoor Leadership School's Wilderness Medical Institute
         (b) National Ski Patrol's Outdoor Emergency Care (OEC) program
         (c) Stonehearth Open Learning Opportunities (SOLO)
         (d) Wilderness Medical Associates
         (e) American Health Safety Institute
         (f) Advanced Wilderness Life Support (AWLS)/Wilderness Life Support for the Medical Professional (WLS:MP)
      (3) Basic Life Support (BLS) clinicians include both the EMTs and WEMRs who meet these credentialing processes
2. Wilderness EMS Physician
   a) In order to be considered a wilderness EMS physician, the physician needs to have fulfilled the requirements in order to function as a medical director under COMAR 30.03.03 and be recognized by the State EMS Medical Director as being qualified to provide medical direction in the wilderness environment. Expertise in wilderness EMS may be demonstrated by:
      (1) Completion of a recognized program in wilderness medicine
      (2) At least 2 years of experience functioning in the wilderness environment under the defined capacity of a wilderness medical practitioner
3. Wilderness EMS Jurisdiction
   a) In order to be recognized as a wilderness EMS jurisdiction the following parameters must be met:
      (1) A written request with a demonstrated need
      (2) EMS clinicians credentialed as Wilderness Clinicians
      (3) The clinicians are functioning under a state recognized wilderness EMS medical director

b) As there is limited utility for a ground ambulance in the wilderness environment, the wilderness EMS agency need not be required to have a primary transport vehicle in order to be recognized as a special operations EMS agency. However, since the patient may eventually need transport to definitive care by ground and/or air ambulance, the wilderness EMS agency should have a plan for transportation by another state licensed emergency medical services (EMS) agency for patients that require transport to an acute care service once the patient(s) is out of the wilderness environment. Thus, there must be readily available and functioning communication methods between the wilderness EMS agency and the local EMS jurisdiction, or other state EMS resources (e.g., SYSCOMM). Further, in order to facilitate timely and appropriate post-wilderness care, if the WEMS program is not a section of a previously established public safety EMS transporting jurisdiction, the wilderness EMS jurisdiction must notify the jurisdiction that will be responsible for ground or air transport as soon as the need for transport has been confirmed. Ideally this communication should occur through direct communication with the transporting jurisdiction's emergency communication center rather than simply dialing 9-1-1.

**C. SCOPE OF PRACTICE**

1. Provision of medical care in the wilderness environment is unique in that delays of care due to the remoteness of the environment may be detrimental to the patient.
   In order to address the unique needs and specialized skills required to manage a patient in the wilderness, these protocols and the training required to utilize these protocols will serve to define the scope of practice of the WEMS clinician. Therefore, THE TERM CLINICIAN IS GENERIC AND DOES NOT IMPLY A SPECIFIC LEVEL OF MEDICAL TRAINING. THE WILDERNESS CLINICIAN MAY BE TRAINED TO ANY LEVEL AND COULD BE A PHYSICIAN, PARAMEDIC, CARDIAC RESCUE TECHNICIAN, EMT, OR WILDERNESS EMERGENCY MEDICAL RESPONDER/WILDERNESS FIRST RESPONDER (WFR).
2. In order for the EMS clinician to use these wilderness EMS protocols there must be a need demonstrated in which it is documented that without these protocols:
   a) It would not be possible to safely extricate the patient from the environment
   b) There is a high risk of the patient or other public safety personnel incurring permanent disability or death without the use of the WEMS Protocols, or
   c) There would be an unnecessary need to mobilize additional EMS resources, and put undue strain on the EMS system, for the management of priority 3 or 4 patients that only require minor care

**D. TRANSFER OF CARE**

1. Care is transferred from the WEMS clinician to the transporting EMS clinician at the point at which the patient is either:
   a) No longer in the wilderness environment, or
   b) The wilderness EMS clinician has formally transferred care to the transporting clinician.
2. There may be times in which the WEMS clinician's expertise is needed after transfer of care to the transporting jurisdiction. If this is the case:
   a) The wilderness EMS agency shall delegate a wilderness EMS clinician to ride to the hospital with the transporting EMS jurisdiction to support patient care.
   b) Conflicts shall be resolved by contacting the medical director for the WEMS jurisdiction and then the local EMS Base Station.

**E. DOCUMENTATION/QUALITY IMPROVEMENT**

1. At the completion of the rescue, the WEMS clinicians must fill out a patient chart in compliance with the MIEMSS charting system.
2. A brief written report shall be provided to the transporting agency with the following information:
   a) Patient name, age, sex
   b) Pertinent history of the case
   c) Vital signs and other pertinent physical findings
   d) Care rendered
3. WEMS clinicians must demonstrate proficiency to the WEMS Medical Director on an annual basis via skills testing and/or documentation of the utilization of skills in the field. This may be demonstrated through regular field training exercises.
4. Review of each call:
   a) Upon completion of the WEMS event, notification of the utilization of the WEMS Protocols will be made to the appropriate EMS supervisor.
   b) The WEMS Medical Director will review 100% of WEMS calls as soon as is reasonably possible. Ideally this should be done within 48 hours of the event.
   c) The WEMS program will maintain a detailed WEMS database and will provide an annual report to the State EMS Medical Director.

**TREATMENT PROTOCOLS**

The wilderness EMS clinician shall have responsibilities for part or all of these protocols, summarized as follows, based on BLS or ALS level of certification/licensure:

| Intervention | BLS | ALS |
|---|---|---|
| Provision of access to medications: Ibuprofen, Acetaminophen, Oral electrolytes, Calcium Carbonate tablets (e.g., Tums), ranitidine, diphenhydramine, epinephrine, aspirin, albuterol, ondansetron ODT, caffeine | • | • |
| Administration of medications in Protocol, not listed above | | • |
| Hemorrhage control with hemostatic agent and tourniquet | • | • |
| Extraglottic/Supraglottic Airway | • | • |
| Surgical Cricothyroidotomy | | • (Paramedic or physician only) |
| Wound closure with steri-strips or other tissue tape | • | • |
| Wound closure with tissue adhesive | | • |
| Pelvic Binder | • | • |

General Trauma Care

Follow the MARCH algorithm and treat immediate life threats

M – massive hemorrhage

A – compromised airway

R – respiratory distress (e.g. tension pneumothorax)

C – circulatory compromise
H – hypothermia/head injury

A. Airway
1. Initiate general patient care as per *The Maryland Medical Protocols for Emergency Medical Services*.
2. Assess the patient's airway and determine if the patient's airway is patent, intact, or compromised.
3. If the airway is compromised, establish a patent airway using one of the following techniques:
   a) Insert an oral-pharyngeal airway or naso-pharyngeal airway.
   b) Insert an extraglottic/supraglottic airway per protocol.

ALS SKILL (PARAMEDIC ONLY)

   c) If unable to insert an extraglottic/supraglottic airway and unable to keep the airway open with a non-invasive technique, proceed to a surgical cricothyroidotomy.

B. Cardiac Arrest
1. Initiate general patient care as per *The Maryland Medical Protocols for Emergency Medical Services*.
2. Perform CPR.
3. If equipped with AED, utilize as appropriate.
4. Continue CPR and utilization of AED per protocol until there is Return of Spontaneous Circulation (ROSC).
5. If an AED is present, the resuscitation may be terminated per the TOR protocol. TOR conditions requiring physician consult are waived, such that clinicians may terminate without consult.
6. If an AED is not present, the resuscitation may be terminated if there is no ROSC after 30 minutes of resuscitative efforts.
7. Resuscitation may also be terminated if rescuers are exhausted or in danger.
8. Resuscitation should remain in place until ROSC conditions for TOR have been met, or care has been turned over to a transporting EMS agency. The patient should not be transported through the wilderness while still in cardiopulmonary arrest.

C. Asthma
1. Initiate general patient care as per *The Maryland Medical Protocols for Emergency Medical Services*.
2. Administer albuterol MDI – Eight puffs inhaled every 20 minutes. May repeat every 20 minutes for two additional rounds. Maximum dose 24 puffs in one hour.
3. Consider administration of epinephrine (manual or auto-injector) for severe asthma.
4. Pediatrics less than 5 years of age administer 0.15 mg IM
5. Pediatrics 5 years old and greater and adults administer 0.5 mg IM

ALS SKILL

6. Consider administration of dexamethasone
   (a) Pediatrics – 0.5 mg/kg to max of 15 mg IV or 16 mg PO tablets every 24 hours
   (b) Adults – 15 mg IV or 16 mg PO tablets every 24 hours

All Clinicians

7. Continue treatment and monitoring of patient.
8. Consider need for transport to definitive care, and arrange for transport as needed.

