FOR THE DELIVERY OF PREHOSPITAL MEDICINE

2025

Version 1.6

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Acknowledgements

The Patient Care Guidelines (PCGs) in this document are written to direct the prehospital emergency medical care provided by participating Fire Department and EMS providers within the Parishes of Livingston, St. Charles, St. Helena, St. Tammany, Tangipahoa, Terrebonne, and Washington. While *protocols* have been traditionally utilized in prehospital care, the authors of this document have specifically moved away from the term *protocol* to *guideline*. The guidelines are the framework for medical decisions when caring for our patients within Southeast Louisiana. The treatment of our patients in the field is complex and ever-changing in the medical literature. Variations from the guidelines may be appropriate based on the clinical presentation and acuity of the patient. Prehospital practitioners should always act in the best interest of the patient given the resources available. Destination determinations will vary based on the geographic location of the service and patient needs.

The most current version of the Southeast Louisiana Patient Care Guidelines can be found at SELAPCG.com. Questions regarding specific patient care guidelines may be sent via email to Admin@SELAPCG.com.

A special thanks to those who put many long hours into the creation of this document:

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Southeast Louisiana Patient Care Guidelines

This document is designed to serve as a guide for transporting and non-transporting Fire/EMS agencies operating within Livingston, St. Charles, St. Helena, St. Tammany, Tangipahoa, and Washington Parishes. This document incorporates evidence-based guidelines and proven medical practices for providing cutting-edge prehospital patient care. While it is impossible to address every possible variation of disease and/or traumatic injury, these patient care guidelines provide a foundation for treatment of the vast majority of patients we encounter. Certainly, education, experience, and clinical judgment will assist us while we provide the highest quality of prehospital patient care. As always, on-line medical control is available for those patients with a chief complaint or condition that does not fall within the scope of this document. Although practices continue to evolve in years to come, the patient's outcome will always be the main focus.

Medical Control Orders

Treatment options found in gray shaded boxes containing **RED** text are only to be performed with the approval of Medical Control. Listed below are several reasons for which Medical Control **must** be contacted:

- As clinically indicated and in accordance with the operating procedures of your employer
- As indicated in the On-Scene Physician policy
- At any point within these guidelines as it may be indicated
- If a line of treatment is in question or becomes unclear
- Prior to administration of medications without standing orders
- Prior to performance of any advanced skill(s) as specifically stated in the appropriate guideline
- To confirm a patient's death (medical or traumatic) and for field termination of cardiac arrest

Medical Control should be contacted for orders as indicated within the COG or when medical direction is desired by the EMS practitioner.

Standing Orders

Standing orders are designed for paramedics to initiate advanced care without contacting Medical Control. Standing orders are listed in **GREEN** text boxes within each guideline. Green text boxes are considered the standard of care for all EMS providers working in the prehospital environment.

Advanced Practice Guidelines | Medications | Procedures

Guidelines, medications, or procedures that are found within an **ORANGE** text box or within the orange section (Advanced Practice Guidelines) of the Region 9 COG are authorized as Paramedic/AEMT Led clinical guidelines. These medications and procedures are considered to be optional and must be approved by the agency's Medical Director. Appropriate education, training, and medical oversight shall be the responsibility of the agency's Medical Director. Evidence of written authorization from the agency's Medical Director will be required for paramedics to perform the following procedures:

- Advanced Resuscitation Cardiac Arrest Guidelines
- TXA, blood or blood product administration
- Rapid sequence intubation/airway
- Delayed sequence intubation/airway
- Finger thoracostomy

Special Response Guidelines

Guidelines found within the **YELLOW** section within the COG are to be utilized at the discretion of the agency and Medical Director. These guidelines are optional. Appropriate education, training, and medical oversight shall be the responsibility of the agency's Medical Director.

EMR | EMT | AEMT | Medication Administration

Any EMT/EMR/AEMT may perform any procedure or administer any medication found within the COG that is listed within their corresponding scope of practice as outlined in the "Louisiana Bureau of EMS: Approved Scope of Practice Matrix for Licensed EMS Practitioners" and/or the SELA PCG Scope of Practice Acknowledgement Document, and as approved by the agency's Medical Director.

Scope of Practice Labeling

Labels which indicate the scope of practice can be found throughout the COG to reflect the minimum scope of practice required to perform an intervention, skill, or medication administration. It is up to the agency and clinicians to understand how these labels apply to local adoption and practice. Although some boxes may be labeled as EMR & Paramedic simultaneously, the contents of the box which applies to the minimum scope should be understood by applicable prehospital clinicians prior to engaging in patient care. The SELA PCG Scope of Practice Acknowledgement Document should be evaluated by every agency and their medical direction which will guide their personnel in how prehospital medicine will be delivered and practiced within their department.

Physician On-Scene Policy

A. Protocol for a Physician Who Is First to Arrive on the Scene of an Emergency:

1. The Good Samaritan Statute applies. The Physician on scene can choose to treat the patient with protection from liability as stated by the law.
2. Upon arrival of an EMS practitioner, the physician has three options:
    I. To allow the EMS practitioner to assume full authority for directing patient care; the physician will not have any risk of liability for abandonment in this situation.
    II. To assist the EMS practitioner in patient care without assuming authority or directing said patient care.
    III. To express his/her desire to assume full authority for directing patient care; the physician must agree to follow the criteria in Section B.

B. Protocol for Physicians Assuming Care of Patient at the Scene of a Medical Emergency

1. Indications: When a physician is at the scene of a medical emergency and wishes to assume authority for directing patient care.

2. Policy: Patient care is established by prehospital clinical operating guidelines and on-line Medical Control physicians. It is not, however, meant to interfere with an established physician-patient relationship. By law, EMS practitioners provide prehospital care under the license of a Medical Director and/or according to the guidelines approved by a parish medical society. They may additionally receive direction via on-line Medial Control from an Emergency Department physician as needed. If responsibility for patient care is transferred to a physician at the scene, that physician becomes responsible for any care given and must accompany the patient to the hospital. Furthermore, the physician accepting this responsibility must sign an agreement to assume patient care and the patient's prehospital medical record.

3. Procedure: EMS practitioners shall treat all on-scene physicians with respect and shall endeavor to work in cooperation with an on-scene physician for the patient's best interest.

- If a physician desires to assist the EMS practitioner in patient care without assuming full authority, the EMS practitioner should explain to the physician that their assistance is appreciated but that State Law requires EMS personnel to comply with local protocols and/or established Medical Control with the base hospital physician.

- If the on-scene physician wishes to assume responsibility for the direction of patient care, the EMS practitioner should ask the physician to show his/her Louisiana State Board of Medical Examiners license as verification of his/her identity as a physician.

- The EMS practitioner should establish contact with Medical Control. After advising the Medical Control Physician (MCP) of patient information, the EMS practitioner should inform the MCP that a physician is present and identify the physician. The EMS practitioner will then place the physician in contact with the on-line MCP so that the two physicians can discuss patient treatment and authority over patient care.

- On-scene physicians who accept Medical Control and the responsibility for the direction of patient care must:
    - Agree to full medical and legal responsibility
    - Accompany the patient to the hospital
    - Sign the EMS patient care report indicating that they have accepted responsibility for patient care and any medical orders given.

- EMS personnel shall only accept orders from the on-line MCP, unless informed by the MCP that Medial Control is being transferred to the on-scene physician. The EMS practitioner should make their agency's equipment, supplies, and ambulance available to the on-scene physician for patient care. If Medial Control is transferred to the on-scene physician, the EMS practitioners may follow orders that are within their scope or practice.

- If at any time the on-scene physician's orders become questionable, are contrary to established Region 9 Clinical Operating Guidelines, or if interfere with patient care, the EMS practitioner should immediately re-establish contact with the on-line MCP for guidance before any further action is taken. In any case of conflict, the MCP's orders shall prevail.

Routine Medical Care

This Guideline is intended for ANY patient encounter where an assessment is performed. Assessment tools are grouped into two tiers, a primary survey and a secondary survey. A primary survey should be acquired and documented on every encountered patient. A secondary survey is an expanded group of assessment tools the clinician may use as clinically indicated dependent upon patient presentation, condition, chief complaint, or procedures and treatments rendered

Fundamental Guidance

- Ensure scene safety and BSI/PPE precautions [1]
- Bring **Oxygen,** BLS, & ALS equipment [2] to the patient
- Assess ABC's and ensure proper positioning of the patient
- Take appropriate spinal precautions [3]

Primary Survey

- **AVPU Scale**
- **Blood Pressure**
- **Heart Rate**
- **Respiratory Rate and Quality**
- **Pain Scale**

Secondary Survey

- **Glasgow Coma Scale:** Any patient presenting with altered mental status, neurological insult, or patient who experienced a significant traumatic event
- **SpO_2:** Patients presenting with any alteration of normal breathing or suspected of a hypoxic injury, patients receiving any respiratory drive altering medications, airway interventions, or patients who have experienced a significant traumatic event
- **$EtCO_2$:** Any patient with any advanced airway interventions, acid base disruptions, circulatory or metabolic disruptions or receiving respiratory drive altering medications
- **Capillary Blood Glucose:** Any patient that presents with altered mental status, suspected stroke, shock, dizziness, syncope, near syncope, seizure, weakness, or loss of consciousness.
- **Temperature:** Any patient exposed to extreme environmental conditions, suspected infectious process, altered mental status or seizure
- **SpCO:** Any patient who presents with known or suspected exposure to carbon monoxide
- **EKG Monitoring:** Patients who present with a possible respiratory or cardiac complaint, significant traumatic injury, or whom are receiving any medication or treatment that have cardiac altering effects
- **12-Lead EKG Assessment:** Patients with a respiratory and or possible cardiac complaint (may be acquired by EMTs, and interpreted by Paramedics or Prehospital RNs.
- **Orthostatic Vitals:** Any patient whom is suspected of dehydration or non traumatic hypovolemia when appropriate

EMR EMT

Airway Management -AND/OR- Oxygen Therapy[4] as clinically indicated and in accordance with the **Airway Management Guideline**

EMR

Crystalloid Fluid IV or **Saline Lock** as clinically indicated

AEMT

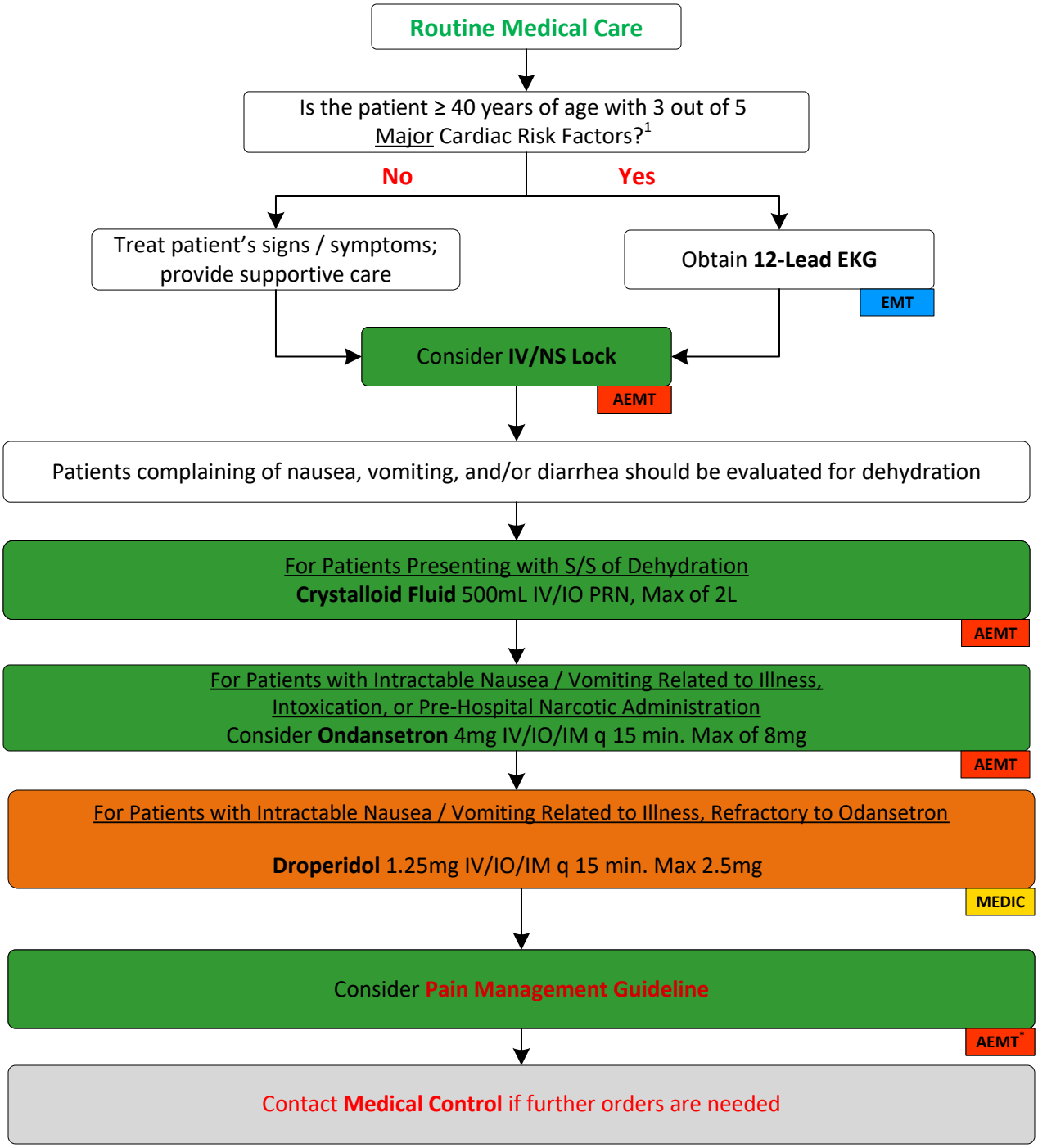
Continue Treatment as per **Appropriate Guideline(s)**
(a patient may fall under multiple clinical guidelines simultaneously)

As scene safety and scene conditions allow, all routine medical care and initial treatment should be completed prior to moving the patient to the ambulance.

[1] Body substance isolation (BSI) precautions include eye protection, face mask, gloves, etc.
[2] Advanced airway equipment, suction, EKG monitor, and departmental-issued ALS gear to include the patient stretcher, if available.
[3] According to **Spinal Motion Restriction Guideline**.
[4] **Oxygen** Flow Rates:

- Conventional Nasal Cannula, 1-6 L/min
- High Flow Conventional Nasal Cannula: ≥5 y/o, 15 L/min; ≤ 5 y/o, 10 L/min; ≤ 1 y/o, 5 L/min titrated to effect
- High Flow ≥ 15 L/min NRB, or BVM

Acute Abdominal Pain & Nausea | Vomiting



[1] Major and Minor Cardiac Risk Factors are defined in the **COG Appendix**.

- Patients < 40 years of age complaining of abdominal pain who:
  - Have a soft and non-tender abdomen
  - Are without fever
  - Have stable vital signs
  - Are not complaining of nausea, vomiting, and/or diarrhea

  Generally will not require advanced treatment
- Elderly patients with hypotension and/or with major cardiac risk factors should be evaluated for possible Abdominal Aortic Aneurysm (AAA) with dissection and STEMI.
- Pregnancy (including ectopic) should be considered in females of childbearing age.
- As per **Routine Medical Care**, a detailed OPQRST / SAMPLE (defined in the **COG Appendix**) history should be obtained. Examples of specific questions to include: last BM, blood in stool, frequency of urination, pain with urination, hernia etc.

Adrenal Insufficiency |Crisis

Primary Adrenal Insufficiency
- Addison disease
- Sepsis
- Congenital adrenal hyperplasia

Secondary Adrenal Insufficiency
- Asthma
- COPD
- Rheumatoid arthritis
- Organ transplant
- Chronic steroid use

Routine Medical / Trauma Care

↓

Consider
Diabetic Emergency Guideline
As clinically indicated

↓

Consider
Shock Guideline
As clinically indicated

↓

Consider Stress-Dose Steroids
- Patients with hypotension refractory to **Crystalloid Fluid** and/or **Vasopressors**
- History of adrenal insufficiency and any of the following S/S:
  - Shock
  - Fever and ill appearing
  - Multisystem trauma
  - Burns >5% TBSA
  - Environmental Hypothermia
  - Environmental Hyperthermia
  - Vomiting/diarrhea with evidence of dehydration
  - Altered mental status

↓

Stress Dose Steroids[1]
Hydrocortisone (Solu-Cortef) 100mg IV/IO/IM
-OR-
Methylprednisolone 125mg IV/IO/IM
-OR-
Dexamethasone 10mg IV/IO/IM

AEMT*

↓

Contact **Medical Control** for additional orders or consultation

Adrenal insufficiency patients may have a primary or secondary history of long-term steroid use.

Administration of steroids may be lifesaving in these patients.

[1] Patients that present with their own steroid medication may have their medication utilized by paramedics for emergency administration including Hydrocortisone (Solu-Cortef). If the patient's medication is unavailable or unusable, **Methylprednisolone** or **Dexamethasone** may be given. Hydrocortisone (Solu-Cortef) is preferred due to its dual glucocorticoid and mineralocorticoid effects.

Airway Management

Patient Can Self Ventilate | Is Able To Oxygenate

Administer **Oxygen** as appropriate and clinically indicated to maintain SpO_2 of ≥ 94%

Is the patient maintaining oxygenation?

YES → Refer to: **Routine Medical Care**

NO → Refer to: **Can Ventilate | Cannot Oxygenate**

Patient Can Self Ventilate | Cannot Oxygenate

(EX: Asthma, CHF, COPD, Generalized Hypoxia, Pulmonary Embolus)

- Assist patient's ventilations via BVM (PPV as tolerated) to maintain a SpO_2 ≥ 94%
- Insert NPA or OPA as tolerated
- Suction as needed
- Monitor $EtCO_2$

EMR

Is patient being oxygenated? Respiratory distress decreasing?

YES → Maintain current **Oxygenation** techniques and return to **Routine Medical Care**

NO → If Patient Is Unconscious
Refer to: **Can't Ventilate | Can Intubate Guideline**

Consider Nasal Intubation

- **Midazolam**[1] 2.5mg IV/IO/IN/IM to reduce anxiety prior to intubation if needed
- Continue to assist ventilations (**Pre-Oxygenate**)
- **Insert NPA** if not already in place (right nare is typically larger)
- Attach BAAM® to ETT, prepare capnography
- Briefly explain the procedure to the patient including the importance of deep inspiration
- Advance lubricated ETT through nasopharynx and into the oropharynx
- Upon deep inspiration listen for the change in pitch from the BAAM® and advance the ETT

MEDIC

Post Intubation Sedation
Refer to: **Can't Ventilate | Can Intubate Guideline**

Maintain current **Oxygenation** techniques and return to **Routine Medical Care**

[1] Additional options for **Benzodiazepines** may be found in the **COG Appendix**.

- Confirm tube placement using traditional methods (lung & epigastric auscultation) in addition to qualitative or quantitative capnography.
- Maintain appropriate oxygenation and ventilation of patient.
- Initiate $EtCO_2$ monitoring for all intubations.

Airway Management

Can't Ventilate | Can Intubate

- Insert **OPA** or **NPA**
- **Pre-Oxygenate** for 2 min. with BVM & prepare for **Endotracheal Intubation**[1]
- Consider **Apneic Oxygenation** (NC 15L/min) during **Pre-Oxygenation** and **Intubation**
- Consider **Suctioning** of the patients airway prior to any **Intubation** attempt

<u>Endotracheal Intubation</u>

- Remove **OPA** and **Intubate** the trachea within 30 seconds
- Visualize **Endotracheal Tube** passing through the vocal cords

<u>Confirm ETT Placement</u>

- **$EtCO_2$ Capnography** (Quantitative) **-AND/OR- $EtCO_2$ Detector** (Qualitative)
- Auscultation of lungs with equal chest rise/fall
- Absence of epigastric sounds

Successful Intubation?

YES

- Secure the **Endotracheal Tube** with a commercial device
- Reconfirm **Endotracheal Tube** placement and continuously monitor **$EtCO_2$ Capnography -AND/OR- $EtCO_2$ Detector**
- Measure and apply **Cervical Collar** to patient

Maintain Advanced Airway Techniques

<u>Post Intubation Sedation (if needed)</u>

Fentanyl 25-50mcg IV/IO q 2 min. PRN, Max of 200mcg[4]

-AND/OR-

Midazolam 5mg IV/IO/IN/IM q 2 min. PRN, Max of 20mg

-AND/OR-

AEMT

Ketamine 1mg/kg slow IV/IO push q 15 min. PRN

-OR-

Ketamine Infusion 1 mg/kg IV/IO then 0.5-2mg/kg/hr

-OR-

Fentanyl Infusion 0.5-2mcg/kg IV/IO then 0.5-2mcg/kg/hr

MEDIC

NO

- Reinsert **OPA** & **Pre-Oxygenate**[3] patient for 1-2 min.
- **Intubate** the trachea within 30 seconds while using the ETT introducer (bougie)
- Max of 2 **Intubation** attempts[2]
  (One attempt on scene for trauma patients)

<u>After 2nd Unsuccessful Attempt</u>

- Reinsert **OPA** & **Pre-Oxygenate** pt for 2-3 min.
- Proceed to **Supraglottic Airway Device**

Insert **Supraglottic Airway Device** and secure according to the manufacturer's guidelines; confirm placement with **Continuous $EtCO_2$ monitoring**

EMT

Return to:
Routine Medical / Trauma Care

[1] Ensure the following tools are available prior to **Endotracheal Intubation**: 10mL syringe, stylet, $EtCO_2$ detector, ETT introducer (bougie), stethoscope, commercial tube restraint, $EtCO_2$ capnography.

[2] An **Intubation** attempt has been made once the distal tip of the endotracheal tube passes the teeth.

[3] **Pre-Oxygenation** is achieved with one ventilation every 3-4 seconds or SpO_2 near 100%.

[4] Consider **Opiate** administration for **Post Intubation Sedation** prior to **Benzodiazepine** administration. See **COG Appendix** for alternative **Opiate** and **Benzodiazepine** options.

- Initiate continuous $EtCO_2$ monitoring for all managed airways.
- Consider **Ondansetron** 4mg IV/IO to decrease aspiration risk prior to any advanced airway placement (excluding cardiac arrest).

Airway Management

Can't Intubate | Can't Ventilate

Reinsert **OPA** and attempt to oxygenate and ventilate
If unable to ventilate the patient →
Prepare for **Needle -OR- Surgical Cricothyrotomy**

Needle Cricothyrotomy

- Locate the cricothyroid membrane & clean with alcohol preps or betadine if available
- Attach a 14g Jelco to a 10mL syringe
- Insert needle through cricothyroid membrane 45° in a caudal direction (toward the feet) aspirating during insertion
- Once air is freely aspirated (usually following a "pop" of penetrating the cricothyroid membrane) advance the catheter into place and secure manually
- Attach a 3.0mm ETT adapter into the catheter hub
- Oxygenate with either BVM or 100% O_2 jet insufflator

MEDIC

Surgical Cricothyrotomy / Surgical Airway

Refer to: Department Clinical Policy

MEDIC*

Consider Post-Intubation Sedation
Refer to: **Airway Management Guideline**

Transport rapidly to the nearest Emergency Department for definitive airway management if needed

Routine **Medical** / **Trauma Care**

Allergic Reaction | Anaphylaxis

Routine Medical Care

Severity of Reaction

Mild

Diphenhydramine 50mg IV/IM
MEDIC

Moderate

Diphenhydramine 50mg IV/IM
MEDIC

Methylprednisolone 125mg IV/IM
MEDIC

Severe

Epinephrine 1:1000
0.3mg – 0.5mg IM
(Thigh is preferred site)
May repeat x 1 in 5 min.
EMT*

Diphenhydramine 50mg IV/IO/IM
MEDIC

For BP ≤ 90-100mmHg
Crystalloid Fluid 1-2L IV/IO
AEMT

Methylprednisolone 125mg IV/IO/IM
MEDIC

Push Dose Epinephrine
5-20mcg (0.5-2mL) IV/IO
q 3-5 min. PRN, Max of 100mcg
MEDIC

Epinephrine Infusion
2-30mcg/min. IV/IO
Refer to: **Shock Guideline**
MEDIC

- Mild – Rash, generalized itching (pruritus), and hives (urticaria) excluding the face.
- Moderate – "Mild" category + SBP > 90mmHg, angioedema without airway compromise, urticaria, and pruritus to the face with or without minor wheezing.
- Severe Reaction – Systolic BP < 90mmHg with respiratory compromise, angioedema, and wheezing.

- Consider anaphylaxis when two or more body systems (cutaneous, respiratory, cardiovascular, neurologic or GI) are involved. Cardiovascular & respiratory systems may not always be involved in anaphylaxis.
- Anyone c/o difficulty swallowing and/or dyspnea should receive a steroid.
- Anyone presenting with wheezing/stridor or breathing difficulty should receive Epi 1:1000 IM.

- Consider immediate **IM Epinephrine** prior to IV/IO access in critically ill patients. Administration to the thigh yields the fastest absorption. Use either the vastus lateralis or the rectus femoris IM site.
- Treat any wheezing or "chest tightness" as indicated in **Reactive Airway Disease Guideline**.
- Patients who take β-blockers have an increased risk for a severe reaction; it is possible for these patients to have a paradoxical response to **Epinephrine**. The use of **Ipratropium Bromide** is recommended for these patients.
- A dystonic reaction (to Phenothiazines) is an adverse reaction NOT an allergic reaction. Patients may receive **Diphenhydramine** 50 mg IV/IM.
- Treat hypotension with **Crystalloid Fluids** in the absence of pulmonary edema.

Altered Mental Status

Routine Medical / Trauma Care

Assess Patient; if possible, obtain baseline LOC

Hypoxia
Refer to:
Airway Management Guideline

CBG < 60mg/dL **-OR-** > 250mg/dL
Refer to:
Diabetic Emergency Guideline

For Patient and Clinician Safety / Uncontrollable Patient
4 Point Soft Restraints
-AND/OR-
Chemical Restraints[1]

EMT | MEDIC

Consider differential diagnosis and treat accordingly

Electrolyte/Metabolic Disturbances

- Hypercalcemia (calcium)
- Hypocalcemia
- Hyponatremia (sodium)
- Hypernatremia
- Hypomagnesemia (magnesium)
- Hepatic Failure (hepatic encephalopathy)
- Alcohol Withdrawal/Delirium Tremens

Infection

- Remember BSI

Meningitis

- S/S: ↑Fever, ↓LOC, stiff neck, fatigue, photosensitivity
- -RMC, determine onset (usually < 2 days), temp, supportive care place mask on patient

Encephalitis/Cerebritis
(inflammation of brain)

Poisoning

- ABC's (RMC) → **Contact Poison Control Center** as needed (800-222-1222)

Carbon Monoxide

- SpO_2 will not reflect hypoxia
- S/S: N/V, headache, papilledema, fatigue, cyanosis and/or ↓LOC
- **TX: NRB 15L/min; NS IV**; titrate to hemodynamic stability → Carbon Monoxide Guideline

Medical

- Stroke →**Stroke Guideline**
- Cardiac Dysrhythmia→ **Appropriate Cardiac Guideline**
- Environmental→ **Hypothermia -OR- Hyperthermia Guideline**

Psychiatric

- -RMC / RTC →**Behavioral Emergency Guideline -OR- Excited Delirium Guideline**
- -RMC / RTC →**Drug Overdose Guideline** for suicide attempt
- Exacerbations of Bipolar Disorder (mania, profound depression); Schizophrenia
- Severe anxiety

Thyrotoxicosis – Hyperthyroidism

- S/S → hyperactivity, weight loss, tremors, diaphoresis, myopathy, N/V, polyuria, fatigue, palpitations, and/or anxiousness

TX: RMC, Consider **Benzodiazepines - Med Control**

Trauma

- -RTC → **Trauma Activation Criteria** as needed

Head Injury / Suspected Intracranial Hemorrhage

- Hypovolemia -**Crystalloid Fluid**
- Hypotension -**Crystalloid Fluid;** consider permissive hypotension in penetrating/blunt trauma (90mmHg SBP)

- **A**lcohol →**Drug Overdose Guideline**
- **E**pilepsy →**Seizure Guideline**
- **I**nsulin →**Diabetic Emergency Guideline**
- **O**verdose →**Drug Overdose Guideline**
- **U**remia →**Routine Medical Care**
- **T**rauma →**Trauma Activation Criteria**
- **I**nfection →**Sepsis Guideline**
- **P**sych →**Excited Delirium Guideline**
- **S**troke →**Stroke Guideline**

[1] **Four Point Restraints** may be used when necessary for the safety of the patient, EMS crew, and bystanders. Uncontrollable patients may be **Chemically Restrained** as per the **Behavioral Emergency Guideline -OR- Excited Delirium Guideline**. **Four Point Restraints** may be applied by a EMT, while **Chemical Restraints** can only be administered by a paramedic.

- When trauma is known or suspected refer to the **Spinal Motion Restriction Guideline**. Patients with an altered mental status cannot be clinically cleared from spinal motion restriction.

Behavioral Emergency | Combative Patient

- Consider your safety first: **Physical Restraints** should be utilized with assistance from Law Enforcement when available
- Consider all possible medical/traumatic etiologies in your differential diagnosis: hypoxia, post-ictal state, overdose, head injury, hypoglycemia, etc.
- Remove patient from stressful environment promptly and utilize verbal reassurance and calming techniques

Possible Causes of a Behavioral Emergency

- Drug withdrawal
- Hypoxia
- Postictal state
- Head trauma
- Depression
- Low blood sugar
- Overdose on stimulants
- Overdose on hallucinogenic drugs
- Psychiatric patient non-compliant with medications
- Psychosis

Routine Medical / Trauma Care

↓

Verbal reassurance, calming techniques, and establish rapport with patient

↓

Consider:
Applying 4 Point Restraints;
If Possible

EMT

Signs and Symptoms

- Anxiety, agitation, confusion
- Affect change, hallucinations
- Delusional thoughts, bizarre behavior
- Combative / violent behavior
- Expression of suicidal / homicidal thoughts

Agitation

Sedation[1]
Midazolam 2.5mg IV/IO/IN/IM q 2 min. PRN, Max of 10mg
-OR-

AEMT*

Droperidol 2.5mg IV/IO
-OR-
Droperidol 2.5-5mg IM

MEDIC

Severe Agitation

Sedation
Ketamine 4mg/kg IM, Max of 400mg

MEDIC

Emergence Hallucinations / Agitation
Midazolam 2.5mg IV/IO/IN/IM PRN

MEDIC

- **Monitor ETCO2**
- **O2 therapy as needed**
- **Assess CBG**
- **EKG**
- **Temperature**

AEMT* MEDIC

Contact **Medical Control** if additional sedation is needed

High Body Temperature is a key finding in predicting a high risk of sudden death. Another key symptom to the onset of death while experiencing a behavioral emergency is "Instant Tranquility." This is when the patient who had been very violent and vocal suddenly becomes quiet and docile while seated in the car or at the scene.

[1] See **COG Appendix** for additional options for **Benzodiazepines and Antipsychotics**.

- Ensure proper positioning of the patient to avoid positional or compression asphyxia. No person should be restrained or compressed in a position that may restrict the airway for any extended period of time.
- Utilize **Physical -AND/OR- Chemical Restraints** as needed for patient and staff safety.
- Law Enforcement should accompany EMS to the hospital if available.
- Use of **Benzodiazepines** in behavioral emergencies should be titrated to relief of agitation and alleviation of physical symptoms including but not limited to: combativeness, diaphoresis, tachypnea, and tachycardia (heart rate goal < 110).
- Care should be given to post-sedation vital sign monitoring (with special attention to EKG rhythms), pulse oximetry, capnography, and maintenance of airway.
- Patients should be transported to the closest appropriate hospital for evaluation and stabilization.

Diabetic Emergency

Routine Medical Care
Including **Temperature**

↓

Assess Blood Glucose

↓

CBG ≤ 60mg/dL

↓

Oral Glucose 15g-30g PO[1]
-OR-
Dextrose 10% 12.5g – 25g IV/IO[3]
-AND/OR-
Dextrose 50% 12.5g – 25g IV/IO[1]

EMR* | AEMT | MEDIC

↓

Repeat **CBG** PRN
Treat Accordingly

↓

Contact **Medical Control**
if further orders are needed

CBG > 250mg/dL
with S/S of DKA[2]

↓

Crystalloid Fluid 1000mL IV/IO

AEMT

↓

12-Lead EKG (Hyperkalemia/ACS Screening)

↓

Reassess patient
Evaluate for S/S of fluid overload

↓

Additional **Crystalloid Fluid** 1000mL IV/IO

AEMT

↓

Additional **Crystalloid Fluid** for extended transports as ordered by **Medical Control**

<u>Common S/S Associated with DKA</u>

- Abdominal pain or cramping
- Altered LOC
- Blood Sugar > 250 mg/dL[2]
- Complaints of being thirsty / polydipsia
- Deep rapid respirations (Kussmaul respirations) with or without an acetone odor to breath
- Dyspnea
- Flushed / dry skin, <u>dehydration</u> (dry mucous membranes, skin tenting, infrequent urination)
- Frequent urination
- Headache or double vision
- Ill-appearing
- Muscle wasting or weight loss
- Nausea / vomiting
- Rapid weak pulse

<u>Common Causes of DKA</u>

- Acute infection
- Insufficient insulin intake
- Non-compliance
- Undiagnosed Type 1 Diabetes

<u>Alcoholic Ketoacidosis</u>

- Chronic alcohol use results in no carbohydrate substrate.
- Glucose may be low, normal or very occasionally, slightly elevated
- Patients appear ill like DKA
- Prehospital treatment is **Crystalloid Fluids**

[1] Provided there is no risk of aspiration or airway compromise related to the patient's mental status, oral carbohydrates along with **Oral Glucose** products may be used in the place of IV/IO **Dextrose**. This includes the use of products found in the patient's home. Capillary glucose levels < 60 mg/dL in patients presenting with an altered mental status who are unable to maintain their own airway can receive IV **Dextrose** under standing orders. An EMT may administer **Oral Glucose** according to the above guidelines.

[2] A blood sugar > 250mg/dL <u>does not</u> mean the patient is in DKA. A CBG of 250mg/dL alone is only indicative of hyperglycemia. Vomiting with hyperglycemia may be a relative indication of acidosis and likely significant of dehydration.

[3] To make **Dextrose 10%**: Dilute 50mL **Dextrose 50%** in 200mL of **NS** = 250mL of **Dextrose 10%**. Titrate to effect.

- Sulfonylureas (e.g. glyburide, glipizide) have long half-lives ranging from 12-60 hrs. Patients with corrected hypoglycemia who are taking these agents are at particular risk for recurrent symptoms and frequently require hospital admission.

Do Not Attempt to Resuscitate (DNAR)

Assess Patient

↓

Resuscitation Should Not Be Attempted In The Following Situations Prior to Contacting **Medical Control**

- Advanced stages of body decomposition, decapitation, hemi-corpectomy, or incineration

↓

Contact **Medical Control** for **DNAR** and **Time of Death**

EMT*

↓

Resuscitation Should Not Be Attempted In The Following Situations Prior to Contacting **Medical Control**

- Lividity
- Rigor Mortis
- Body decomposition, decapitation, hemi-corpectomy, or incineration
- Any reason to believe **CPR** is not indicated or desired, especially in the presence of a known terminal illness.
- Presence of legal documents (Physician Orders for Life Sustaining Treatment (POLST), Advanced Directives, Living Wills, or DNR) stating resuscitative efforts be withheld.

↓

Necessary Assessment Findings

- Asystole **EKG**[1] strip in at least two leads, which must be included in the Patient Care Report.

Examine and Document Findings On-Scene

- Patient medications
- Known medical history
- Last time patient was spoken to or known well time
- Patient position and location
- Skin tempurature
- Pupils
- Presence of obvious trauma or deformity
- Unusual findings or circumstances

↓

Contact **Medical Control** for **DNAR** and **Time of Death**

AEMT*

[1] EKG electrodes may be placed posteriorly or on limbs when necessary. Every effort possible should be made to preserve a crime scene.

- If EMS arrives to find **CPR** in progress on a patient who is clearly deceased or a patient who meets DNAR criteria, CPR can be stopped with orders from **Medical Control**.
- For traumatic DNAR, see the **Adult Traumatic Prehospital Termination of Resuscitation Guideline**.

Drowning

Routine Medical / **Trauma Care**

If mechanism exists, evaluate the need for **Spinal Motion Restriction Guideline**

Once the patient is out of the water or in shallow water, open the patient's airway and evaluate respiratory function

Respiratory Distress

Support respiratory function as needed
Refer to: **Airway Management Guideline**

If Fluid is Auscultated in Lungs
CPAP 5-10cmH_2O PEEP
-AND-
Albuterol 5mg Nebulized PRN[1]
-Also Consider-
Continuous Albuterol 20mg Nebulized

EMT

Contact **Medical Control** if further orders are needed

Respiratory / Cardiac Arrest

Treatment Priorities

- Deliver two rescue breaths if the patient is not breathing; this can be done while in the water
- Once patient is out of the water, begin **CPR** and apply defibrillation pads to the patient's dry chest
- Provide early, aggressive airway management with intubation
- Follow appropriate **Pulseless Arrest Guideline**

EMR

Contact **Medical Control** if further orders are needed

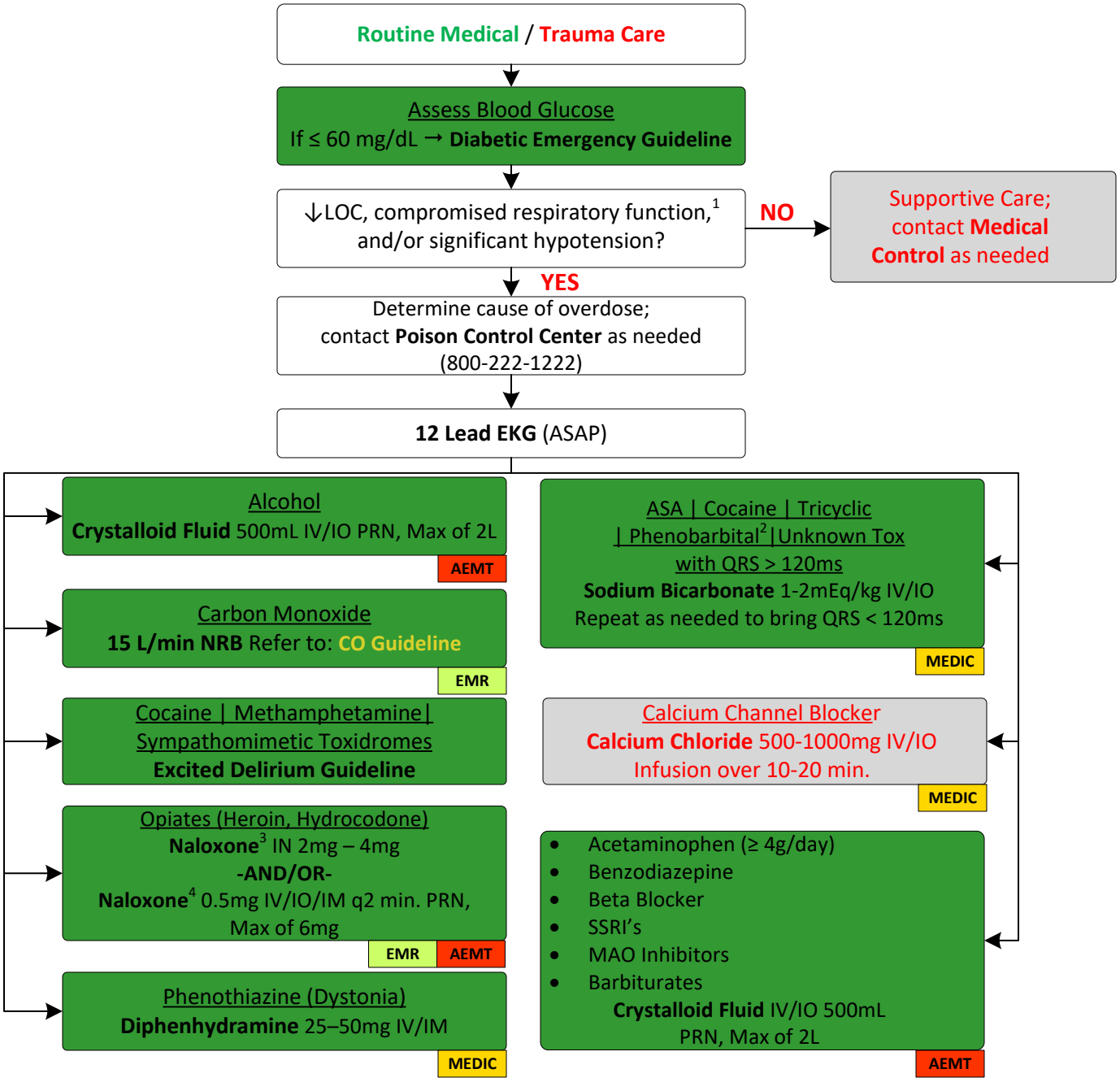
If BVM Ventilation is Required
Consider utilizing a **PEEP Valve** set at 5-10cmH_20, as needed

When treating drowning victims, addressing submersion-induced hypoxia remains an immediate focus in the American Heart Association's 2015 updates. Attention should be placed on oxygenation and ventilation; therefore, **CPR** for drowning victims should follow the traditional A-B-C approach to cardiac arrest care as opposed to the newer C-A-B approach.

[1]EMTs may administer a total of 10mg of **Albuterol**, Max

- If water temperature > 43°F (6°C), initiate resuscitation in persons who have been submerged for < 30 minutes.
- Paramedics should use sound clinical judgement when deciding if resuscitation efforts should be initiated, including but not limited to water temperature, length of submersion, and any associated trauma. If there is any doubt or if the events leading to the submersion are unclear, it is recommended that resuscitation be initiated and the victim be transported to an ED unless there is obvious death (i.e. rigor mortis, decomposition, decapitation, or lividity).
- Unnecessary **Spinal Motion Restriction** can impede adequate opening of the airway and delay delivery of rescue breaths. Routine **Spinal Motion Restriction** in the absence of circumstances that suggest a spinal injury is not recommended.

Drug Overdose



[1] SpO_2 < 94%, shallow respirations, unable to maintain airway, respiratory rate ≤ 10/min and/or symptomatic hypotension SBP < 90mmHg. If any signs of respiratory distress exist, monitor $EtCO_2$.

[2] Tricyclic Antidepressants or Phenobarbital overdose S/S include: Respiratory depression, QRS >120ms, Focal seizures, AV blocks, and Ventricular arrhythmias.

[3] Opening and/or maintaining the airway, provision of oxygen and ensuring adequate circulation should be performed prior to Naloxone administration. Naloxone may be administered by bystanders, Law Enforcement, EMRs, EMTs, and Paramedics intranasally. Refer to the **Protocol Appendix** for more information regarding intranasal medication delivery.

[4] **Naloxone IV/IO/IM** should be titrated in 0.5mg increments, typically to a Max of 2mg or until adequate ventilation/oxygenation is achieved as measured by pulse ox, adequate respirations, patent airway (via NPA/OPA or adequate gag reflex). Doses administered in amounts larger than 0.5mg increase the risk of flash pulmonary edema. The likelihood of this incidence, although rare, increases in proportion to the administered dose. Occasionally, doses larger than 2mg may be required for synthetic opiate overdoses. AEMTs and Paramedics may administer **Naloxone** IV/IO/IM as a first-line treatment for known or suspected opiate overdose **-AND/OR-** after intranasal **Naloxone** has failed as clinically necessary.