D. Acute coronary syndrome

1. Initiate general patient care as per *The Maryland Medical Protocols for Emergency Medical Services*.
2. Acute coronary syndrome may be difficult to diagnose in the wilderness environment without the use of a 12-lead EKG. WEMS clinicians should have a high index of suspicion in a patient complaining of chest pain, shortness of breath, or extreme fatigue without an alternate explanation for these symptoms.
3. Closely monitor vital signs during patient contact.
4. Provide oxygen if available to keep oxygen saturation above 90% if a pulse oximetry is available.
5. Administer aspirin 324 mg (81 mg low-dose aspirin X 4) or 325 mg aspirin chewed
6. Expedite transport out of the wilderness.

E. Shock

1. Patients presenting with shock will exhibit signs of poor perfusion to critical organs.
2. The patient may or may not be hypotensive.
3. The most common reason for shock in trauma is hemorrhage.
4. Treat the underlying cause. Control external bleeding.
5. Control for environmental conditions.

ALS SKILL

6. If carrying IV/IO fluids establish IV/IO access and administer parenteral fluids with Lactated Ringer's (LR) or 0.9% Normal Saline (NS).
7. Pediatrics 20 mL/kg bolus to maintain a radial pulse and to maintain normal mentation
8. Adults 500–1,000 mL bolus to maintain a radial pulse and to maintain normal mentation
9. Continue fluids to maintain peripheral perfusion.
10. Consider push dose epinephrine for patients in extremis and follow the protocol as written – ONLY for jurisdictions approved to use the *Push Dose Epinephrine for WEMS* OSP.

ALL CLINICIANS

11. Expedite transport.

F. External Bleeding

1. Initiate general patient care as per *The Maryland Medical Protocols for Emergency Medical Services*.
2. Control external bleeding with direct pressure.
3. If unable to control extremity bleeding with direct pressure, apply tourniquet proximally to the site of bleeding. Note the time and date of the tourniquet application. If time of delivery of patient to definitive care is expected to exceed 2 hours, then it is appropriate to release the tourniquet every 2 hours and attempt tourniquet conversion or tourniquet replacement (TC/TR). However if attempting TC/TR, closely observe area for bleeding and immediately reapply if bleeding resumes.
4. If unable to control bleeding in site other than extremity, or if unable to get control of bleeding with a tourniquet, then apply hemostatic impregnated gauze or hemostatic agent (Hem-

Con® or similar product) per manufacturer instructions.

5. Pack wound as needed to control hemorrhage

ALS Clinicians

Consider push dose TXA for massive hemorrhage and follow protocol as written – ONLY for jurisdictions approved to use *Push Dose Tranexamic Acid (TXA) for WEMS* OSP.

G. Wound Care

1. Initiate general patient care as per *The Maryland Medical Protocols for Emergency Medical Services*.
2. Once bleeding has been controlled, assess the size and depth of the wound. Assess for extent of contamination. In addition, assess for any suspicion of underlying broken bones, dislocated joints or tendon injury in association with the wound.
3. Irrigate the wound. Ideally, the wound should be irrigated with high pressure with a commercially available irrigation bullet, normal saline, or *Lactated Ringer's*. Alternatively, if a commercial irrigation fluid is not available, high-pressure irrigation devices can be created with a syringe or a plastic bag with a small hole using water that is clean enough to drink. Irrigate until all visible foreign bodies have been removed.
4. Assess need for primary closure of wound.
   a) In the wilderness setting, large wounds may warrant primary closure if time to definitive treatment is greater than 4 hours.
   b) Primary closure can be achieved with:
      (1) Steri-strips or other tape (duct tape works well)

ALS SKILL

      (2) Tissue adhesive (Dermabond® or similar product)
      (3) Staples (Physician only skill)
      (4) Sutures (Physician only skill)
   c) Wounds that persist with foreign bodies despite adequate irrigation should not be primarily closed.
   d) Unless there will be a significant delay of transport of patient to definitive care (i.e., greater than 12 hours) do not primarily close facial wounds in the wilderness environment.
5. Assess need for administration of antibiotics
   a) Wounds that warrant antibiotic prophylaxis include:
      (1) Grossly contaminated wounds
      (2) Wounds with obvious involvement of broken bones or joint spaces
      (3) Wounds with involvement of tendons or ligaments
      (4) Mammalian bites
   b) Antibiotics that may be used include:
      (1) Amoxicillin-clavulanate (Augmentin®) – 10 mg/kg or 500 mg of the amoxicillin component every 8 hours
      (2) Cephalexin (Keflex®) – 10 mg/kg or 500 mg every 6 hours
      (3) Bactrim® 5 mg/kg every 12 hours or 1 DS every 12 hours
      (4) Clindamycin 10 mg/kg every 8 hours or 300 mg every 8 hours
      (5) Doxycycline 100 mg every 12 hours

ALL CLINICIANS

6. Cover wound with bacitracin antibiotic ointment.
7. Cover wound with sterile gauze and gauze wrap.

H. Altered mental status

1. The differential of altered mental status is quite broad, including:
   a) Traumatic brain injury
   b) Stroke
   c) Infection
   d) Acute coronary syndrome
   e) Intoxication
   f) Hypoglycemia
   g) Hyponatremia
   h) Shock
2. If there is any possibility of trauma, protect the patient's cervical spine.
3. If unable to check glucose with a glucometer, assume that the patient is hypoglycemic and treat accordingly.
   a) Gently rub oral glucose on the inside of the patient's cheek, 10–15 grams.

ALS SKILL

   b) If carrying glucagon, administer 1 mg IM (0.5 mg if less than 25 kg).
   c) If carrying IV medications, administer dextrose. Administer 10% dextrose as per the *General Patient Care* protocol

ALL CLINICIANS

4. Facilitate extrication from the wilderness and arrange for transport with another EMS agency.

I. Traumatic Brain Injury

1. Initiate general patient care as per the MIEMSS protocols.
2. Any patient with a head injury and the following findings should prompt the WEMS clinician to initiate rapid transportation to a trauma center:
   a) GCS less than 13 or a motor score less than 6
   b) Rapidly declining GCS
   c) Debilitating headache
   d) Profuse vomiting
   e) Raccoon's eyes
   f) Battle's signs
   g) Seizures
3. Protect the cervical spine and manage the airway as needed.
4. In a patient with a head injury and no loss of consciousness, but at least a brief period of confusion or loss of memory, closely observe and monitor for any periods of loss of consciousness, confusion, profound vomiting, or debilitating headache. Facilitate extrication from the wilderness for any concerning signs or symptoms.

J. Back Injury/Spinal Cord Injury

   1. The highest priority in the management of a patient with concern for spinal cord injury is resuscitation and maintenance of perfusion. Clinicians should reduce the risk of hypotensive events with a target mean arterial (MAP) in adults and pediatric patients greater

than 12 years of age of 80 mmHg, and a systolic pressure greater than 70 mmHg + [(age in years) X 2] If the patient is able to ambulate, clinicians should check a blood pressure with the patient standing and ensure the patient is able to maintain the target pressure or greater after the patient stands. If the patient's pressure drops below the target after standing then the patient should be transported in a supine position. Patients that are not able to maintain the target MAP even when supine may need ALS interventions.

2. Once the clinicians are able to maintain a MAP greater than 80 mmHg, further decisions should be made based on the environment and other potential injuries with the patient. Extrication of a fully immobilized patient from the wilderness environment can be quite difficult and pose increased risks to both the patient and rescuers. Therefore, despite a significant mechanism of injury, patients who have concern for spinal column injury and/or meet criteria for the *Spinal Protection* protocol should be allowed to ambulate on their own volition as long as the patient is alert, reliable, has no major neurological deficits, and is able to maintain a MAP greater than 80 mmHg.
3. Patients who have evidence of neurological deficit and/or those who are not able to safely ambulate on their own volition shall be secured in an extrication device in a manner that conforms, as much as possible, to the normal contours of the spine and minimizes, as much as possible, gross movement of the spinal column.
4. Clinicians managing a patient who has been secured in an extrication device should protect the patient from release of bladder or bowel with an appropriate protection mechanism, which may include a diaper, chucks or other skin barrier protection especially if the transport time to definitive care is expected to be greater than one hour.