- When trauma is known or suspected, refer to the **Spinal Motion Restriction Guideline**. Patients with an altered mental status cannot be clinically cleared.
- Uncontrollable patients may be **Chemically Sedated** / **Physically Restrained** as indicated in the **Excited Delirium Guideline**.

Eclamptic Emergencies | Seizure

Pre-eclampsia
A complication occurring in about 3% to 5% of pregnancies characterized by hypertension, proteinuria, and edema in a pregnant female > 20 weeks gestation. The condition may progress rapidly from mild to severe and, if untreated, can lead to eclampsia.

Eclampsia
A severe hypertensive disorder (≥ 140/90mmHg) of pregnancy characterized by convulsions and coma, occurring between 20 weeks gestation and 6 to 8 weeks postpartum. Eclampsia is the most serious complication of pregnancy-induced hypertension.

Routine Medical Care

↓

Assess **Blood Glucose** & **Temperature**

↓

Treat hypoglycemia < 60mg/dL
Refer to: **Diabetic Emergency Guideline**
AEMT

↓

Crystalloid Fluids IV/IO PRN
AEMT*

↓

Generalized Seizure Activity Upon Arrival
Midazolam 10mg IM/IN prior to IV/IO access
AEMT*

↓

$EtCO_2$ Monitoring

↓

For generalized seizure activity beginning in the presence of EMS with IV/IO access already established or for partial seizure

↓

Seizure Control[1,2]
Midazolam 2.5mg IV/IN/IM/IO q 2 min. PRN, Max of 10mg
-AND-
For Eclamptic Seizures Also Include
Magnesium Sulfate Infusion 4–6g mixed in 250mL of NS or D5W, IV/IO over 10 min.
AEMT* MEDIC

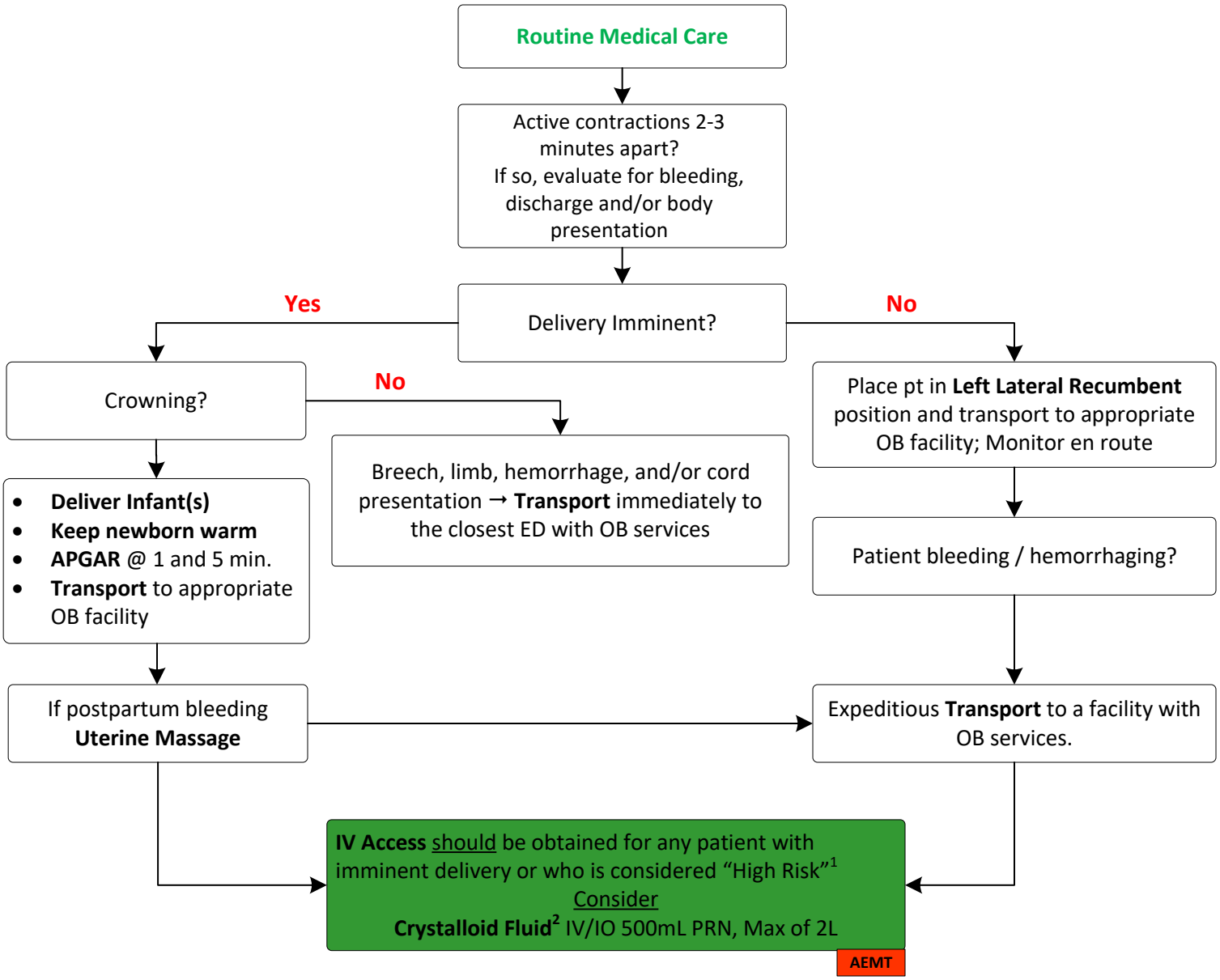
↓

Contact **Medical Control** if additional **Benzodiazepine** administration is needed for seizure control
AEMT*

[1] Refer to the **COG Appendix** for additional options for **Benzodiazepines**.
[2] Additional **Benzodiazepines** may be administered after **Versed** IM in patients who were actively seizing upon arrival, as per the Seizure Control order. Do not exceed a combined Max of 20mg of **Midazolam** without orders from **Medical Control**.

- **Diazepam/Lorazepam** cannot be given via intranasal route. Oil-based medications cannot be atomized.
- Post-seizure, any pregnant patient should be positioned on her left side to facilitate increased placental perfusion and return of blood to the right side of the heart.

Emergency Childbirth



- Do not delay transport awaiting placental delivery
- All products of conception must accompany the patient to the ED

Prolapsed Cord

- Place patient in knee/chest or deep Trendelenburg position
- Elevate presenting part or retract maternal tissue to allow/increase fetal blood flow until relieved by hospital staff

[1] **HIGH RISK** includes but is not limited to:

- Preterm Labor
- Vaginal bleeding
- Multiple gestation pregnancy
- Placental abruption
- Placenta previa
- Pre-eclampsia
- Patient who states she is "high risk" (diabetic, HTN, etc.)
- Trauma

[2] **Lactated Ringers** is the **Crystalloid Fluid** of choice if available.

- Refer to the **COG Appendix** for information on difficult delivery techniques.

Excited Delirium

Excited delirium is a condition in which a person is in a psychotic state or is extremely agitated. Mentally, the subject is unable to focus his/her attention on any one thing and is often distracted by his surroundings. The subject's inability to process rational thought precludes normal de-escalation procedures. Physically, the organs within the subject are responding to the inciting factor, whether it be a drug stimulant or the exacerbation of an underlying psychiatric condition. These two factors occurring at the same time cause a person to act erratically enough that they become a danger to themselves and to the public. This is typically when law enforcement comes into contact with the person.

Possible Causes Of Excited Delirium

- Drug withdrawal
- Head trauma
- Illness
- Low blood sugar
- Overdose on stimulants
- Overdose on hallucinogenic drugs
- Psychiatric patient off their medications
- Psychosis

Routine Medical / Trauma Care

↓

Provide verbal reassurance using calming techniques and establish a rapport with patient

↓

Consider **Applying 4 Point Restraints;** If Possible

EMT

Symptoms of Excited Delirium

- Bizarre / Aggressive behavior
- Dilated pupils
- Fear and panic
- High Body Temperature*
- Incoherent speech
- Inconsistent breathing patterns
- Nakedness
- Profuse sweating
- Shivering

Agitation

Sedation
Midazolam 2.5mg IV/IO/IN/IM
q 2 min. PRN, Max of 10mg

MEDIC

Severe Agitation

Sedation
Ketamine 4mg/kg IM
(Max of 400mg)

MEDIC

↓

Emergence Hallucinations / Agitation
Midazolam 2.5mg IV/IO/IN/IM PRN

MEDIC

- **Monitor ETCO2**
- **O2 therapy as needed**
- **Assess CBG**
- **EKG**
- **Temperature**

MEDIC

↓

Contact **Medical Control** if additional sedation is needed

*High Body Temperature is a key finding in predicting a high risk of sudden death. Another key symptom to the onset of death while experiencing a behavioral emergency is "Instant Tranquility." This is when the patient who presented as violent and/or vocal suddenly becomes quiet and docile while seated in the car or at the scene.

[1] See **COG Appendix** for additional options for **Benzodiazepines**.

- Ensure proper positioning of the patient to avoid positional and compression asphyxia. No person should be restrained or compressed in any position that may restrict the airway for any extended period of time.
- Utilize **Physical -AND/OR- Chemical Restraints** as needed for patient and staff safety.
- Law Enforcement should accompany EMS to the hospital if available.
- Use of **Benzodiazepines** in excited delirium should be titrated to relief of agitation and alleviation of physical symptoms including but not limited to: combativeness, diaphoresis, tachycardia (goal for a heart rate < 110 bpm), tachypnea.
- Care should be given to post-sedation vital sign monitoring (with special attention to EKG rhythms), pulse oximetry, capnography, and maintenance of airway.
- Patients should be transported to the closest appropriate hospital for evaluation and stabilization.

Fever | Infection Control

Differential Diagnosis

- Infection/Sepsis
- Cancers/Tumor/Lymphoma
- Medication/Drug reaction
- Hyperthyroid
- Meningitis
- Heat stroke

Routine Medical Care

↓

Initiate Methods For **Passive Cooling**
Refer to: **Hyperthermia|Environmental Guideline**

↓

Evaluate patient's ability to swallow tablet; If able

↓

Fever > 100.4°F
Acetaminophen[1] tablet 1g PO
-OR-
Ibuprophen[2] tablet 600mg PO

EMT

↓

Evaluate for Dehydration

↓

Crystalloid Fluid IV/IO 500mL PRN Max of 2L

AEMT

↓

Consider
Sepsis|Septic Shock Guideline

Primary Symptoms

- Warm
- Flushed
- Sweaty
- Chills

Associated Symptoms

- Myalgias
- Cough
- Chest wall pain
- Headache
- Dysuria
- Abdominal pain
- Mental status changes
- Rash

[1] Evaluate all of the patient's medications prior to the administration of **Acetaminophen** to prevent overdose. Safe maximum daily dosing of **Acetaminophen** is ≤ 4g/day.

[2] Allergies to NSAIDs (non steroidal anti-inflammatory medications) and/or known or suspected pregnancy are contraindications to **Ibuprofen** administration.

- NSAIDs should not be used in the setting of environmental heat emergencies.
- Consider the use of contact precautions and droplet precautions as necessary.

Hyperthermia | Environmental Emergency

Routine Medical Care / **Trauma Care**

- Move victim to a cool area and shield from the sun or any external heat source
- Remove as much clothing as practical and loosen any restrictive garments

Apply **Cold Packs** to the armpits, groin, and posterior neck
Perform **Passive Leg Raise** as needed

Heat Exhaustion

- GCS of 15
- Temperature < 104°F
- Cool skin
- Decreased skin elasticity
- Delayed capillary refill
- Diaphoretic
- Dizzy
- Dry mucous membranes
- Headache
- Muscle cramps (leg & abdomen)
- Nausea
- Pallor
- Reduced urinary output
- Weakness

PO Fluids[1]
as tolerated

EMR

Crystalloid Fluid
500mL IV/IO PRN, Max of 2L
To achieve a MAP ≥ 65mmHg or as clinically indicated for dehydration

AEMT

Differential Diagnosis

- Adverse Drug Event: NMS / Malignant Hyperthermia
- CNS lesion / Tumor
- Delirium Tremens (DTs)
- Fever (Infection)
- Exercise/Exertion
- Heat Exhaustion/Heat Stroke
- Hyperthyroid Storm
- Sympathomimetic Toxidrome

Ice Bath Immersion is critical for exertional heat stroke management when available

Heat Stroke

- GCS ≤ 14
- Temperature > 104°F
- Hot / dry skin (classic)
- Diaphoretic (exertional)
- Dizziness, lightheadedness
- Extreme fatigue not typical for activity (exertional)
- Headache
- Nausea/vomiting/diarrhea
- Muscle cramps
- Reduced urinary output
- Seizures
- Sweating may have stopped
- Tachypnea

Evaporative Cooling[2,3]
-OR-
Ice Bath Immersion[2,4]
(If available on scene)

EMR

Crystalloid Fluid
500mL IV/IO PRN, Max of 2L
To achieve a MAP ≥ 65mmHg or as clinically indicated for dehydration

AEMT

Contact **Medical Control** if additional orders are needed

[1] **PO Fluids** of choice are sports drinks/products containing electrolytes.
[2] Cooling efforts for heat stroke patients should continue to a target temperature of less than 102.2°F (39°C) and the patient demonstrates improvement in mental status.
[3] **Evaporative Cooling** may be achieved through misting/wetting the skin with tepid water while fanning the patient.
[4] **Ice Bath Immersion** is commonly available at commercial sporting arenas or events. Ice baths may also be created utilizing a large tub or body bag, water, and ice. It is acceptable to delay transport from the scene for ice bath immersion if rapidly available. Consider utilization of a KED if submerging the patient in a bath or tub.
to assist with placement/removal of the patient experiencing AMS.

- For tonic-clonic seizure activity, refer to: **Seizure Guideline**.
- For Fever from viral illness/infection, refer to: **Fever Guideline**.
- Patient history should include: length of exposure, attempts at oral rehydration, last urination, and alcohol or drug use within the past 24 hours.
- If AMS without hyperthermia, consider exercise-associated hyponatremia.

Hypothermia | Environmental Emergency

Routine Medical Care / **Trauma Care**

- Remove from cold environment
- Place in warm environment (if possible)
- Handle gently
- Remove wet clothing
- Cover with blankets
- Consider heat packs
- Consider **Warm Crystalloids** IV/IO (if available)

EMR | AEMT

Contact **Medical Control** if additional orders are needed

<u>Signs and Symptoms</u>

- Cold, clammy skin
- Shivering
- Change in mental status
- Extremity pain or sensory abnormalities
- Bradycardia
- Hypotension or shock

<u>Hypothermia Categories</u>

- Mild: 95-89.8 °F (35-32.1 °C)
- Moderate: 89.7-82.5 °F (32-28 °C)
- Severe: 82.4-75.2 °F (28-24 °C)
- Profound: < 75.2 °F (< 24 °C)

<u>Differential Dx</u>

- Sepsis
- Shock
- Environmental exposure
- Toxins
- Hypoglycemia
- Hypothyroidism

- For patients with a core temperature less than 86˚F (30˚C), ventricular fibrillation is a common cause of death. Handling patients gently may prevent this.
- If the patient's temperature is unable to be measured, treat the patient based on the suspected temperature.
- Hypothermia may produce severe bradycardia; take at least 45 second to palpate a pulse.
- **Heat Packs** can be activated and placed in the axillary and groin areas. Care should be taken not to place the packs directly against the patient's skin.
- Consider <u>withholding</u> **CPR** if patient has an organized rhythm or other signs of life. Consult with **Medical Control**.
- Intubation attempts may cause ventricular fibrillation. Any intubation attempt should be performed by the most experienced clinician on scene.
- Avoid hyperventilation as this can cause ventricular fibrillation.
- If the patient's core body temperature is <u>below</u> 86˚F (30˚C) antiarrhythmic medications may not be effective. Refer to: **Cardiac Arrest Special Considerations Guideline**.
- **Cardiac Pacing** should be withheld for any patient with a core body temperature <u>below</u> 86˚F (30˚C).

Mental Health Emergency

This guideline applies to patients exhibiting psychological disturbances that produce thoughts, feelings, and behaviors that may be destructive to the patient or another person.

Routine Medical Care

Suicidal / Homicidal ideation or grave disability without physical complaint, injury, or drug ingestion?

→ **Transport** to the closest appropriate facility not on PEC diversion

Suicidal ideation with drug ingestion or significant injury?

→ **Transport** to closest appropriate facility

Consider Alternative Differential Diagnosis

- **A**lcohol →**Drug Overdose Guideline**
- **E**pilepsy →**Seizure Guideline**
- **I**nsulin →**Diabetic Emergency Guideline**
- **O**verdose →**Drug Overdose Guideline**
- **U**remia →**Routine Medical Care Guideline**
- **T**rauma →**Trauma Activation Criteria**
- **I**nfection →**Sepsis Guideline**
- **P**sychosis →**Excited Delirium Guideline**
- **S**troke →**Stroke Guideline**

- PEC (Physician's Emergency Certificate) diversion status will be activated when >25% of primary emergency department beds are occupied by PEC'd patients.
- Contact/Consult with **Medical Control** for any patient who meet the above criteria and adamantly refuses transport.

Pneumonia

Routine Medical Care

↓

Consider
Sepsis | Septic Shock Guideline

↓

Consider
Fever | Infection Control Guideline

↓

Oxygenate pt as clinically indicated to an $SpO_2 \geq 94\%$
Assist pt with deep breathing[1]

EMR

↓

Consider **CPAP** 5-10cmH_2O for Respiratory Distress

EMT

↓

Using the adjacent blue box, focus should be placed on recent and past medical history

↓

Evaluate the need for bronchodilators by the level of distress, wheezing, and crackles

↓

Albuterol 5mg PRN, Max of 10mg
-AND-
Ipratropium Bromide
Nebulized 500mcg[4]

EMT

↓

Suspected Dehydration
Crystalloid Fluid 500mL IV/IO PRN, Max of 1L

AEMT

Signs and Symptoms Associated with Pneumonia

- Hypoxia
- Productive cough (mucus could be green or yellow, & may contain blood)
- Fluid in pleural cavity which could cause reproducible chest wall pain, especially on inspiration, and is commonly mistaken for rales related to pulmonary edema
- Dehydration
- Tachycardia
- Fever (not always solid indicator in aging adults)
- Tachypnea
- Chills
- Bed bound patients
- Aspiration risk
- Institutionalized[2] (currently or recent)
- Hemoptysis[3] (coughing or spitting up blood)
- Adventitious lung sounds, such as crackles

If BVM Ventilation is Required
consider utilizing a **PEEP Valve**
set at 5-10cmH_2O, as needed

Pneumonia can be caused by a viral or bacterial infection. This can often be mistaken for pulmonary edema and/or COPD; therefore, it is imperative to understand the presentation of pneumonia. Patients who have a history of asthma and COPD have a higher risk for developing pneumonia.

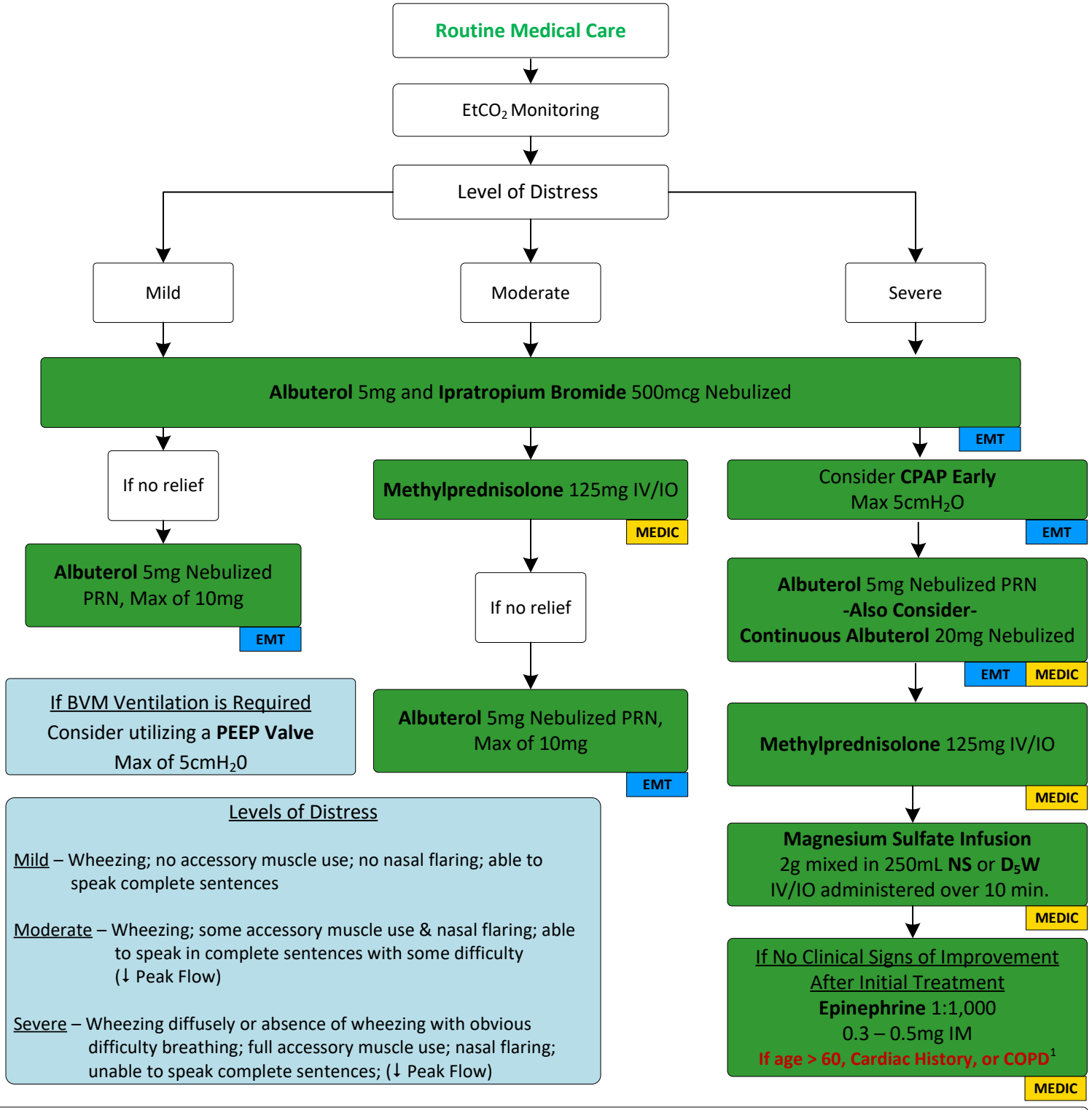
[1] If tolerated: Deep breathing increases the surface area within the alveoli of the lungs. An increase in surface area increases the gas exchange, which will increase oxygenation. This also stimulates air movement in the base of the lungs which is most often the site of the pneumonia.

[2] Institutionalized: Any of the following is considered an institution: Hospital, Nursing home, incarceration, etc. This increases the risk for pneumonia due to their sedentary lifestyle and increased risk of exposure to infectious disease.

[3] PPE masks should be used on anyone presenting with hemoptysis. Hemoptysis should be considered tuberculosis (TB) until proven otherwise.

[4] **Ipratropium Bromide** 500mcg Nebulized should be administered with the initial treatment and then with every 4th round of **Albuterol**.

Reactive Airway Disease



[1] Patients ≥ ≈ 60 years of age with a cardiac history, COPD, and/or renal failure shall not be given **Magnesium Sulfate** or **Epinephrine** without consultation from **Medical Control**.

- The current dose for **Albuterol** is 5mg for patients ≥ 30kg. For patients < 30kg, administer 2.5mg nebulized.
- Determine if the patient has been intubated in the past. If so, this patient may require more aggressive treatment.
- The onset of action for **Ipratropium Bromide** is ≈ 20 minutes with peak action between 60-90 minutes; therefore, it should be given with the first **Albuterol** treatment and with every 4th treatment thereafter.
- Corticosteroids (**Methylprednisolone**) or oral Prednisone is the only proven treatment for the inflammatory response in asthma. Early administration of these medications is vital, as they may aid in reducing the need for hospital admission. It usually takes six hours once the medication is given before it's effects are seen.
- Consider the use of qualitative $EtCO_2$ as a diagnostic tool by assessing for bronchospastic or "Shark Fin" waveforms.

Seizure

Seizure Types

Tonic–Clonic Seizures
A regular pattern of contraction and extension of the arms and/or legs, loss of consciousness, and may include crying or moaning.

Absence Seizures
Sometimes called Petit Mal Seizures, can cause rapid blinking or a few seconds of staring into space and usually associated with a loss of and return to consciousness, generally without post-ictal lethargy.

Simple Focal Seizures
Focal seizures are limited to one hemisphere of the brain and may include twitching, and/or a change in sensation such as taste or smell without LOC or AMS.

Complex Focal Seizures
Focal seizures are limited to only one hemisphere of the brain but may include twitching with an altered LOC and an inability to respond to questions or directions.

Routine Medical Care

↓

Treat hypoglycemia < 60mg/dL
Refer to: **Diabetic Emergency Guideline**

AEMT

↓

For new onset seizures, an IV should be established as soon as possible
Patients requiring transport should have IV access

↓

Generalized Seizure Activity Upon Arrival
Midazolam 10mg IM/IN prior to IV/IO access

AEMT*

↓

$EtCO_2$ Monitoring

↓

For generalized seizure activity beginning in the presence of EMS with IV/IO access already established or for partial seizure

↓

Seizure Control[1,2]
Midazolam 2.5mg IV/IN/IM/IO q 2 min. PRN, Max of 10mg

AEMT*

↓

For Seizure Control After Benzodiazepine Administration
Levetiracetam Infusion[3] 60mg/kg IV/IO
Mixed in 500mL of **NS** or **D5W**, Max of 4500mg
Infuse over 15 min.

MEDIC

↓

Contact **Medical Control**
if additional **Benzodiazepine** administration
is needed for seizure control

[1] Refer to the **COG Appendix** for additional options for **Benzodiazepines**.
[2] Additional **Benzodiazepines** may be administered after **Versed** IM in patients who were actively seizing upon arrival, as per the Seizure Control order. Do not exceed a combined Max of 20mg of **Midazolam** without orders from **Medical Control**.
[3] **Levetiracetam** may be administered mixed in 250mL for infusions containing 3500mg or less. Do not constitute **Levetiracetam** more than 15mg/mL.

- **Benzodiazepine** administration is the first line treatment for seizure control. **Anti-epileptics** should be administered after **benzodiazepine** administration has been initiated.
- If seizure is secondary to trauma, transport to a trauma center.
- **Diazepam/Lorazepam** cannot be given via intranasal route. Oil-based medications cannot be atomized.

Sepsis – Suspected | Septic Shock

Routine Medical Care

Vital Signs
Including **Temperature** and **Shock Index**[1]

Suspected Infection plus two or more of the following criteria:
- Respiratory Rate > 22 breaths/min.
- Heart Rate > 90 bpm
- SBP ≤ 100mmHg
- Altered Mental Status
- Temp > 100.4°F or < 96.8°F

No → **Routine Medical Care**[2]

And

$EtCO_2$ ≤ 25mmHg

No → **Routine Medical Care**[2]

Yes

Consider Sepsis

Crystalloid Fluid[3] 500mL IV/IO PRN, Max of 2L

AEMT

If SBP < 90mmHg **-OR-** MAP < 65mmHg
After 2L IV/IO Bolus

Norepinephrine Infusion 2-30mcg/min. IV/IO
-OR-
Push Dose Epinephrine 5-20mcg IV/IO q3-5 min.

MEDIC

Push Dose Epinephrine

5-20mcg IV/IO, q 3-5 min

May be utilized for severe hypotension not responsive to initial interventions, where vasopressors are indicated, to bridge the gap while preparing an infusion.

MEDIC

Cefepime 2g IV/IO
Prepared in 100mL D5W or NS over 30 min.
-OR-
Zosyn 4.5g IV/IO
Prepared in 100mL D5W or NS over 30 min.

MEDIC

Sepsis Alert
To receiving Emergency Department

Signs / Symptoms
- Hyper/Hypothermia
- Chills
- Rash
- Altered mental status
- Myalgias
- Cough
- Dysuria

History
- Age
- Fever
- Previous infection
- Immunocompromised
- Bedridden / Immobilized patient
- Recent surgery

[1] **Shock Index** (**SI**) = HR / SBP. Normal Shock Index ranges are between 0.5 and 0.7. A **SI** > 0.9 is concerning for increased mortality. HR should be < SBP.
[2] Patients with suspected sepsis may not have a low $EtCO_2$ reading. Consider sepsis based on clinical presentation.
[3] Lactated Ringers is the crystalloid fluid of choice for the resuscitation of septic patients when available.
- Attempt to identify the source of presumed infection and relay this information to the receiving facility.
- Early recognition of sepsis allows for early, aggressive treatment and initiation of antibiotics.
- Low end tidal levels have a positive correlation with elevated lactate levels.

Shock

Routine Medical / **Trauma Care**

- Septic
- Anaphylactic
- Hypovolemic
- Neurogenic
- Cardiogenic

Establish 1 to 2 large bore IV's ≥ 18g or IO **Crystalloid Fluid** for fluid loss (1000-2000mL) — AEMT

Crystalloid Fluid IV/IO 250-500mL upon confirmation of clear bilateral lung sounds — AEMT

Reassess vital signs and indications; if patient is still tachycardic and/or hypotensive due to hypovolemic etiology continue **Crystalloid Fluid** challenge to a Max of 2L — AEMT

Consider
Dopamine Infusion[1] 5-20mcg/kg/min. IV/IO
-OR-
Epinephrine Infusion[1,2] 2-30mcg/min. IV/IO
-OR-
Norepinephrine Infusion[1] 2-30mcg/min. IV/IO
MAP Goal ≥ 65mmHg — MEDIC

Push Dose Epinephrine
5-20mcg IV/IO q3-5 min.
may be utilized for severe hypotension not responsive to initial interventions, where vasopressors are indicated, to bridge the gap while preparing an infusion. — MEDIC

S/S of Septic Shock

- Fever (typically present)
- Hypotension
- Skin appears flushed
- Warm extremities

S/S of Hypovolemic Shock

- Altered mental status
- Capillary refill > 2 seconds
- Chest pain
- Diaphoresis
- Increased level of anxiety
- Muscle cramping
- N/V/D
- Pallor
- Possible hx of recent trauma
- SBP of < 90-100mmHg
- Dyspnea
- Tachycardia > 120 bpm

S/S of Neurogenic Shock

- Hypotension
- +/- Tachycardia
- Usually associated with a traumatic event

[1] Refer to: **COG Appendix** for the appropriate vasopressor infusion chart
[2] **Epinephrine** is the vasopressor of choice in anaphylactic shock.

- Consider **Stress Dose Steroid** administration for any patient with a history of primary or secondary adrenal insufficiency. Refer to: **Adrenal Insufficiency | Crisis Guideline** as needed.
- **Lactated Ringers** is the crystalloid fluid of choice when available.
- Vasopressor selection will be based on availability, patient disease process, and clinical judgment.
- **Norepinephrine** is *generally* the vasopressor of choice and strongly preferred in septic shock when available.
- Consider underlying causes of obstructive shock (PE, tension pneumothorax, cardiac tamponade) and treat as clinically appropriate.

Stroke

As pre-hospital providers, our crucial role in caring for stroke victims is geared toward recognition and efficient transport to the closest appropriate hospital. The **Cincinnati Stroke Scale** shall be used as a quick stroke screening tool. More detailed testing of neurological function should be completed enroute to the ED. When possible, transport a family member or person who has pertinent medical information to the ED.

Determine Onset of Focal Neurological Symptoms
"Time Last Seen Normal"

Critically ill patients with compromise of airway, breathing, or circulation may be transported to the closest ED

Routine Medical Care

Supplemental **Oxygen** to keep $SpO_2 \geq 94\%$ — EMR

Assess **Blood Glucose,** if < 60mg/dL
Dextrose 50% 12.5g IV/IO — EMT

Do Not treat hypertension

Assess initial neurological function using the **Cincinnati Stroke Scale** exam
Determine "Time Last Seen Normal"

Assess for Large Vessel Occlusion Stroke using the **VAN Assessment**

Cincinnati Stroke Scale
- Slurred speech
- Facial droop
- Arm drift

VAN Assessment
- Visual disturbance- Field cut, doubled, or blind vision
- Aphasia- Inability to speak or understand
- Neglect- Gaze to one side or ignoring one side

- All new-onset neurological complaints consistent with stroke should be treated by EMS as a **"Stroke Activation"**
- Decisions about IV tPA eligibility will be made at the receiving Emergency Department
- IV tPA may be given up to 4.5 hours after onset of acute stroke symptoms
- Mechanical clot retrieval may be indicated for patients with large vessel occlusion

Last seen normal < 6 hours[1]
-AND-
VAN Positive

If **< 15 minutes of additional transport time** proceed to a comprehensive stroke center, or thrombectomy-capable stroke center

If > 15 Min. of Additional Transport Time

Last seen normal > 6 hours
-OR -
VAN Negative

Transport to closest, appropriate stroke center or stroke capable off-site emergency department

Position patient supine for transport. If aspiration risk or decreased LOC, **Elevate the head of the stretcher 30°**

Receiving ED must be contacted as soon as possible for prehospital "**Stroke Activation**"

[1] Last seen normal < 6 hours should include patients without a definite time of LSN, but who could reasonably be assumed to be within 6 hours of onset, including patients who wake up with stroke symptoms.

- Patients who awaken from sleep with neurological deficits must still be transported to a hospital with neurological services, a functional CT scanner, and capable of administering thrombolytic therapy. These patients should be transported as a **Stroke Activation**.
- Treat hypotension as per the **Shock Guideline** to improve perfusion.
- Treat generalized seizure activity aggressively per the **Seizure Guideline**.

Termination of Resuscitation | Non-Traumatic

All of the Following Must Be Met to Consider **Termination of Resuscitation**

- Pulseless and apneic prior to EMS arrival
- **18 years of age or older**
- > 30 min. **Resuscitation** (by ALS) following appropriate **Pulseless Cardiac Guideline**
- > 30 min. of **CPR** with interruptions only for rhythm checks
- **ETT** or **Supraglottic Airway** with proper documentation of qualitative and/or quantitative capnography
- Patent **IV/IO Access**
- No perfusing rhythm at anytime during the resuscitation
- Persistent asystole or agonal rhythm at a rate < 40 bpm (not VF/VT) with no identifiable reversible causes after a minimum of 30 minutes of resuscitation
- Patient's immediate family members must be fully informed of situation, if on scene
- A safe environment for EMS / First Responders
- Law Enforcement / Coroner on scene or notified

All of the Above Criteria Met?

YES

Contact **Medical Control** for Termination of Resuscitation

AEMT*

Post Termination Procedure

The patient's body becomes property of the Coroner's Office once pronounced

Leave all Advanced Airways, IV/IO Catheters, ECG Electrodes/Defibrillation Pads, and Decompression Catheters in place

NO

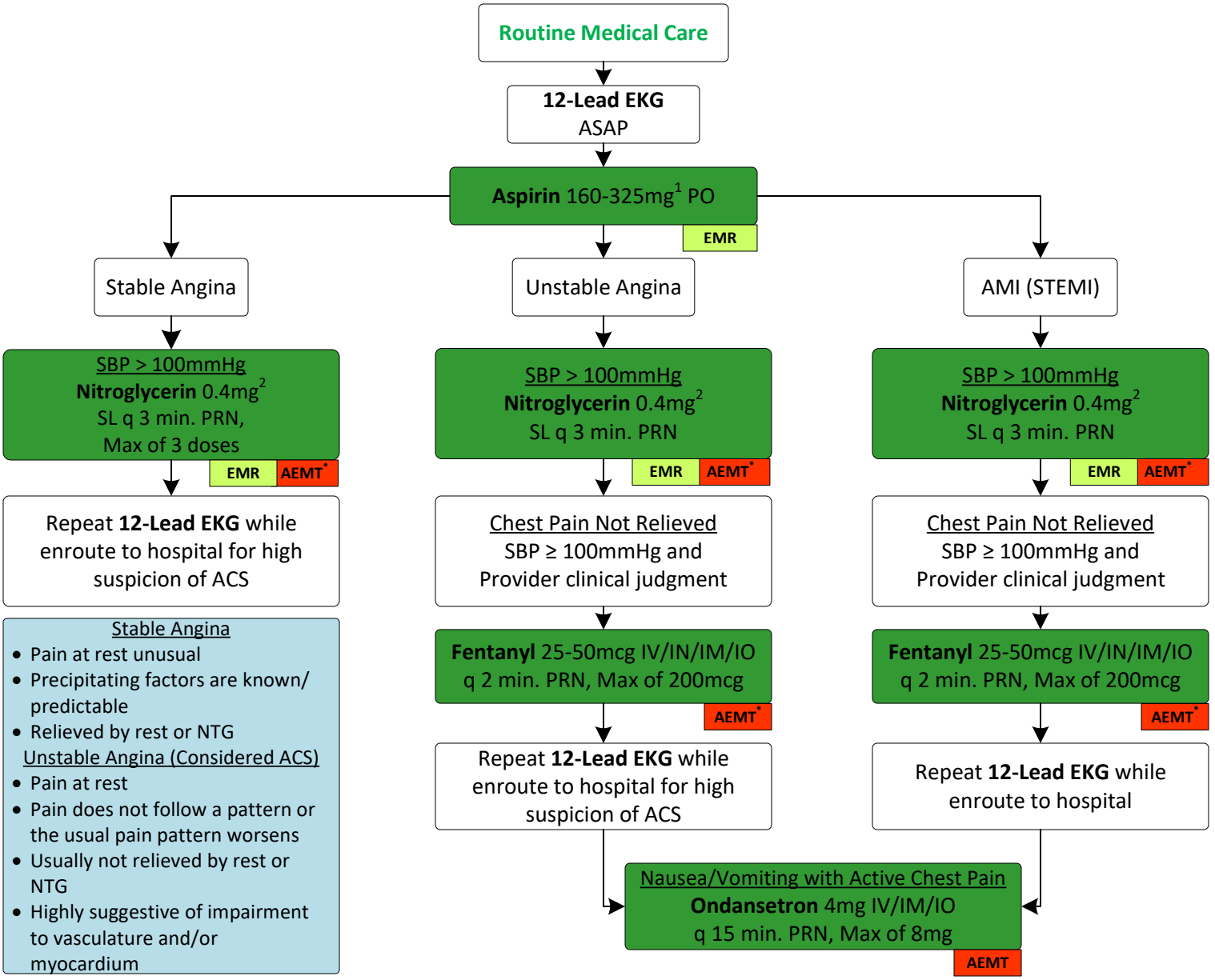
Continue Resuscitation on scene for 30 min.[1] prior to movement or packaging of the patient

Package patient and **Transport** to the closest appropriate ED

[1] Deterioration of a safe scene in which the prehospital providers are in danger takes priority over scene time on cardiac arrests. If the scene has become too dangerous to provide patient care, law enforcement must be dispatched with documentation reflecting such on the run report.

- If Medical Control does not grant "Termination" after two requests, transport to the closest appropriate ED.
- When system configuration allows, it is preferable to have two on-duty paramedics, one of whom is at a supervisory level and/or an on-line medical director on scene verifying proper basic and advanced treatments.
- Termination of Resuscitation does not apply in public venues / public view, or at any time the crew feels their safety is compromised.
- This guideline is not applicable to EMRs, or EMTs

Acute Coronary Syndrome (ACS)



Notifying the receiving ED as early as possible is a high priority when infarct is suspected.
Transport to a hospital with percutaneous coronary intervention capabilities.

[1] **Aspirin** (ASA) is contraindicated in patients with current or recent GI bleeding.

[2] **Nitroglycerin (NTG)** is contraindicated in patients who have taken phosphodiesterase inhibitors such as Viagra or Levitra within the past 24 hours (Cialis in the past 48 hours). **NTG** SL tablets and **NTG** SL spray may be used interchangeably.

- EMRs and EMT's may administer the patient's own **Nitroglycerin** 0.4mg[2] SL q 3 min. PRN, Max of 3 doses
- If the administration of one **NTG** dose results in a substantial decrease in blood pressure, discontinue **NTG** use; this response may be indicative of a MI involving the right ventricle. This hypotension usually responds well to a **Crystalloid Fluid** bolus. A common finding associated with a right sided inferior MI is ST elevation in V4R +/- bradycardia.
- Age and cardiac risk factors (defined in the **COG Appendix**) are a key evaluation tool in this protocol. Major Cardiac Risk Factors should be documented in the patient care report.
- Consider a **Right Sided 12-Lead EKG** (V4R) for suspected Inferior STEMI (II, III, aVf).
- Refer to the **COG Appendix** for definitions and protocol guidelines regarding: STEMI Activation Criteria, STEMI Equivalents, and STEMI Imposters.
- Treat life-threatening arrhythmias per the appropriate **Cardiac Guideline** before initiating this ACS protocol.
- Scene time for patients presenting with STEMI should be minimized with a goal of < 15 minutes.
- **Defibrillation Pads** should be applied to the patient's chest immediately after STEMI is detected in the case of VF/VT.

Asystole | PEA

Effective **CPR** performed prior to arrival?
AED used prior to arrival?
EMS witnessed arrest?

Treatment Priorities

- Effective chest compressions and controlled ventilations at 10/min takes priority over any other treatment.
- Perform continuous chest compressions without stopping for ventilations.
- Only pause for < 10 seconds every 2 minutes to verify cardiac rhythm.
- **Charge Defibrillator** to maximum joules and prepare for defibrillation of VT/VF if present at rhythm check .

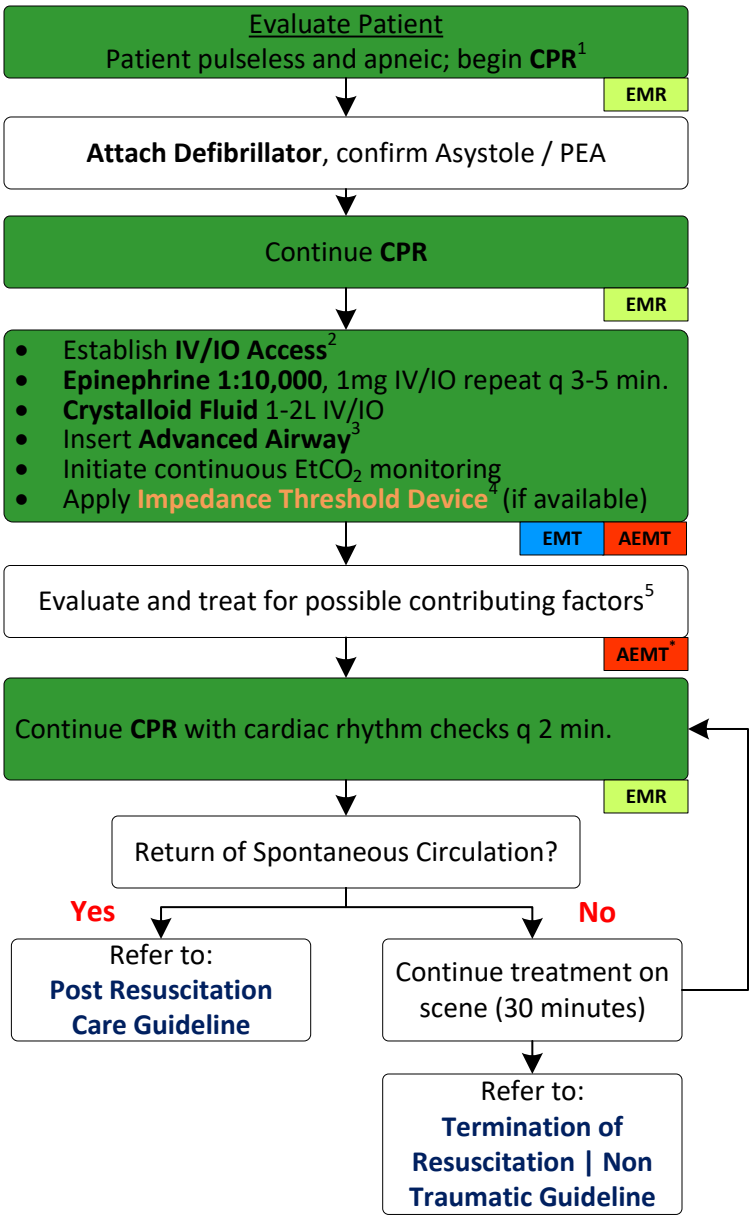
PEA Evaluation

Narrow Complex Etiology

- Hypoxia
- Hypovolemia
- Tension pneumothorax
- Cardiac tamponade
- Mechanical hyperinflation
- Pulmonary embolism
- Acute MI
- Myocardial rupture

Wide Complex Etiology

- Severe hyperkalemia
- Sodium channel blocker toxicity
- Acute MI
- Left ventricular failure



[1] Guidelines for **CPR** and cardiac arrest management are outlined in the **COG Appendix**.

[2] **Proximal Humerus IO** access provides superior flow rates and decreased delivery time for medication to reach central circulation compared to other means of intraosseous and vascular access. Refer to the **COG Appendix** for intraosseous access guidelines.

[3] Initiate airway management per the **Airway Management Guideline**. Avoid prolonged (>10 sec) pauses in compressions for airway management.

[4] An **Impedance Threshold Device** prevents unnecessary air from entering the chest during the decompression phase of **CPR**. When air is prevented from rushing into the lungs as the chest wall recoils, the vacuum (negative pressure) in the thorax pulls more blood back to the heart, resulting in an increase in blood flow to the heart, brain, and organs. Remove the **Impedance Threshold Device** upon Return of Spontaneous Circulation (ROSC).

[5] Contributing Factors and Recommended Treatment:

- Hydrogen Ion Acidosis (Metabolic Acidosis) – **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypoglycemia – **Dextrose** 25g IV/IO
- Hyperkalemia – Including Hx of renal failure: **Calcium Chloride** 1000mg IV/IO and **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypothermia – Avoid rigorous movement of patient; especially if patient regains pulse; excessive movement could cause V-Fib or V-Tach. Refer to: **Cardiac Arrest | Special Circumstances Guideline**
- Hypovolemia – Fluid bolus: **Crystalloid Fluid** 1-2L IV/IO
- Tension Pneumothorax – **Needle Decompression** (Paramedics)
- Toxins – Tricyclic antidepressants or Sodium channel blocker overdose: **Sodium Bicarbonate** 1mEq/kg IV/IO
  – Opiate Overdose: **Naloxone** 2mg IV/IO

Bradycardia | Symptomatic

Atropine is **NOT** indicated for 2° II or 3° AV Blocks

Routine Medical Care

12-Lead EKG ASAP

Symptomatic (Non 2° II or 3°)

Atropine Sulfate 1mg IV/IO q 3 min. PRN, Max of 3mg. If patient becomes unstable, do not delay **Transcutaneous Pacing**

MEDIC

Transcutaneous Pacing[1] as needed

MEDIC

AV Block – 2° II or 3°

Non-Symptomatic

Supportive care; monitor for S/S of Symptomatic Bradycardia
Contact **Medical Control** if needed

If at ANY TIME the above rhythms are present **Transcutaneous Pacing Pads** MUST be applied (Asymptomatic or Symptomatic)

If symptomatic, prepare for **Transcutaneous Pacing**[1]

Consider Premedication for Transcutaneous Pacing
Midazolam 2.5 – 5mg IV/IO/IN/IM

MEDIC

Transcutaneous Pacing
Set rate between 70-80 bpm
Start at 50 Milliamperes (mA) and increase output until capture is achieved[1] then add 10mA for safety margin.

MEDIC

Consider
Shock Guideline

Contact **Medical Control** for Consultation
Dopamine Infusion 2–10mcg/kg/min IV/IO
-OR-
Epinephrine Infusion 2-10mcg/min IV/IO

MEDIC

[1] Each patient will present differently, therefore it is unrealistic to indicate when TCP is or is not needed. Paramedics should use their clinical judgement to make this decision; if in doubt, consult with **Medical Control**.

- Symptomatic Bradycardia is defined as a pulse < 60 beats per minute (bpm) with a SBP < 100mmHg, shortness of breath, altered mental status, and/or other signs of hypoperfusion.
- Transplanted hearts will not respond to **Atropine Sulfate**; **Transcutaneous Pacing** is the treatment of choice.
- **Transcutaneous Pacing** is the treatment of choice for 2nd degree type II and 3rd degree AV heart blocks with serious S/S. Contact **Medical Control** if no other serious S/S exist. **Atropine Sulfate** is not indicated for AV blocks at this level.

Cardiac Arrest | Special Resuscitation

Cardiac Arrest
Ventricular Assist Device (VAD) Patient

- Consult with family/caregivers regarding device-specific knowledge or skills
- **Contact** VAD Coordinator
- Evaluate DNR Status

EMR

Access patient device for function/ alarms[1]

Apply **EKG/Defibrillator** and treat underlying cardiac rhythms per appropriate **Cardiac Guideline**[2]

Crystalloid Fluids[3] 250mL IV/IO PRN, Max of 1L

AEMT

Begin **Manual CPR**[4] if resuscitation is required

EMR

Transport patient with all primary and backup VAD components

Cardiac Arrest
Pregnant Patient

Evaluate Patient for prolonged downtime or signs incompatible with life

If indicated; resuscitate patient per appropriate **Cardiac Guideline**

<u>On-Scene Treatment Priorities</u>[5]

- **Continuous Chest Compressions**
- Consider **left lateral uterine displacement**
- Establish **IV/IO access** in upper extremities or EJ
- Secure **Airway with ETT or Supraglottic Airway**
- Ventilate with decreased tidal volume

AEMT

Initiate **Rapid Transport** to closest ED with OB/GYN Services (if available) for evaluation of perimortem cesarean section for patients who are >20 weeks gestation

[1] **Auscultate** heart sounds to determine if the VAD device is functioning and determine device type. Continuous flow devices will present with "whirling sounds" upon auscultation. Inspect the controller located around the patient's waist or in the VAD Pak to determine device type. Intervene appropriately based on the alarm type and the patient's VAD guide. Contact the patient's VAD Coordinator as soon as possible for assistance with troubleshooting and patient care.

[2] The cardiac monitor and **12-lead EKG** are not affected by the patient's VAD device and can provide diagnostic information.

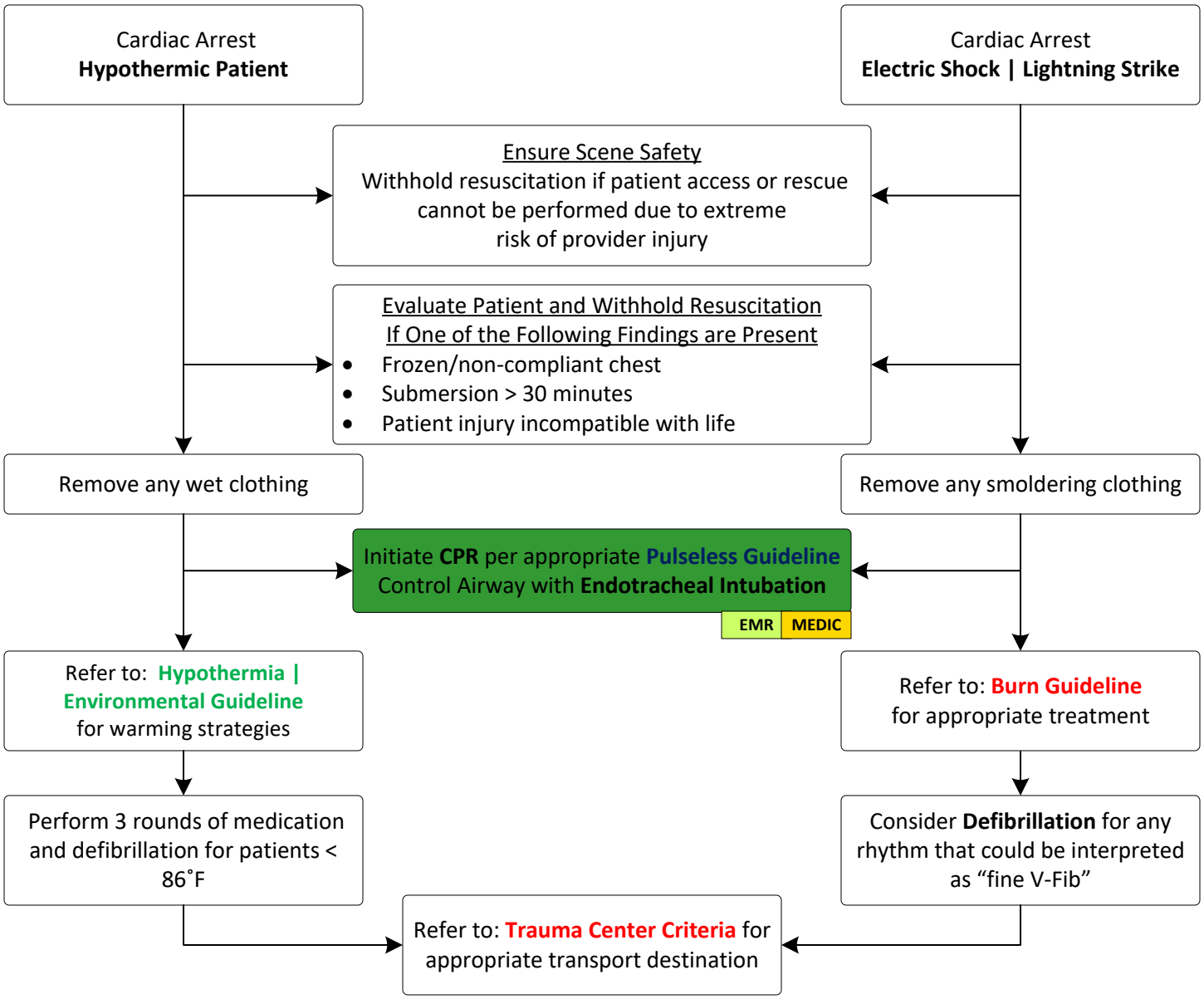
[3] VAD patients are preload dependent. Consider fluid resuscitation early to address hypo-perfusion.

[4] Deciding when to initiate **Manual CPR/Chest Compressions** can be very difficult. Chest compressions <u>may cause death by exsanguination</u> if the device becomes dislodged. However, if the VAD has stopped, the heart will not be able to maintain perfusion and the patient will likely not survive. The use of mechanical CPR devices are contraindicated for this reason. Contact the patient's VAD Coordinator for assistance with clinical decision making as soon as possible.

[5] <u>On-Scene Treatment Priorities for Pregnant Patients</u>:

- **Manual left lateral uterine displacement** should be considered while performing chest compressions to improve venous return to the heart when fundus height is at or above the level of the umbilicus during chest compressions. This maneuver may relieve aortocaval compression during high-quality CPR.
- Endotracheal tube sizing may need to be decreased by 1 size as compared to non-pregnant females.
- Qualitative (colorimetric) $EtCO_2$ detectors may indicate improper placement of advanced airway due to associated anatomical changes of the diaphragm and a decrease in functional lung volume associated with the 3rd trimester of pregnancy. Consider the use of quantitative (wave form) $EtCO_2$ devices and ventilation with decreased tidal volume.
- Medications given IV/IO in the lower extremities may not reach the maternal heart unless (or until) the fetus is delivered. Therefore, venous (including intraosseous) access in the lower extremities is strongly discouraged.

Cardiac Arrest | Special Resuscitation



- ACLS guidelines recommend resuscitative efforts on all pulseless and apneic hypothermic patients. In the pre-hospital setting, it is difficult to determine core body temperature. Therefore, we should consider patients who are hypothermic to be classified as "severely hypothermic" with a core body temp of less than 82.4°F (28°C).
- It is recommended to take up to 60 seconds when evaluating for a pulse and respiratory effort in hypothermic patients. If the determination of a presence of a pulse becomes unclear, **CPR** should be initiated.
- Avoid rigorous movement of the hypothermic patient; especially if the patient regains a pulse. Excessive movement could precipitate V-Fib or V-Tach. This is rare, but when it occurs, the VF/VT is almost always refractory to treatment.
- Early aggressive **CPR**, **Defibrillation**, and **Airway Control** is the focus of treatment for lightning strikes or electrical burns.
- **Endotracheal Intubation** of the lightning strike or electrical burn patient is preferred because of an increased risk of tracheal edema. **Endotracheal Intubation** should be considered early, even if spontaneous breathing has resumed.

CHF | Pulmonary Edema

Medical History Indications
- Hx of CHF, MI, A-Fib, Renal Failure
- Orthopnea (# of pillows under head to facilitate breathing)
- Paroxysmal nocturnal dyspnea
- Prior intubation
- Dyspnea upon exertion
- Takes diuretic

Recognition is Key

Routine Medical Care
Including **Temperature**

Physical Exam Indications
- Dyspnea
- Hepatojugular reflux
- HTN
- JVD at 30° elevation
- Pitting edema
- Rales / Rhonchi
- Tachycardia

Blood Pressure
-AND-
12-Lead EKG
ASAP

Systolic BP > 100mmHg with pulmonary edema and/or R.R. ≥ 30 breaths/min.

Dyspnea Related to Acute Pulmonary Edema
Early CPAP 5-10cmH_2O
EMT

Nitroglycerin (NTG)[1] 0.4mg SL, q 5 min. with SBP > 100mmHg
AEMT

Systolic BP >100 <140mmHg
Nitroglycerin[2] **Infusion** 50-100mcg/min. IV/IO
-OR-
Systolic BP > 140mmHg
Nitroglycerin[2] **Infusion** 200mcg slow IV/IO Push
-THEN-
Nitroglycerin[2] **Infusion** 100-400mcg/min. IV/IO
Titrate to symptoms; MAP Goal Decrease of Approximately 20%
MEDIC

Monitor BP q 2-5 min.

If Systolic BP is < 100mmHg or Symptoms Resolve
Terminate **Nitroglycerin** administration
For NTG Related Hypotension
Crystalloid Fluid 250mL IV/IO PRN, Max of 1L
AEMT

Aspirin 160-325mg PO (Consider **ACS Protocol**)
EMR

If BVM Ventilation is Required
Consider utilizing a **PEEP Valve** 5-10cmH_2O, as needed

Systolic BP < 100mmHg with pulmonary edema and/or R.R. ≥ 30 breaths/min.

Dyspnea Related to Acute Pulmonary Edema
Early CPAP 5cmH_2O
EMT

Push Dose Epinephrine
0.5-2mL (5-20mcg) IV/IO q 3-5 min.
MEDIC

Dopamine Infusion 10-20 mcg/kg/min. IV/IO
-OR-
Epinephrine Infusion 2-30 mcg/min. IV/IO
-OR-
Norepinephrine Infusion 2-30mcg/min. IV/IO
MEDIC

Monitor BP q 2-5 min.

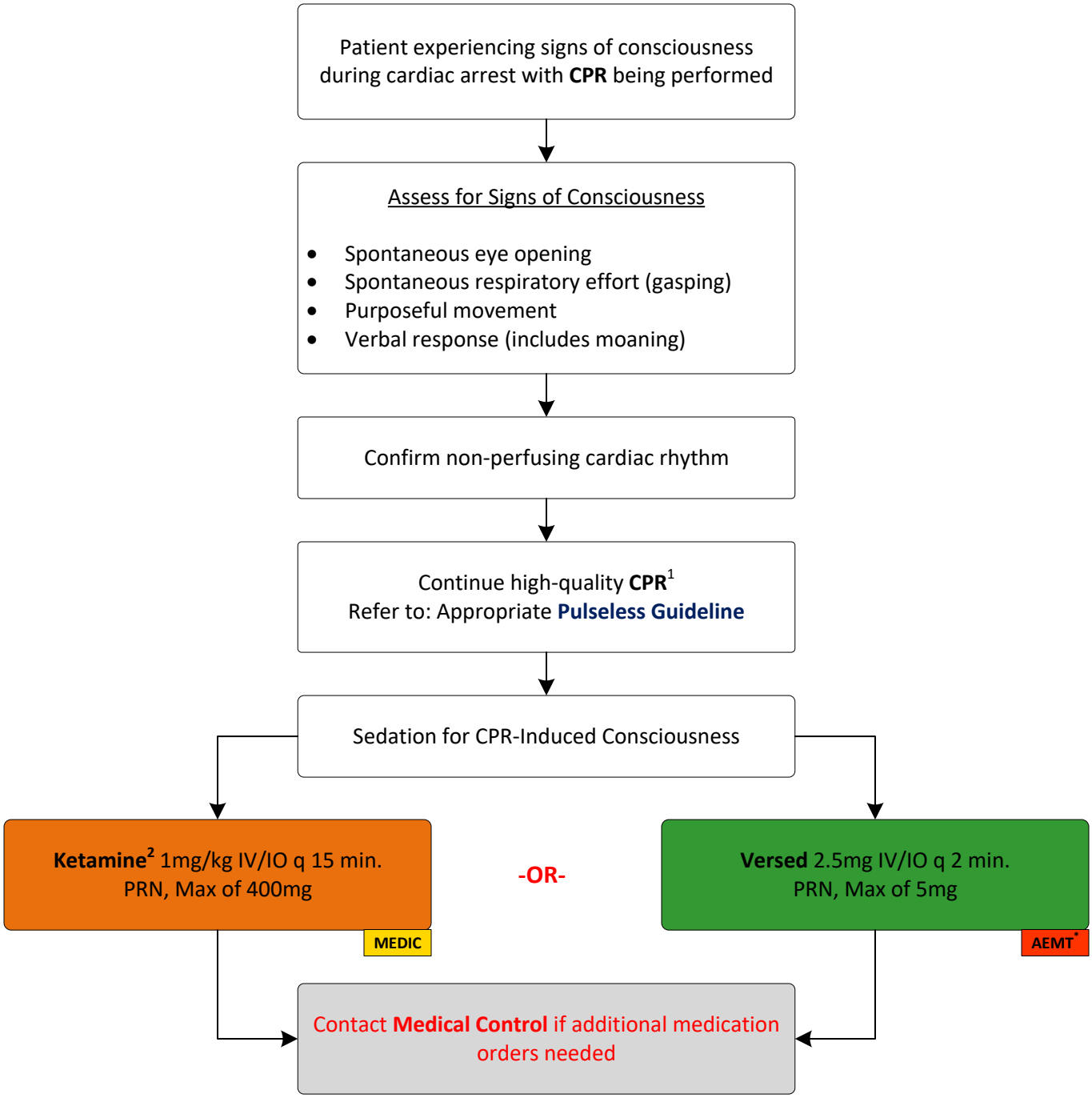
Systolic BP > 100mmHg
CPAP 5-10cmH_2O
-OR-
BVM with **PEEP Valve** 5-10cmH_2O
EMT

[1] Disruption of the **CPAP** seal will cause a loss in therapeutic benefit of PPV and may take 30-90 seconds to regain effectiveness. **Nitroglycerin (Tridil)** IV/IO is preferred over PO or SL routes for this reason. If **Nitroglycerin (Tridill)** IV/IO is unavailable, minimize **CPAP** disruption for SL **NTG**.

[2] Refer to: **COG Appendix** for **Nitroglycerin Infusion** Chart.

- Consider myocardial infarction as a cause of pulmonary edema – transport to a facility with a cardiac catheterization lab.
- In the elderly and recently institutionalized patients, consider pneumonia.
- Avoid **NTG** in patients that have taken Viagra or Levitra in the past 24 hours or Cialis in the past 48 hours.
- Consider the use of quantitative $EtCO_2$ as a diagnostic tool.

CPR-Induced Consciousness

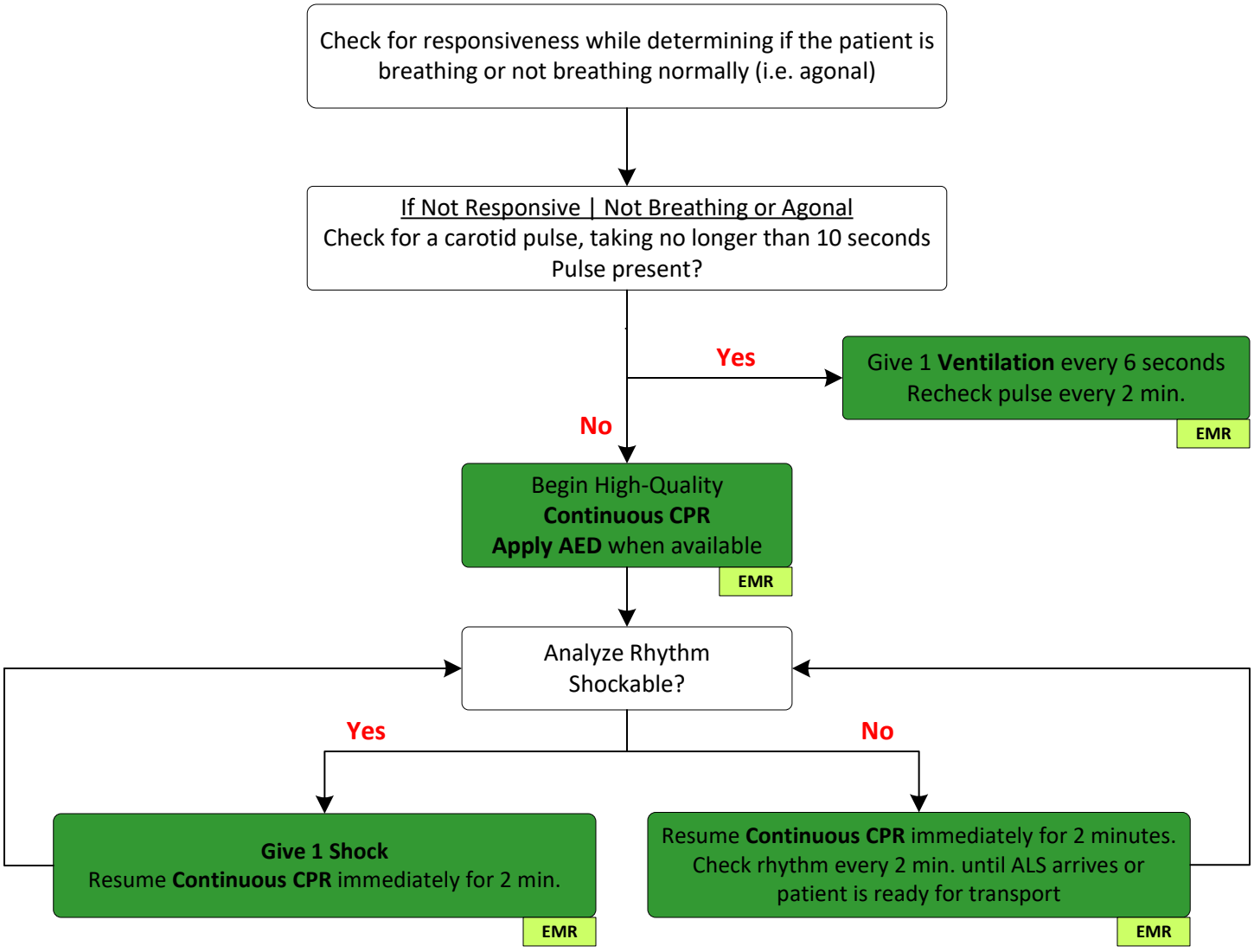


[1] High-quality **CPR**, including the use of mechanical CPR devices, has been demonstrated to provide and maintain adequate cerebral blood flow for some patients to regain consciousness during **CPR**.

[2] **Ketamine** is the physiologic agent of choice for CPR-induced consciousness patients when it is available.

- Patients experiencing CPR-induced consciousness will lose consciousness or cease purposeful movement during pauses for rhythm checks, which are indicative of underlying non-perfusing cardiac rhythms (V-Fib, V-Tach, Asystole, or PEA).
- Patients presenting with CPR-induced consciousness or spontaneous respiratory effort (gasping) have shown a higher likelihood of long term survival.

CPR | AED



Following the Initial Rhythm Check or Shock

- Consider the use of a **Mechanical Compression Device**, if available
- Consider the use of a **Supraglottic Airway**
- Apply Impedance Threshold Device[2]; if available

Emphasis on High-Quality **Continuous CPR**

- Rate of 100-120 compressions per minute
- Compression depth of at least 2 inches
- Allow complete recoil after each compression
- Minimize interruptions in compressions
- Give 1 **Ventilation** every 6 seconds
- Avoid excessive ventilation

[1] Do not delay compressions while preparing a **BVM/Oral Airway** or applying the **AED**.

[2] An **Impedance Threshold Device** prevents unnecessary air from entering the chest during the decompression phase of **CPR**. When air is prevented from rushing into the lungs as the chest wall recoils, the vacuum (negative pressure) in the thorax pulls more blood back to the heart, resulting in an increase in blood flow to the heart, brain, and organs. Remove the **Impedance Threshold Device** upon return of spontaneous circulation (ROSC).

- Allow for early consideration of ALS backup or intercept.
- Patient treatment should be continued on scene for a minimum of 30 minutes.

Post Resuscitation Care

Repeat Primary Assessment

Targeted Temperature Management Inclusion Criteria
- 18 years of age or older
- ROSC not related to blunt/ penetrating trauma
- Temperature after ROSC > 93.2°F(34°C)
- Advanced airway in place with confirmation of placement
- SBP > 90mmHg with vasopressor support

Continue Ventilatory Support
Per **Airway Management Guideline**
- Monitor $EtCO_2$ (ideal > 20mmHg)
- Respiratory Rate < 12 breaths/min
- Maintain SpO_2 between 92%-98%
- **Elevate the Head of Bed** 20° - 30° (if possible)
- **BVM** with **Oxygen** 4L/min if not hypoxic

EMR

Targeted Temperature Management Exclusion Criteria
- Neurologically intact after successful resuscitation
- Pregnancy
- Refractory ventricular arrhythmias (VF/VT/Torsades)
- End stage terminal illness
- Pre-existing hypothermia < 93.2°F
- Obvious recent major surgery

If VT / VF Arrest, continue anti-arrhythmic per therapy protocol[2]

Hypotension | Significant Ectopy | Bradycardia

Crystalloid Fluid IV/IO 1000mL
-AND/OR-
Dopamine Infusion 10-20mcg/kg/min IV/IO
-OR-
Epinephrine Infusion 2-30mcg/min IV/IO
-OR-
Norepinephrine Infusion 2-30mcg/min IV/IO

MAP Goal ≥ 80mmHg

MEDIC

Push Dose Epinephrine
0.5-2.0mL (5-20mcg)
IV/IO q 3-5 min.

MEDIC

Treat per appropriate **Cardiac Guideline**

Treat per **Bradycardia Guideline**

Remain On Scene to Stabilize
- Confirm airway/monitor $EtCO_2$
- Obtain vital signs
- Obtain **12-Lead EKG**
- Establish secondary IV/IO access
- Initiate **Amiodarone Infusion**

MEDIC

If arrest recurs, immediately treat according to appropriate guideline and/or initial successful treatment

Contact **Medical Control** if further consultation or orders are needed

Transport to appropriate receiving center[3]

[1] Surface cooling = commercial device or ice/cold packs to axilla/groin areas.
[2] If successful electrical conversion of VF/VT occurs prior to having administered an anti-arrhythmic, give **Amiodarone** 150mg IV/IO over 10 minutes. Administer **Amiodarone Infusion** 1mg/min IV/IO if any **Amiodarone** was given prior to or proceeding return of spontaneous circulation (ROSC). See **COG Appendix** for **Amiodarone Infusion** Chart.
[3] Consider transport to facility with cardiac catheterization capabilities and/or **Targeted Temperature Management** services.
- Consider **Push-Dose Epinephrine** to bridge the gap while preparing an infusion.
- The condition of the post-resuscitation patient may fluctuate rapidly and requires close monitoring of post-ROSC care; consult with online **Medical Control** when required.
- Hyperventilation is a significant contributor to hypotension as increased thoracic pressure causes decreased venous return to the heart in post-arrest patients; hyperventilation must be avoided at all costs.

Tachycardia | Narrow Complex

Stable Narrow Complex > 150 bpm SVT

Routine Medical Care
12-Lead EKG ASAP

Valsalva Maneuver

- Regular Rhythm
  - Prior to administration of **Adenosine -OR- Diltiazem -OR- Metoprolol**, begin printing EKG
  - **Adenosine** 6mg IV/IO rapid push — MEDIC
  - If no rhythm change, **Adenosine** 12mg IV/IO rapid push — MEDIC
  - If no rhythm change, consider **Diltiazem -OR- Metoprolol** — MEDIC
- Irregular Rhythm
  - Symptomatic A-Fib or A-Flutter with rapid ventricular response confirmed by **12-Lead EKG**?[1]
  - **Diltiazem** 10mg slow IV/IO push q 5 min. PRN, Max of 20mg **-OR-** **Metoprolol** 5mg slow IV/IO push q 5 min. PRN, Max of 15mg — MEDIC

[1] Treatment of symptomatic atrial rhythms with RVR may be treated at a HR < 150 bpm. The Treatment goal is a HR of ≤ 110 bpm.

- Despite **12-Lead** analysis, if unable to determine whether the rhythm is regular or irregular and the QRS is ≤ 0.12 seconds, give **Adenosine** 6mg IV/IO as a diagnostic tool to slow the rate.
- Monitor for hypotension with **Diltiazem** or **Metoprolol** administration. Never administer a IV/IO β-blocker and calcium blocker to the same patient.
- IO administration of **Adenosine** is only indicated via the proximal humerus.

Unstable Narrow Complex > 150 bpm (SVT, A-Flutter / A-Fib)

Unstable is recognized as altered mental status, severe hypotension, and/or hypoxia. Cardioversion is rarely indicated for rates < 150 bpm

Routine Medical Care
12-Lead EKG ASAP

Pre-Medicate (if possible)
Midazolam 2.5-5mg IV/IO/IN/IM — MEDIC

For Unstable SVT & A-Flutter
Synchronized Cardioversion 120J
For Unstable A-Fib RVR
Synchronized Cardioversion 120J
(Escalate to 200J, then to Max Joules if initial cardioversion is unsuccessful) — MEDIC

Upon conversion, provide supportive care as clinically indicated

If no conversion, contact **Medical Control** for further orders

Tachycardia | Wide Complex

Stable Wide Complex (V-Tach) >150 bpm

Routine Medical Care

Confirm V-Tach with **12-Lead EKG**

Amiodarone 150mg mixed in 100mL **D_5W** or **NS**, IV/IO over 10 minutes

MEDIC

If Conversion
Amiodarone Infusion 1mg/min IV/IO[1]

MEDIC

A patient in V-Tach is not likely to be stable; however, stable patients should receive **Magnesium Sulfate** 2g mixed in 250mL of NS or D5W IV/IO over 10 minutes. In cases of polymorphic (irregular) VT such as Torsades de Pointes, cardioversion at a high energy setting will most likely be the most effective treatment.

If V-Tach exists after **Amiodarone** bolus, contact **Medical Control** for further orders

Unstable Wide Complex (V-Tach) > 150 bpm

Unstable tachycardia is recognized by altered mental status, severe hypotension, and/or hypoxia.
Cardioversion is rarely indicated for rates < 150 bpm

Routine Medical Care

Confirm V-Tach with **12-Lead EKG**

Pre-Medicate (if possible)
Midazolam 2.5–5mg IV/IO/IN/IM

MEDIC

For Unstable Wide Complex Tachycardia[2]
Synchronized Cardioversion 120J
(Escalate to 200J then to Max Joules if unsuccessful)

MEDIC

Upon Conversion
Amiodarone 150mg in 100mL D_5W over 10 minutes IV/IO
-Then-
Amiodarone Infusion 1mg/min IV/IO[1]

MEDIC

If no conversion contact **Medical Control** for further orders

[1] Refer to the **COG Appendix** for **Amiodarone Infusion** Chart.
[2] Arrhythmias with a polymorphic QRS appearance usually do not permit synchronization and will require a high-energy unsynchronized shock. If attempts at cardiac synchronization fail, or if there is any doubt weather monomorphic or polymorphic VT is present in the unstable patient, provide high energy **Defibrillation** at Max Joules without delay.

Ventricular Fibrillation | Ventricular Tachycardia (Pulseless)

Effective **CPR** performed prior to arrival?
AED used prior to arrival?
EMS witnessed arrest?

Evaluate Patient
Patient pulseless and apneic, begin **Continuous CPR**[1]
EMR

Attach **Defibrillator**, confirm V-Fib / V-Tach

Defibrillate at Max Joules
Resume **Continuous CPR**
EMR

- Establish **IV/IO Access**[2]
- **Epinephrine 1:10,000**, 1mg IV/IO repeat q 3-5 min.
- **Crystalloid Fluid** 1-2L IV/IO
- Insert **Advanced Airway**[3]
- Initiate continuous $EtCO_2$ monitoring
- Apply **Impedance Threshold Device**[4] (if available)

AEMT*

→ Torsades De Pointes
Magnesium 2g IV/IO
AEMT*

Evaluate and treat for possible contributing factors[5]
AEMT*

Continue **CPR** with cardiac rhythm checks q 2 min.
EMR

Shockable rhythm?

Yes

- **Defibrillate** at Max Joules
- **Amiodarone** 300mg IV/IO

-Then-

- **Amiodarone** 150mg IV/IO after 5 min. if continued VF/VT; Max of 450mg total

AEMT*

Refer to:
V-Tach | V-Fib Storm Guideline
For Polymorphic V-Tach or Refractory V-Fib
(Patient is defibrillated 3 times)

No

Continue treatment on scene (30 minutes)

Refer to:
Post Resuscitation Care Guideline
-OR-
Termination of Resuscitation | Non Traumatic Guideline

Treatment Priorities

- Effective chest compressions and controlled ventilations at 10/min takes priority over any other treatment
- Perform continuous chest compressions without stopping for ventilations
- Only pause for < 10 seconds every 2 minutes to verify cardiac rhythm
- **Charge Defibrillator** to maximum joules and prepare for defibrillation of VT/VF if present at rhythm check

[1] Guidelines for **CPR** and cardiac arrest management are outlined in the **COG Appendix**.

[2] **Proximal Humerus IO** access provides superior flow rates and decreased delivery time for medication to reach central circulation compared to other means of intraosseous and vascular access. Refer to the **COG Appendix** for intraosseous access guidelines.

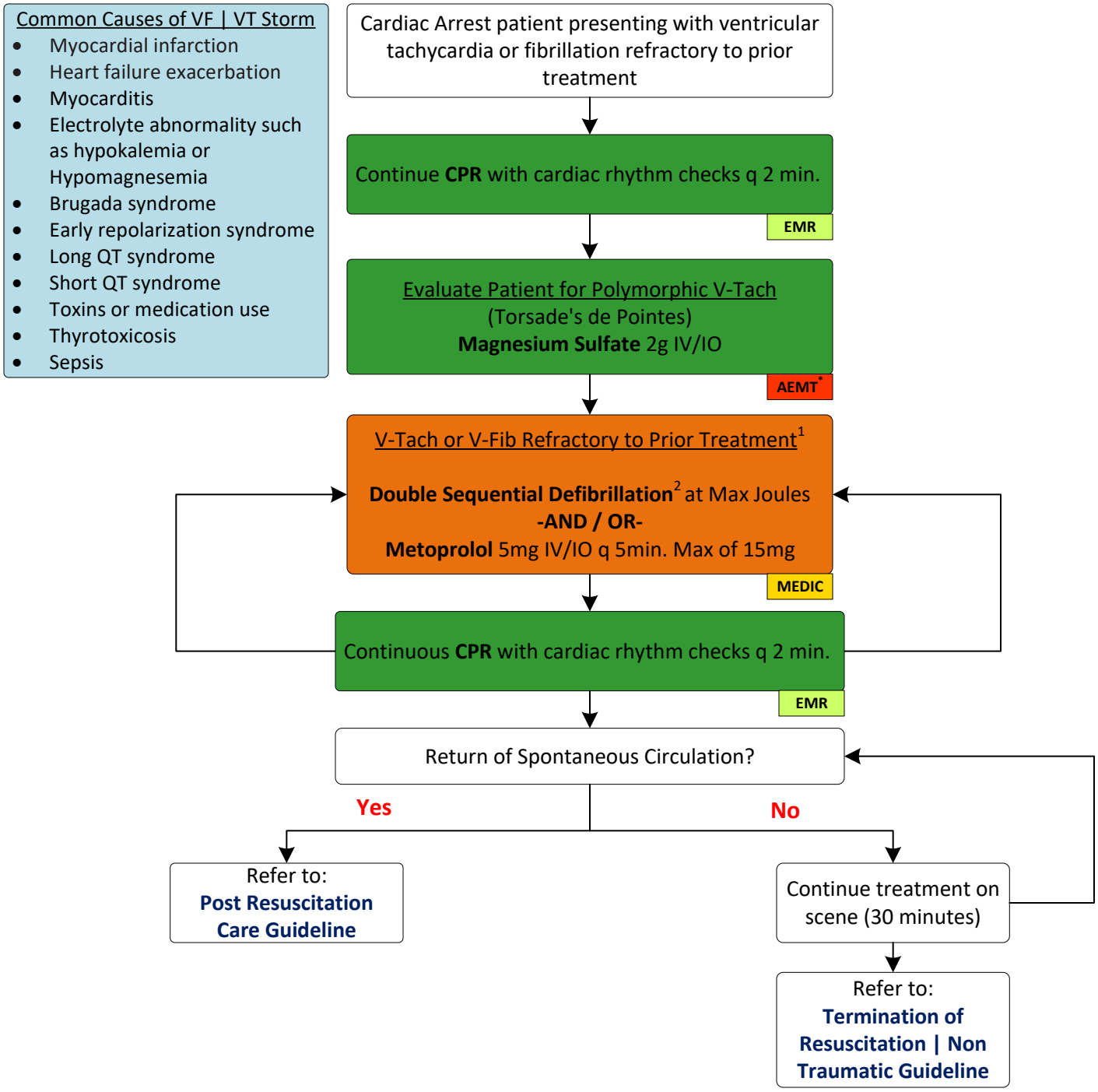
[3] Initiate airway management per the **Airway Management Guideline**.

[4] An **Impedance Threshold Device** prevents unnecessary air from entering the chest during the decompression phase of **CPR**. When air is prevented from rushing into the lungs as the chest wall recoils, the vacuum (negative pressure) in the thorax pulls more blood back to the heart, resulting in an increase in blood flow to the heart, brain, and organs. Remove the **Impedance Threshold Device** upon return of spontaneous circulation (ROSC).

[5] Contributing Factors and Recommended Treatment:

- Hydrogen Ion Acidosis (Metabolic Acidosis) – **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypoglycemia – **Dextrose** 25g IV/IO
- Hyperkalemia – Including Hx of renal failure – **Calcium Chloride** 1000mg IV/IO and **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypothermia – Avoid rigorous movement of patient; especially if patient regains pulse. Excessive movement could cause V-Fib or V-Tach. Refer to **Cardiac Arrest Special Circumstances Guideline**
- Hypovolemia – Fluid bolus: **Crystalloid Fluid** 1-2L IV/IO
- Tension Pneumothorax – **Needle Decompression**
- Toxins – Tricyclic antidepressants or sodium channel blocker overdose: **Sodium Bicarbonate** 1mEq/kg IV/IO
  – Opiate overdose **Naloxone** 2mg IV/IO

Ventricular Fibrillation | Ventricular Tachycardia Storm (pulseless)



[1] Refractory VT/VF is defined as: any adult patient who has persisted in pulseless ventricular fibrillation/tachycardia without transient interruption of fibrillation despite at least 3 external defibrillations.

[2] **Double Sequential Defibrillation** will be performed as per department/service clinical guidelines.

- **Metoprolol** can be utilized to inhibit β-adrenergic receptors in the myocardium, providing a beneficial effect in cardiac arrest by blocking the beta effects of high concentrations of endogenous and exogenous catecholamines, thus reducing the threshold for refractory V-Tach or V-Fib.

Routine Trauma Care

- Ensure scene safety & BSI precautions
- Assess the MOI
- Assess ABC's and need for spinal precautions as per **Spinal Motion Restriction Guideline**
- Perform airway management and ventilatory assistance as needed per the **Airway Management Guideline**
- Assess for and begin treating Life Threatening Injuries
- If the patient is or becomes pulseless, proceed to the **Traumatic Arrest Guideline**

Is a **Trauma Center** indicated as per the **Trauma Activation Criteria Guideline**?

Yes

Transport to **Trauma Center**
Contact LERN[1]

Vital Signs q 5 min.

- Establish two **Large Bore IVs**
  If peripheral IV access is unobtainable or for unstable patients, **IO Access** can replace one large bore IV
- **Monitor EKG**
- **Assess** for and treat non-life threatening injuries
- Consider Pain Management
  Refer to: **Pain Management Guideline**

AEMT

Consider **TXA** or **Blood Administration**
Refer to: **TXA | Blood Guideline**

AEMT* MEDIC*

Contact Trauma Center

No

Perform focused history & physical exam

Stabilize and treat patient as needed

Transport to appropriate facility

[1] Do not delay transport in order to make contact with LERN if **Trauma Activation Criteria** is met. Begin **Transport** to the closest appropriate trauma center or facility. LERN may be contacted during transport, by on-scene non-transporting EMS providers, or after patient care has been turned over at the receiving facility.