K. Headache

1. Headaches can be benign, or they can be a symptom of a life threatening illness
2. Assess patient for possible signs or symptoms of a life threat and expedite extrication out of the wilderness for concerning findings
3. The most common causes for benign headache in first responders are fatigue, tension, dehydration, and caffeine withdrawal
4. Treat benign headaches with:
   a) Adult:
      (1) Acetaminophen 650 mg po
      (2) Ibuprofen 400–600 mg po
      (3) Caffeine 200 mg po
   b) Pediatric
      (1) Ibuprofen 200–400 mg po

L . Diagnosis of fractures in the wilderness will be based on clinical findings rather than radiologic studies.

1. Things to assess when considering if a patient has a possible fracture requiring immobilization are:
   a) Ability of the patient to bear weight or use the affected limb
   b) Evidence of angulations, deformities, crepitus, bruising
   c) Did the patient hear a breaking sound or feel the bone breaking?
   d) Multiple areas of tenderness may indicate an unstable fracture

2. Assess distal neurological as well as vascular function.
3. If the patient does NOT have intact distal pulses, then manually reduce by bringing the affected area back to a near anatomic alignment.
4. The general principle of splinting is to immobilize the joint above and below the site of suspected fracture. Provide adequate padding. Splints may be commercially designed or improvised. Assess pulses before and after splinting. Perform frequent vascular checks during transportation.
5. Consider protecting the patient from release of bladder or bowel as discussed in spinal cord injury section—especially for fractures of the lower extremities that may prevent the patient from being able to urinate unaided.
6. Refer to the Pain Management protocol for management of the patient's pain
7. Specific splinting guidelines are as follows:
   a) Shoulder and upper arm
      (1) Immobilize as needed for comfort.
      (2) Place in a sling and swath.
   b) Lower arm
      (1) Immobilize, including the wrist and elbow.
      (2) Place in sling and swath.
   c) Hand
      (1) Realign misangulated digits as needed.
      (2) Place a soft roll of gauze in the hand.
      (3) Wrap with a bandage.
   d) Hip
      (1) Immobilize both upper legs together, placing padding between the legs.
      (2) Place on a stretcher.
      (3) Carry out.
      (4) Do not place patient in traction.
   e) Pelvis
      (1) Assess for injury to genitalia.
      (2) Pelvic fracture is noted by instability of the pelvis.
      (3) Immobilize with commercially available pelvic binder or improvised pelvic binder.
      (4) Facilitate extrication from the wilderness and arrange for transport with a transporting EMS agency. Expedite transport to a trauma center for patients with hypotension or signs of shock.
   f) Femur
      (1) Immobilization of femur fractures with traction splints is no more effective than immobilization to the unaffected leg and transport on a stretcher. In the WEMS setting, the clinician should use judgment and either use a traction split or immobilize the injured leg to the unaffected leg.
      (2) Immobilize the fractured leg to the uninjured leg with adequate padding or use a traction splint.
      (3) Place padding behind the knees.
      (4) Carry the patient out on a stretcher.
   g) Knee
      (1) Patellar fractures typically occur due to a direct blow to the patella.
      (2) The patient is likely to have significant pain and not want to fully extend the knee.

(3) Immobilize with a circumferential splint ensuring that the popliteal artery behind the knee is not compromised.
(4) The patient may be able to ambulate out on own with a crutch and assistance.

h) Ankle
(1) Noting that the fibula is not a weight bearing bone, a patient with an ankle fracture may be able to ambulate with assistance after stabilization of the injury.
(2) Assess for pain at the head of the fibula, as well as pain and deformities in the ankle, talar dome, calcaneus, and bones of the foot.
(3) Assess for vascular compromise and reduce as needed.
(4) Splint ankle to support both lateral as well as dorsal/plantar movement
(5) Perform assisted walk-out, or carry-out, as needed based on stability of the injury and patient comfort.

M. Dislocations
1. Considerations for reducing a dislocated joint in the wilderness:
a) Reductions are typically easier immediately after an injury, before the joint has become swollen and muscles are in spasm.
b) Extrication of a patient from the wilderness with a dislocated joint can be quite difficult, presenting increased risks to the patient and the rescuers.
c) Dislocated joints can result in compromise to vascular and/or neurological structures.
2. Always check neurological and vascular integrity before and after an attempted reduction.
3. Consider placing a diaper on the patient for control of urine—especially for dislocations of the lower extremities that may prevent the patient from being able to urinate unaided.
4. Specific reductions are as follows:
a) Shoulder
(1) The greater majority of shoulder dislocations are anterior. Mechanism is typically external rotation and abduction. The patient will complain of pain in the shoulder and will be resistant to bringing the arm into a position of rest across the body.
(2) Check for motor and vascular integrity in the hand.
(3) Also check for sensation in the outer aspect of the shoulder.
(4) Reduction technique
External Rotation
(a) Lie the patient supine on a flat surface.
(b) Secure the patient's affected arm adducted to the patient's side.
(c) The elbow should be flexed to 90 degrees.
(d) Hold the patient's wrist and gently guide the arm into a slow external rotation while holding the upper arm fixed to the patient's side.
(e) Whenever the patient experiences pain, halt the procedure momentarily then continue.
(f) Continue guiding the forearm until it is lying perpendicular to the patient's side on the flat surface.
(5) Place the patient in a sling and swath.
b) Fingers
(1) Clinically diagnosed by obvious deformity and loss of function

(2) Reduction technique
  (a) Maintain digit in partial flexion.
  (b) Apply traction to the flexed digit while pushing the base of the phalanx back into place.
(3) Splint the fingers in an anatomic position with a roller gauze splint.

c) Hip
(1) Hip dislocations tend to be posterior. The patient's hip will be internally rotated and adducted. You may also notice the affected limb to appear shorter than the other limb.
(2) If equipped with ALS medications, pretreat with midazolam 5 mg IM. Alternatively pre-medicate as per the Pain Management protocol. Do not treat with both a benzodiazepine and an opiate pain medication within a 30-minute timeframe.
(3) Reduction technique
  (a) The patient should be lying supine flat on the ground.
  (b) Flex the hip and knee to 90 degrees.
  (c) Straddle the patient and apply traction in an upward direction while another clinician is providing counter traction by holding the pelvis fixed to the ground.
(4) Once reduced, the hip should be immobilized to the uninjured leg and the patient carried out on a stretcher.

d) Knee
(1) Knee dislocations carry great risk of injury to the popliteal artery behind the knee.
(2) Assess for pulses in the foot.
(3) Reduction technique
Gently exaggerate the injury and then apply gentle traction to bring the joint to anatomic position.
(4) Splint the knee slightly flexed and carry the patient out.
(5) Expedite transport to a trauma center for patients with concern for vascular compromise.

e) Patella
(1) The patella will typically displace laterally with the knee held flexed by the patient for comfort.
(2) Reduction technique
  (a) Gently extend the knee so that the lower leg is straight to the upper leg. This movement may result in the reduction of the dislocated patella.
  (b) If the patella remains dislocated after extension of the knee, then apply gentle pressure on the lateral edge of the patella pushing the patella back into its anatomic location. Do not force the patella if it is not easily reducible.
(3) Splint the leg in extension.
(4) The patient may be able to ambulate with a crutch and assistance.

f) Ankle
(1) Ankle dislocations are typically associated with fractures.
(2) There will be obvious deformity.
(3) There may be compromise of vascular structures.
(4) Reduction technique
Apply traction to reduce the ankle back into its anatomic location, while performing counter-traction against the lower leg.

(5) The ankle will likely remain unstable after reduction and may easily dislocate without splinting. Therefore, be prepared to splint the ankle immediately after reduction. Have one clinician maintain the reduction, while another clinician applies a splint.
(6) Perform assisted walk-out, or carry-out depending on stability of the injury, vascular compromise, and patient comfort.

N. Ankle sprain
1. An ankle sprain typically is described by the patient as twisting of the ankle after walking or tripping over a ledge. The patient will often be able to ambulate on the ankle with assistance. There should be no instability to the ankle.
2. Management
a) Support the ankle with an ACE wrap or other supportive device.
b) Provide a walking aid for the patient such as a crutch or walking stick.
c) Assist the patient in ambulating out of the wilderness.

O. Foot Care – Blister management
1. Blisters form as a friction injury and often develop from a hiker wearing a shoe that has not been broken in and/or is not fitted properly.
2. Management
a) Cover the blister with a blister bandage to protect the skin from further injury.
b) In most cases you should NOT open the blister, as this increases the risk of infection.
c) You may open the blister with a scalpel or clean knife if the location of the blister is impeding the ability for the patient to self-extricate from the wilderness. Cut in the lines of the skin, drain the fluid, and then cover with antibiotic ointment and a sterile dressing.
d) Assist the patient in ambulating out of the wilderness.

P. Eye
1. Retrobulbar hematoma
a) Patients with direct blunt trauma to the eye are at risk for developing bleeding behind the eye that can cause loss of vision.
b) Look for: Proptosis (i.e., the eye bulging out of the socket), Loss of vision, loss of light reflex.
c) If there is concern for a retrobulbar hematoma, this is an ophthalmologic emergency. Expedited transport out of the wilderness
d) Physician
Perform lateral canthotomy as needed
2. Non-painful acute loss of vision
a) Patients with acute non-painful loss of vision may have occlusion of the artery to the eye or vasculitis of the artery.
b) If available, administer oxygen at high flow.
ALS SKILL
c) Administer aspirin 325 mg po (adults only).
ALL CLINICIANS
d) Expedite transport to the ophthalmology referral center.
2. Globe rupture
a) Rupture of the eye globe may be obvious or occult.
b) Obvious globe rupture will be diagnosed by bleeding from the orbit and irregularly

shaped orbit and/or pupil that is not reactive to light.

c) Cover the affected eye with eye dressing, being careful not to put pressure on the globe, and expedite transport to the ophthalmology referral center.

3. Red Eye
   a) Differential diagnosis of red eye includes:
      (1) Foreign body
      (2) Abrasions
      (2) Infection—either bacterial or viral
      (3) Allergic reaction
      (4) Globe rupture
      (5) Acute angle closure glaucoma
   b) Cover eye and expedite transport to ophthalmology referral center if there is concern for globe rupture or acute angle closure glaucoma as these are true eye emergencies. Other causes of the red eye may be less emergent and require non-emergent rather than emergent ophthalmological referral.
4. Foreign body in eye
   a) If the clinician is sure that the patient's discomfort is due to a foreign body, the clinician may attempt to remove the foreign body.

ALS SKILL

   b) Numb the eye with 2 drops tetracaine 0.5% ophthalmic solution (peds and adults).

ALL CLINICIANS

   c) Evert the eyelid.
   d) Remove any foreign particles with a moist cotton applicator or equivalent.
   e) DO NOT FORCEFULLY REMOVE PARTICLES STUCK TO THE EYE.
   f) Irrigate the eye with water clean enough to drink.

Q. Nose - Epistaxis
1. Control bleeding by holding pressure to the base of the bony prominence of the nose until bleeding stops.
2. If unable to control bleeding, pack.
3. Atomize 2–3 squirts of oxymetazoline hydrochloride (e.g., Afrin) to the affected nare.

ALS SKILL

4. Consider TXA 500 mg soaked on a cotton pledget and packed into the nose for uncontrolled bleeding.
5. If you anticipate the packing to be in for greater than 24 hours, initiate antibiotic prophylaxis with either Augmentin® or Bactrim®.

ALL CLINICIANS

6. Facilitate extrication out of the wilderness and transport to an acute care facility by a transporting EMS agency for patients with uncontrolled epistaxis.

R. Teeth
1. Fractured tooth
   a) A fractured tooth that is bleeding is a dental emergency.
   b) The exposed nerve roots will typically be quite painful.
   c) Place crushed aspirin on the top of the exposed nerve roots. This will initially be painful to the patient, but the pain should quickly decrease and then be followed by significant

relief of pain. You can also cover the exposed nerve roots with sugarless gum or wax.
d) Have patient cover tooth with gauze.
e) Refer patient to acute dental care.

2. Tooth avulsion
a) Pick the tooth up by the top rather than the root.
b) Irrigate tooth and socket gently with water clean enough to drink.
c) DO NOT SCRUB THE TOOTH.
d) Replace tooth in socket and have patient maintain tooth by keeping mouth closed as much as possible. You may fix the tooth in place with a piece of sugarless gum.
e) Alternatively place tooth inside of cheek ensuring that the patient does not aspirate or swallow the tooth.
f) If traveling in difficult terrain, it is acceptable to place tooth in container with clear liquid.

PHYSICIAN LEVEL SKILL

Consider dental block.

S. Burns
1. Clean burns as directed by the wound care section of this protocol.
2. Cover burn with antibiotic ointment and with sterile dressing.
3. Treat pain as per the *Pain Management* protocol.
4. Transport to burn center if meeting burn center criteria (see *Burn* protocol in MIEMSS treatment protocols).

T. Anaphylaxis
1. Severe allergic reactions present with diffuse hives, airway swelling, GI upset, and signs of hypoperfusion. Anaphylaxis presents with two organ systems affected.
2. Goals of treatment are to counteract the effects on the airway, respiratory system, and cardiovascular system.
3. Specific treatment
a) Epinephrine (manual or auto-injector)
(1) Less than 5 years of age, administer 0.15 mg IM
(2) Patients 5 years of age and greater and adults, administer 0.5 mg IM
(3) Repeat *epinephrine* dosing as needed
b) Albuterol MDI 2 puffs may repeat every 5 minutes as needed
c) Benadryl®: Pediatric 1 mg/kg every 6 hours; Adults 25–50 mg every 8 hours
d) Pepcid 20 mg po

ALS SKILL

e) Dexamethasone: Pediatric 0.5 mg/kg to a maximum of 15 mg IV or 16 mg PO tablets; Adults 15 mg IV or 16 mg PO tablets

ALL CLINICIANS

4. Expedite extrication out of the wilderness.

U. Hypothermia
1. Hypothermia occurs when the body's ability to conserve and generate heat is not able to compensate for loss of heat.
2. The conditions that are most favorable for development of hypothermia mirror the most efficient methods for losing heat—wet and windy conditions. Therefore, temperatures just

above freezing are often more favorable for the development of hypothermia than temperatures below freezing.

3. The beginning stages of hypothermia are clinically evident when a patient is cold and shivering. During this stage, the patient will be able to re-warm themselves with passive warming techniques.
   a) Remove the patient from the wet and windy conditions.
   b) Remove any wet clothes.
   c) Place the patient in sleeping bags or cover the patient with blankets (foil safety blankets work well). Another option is to place the patient's body into garbage bags, ensuring that the head is not covered with the bag.
4. The point at which the patient is no longer shivering marks the beginning of severe hypothermia. If the patient is not shivering, the patient will not be able to self-generate heat. Also during this stage the patient may develop confusion and other neurological findings. Treatment will need to be active replacement of heat. Follow the steps in #3 above. In addition, add heat to the patient. Possible methods for adding heat include:
   a) Have another person join the patient in a sleeping bag or under blankets.
   b) Pack the patient's axilla and groin with warm packs or water bottles filled with warm liquids.
5. Profound hypothermia is marked by cardiac instability progressing to arrhythmias—ventricular fibrillation, severe bradycardias, and asystole. Handle the patient carefully so as to not induce ventricular fibrillation, but nevertheless remove the patient from the environment. If suspicious of cardiac arrest, check for a pulse for at least 30 seconds. If the patient is in cardiac arrest, attempt to warm the patient while performing CPR. Continue CPR until the patient is warm, they are transferred to the transporting EMS agency, or the rescuers are fatigued.
6. If the patient is alert and there is no concern for airway compromise, feed the patient per the nutrition guidelines. The treatment of hypothermia is aided by the patient having fuel to self-generate heat.

V. Frostbite

1. Frostbite is a localized tissue injury from freezing of tissue. Whereas hypothermia can occur in temperatures above freezing, tissue will not freeze unless temperatures are below freezing.
2. The beginning stages of frostbite are marked by periods of intermittent pain and swelling of the affected tissue. This period is actually called "frostnip" and does not require intervention other than removing the affected tissue from the cold environment.
3. Once the tissue is frostbitten the skin will be pale, cold, and numb. Underlying tissue may be soft and pliable or firm depending on the depth of the freezing.
4. Treatment should only be initiated if the clinician is confident that there is no chance of the affected tissue refreezing. If the tissue is likely to continue to be exposed to a cold environment prior to the patient reaching definitive care, then the affected tissue should, as much as possible, be protected from the environment and covered with warm clothes and/or sterile dressing.
5. If the clinician is reasonably sure the tissue will not be further exposed to the cold, then active treatment may be initiated.
   a) Actively warm the affected tissue in warm water that has been measured with

a thermometer to a temperature of 100.4–104 degrees Fahrenheit.