- Tailor all resuscitation with fluid to clinical setting and suspected etiology of hypovolemic shock. Uncontrolled / Internal Hemorrhage should be managed by "Balanced Resuscitation" (ATLS), ensuring that vital organs are perfused while not over-fluid resuscitating the patient, interfering with internal hemorrhage control. It is therefore recommended that a Systolic BP of < 80mmHg, a change in mental status, or a loss of radial pulses be treated with 250mL of incremental IV/IO **Crystalloid Fluid** boluses while enroute to a **Trauma Center** or closest appropriate facility.
- Helmets and shoulder pads are only to be removed if they interfere with securing an airway or the ability to perform chest compressions. Removal should be performed with the help of the onsite athletic trainers.
- Communication Center will transmit a solid tone for 3-5 seconds once scene time reaches 8 minutes on appropriate calls.
- Tension Pneumothorax (TPX) – **Medical Control** consultation for **Needle Decompression** or **Finger Thoracostomy** may be considered but is not required, particularly when a patient is in traumatic cardiac arrest. **Finger Thoracostomy** should only be considered for patients when TPX is suspected and the patient is currently experiencing cardiac arrest, peri-arrest, or being mechanically ventilated. Utilize **Needle Decompression** for the treatment of TPX in all other patients. MEDIC | MEDIC*

Signs and Symptoms of TPX In Self-Ventilating Patients

- Blunt or penetrating trauma to the thorax or abdomen
- Pleuritic chest pain
- Respiratory distress
- Tachypnea
- Falling SpO_2
- Agitation
- Decreasing respiratory rate (late sign)
- $SpO_2 \leq 90\%$ despite high flow O_2 administration (late sign)
- Decreasing LOC (late sign)
- Hypotension (late sign)

Signs and Symptoms of TPX In Mechanically Ventilated Patients

- Blunt or penetrating trauma to the thorax or abdomen
- Immediate decrease in $SPO_2 \leq 90\%$, despite high flow O_2 administration (early sign)
- Hypotension (early sign)
- Tachycardia (early sign)
- Decrease in perfusion (early sign)
- Increase in ventilator pressure/BVM compliance (early sign)

- If a **Field Amputation** is needed, contact the nearest **Trauma Center -And/OR- LERN** as early as possible to allow for resource mobilization.
- In Traumatic Brain Injury (TBI), avoid hypoxia and hypotension.

Traumatic Cardiac Arrest

Initial management X-ABC (but may be performed simultaneously)

- Control of external hemorrhage
- Airway Control: **BVM**, **Endotracheal Intubation**, or **Supraglottic Airway**, and **$EtCO_2$ Monitoring**.
- Bilateral **Needle Decompression** or **Finger Thoracostomy** MEDIC | MEDIC*
- Application of **Pelvic Binder** if appropriate mechanism of injury
- IV/IO **Crystalloid Fluid** | **Blood Administration** AEMT | MEDIC*
- **External Chest Compressions** may be delayed while treating underlying causes including hypoxia, hypovolemia, and tension pneumothorax, however, compressions should not be considered a futile measure in all cases (i.e. suspected M.I. leading to motor vehicle collision or traumatic brain injury). EMR
- For suspected traumatic arrest due to extremity trauma exsanguination, early application of **Tourniquet(s)** is critical. EMR
- For more information, refer to the **Traumatic Cardiac Arrest Guideline**.

Burns

Routine Trauma Care

Evaluate Airway
Monitor for stridor, hoarse voice, soot, singed hairs, wheezes, rales, soot tinged-sputum, or respiratory distress

Yes → High Flow **Oxygen**
100% NRB
Anticipate aggressive airway management
EMR

Ocular Burn or Chemical Exposure
- Initiate continuous irrigation with water or normal saline
- Remove contact lenses as soon as possible

Provided the patient is no longer in contact with the burning source, treatment of life threatening injuries takes priority

Determine the burn source and remove any clothing, jewelry, or other constricting items

Using "The Rule of Nines," determine % of TBSA burned

For Critical Burns [1,2,3]
< 20% TBSA **Crystalloid Fluid** at 125mL/hr IV/IO
≥ 20% TBSA **Crystalloid Fluid** at 500mL/hr IV/IO
(250mL/hr in school-aged children)
AEMT

SBP > 100mmHg and
No Signs of Respiratory Distress
Refer to: **Pain Management Guideline**
AEMT*

Contact **Medical Control** for additional pain control or further orders

- For minor soft tissue burns involving < 10% TBSA, irrigate with sterile saline or water, then cover with dry sterile dressing
- For thermal burns > 10% TBSA, use a dry sterile dressing or burn sheet for larger body surfaces
- Apply sheets/blankets to prevent hypothermia

[1] Critical Burns > 10% Total Body Surface Area (TBSA) having any 2nd degree and/or 3rd degree burns, electrical injury, concomitant trauma, inhalation injury, any burns to the perineum, face and/or circumferential burns.

[2] Required fluid amounts are estimated according to the following formulas:
- **Adults**: 2mL x patient's weight(kg) x % TBSA burned. 50% should be infused within the first 8 hours.
- **Pediatrics:** 3mL x patient's weight(kg) x % TBSA burned. 50% should be infused within the first 8 hours.
- **Electrical:** 4mL x patient's weight(kg) x % TBSA burned. 50% should be infused within the first 8 hours.

[3] **Lactated Ringers** is the **Crystalloid Fluid** of choice for burns when available.
- Palmar surface of patient's hand and fingers = 1% TBSA.
- When both arms are burned and IV access is needed, use the veins of the feet or one external jugular. Venous access may be attempted through burned skin when necessary for intravenous or intraosseous access.
- Consider inhalation exposure to **CO and Cyanide** – treat as per applicable guideline.
- If the incident occurs at an industrial site, obtain MSDS sheet(s) when possible.

Burns

Burn Severity Determination
(2nd and 3rd degree burns only for calculation)

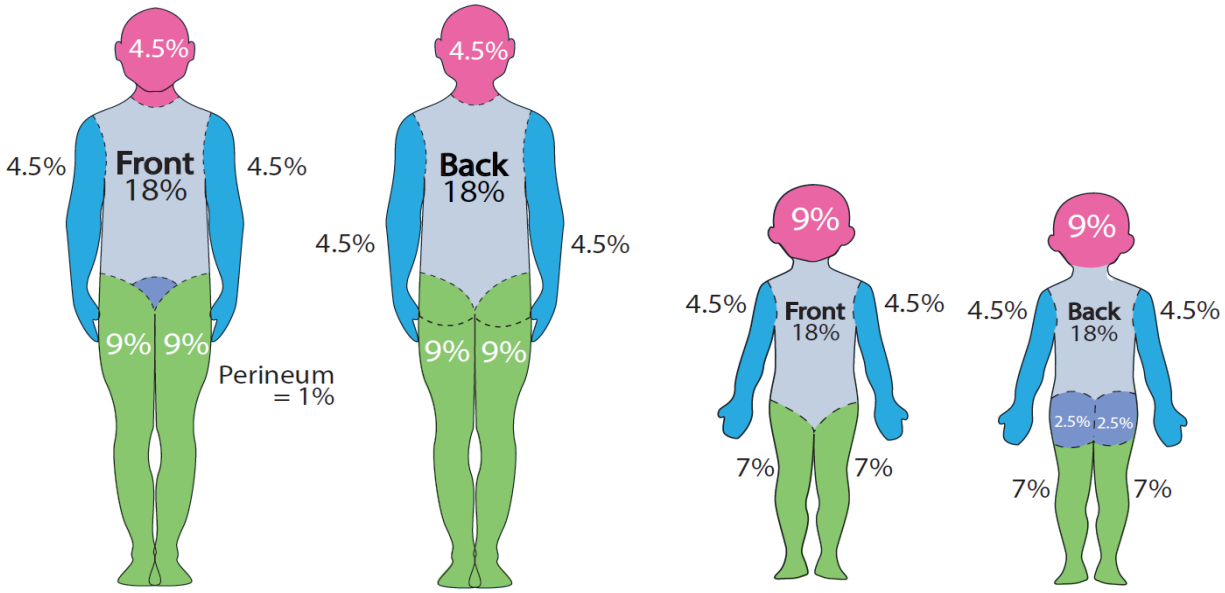
- **First Degree (Superficial Partial Thickness)**
  Red, dry, painful (does not count in % TBSA calculation)
- **Second Degree (Partial Thickness)**
  Red, blistered, weepy, swollen, sloughing skin, painful
- **Third Degree (Full Thickness)**
  Whitish, brown, charred, no sensation to burned area

Electrical Burns

- Suspect deep tissue injury
- Look for electrical contract points (blackened, dry holes in the skin)
- Evaluate for associated traumatic injuries
- Determine characteristics of source if possible (AC/DC, voltage, amperage)

Chemical Burns

- Obtain MSDS sheet(s) when possible
- Remove contaminated clothing
- Do not delay therapy while trying to identify the causative agent



- Chemical burns are uncommon but do occur, especially in the industrial settings of our region. If safety permits, remove any clothing & brush off any residue that may be present.
- Regardless of the extent of injury, flush the patient with copious amounts of tepid water. This will make certain the burning has stopped and aid in decontaminating the patient. Flushing should not be done in the ambulance. Consider / treat for hypothermia as per the **Hypothermia|Environmental Guideline**, as needed.
- If patient care can be safely delivered during decontamination, it may be done so during this time. The safety of the pre-hospital staff and hospital staff takes priority. Serious injury or death to the EMS crew could result from transporting improperly decontaminated patients in the confines of their ambulance. Furthermore, ED staff could become exposed if patients are not decontaminated prior to transport.

Burns | Adults

Routine Trauma Care

Evaluate Airway
Monitor for stridor, hoarse voice, soot, singed hairs, wheezes, rales, soot tinged-sputum, or respiratory distress

Yes → **Oxygen** 100% via NRB
Anticipate aggressive airway management

Provided the patient is no longer in contact with the burning source, treatment of life threatening injuries takes priority

Determine the burn source and remove any clothing, jewelry, or other constricting items

Using "The Rule of Nines," determine % of TBSA burned

For Critical Burns [1,2,3]
< 20% TBSA **Crystalloid Fluid** at 125mL/hr IV/IO
≥ 20% TBSA **Crystalloid Fluid** at 500mL/hr IV/IO

AEMT

SBP > 100mmHg and No Signs of Respiratory Distress
Refer to: **Pain Management Guideline**

AEMT*

If Time Permits and All Other Management Items Have Been Preformed
Consider Initiation of **Fluid Resuscitation** as Calculated By **The Consensus Formula**[2]

AEMT

Contact **Medical Control** for additional pain control or further orders

Standard of Care For Burns

- For minor soft tissue burns involving < 10% TBSA, irrigate with sterile saline or water, then cover with dry sterile dressing
- For thermal burns > 10% TBSA, use a dry sterile dressing or burn sheet for larger body surfaces
- Apply sheets/blankets to prevent hypothermia

Ocular Burn or Chemical Exposure

- Initiate continuous irrigation with water or normal saline
- Remove contact lenses as soon as possible

[1] Critical Burns > 10% Total Body Surface Area (TBSA) having any 2nd degree and/or 3rd degree burns, electrical injury, concomitant trauma, inhalation injury, any burns to the perineum, face and/or circumferential burns.

[2] Required fluid amounts are estimated according to the following formulas:

- **Adults**: 2mL x patient's weight(kg) x % TBSA burned. 50% should be infused within the first 8 hours.
- **Electrical:** 4mL x patient's weight(kg) x % TBSA burned. 50% should be infused within the first 8 hours.

[3] **Lactated Ringers** is the **Crystalloid Fluid** of choice for burns when available.

- Palmar surface of patient's hand and fingers = 1% TBSA.
- When both arms are burned and IV access is needed, use the veins of the feet or one external jugular. Venous access may be attempted through burned skin when necessary for intravenous or intraosseous access.
- Consider inhalation exposure to **CO and Cyanide** – treat as per applicable guideline.
- If the incident occurs at an industrial site, obtain MSDS sheet(s) when possible.

Burns | Pediatric

Routine Trauma Care

↓

Evaluate Airway
Monitor for stridor, hoarse voice, soot, singed hairs, wheezes, rales, soot tinged-sputum, or respiratory distress

Yes → **Oxygen** 100% via NRB
Anticipate aggressive airway management
EMR

↓

Provided the patient is no longer in contact with the burning source, treatment of life threatening injuries takes priority

↓

Determine the burn source and remove any clothing, jewelry, or other constricting items

↓

Using "The Rule of Nines," determine % of TBSA burned

↓

For Critical Burns < 20% TBSA [1,2,3]
Crystalloid Fluid 125mL/hr IV/IO
AEMT

↓

For Critical Burns > 20% TBSA [1,2,3]
≤5 years of age **Crystalloid Fluid** 125mL/hr IV/IO
6-13 years of age **Crystalloid Fluid** 250mL/hr IV/IO
≥14 years of age Crystalloid Fluid 500mL/hr IV/IO
AEMT

↓

SBP > 70 + (Age in Years x2)
with No Signs of Respiratory Distress
Refer to: **Pediatric Pain Management Guideline**
AEMT*

↓

If Time Permits and All Other Management Items Have Been Preformed
Consider Initiation of **Fluid Resuscitation** as Calculated By **The Consensus Formula**[2]
AEMT

↓

Contact **Medical Control**
for additional pain control or further orders

Standard of Care For Burns

- For minor soft tissue burns involving < 10% TBSA, irrigate with sterile saline or water, then cover with dry sterile dressing
- For thermal burns > 10% TBSA, use a dry sterile dressing or burn sheet for larger body surfaces
- Apply sheets/blankets to prevent hypothermia

Ocular Burn or Chemical Exposure

- Initiate continuous irrigation with water or normal saline
- Remove contact lenses as soon as possible

[1] Critical Burns > 10% Total Body Surface Area (TBSA) having any 2nd degree and/or 3rd degree burns, electrical injury, concomitant trauma, inhalation injury, any burns to the perineum, face and/or circumferential burns.

[2] Required fluid amounts are estimated according to the following formulas:

- **Pediatrics:** 3mL x patient's weight(kg) x % TBSA burned. 50% should be infused within the first 8 hours.
- **Electrical:** 4mL x patient's weight(kg) x % TBSA burned. 50% should be infused within the first 8 hours.

[3] **Lactated Ringers** is the **Crystalloid Fluid** of choice for burns when available.

- Palmar surface of patient's hand and fingers = 1% TBSA.
- When both arms are burned and IV access is needed, use the veins of the feet or one external jugular. Venous access may be attempted through burned skin when necessary for intravenous or intraosseous access.
- Consider inhalation exposure to **CO and Cyanide** – treat as per applicable guideline.
- If the incident occurs at an industrial site, obtain MSDS sheet(s) when possible.

Burn Center Transport Criteria

Burn Center Referral Criteria

- Partial thickness burns > 10 % total body surface area (TBSA)
- Burns involving the face, hands, feet, genitalia, perineum, or major joints
- Full thickness burns
- Electrical burns, including lightning injuries
- Chemical burns
- Inhalation injuries
- Circumferential burns
- Burns associated with trauma

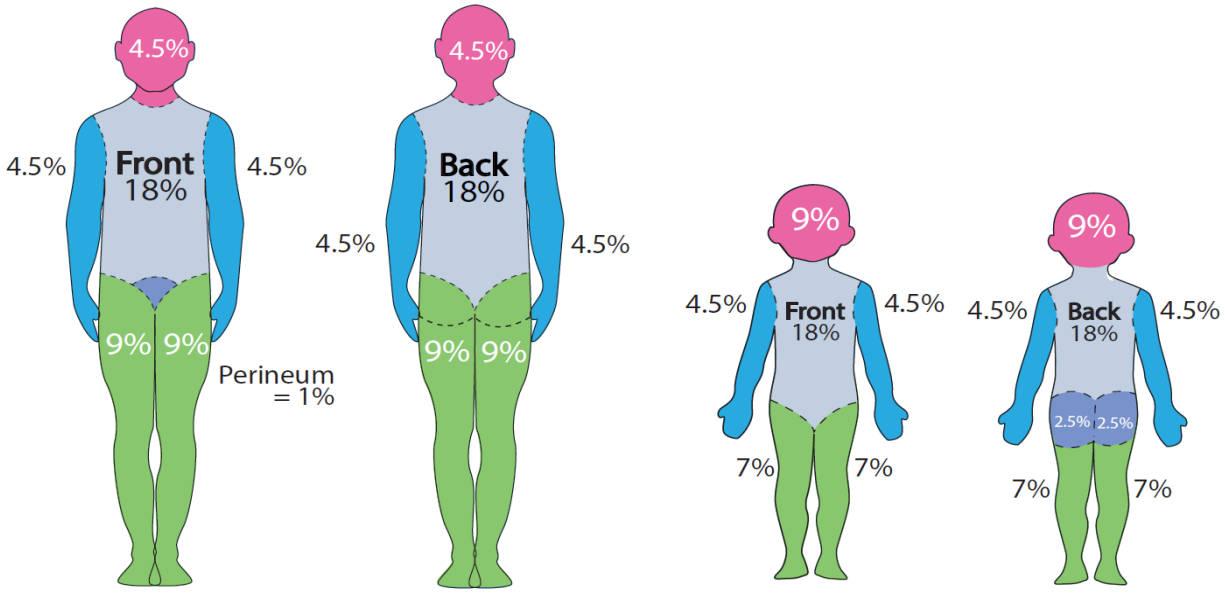
Patients < 15 years old may require transfer to a pediatric burn center for admission and therefore may be transported to the closest, most appropriate facility.

Patients with facial / airway burns or anticipated airway compromise may be diverted to the closest facility for airway stabilization.

Burn Severity Determination

(2nd and 3rd degree burns only for calculation)

- **First Degree (Superficial Partial Thickness)**
  Red, dry, painful (does not count in % TBSA calculation)
- **Second Degree (Partial Thickness)**
  Red, blistered, weepy, swollen, sloughing skin, painful
- **Third Degree (Full Thickness)**
  Whitish, brown, charred, no sensation to burned area



Burn Center Medical Control should be contacted for every major burn patient and anytime it becomes unclear if a patient is a candidate for the burn center.

Crush Injury | Syndrome (> 2 Hours)

Crush Injury

Compression of extremities or other major muscle groups causing muscle swelling and/or neurological impairment.

Crush Syndrome

Systemic manifestations of crush injury due to traumatic rhabdomyolysis and the release of potentially toxic cell components and electrolytes. This may lead to lethal dysrhythmias, hyperkalemia, hypocalcemia, renal failure, local tissue injury, or death. More likely with multiple crushed limbs. Crush syndrome may also lead to altered mental status and hypotension.

Compartment Syndrome Signs and Symptoms

Pain, Paresthesia, Pallor, Paralysis, Pulselessness, & Poikilothermia

Routine Trauma Care

↓

Hemorrhage Control Guideline

↓

Remove any rings, bracelets, or constricting items

↓

For Patients Who are Crushed/Trapped > 2 Hours Pre-Extrication

- Monitor EKG
- Establish 2 large-bore IV's
- **NS** 2L with 50mEq of **Sodium Bicarbonate** added per liter IV/IO bolus
- Following bolus, infuse **NS** 500mL/hr IV/IO
- **Consider Pain Management Guideline**

AEMT | AEMT*

↓

Post-Extrication

Monitor for Hyperkalemia

(peaked T-waves, widened QRS, sine wave)

↓

Contact **Medical Control** If Hyperkalemia is Suspected

- **Calcium Chloride** 1g IV/IO over 2 min.
- **Sodium Bicarbonate** 100mEq IV/IO Bolus
- **Albuterol Sulfate** 20mg nebulized

MEDIC

↓

Be prepared for sudden cardiac arrest post-extrication

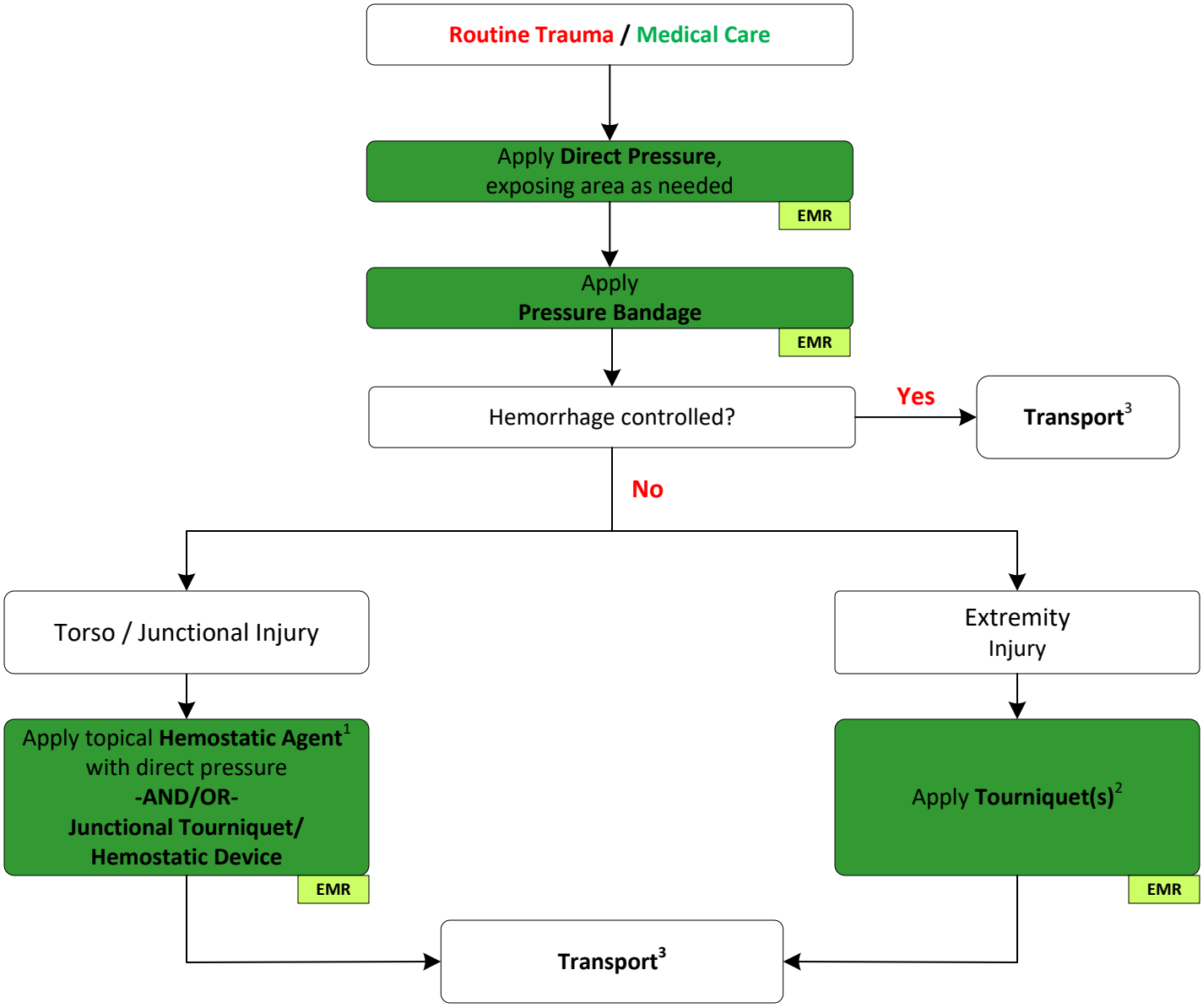
Refer to: Appropriate **Cardiac** or **Trauma Guideline**

↓

Contact **Medical Control** if further orders are needed

- Monitor the air quality for confined space rescue.
- Monitor the patient closely during extrication.
- Large volume fluid resuscitation is critical to avoid renal failure and death.
- Do not overlook other potential injuries.

Hemorrhage Control



If life-threatening hemorrhage, immediate use of a tourniquet or topical hemostatic agent is authorized.

[1] Use **Hemostatic Agent** per the manufacturer's instructions for use. Rolled gauze dressing may be used for wound packing as clinically indicated when commercially produced **Hemostatic Agents** are not available.

[2] **Tourniquets** should be used for potentially life-threatening hemorrhage when direct pressure fails to control bleeding. Apply "High and Tight" in the most accessible, proximal position. Cut away clothing prior to application so that tourniquet is visible. Mark "TK" and time of application on a piece of tape, then secure to the **Tourniquet**. Notify receiving ED staff of tourniquet placement upon ED arrival. If hemorrhage is not controlled with one tourniquet, apply a second **Tourniquet** without overlapping the initial tourniquet.

[3] If amputation, gently wash severed part with sterile saline to remove debris. Wrap severed part in sterile gauze moistened in sterile saline and place in transport container. Place transport container on ice (if available) for transport to receiving ED (amputated part should not come in direct contact with ice).

Open Wound | Fracture | Dislocation

Routine Trauma Care

Evaluate MOI and the need for **Spinal Motion Restriction** as per the **Spinal Motion Restriction Guideline**

Locate, expose and provide manual stabilization of injury

Control bleeding and assess distal circulation

Clean, bandage, and dress
any open wound using an aseptic technique

Treat Pain
Refer to: **Pain Management Guideline**[1]

AEMT*

If Distal Circulation Is Absent
Reposition/Reduce fracture/dislocation as clinically necessary to restore distal circulation x1 attempt

EMT

- **Immobilize** fracture or dislocated joints by securing the bones above and below the injured joint
- **Reassess** distal circulation before and after immobilization

EMR

Consider application of **Cold Packs** to fracture locations with evidence of swelling

For Adults with Open Fracture(s)
Cefazolin 2g Slow IV/IO Push over 3-5 min.

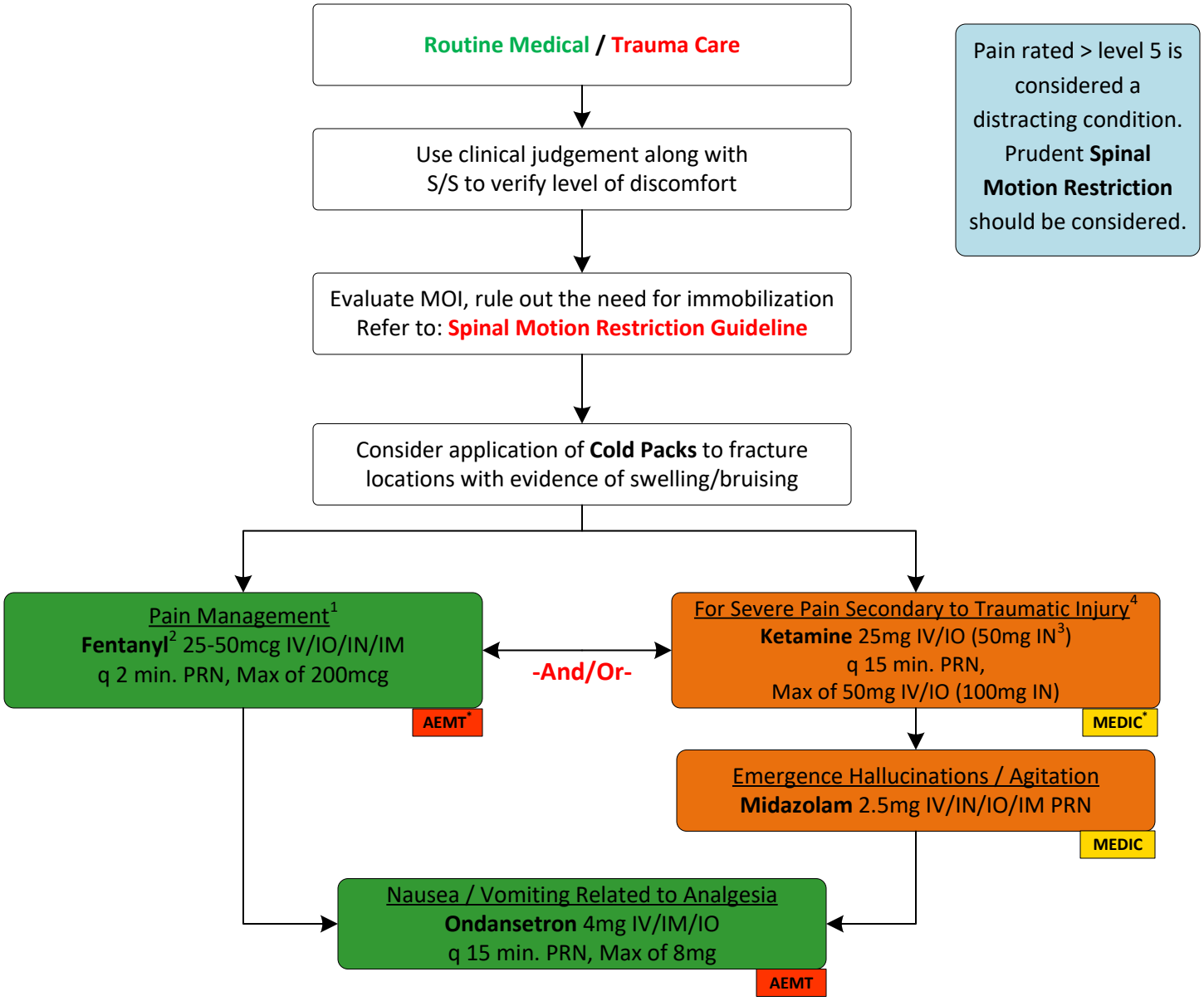
For Pediatrics with Open Fracture(s)
Cefazolin 30mg/kg Slow IV/IO Push over 3-5 min.; Max of 2g

MEDIC

[1] Consider the use of analgesics prior to patient movement or immobilization whenever possible.

- This protocol is developed for use on stable patients with complaints of an isolated fracture or dislocation.
- Patients suspected of pelvis / femur fractures should be monitored closely for signs and symptoms of shock.
- Never reintroduce an exposed bone (open fracture) back into the skin unless vascular compromise is present.
- For suspected hip fractures / dislocations, immobilize in the position found. Consider using the sheet-papoose method of immobilization or, if available, an appropriate commercial device.

Pain Management |Non-Cardiac



[1] Additional options for opiate administration can be found in the **COG Appendix**.

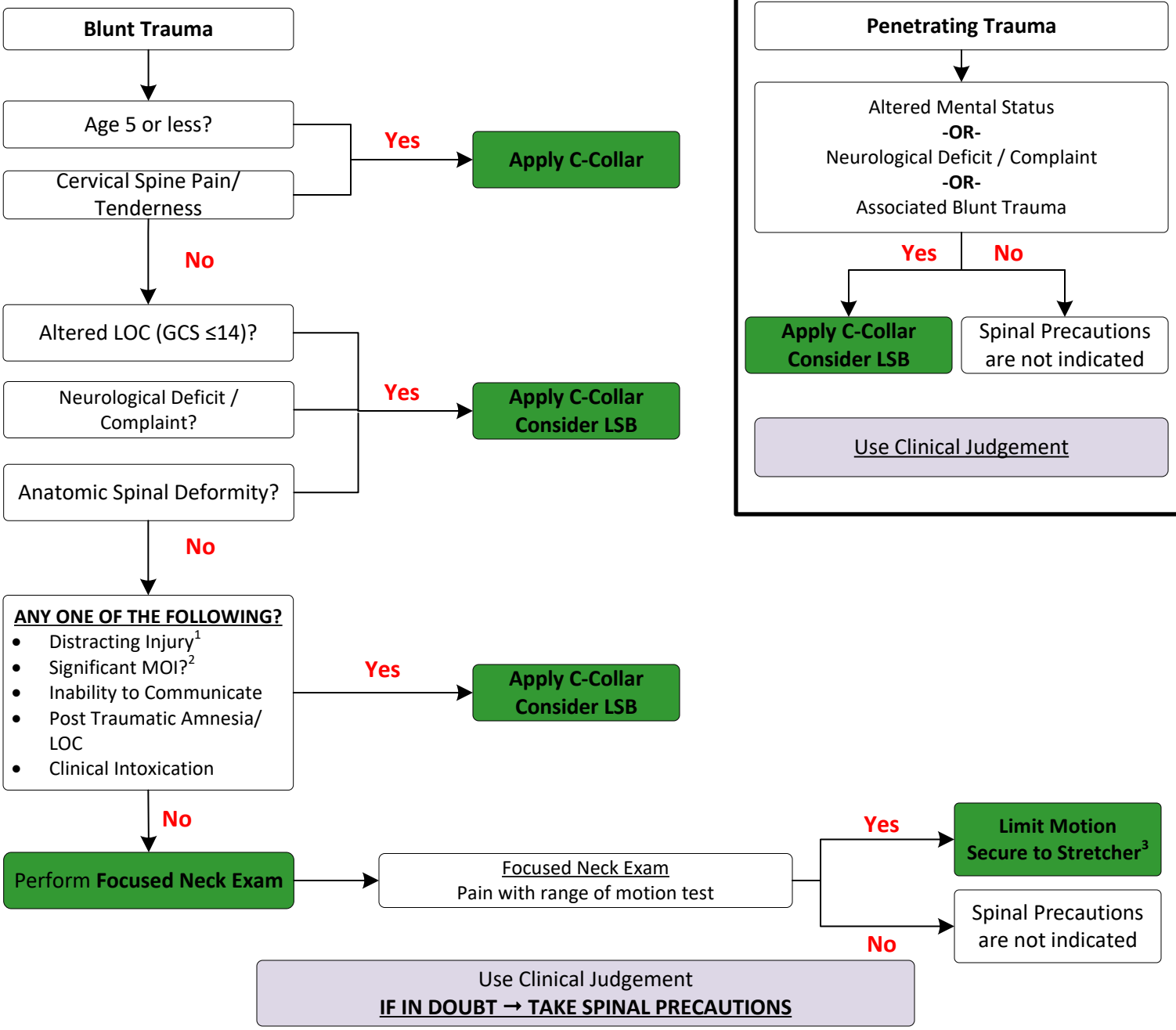
[2] **Fentanyl** is the opiate of choice within the pre-hospital setting. Standard **Fentanyl** dosing for all patients is 1-2mcg/kg but has been broken into 25-50mcg increments for ease of administration for adults. The risk of histamine release, itching, and vasodilation associated with **Fentanyl** is minimized as compared with other non-synthetic opiates.

[3] Intranasal (IN) **Ketamine** is preferred to Intramuscular (IM) **Ketamine** for pain management.

[4] The slow administration of IV/IO **Ketamine** for pain management has been proven to reduce the incidence of emergence hallucinations and adverse reaction. Dilute 25mg of **Ketamine** into 100mL of **NS** or **D5W** and administer "wide open" via a 60 gtt set. This should be considered as the preferred method for administration.

- Any patient receiving medication for pain management must be transported to an appropriate emergency department.
- Head trauma is not a contraindication for pain management.
- Pain management of the head trauma patient should be titrated to maintain a systolic BP of ≥ 110 mmHg when possible.
- Pain management of the hypotensive patient can be achieved by administering smaller doses of **Fentanyl** or **Ketamine** and titrating to effect. Use clinical judgement to determine the appropriate strategy for each patient.

Spinal Motion Restriction



[1] **Distracting Injury** – any painful injury that might distract the patient from the pain of a cervical spine injury; pain score > 5 is a distraction.

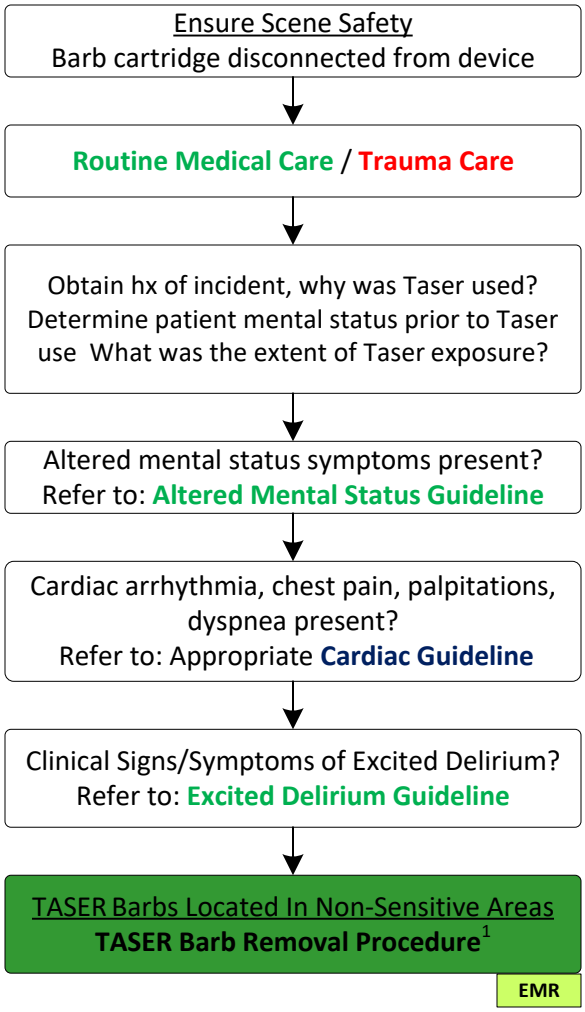
[2] **Significant M.O.I.** – determined by sound clinical judgement.

[3] non-ambulatory patients should be moved via LSB or Scoop Stretcher and then transferred onto EMS Stretcher unless gross deformities to spine or long bones exist. Patients who are secured to a EMS stretcher should have limited range of bidirectional motion that can be provided by securement with commercially available foam blocks and bands.

👍 Rule of Thumb – If you spend any length of time debating if you should take spinal precautions, you probably should.

- **Long Spine Boards** (**LSB**) have both risks and benefits. They have not been shown to improve outcomes. The best use of **LSB**s may be for extricating an unconscious patient or providing a firm surface for chest compressions. Utilization of the **LSB** should follow consideration of the individual patient's risks vs. benefits.
- **A Cervical Collar** and **LSB** should be strongly considered in patients with blunt trauma and the following co-presenting conditions: distracting injury, intoxication/altered mental status, neurological complaint, non-ambulatory blunt trauma patients with spinal pain, tenderness, or spinal deformity.
- Ambulatory patients with blunt trauma but no major injuries or co-morbidities may not need to be fully immobilized; perform a focused neck exam, assessment, and use good clinical judgement. If the patient does not require **LSB** immobilization, a **Cervical Collar** should be placed and precautions taken to ensure minimal patient movement, or tight securement to the stretcher, and/or manual in-line stabilization when appropriate.

TASER© Barb Removal



Signs and Symptoms Requiring Transport

- Evidence of excited delirium prior to having the Taser© deployed
- Persistent abnormal vital signs (HR > 115 or < 60bpm, SBP >180mmHg or < 90mmHg
- History or physical findings consistent with amphetamine or hallucinogenic drug use
- Cardiac history
- Altered mental status and/or excited delirium, including resistance to evaluation
- Evidence of hyperthermia
- Complaints of chest pain, shortness of breath, palpitations, or headache
- Patient requesting hospital transport
- Sensitive Areas: Above clavicle, female breast, genitalia, suspected vascular injury, or suspected spinal cord injury

[1] Refer to **COG Appendix** for **Taser Barb Removal Procedure**.

- Advise patient to watch for signs of possible infection: fever, localized pain, redness, swelling, heat, or purulent discharge.
- If the patient has not had a tetanus vaccination within the last 5 years, advise patient to acquire one within 72 hours.
- If the patient is not being transported, make sure your **REFUSAL** documentation includes a good history of events leading up to and following the TASER© event, as well as any/all assessments performed.
- All TASER© probes shall be accounted for prior to removal. Removed probes should be handled as contaminated sharps and disposed of accordingly; however, Law Enforcement may require return of probes so that the probes can be logged as evidence. Do not cut wires unless authorized by Law Enforcement.
- Complete medical documentation is required whether or not EMS transports the subject.
- If the patient requests medical treatment and transport, transport to the appropriate hospital.
- Treat all other trauma/medical conditions as per the applicable guideline.

Trauma Activation Criteria

The recognition of major trauma and the decision to transport the patient to a designated trauma facility will supersede patient choice without consideration of patient finances. Contact **LERN -AND/OR**- transport to the closest **Level 1 or Level 2 Trauma Center** for patients meeting **Anatomic** or **Physiologic Criteria**.

Anatomic Criteria

- Penetrating injuries to the head, neck, torso, or extremities proximal to the elbow or knee
- Chest wall instability, deformity, or flailed segment
- Two or more proximal long bone fractures
- Crushed, degloved, mangled, or pulseless extremity
- Amputation proximal to the wrist or ankle
- Suspected Pelvic fractures
- Skull deformity or suspected skull fracture
- Suspected spinal injury with new motor/sensory loss
- Active bleeding requiring a torniquet or wound packing with continuous pressure
- Combination of mechanism of trauma associated with burns including high voltage electrical injury
- Blunt abdominal injury with firm or distended abdomen or with "seatbelt sign"

Physiologic Criteria

- Unable to Follow Commands (Motor GCS <6)
- GCS ≤ 13
- Respiratory Rate < 10 or > 29/min or need for ventilatory support
- Respiratory rate < 20 in infant, less than 1 year of age or need for ventilatory support
- Room air pulse oximetry < 90%
- Age 0-9: SBP < 70 mmHg + (2 x age in years)
- Age 10-64: SBP < 90 mmHg **-AND/OR**- Shock Index >1
- Age ≥ 65: SBP <110 mmHg **-AND/OR**- Shock Index > 1

Special Considerations

- EMS provider judgement

Patients whom meet activation criteria soley based on **Mechanism of Injury Criteria** must be transported to a **Level 2, Level 3,** or to the closest **Trauma Center**

Mechanism of Injury Criteria

Falls:

- From height > 10ft (all ages)

High Risk Auto Crash:

- Intrusion (including roof) > 12 inches into occupant site; > 18 inches any site
- Need for extrication for entrapped patient
- Ejection (partial or complete) from automobile
- Death in same passenger compartment
- Child (Age 0-9) unrestrained or in unsecured child safety seat
- Vehicle telemetry data consistent with high risk injury
- Auto Vs. Pedestrian/Bicyclist/Motorcycle/ATV Rider who was thrown, run over, or experienced significant impact (>20mph)

Additional Considerations and Mechanisms:

- Rider separated from transport vehicle with significant impact (e.g. motorcycle, ATV, horse, boat, etc.)
- Head trauma in conjunction with anticoagulant use (excluding ASA) or history of bleeding disorder with evidence of high energy impact or other significant mechanism
- Blast or explosion injury
- Hanging

The receiving **Trauma Center** must be contacted for every trauma activation. If at anytime it becomes unclear whether or not a patient is a candidate for the trauma center, contact **Medical Control**.

- If the patient meets trauma criteria but has one of the below conditions or online **Medical Control** feels it is in the patient's best interest to stop at a closer facility, transport the patient to the closest **Emergency Department** for appropriate stabilization followed by expeditious transfer to a **Trauma Center**:
  - Non-patent airway (Can this be corrected by OPA, BVM and O_2?)
  - Tension pneumothorax (if uncorrected by needle decompression or finger thoracostomy)
  - Burn Patient > 40% BSA without IV/IO access
  - Transport time > 50 minutes to a **Trauma Center**
- The patient in traumatic cardiopulmonary arrest not meeting **Adult Traumatic Prehospital Termination of Resuscitation Guideline** criteria may be transported to the closest appropriate **Emergency Department** for evaluation and treatment.

Traumatic Prehospital Do Not Attempt Resuscitation (DNAR)

Assess Patient

↓

Resuscitation Should Not Be Attempted In The Following Situations Prior to Contacting **Medical Control**

- Advanced stages of body decomposition, decapitation, hemi-corpectomy, or incineration

↓

Contact **Medical Control** for **DNAR** and **Time of Death**

EMT*

↓

Adult Traumatic Prehospital Termination of Resuscitation

If the patient meets the following criteria, **Medical Control** will be contacted for Traumatic DNAR:

- Age ≥ 18 years of age
- Victim of blunt or penetrating trauma without signs of life, including spontaneous movement or pupillary response
- Apneic and pulseless with EKG revealing asystole or PEA < 40 bpm

↓

Contact **Medical Control** for **DNAR** and **Time of Death**

AEMT*

- If the mechanism of injury does not correlate with the clinical condition, suggesting a non-traumatic cause of cardiac arrest, standard resuscitative measures should be followed. Refer to: Appropriate **Pulseless Guideline**.

Traumatic Cardiac Arrest

Refer to: **Traumatic Pre Hospital Do Not Attempt Resuscitation Guideline**

Evaluate Patient
Patient pulseless, apneic, PEA > 40 bpm?
Extensive trauma incompatible with life?