ALS SKILL

b) Give ibuprofen 600 mg po every 6 hours for management of the frostbite (Peds dosing 10 mg/kg up to max of 600 mg).
c) Manage pain as needed—see *Pain Management* protocol.

ALL CLINICIANS

6. Facilitate extrication out of the wilderness and arrange transport with a transporting EMS agency to an acute care facility.

W. Heat Exhaustion

1. Heat exhaustion is marked by intravascular volume depletion due to dehydration and excessive sweating in a hot environment.
2. Symptoms include dizziness, excessive sweating, headache, confusion, nausea, and weakness.
3. Treatment
   a) Remove the patient from the hot environment and keep in the shade.
   b) Cool the patient by getting the patient wet and fanning.
   c) Replace fluids with oral rehydration solution for patients without airway compromise.
4. Facilitate extrication from the wilderness and transport by a transporting EMS agency to an acute care facility if unable to easily resolve the heat exhaustion with oral rehydration solution.

X. Heat Stroke

1. Heat stroke is a true environmental emergency marked by injury to the neurological system as a result of excessive heat.
2. The patient may or may not be sweaty.
3. Symptoms include confusion, ataxia, and tachycardia.
4. Skin will be red and hot.
5. Treatment mirrors that for heat exhaustion.
   a) Remove patient from the hot environment and keep in the shade.
   b) Cool patient with water and fanning.
   c) Place ice packs in axilla and groin; if shivering, remove the ice packs.
   d) If the patient is alert, orally replace fluids.

Y. Exercise Induced Hyponatremia (EIH)

1. Patients exposed to intense exercise or physical exertion may be prone to over-hydration with free water, which can lead to exercise induced hyponatremia (EIH). EIH can progress to a neurological emergency with brain herniation and death
   a) Assess patient's history for over hydration versus dehydration.
   b) If history is consistent with over hydration, restrict isotonic and hypotonic fluids.

   BLS

   c) Consider hypertonic oral solutions or foods (e.g., dissolve bouillon cube in water).
   d) Mild EIH – observe patient for at least an hour regardless of improvement of symptoms.

   ALS

   e) In patients with history consistent with EIH, and altered mental status establish IV/IO access.

Consult with Wilderness EMS medical direction prior to administration of 3% saline.
If unable to contact medical direction, proceed only with first dose of 3% hypertonic saline, and follow *Extraordinary Care* protocol.

f) Administer 100 mL 3% hypertonic saline IV/IO, may repeat every 10 minutes 2 more times for a total of 3 doses until there is improvement of mental status.
g) Second dose of 100 mL 3% saline may only be administered after medical direction consultation.

ALL CLINICIANS

h) Expedite extrication out of the wilderness and arrange transport with a transporting EMS agency to an acute care facility.

Z. Snake Bites

1. There are two wild snakes indigenous to the State of Maryland that are poisonous:
   a) Northern Copperhead – The Northern Copperhead is identified by the coppery color to its head and the alternating tan and dark brown on its body. It likes to hide within wood-piles or under logs.
   b) Timber Rattlesnake – The Timber Rattlesnake is a large, stout-bodied snake that can grow up to 5 feet or more. It is typically identified by bands of dark chevrons on its back. Generally, the snake likes to live in wooded areas, but gravid females may be found sunning on open rocks.
2. Snake bites may or may not present with paired fang puncture wounds. A snake bite may also present with a single puncture wound or just a scratch.
3. The greater majority of bites will present with immediate onset of pain at the site of the bite. The bite will become swollen and erythematous.
4. Mark the site of erythema and monitor its progression.
5. Treatment
   a) Gently clean the area and cover with a sterile dressing.
   b) Do NOT attempt to suck out the venom with a commercial or improvised device.
   c) Do not apply a distal and proximal constricting band for poisonous snakebite to an extremity. Splint the extremity. Remove any jewelry on affected extremity.
   d) As much as possible keep the affected area below the level of the heart.
   e) Unless absolutely necessary, the patient should be carried out rather than walked out on their own accord.
   f) Calmly extricate patient out of the wilderness.
6. Do NOT try to catch the snake for identification purposes.

AA. Tick Bites

1. Tick bites in the State of Maryland are at high risk for transmission of Lyme disease and/or Rocky Mountain spotted fever.
2. In order for a tick to transmit Lyme, the tick has to be attached to the patient for at least 36 hours. Ticks found on a patient that are engorged with blood pose a much higher risk than ticks that are not engorged with blood.
3. Lyme disease presents with a circular red rash with the center clear of redness. Patients will have fevers and non-specific flu-like symptoms. The patient may also have neurological finding such as a facial droop.

4. To remove a tick, directly pull the tick up from the skin using a pair of tweezers or a tick key in a single firm steady pull.

ALS SKILL

5. Consider Lyme prophylactic – administer doxycycline 200 mg po
   Pediatric greater than 12 years dosing 4.4 mg/kg up to a max dose of 200 mg
   Pediatric dosing 8–12 years 2.2 mg/kg up to a max dose of 100 mg
   If there is high suspicion for Lyme disease, start the patient on antibiotic treatment with doxycycline 100 mg twice a day; 2.2 mg/kg 8 years or greater. If less than 8 years old use Augmentin® 10 mg/kg every 12 hours.
6. If there is suspicion for Rocky Mountain spotted fever (the patient has fever and petechiae), then doxycycline is the antibiotic of choice for all age groups. If less than 45 kg estimated weight, administer 2.2 mg/kg every 12 hours to max dose of 100 mg. If greater than 45 kg then administer 100 mg every 12 hours.

BB. Large Animal Attacks (e.g., bear, wild cat, fox)

1. Ensure that the area is safe and that the animal is not still a threat to the patient or rescuers.
2. Patients typically die from large animal attacks secondary to injury to airway structures or hemorrhagic shock from large, gaping wounds.
   Follow the MARCH algortithm.
   M – massive hemorrhage
   A – compromised airway
   R – respiratory distress (e.g., tension pneumothorax)
   C – circulatory compromise
   H – hypothermia/head injury
3. Ensure the patient has an intact airway.
4. Control for any external bleeding.
5. Clean and dress wounds.
6. Facilitate extrication from the wilderness and arrange transport with a transporting EMS agency.
7. Do NOT attempt to capture the animal for identification purposes.

CC. Plants

1. Patients may develop localized skin reactions after contact with a plant.
   a) Remove the patient from the plant.
   b) Wash the area clean.
   c) Treat with Benadryl – 25-50mg/po for adults; 1mg/kg for pediatrics.

ALS SKILL

   d) For mild reactions, use a topical steroid. Cover the area with a topical steroid cream or ointment (e.g., betamethasone valerate 0.1%) up to twice a day.
   e) For severe reactions administer dexamethasone 15 mg IV or 16 mg PO tablets; for pediatrics 0.5 mg/kg to a max dose of 15 mg IV or 16 mg PO tablets.
   f) Transport
2. Ingestion of plants and mushrooms can be life-threatening.
   a) Patients will present with nausea and vomiting.
   b) Provide supportive care.

c) Facilitate extrication from the wilderness for patients with persistent vomiting, or signs of dehydration.
d) Treat dehydration with oral rehydration solution.
e) Treat nausea/vomiting with ondansetron ODT.

DD. Oral Rehydration

1. Oral rehydration with a glucose-sodium solution may be indicated in one of these conditions.
   a) Excessive sweat loss from intense exercise
   b) Mild to moderate heat illness, or severe heat illness as long as the airway is intact and the patient is able to tolerate oral fluids
   c) Dehydration from vomiting or diarrhea
   d) Delayed capillary refill time
2. The patient will likely feel dehydrated. Mucus membranes will be dry. Skin may tent.
3. Replacement of fluids with only water and no electrolytes may lead to a dilution of intravascular sodium levels. This risks the development of cerebral edema. Therefore, fluids should be replaced with a solution of glucose and salts.
4. The ideal solution will contain 2–6% glucose and 30 mEq/Liter of sodium. Use oral rehydration solution (ORS) to replace fluids as needed. Do not use commercial sports drinks as these solutions contain high concentrations of glucose that may paradoxically result in further dehydration.
5. If a balanced glucose/sodium oral rehydration solution is not available, hydrate with water judiciously.
6. Replace fluids at a rate of 50–100 mL/kg over the first 4–6 hours.

EE. Nutrition

1. In rescues that are expected to be prolonged (i.e., greater than 4 hours) it may be necessary to provide nutritional support to the patient.
   a) Ensure that the patient has an intact airway and that the patient is not experiencing nausea or vomiting.
   b) Only feed the patient if you are reasonably sure that the patient will not be going to surgery in the next 12 hours.
   c) Provide nutrition with a combination of protein and carbohydrate.
      (1) Energy bars and a mixture of dried fruits and nuts are a good choice.

FF. Nausea

1. Patients with traumatic injuries and/or medical illness may experience nausea. All clinicians should refer to the treatment protocols for ODT ondansetron.

ALS SKILL

2. If carrying ALS medications and IVs, follow *Nausea and Vomiting* protocol in MIEMSS treatment protocols.
3. Alternatively, may administer
   a) Promethazine pediatric greater than 2 years old 0.5 mg/kg every 12 hours; adults 25 mg po every eight hours
   b) Zofran® pediatric 0.1 mg/kg; adults 4 mg IM

GG. Diarrhea

1. Diarrhea in the wilderness can result in significant dehydration to the patient.
2. Orally rehydrate the patient with oral rehydration solution as noted in the *ORS* protocol.

ALS SKILL

3. Administer loperamide
4. Pediatric – (loperamide is generally not indicated for pediatric populations. However, in the wilderness it may be needed to prevent profound dehydration or to facilitate extrication. Use judiciously.)
5. 2–6 years of age or 13–20 kg 1 mg po three times a day
6. 6–8 years of age or 20–30 kg 2 mg bid
7. Adults – 4 mg po for the first dose then 2 mg po after each subsequent loose stool up to a total of 16 mg in a 24-hour period
8. Contraindications for loperamide are diarrhea with fevers and bloody diarrhea.

HH. Abdominal Pain

1. Non-traumatic abdominal pain may indicate a surgical emergency.
2. In women, a ruptured ectopic pregnancy is a true emergency that may present with abdominal pain.
   a) Check a female patient's urine for beta hCG using a commercial urine pregnancy test.
   b) If the patient with abdominal pain is pregnant, facilitate extrication from the wilderness and expedite transport by a transporting EMS agency to an acute care center.
3. In non-pregnant females and all males with abdominal pain, monitor vital signs and patient symptoms. Concerning findings suggestive of a surgical abdomen include:
   a) Instability of vital signs
   b) Progressing pain
   c) Rebound pain–pain with movement
   d) Nausea and vomiting
4. If there is high concern for surgical abdomen, do not feed the patient, expedite transport out of the wilderness and transport by a transporting EMS agency to an acute care center.
5. All other patients with abdominal pain should be extricated from the wilderness with care and transferred to a transporting EMS agency so as to not miss occult surgical disease.

II. Gastroesophageal reflux

1. Gastroesophageal reflux (GERD) (or heartburn) is typically identified by the patient complaining of a burning, substernal chest pain. The patient also may complain of having a sour taste.
2. It is important to note that the patient with symptoms of GERD may actually have an acute coronary syndrome. Therefore, as you are treating the patient's symptoms, also assess for possible acute coronary syndrome and manage appropriately. Relief of symptoms with the recommended treatment for GERD does NOT rule out the possibility of acute coronary syndrome.
3. Management of GERD
   Tums 1–2 chewed every hour as needed to a max dose of 4 tablets

JJ. Pain Management

1. Treatment of pain in the wilderness may at times be necessary in order to facilitate extrication and transport out of the wilderness. Therefore, treatment of pain not only benefits the patient by simply decreasing pain, treatment of pain also improves the safety of the patient and rescuers by decreasing the time spent in the wilderness.
2. Mild to moderate pain can be treated with ibuprofen and/or acetaminophen.
   a) Ibuprofen 600 mg every 6 hours orally; 10 mg/kg to max dose 600 mg for pediatric dosing
   b) Acetaminophen up to 650 mg every 6 hours orally; 160 mg/5mL for 3–5 years old; 320 mg/10 mL 6–9 years old

ALS SKILL

3. Management of severe pain will often require treatment with an opiate analgesic. While intravenous opiates may have a quicker onset and are easier to tritate, oral opiate analgesics tend to have less acute respiratory depression.
   a) If carrying parenteral morphine, administer 0.1 mg/kg IV/IM up to 20 mg IM. May repeat dose of 0.05 mg/kg every hour as needed.
   b) Administer fentanyl 1 **mcg**/kg IN/IV/IM to a max dose of 200 **mcg** with a repeat dose of 1 **mcg**/kg to a max dose of 200 **mcg** every 1 hour as needed.
   c) Alternatively, administer oxycodone 5–10 mg every 6 hours as needed. Pediatric dosing for oxycodone – 0.1 mg/kg every 6 hours

**FORMULARY**

**acetaminophen (Tylenol®)**

- Availability . . . . . 325 mg tablet; 160 mg/5 mL
- Action . . . . . analgesic; anti-pyretic
- Indication . . . . . mild to moderate pain; fever
- Contraindication . . . . . known end stage liver disease
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . 3–5 years old 160 mg/5 mL every 6 hours as needed
  6–9 years old 320 mg/10 mL every 6 hours as needed
  10 years and above 640 mg/20 mL or 650 mg tab every 6 hours as needed

**albuterol**

- Availability . . . . . 90 **mcg**/metered spray
- Action . . . . . bronchodilator
- Indication . . . . . shortness of breath; exacerbation of asthma/COPD; wheezing
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose (Peds & Adult) . . . . . Eight puffs inhaled every 20 minutes. May repeat every 20 minutes for two additional rounds. Maximum dose 24 puffs in one hour

**amoxicillin-clavulanate (Augmentin®)**
- Availability. . . . . 500 mg–125 mg tablet; 125 mg–31.5 mg/5 mL
- Action . . . . . antibiotic
- Indication . . . . . suspected respiratory infection
- Contraindication . . . . . hypersensitivity to penicillin
- Precautions. . . . . N/A
- Side effects. . . . . diarrhea
- Dose . . . . . Pediatrics – 10 mg/kg every 12 hours
  Adult - 1 tablet every 8 hours

**Aspirin**
- Availability. . . . . 325 mg; 81 mg
- Action . . . . . anti-platelet
- Indication . . . . . suspected acute coronary syndrome or stroke
- Contraindication . . . . . hypersensitivity to salicylates
- Precautions. . . . . N/A
- Side effects. . . . . N/A
- Dose . . . . . No pediatric dosing
  Adults - one 325 mg tab po qd or four 81 mg tabs po qd

**bacitracin**
- Availability. . . . . 1 ounce (28 gram) ointment tube
- Action . . . . . topical antibiotic
- Indication . . . . . soft tissue wounds
- Contraindication . . . . . N/A
- Precaution . . . . . N/A
- Side effects. . . . . N/A
- Dose (Peds and Adult) . . . . . cover the affected area 2–3 times a day

**betamethasone valerate**
- Availability. . . . . 0.1% topical ointment
- Action . . . . . topical steroid anti-inflammatory
- Indication . . . . . contact dermatitis
- Contraindication . . . . . N/A
- Precautions. . . . . N/A
- Side effects. . . . . N/A
- Dose (Peds and Adult) . . . . . apply to affected area twice a day

**calcium carbonate (Tums®)**
- Availability. . . . . 500 mg; 750 mg chewable
- Action . . . . . neutralizes stomach acid
- Indication . . . . . upset stomach; gastroesophageal reflux
- Contraindication . . . . . N/A
- Precautions. . . . . N/A
- Side effects. . . . . N/A

- Dose . . . . . Pediatric – 1 every four hours as needed
  Adult – 1–2 every hour as needed up to max dose of 8 tabs

**cephalexin (Keflex®)**
- Availability. . . . . 500 mg tablets; 125 mg/5mL
- Action . . . . . antibiotic
- Indication . . . . . suspected skin infection or prophylaxis for skin wound
- Contraindication . . . . . hypersensitivity to penicillin
- Precautions. . . . . N/A
- Side effects. . . . . diarrhea
- Dose . . . . . Pediatric – 10 mg/kg every 6 hours
  Adult – 500 mg every 6 hours