X-ABC Resuscitation
- e**X**sanguination control
- **A**irway
- **B**reathing
- **C**irculation

Begin resuscitation utilizing the X-ABC method

Control External Hemorrhage
Refer to: **Hemorrhage Control Guideline**
EMR

Manage The Patient's Airway
Refer to: **Airway Management Guideline**
EMR

For Apparent or Suspected Blunt or Penetrating Trauma to the Thorax or Abdomen
Bilateral **Needle Thoracostomy**
-AND/OR-
MEDIC

Bilateral **Finger Thoracostomy**
MEDIC*

Crystalloid Fluid 1-2L IV/IO
-AND/OR-
AEMT

Blood or Blood Products IV/IO
Refer to: **TXA | Blood Guideline**
AEMT* MEDIC*

- Begin **CPR** with cardiac rhythm checks q 2 min.
- **Epinephrine 1:10,000** 1mg, repeat q 3-5 min.
- Treat cardiac rhythms per appropriate **Pulseless Guideline**
- Consider application of **Pelvic Binder** if appropriate mechanism

EMR AEMT

Return of Spontaneous Circulation?

YES → Refer to: **Trauma Center Criteria Guideline**

NO → **Transport** to closest, most appropriate Emergency Department

- **Chest Compressions** may be delayed while treating underlying causes including hypoxia, hypovolemia, and tension pneumothorax; however, compressions should not be considered a futile measure in all cases (i.e. suspected M.I. leading to motor vehicle collision or traumatic brain injury).
- X-ABC Resuscitation may be performed simultaneously if adequate assistance is available.

- Goal of scene time is < 10 min. Make every effort possible to complete all initial interventions on scene and then initiate transport to the closest appropriate facility.

Pediatric Preambles

The American Heart Association's recommended age group classifications will be adopted for use within these guidelines and are as follows:

- A neonate is birth to 28 days old
- An infant is less than one year of age
- A child is one year of age to an adolescent (known by secondary sex characteristics and/or ≈12-14 years of age)
- An adolescent is considered an adult for the purpose of treatment

Most pediatric emergencies are a result of respiratory collapse, congenital heart disease, or shock. Early recognition and aggressive treatment are imperative in treating pediatric patients. The most common cause of cardiac arrest in pediatrics is respiratory failure or shock.

Shock

PALS defines three types of shock: (1) compensated shock, (2) inadequate end organ perfusion, and (3) decompensated shock.

Compensated shock:

- Cool extremities
- Normal BP
- Prolonged capillary refill
- Tachycardia
- Weak peripheral pulses
- Intact central pulses

Inadequate end organ perfusion (all of the above criteria plus):

- Decreased urine output
- Depressed mental status
- Metabolic acidosis
- Tachypnea
- Weak central pulses

Decompensated shock (all of the above criteria plus):

- Hypotension

In assessing vital signs, capillary refill combined with another assessment tool is an adequate indicator of perfusion status. The formula used to approximate blood pressure remains the same, 70 + (2 x age in years) and should be used when treating hypotension or uncompensated shock. When fluid resuscitation is required, IV boluses can be administered in 20 mL/kg increments (10mL/kg for neonates or patients in cardiogenic shock and can be repeated twice for a total of 30 mL/kg). Isotonic fluids should be used. When treating patients for

shock, a fluid bolus of 20 mL/kg (10 mL/kg for neonates) should be administered, even if the patient has a normal blood pressure.

Pediatric patients are able to compensate better than adults when showing signs of poor perfusion. Children in shock may present with tachycardia as their only symptom.

There are many different causes of shock including:

Septic shock:

Sepsis, or a systemic infection in the bloodstream, is the most common cause of shock. Patients with septic shock generally present with fever and tachycardia. Signs of poor perfusion may or may not be present. Patients with septic shock require isotonic fluid boluses in the amount of 10-20mL/kg which can be repeated up to 3 times in the field. Rapid administration of IV fluids is imperative in treating septic shock and early antibiotic administration is also very important. Early notification to the receiving hospital can facilitate proper preparation of antibiotics and other needed therapies in anticipation of a patient's arrival. It is important to note that patients with underlying medical conditions are at a much higher risk of developing septic shock. Therefore, anyone with the following medical conditions who also present with fever and tachycardia should be treated for septic shock:

- Severe developmental delay
- Sickle cell disease or asplenia
- Cancer
- History of organ transplant
- Indwelling line or catheter
- Immune deficiency/compromise/suppression

Anaphylactic shock:

Anaphylactic shock is a distributive shock caused by massive histamine release causing a profound, systemic vasodilation that leads to decreased perfusion and hypotension. Anaphylactic shock is a life-threatening condition and is treated with Epinephrine 1:1,000 IM every 5 minutes and isotonic fluid boluses of 20 mL/kg up to 3 times (max 60 mL/kg).

Cardiogenic shock:

Cardiogenic shock is caused by impaired cardiac activity preventing proper perfusion to tissues and organs resulting in an increased heart rate, and eventually, poor perfusion and fluid overload. Signs include weak pulses, hepatomegaly (enlarged liver), and crackles on auscultation of the lungs. Cardiogenic shock requires isotonic fluid administration but in smaller doses than when treating other types of shock. 10 mL/kg isotonic

fluid boluses can be given up to 3 times (Max 30 mL/kg). Patients with cardiogenic shock will decompensate if too much fluid is given too quickly. Signs of cardiogenic shock are similar to signs of septic shock, making differentiating between the two sometimes difficult. Any patient with signs of shock who decompensates after a rapid fluid bolus should have an epinephrine drip initiated. Call medical control and notify the receiving hospital about a patient with suspected cardiogenic shock as promptly as possible.

Airway / Ventilation

When selecting an oral airway, it is important to determine the correct size. An oral airway that is too small will not prevent the tongue from obstructing the airway; an oral airway that is too large can itself obstruct the airway. Studies have shown that out-of-hospital use of bag-valve-masks (BVMs) can be safer, and as effective as providing ventilation via an ETT for short transports. Additionally, there are a higher number of unsuccessful pediatric intubations documented when compared to adult intubations in the prehospital setting. As a general rule, apneic patients should still be intubated; however, consider ventilating with a BVM or placing of a Supraglottic airway when these interventions may be effective.

During cardiac arrest, patients are often over-ventilated which can have paradoxical effects. Ventilating with an excessive tidal volume increases intrathoracic pressure and reduces venous return, which reduces cardiac output and can cause barotrauma. Excessive minute volume or a high ventilatory rate can also decrease cerebral blood flow and coronary perfusion, thereby working against resuscitative efforts. Proper ventilation with a controlled peak inspiratory pressure (PIP) will minimize GI distension, which can reduce the risk of aspiration. Pediatric assessment tape is recommended to ensure the use of proper tidal volumes and ventilatory rates.

If pediatric endotracheal intubation is required, the size of the ETT is determined by the following formulas: (patient's age in years / 4) + 4 = uncuffed ETT size in mm; or (age in years / 4) + 4, then subtract 1/2 size = cuffed ETT size in mm. It is very important that the ETT is properly sized to ensure minimal air leakage and maximal airway protection; if an ET tube is too small, consider using a larger one, provided it is a prudent choice to do so using sound clinical judgment. Cuffed endotracheal tubes are preferred in pediatric patients.

Confirmation of ETT placement is accomplished with the same methods used in adult ETT confirmation. Capnography (electronic $EtCO_2$ monitoring) is the "gold standard" of airway placement confirmation, monitoring, and documentation. If tube placement confirmation by continuous $EtCO_2$ measurement if

unavailable, or if at **ANY TIME** it is thought that the ET tube is misplaced, the tube should be **immediately removed and alternate means should be used to control the airway** (i.e. BVM). If it is believed that the ET tube is in the trachea but ventilation is difficult, consider suctioning the tube briefly to remove any obstruction and re-attempt ventilation before removing the ET tube. $EtCO_2$ monitoring may give low readings for the first few minutes during a cardiac arrest, but as CPR increases circulation and cellular perfusion, $EtCO_2$ values should increase in any patient with a viable downtime. The presence of any $EtCO_2$ value and/or waveform is evidence of proper airway placement. **NOTE: An abrupt and sustained increased in $EtCO_2$ is often the first indicator of a return of spontaneous circulation (ROSC)**.

Suctioning is a necessary skill in airway protection, but it is important to note that prolonged suctioning may work against oxygenation efforts and/or cause damage if the catheter directly contacts tissue. If suctioning is required, the duration of suction time should be limited with a max suction force between 80 and 100mmHg.

Listed below are common signs and symptoms associated with respiratory distress, failure, and arrest. This list was taken from the National Association of Emergency Medical Services Physicians. These can be referenced when assessing the respiratory status in pediatrics.[1]

Respiratory distress:

- Able to maintain sitting position (children older than four months)
- Alert, irritable, anxious
- Audible wheezing
- Central cyanosis that resolves with oxygen administration
- Intercostal retractions
- Mild tachycardia
- Nasal flaring
- Neck muscle use
- Respiratory rate > normal for age
- Stridor

[1] Brown K. Model Pediatric Protocols 2003 *National Association of EMS Physicians* 2003.

Respiratory failure (involves the above findings with any of the following):

- Central cyanosis
- Decreased muscle tone
- Increased respiratory effort at sternal notch
- Marked tachycardia
- Marked use of accessory muscles
- Poor peripheral perfusion
- Retractions, head bobbling, grunting
- Sleepy, intermittently combative, or agitated

Respiratory arrest (involves the above findings with any of the following):

- Absent breath sounds
- Absent or shallow chest wall motion
- Bradycardia or asystole
- Limp muscle tone
- Respiratory rate slower than 10 breaths per minute
- Unable to maintain sitting position (> 4 yrs of age)
- Unresponsive to voice or touch
- Weak or absent pulses

Circulation

Chest Compressions:

Focus should be placed on immediate, effective, continuous, and minimally interrupted chest compressions in both adult and pediatric patients. Despite the likelihood of a respiratory origin in a pediatric patient, compressions should be started immediately. Even basic airway equipment requires some set-up time for sizing and deployment. Therefore, the first cycle of chest compressions should be initiated without delay while allowing time (approximately 18 seconds for the first cycle) for basic airway equipment set-up and sizing. This simple logic changes our focus from Airway, Breathing, and Circulation (ABC) to Circulation/Compression, Airway, and Breathing/Ventilation (CAB).

Chest compressions should be performed at a rate of 100-120 per minute. To achieve effective chest compressions, compress at least one third of the anteroposterior (AP) diameter of the chest. This corresponds

to approximately 1½ inches (4 cm) in most infants and about 2 inches (5 cm) in most children. Once children have reached puberty (adolescence), the recommended adult compression depth is at least 2 inches (5 cm) but no greater than 2.4 inches (6 cm). Before the next compression is delivered, full chest recoil should be ensured from the previous compression.

Continue chest compressions while the defibrillator is charging. Pause compressions just before a shock is delivered to ensure the best chance of conversion. **NOTE: The chest compression/ventilation ratio for the neonate is 3:1 to increase the focus on ventilation unless there is evidence of a cardiac origin, during which the ratio should revert back to 15:2.**

In symptomatic bradycardia, chest compressions should be initiated when the heart rate is less than 60 beats per minute.

Vascular Access:

Intraosseous (IO) access is just as effective as intravenous (IV) access in pediatrics. IO access should be obtained early for unstable and/or symptomatic children. Therefore, it is unacceptable to make multiple IV attempts in a critical pediatric patient. In cardiac arrest, IO access is preferred. The preferred IO site for a pediatric patient is the distal femur.

Brief Resolved Unexplained Events (BRUE):

Any patient less than 1 year old who has a brief resolved unexplained event (BRUE) that resulted in any period of apnea, altered or inadequate breathing, cyanosis, marked change in tone, altered mental status, or any episode that required CPR should be transported to a hospital even if the patient is well-appearing upon examination. If another problem is identified, follow the appropriate guideline. If the parents refuse patient transport, call medical control to discuss parental-patient refusal against medical advice (AMA).

Defibrillator / Cardioversion

Defibrillator Pad Placement:

Place the white pad just left of the sternum and the other (red) pad on the upper back just below the scapula. Adult defib pads are generally used on pediatric patients > 10kg. However, refer to device's guidelines.

Energy Settings:

- In V-Fib / Pulseless V-Tach (no stacked shocks):
    - First defibrillation at 2 J/kg
    - Second shock at 4 J/kg (escalating to a maximum of 10 J/kg in refractory V-fib)
- After the 2nd shock, Epi 1:10,000 at a dose of 0.01mg/kg q 3-5 minutes
- For refractory VF/VT, give Amiodarone 5 mg/kg prior to the next shock in the sequence.

Notations and Reference

Glasgow Coma Scale

	Child	Infant	Score
Eye Opening	Spontaneous	Spontaneous	4
	To Speech	To speech	3
	To pain	To pain	2
	No response	No response	1
Best Verbal Response	Oriented appropriate	Coos & babbles	5
	Confused	Irritable cries	4
	Inappropriate words	Cries to pain	3
	Incomprehensible sounds	Moans to pain	2
	No response	No response	1
Best Motor Response	Obeys commands	Moves spontaneously & purposefully	6
	Localizes commands	Withdraws to touch	5
	Withdraws in response to pain	Withdraws in response to pain	4
	Flexion in response to pain	Abnormal flexion/posture to pain	3
	Extension in response to pain	Abnormal extension/posture to pain	2
	No response	No response	1

APGAR

An APGAR score is required at 1 and 5 minutes postpartum. Please perform life-saving interventions immediately after birth, as necessary. APGARs are calculated after the patient is stabilized based on how the patient appeared at 1 and 5 minutes of life.

Clinical Sign	0 (zero)	1 point	2 points
Appearance	Blue or pale	Pink body with blue extremities	Completely pink
Pulse	Absent	Below 100 bpm	Above 100 bpm
Grimace	No response	Grimaces	Cries
Activity	Limp	Some flexion	Active motion
Respiratory	Absent	Slow, irregular	Good, strong cry

A score of 7 – 10 is associated with coughing and crying within seconds of delivery. Newborns with this score typically do not require further resuscitation.

A score of 4 – 6 are moderately depressed. These patients typically appear pale or cyanotic and may have respiratory complications and/or flaccid muscle tone. These newborns will require some type of resuscitation efforts.

Term Newborn Vital Signs

Heart rate 120 – 160 beats per minute
Respiratory rate 30 – 60 breaths per minute
SBP 56 – 90mmHg
DBP 26 – 56mmHg
Glucose ≥ 40mgdL

Neonatal Resuscitation

Three Question Rapid Assessment

1. Was the baby born following a full-term gestation?
2. Presence of good muscle tone?
3. Baby breathing or crying?

Term Newborn Vital Signs

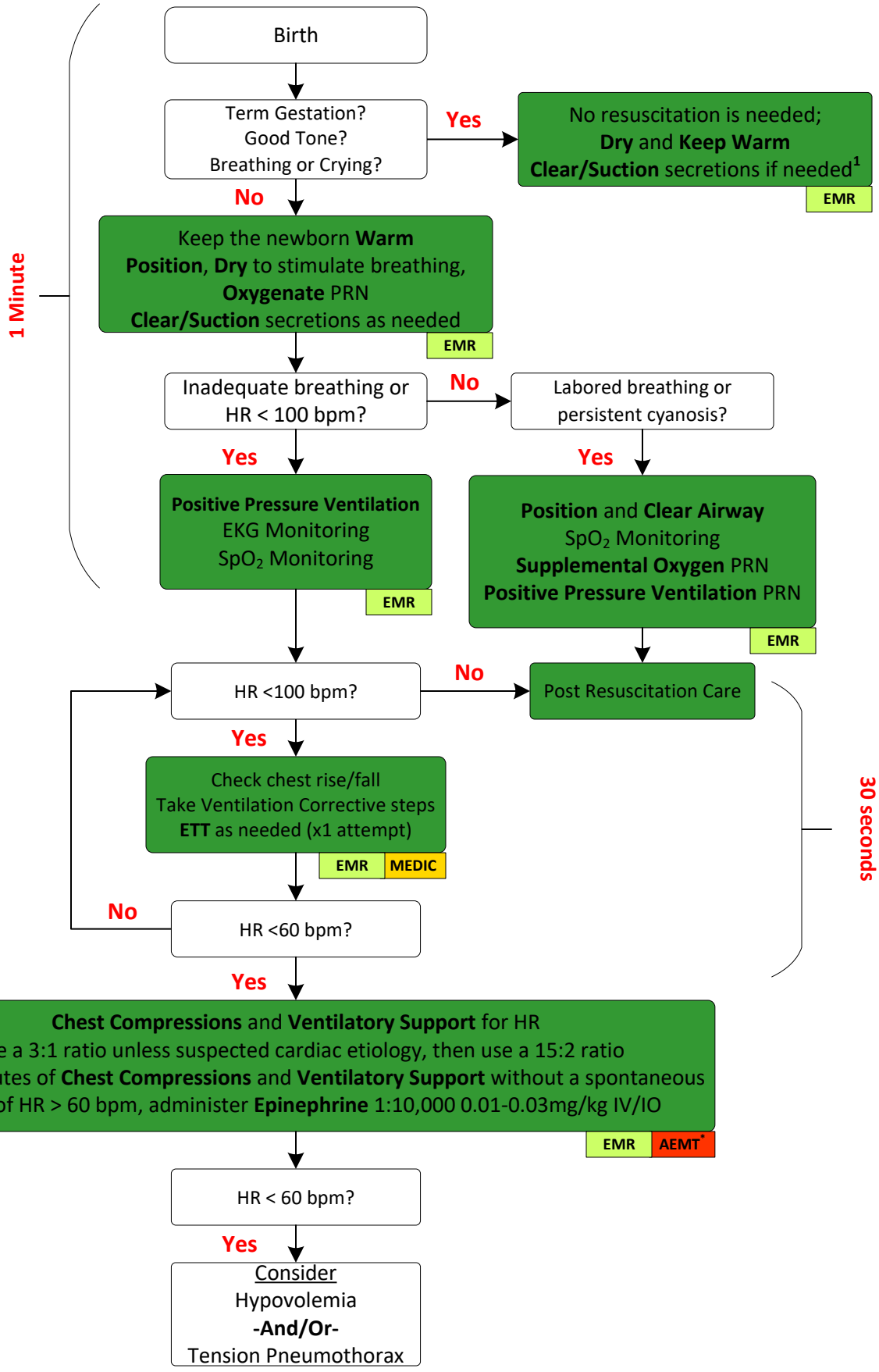
Heart Rate 120–160 bpm
Respiratory Rate 30–60 bpm
SBP 56 – 90mmHg
DBP 26 – 56mmHg
Glucose ≥ 40mg/dL

APGAR Score

Performed at 1 and 5 minutes after birth

Targeted Preductal SpO_2 After Birth

1 min	60-65%
2 min	65-70%
3 min	70-75%
4 min	75-80%
5 min	80-85%
10 min	85-95%



[1] Routine intubation for tracheal suctioning in the presence of meconium-stained amniotic fluid is no longer recommended.

Pediatric Adrenal Insufficiency | Crisis

Primary Adrenal Insufficiency
- Addison disease
- Sepsis
- Congenital adrenal hyperplasia

Secondary Adrenal Insufficiency
- Asthma
- Organ transplant
- Chronic steroid use

Routine Medical / Trauma Care

↓

Consider
Pediatric AMS Guideline
as clinically indicated

↓

Consider
Pediatric Shock Guideline
as clinically indicated

↓

Consider Stress Dose Steroids
- Patients with hypotension refractory to **Crystalloid Fluid** and/or **Vasopressors**
- History of adrenal insufficiency and any of the following signs and symptoms:
  - Altered mental status
  - Burns >5% TBSA
  - Environmental hypothermia
  - Environmental hyperthermia
  - Fever and ill-appearing
  - Multisystem trauma
  - Shock
  - Vomiting/diarrhea with evidence of dehydration

↓

Stress Dose Steroids[1]
Hydrocortisone (Solu-Cortef) 2mg/kg IV/IO/IM
Max of 100mg
-OR-
Methylprednisolone 2mg/kg IV/IO/IM
Max of 125mg
-OR-
Dexamethasone 0.3mg/kg IV/IO/IM
Max of 10mg

AEMT*

↓

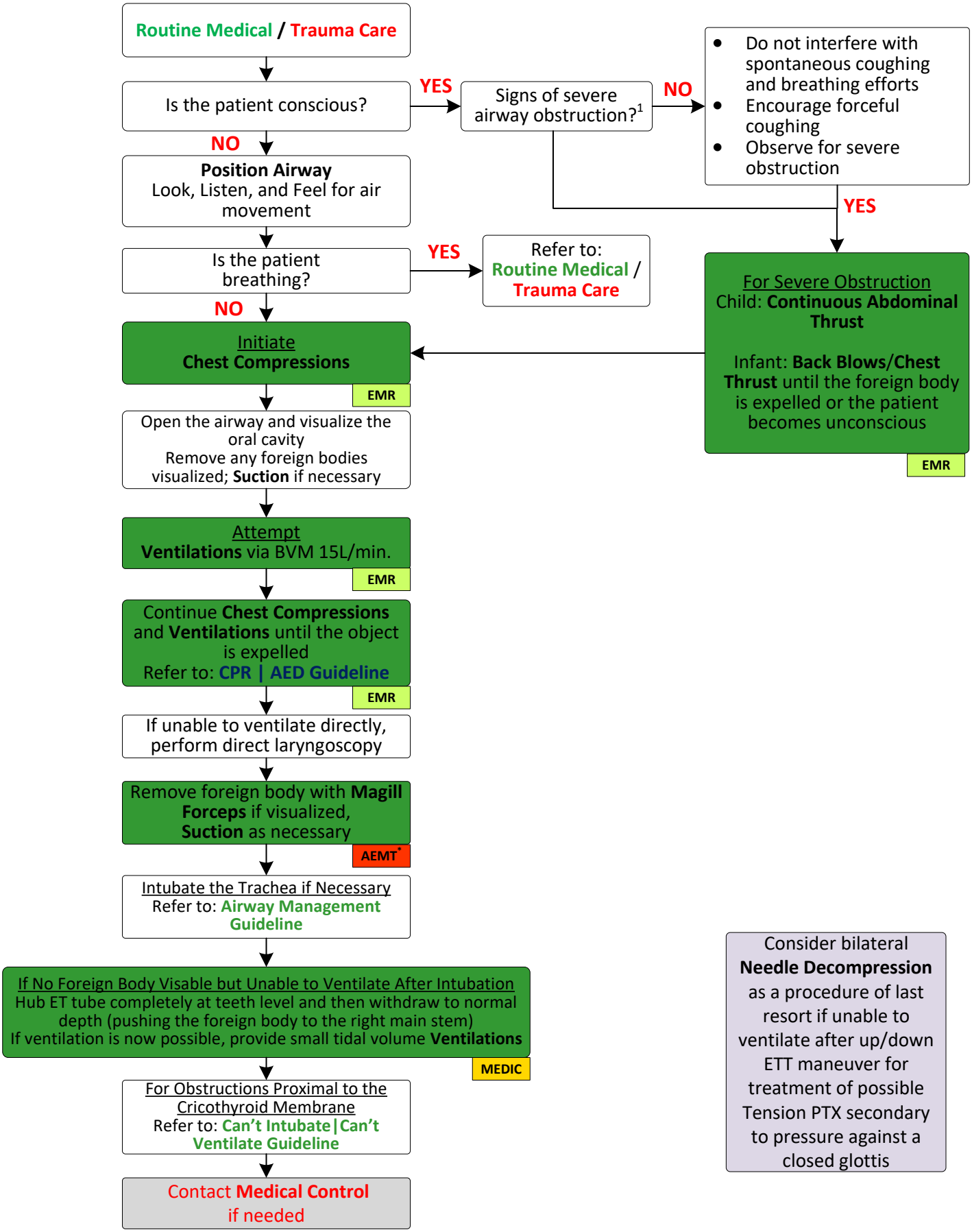
Contact **Medical Control**
for additional orders or consultation

Adrenal Insufficiency patients may have a primary or secondary history of long-term steroid use.

Administration of steroids may be life-saving in these patients.

[1] Patients that present with their own steroid medication may have their medication utilized by AEMTs* & Paramedics for emergency administration including Hydrocortisone (Solu-Cortef). If the patient's medication is unavailable or unusable, **Methylprednisolone** or **Dexamethasone** may be given. **Hydrocortisone** (Solu-Cortef) is preferred due to its dual glucocorticoid and mineralocorticoid effects when available.

Pediatric Airway Obstruction | Foreign Body



[1] Signs of severe airway obstruction include: silent cough, or increasing respiratory distress accompanied by stridor.

Pediatric Altered Mental Status

Routine Medical Care

Cardiac or Respiratory Failure?
(including HR < 60 bpm and age < 8yo)

→ **Pediatric Cardiac Arrest Guideline**

Signs of opiate/opioid overdose or respiratory compromise present?

- Shallow respirations
- Inability to maintain airway
- RR< 10/min
- SpO_2 < 94%

→ **Naloxone** 0.1mg/kg IV/IO/IN/IM q 2 min. PRN, Max of 2mg — AEMT

Pediatric patients exhibiting signs and symptoms of AMS should have all of their clothing removed and be thoroughly examined for signs of trauma or abuse.

Infants < 4 months of age with evidence of bruising should be transported to a trauma center.

Access **CBG**
CBG< 60mg/dL ?
(<40mg/dL if newborn)

→ **Dextrose 10%**[1,2] 5mL/kg IV/IO Max of 250mL — AEMT

Signs of Hypotension/ Hypoperfusion?
Hypotension = SBP 70mmHg + (Age x 2)

→ **Crystalloid Fluid** 20mL/kg IV/IO PRN, Max of 60mL/kg
-AND-
Consider
Pediatric Shock Guideline — AEMT

Obvious signs of trauma or injury?

→ **Appropriate Trauma Guideline**

Recent or current seizure activity?

→ **Pediatric Seizure Guideline**

Signs/Symptoms of stroke?

→ **Adult Stroke Guideline**

Consider other causes of AMS

Contact **Medical Control** for additional orders or consultation

Causes of AMS

- **A**lcohol → Drug Overdose Guideline
- **E**pilepsy → Pediatric Seizure Guideline
- **I**nsulin → Pediatric AMS Guideline
- **O**verdose → Drug Overdose Guideline
- **U**remia → Routine Medical Care
- **T**rauma → Trauma Activation Criteria
- **I**nfection → Sepsis Guideline
- **P**sych → Excited Delirium Guideline
- **S**troke → Stroke Guideline

[1] To create 5g of **Dextrose 10% :** Withdraw 40mL of **D50** and replace with 40mL of **NS** = **Dextrose 10%** (0.5g/5mL).

-OR-

To create 25g of **Dextrose 10% :** Withdraw 50mL of 250mL Bag of **NS** and replace with 50mL of **D50** = **Dextrose 10%** (0.5g/5mL).

[2] If there is no risk for aspiration or airway compromise related to the patient's mental status, oral carbohydrates along with oral glucose may be administered in place of IV/IO **Dextrose**. This includes the use of products found in the patient's home.

Pediatric Allergic Reaction | Anaphylaxis

Evaluate for non-anaphylactic allergic reaction versus anaphylaxis

Consider other specific guidelines (e.g. airway management, breathing difficulty, shock)

Routine Medical Care

Severity of Reaction

Non-Anaphylactic Allergic Reaction

Diphenhydramine
1-2mg/kg IV/IM
MEDIC

For Wheezing and Chest Tightness
Pediatric Asthma Guideline
-Or-
Bronchiolitis Guideline
For Stridor
Pediatric Croup | Stridor Guideline

Anaphylaxis

Epinephrine 1:1,000[1]
If < 25kg, 0.15mg IM
If ≥ 25kg, 0.3mg IM
PRN, q 5 min. Max of 2 doses
EMT*

Diphenhydramine
1-2mg/kg IV/IO/IM
MEDIC

Crystalloid Fluid 20 mL/kg
IV/IO PRN, Max of 60mL/kg
AEMT

Methylprednisolone[2]
2mg/kg IV/IO/IM
MEDIC

Persistent hypotension
or signs of hypoperfusion?

For patients ≥ 2 years of age
(14kg IBW)
Epinephrine Infusion
0.1-1mcg/kg/min. IV/IO
Refer to: Pediatric Shock Guideline
MEDIC

Non-Anaphylactic Allergic Reaction

- Symptoms involve only one organ system and are generally considered a mild or moderate reaction.

Anaphylaxis

- Severe reaction that is often rapid in onset and meets one of the following criteria:

Involves Two or More Body Systems

- Respiratory compromise (dyspnea, wheezing, stridor)
- Facial/lip/tongue swelling, voice change, feeling of throat tightening, difficulty swallowing
- Rash, widespread hives (urticaria), generalized itching
- Persistent GI involvement (vomiting or abdominal pain)
- Altered mental status, syncope, or shock

-OR-

Known Allergen Exposure

(Two system involvement is not required)

- With hypotension: SBP <70mmHg + (Age in years x 2)

-OR-

- Respiratory compromise

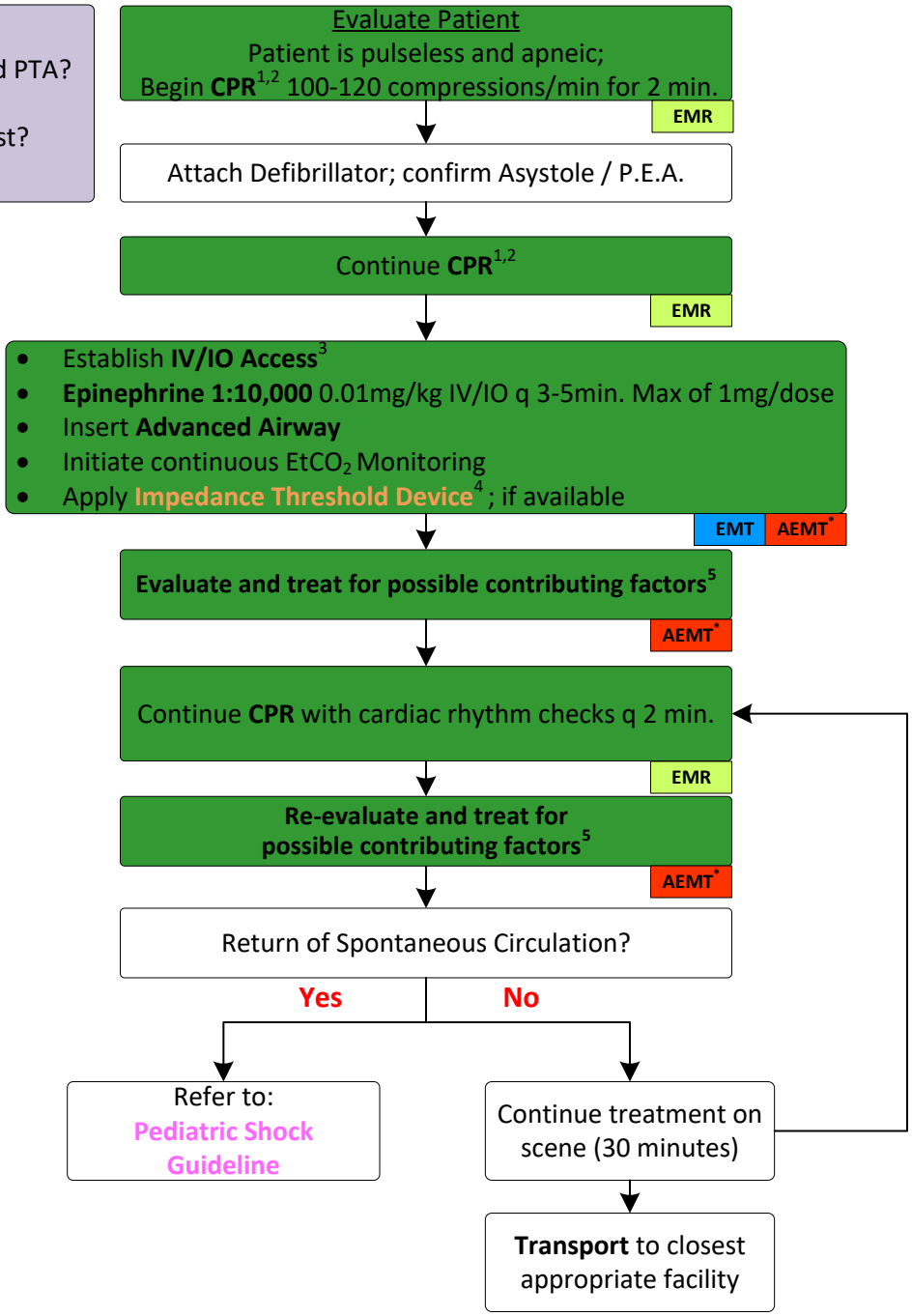
[1] The mainstay of treatment for anaphylaxis is **Epinephrine**. Consider immediate **Epinephrine** IM prior to initiating IV/IO access in critically ill patients. Administration of **Epinephrine** IM is most effective via the vastus lateralis or the rectus femoris sites.

[2] **Corticosteroids** are not indicated as the initial treatment for anaphylaxis in the place of **Epinephrine**; they can be given as adjunctive therapy after the administration of **Epinephrine** but should be considered as a secondary treatment.

- If the patient has their own **Epinephrine** auto-injector, BLS or ALS providers may assist with administration.
- Reassess frequently for signs of deterioration, including impending airway obstruction.
- A dystonic reaction (to Phenothiazines) is an adverse reaction **NOT** an allergic reaction. Patients may receive **Diphenhydramine** 1-2mg/kg IV/IM.

Pediatric Asystole | PEA

Effective CPR performed PTA?
AED used PTA?
EMS witnessed arrest?



[1] Guidelines for Pediatric CPR may be found in the **Pediatric CPR | AED Guideline**.
[2] Patients should be worked on scene for a minimum of 30 minutes to ensure high quality **CPR** and patient management. **CPR** maybe performed in the back of an ambulance for pediatric patients to facilitate scene safety/management but transport should not be initiated until the patient regains a pulse or unless extenuating circumstances exist.
[3] IO access is the standard of care for venous access in the presence of cardiac arrest. For pediatric patients < 8 years old, the distal femur site should be considered. Refer to the **COG Appendix** for more information regarding **Intraosseous Access**.
[4] **Impedance Threshold Devices** may be utilized for patients ≥ 2 years of age.
[5] Contributing Factors and Recommended Treatment:

- Hypoglycemia – **Dextrose 10%** 1g/kg IV/IO
- Hyperkalemia – Includes Hx of renal failure: **Calcium Chloride** 20mg/kg IV/IO Max of 1g and **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypothermia – Avoid rigorous movement of patient; especially if patient regains pulse; excessive movement could cause V-Fib or V-Tach; Refer to: **Cardiac Arrest Special Circumstances Guideline**
- Hypovolemia – Fluid bolus: 20-60mL/kg of **Crystalloid Fluid** IV/IO
- Tension Pneumothorax – **Needle Decompression**
- Toxins – Tricyclic antidepressants or sodium channel blocker overdose: **Sodium Bicarbonate** 1mEq/kg IV/IO
  – Opiate overdose: **Naloxone** 0.1mg/kg IV/IO

Pediatric Bradycardia

Routine Medical Care

↓

HR < 60 bpm and < 8 Years Old with Signs of AMS or Poor Perfusion?

Refer to: **Pediatric Cardiac Arrest Guideline**[1]

↓

Cardiopulmonary Compromise Present?

- Hypotension
- Altered mental status
- Signs of shock

No →

- Support ABC's
- O_2 as needed
- Observe
- Transport

Yes ↓

Ensure Proper
Oxygenation -AND- Ventilation
Obtain **12-Lead EKG**

EMR | EMT*

↓

Poor perfusion and/or compromise persists?

No → (Support ABC's)

Yes ↓

Identify and Treat Reversible Causes (H's and T's)

MEDIC

↓

Epinephrine 1:10,000
0.01mg/kg IV/IO q 5 min. PRN, Max of 1mg

MEDIC

↓

Bradycardia Due to Vagal Stimulation
-OR-
Bradycardia Due to Primary AV Block
Atropine Sulfate 0.02mg/kg IV/IO
PRN, Max of 2 doses
(Min single dose 0.1mg, Max single dose 0.5mg)

MEDIC

↓

Transcutaneous Pacing
if needed to support cardiorespiratory function

MEDIC

↓

Consider
Pediatric Shock Guideline

↓

Contact **Medical Control**
for additional orders or consultation

- Significant bradycardia is defined by PALS as a heart rate less than 60 bpm with signs of poor systemic perfusion.
- Treatment should be geared toward reversing hypoxia and hypotension – H's and T's should also be considered.
- Use caution when intubating and suctioning patients <1 y/o as excessive vagal stimulation can cause further bradycardia.

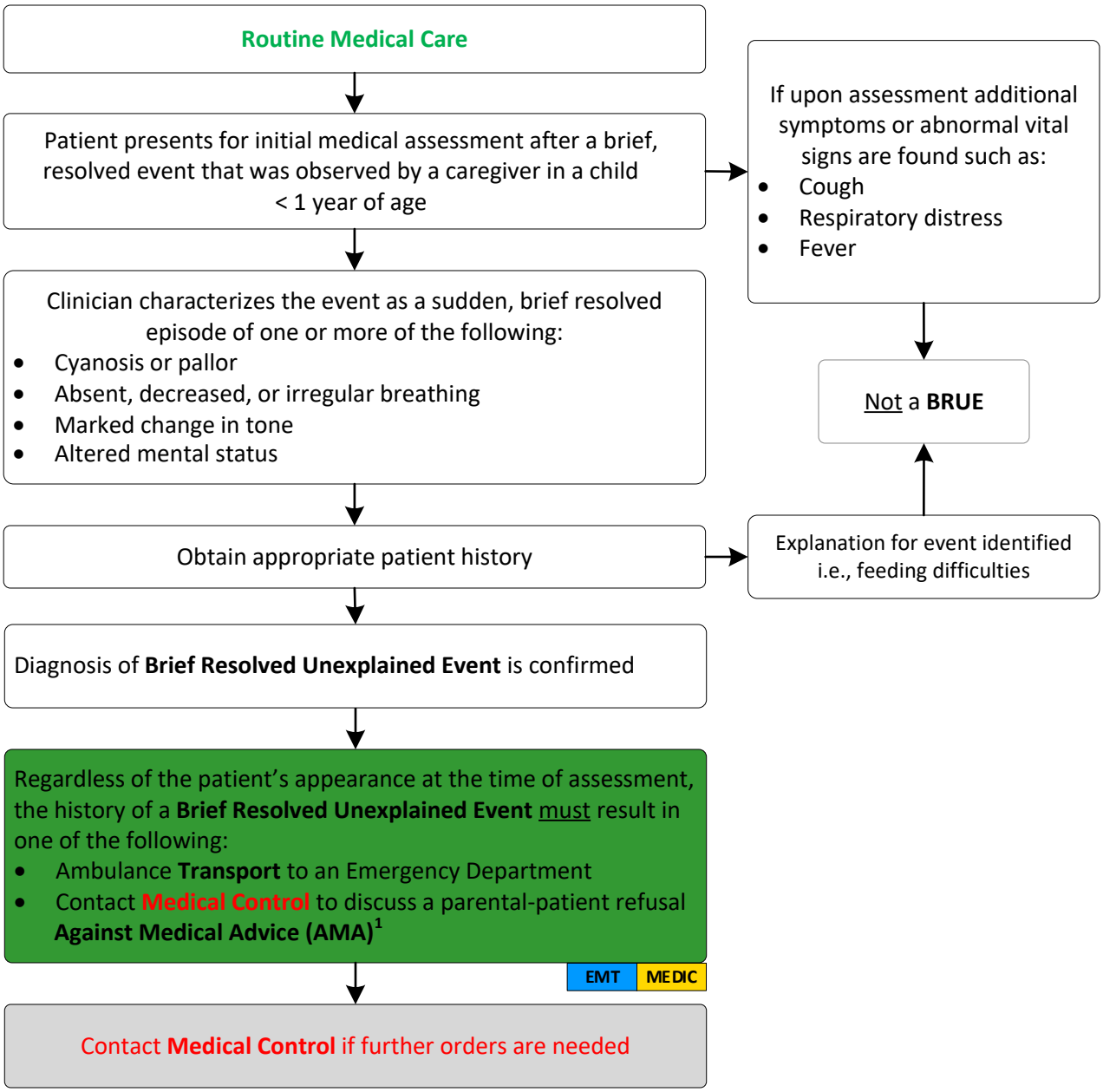
Reversible Causes of Pediatric Bradycardia

Hypovolemia - 20mL/kg **NS** bolus (Max 60mL/kg)
Hypoglycemia – **Dextrose 10%** 5mL/kg (0.5g/kg) IV/IO
Hyperkalemia – **Calcium Chloride** 20mg/kg IV/IO Max 1g
Hypokalemia – **Routine Medical Care**
Hypothermia – **Hypothermia | Environmental Guideline**
Hypoxia – **RMC -AND/OR- Airway Management Guideline**
Toxins – **Naloxone** 0.1mg/kg IV/IO for opiates
Tension Pneumothorax – **Needle Decompression**
Trauma – **Appropriate Trauma Guideline**
Tamponade (Cardiac) – **Routine Medical Care**
Thrombosis, Pulmonary (i.e. PE)– **Routine Medical Care**
Thrombosis, Coronary (i.e. STEMI) **ACS Guideline**

[1] Chest compressions should not be delayed for an EKG and should continue while hypoxia is being treated.

- The most common cause of pediatric bradycardia is hypoxia – it often occurs just prior to cardiac arrest.
- The primary factor guiding patient care is hemodynamic stability. Bradycardic patients who are perfusing well and do not have respiratory compromise usually do not require emergency treatment.

Pediatric Brief Resolved Unexplained Event (BRUE)



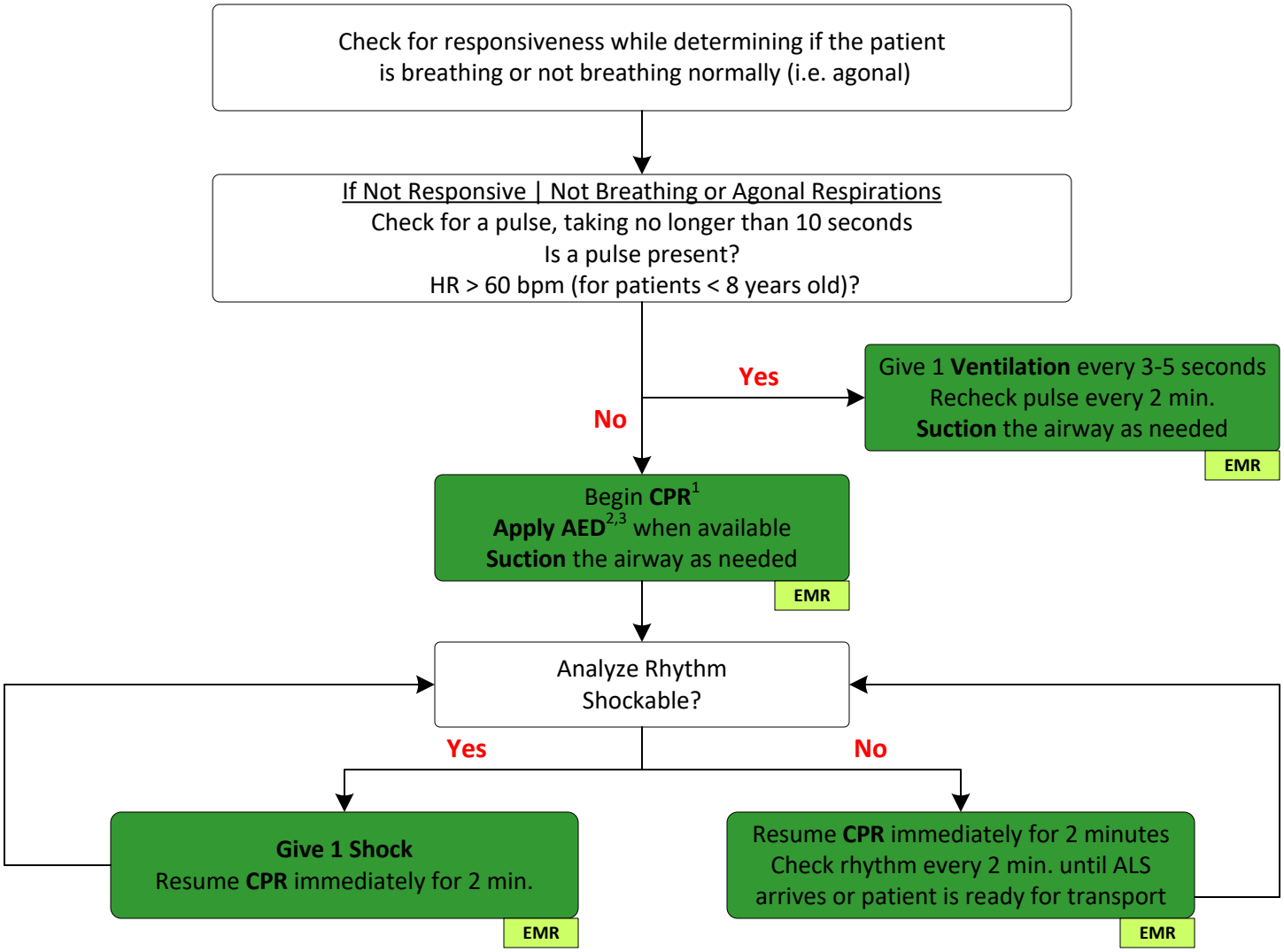
[1] Obtaining a refusal of any kind should be done with the highest available trained provider on duty, optimally a paramedic. An EMT may transport of BRUE patient if an ALS provider is not available for transport.

Brief Resolved Unexplained Event (BRUE):

An event occurring in an infant <1 year of age when the observer reports a sudden, brief, and now resolved episode of ≥ 1 of the following:

- Cyanosis or pallor
- Absent, decreased, or irregular breathing
- Marked change in tone (hyper or hypotonia)
- Altered level of responsiveness

Pediatric CPR | AED



Following the Initial Rhythm Check or Defib

- Utilize a **Mechanical Compression Device**; if available
- Consider the use of a **Supraglottic Airway**
- Apply Impedance Threshold Device;[4] if available

Emphasis on High-Quality **Continuous CPR**

- Compression rate of 100-120 per minute
- Initiate **Continuous Chest Compressions** and **Ventilate** every 3 seconds via BVM or every 5-6 seconds after the placement of an **Supraglottic** or **Advanced Airway**
- Compression depth of at least 1/3 of the chest wall
- Allow complete recoil after each compression
- Minimize interruptions in compressions
- Avoid excessive ventilation

[1] Evaluate pulses in infants by palpating the brachial artery. Pulses may be evaluated in children by palpating the carotid artery.
[2] Do not delay compressions while preparing a BVM / Oral Airway or applying the AED.
[3] Use pediatric AED pads with an in-line dose attenuator as indicated when available. If pediatric AED pads are not available, adult AED pads and energy settings may be used.
[4] An **Impedance Threshold Device** can be utilized for patients ≥ 2 years of age. An **Impedance Threshold Device** prevents unnecessary air from entering the chest during the decompression phase of **CPR**. When air is prevented from rushing into the lungs as the chest wall recoils, the vacuum (negative pressure) in the thorax pulls more blood back to the heart, resulting in an increased blood flow to the heart, brain, and organs. Remove the **Impedance Threshold Device** upon return of spontaneous circulation (ROSC).

- Allow for early consideration of ALS backup or intercept.
- Patients should be worked on scene for a minimum of 30 minutes to ensure high quality **CPR** and patient management. **CPR** may be performed in the back of an ambulance for pediatric patients to facilitate scene safety/management but transport should not be initiated until the patient regains a pulse or unless extenuating circumstances exist.

Pediatric Croup | Stridor

Concerning Symptoms

- Significant inspiratory stridor at rest
- Decreased responsiveness
- Apnea or cyanosis
- Inability to tolerate secretions

Routine Medical Care

Oxygen 15L/min NRB
-OR-
Assist Ventilations with **BVM** as needed[1]
Suction (bulb or mechanical) if excessive secretions are present

EMR

Attempt to keep child calm, avoid undue distress
Allow for position of comfort

Stridor at Rest?

No → Continue to monitor and reassess frequently during transport

Yes

Epinephrine 1:1,000 3mg Nebulized PRN, Max of 2 treatments

MEDIC

Dexamethasone IV/IM 0.6mg/kg Max of 16mg

MEDIC

Assess for hypoperfusion / dehydration

For Hypoperfusion / Dehydration[1]
Crystalloid Fluid IV/IO 20mL/kg

AEMT

Contact **Medical Control** for additional orders or consultation

Croup usually affects children under the age of 3 and is associated with cold symptoms, hoarse voice, and a barking cough. Always also consider the possibility of foreign body aspiration in your differential diagnosis.

[1] The benefits of IV/IO access and fluid should outweigh the increased distress caused to the child.

Pediatric Do Not Attempt to Resuscitate (P-DNAR)

Assess Pediatric Patient[1]

↓

Resuscitation Should Not Be Attempted In The Following Situations Prior to Contacting **Medical Control**

- Lividity
- Rigor Mortis
- Body decomposition
- Extensive traumatic injuries incompatible with life such as but not limited to: decapitation, transection of the torso, severe displacement of brain matter, complete exsanguination, or incineration
- Presence of legal documents (Physician Orders for Life Sustaining Treatment (POLST), Advanced Directives, Living Wills, or DNR) stating resuscitative efforts be withheld

↓

If any doubt of clinical death exists; refer to the appropriate: **Pediatric Cardiac Arrest Guideline**

↓

Necessary Assessment Findings

- Asystole **EKG**[1,2] strip in at least two leads, which must be included in the Patient Care Report.

Examine and Document Findings On-Scene

- Signs of possible neglect or abuse
- Patient medications
- Known medical history
- Last time patient was spoken to or known well time
- Patient position and location
- Skin temperature
- Pupils
- Presence of obvious trauma or deformity
- Unusual findings or circumstances

↓

Contact **Medical Control** for **P-DNAR** and **Time of Death**

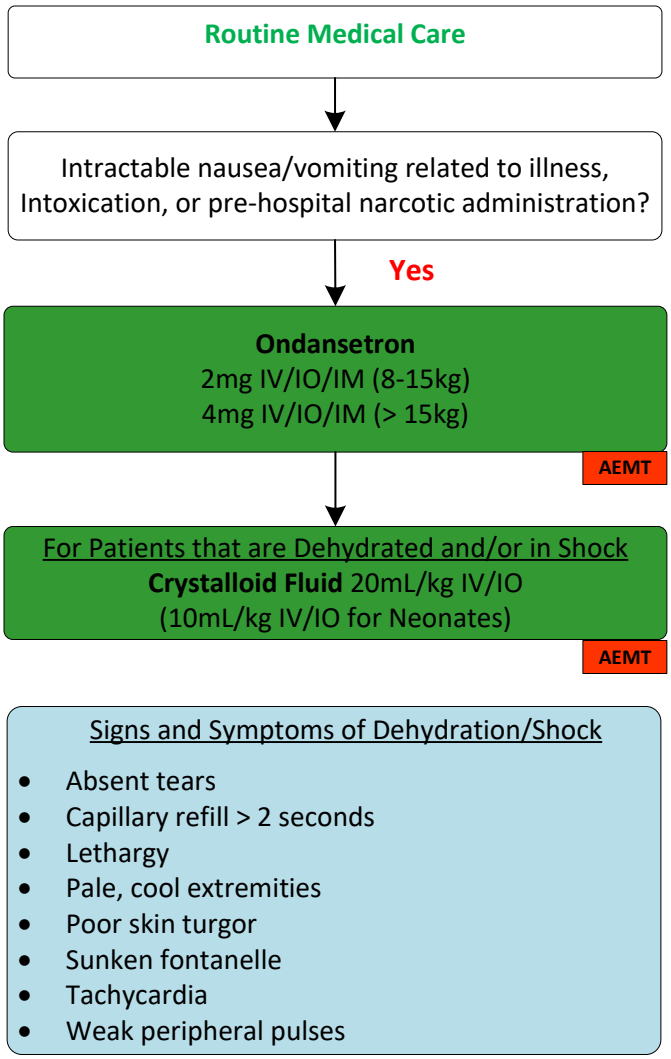
MEDIC

[1] EKG electrodes may be placed posteriorly or on limbs when necessary. Every effort possible should be made to preserve a crime scene when possible.

[2] Patients who present with advanced stages of decomposition or whom are absolutely inaccessible may be assessed and pronounced without a confirmatory EKG with orders from **Medical Control.** Prudent clinical judgement must be used.

- If a Paramedic arrives to find **CPR** in progress on a pediatric patient who is clearly deceased or meets DNAR criteria, CPR can be stopped with orders from **Medical Control**.

Pediatric Nausea | Vomiting | Dehydration



Signs and Symptoms of Dehydration/Shock

- Absent tears
- Capillary refill > 2 seconds
- Lethargy
- Pale, cool extremities
- Poor skin turgor
- Sunken fontanelle
- Tachycardia
- Weak peripheral pulses

Pediatric Traumatic Pain Management

Routine Medical Care / **Trauma Care**

- Evaluate mechanism of injury
- Assess the need for spinal precautions
  Refer to: **Spinal Motion Restriction Guideline**

Consider Comfort Therapies

- Place patient in **Position of Comfort**
- **Splint/support** painful areas
- Consider **Ice -AND/OR- Compression**

Evaluate level of pain by either **Numeric Pain Scale** (1-10) or by using the **Bieri Faces Pain Scale**

Intranasal delivery of **Fentanyl** is the preferred method of administration prior to IV access

Administer Opiates for Moderate to Severe Pain (4-10) [1,2,3]

Fentanyl 1mcg/kg IV/IO/IM/IN
Max initial dose of 100mcg
May repeat q 5 min. PRN, Max of 200mcg

AEMT* | MEDIC

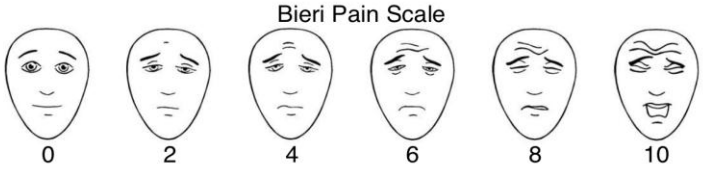
Have **Naloxone** readily available to treat opiate-induced respiratory depression.

Reassess pain level 5-10 minutes after treatment

10 min after initial treatment, if pain is 8-10
Contact **Medical Control**
for additional orders or consultation

Consider repeating **Fentanyl**

Bieri Pain Scale



[1] Additional options for opiate administration can be found in the **COG Appendix**.
[2] **Fentanyl** is the opiate of choice within the pre-hospital setting. The risk of histamine release, itching, and vasodilation associated with **Fentanyl** is minimized as compared with other non-synthetic opiates.
[3] AEMTs with additional training and medical director authorization may administer Fentanyl IN/IM.

- Any patient receiving medication for pain management must be transported to an appropriate Emergency Department
- Head trauma is not a contraindication for pain management.
- Pain management for the hypotensive patient can be achieved by administering smaller doses of **Fentanyl** or other analgesic and titrating to effect. Use clinical judgement to determine the appropriate strategy for each patient.

Pediatric Seizure

Seizure Types

Tonic–Clonic Seizures
A regular pattern of contraction and extension of the arms and/or legs, loss of consciousness, and may include crying or moaning.

Absence Seizures
Sometimes called Petit Mal Seizures, can cause rapid blinking or a few seconds of staring into space and usually associated with a loss of and return to consciousness, generally without post-ictal lethargy.

Simple Focal Seizures
Focal seizures are limited to one hemisphere of the brain and may include twitching, and/or a change in sensation such as taste or smell without LOC or AMS.

Complex Focal Seizures
Focal seizures are limited to only one hemisphere of the brain but may include twitching with an altered LOC and an inability to respond to questions or directions.

Febrile Seizures
Normally occur as result of a rapid increase in body temperature and present with S/S of generalized seizure activity. Febrile Seizures occur in 2% - 3% of children between the ages of 3 months and 5 years of age.

Routine Medical Care

↓

Check CBG; if < 60mg/dL, treat according to **Pediatric Altered Mental Status Guideline**

↓

For Patients Experiencing Generalized Seizure Activity Upon EMS Arrival[1]
Midazolam 0.2mg/kg IM/IN Max of 5mg; prior to IV/IO access
AEMT*

↓

$EtCO_2$ Monitoring

↓

Seizure Control After Arrival with IV/IO Access[1,2,3,4]
Midazolam 0.1mg/kg IV/IO q 3-5 min. PRN, Max of 2mg per dose, total Max of 5mg
-OR-
Midazolam 0.2mg/kg IM/IN q 3-5 min. PRN, Max of 5mg
AEMT* MEDIC

↓

For Febrile Seizures
- Remove as much clothing as practical and loosen any restrictive garments
- Apply **Cold Packs** to the armpits, groin, and posterior neck

EMR

↓

For Seizure Control After Benzodiazepine Administration
Levetiracetam Infusion[5] 60mg/kg IV/IO
Mixed in 100mL or 250mL of **NS** or **D5W**, Max of 3500mg (15mg/mL)
Infuse over 15 min.
MEDIC

↓

Contact **Medical Control** for additional **orders or consultation**

Consider febrile seizures in patients under the age of 5 who do not have a seizure history, history of recent trauma, and/or who have a fever (taken axillary & add one degree). If the patient has a history of febrile seizures, they often recur with subsequent spikes in temp.

[1] Generalized seizures include: absent, tonic-clonic, atonic, and myoclonic. A focal/partial seizure consists of firing in only one area of the brain and can be partial or complex, depending on whether consciousness is impaired. All seizure activity that results in a loss of consciousness or altered mental status should be treated aggressively with **Benzodiazepines**.
[2] Refer to the **COG Appendix** for additional options for **Benzodiazepines**.
[3] Additional **Benzodiazepines** may be administered after **Versed** IM in patients who were actively seizing upon arrival, as per the Seizure Control order. Do not exceed 10mg of **Midazolam** without orders from **Medical Control**.
[4] AEMTs may may only administer intranasal or intramuscular **Midazolam** with additional training and medical director approval.
[5] **Levitracitam** infusions are to be mixed to a maximum concentration of 15mg/mL. Mix in solution that diluent that appropriately correlates with patient size using clinical judgement.

- **Benzodiazepine** administration is the first line treatment for seizure control. **Anti-epileptics** should be administered after **benzodiazepine** administration has been initiated.
- Consider IO access in cases of Status Epilepticus (seizure lasting >5 minutes or repeated seizures with no return to consciousness within 5 minutes). Status epilepticus should be treated the same regardless of the type of seizure.
- **Diazepam/Lorazepam** cannot be given via the intranasal route. Oil-based medications cannot be atomized.

Pediatric Shock

Routine Medical / Trauma Care

Septic

Anaphylactic

Hypovolemic

Neurogenic

Cardiogenic

Pediatric BP Goal
Minimum systolic BP of:
70mmHg + (age in years x 2)

Establish 1 to 2 large bore IV's/IO access
Crystalloid Fluid for fluid loss 10-20mL/kg
AEMT

Crystaloid Fluid IV/IO 10mL/kg upon confirmation of clear bilateral lung sounds
AEMT

Reassess vital signs and indications; if patient is still tachycardic and/or hypotensive due to hypovolemic etiology continue **Crystalloid Fluid** challenge to a Max of 60mL/kg IV/IO
AEMT

S/S of Septic Shock

- Fever (typically)
- Hypotension
- Flushed skin
- Warm extremities

For Patients ≥ 14kg, Consider Vasopressor Support[1,2]

Epinephrine 0.1-1mcg/kg/min. IV/IO
MEDIC

S/S of Neurogenic Shock

- Hypotension
- ± tachycardic
- May be associated with a traumatic event

Aggressively treat pediatric patients presenting with tachycardia and fever for shock with a recent hx of:

- Cancer
- Indwelling lines
- Severe developmental delay
- Immunodeficiency
- Sick cell disease
- Urinary catheter

S/S of Hypovolemic Shock

- Altered mental status
- Capillary refill > 2 seconds
- Chest pain
- Diaphoresis
- Dyspnea
- Increased level of anxiety
- Muscle cramping
- Nausea/vomiting/diarrhea
- Pallor
- Possible hx of recent trauma
- SBP of < 90-100mmHg
- Tachycardia > 120 bpm

[1] Refer to the **COG Appendix** for pediatric vasopressor infusion charts. Pediatric vasopressors are indicated for patients ≥ 2 years of age or 14kg IBW for safety considerations when infusions are hung to gravity.
[2] **Epinephrine** is the vasopressor of choice for pediatric patients.

- Consider **Stress Dose Steroid** administration for any patient with a history of primary or secondary adrenal insufficiency. Refer to: Pediatric Adrenal Insufficiency | Crisis Guideline if needed.
- **Lactated Ringers** is the crystalloid fluid of choice when available.
- Vasopressor selection will be based on availability, patient disease process, and clinical judgment.
- Consider underlying causes of obstructive shock (PE, tension pneumothorax, cardiac tamponade) and treat as clinically appropriate.

Pediatric Tachycardia

Narrow Complex Tachycardia (QRS ≤ 0.09 seconds)

Routine Medial Care

↓

Consider
Valsalva Maneuver[1,2]

MEDIC

↓

Stable Narrow Complex Tachycardia
Adenosine 0.1mg/kg IV rapid push, Max of 6mg
If First Dose Is Unsuccessful
Adenosine 0.2mg/kg IV rapid push, Max of 12mg

MEDIC

↓

Unstable Narrow Complex Tachycardia
Synchronized Cardioversion 0.5 – 1 J/kg
May escalate to 2J/kg if initial cardioversion is unsuccessful

MEDIC

↓

If no conversion, contact **Medical Control** for further orders

[1] Do not delay treatment to attempt a **Valsalva Maneuver**.
[2] Ice may be applied to a pediatric patient's face/neck to facilitate a **Valsalva Maneuver**.

- In infants, SVT is usually > ≈ 220 bpm and often goes undetected until the patient is critical.
- In children, SVT is usually > ≈ 180 bpm. Often complain of dizziness, chest discomfort, or becoming lightheaded; this age group will often say their heart "feels as if it is racing."

Wide Complex Tachycardia (>180 bpm QRS > 0.09 seconds)

Routine Medial Care

↓

Stable and Regular Wide Complex Monomorphic Rhythms
Adenosine 0.1mg/kg IV rapid push, Max of 6mg
If First Dose is Unsuccessful
Adenosine 0.2mg/kg IV rapid push, Max of 12mg

MEDIC

↓

For Stable Wide Complex Tachycardia[1]
Amiodarone Infusion 5 mg/kg IV/IO over 20 – 60 min.

MEDIC

↓

Unstable Wide Complex Tachycardia
Synchronized Cardioversion 0.5 – 1 J/kg
(May escalate to 2J/kg if initial cardioversion is unsuccessful)

MEDIC

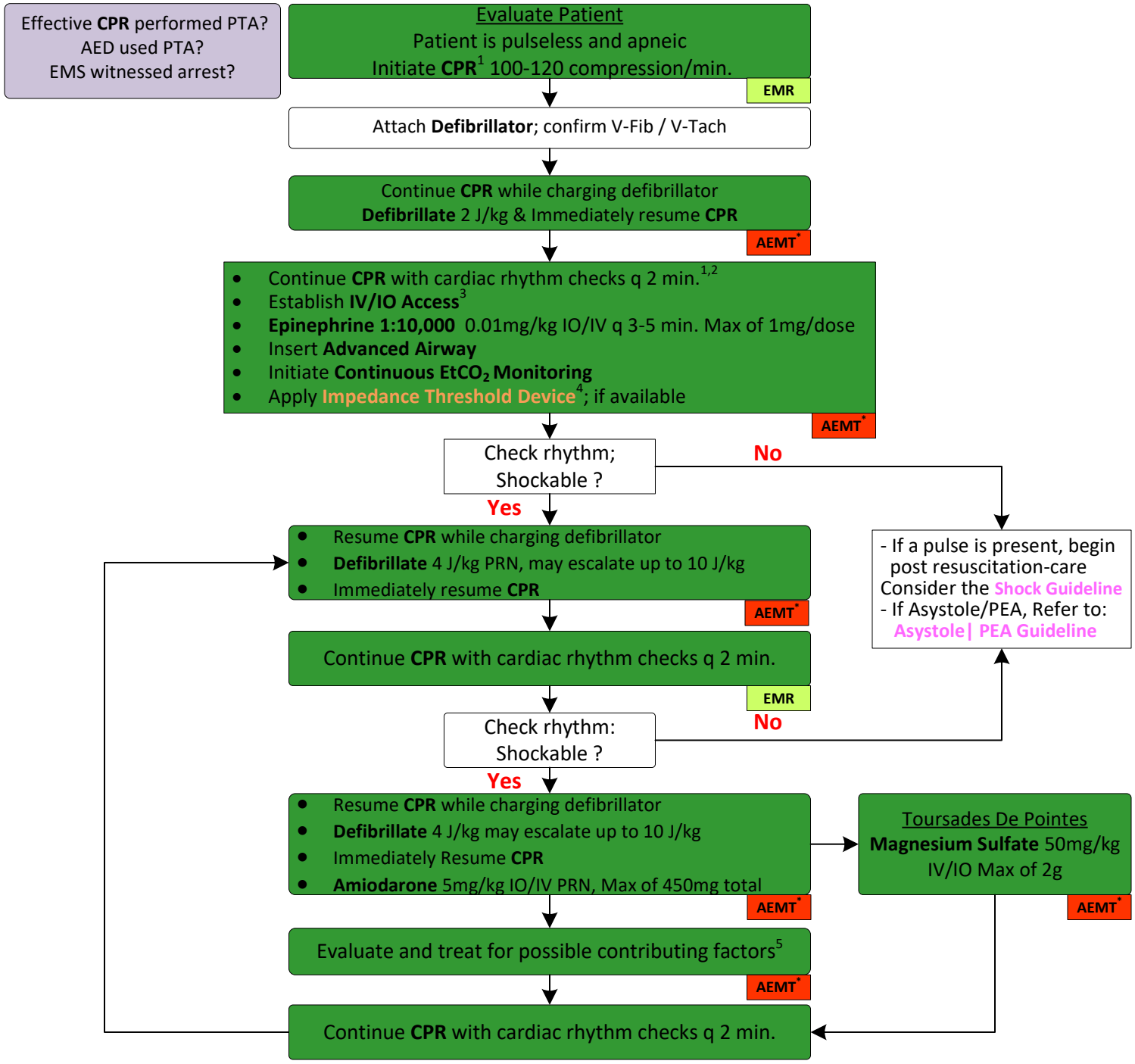
↓

If no conversion contact **Medical Control** for further orders

[1] If Torsades de Pointes, **contact Med Control** for **Magnesium Sulfate** 50mg/kg IV/IO over 20 min. Max of 2g.

- Evaluate and treat for possible contributing factors: hypoxia, hypovolemia, acidosis, hypo or hyperkalemia, hypoglycemia, hypothermia, toxins, cardiac tamponade, tension pneumothorax, thrombosis or trauma.
- Unstable is defined as ↓ BP, Δ mental status, ↓SpO_2, ↑ capillary refill.

Pediatric Ventricular Fibrillation | Tachycardia (Pulseless)



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[3] IO access is the standard of care for venous access in the presence of cardiac arrest. For pediatric patients < than 8 years old, the distal femur site should be considered. Refer to the COG Appendix for more information regarding **Intraosseous Access**.
[4] **Impedance Threshold Devices** may be utilized for patients ≥ 2 years of age.
[5] Contributing Factors and Recommended Treatment:

- Hypoglycemia – **Dextrose 10%** 1g/kg IV/IO
- Hyperkalemia –Including Hx of renal failure: **Calcium Chloride** 20mg/kg IV/IO Max of 1g and **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypothermia – Avoid rigorous movement of patient; especially if patient regains pulse. Excessive movement could cause V-Fib or V-Tach; Refer to: **Cardiac Arrest Special Circumstances Guideline**
- Hypovolemia – Fluid bolus: 20-60mL/kg of **Crystalloid Fluid** IV/IO
- Tension Pneumothorax – **Needle Decompression**
- Toxins – Tricyclic antidepressants or sodium channel blocker overdose: **Sodium Bicarbonate** 1mEq/kg IV/IO
  – Opiate overdose: **Naloxone** 0.1mg/kg IV/IO

Pediatric Lower Airway Obstruction: Asthma | Wheezing > 2 yo

Consider asthma in patients over 2 years of age or in patients with a history of asthma.

Age-Appropriate Assisted Ventilation Rates

Neonates (<1 mo): 40/min
Infants (<1 yo): 30/min
Children (> 1yo): 20/min

Routine Medical Care

If Excessive Secretions are Present
Suction the nose and/or mouth via bulb or suction catheter
Assist **Ventilations** with BVM as needed for respiratory failure

EMR

Signs of Impending Respiratory Failure

- Accessory muscle use
- Head bobbing
- Nasal flaring
- Silent chest
- Silent cry

Continuous Duo-Neb via Nebulizer

≤ 4 Years Old
Albuterol Sulfate 2.5mg Nebulized
≥ 5 Years Old
Albuterol Sulfate 5mg Nebulized
-AND-
Ipratropium Bromide 500mcg Nebulized

EMT

Consider IM **Epinephrine** early for sick patients

Severe Respiratory Distress:
Epinephrine 1:1000 IM
(Thigh is preferred site)
< 25kg 0.15mg IM
> 25kg 0.3mg IM

MEDIC

Response Adequate?

Yes

If Tolerating PO
Dexamethasone 0.6mg/kg PO Max of 16mg
-Or-
If Not Tolerating PO
Dexamethasone 0.6mg/kg IV/IO/IM Max of 16mg
-Or-
Methylprednisolone 2mg/kg IV/IO/IM Max of 125mg

MEDIC

- Continue monitoring and reassessment during transport
- Be prepared to assist ventilations as needed

Contact **Medical Control**
for additional orders or consultation

No

- **Dexamethasone** 0.6mg/kg IV/IO/IM Max of 16mg
  -OR-
- **Methylprednisolone** 2 mg/kg IV/IO/IM Max of 125mg
  -AND-
- **Crystalloid Fluid** 20mL/kg IV/IO
  -Also Consider-
- **Magnesium Sulfate Infusion** 50mg/kg IV/IO Max of 2g
  (Mixed in 100mL of NS/D5W and given over 15 min.)

MEDIC

Response Adequate?

- Assess for pneumothorax
- Assist ventilations with BVM as needed

Pediatric Lower Airway Obstruction: Wheezing Due to Bronchiolitis

Consider bronchiolitis in patients < 2 years old, with recent URI, and with no history of asthma

Bronchiolitis is a symptom caused by a viral illness characterized by fever, copious secretions, and respiratory distress. Bronchiolitis is typically seen during the months of November through April.

The most important interventions are supplemental oxygen and suctioning secretions adequately and often.

There is no proven benefit of bronchodilators or steroids in the treatment of bronchiolitis.

Age Appropriate Assisted Ventilation Rates

- Neonates (<1 mo): 40/min.
- Infants (<1 yo): 30/min.
- Children (> 1yo): 20/min.

Signs of Impending Respiratory Failure

- Accessory muscle use
- Head bobbing
- Nasal flaring
- Silent chest
- Silent cry

Routine Medical Care

↓

Suction the nose and/or mouth via bulb or suction catheter
-And-
Administer **Oxygen** to achieve SpO_2 > 90%

EMR

↓

Assess $EtCO_2$

↓

For Dehydration or Hypoperfusion
Crystalloid Fluid 20mL/kg IV/IO

AEMT

↓

- **Re-suction** the nose and/or mouth
- **Assist Ventilations** with BVM as needed for respiratory failure

EMR

↓

Severe Respiratory Distress
Epinephrine 1:1,000 3mg Nebulized PRN, Max of 2 Treatments

MEDIC

↓

Contact **Medical Control** for additional orders or consultation

General Hazmat Treatment Guideline

Only trained and department-approved personnel should enter into warm zones

Possible Hazmat Threat Identified

↓

Scene Safety

- Stay/move upwind and uphill of all hazards
- Communicate with dispatch to notify Hazmat Team if not already on scene
- Identify a safe route to the scene and staging area

↓

Once Hazmat Team has determined the chemical(s) involved, confirm level of PPE required for EMS

↓

Any patient that has made contact with a hazardous material and/or who is showing signs or symptoms must be immediately decontaminated by the Hazmat Team prior to EMS medical triage, treatment, or transport

↓

After Patient Decontamination

Utilize **START Triage** and place patient into appropriate priority group

Treat patients according to hazard, level of exposure, and signs and symptoms, as well as within **COG Guidelines**

↓

Prior to Patient Securement on the Stretcher

- The patient should be wrapped in a sheet to prevent hypothermia and limit secondary contamination
- The patient's head should remain exposed to maintain airway, breathing, and circulation

Prior to Patient Loading

- The window between the patient and driving compartments may be sealed using plastic and secured with tape
- The patient compartment may be ventilated and the cabin temperature increased to prevent hypothermia

↓

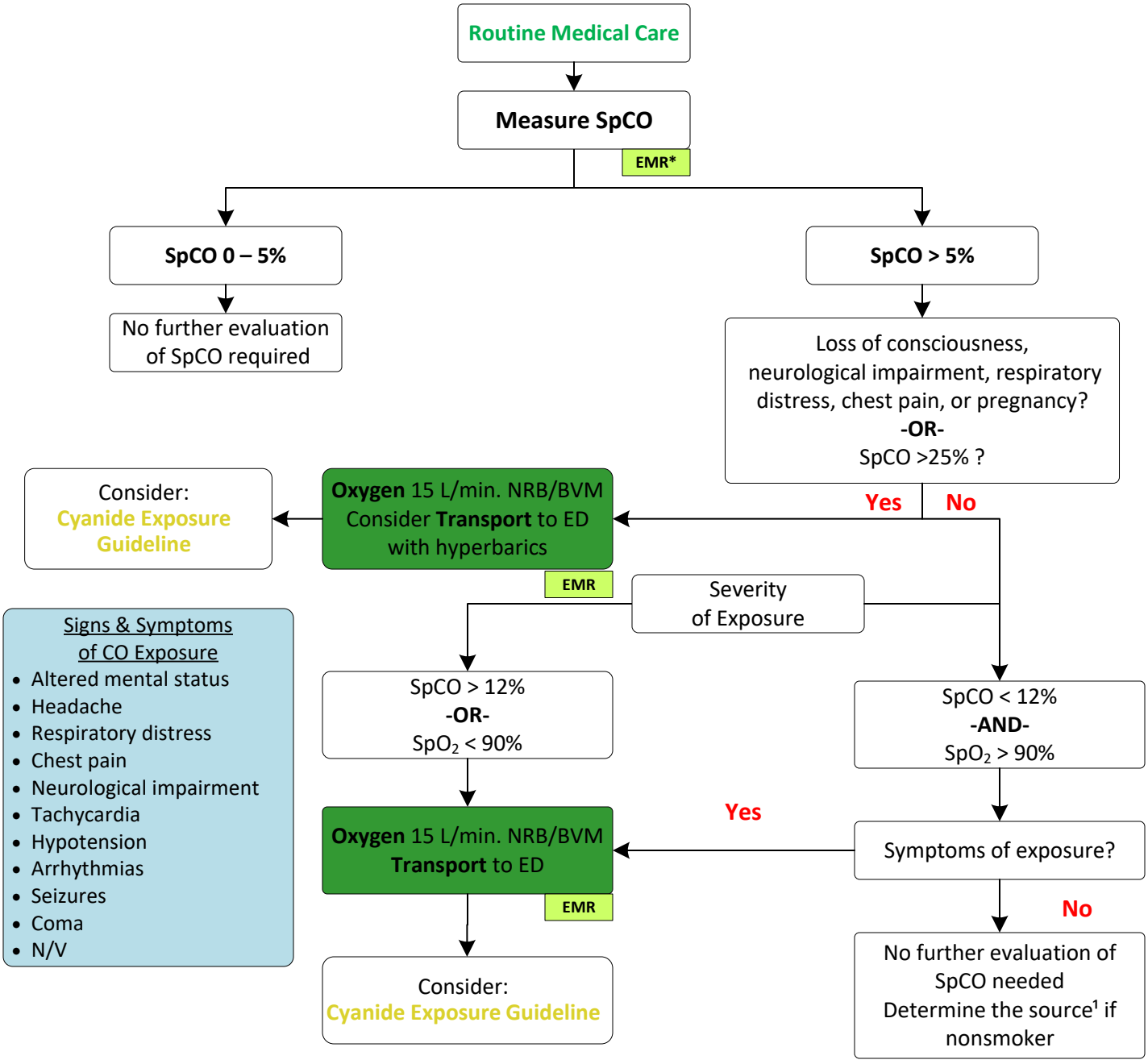
Prior To Transport

Contact hospitals to determine decontamination capabilities and bed status

Consider contacting **Poison Control** for additional information: **1-800-222-1222**

- Assume that all patients are potentially contaminated and use appropriate PPE and patient packaging techniques to prevent transmission of contaminants
- The primary role of EMS is medical triage, treatment and transport of patients exposed to a hazardous material in addition to responder rehabilitation
- The removal of all patient clothing and providing gross decontamination of a patient with water removes 80% of contaminants. Most remaining contaminants are in the patient's hair. It is important to remove the patient from the source and limit exposure; treatment and antidotes will not be effective if the patient continues to be exposed to the hazard
- Patient belongings/clothing should not be transported by EMS. Any contaminated items should be left on scene and evaluated for proper decontamination by the Hazmat Team

Carbon Monoxide Exposure



[1] Chronic co-exposure is clinically significant; recommend smoking cessation treatment for smokers.

- Fetal hemoglobin has a much higher affinity for CO than maternal hemoglobin. Females with a known or suspected pregnancy should have SpCO levels evaluated. EMS practitioners should remember that the fetal COHb could be much higher than measured in the adult patient. ED evaluation for any CO-exposed pregnant female is recommended.
- Absent or low levels of COHb is not a reliable predictor of firefighter or victim exposure to other toxic fire byproducts.
- Subtle neurological findings may rapidly improve with **Oxygen** 15 L/min. NRB, but still require ED evaluation.
- The differential diagnosis for co-exposure is extensive, so consider other causes. Some of these may include but are not limited to:
  - Toxic fire byproducts
  - Acute cardiac event
  - Acute neurologic event
  - Acute intoxication
  - Flu-like illness
  - Headache of non-toxic origin

Cyanide Exposure

Consider treatment as per Signs and Symptoms listed below or for any patient with altered mental status or who is unresponsive after smoke inhalation from a fire or after a known exposure to a cyanide compound.

Signs and Symptoms

- "Cherry Red" skin
- Malaise, flu like illness
- Dizziness
- Syncope
- Chest pain
- Dyspnea
- Nausea/vomiting
- Tachycardia
- Headache

Severe Symptoms

- Cardiac arrest
- Seizures
- Altered mental status

General Hazmat Treatment Guideline

↓

Routine Medical Care
Including **SpCO**

↓

Oxygen 15L/min. NRB/BVM

EMR

↓

If Altered Mental Status Symptoms Present
Refer to: **Altered Mental Status Guideline**

↓

If **SpCO** > 5%
Refer to: **Carbon Monoxide Guideline**

↓

High suspicion of cyanide exposure/poisoning
With LOC, seizure, or cardiac arrest?

No → Continue to monitor

Yes

↓

Hydroxocobalamin[1] 5g IV/IO over 15 min.
Pediatric Exposure
Hydroxocobalamin[1] 70mg/kg IV/IO over 15 min.

AEMT*

↓

Hypotension present?
Refer to: **Shock Guideline**

↓

In Severe Cases, Contact Medical Control
For Additional Administration
Hydroxocobalamin[1] 5g IV/IO over 15-120 min.
Pediatrics
Hydroxocobalamin[1] 70mg/kg IV/IO over 15-120 min.

AEMT*

[1] A 5g vial of **Hydroxocobalamin** is reconstituted with 200mL of 0.9% sodium chloride using the supplied transfer spike. The vial should be rocked, not shaken, for at least 60 seconds prior to infusion.

[2] Establish a secondary means of vascular access. **Hydroxocobalamin** must be administered independently as it is incompatible with most standard ACLS medications.

- Consider CO and CN poisoning after exposure to any product of combustion.
- Early treatment with **Hydroxocobalamin** is crucial to survival of CN poisoning.
- Begin **CPR** immediately if the patient is in cardiac arrest.
- Continue **High Flow Oxygen** regardless of SpO_2 reading.
- CO and CN poisoning affects oxygen delivery to cells and both will show falsely elevated SpO_2/SaO_2 readings in the presence of cellular hypoxia.
- **Hydroxocobalamin** therapy will cause bodily fluids to have a red-tinged color.

High Consequence Biological Pathogens

Prior to Patient Contact for a Suspected High Consequence Pathogen Patient Don Appropriate PPE for

- **Airborne Precautions**[1]
- **Contact Precautions**[2]
- **Droplet Precautions**[3]
- **All-Hazard Precautions**[4]

If PPE is limited, both the patient and the attending EMS clinicians should at least don a face mask as a minimum precaution

Attending EMS Clinicians should additionally don gloves prior to patient contact

Assess the Following Criteria

Signs and Symptoms Screening Criteria

1. Does the patient have a fever ≥ 100.4°F?
2. Does the patient have symptoms of respiratory illness (flu-like symptoms, cough, or difficulty breathing)?

NO → If All Assessments Are Negative: **Refer to: Routine Medical Care**

YES to Either

Ensure the patient and EMS clinician are wearing a facemask

Exposure Screening Criteria

3. In the last 14 days prior to symptom onset, has the patient traveled from an area with confirmed community transmission?
4. In the last 14 days prior to symptom onset, has the patient come into close contact with a PUI (patient under investigation), someone who is being monitored for, or who has had a confirmed positive test for a high consequence biological pathogen?

NO → If All Assessments Are Negative **Refer to: Routine Medical Care**

YES to Either

Positive High Consequence Pathogen Screening

For Patients with a Positive High Consequence Pathogen Screening

- **Alert the Communications Center of High Consequence Pathogen PUI Activation**
- **Minimize patient exposure to essential EMS clinicians**
- **Limit aerosol generating procedures for life-saving interventions**[5]
- **Document positive findings criteria and relevant hx in the PCR**
- **Alert the receiving facility of a High Consequence Pathogen PUI Activation**

Utilize a **Screening Tool** on All Patients with the Following Complaints

- Breathing problem
- Cough
- Fever
- Flu-like symptoms
- Respiratory illness
- Sick person

Family members may be asked to assist in placing a facemask on the patient prior to EMS clinician contact

High Consequence Biological Pathogens

When available, the below referenced PPE is recommended to limit exposure:

[1]**Airborne Precautions:** Standard PPE with fit-tested N95 mask (or PAPR respirator) and utilization of a gown, change of gloves after every patient contact, and strict hand washing precautions. This level is utilized with aspergillus, tuberculosis, measles (rubeola), chickenpox (varicella-zoster), smallpox, influenza, rhinovirus, norovirus, rotavirus, or zoster (shingles).

[2]**Contact Precautions:** Standard PPE with utilization of a gown, change of gloves after every patient contact, and strict hand washing precautions. This level is utilized with GI complaints, blood or body fluids, C. diff, scabies, wound and skin infections, MRSA. Clostridium difficile (C. diff) is not inactivated by alcohol-based cleaners and washing with soap and water is indicated.

[3]**Droplet Precautions:** Standard PPE plus a standard surgical mask for providers who accompany patients in the treatment compartment and a surgical mask or NRB $\mathbf{O_2}$ mask for the patient. This level is utilized when influenza, meningitis, mumps, streptococcal pharyngitis, pertussis, adenovirus, rhinovirus, SARS, and undiagnosed rashes.

[4]**All-Hazards Precautions:** Standard PPE plus airborne precautions plus contact precautions. This level is utilized during the initial phases of an outbreak when the etiology of the infection is unknown or when the causative agent is found to be highly contagious (e.g. SARS, MERS-CoV, COVID-19).

[5]Limit aerosol generating procedures for life-saving interventions such as CPAP, nebulizer therapy, BVM ventilation, and suctioning. Use appropriate exhalation filters if available. Utilize a NRB mask for $\mathbf{O_2}$ therapy if needed.

Invasive Procedures

- If invasive procedures are necessary for life-saving interventions, clinicians should don all available and applicable PPE.
- Utilize techniques and procedures that minimize exposure to droplets or aerosolizing material when possible, especially during airway management.

Transporting Clinicians

Driving Clinician

- Should wear full PPE as described when caring for patient.
- Remove all PPE, except N95 mask (or higher) or PAPR, and perform hand hygiene prior to entering cab of vehicle to prevent contamination of driver's compartment.
- Close the window between the patient compartment and the cab of the transporting unit if possible.
- Do not allow family members to ride in the cab to limit possible cross contamination.

Attending Clinician(s)

- Create negative pressure environment in patient compartment by engaging the exhaust fan if available.
- If no door or window is available to separate the cab and the patient compartment space, open the outside air vent in the driver's compartment and set the rear exhaust fan to full. Set the vehicle's ventilation system to non-recirculating to bring in maximum outside air.
- Ensure use of all available and appropriate PPE is utilized if aerosolizing procedures are employed.

Maintain Records

- Document all prehospital providers who were in the room with the patient at the scene and who were in ambulance during transport (self-monitoring for symptoms for 14 days is recommended, even if wearing appropriate PPE).
- This does not mean the providers can no longer work.
- If all prehospital provider names (students, observers, supervisors, first response, etc.) are listed in the patient care report, then this is a sufficient record.
- Document the level of PPE worn with each patient encounter.

Equipment and Transport Unit Decontamination

- Follow standard operating procedures for the containment and disposal of regulated medical waste.
- Follow standard operating procedures for containing and reprocessing used linen.
- Removing soiled linen from the vehicle. Avoid shaking the linen.
- Clean and disinfect the vehicle in accordance with agency standard operating procedures.
- Personnel performing the cleaning should wear a disposable gown and gloves (a respirator should not be needed) during the clean-up process; the PPE should be discarded after use.
- All surfaces that may have come in contact with the patient or materials contaminated during patient care (e.g., stretcher, rails, control panels, floors, walls, work surfaces) should be thoroughly cleaned and disinfected using an **EPA-registered disinfectant** appropriate for SARS, MERS-CoV, or coronavirus in healthcare settings in accordance with manufacturer's recommendations.