**chitosan (Hemcon®)**
- Availability. . . . . 2"X2"; 2"X4"; 4"X4" bandages
- Action . . . . . hemostatic
- Indication . . . . . severe bleeding
- Contraindication . . . . . N/A
- Precautions. . . . . N/A
- Side effects. . . . . N/A
- Dose (Peds and Adult) . . . . . apply to severe bleeding as needed

**ciprofloxacin (Cipro®)**
- Availability. . . . . 500 mg tablets
- Action . . . . . antibacterial
- Indication . . . . . suspected urinary tract infection; skin infection if patient is hypersensitive to penicillin
- Contraindication . . . . . hypersensitivity to floroqinolone
- Precautions. . . . . N/A
- Side effects. . . . . N/A
- Dose . . . . . no pediatric dosing
  Adult – 500 mg every 12 hours

**clindamycin (Cleocin®)**
- Availability . . . . . 150 or 300 mg/tablet, reconstituted liquid 75 mg/ 5 mL
- Action . . . . . antibiotic
- Indication. . . . . suspected pharyngitis or respiratory infection; cellulitis
- Contraindication . . . . . hypersensitivity to clindamycin
- Precautions . . . . . N/A
- Side effects . . . . . diarrhea
- Dose . . . . . Pediatrics– 10mg/kg every 8 hours
  Adult -300mg every 8 hours

**cryanoacrylate tissue adhesive (Dermabond®)**
- Availability . . . . . single use ampoules
- Action . . . . . tissue adhesive
- Indication . . . . . minor wound repair
- Contraindication . . . . . known hypersensitivity
- Precaution . . . . . avoid near eyes
- Side effects . . . . . transient local discomfort
- Dose . . . . . as required for wound closure; may need 2–4 layers

**dexamethasone (Decadron®)**
- Availability . . . . . 1 mg/mL solution or 4 mg tablets
- Action . . . . . Steroidal anti-inflammatory
- Indication . . . . . asthma, allergic reactions
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . Adults – 15 mg IV or 16 mg tablets PO every 24 hours as needed.
  Pediatrics – 0.5 mg/kg to a max of 15 mg IV or 16 mg tablet PO every 24 hours as needed.

**diphenhydramamine (Benadryl®)**
- Availability . . . . . 25 mg tablets; 12.5 mg/5 mL
- Action . . . . . antihistamine
- Indication . . . . . allergic reactions
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . sedating
- Dose . . . . . Pediatric – 1 mg/kg to max dose 50 mg every 8 hours
  Adult – 25–50 mg every 8 hours as needed

**doxycycline (Doxy®)**
- Availability . . . . . 100 mg tablets; 25 mg/5 mL
- Action . . . . . antibacterial
- Indication . . . . . suspected respiratory infection with contraindication to Augmentin®, high suspicion of Lyme disease or Rocky Mountain spotted fever or Lyme prophylactic
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . 8–14 years old – 2.2 mg/kg every 12 hours
  Adults – 100 mg every 12 hours
  For Lyme prophylactic:
  Adult – 200 mg PO
  Pediatric greater than 12 years of age 4.4 mg/kg max dose 200 mg.
  Pediatric 8–12 years – 2.2 mg/kg max dose 100 mg.

**epinephrine auto-injector***

- Availability. . . . . 0.3 mg; 0.15 mg auto-injector
- Action . . . . . antihistamine; anti-inflammatory; vasoconstrictor
- Indication . . . . . moderate to severe allergic reaction
- Contraindication . . . . . N/A
- Precautions. . . . . N/A
- Side effects. . . . . tachycardia; hypertension
- Dose . . . . . Pediatric less than 30 kg estimated weight – 0.15 mg IM
  greater than 30 kg estimated weight and adults – 0.3 mg IM

* All levels of clinicians shall be authorized to manually draw up epinephrine with a needle and syringe from an ampule or vial after education and credentialing by the wilderness jurisdictional medical director.

**fentanyl**

- Availability. . . . . prefilled syringe, multidose vial
- Action . . . . . opioid analgesic
- Indication . . . . . severe pain
- Contraindication . . . . . N/A
- Precautions. . . . . N/A
- Side effects. . . . . depressed level of consciousness; hypoxia; hypotension
- Dose . . . . . 1 **mcg**/kg IN/IV/IM to a max dose of 200 **mcg** with a repeat dose of 1 **mcg**/kg to a max dose of 200 **mcg** every 1 hour as needed

**glucagon**

- Availability. . . . . 1 mg injector
- Action . . . . . facilitates release of glucose from glycogen stores in the liver
- Indication . . . . . suspected hypoglycemia in patient that is not able to take oral glucose
- Contraindication . . . . . N/A
- Precautions. . . . . N/A
- Side effects. . . . . N/A
- Dose . . . . . Pediatric less than 25 kg – 0.5 mg IM
  greater than 25 mg and adults – 1 mg IM

**glucose gel (Glutose 15®)**

- Availability. . . . . 15 grams oral gel
- Action . . . . . raises blood glucose levels
- Indication . . . . . suspected hypoglycemia
- Contraindication . . . . . N/A
- Precautions. . . . . use caution in patient with depressed level of consciousness
- Side effects. . . . . N/A
- Dose (Peds and Adult) . . . . . give to patient by mouth
  in patient with depressed level of consciousness, rub the gel on the patient's gums, but use caution

**hemostatic agent**
All levels of clinicians are authorized to use gauze impregnated with hemostatic agent.

**3% hypertonic saline**
- Availability . . . . . N/A
- Action . . . . . N/A
- Indication . . . . . altered mental status and history consistent with acute, exercise induced hyponatremia
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . 100 mL IV/IO, with medical direction required

**ibuprofen (Advil®; Motrin®)**
- Availability . . . . . 200 mg; 400 mg; 600 mg; 40 mg/mL
- Action . . . . . anti-inflammatory; analgesic
- Indication . . . . . mild to moderate pain
- Contraindication . . . . . hypersensitivity; known renal disease; history of GI bleeding
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . Pediatric – 10 mg/kg to max dose 600 mg every 6 hours as needed
  Adult – 200 mg–600 mg every 6 hours as needed

**loperamide (Imodium®)**
- Availability . . . . . 2 mg tablets
- Action . . . . . anti-diarrheal
- Indication . . . . . diarrhea
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . constipation
- Dose . . . . . Pediatric – 2 mg after first watery stool, then 1 mg after each subsequent watery stool; max dose 8 mg per day
  Adult – 4 mg after first watery stool; then administer 2 mg after each subsequent watery stool; max dose 16 mg per day

**metaclopramide (Reglan®)**
- Availability . . . . . 10 mg tablets; 5 mg/mL
- Action . . . . . anti-emetic
- Indication . . . . . nausea and vomiting
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . Pediatric – 0.1 mg/kg every 8 hours as needed
  Adult – 10 mg every 8 hours as needed

**morphine**
- Availability . . . . . 4 mg carpuject
- Action . . . . . opiate analgesic
- Indication . . . . . severe pain
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . depressed level of consciousness; hypoxia; hypotension
- Dose . . . . . Pediatric – 0.1 mg/kg IM every hour as needed
  Adult – 4 mg IM every hour as needed

**ondansetron (Zofran®)**
- Availability . . . . . 4 mg injectable solution
- Action . . . . . anti-emetic
- Indication . . . . . severe nausea and vomiting
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . Pediatric – 0.1 mg/kg IM every 1 hour as needed up to max dose 16 mg per day
  Adult – 4 mg IM every 1 hour as needed up to max dose of 32 mg per day

**oxycodone**
- Availability . . . . . 5 mg tablet
- Action . . . . . opiate analgesic
- Indication . . . . . moderate to severe pain
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . depressed level of consciousness
- Dose . . . . . Pediatric – 0.05–0.15 mg/kg every 6 hours
  Adult – 1–2 tablets by mouth every 4 hours as needed

**promethazine (Phenergan®)**
- Availability . . . . . 25 mg tablets; 6.25/5 mL
- Action . . . . . anti-emetic
- Indication . . . . . mild to moderate nausea
- Contraindication . . . . . N/A
- Precautions . . . . . N/A
- Side effects . . . . . N/A
- Dose . . . . . Pediatric – 0.5 mg/kg every 8 hours as needed
  Adult – 25 mg every 8 hours by mouth as needed