Hydrofluoric Acid Exposure

Signs and Symptoms

Ocular
- Chemical conjunctivitis
- Lacrimation.
- Severe irritation
- Burns

Cardiovascular
- Cardiovascular collapse
- Ventricular arrhythmias

Respiratory
- Throat burning/irritation
- Dyspnea
- Wheezing
- Stridor

Gastrointestinal
- Nausea and vomiting

Skin
- Irritation
- Chemical burns
- Extreme pain

General Hazmat Treatment Guideline

Routine Medical Care

Obtain 12-Lead EKG
Evaluate for QT Interval >500ms

Obtain History of Exposure

For Symptomatic Patients
Oxygen 15L/min. NRB/BVM

Altered mental status present?
Refer to: **Altered Mental Status Guideline**

Unsecured airway?
Refer to: **Airway Management Guideline**

→ Symptoms of Bronchospasm Present?
Refer to:
Reactive Airway Disease Guideline

Injury to Eye
Eye Irrigation with **NS**

Skin Exposure
Skin Irrigation with **H_20**

Calcium Gluconate Gel 2.5%[1] Transdermal
(Apply to burned area)

Life Threats
- Arrhythmias
- Cardiac arrest

[1] To Make **Calcium Gel**: Mix 10mL of 10% Calcium Chloride into 2 ounces of water soluble jelly. Commercially available **Calcium Gluconate Gel** can also be utilized.

- Assume that all patients are potentially contaminated and use appropriate PPE and patient packaging techniques to prevent the transmission of contaminants. Refer to: General Hazmat Treatment Guideline
- Relay the Following Information to Dispatch As Soon As Possible:
  - Name and form of chemical(s) involved
  - Amount of chemical(s)
  - Route of exposure
  - Number of patients

Irritant Gas | Ammonia, Hydrogen Chloride, and Phosgene Exposure

Signs and Symptoms

CNS
- Stupor
- Lethargy
- Coma
- Seizures

Eyes
- Chemical conjunctivitis
- Necrosis
- Blindness

Cardiovascular
- Ventricular arrhythmias
- Hypotension

Respiratory
- Acute pulmonary edema
- Bronchospasm
- Stridor
- Cough
- Dyspnea
- Chest pain
- Respiratory tract irritation
- Laryngeal edema

Gastrointestinal
- Nausea and vomiting

General Hazmat Treatment Guideline

↓

Routine Medical Care

↓

Obtain hx of exposure, observe for toxidrome

↓

For Symptomatic Patients
Oxygen 15L/min. NRB/BVM
EMR

↓

Altered Mental Status present?
Refer to: **Altered Mental Status Guideline**

↓

Respiratory symptoms present?[1]
Refer to: **Reactive Airway Disease Guideline**

↓

Hypotension present?
Refer to: **Shock Guideline**

↓

Active seizure present?
Refer to: **Seizure Guideline**

↓

For Eye Injury
Eye Irrigation
EMR

Life Threats Include
- Airway compromise
- Pulmonary edema
- Hypotension

[1] If suspected non-cardiogenic pulmonary edema, consider early **CPAP** 5-10 cmH_2O.

- Assume that all patients are potentially contaminated and use appropriate PPE and patient packaging techniques to prevent the transmission of contaminants. Refer to: **General Hazmat Treatment Guideline**
- Communicate to Dispatch As Soon As Possible:
  - Name and form of chemical(s) involved
  - Amount of chemical(s)
  - Route of exposure
  - Number of patients
- **Phosgene** exposures may have minimal initial symptoms. Patients should be transported and admitted for up to 24 hours of monitoring if exposed.
- Low concentrations of airborne acids and alkalis can produce a rapid onset of eye, nose, and throat irritation. Higher concentrations (low concentrations of ammonia) can produce cough, stridor, wheezing, and non-cardiogenic pulmonary edema. Ingestion of acids and alkalis can result in severe injury to the upper airway, esophagus, and stomach. In addition; there may be circulatory collapse as well as partial or full-thickness burns.
- A key consideration concerning the effects of respiratory irritants is water solubility. Water soluble materials tend to irritate upper airway passages resulting in cough reflex, wheezing, and bronchospasm. Unless the patient has a pre-existing pulmonary condition (asthma, COPD) symptoms from mild to moderate exposures tend to improve with fresh air and good ventilation. With non-water soluble respiratory irritants, or in cases of severe exposure to water soluble irritants, non-cardiogenic pulmonary edema can develop with a delayed onset of 6–10 hrs. Any significant exposure to a respiratory irritant needs to be evaluated at a medical facility.
- End-stage symptoms or respiratory irritation may resemble organophosphate poisoning due to excessive mucosal secretions. However, these patients will have normal or dilated pupils whereas organophosphate or nerve agent patients will have pinpoint pupils.

Irritant Gas | Chlorine Exposure

Signs and Symptoms

CNS
- Decreased LOC
- Coma
- Dizziness
- Headache

Ocular
- Chemical conjunctivitis
- Severe irritation
- Burns

Cardiovascular
- Cardiovascular collapse
- Ventricular arrhythmias

Respiratory
- Acute or delayed non-cardiogenic pulmonary edema
- Dyspnea
- Tachypnea
- Airway burns to mucous membranes and lungs
- Coughing
- Choking/burning sensation
- Rhinitis
- Sinusitis
- Rhinorrhea
- Pneumonitis
- Pneumonia

Gastrointestinal
- Nausea and vomiting

Skin
- Irritation
- Chemical burns
- Frostbite secondary to exposure to expanding gas

General Hazmat Treatment Guideline

↓

Routine Medical Care

↓

Obtain hx of exposure, observe for toxidrome

↓

For Symptomatic Patients
Oxygen 15L/min. NRB/BVM
EMR

↓

Altered mental status present?
Refer to: **Altered Mental Status Guideline**

↓

Respiratory symptoms present?[1]
Refer to: **Reactive Airway Disease Guideline**

↓

For Suspected Chlorine Inhalation
Sodium Bicarb 3mEq mixed in 2.5mL of **NS** Nebulized
EMT*

↓

Hypotension present?
Refer to: **Shock Guideline**

↓

Active seizure present?
Refer to: **Seizure Guideline**

↓

For Eye Injury
Eye Irrigation
EMR

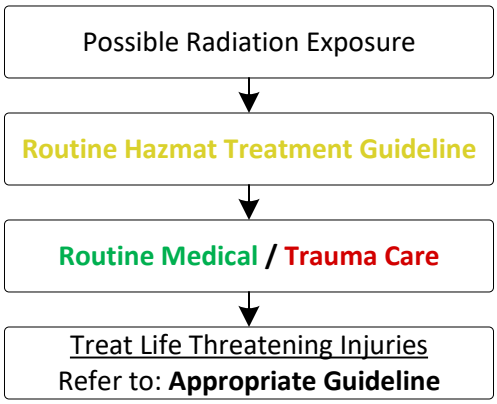
Life Threats
- Airway compromise
- Pulmonary edema
- Hypotension

[1] If suspected non-cardiogenic pulmonary edema consider early **CPAP** 5-10 cmH_2O.

- Assume that all patients are potentially contaminated and use appropriate PPE and patient packaging techniques to prevent the transmission of contaminants. Refer to: General Hazmat Treatment Guideline
- Communicate to Dispatch As Soon As Possible:
  - Name and form of chemical(s) involved
  - Amount of chemical(s)
  - Route of exposure
  - Number of patients
- A key consideration concerning the effects of respiratory irritants is water solubility. Water soluble materials tend to irritate upper airway passages resulting in cough reflex, wheezing, and bronchospasm. Unless the patient has a pre-existing pulmonary condition (asthma, COPD) symptoms from mild to moderate exposures tend to improve with fresh air and good ventilation. With non-water soluble respiratory irritants, or in cases of severe exposure to water soluble irritants, non-cardiogenic pulmonary edema can develop with a delayed onset of 6–10 hrs. Any significant exposure to a respiratory irritant needs to be evaluated at a medical facility.
- End-stage symptoms or respiratory irritation may resemble organophosphate poisoning due to profound fluid involvement. However, these patients will have normal or dilated pupils whereas organophosphate or nerve agent patients will have pinpoint pupils.

Radiation Exposure

A radiological survey conducted with specialized equipment is the only way to confirm the presence of radiation. If a terrorist event involves the use of radioactive material, both patient exposure and contamination must be assessed.



Addressing contamination issues should not delay treatment of life-threatening injuries

Exposure

- Occurs when a person is near a radiation source. People exposed to a source of radiation can suffer from radiation illness if the dose is high enough but will not become radioactive.[1]

Contamination

- Occurs externally when loose particles of radioactive material are deposited on surfaces, skin, or clothing.
- Internal contamination occurs when radioactive particles are inhaled, ingested, or lodged in an open wound.[1]
- Contaminated patients should be decontaminated as soon as possible without delaying critical care. Patients that have been exposed to radiation but are not contaminated with radioactive material do not need to be decontaminated. It is highly unlikely that the levels of radioactivity associated with a contaminated patient would pose a significant health risk to providers.[1]
- Standard PPE including a surgical facemask (N95 when available), outer garment protection, and gloves.

Decontamination

- Decontamination of contaminated individuals should involve brushing away of contaminants, removal of clothing, soap/ water rinsing, and eye irrigation as needed[1].
- Acute Radiation Syndrome is caused by high doses of radiation (less likely in the event of a dirty bomb). Symptoms (acute or delayed) may include nausea, vomiting, dizziness, loss of consciousness, hypotension/shock.
- Cutaneous Radiation Injury / Burns with early presentation are unlikely, but if present, may represent a significant exposure to radiation. Most likely, burns are due to a combination of either thermal or chemical burns associated with a radiation incident.

- Three primary methods of protection from radiation:
  - Limit the time of exposure
  - Maximize distance from the source (even a short distance from a scene)
  - Shielding from external exposure and inhalation of radioactive material

- [1] Radiological Terrorism Emergency Management Pocket Guide for Clinicians, CDC 2005
- [2] Radiological Attack: Dirty bombs and Other Devices. The National Academies / DHS 2004

Advanced Resus Cardiac Arrest

Treatment Priorities

- Effective chest compressions and controlled ventilations at 10/min takes priority over any other treatment
- Perform continuous chest compressions without stopping for ventilations
- Only pause for < 10 seconds every 2 minutes to verify cardiac rhythm
- **Charge Defibrillator** to maximum joules and prepare for defibrillation of VT/VF if present at rhythm check

Evaluate Patient
Patient pulseless and apneic, begin **Continuous CPR**[1]
EMR

Insert Advanced Airway
Establish $EtCO_2$ Monitoring
EMT

Attach **Defibrillator with AP Placement**,
Evaluate for V-Fib / V-Tach

Defibrillate at Max Joules, If $EtCO_2 \geq 20mmHg$[2]
Resume **Continuous CPR**
EMR

- Apply **Impedance Threshold Device**[4] (if available)
- Establish **IV/IO Access**
- **Epinephrine 1:10,000**, 1mg IV/IO repeat q 5-7 min. Max of 3mg
- **Crystalloid Fluid** 1-2L IV/IO

AEMT*

Effective **CPR** performed prior to arrival?
AED used prior to arrival?
EMS witnessed arrest?

Torsades De Pointes
Magnesium 2g IV/IO
AEMT*

Evaluate and treat for possible contributing factors[5]
AEMT*

Continue **CPR** with cardiac rhythm checks q 2 min.
EMR

Shockable rhythm?

Yes

- **Defibrillate** at Max Joules
- **Amiodarone** 300mg IV/IO

-Then-

- **Amiodarone** 150mg IV/IO after 5 min. if continued VF/VT; Max of 450mg total

AEMT*

Refer to:
V-Tach | V-Fib Storm Guideline[2]
For Polymorphic V-Tach or Refractory V-Fib
(Patient is defibrillated 3 times)

No

Continue treatment on scene (30 minutes)
-OR-
Continue treatment on scene for 20 minutes for sustained $EtCO_2$ of ≤ 15mmHg

Refer to:
Post Resuscitation Care Guideline
-OR-
Termination of Resuscitation | Non Traumatic Guideline

[1] Guidelines for **CPR** and cardiac arrest management are outlined in the **COG Appendix**.
[2] For ventricular rhythms that are refractory to multiple defibrillations, consider applying additional defibrillation pads and **Defibrillate** the patient from a different vector.
[3] Initiate airway management per the **Airway Management Guideline**.
[4] An **Impedance Threshold Device** prevents unnecessary air from entering the chest during the decompression phase of **CPR**. When air is prevented from rushing into the lungs as the chest wall recoils, the vacuum (negative pressure) in the thorax pulls more blood back to the heart, resulting in an increase in blood flow to the heart, brain, and organs. Remove the **Impedance Threshold Device** upon return of spontaneous circulation (ROSC).
[5] Contributing Factors and Recommended Treatment:

- Hydrogen Ion Acidosis (Metabolic Acidosis) – **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypoglycemia – **Dextrose** 25g IV/IO
- Hyperkalemia – Including Hx of renal failure – **Calcium Chloride** 1000mg IV/IO and **Sodium Bicarbonate** 1mEq/kg IV/IO
- Hypothermia – Avoid rigorous movement of patient; especially if patient regains pulse. Excessive movement could cause V-Fib or V-Tach. Refer to **Cardiac Arrest Special Circumstances Guideline**
- Hypovolemia – Fluid bolus: **Crystalloid Fluid** 1-2L IV/IO
- Tension Pneumothorax – **Needle Decompression**
- Toxins – Tricyclic antidepressants or sodium channel blocker overdose: **Sodium Bicarbonate** 1mEq/kg IV/IO
  – Opiate overdose **Naloxone** 2mg IV/IO

Delayed Sequence Intubation

Indications
- Failure to protect the airway
- Impending airway compromise
- Elective or emergent intubation in spontaneously breathing patients
- Patient is agitated or otherwise intolerant of pre-oxygenation via NC, non-rebreather, bag-valve mask, or non-invasive ventilation

Contraindications
- Inability to establish a suitable environment
- Unsatisfactory risk/benefit analysis
- Cardiac arrest or peri-arrest

Access Patient
Establish Suitable Environment[1]

↓

Begin Pre-Oxygenation
Oxygen 15L/min. NC
-AND-
Oxygen 15L/min. NRB/BVM

EMR

↓

Utilize RSI/DSI Checklist[2]
Assign Roles[3]

↓

Confirm Placement of Monitoring Equipment and IV/IO Access

↓

Evaluate and Address Hypotension
Push Dose Epinephrine 5-20mcg IV/IO q 3-5min. PRN
-AND/OR-
Appropriate **Shock Guideline** Algorithm

MEDIC

↓

Visually Confirm Required Airway Equipment and Adequate Patient Positioning

↓

Consider
Ondansetron 4mg IV/IO

AEMT

↓

For Sedation and Pre-Oxygenation
Ketamine 2mg/kg IV/IO
-AND-
Begin **Apneic Oxygenation Procedure**[4]

MEDIC

↓

Administer Paralytic Agent[5]
Rocuronium 1.2mg/kg IV/IO

MEDIC*

↓

Successfully Intubated the Trachea?

No → May repeat x 1
If not successful,
Refer to:
Airway Management Guideline

Yes ↓

Confirm ETT Placement Via
Visualization, Auscultation, Continuous $EtCO_2$
Secure ETT placement with commercial ETT restraint device

↓

Post Intubation Sedation
Refer to: **Airway Management Guideline**

Delayed Sequence Intubation is the preferred method when advanced airway management is considered to be elective.
-OR-
For patients presenting with agitation or excited delirium from hypoxia, hypercapnia, or an underlying medical condition.

[1] Establish or move the patient to an environment where all providers have an adequate space to perform the procedure, while ensuring visibility to monitoring devices and the ability to easily adjust patient position (i.e. on a stretcher or cot) as needed.
[2] Refer to the **COG Appendix** for the DSI checklist. The utilization of this checklist is mandatory when performing this procedure.
[3] Ensure that at least 2 on-duty ALS providers are engaged in the patient's care throughout the procedure. This will include any combination of paramedics, registered nurses, or physicians who are trained to provide care in the prehospital environment. At least one provider must have written authorization from their Medical Director to perform this procedure.
[4] NC at 15L/min. in conjunction with a BVM (including PEEP valve) being held in place utilizing a two-hand technique. Once SpO_2 reaches ≥ 94%, wait 3 minutes before administering the **Paralytic Agent.** Maintain NC at 15L/min. throughout the intubation procedure.
[5] Refer to the **COG Appendix** for alternative **Paralytic Agents** and dosages.

- Endotracheal Intubation should be performed by the most skilled/experienced provider on scene, preferably with video laryngoscopy if available.
- Consider hypotensive dosing strategies for **Sedation** and **Paralytic Administration** as appropriate. Refer to the **COG Appendix** for additional information.

Rapid Sequence Intubation

Indications
- Failure to protect the airway
- Impending airway compromise
- Patients with an unstable airway with failure to oxygen or ventilate
- Peri-arrest
- Patients presenting with an immediate need for advanced airway management

Contraindications
- Inability to establish a suitable environment
- Unsatisfactory risk/benefit analysis
- Elective need for airway management

Access Patient
Establish Suitable Environment[1]

Begin Pre-Oxygenation
Oxygen 15L/min. NC
-AND-
Oxygen 15L/min. NRB/BVM
EMR

Utilize RSI/DSI Checklist[2]
Assign Roles[3]

Confirm Placement of Monitoring Equipment and IV/IO Access

Evaluate and Address Hypotension
Push Dose Epinephrine 5-20mcg IV/IO, q 3-5min. PRN
-AND/OR-
Appropriate **Shock Guideline** Algorithm
MEDIC

Visually Confirm Required Airway Equipment and Adequate Patient Positioning

Consider
Ondansetron 4mg IV/IO
AEMT

Administer Sedation[4]
Ketamine 2mg/kg IV/IO
-OR-
Etomidate 0.3mg/kg IV/IO
MEDIC

Administer Paralytic Agent[5]
Rocuronium 1.2mg/kg IV/IO
MEDIC*

Successfully Intubate the Trachea?

No → May repeat x 1
If not successful
Refer to: Appropriate **Airway Management Guideline**

Yes

Confirm ETT Placement Via
Visualization, Auscultation, Continuous $EtCO_2$
Secure ETT placement with commercial ETT restraint device

Post Intubation Sedation
Refer to: **Airway Management Guideline**

Rapid Sequence Intubation is the preferred method for an unconscious, unresponsive patient with an immediate need for advanced airway management.

[1] Establish or move the patient to an environment where all providers have an adequate space to perform the procedure, while ensuring visibility to monitoring devices and the ability to easily adjust patient position (i.e. on a stretcher or cot) as needed.
[2] Refer to the **COG Appendix** for the RSI/DSI checklist. The utilization of this checklist is mandatory when performing this procedure.
[3] Ensure that at least 2 on-duty ALS providers are engaged in the patients care throughout the procedure. This will include any combination of paramedics, registered nurses, or physicians who are trained to provide care in the prehospital environment. At least one provider must have written authorization from their Medical Director to perform this procedure.
[4] NC at 15L/min. in conjunction with a BVM (including PEEP valve) being held in place utilizing a two-hand technique. SpO_2 should be ≥ 94% before administering the **Paralytic Agent.** Maintain NC at 15L/min. throughout the intubation procedure.
[5] Refer to the **COG Appendix** for alternative **Paralytic Agents** and dosages.

- Endotracheal Intubation should be performed by the most skilled/experienced provider on scene, preferably with video laryngoscopy if available.
- Consider hypotensive dosing strategies for **Sedation** and **Paralytic Administration** as appropriate. Refer to the **COG Appendix** for additional information.

Adult TXA | Blood Products

Routine Medical / **Trauma Care**

Patients Meeting the Following Infusion Criteria
Injury Pattern or Etiology Consistent with Massive Hemorrhage
And/Or
Traumatic Brain Injury
-And at Least One of the Following-

- Shock Index > 1
- HR ≥ 120 bpm
- Systolic BP < 90mmHg
- GCS ≤ 12

Traumatic Injury | **Medical Etiology**

For Adult Patients with an Injury Pattern Consistent with Massive Hemorrhage or TBI < Than 3 Hours From Onset

Tranexamic Acid (TXA) 2g slow IV/IO push

AEMT*

For Adult Patients with Injury Patterns Consistent with Massive Hemmhorage[2,3]
Blood Products IV/IO

MEDIC*

Quantifiable Blood Loss

(GI Bleed, Vaginal Bleed, Etc.)

Contact **Medical Control** for orders if **Blood Products/TXA** use is required

Evaluate for Patient Improvement/Stabilization

- SBP Approximately 100mmHg (Hemmorhage)
- SBP ≥ 110mmHg (TBI)
- Oxygen Saturation > 92%
- Improvement of HR

[1] Administer **Tranexamic Acid** (TXA) as soon as possible after injury (not more than 3 hours after injury). Benefits of **TXA** may diminish by 10% for every 15 minutes of treatment delay.

[2] **Blood Product Therapy** administration as indicated per the participating EMS Agency's Clinical Policy/Guideline.

[3] The systolic blood pressure (SBP) goal is approximately 100mmHg when resuscitating a patient with **Blood Products**. In patients with traumatic brain injury, the SBP goal is ≥ 110mmhg. If **Blood Products** are not available, resuscitate patients with **Crystalloid Fluid** to a maintain a SBP of 80-90mmhg and allow permissive hypotension.

- Patients meeting criteria may refuse the transfusion for religious, social, or personal reasons if they are awake, alert, and oriented. The reason for refusal must be clearly documented in the patient's electronic medical record.
- **Blood Products** should be infused through a large bore IV catheter (18g or larger) or an IO catheter.
- If the patient develops signs of allergic reaction, the infusion of **Blood Products** should be immediately stopped and the saline infusion continued. Contact **Medical Control** for direction. True anaphylactic reactions are treated as per the **Allergic Reaction Guideline**.
- Emergency release and transfusion of blood products are authorized in the event that the criteria are met as per the above mentioned guideline.
- In the event that **O-Negative PRBCs** or **Whole Blood** is not available, females can receive **O-Positive PRBCs** or **Whole Blood**.

Pediatric TXA | Blood Products

Routine Medical / **Trauma Care**

Patients Meeting the Following Infusion Criteria
Injury Pattern or Etiology Consistent with Massive Hemorrhage
And/Or
Traumatic Brain Injury
-And at Least One of the Following-

0-9 Years of Age
- Shock Index > 1.2
- Systolic BP < 70mmHg + (Age In Years x 2)
- GCS of ≤ 12 with presumptive evidence of TBI

10-15 Years of Age
- Shock Index > 1
- Single Episode of hypotension with SBP 90mmHg
- GCS of ≤ 12 with presumptive evidence of TBI

Traumatic Injury

For Pediatric Patients with an Injury Pattern Consistent with Massive Hemorrhage or TBI < Than 3 Hours From Onset

Tranexamic Acid (TXA) 15mg/kg slow IV/IO push

AEMT*

For Pediatric Patients with Injury Patterns Consistent with Massive Hemmhorage[2,3]
Blood Products 10mL/kg IV/IO

MEDIC*

Medical Etiology

Quantifiable Blood Loss

(GI Bleed, Vaginal Bleed, Etc.)

Contact **Medical Control** for orders if **Blood Products/TXA** use is required

Evaluate for Patient Improvement/Stabilization
- SBP of approximately 100mmHg
- Oxygen Saturation > 92%
- Improvement of HR

[1] Administer **Tranexamic Acid** (TXA) as soon as possible after injury (not more than 3 hours after injury). Benefits of **TXA** may diminish by 10% for every 15 minutes of treatment delay.
[2] **Blood Product Therapy** administration as indicated per the participating EMS Agency's Clinical Policy/Guideline.
[3] The systolic blood pressure (SBP) goal is approximately 90mmHg when resuscitating a patient with **Blood Products**. In patients with traumatic brain injury, the SBP goal is ≥ 100mmhg. If **Blood Products** are not available, resuscitate patients with **Crystalloid Fluid** to a maintain a SBP of 70mmHg + (Age in Years x 2) to allow permissive hypotension.

- **Blood Products** should be infused through a large bore IV catheter (18g or larger) or an IO catheter when possible.
- If the patient develops signs of allergic reaction, the infusion of **Blood Products** should be immediately stopped and the saline infusion continued. Contact **Medical Control** for direction. True anaphylactic reactions are treated as per the **Allergic Reaction Guideline**.
- Emergency release and transfusion of blood products are authorized in the event that the criteria are met as per the above mentioned guideline.
- In the event that **O-Negative PRBCs** or **Whole Blood** is not available, females can receive **O-Positive PRBCs** or **Whole Blood**.

Air Medical | Landing Zone

Selecting a Landing Zone

1st Choice

- As close as safely possible to incident

2nd Choice

- Between route from the incident to the hospital and incident
- Benefit - on the way to the hospital, not further away, which can cause a slight delay

3rd Choice

- Pre-designated area (i.e. football field, airport, helipad)
- Downside - ambulance has to load, then unload, helicopter has to land away from incident, can cause major delay

Landing Zone Requirements

- Designated Landing Zone (LZ) Coordinator
- Location that measures approximately 100ft X 300ft (100ftx100ft landing zone and 200ft x 100ft approach area)
- Flat and firm ground with no more than a 3 inch slope for every 100 ft
- Clear of wires, people, obstructions, unstable sheds, loose roofs, loose debris, and livestock
- Properly marked and free of moving vehicles or bystanders
- At least 1 mile up-wind to any hazardous materials incident

Marking the Landing Zone

- Mark the corners of the 100ft x 100ft landing zone/touch down area with vehicle headlights, box lights, or continuous burning amber-colored lights
- Direct light beams horizontally across the touchdown area.
- Mark any obstructions with red strobe or continuous burning lights

Landing on Roads

- Coordinate with Law Enforcement (if on scene)
- Set up the landing zone once traffic is fully stopped
- Block off on both ends of the roadway with emergency vehicles
- Blocking of vehicles should remain in place until the aircraft departs from the scene
- Traffic should not be allowed to pass while the aircraft is on scene

Landing Zone Coordinator

- Attended and passed an air medical landing zone course
- Communicates with aircraft- required direct communication for night landings
- Present inside the landing zone
- Verifies correct marking of the LZ and appropriate landing direction
- Delegates other duties in LZ
- Must have appropriate clothing and eye protection
- Will act as ground guide, should be at the end of the touch down zone

Safety Officer

- Works with the Landing Zone Coordinator and Flight Crew to ensure safety around the aircraft
- Ensures that no vehicle traffic or non-essential personnel approaches the area near the aircraft
- Ensures that personnel only approach the aircraft at the direction of the attending flight crew
- Ensures that no personnel approaches the aircraft with unsecured clothing that could be sucked in the rotors

Establishing Communication with Responding Air Medical Resources

- To establish on-scene communications with Acadian Air Med Units utilize, “Acadian OPS 1 or OPS 2”
- Acadian Air Med Louisiana aircraft include:
  - Air Med 1-7
  - Life Air Rescue 1
  - Ochsner Rescue 1
- To establish on-scene communications with Med-Trans Aircraft utilize, “8CALL90 or 8CALL90-Direct”
- Med-Trans Mississippi aircraft include:
  - Rescue 5, 7, 8, and 9

On-Scene Communication with Responding Air Medical Resources

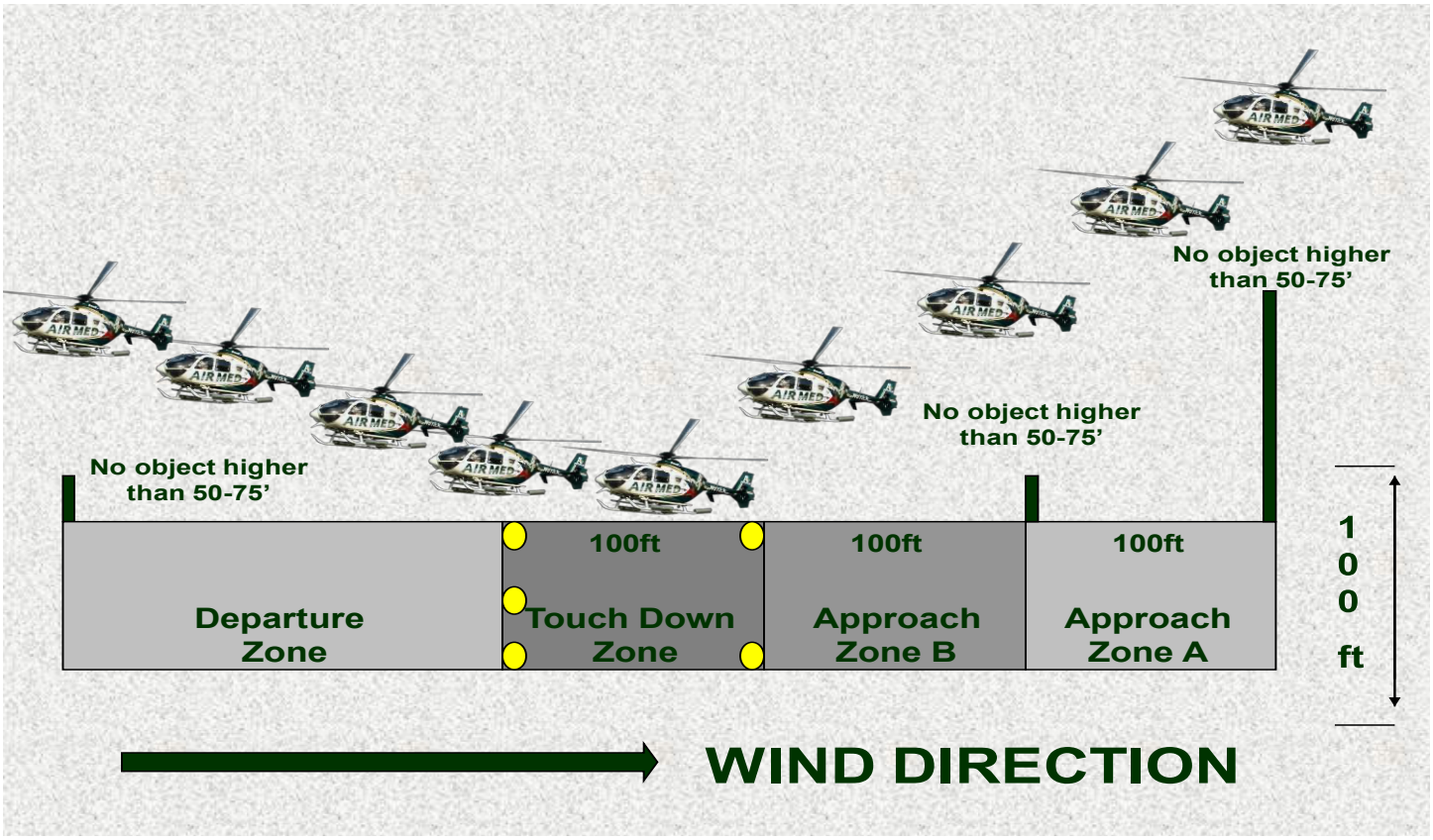
- The Landing Zone Coordinator should establish communications with the responding aircraft and relay the following information:
  - Landing zone location (landing zone address, GPS location, or cross-streets)
  - Direction of wires and location related to the landing zone
  - Hazards and markings
  - Lighting
  - Obstructions
  - Slope
  - Surface
  - Wind direction

Landing Zone Safety

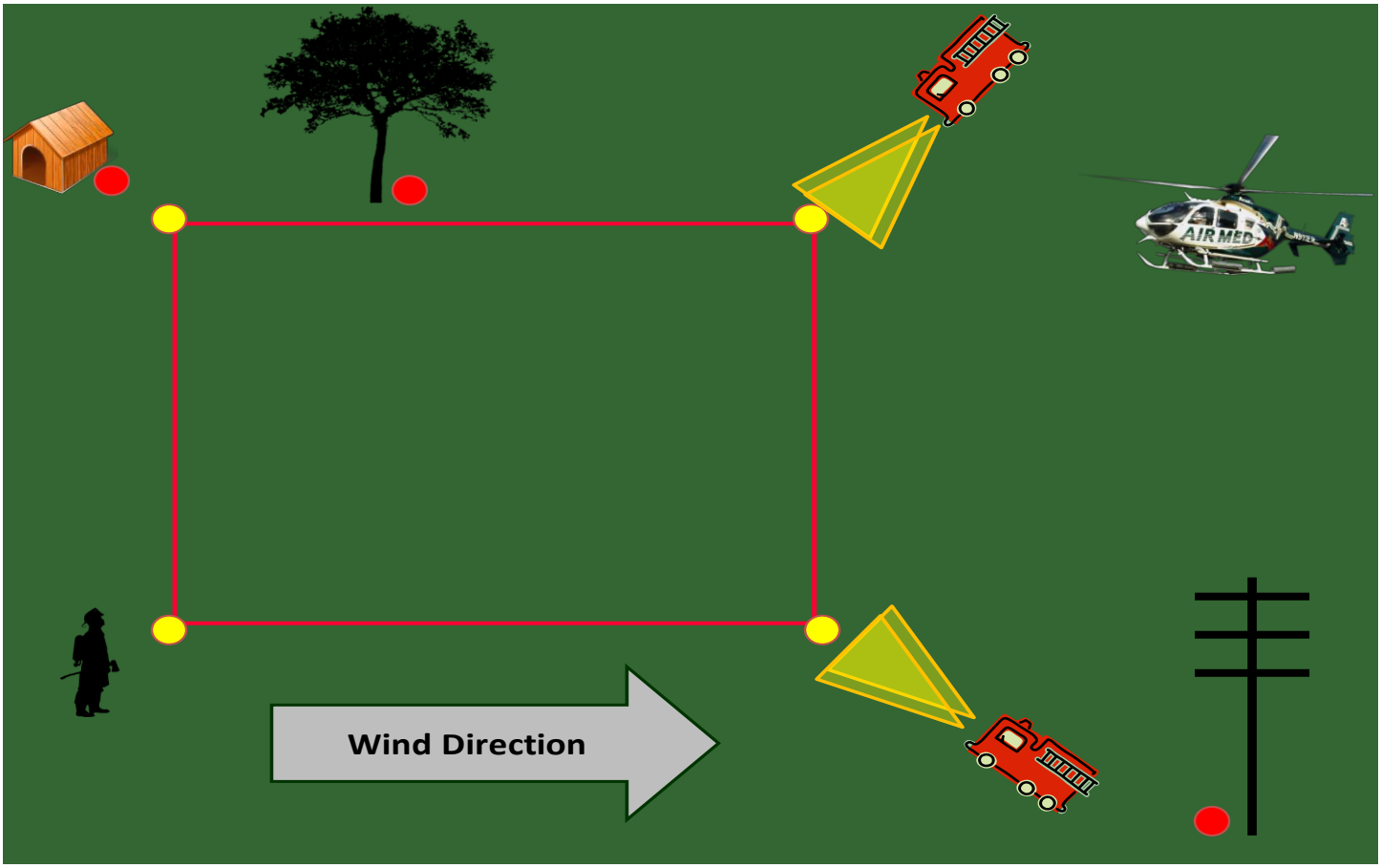
- Pay close attention to instructions given by the flight crew
- Do not approach the aircraft unless directed to do so by the flight crew
- Approach the aircraft from a 3 or 9 o’clock position when directed to do so
- Exit in the same direction in which the aircraft was approached
- The pilot and flight crew has the ultimate authority to abort the mission if the landing zone is deemed unsafe for any reason
- The safety of the flight crew and members will not be compromised regardless of the nature of the emergency

Air Medical | Landing Zone

Approach Zone



Landing Zone



Air Medical Response

Purpose

Air medical services are a valuable yet limited resource throughout Louisiana. It is important that pre-hospital clinicians and members of public safety organizations utilize consistent and appropriate criteria when requesting air medical services for assistance with patient care and transport. It should be noted that air medical services are not deployed for the sole purpose of expediting patient transport to an appropriate hospital. Air medical services should be utilized as a specialized resource equipped with highly trained pre-hospital clinicians with an advanced scope of practice, specialized equipment, and expanded pharmacology, which ideally should include blood products. The following criteria should be utilized when requesting air medical response. While this document does not require the use of air medical services, it serves as a guideline for air medical response throughout the region.

Pre-Response Planning

Any agency who may utilize air medical resources should strongly consider pre-incident planning and training to ensure timely notification, utilization, and safety. The key to effectively utilizing air medical resources is to request air medical response as early in the incident as possible. This includes requests for air medical units by communications centers for call types that may meet request criteria upon the initial dispatch of ground resources. Agencies should also ensure that on-scene personnel have access to the appropriate radio frequencies to communicate with and assist in securing safe landing zones for air medical units. Currently, Acadian Air Med provides air medical resources throughout the region.

- Acadian's Air Med Operations Center (AMOC) should be contacted for flight requests at (337) 291-1594
- Request for training and radio interoperability should be sent to airmedoc@acadian.com
- On scene communications with Acadian Air Med Units 1-7, Life Air Rescue, and Ochsner Rescue 1 will be done via Acadian Air Med OPS 1 and OPS 2
- Med-Trans Mississippi aircraft Rescue 5, 7, 8, and 9 may be dispatched via AMOC as mutual aid units
- On scene communications with Med-Trans units will be done via 8CALL90 or 8CALL90-Direct

Emergent Request for Air Medical Response

Request for air medical response should be considered for the following criteria:

Operational

- Extended ground transport time
- Prolonged extrications
- Remote areas or areas not accessible by ground units
- Mass casualty incidents
- Incidents involving multiple critical patients
- Nature of emergency is such that the local hospital is not appropriate and transport by ground to an appropriate facility is greater than 20 minutes

Medical

- Patients meeting trauma activation criteria
- Patients with respiratory compromise or those requiring rapid sequence intubation
- Patients meeting burn center criteria
- Patients with signs/symptoms of acute stroke
- STEMI patients
- Other high risk medical emergencies after consultation with medical control

Contraindications

- Diabetics in which unresponsiveness is immediately reversible
- Non-traumatic back pain
- Chronic Illness
- Pregnancy with threatening imminent delivery
- Patient weight > 350lbs
- Isolated or chronic headaches with normal GCS and no other complaints
- Choking patients with air movement (coughing)
- Sick person not in extremis
- Psychiatric patients
- Patients unable to lay flat
- Patients who express extreme fear of flying

Cancelation of Responding Air Medical Units

If upon making patient contact it is determined that air medical response is not necessary, the responding units may be cancelled. The decision to cancel responding air medical units should be considered for:

- Patients with minor injuries
- Patient refusal to fly
- Extended scene time of a packaged patient > than 10 minutes
- Any contraindication stated above

Landing Zones

Landing zones should be established as per the **Air Medical | Landing Zone Guideline**. Landing zones should be established in locations that facilitate the expedient loading of the aircraft, on or nearby the incident, or in the direction of the closest appropriate facility. If a helipad of a non-appropriate hospital emergency department is utilized the ground crew should not wait more than 8 minutes for the aircraft before proceeding to the ED for patient stabilization.

Approved Abbreviations List

AAA	Abdominal Aortic Aneurysm
ABC's	Airway, Breathing, Circulation
ACLS	Advanced Cardiac Life Support
ALS	Advanced Life Support
AMI	Acute Myocardial Infarction
AMS	Altered Mental Status
ASA	Aspirin
BAAM	Beck Airway-Airflow Monitor
BP	Blood Pressure
B/p	Blood pressure
Bpm	Beats per minute
BSA	Body Surface Area
BVM	Bag Valve Mask
CaCl	Calcium Chloride
CBG	Capillary Blood Glucose
cc	Cubic centimeter
C-spine	Cervical Spine
CHF	Congestive Heart Failure
Cx	Chest
c/o	Complaining (or complaints) of
COPD	Chronic Obstructive Pulmonary Disease
Cm	Centimeter
CPR	Cardio-Pulmonary Resuscitation
CVA	Cerebrovascular Accident
DAM	Difficult Airway Maneuvers
DKA	Diabetic Ketoacidosis
DNR	Do Not Resuscitate
DNAR	Do Not Attempt to Resuscitate
ED	Emergency Department
ECG	Electro-cardiogram
Epi	Epinephrine
ET	Endotracheal
ETT	Endotracheal tube
ETCO2	End-tidal Carbon Dioxide
ETOH	Alcohol use or odor present on patient
Fx	Fracture
G	Gram
GCS	Glasgow Coma Scale
HTN	Hypertension
Hx / hx	History
IO	Intraosseous
IM	Intramuscular
IV	Intravenous
Kg	Kilogram
≥	Greater than or equal to
≤	Less than or equal to
♂	Male
♀	Female

J	Joule (electrical measurement)
KVO	Keep Vein Open
LOC	Level of Consciousness
Lpm	Liters per minute
mA	Milliamperes
Max	Maximum
mL	Milliliter
µg	Microgram
Min	Minute
mm/Hg	Millimeters of mercury
mEq	Millequivalent
Mg	Milligram
MgSO4	Magnesium Sulfate
MI	Myocardial Infarction
NPA	Nasopharyngeal Airway
NPO	Nothing by mouth
NTG	Nitroglycerin
NS	Normal Saline
MOI	Mechanism(s) of Injury
O2	Oxygen
OB	Obstetrical
OPA	Oropharyngeal Airway
OD	Overdose
PEA	Pulseless Electrical Activity
PHTLS	Prehospital Trauma Life Support
PO	By mouth
PPV	Positive Pressure Ventilations
Prn	As needed
PTA	Prior to arrival
Pt	Patient
Pts	Patients
q	Every
RMC	Routine Medical Care
r/o	Rule out
SBP	Systolic Blood Pressure
SpO_2	Oxygen Saturation via Pulse Oximetry
SL	Sublingual
SQ	Sub-cutaneous
SVT	Supraventricular Tachycardia
TCA	Tricyclic Antidepressant
TD	Transdermal
TCP	Transcutaneous pacing
V-Fib	Ventricular Fibrillation (VF)
V-Tach	Ventricular Tachycardia (VT)
>	Greater than
<	Less than
≈	Approximately
Δ	Change

Cardiac Risk Factors

Major Cardiac Risk Factors

- Diabetes Mellitus (type I or II)
- Use of tobacco products (packs per day / years)
- Hypertension
- High cholesterol
- Family history of myocardial infarction before the age of 45 or any significant cardiovascular event

Minor Cardiac Risk Factors

- Obesity
- Sedentary lifestyle
- Cocaine use
- ≥ 50 years of age

SAMPLE History

S	Signs and symptoms including pain
A	Allergies
M	Medications prescribed and medications taken prior to arrival
P	Past medical history
L	Last intake and output
E	Events leading to injury or illness

Pain Assessment (OPQRST)

O	Onset	When did the pain first start?
P	Provocation	What causes the pain; what makes it better or worse?
Q	Quality	Description of pain (sharp, dull, stabbing, pressure, etc)
R	Radiation	Is the pain localized in one area or does it spread?
S	Severity	1 – 10 scale
T	Time	What time did the pain start? Has the pain occurred before?

Baker Pain Scale

Glasgow Coma Scale

Response	Scale	Score
Eye Opening Response	Eyes open spontaneously	4 Points
	Eyes open to verbal command, speech, or shout	3 Points
	Eyes open to pain (not applied to face)	2 Points
	No eye opening	1 Point
Verbal Response	Oriented	5 Points
	Confused conversation, but able to answer questions	4 Points
	Inappropriate responses, words discernible	3 Points
	Incomprehensible sounds or speech	2 Points
	No verbal response	1 Point
Motor Response	Obeys commands for movement	6 Points
	Purposeful movement to painful stimulus	5 Points
	Withdraws from pain	4 Points
	Abnormal (spastic) flexion, decorticate posture	3 Points
	Extensor (rigid) response, decerebrate posture	2 Points
	No motor response	1 Point

Cardiac Arrest Management

All medical patients in cardiac arrest must be treated on scene where found for no less than 30 minutes. Patient care including adequate, aggressive CPR / BLS is the focus in cardiac arrest, not patient packaging and transport. If a scene becomes unsafe where patient care cannot be delivered properly, law enforcement must be requested. The patient must then be transported to the closest appropriate ED.