**tetracaine**
- Availability . . . . . 0.5% ophthalmic solution
- Action . . . . . topical anesthetic
- Indication . . . . . severe eye pain; foreign body removal from the eye
- Contraindication . . . . . hypersensitivity

- Precautions. . . . . N/A
- Side effects. . . . . N/A
- Dose (Peds and Adult) . . . . . 2 drops to the affected eye

**trimethoprim/sulfamethoxazole (Bactrim®)**

- Availability. . . . . 160 mg TMP/800 mg SMX (DS tab); 40 mg/200 mg/5 mL
- Action . . . . . antibiotic
- Indication . . . . . sinus infection, upper respiratory infection, urinary tract infection
- Contraindication . . . . . hypersensitivity to sulfa
- Precautions. . . . . N/A
- Side effects. . . . . N/A
- Dose . . . . . Pediatric – 5 mg/kg TMP every 12 hours
  Adult – 1 DS tab po bid

# 15.43 Optional Supplemental Protocol – WILDERNESS EMS PROTOCOLS: Push Dose Epinephrine for WEMS (Optional)



1. **Pharmacology**
   Vasopressor medication – sympathomimetic catecholamine; Beta1, Beta2, and Alpha-adrenergic receptors; increases SVR, increases heart rate, increased myocardial contractility

2. **Pharmacokinetics**
   Onset of action: 1 minute
   Duration of action: 5-10 minutes

3. **Indications**
   a) Clinical findings of shock and concern that patient is pre-cardiac arrest AND
   b) SBP less than 90 mmHg, MAP less than 65 mmHg, or inability to palpate peripheral pulses

4. **Contraindications**
   Patients in cardiac arrest - see cardiac arrest dosing for epinephrine

5. **Precautions**
   Epinephrine comes in 0.1 mg/mL and 1 mg/mL concentrations. Check your concentration carefully prior to mixing.

6. **Dosage**
   a) To create epinephrine (10 **mcg**/mL) solution:
      (1) Mix 1 mL of epinephrine (0.1 mg/mL) in 9 mL of normal saline to make 10 **mcg**/mL in a syringe
      or
      (2) Mix 1 mL of epinephrine (1 mg/mL) in 100 mL of normal saline to make 10 **mcg**/mL, then withdraw 10 mL of this solution into a syringe.
   b) Administer 10-20 **mcg** (1-2 mL) of epinephrine of a 10 **mcg**/mL solution by slow IV push over 1 min. Repeat as needed every 3-5 minutes to maintain perfusion, systolic blood pressure greater than 90 mmHg, MAP greater than 65 mmHg, and palpable pulses.

1. **Pharmacology**
   Anti-fibrinolytic medication

2. **Pharmacokinetics**
   Onset variable; Peak effect: 2 hours; Duration: 10 hours

3. **Indications**
   Suspected hemorrhagic shock (SBP less than 90 mmHg) due to traumatic mechanism; Injury should have occurred within the past 1 hour and must have occurred within the past 3 hours.

4. **Contraindications**
   a) Patients less than 15 years of age
   b) Hypersensitivity or allergy to TXA
   c) Known arterial or venous thromboembolism (PE, DVT)
   d) Patients more than 3 hours from the time of injury

5. **Dosage**
   For patients 15 years of age and older:
   Administer 1 gram in 30 mL of approved diluent (NS, LR, or D5W) as a very slow IV/IO push over 8-10 minutes.

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# Research Protocol – CALCIUM AND VASOPRESSIN FOLLOWING INJURY EARLY RESUSCITATION TRIAL (CAVALIER) 16.1



**1. Purpose**

This is a multi-center, double-blind, prehospital and in-hospital phased randomized trial. The prehospital arm randomizes injured patients who are at risk of hemorrhagic shock to receive calcium gluconate or normal saline. The current participating sites include: Maryland State Police Aviation Command (prehospital) and R Adams Cowley Shock Trauma Center (in-hospital).

**2. Indications**

Injured patients who are 18-90 years of age, and meet one of the following criteria:

1. SBP less than or equal to 90 and HR greater than or equal to 108 at scene, outside hospital or during transport, OR
2. SBP less than or equal to 70 at the scene, outside hospital or during transport

**3. Contraindications**

a) Wearing "NO CAVALIER" opt-out bracelet or subject/family voices objection to the study
b) Age less than 18 or greater than 90 years
c) Known prisoner
d) Known pregnancy
e) Isolated fall from standing mechanism
f) Traumatic arrest with greater than 5 consecutive mins of CPR without ROSC
g) Brain matter exposed or penetrating brain injury
h) Submersion or hanging victims
i) Unable to obtain IV/IO access

**4. Procedure**

a) Administer 10 mL of study medication by the IV or IO route
Note: The paramedic will blinded as to which medication, calcium gluconate or normal saline, will be administered to the patient.
b) Provide all other indicated care per the *Maryland Medical Protocols for Emergency Medical Services*

# Research Protocol – PEDIATRIC SEIZURE STUDY: PEDIDOSE



**1. Indications**

**Research Protocol for use in Prince George's County only**

- Inclusion: Child 0 months-17 years of age with active seizure during EMS care
- Exclusion:
  - (1) Prior history of benzodiazepine allergy
  - (2) Known or presumed pregnancy
  - (3) Severe growth restriction based on paramedic assessment
- If patient meets any exclusion criteria, obtain medical consultation from a Pediatric Base Station.

**2. Seizure has stopped**

a) Identify and treat injuries.
b) Check blood glucose and treat per *Hypoglycemia* protocol. If blood glucose is less than 70 mg/dL, administer oral glucose paste (10-15 grams) between the gum and cheek. Administer single additional dose of oral glucose if not improved after 10 minutes.

**3. Active seizure**

a) Do not restrain the patient or place and device into the patient's mouth.
b) Protect the patient from injury.
c) Identify and treat potential underlying cause of seizure: epilepsy, head injury, hypoxia, hypoglycemia, hypoperfusion, infection (fever/stiff neck), stroke, alcohol or drug abuse or withdrawal, CVA, head injury.

**4. Active seizure**

**For a patient with ongoing seizure activity or recurrent seizure activity during EMS care:**

a) Administer *midazolam* with age-appropriate dosing per table below.
b) Do not delay *midazolam* to place an IV or obtain blood glucose.

| Age | First Dose mg | First Dose ml | Route | Second Dose |
|---|---|---|---|---|
| **0-5 months**<br><br>**or for patient that does not meet study criteria** | 0.2 mg/kg<br>**OR**<br>Max dose 5 mg | NA | IN/IM*<br>*Preferred | **Medical Consultation REQUIRED<br>Total max dose 5 mg |
| | 0.1 mg/kg<br>Max dose 5 mg | | IV/IO<br>Slow IVP over 1-2 minutes | |
| **6-16 months** | 1.25 mg | 0.25 ml | IN/IM | 1.25 mg |
| **17 months-5 years** | 2.5 mg | 0.5 ml | IN/IM | 2.5 mg |
| **6-11 years** | 5 mg | 1 ml | IN/IM | 5 mg |
| **12-13 years** | 10 mg | 2 ml | IN/IM | 10 mg<br>**Medical Consultation REQUIRED |
| **14-17 years**<br><br>MIEMSS *Pediatric Seizure* protocol | 0.2 mg/kg<br>Max dose 5 mg<br>**OR** | NA | IN/IM*<br>*Preferred | **Medical Consultation REQUIRED; Total max dose 5 mg |
| | 0.1 mg/kg<br>Max dose 5 mg in 2 mg increments | | IV/IO<br>Slow IVP over 1-2 minutes | |
| **18 Years of Age and Older – See MIEMSS *Adult Seizure* protocol** | | | | |

If age unknown, use Handtevy app to estimate age:

a) **Airway and vital signs must be closely monitored after *midazolam* administration.**
b) **Initiate *oxygen* per protocol, cardiac monitoring, continuous $ETCO_2$, and pulse oximetry. Maintain all monitoring until transfer of care at the hospital.**
c) Check blood glucose (after the first dose of *midazolam* administered)
d) Children who require *midazolam* administration by EMS should be transported to a Pediatric Resource level facility or higher. If feasible, transport patient to Children's National Medical Center or Children's National at UMC location.

• See table above regarding need for medical consultation.
• Obtain medical consultation from the Children's National Medical Center Base Station.

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