Team Member Positions

Lead Medic

- Directs team positions
- Communicates with all team members
- Responsible for patient treatment decisions
- Communicates with **Medical Control** and family members
- May function in any position, as long as responsibilities are maintained (Clinical Float)

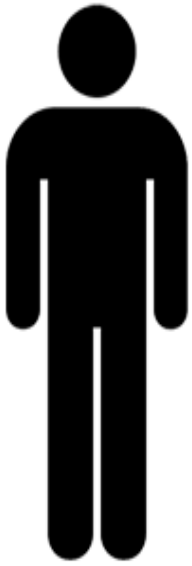
Airway Management

- Assemble and appropriately apply all equipment for airway and ventilation management (Suction, ITD, OPA, NPA, BVM, ETT, SGA, $EtCO_2$)
- Open/Clear Airway
- Insert OPA
- Apply ITD
- Maintain adequate BVM Mask Seal
- Perform ETI or SGA Insertion without (or minimal) interruption in chest compressions
- Ventilates patient as appropriate and secures advanced airways

Chest Compressions

- Performs manual chest compressions at a rate of 120/ min and appropriate depth
- Works in conjunction with team members to apply mechanical CPR device with minimal interruptions in chest compressions
- Controls mechanical CPR device and ensures proper device positioning

EMT's and EMR's may fill positions as necessary and perform skills within their scope of practice



Move/relocate the patient as needed to facilitate access for all team members to adequately work.

Team Member Positions

Recorder

- Assist Lead Medic with organization of cardiac arrest and treatment timelines
- Responsible for documentation or care/interventions and time procedures were performed
- The utilization of a digital app or template algorithm is encouraged

Medication Administration

- Establishes IO/IV access
- Administers all medications per appropriate COG
- If epinephrine is indicated, consider early administration

Defibrillator/Monitor

- Applies defibrillation pads and all other appropriate assessment devices
- Interprets rhythms, defibrillates as clinically indicated
- Coordinates double sequential defibrillation as needed with the Lead Medic

Clinical Float

- Rotates and assist other team members as needed
- May establish vascular access, perform airway procedure, medication administration or any other needed intervention
- May function as the Lead Medic

Shoulder Dystocia Techniques

Indications

- Clinical inability to deliver either shoulder
- Turtle sign: fetal head appears to retract back into the perineum

McRoberts Maneuver

- Place/hold the patient's legs in "extreme lithotomy position" (hips hyper flexed and knees against the chest while lying supine). Refer to: Figure A.
- With the help of a second provider, attempt suprapubic pressure to disengage the impacted shoulder, pushing the anterior shoulder under the pubic symphysis while applying gentle, downward traction to the fetal head. Refer to: Figure B.

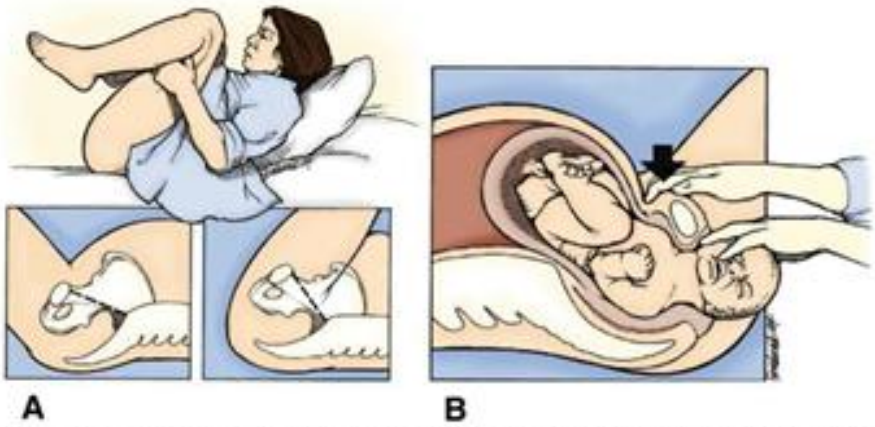


Figure 1. The McRoberts maneuver and suprapubic pressure. (A) The McRoberts maneuver causes cephalic rotation of the pubic symphysis, reduces lumbar lordosis, and may facilitate disimpaction of the anterior fetal shoulder. (B) Suprapubic pressure in the posterior direction may allow the anterior shoulder to move under the pubic symphysis. Reprinted with permission from Lew GH, Pulia MS. Emergency Childbirth. In: Roberts J, editor. Roberts Hedges Clinical Procedures in Emergency Medicine. Philadelphia: Elsevier; 2013:1170.

The Rubin Technique

- Insert two fingers in the vagina posteriorly and apply pressure to the anterior surface of the posterior shoulder to rotate the infant 180°. Refer to: Figure A
- Insert two fingers into the vagina posteriorly and apply pressure to the posterior surface of the posterior shoulder to rotate the infant 180° Refer to: Figure B

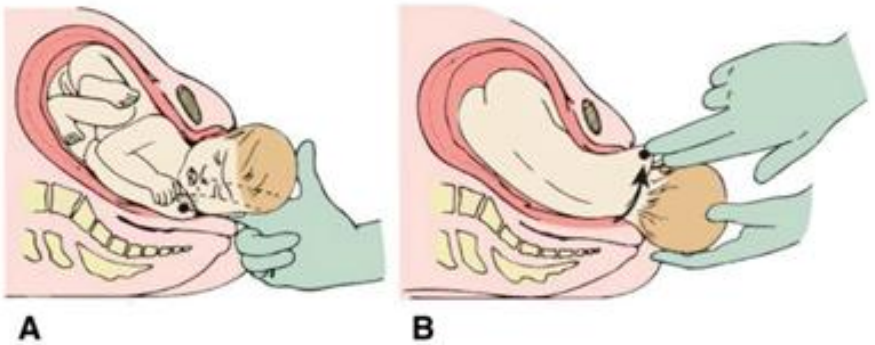
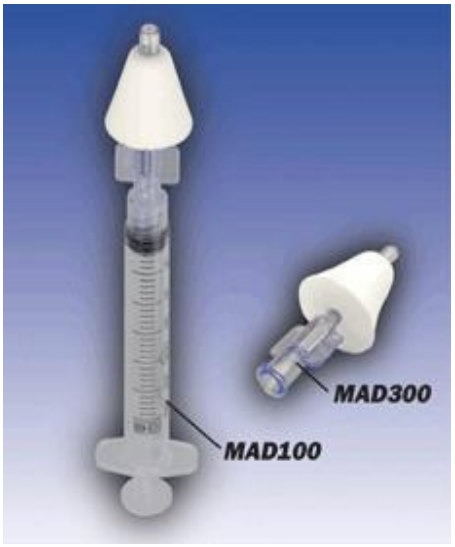


Figure 2. The Rubin technique. Also known as the Reverse Woods' Screw maneuver, the Rubin technique requires the practitioner to apply pressure on the posterior surface of the posterior shoulder (A), thereby adducting the shoulder and rotating the fetus 180° to deliver that shoulder anteriorly (B). Reprinted with permission from Lew GH, Pulia MS. Emergency Childbirth. In: Roberts J, editor. Roberts Hedges Clinical Procedures in Emergency Medicine. Philadelphia: Elsevier; 2013:1170.

Intranasal (IN) Medication Delivery

The intranasal (IN) route for medication delivery has several advantages but is not preferred over traditional IV routes. Not all medications can be given intranasaly for various reasons. **Naloxone, Midazolam Fentanyl,** and **Ketamine** may be given IN. The intranasal route is also useful for topical anesthetics prior to nasal intubations.



The device is designed to "mist" the medication in the nasal mucosa. The nasal mucosa is quite vascular which allows an almost instant route for the medication to enter central circulation. Each mL, 10-50 microns of the medication, is expelled in the nasal cavity across mucosal membrane where it is absorbed into the circulation. Studies have shown serum levels of IN delivered medications to be comparable to serum level of medications given IV within 2-10 minutes.

Factors Which Could Reduce the Effectiveness of IN Delivery

- Decreased blood flow to nasal mucosa (trauma / surgery)
- Dehydration (dry mucous membranes)
- Epistaxis
- Hypotension
- Increased mucous production
- Vasoconstrictors, topical (i.e. snorting cocaine)

Procedure

(Non-sterile)

- Load syringe with desired amount of medication (Max 2 mL)
- Apply atomizer adapter on the syringe
- Place the tip of the atomizer 1.5 cm within the nostril aiming slightly up and outward (towards the top of the ear)
- Quickly compress the syringe, administering Max of 1mL per nostril
- If needed, repeat the procedure in the other nostril

- IN medication delivery does not replace the need for IV access. This is simply another route for medication deliver when vascular access is unobtainable.
- Vascular access may be unobtainable for several reasons, including but not limited to:
  - Poor peripheral access
  - Combative / violent patients
  - Less frightening (pediatrics)

Infusion Reference Charts

Common Gravity Infusion Reference Chart			
100 mL Infusion	**10 gtts**	**15 gtts**	**60 gtts**
10 minutes	100 gtts/min	150 gtts/min	600 gtts/min
20 minutes	50 gtts/min	75 gtts/min	300 gtts/min
30 minutes	33 gtts/min	50 gtts/min	200 gtts/min
Can be utilized to administer loading doses over time (Amiodarone, Ketamine, Magnesium Sulfate)			

Common Gravity Infusion Reference Chart			
250 mL Infusion	**10 gtts**	**15 gtts**	**60 gtts**
10 minutes	250 gtts/min	375 gtts/min	1500 gtts/min
20 minutes	125 gtts/min	188 gtts/min	750 gtts/min
30 minutes	83 gtts/min	125 gtts/min	500 gtts/min
Can be utilized to administer loading doses over time (Amiodarone, Ketamine, Magnesium Sulfate)			

Amiodarone Maintenance Infusion	
mg/min	1
mL/hr	60
mL/hr (microdrops/min) when concentrated as 100mg/100mL -OR- 250mg/250mL of D5W or Normal Saline	

Infusion Reference Charts

Dopamine Infusion Chart

Patient weight in kg												
mcg/kg/min	40	50	60	70	80	90	100	110	120	130	140	150
5	8	9	11	13	15	17	19	21	23	24	26	28
10	15	19	23	26	30	34	38	41	45	49	53	56
15	23	28	34	39	45	51	56	62	68	73	79	84
20	30	38	45	53	60	68	75	83	90	98	105	113

mL/hr (microdrops/min) when concentrated as 400mg/250mL of D5W or Normal Saline

Epinephrine Infusion Chart

mcg/min	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
mL/hr	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

mL/hr (microdrops/min) when concentrated as 1mg/250mL of D5W or Normal Saline

Pediatric Epinephrine Infusion Chart

Patient weight in kg													
mcg/kg/min	14	16	18	20	22	24	26	28	30	32	34	36	38
0.1	21	24	27	30	33	36	39	42	45	48	51	54	57
0.2	42	48	54	60	66	72	78	84	90	96	102	108	114
0.3	63	72	81	90	99	108	126	135	144	153	162	171	180
0.4	84	96	108	120	132	144	156	168	180	192	204	216	228
0.5	105	120	135	150	165	180	195	210	225	240	255	270	285
0.6	126	144	162	180	198	216	234	252	270	288	306	324	342
0.7	147	168	189	210	231	252	273	294	315	336	357	378	399
0.8	168	192	216	240	264	288	312	336	360	384	408	432	456
0.9	189	216	243	270	297	324	351	378	405	432	459	486	513
1.0	210	240	270	300	330	360	390	420	450	480	510	540	570

mL/hr (microdrops/min) when concentrated as 1mg /250mL of D5W or Normal Saline

Fentanyl Infusion Chart

Patient weight in kg												
mcg/kg/hr	40	50	60	70	80	90	100	110	120	130	140	150
0.5	25	31	38	44	50	56	63	69	75	81	88	94
1	50	63	75	88	100	113	125	138	150	163	175	188
1.5	75	94	113	131	150	169	188	206	225	244	263	281
2	100	125	150	175	200	225	250	275	300	325	350	375

mL/hr (microdrops/min) when concentrated as 200mcg/250mL of D5W or Normal Saline

Infusion Reference Charts

Ketamine Infusion Chart												
Patient weight in kg												
mg/kg/hr	40	50	60	70	80	90	100	110	120	130	140	150
0.5	20	25	30	35	40	45	50	55	60	65	70	75
1	40	50	60	70	80	90	100	110	120	130	140	150
1.5	60	75	90	105	120	135	150	165	180	195	210	225
2	80	100	120	140	160	180	200	220	240	260	280	300
mL/hr (microdrops/min) when concentrated as 250mg/250mL of D5W or Normal Saline												

Nitroglycerine Infusion Chart							
mcg/min	100	150	200	250	300	350	400
mL/hr	60	90	120	150	180	210	240
mL/hr (microdrops/min) when concentrated as 25mg/250mL of D5W or Normal Saline							

Nitroglycerine Infusion Chart							
mcg/min	100	150	200	250	300	350	400
mL/hr	30	45	60	75	90	105	120
mL/hr (microdrops/min) when concentrated as 50mg/250mL of D5W or Normal Saline							

Norepinephrine Infusion Chart															
mcg/min	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
mL/hr	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5
mL/hr (microdrops/min) when concentrated as 4mg/250mL of D5W or Normal Saline															

Norepinephrine Infusion Chart															
mcg/min	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
mL/hr	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450
mL/hr (microdrops/min) when concentrated as 4mg/1000mL of D5W or Normal Saline															

Medical Terms

Anaphylactic shock	Rapidly developing, systemic anaphylaxis that produces life-threatening vascular collapse and acute airway obstruction within minutes after exposure to an antigen
Angioedema	Condition marked by the development of edematous areas of skin, mucous membranes, or internal organs. It is frequently associated with urticaria (hives). It is benign when limited to the skin but can cause respiratory distress when present in the mouth, pharynx, or larynx.
Anisocoria	A condition characterized by an unequal size of the pupils
Ascites	The abnormal accumulation of fluid in the peritoneal cavity
Ataxia	Gait marked by staggering and unsteadiness
Cardiogenic shock	Failure of the heart to pump an adequate supply of blood and oxygen to body tissues. The most common cause is acute myocardial infarction (AMI). Treatment usually includes volume replacement, high flow oxygen, inotropic agents
Chronotropic	Effects are ones that change the heart rate (i.e. the time between p waves).
Clonic	Alternating contracting and relaxing the muscles
Contralateral	Referring to the opposite side
Diplopia	Double vision
Dysarthria	Imperfect articulation of speech due to disturbances of muscular control
Dry mucous membranes	Seen in fevers, chronic gastritis, some liver disturbances
Dysphasia	Difficulty swallowing
Dystonic	Prolonged involuntary muscular contractions that may cause twisting of body parts, repetitive movements, and increased muscular tone. This is an adverse reaction NOT a allergic reaction. Treatment is **IV** Benadryl
Eclampsia	A severe hypertensive disorder (≥ 140/90mmHg) of pregnancy characterized by convulsions and coma, occurring between 20 weeks' gestation and the end of the sixth week postpartum
Epistaxis	Hemorrhage from the nose (nosebleed)
Etiology	The set of factors that contributes to the occurrence of a disease or injury

Medical Terms

Gait	Manner of walking
Gaze	Movement of both eyes together
Gaze, dysconjugate	Failure of the eyes together
Hepatojugular reflux	With the patient at 30° angle press on the abdomen over the liver lightly. If the jugular veins rise ≈ 4 cm it is a positive reflux which is a sure sign of CHF
Hyperglycemia	increase in blood sugar levels without major sign and symptoms
Hypovolemic shock	Shock occurring when there is an insufficient amount of fluid in the circulatory system. Usually, this is due to the bleeding, diarrhea, or vomiting
Infarction	The death of tissue due to a lack of blood flow. A myocardial infarction is death of part of the heart muscle caused by an obstruction of a coronary artery
Inotropic	Influencing the force of muscular contraction (increasing the force)
ischemia	reduced (isch) blood (emia). A condition of inadequate blood flow to a tissue. Ischemia to the heart can cause angina, and if present long enough, infarction.
Lividity	Skin discoloration, as from bruising, or venous congestion
Neurogenic shock	A form of distributive shock due to decreased peripheral vascular resistance. Damage to either the brain or the spinal cord inhibits transmission of neural stimuli to the arteries and arterioles, which reduces vasomotor tone. The decreased peripheral resistance results in vasodilatation and hypotension; cardiac output diminishes due to the altered distribution of blood volume.
Nystagmus	Constant, involuntary, cyclical movement of the eyeball in any direction
Orthopnea	Breathing difficulty which occurs when lying flat; symptom of heart failure. It is measured by the number of pillows needed to prop the patient up to enable breathing
Orthostatic hypotension	fall in blood pressure upon standing, which causes symptoms such as dizziness, lightheadedness, dimming or tunneling of vision, and pain or discomfort in the back of the head and neck
Paroxysmal-nocturnal dyspnea	(PND) shortness of breath that usually occur when the patients are asleep lying flat. PND commonly occurs several hours after a person with heart failure has fallen asleep. PND resolves quickly once a person awakens and sits upright. It takes longer to develop than orthopnea.

Medical Terms

Plegia	Complete weakness (unable to move)
Poikilothermia	Inability to regulate one's own body temperature
Pruritus	Severe itching
Qualitative devices	(Capnography) exhaled CO2 detecting device used to determine initial ETT placement. It is not used for continuous ventilation monitoring. (TubeCheck™, ETCO2 detector, etc.)
Quantitative capnography	Exhaled CO2 continuous measuring/monitoring device used for initial ETT placement and allows for continuous end-tidal CO2 monitoring
Pallor	Lack of color, paleness
Rigor mortis	State of hardness and stiffness of muscles in a dead body
Sepsis	A systemic inflammatory response to infection, in which there is fever or hypothermia, tachycardia, tachypnea, and evidence of inadequate blood flow to internal organs
Septic shock	Hypotension and inadequate blood flow to organs, as the result of sepsis. S/S includes hypotension, fever, tachypnea, tachycardia, decreased urinary output. Temperature and hypoxia vary with the degree of sepsis
Supraglottic	Located above the glottis
Stridor	High-pitched, harsh sound occurring during inspiration, sign of an upper airway obstruction
Tonic	Tension or contraction especially muscular
Urticaria	Vascular reaction of the skin characterized by sudden eruption of pale papules/hives and itching.
Valsalva's maneuver	An attempt to forcibly exhale with the glottis, nose, and mouth closed. This maneuver causes increased intrathoracic pressure, slowing of the pulse, decreased blood return to the heart, and increased venous pressure
Vertigo	A sensation of spinning or feeling dizzy; it is a symptom not a disease

Medication Dosage Guide

ACETAMINOPHEN (TYLENOL®):

- Fever Control — 1g PO

ADENOSINE (ADENOCARD):

- Tachycardia | Narrow Complex — 6mg IV/IO rapid push **-IF NO CONVERSION-** 12mg IV/IO Rapid Push

PEDIATRIC

- Tachycardia | Narrow Complex — 0.1mg/kg IV Max Dose 6mg **-IF NO CONVERSION-** 0.2mg/kg IV Max Dose 12mg

ALBUTEROL SULFATE (PROVENTIL, VENTOLIN):

- Drowning — 5mg Nebulized PRN, Consider: Continuous Neb 20mg/hr
- Crush Injury — **MED CONTROL**: Continuous Neb 20mg/hr
- Pneumonia — 5mg Nebulized
- Reactive Airway — 5mg Nebulized PRN, Max of 10mg Severe: Continuous Neb 20mg/hr

PEDIATRIC

- Lower Airway Obstruction Asthma, >2years — ≤ 4 years old: 2.5mg Nebulized; ≥ 5 years old: 5mg Nebulized

AMIODARONE (NEXTERONE):

- V-fib| V-Tach (Pulseless) — 300mg IV/IO |THEN| after 5min 150mg IV/IO, Max of 450mg

PEDIATRIC

- V-fib | V-Tach (Pulseless) — 5mg/kg IV/IO, Max of 450mg

AMIODARONE INFUSION:

- Post Resuscitation — Loading Dose: 150mg IV/IO over 10 min. Maintenance Dose: 1mg/min IV/IO
- Tachycardia | Wide Complex Stable — Loading Dose: 150mg/100mL IV/IO over 10 min. Maintenance Dose: 1mg/min IV/IO
- Tachycardia | Wide Complex Unstable — Loading Dose: 150mg/100mL IV/IO over 10 min. Maintenance Dose: 1mg/min IV/IO

PEDIATRIC

- Tachycardia, Wide Complex — **MED CONTROL**: 5mg/kg IV/IO over 20-60 min.

ASPIRIN:

- Acute Coronary Syndrome — 160-325mg PO
- CHF — 160-325mg PO

ATROPINE SULFATE (ATROPEN®, a component of MARK I® KIts and DUODOTE®):

- Bradycardia — 1mg IV/IO q 3 min. Max of 3mg
- Nerve Agent |Organophosphate — 2mg IV/IO q 5 min.

PEDIATRIC

- Bradycardia — 0.02mg/kg IV/IO PRN, Max of 2 doses (Min single dose: 0.1mg; Max single dose of 0.5mg)
- Nerve Agent | Organophosphate — 0.02mg/kg IV/IO q 5 min.

CALCIUM CHLORIDE:

- Asystole/PEA — 1000mg IV/IO
- Crush Injury — MED CONTROL: 1g IV/IO over 2 min.
- Drug Overdose — Med Control 500-1000mg mixed in 250mL of NS or D5W IV/IO over 10-20 minutes
- V-Fib| V-Tach (Pulseless) — 1000mg IV/IO

PEDIATRIC

- Asystole | PEA — 20mg/kg IV/IO Max of 1g
- V-Fib | V-Tach (Pulseless) — 20mg/kg IV/IO Max of 1g

CALCIUM GLUCONATE GEL:

- Hydrofluoric Acid Exposure — 2.5% transdermal

CEFEPIME:

- Sepsis-Suspected | Septic Shock — 2g/100mL, IV/IO, administered over 30 min.

CEFAZOLIN (Ancef):

- Open Fracture(s) — Adults: 2g Slow IV/IO Push over 3-5 min.
  Pediatrics: 30mg/kg Slow IV/IO Push over 3-5 min. Max of 2g

CRYSTALOID FLUIDS (NS, LR):

- Routine Medical Care — Adults: 250–2000mL IV/IO PRN
  Neonates: 10mL/kg IV/IO
  Pediatrics: 20mL/kg IV/IO PRN, Max of 60mL/kg

DEXAMETHASONE (DECADRON):

- Adrenal Insufficiency — 10mg IV/IO
- Allergic Reaction — 10mg IV/IO/IM
- Reactive Airway — 10mg IV/IO/IM

PEDIATRIC

- Adrenal Insufficiency — 0.3mg/kg IV/IO Max of 10mg
- Croup — 0.6mg/kg IV/IM Max of 16mg
- Lower Airway, Asthma, >2years — 0.6mg/kg PO Max of 16mg -OR- 0.6mg/kg IV/IO/IM Max of 16mg

Medication Dosage Guide

DEXTROSE (D10W, D50W):

- Asystole/PEA — 25g IV/IO
- Diabetic Emergency — 12.5-25g IV/IO
- Stroke — 12.5g IV/IO
- V-Fib | V-Tach Pulseless — 25g IV/IO

PEDIATRIC

- Altered Mental Status — D10W 0.5g/kg IV/IO Max of 250mL (5mL/kg)
- Asystole/PEA — D10W 1g/kg IV/IO
- V-Fib | V-Tach (Pulseless) — D10W 1g/kg IV/IO

DROPERIDOL

- Abdominal Pain | N/V — 1.25mg IV/IO/IM q 15 min. Max of 2.5mg
- Behavioral Emergency — 2.5mg IV/IO; 2.5-5mg IM

DIAZEPAM (VALIUM):

- Airway Management — Nasal Intubation 2.5-5mg IV/IO/IM q 2 min. Max of 10mg
  Post Intubation Sedation 2.5-5mg IV/IO/IM q 2 min. Max of 10mg
- Behavioral Emergency — 5mg IV/IO/IM q 2 min. Max of 10mg
- Bradycardia, TCP Premedication — 2.5-5mg IV/IO/IM
- CPR Induced Consciousness — 2.5-5mg IV/IO/IM
- Excited Delirium — 5mg IV/IO/IM q 2 min. Max of 10mg
- Pain Management, Emergence — 5mg IV/IO/IM q 2 min. Max of 10mg
- Seizure — Seizing on Arrival: 5mg IM
  Seizing with IV/IO Access: 5mg IV/IO/IM q 2 min. Max of 10mg
- Tachycardia, TCP Premedication — 2.5-5mg IV/IO/IM

PEDIATRIC

- Seizure — Seizing on Arrival: 0.1mg/kg IM Max of 5mg
  With IV/IO Access: 0.1mg/kg IV/IO/IM Max of 5mg, q 2 min. PRN, Total Max of 10mg

DILTIAZEM (CARDIZEM):

- Tachycardia | Narrow Complex — 10mg IV/IO slow push q 5min. Max of 20mg

DIPHENHYDRAMINE (BENADRYL):

- Allergic Reaction — 50mg IV/IO/IM
- Drug Overdose, Dystonia — 25-50mg IV/IO/IM

PEDIATRIC

- Allergic Reaction — 1-2mg/kg IV/IO/IM Max of 50mg

DOPAMINE INFUSION:

- Bradycardia — MED CONTROL: 2-10mcg/kg/min. IV/IO
- CHF, SBP <100mmHg — 10-20mcg/kg/min. IV/IO
- Post Resuscitation — 10-20mcg/kg/min. IV/IO

PEDIATRIC

- Shock >14kg — 5-20mcg/kg/min. IV/IO

DUODOTE | MARK 1 KIT:

- Nerve Agent | Organophosphate — IM Auto injector x3

EPINEPHRINE (ADRENALINE)1:1000:

- Allergic Reaction — 0.3-0.5mg IM, May repeat x1 in 5 min.
- Reactive Airway Disease — 0.3-0.5mg IM, **MED CONTROL**: Age > 60 years old

PEDIATRIC

- Allergic Reaction
  - <25kg 0.15mg IM q 5 min. Max of 2 doses
  - >25kg 0.3mg IM q 5 min. Max of 2 doses
- Croup | Stridor — 3mg Nebulized Max x2
- Lower Airway Obstruction | Asthma, > 2 years old
  - <25kg 0.15mg IM
  - >25kg 0.3mg IM

Bronchiolitis < 2 years old — 3mg Nebulized, Max of 2 doses

EPINEPHRINE (ADRENALINE) 1:10,000:

- Asystole | PEA — 1mg IV/IO q 3-5 min.
- Traumatic Cardiac Arrest — 1mg IV/IO q 3-5 min.
- V-Fib | V-Tach (Pulseless) — 1mg IV/IO q 3-5 min.

PEDIATRIC

- Asystole | PEA — 0.01mg/kg IV/IO q 3-5 min. Max of 1mg/dose
- Bradycardia — 0.01mg/kg IV/IO q 5 min. Max of 1mg
- Neonatal Resuscitation — 0.01-0.03mg/kg IV/IO
- V-Fib | V-Tach (Pulseless) — 0.01mg/kg IV/IO q 3-5 min. Max of 1mg for a single dose

EPINEPHRINE (ADRENALINE) INFUSION:

- Allergic Reaction — 2-30mcg/min. IV/IO
- Bradycardia — **MED CONTROL**: 2-10mcg/min. IV/IO
- CHF, SBP < 100mmHg — 2-30mcg/min. IV/IO
- Post Resuscitation — 2-30mcg/min. IV/IO

PEDIATRIC

- Allergic Reaction > 2 years old/14kg: — 0.1-1mcg/kg/min. IV/IO
- Shock > 2 years old/14kg: — 0.1-1mcg/kg/min. IV/IO

EPINEPHRINE (ADRENALINE) PUSH-DOSE:

- Allergic Reaction — 5-20mcg (0.5-2mL)IV/IO q 3-5min, Max 100mcg
- CHF, SBP < 100mmHg — 5-20mcg (0.5-2mL)IV/IO q 3-5 min.
- Delayed Sequence Intubation — 5-20mcg (0.5-2mL) IV/IO q 3-5 min.
- Post Resuscitation — 5-20mcg (0.5-2mL) IV/IO q 3-5 min.
- Rapid Sequence Intubation — 5-20mcg (0.5-2mL)IV/IO q 3-5 min.
- Sepsis — 5-20mcg (0.5-2mL) IV/IO q 3-5 min.

ETOMIDATE (AMIDATE):

- Rapid Sequence Intubation — 0.3mg/kg IV/IO
  Hypotensive: 0.15mg/kg IV/IO

FENTANYL (SUBLIMAZE):

- Abdominal Pain — 25-50mcg IV/IO/IM/IN q 2 min. Max 200mcg
- Acute Coronary Syndrome — 25-50mcg IV/IO/IM/IN q 2 min. Max 200mcg
- Airway Management
- Post Intubation Sedation — 25-50mcg IV/IO q 2 min. Max of 200mcg
- Pain Management — 25-50mcg IV/IO/IM/IN q 2 min. Max of 200mcg

PEDIATRIC

- Traumatic Pain Management — 1mcg/kg IV/IO/IM/IN q 5 min. Max of 100mcg, Total Max of 200mcg

FENTANYL (SUBLIMAZE) INFUSION:

- Post Intubation Sedation — Loading Dose: 0.5-2mcg/kg IV/IO push
  Infusion: 0.5-2mcg/kg/hr

GLUCOSE (ORAL):

- Diabetic Emergency — 15g PO

HYDROCORTISONE SUCCINATE (CORTEF®, SOLUCORTEF®):

- Adrenal Insufficiency — 100mg IV/IO/IM

PEDIATRIC

- Adrenal Insufficiency — 2mg/kg IV/IO/IM Max of 100mg

HYDROMORPHONE (DILAUDID®):

- Abdominal Pain — 0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg
- Acute Coronary Syndrome — 0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg
- Airway Management — Post Intubation Sedation: 0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg
- Pain Management — 0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg

PEDIATRIC

- Traumatic Pain Management — 0.01mg/kg IV/IO/IM q 5 min. PRN, Max of 2mg

HYDROXOCOBALAMIN (CYANOKIT) INFUSION:

- Cyanide Exposure — 5g IV/IO over 15 minutes
  MED CONTROL: Additional 5g IV/IO over 15-120 min.

PEDIATRIC

- Cyanide Exposure — 70mg/kg IV/IO over 15 minutes
  MED CONTROL: Additional 70mg/kg IV/IO over 15-120 min.

IBUPROFEN (ADVIL®, MOTRIN®):

- Fever Control — 600mg PO

IPRATROPIUM BROMIDE (ATROVENT®):

- Reactive Airway — 500mcg Nebulized
- Pneumonia — 500mcg Nebulized

PEDIATRIC

- Lower Airway |Asthma, > 5 years old — 500mcg Nebulized

KETAMINE HYDROCHLORIDE (KETALAR®):

• Airway Management	Post Intubation Sedation: 1mg/kg IV/IO slow push q 15 min.
• Behavioral Emergency	4mg/kg IM Max 400mg
• CPR Induced Consciousness	1mg/kg IV/IO q 15min, Max 4mg/kg
• Delayed Sequence Intubation	2mg/kg IV/IO Hypotensive: 0.5mg/kg IV/IO
• Excited Delirium	4mg/kg IM Max of 400mg
• Pain Management	25mg mixed in 100mL NS IV/IO q 15 min. 25mg slow IV/IO push q 15 min. 50mg IM/IN q 15 min.
• Rapid Sequence Intubation	2mg/kg IV/IO Hypotensive: 0.5mg/kg IV/IO

KETAMINE HYDROCHLORIDE (KETALAR®) INFUSION:

Post Intubation Sedation	Loading Dose: 1mg/kg IV/IO Infusion: 0.5-2mg/kg/hr IV/IO

LIDOCAINE 2 %:

• IO Anesthesia	40mg IO over 2 minutes; 20mg Maintenance over 1 min.
Pediatric	
• IO Anesthesia	0.5mg/kg IO over 2 min; Max of 40mg ; Maintenance ½ of loading dose

LORAZEPAM (ATIVAN):

• Airway Management	Nasal Intubation: 2-4mg IV/IO/IM Post Intubation Sedation: 2-4mg IV/IO/IM q 2min Max of 8mg
• Behavioral Emergency	2-4mg IV/IO/IM q 2 min. Max of 8mg
• Bradycardia, TCP Premedication	2-4mg IV/IO/IM
• CPR Induced Consciousness	2-4mg IV/IO/IM
• Excited Delirium	2-4mg IV/IO/IM q 2 min. Max of 8mg
• Pain Management, Emergence	2-4mg IV/IO/IM
• Seizure	Seizing on Arrival: 4mg IM Seizing with IV/IO Access: 2-4mg IV/IO/IM q 2min Max of 8mg
• Tachycardia, TCP Premedication	2-4mg IV/IO/IM

LORAZEPAM (ATIVAN) CONTINUED:

PEDIATRIC

- Seizure — Seizing on Arrival: 0.1mg/kg IM Max of 4mg
- Seizing with IV/IO Access — 0.1mg/kg IV/IO/IM q 2 min. Max of 4mg

MAGNESIUM SULFATE:

- V-Fib | V-Tach (Pulseless), Torsades — 2g IV/IO
- V-Fib | V-Tach Storm, Torsades — 2g IV/IO

PEDIATRIC

- V-Fib | V-Tach (Pulseless), Torsades — 50mg/kg IV/IO Max of 2g

MAGNESIUM SULFATE INFUSION:

- Reactive Airway — 2g mixed in 250mL NS/D5W IV/IO over 10 min. **MED CONTROL**: age >60
- Seizure, Eclampsia — 4-6g mixed in 250mL NS/D5W IV/IO over 10 min.
- Tachycardia | Wide Complex, Torsades **MED CONTROL**: 2g mixed in 250mL NS/D5W IV/IO over 10 min.

PEDIATRIC

- Lower Airway | Asthma >2years old — 50mg/kg/ mixed in 100mL NS/D5W IV/IO over 15 min. Max of 2g
- Tachycardia | Wide Complex, Torsades **MED CONTROL**: 50mg/kg mixed in 100mL NS/D5W IV/IO over 20 min. Max of 2g

METHYLPREDNISOLONE (SOLU-MEDROL):

- Adrenal Insufficiency — 125mg IV/IO/IM
- Allergic Reaction — 125mg IV/IO/IM
- Reactive Airway — 125mg IV/IO/IM

PEDIATRIC

- Adrenal Insufficiency — 125mg/kg IV/IO/IM
- Allergic Reaction — 2mg/kg IV/IO/IM
- Lower Airway | Asthma >2 years old — 2mg/kg IV/IO/IM Max 125mg

METOPROLOL (LOPRESSOR®):

- Tachycardia | Narrow Complex — 5mg IV/IO slow push q 5 min. Max of 15mg
- V-Fib | V-Tach Storm — 5mg IV/IO q 5 min. Max of 15mg

MIDAZOLAM HCL (VERSED®):

- Airway Management — Nasal Intubation: 2.5mg IV/IO/IM/IN
  Post Intubation Sedation: 5mg IV/IO/IM/IN q 2 min. Max of 20mg
- Behavioral Emergency — 2.5mg IV/IO/IM/IN q 2 min. Max of 10mg
- Bradycardia, TCP Premedication — 2.5-5mg IV/IO/IM/IN
- CPR Induced Consciousness — 2.5mg IV/IO q 2 min. Max of 5mg
- Excited Delirium — 2.5mg IV/IO/IM/IN q 2 min. Max of 10mg
- Pain Management, Emergence — 2.5mg IV/IO/IM/IN
- Seizure — Seizing on Arrival: 10mg IM/IN
  Seizing with IV/IO Access: 2.5mg IV/IO q 2 min. Max of 10mg
- Tachycardia, TCP Premedication — 2.5-5mg IV/IO/IM/IN

PEDIATRIC

- Seizure — Seizing on Arrival: 0.2mg/kg IM/IN Max of 5mg
  Seizing with IV/IO Access: 0.1mg/kg IV/IO q 3-5 min Max Dose 2mg; Total Max of 5mg

MORPHINE SULFATE:

- Abdominal Pain — 2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg
- Acute Coronary Syndrome — 2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg
- Airway Management — Post Intubation Sedation: 2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg
- Pain Management — 2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg

PEDIATRIC

- Traumatic Pain Management — 0.1mg/kg IV/IO/IM q 2 min. PRN, Max of 4mg; Total Max of 10mg

NALOXONE (NARCAN):

- Asystole | PEA — 2mg IV/IO
- Drug Overdose — 2mg IN **-AND/OR-** 0.5mg IV/IO/IM/IN q 2 min. Total Max of 4mg
- V-Fib | V-Tach (Pulseless) — 2mg IV/IO

PEDIATRIC

- Altered Mental Status — 0.1mg/kg IV/IO/IM/IN q 2 min. Max of 2mg
- Asystole | PEA — 0.1mg/kg IV/IO
- V-Fib | V-Tach (Pulseless) — 0.1mg/kg IV/IO

NITROGLYCERIN (NTG SL, NITROSTAT®):

- ACS (Stable Angina) — 0.4mg SL q 3min. Max of 3 doses
- ACS (Unstable Angina) — 0.4mg SL q 3 min.
- CHF — 0.4mg SL q 5 min.

NITROGLYCERIN INFUSION (TRIDIL®):

- CHF, SBP 100-140mmHg — 50-100mcg/min IV/IO
- CHF, SBP > 140mmHg — Loading Dose: 200mcg slow IV/IO push
  Infusion: 100-400mcg/min IV/IO

NOREPINEPHRINE (LEVOPHED®) INFUSION:

- CHF, SBP < 100mmHg — 2-30mcg/min IV/IO
- Post Resuscitation — 2-30mcg/min IV/IO
- Sepsis — 2-30mcg/min IV/IO
- Shock — 2-30 mcg/min IV/IO

ONDANSETRON HCL (ZOFRAN®):

- Acute Abd Pain | N/V — 4mg IV/IO/IM q 15 min. Max of 8mg
- Acute Coronary Syndrome — 4mg IV/IO/IM q 15 min. Max of 8mg
- Airway Management
- Pre-Intubation — 4mg IV/IO
- Delayed Sequence Intubation — 4mg IV/IO
- Pain Management — 4mg IV/IO/IM q 15 min. Max of 8mg
- Rapid Sequence Intubation — 4mg IV/IO

  PEDIATRIC
- Nausea/Vomiting — 8-15kg: 2mg IV/IO/IM q 15 min. Max of 4mg
  >15kg: 4mg IV/IO/IM q 15 min. Max of 8mg

PRADLIXIME CHLORIDE (2-PAM, a component of MARK I® Kits and DUODOTE®):

- Nerve Agent/Organophosphate — **MED CONTROL**: 1g mixed in 100mL NS/D5W IV/IO over 15 min.

  PEDIATRIC
- Nerve Agent/Organophosphate — **MED CONTROL**: 15mg/kg/mixed in 100mL of NS/D5W IV/IO over 15 min.

ROCURONIUM BROMIDE (ZEMURON®):

- Delayed Sequence Intubation — 1.2mg/kg IV/IO
  Hypotensive 1.6mg/kg IV/IO
- Rapid Sequence Intubation — 1.2mg/kg IV/IO
  Hypotensive 1.6mg/kg IV/IO

SODIUM BICARBONATE:

- Asystole | PEA — 1mEq/kg IV/IO
- Crush Injury — Prior to Extrication: 100mEq mixed in 2000mL NS IV/IO
  Post Extrication, Hyperkalemia; **MED CONTROL**: 100mEq IV/IO push
- Drug Overdose — 1-2 mEq/kg IV/IO, repeat to QRS < 120ms
- Irritant Gas, Chlorine Exposure — 3mEq mixed in 2.5mL of NS; Nebulized
- V-Fib | V-Tach (Pulseless) — 1mEq/kg IV/IO

PEDIATRIC

- Asystole | PEA — 1mEq/kg IV/IO
- V-Fib | V-tach (Pulseless) — 1mEq/kg IV/IO

SUCCINYLCHOLINE (ANECTINE®, QUELICIN®):

- Delayed Sequence Intubation — 1.5-2mg/kg IV/IO
  Hypotensive 2mg/kg IV/IO
- Rapid Sequence Intubation — 1.5-2mg/kg IV/IO
  Hypotensive 2mg/kg IV/IO

TRANEXAMIC ACID (TXA):

- TXA | Blood — 2g Slow IV/IO Push
- Pediatric TXA | Blood — 15mg/kg Slow IV/IO Push

VECURONIUM BROMIDE:

- Delayed Sequence Intubation — 0.3mg/kg IV/IO
  Hypotensive: 0.3mg/kg IV/IO
- Rapid Sequence Intubation — 0.3mg/kg IV/IO
  Hypotensive: 0.3mg/kg IV/IO

ZOSYN (PIPERACILLIN + TAZOBACTAM):

- Adult Sepsis (Suspected GI Tract) — 4.5g in 100mL IV/IO Infusion over 30 min.

Acetaminophen (Tylenol®):

1. **Classification:**
   - Antipyretic, Analgesic
2. **Physiologic Effect:**
   - May work peripherally to block pain impulse generation; may also inhibit prostaglandin synthesis in CNS
3. **Major Indications:**
   - Fever
4. **Primary Contraindications:**
   - Hypersensitivity
   - Severe acute liver disease
   - Total administration > 4g/day
   - Environmental heat related emergencies
5. **Additional Information**
   - There are multiple over-the-counter medications, as well as scheduled drugs, that include acetaminophen (Tylenol®) as an active ingredient
   - Use caution in evaluating all possible sources of acetaminophen prior to administration to prevent overdose

Acetaminophen (Tylenol®) Dose:

- Fever Control 1g PO

ADENOSINE (ADENOCARD):

1. **Classification:**
   - Class V Antiarrhythmic
2. **Physiologic Effect:**
   - Slows conduction through AV node and interrupts AV re-entry pathways, which restore normal sinus symptoms
3. **Major Indications:**
   - Conversion of narrow complex tachycardia; stable supraventricular tachycardia (SVT)
4. **Primary Contraindications:**
   - Second or third degree AV block (except in patients with functioning pacemakers)
   - Sick sinus syndrome
   - Hypersensitivity
   - Symptomatic bradycardia
   - Wolf-Parkinson-White
   - Ventricular tachycardia
6. **Side Effects:**
   - Flushing
   - Dyspnea
   - Chest pain
   - Transient periods of asystole, sinus bradycardia, or ventricular ectopy
   - Hypotension
   - Palpitations
7. **Additional Information:**
   - Administer via large-bore IV access at or superior to the antecubital fossa or via the proximal humerus IO site Follow with rapid saline flush

ADENOSINE (ADENOCARD) Dose:

- Tachycardia | Narrow Complex — 6mg IV/IO rapid push **-IF NO CONVERSION-** 12mg IV/IO Rapid Push

PEDIATRIC

- Tachycardia | Narrow Complex — 0.1mg/kg IV Max Dose 6mg **-IF NO CONVERSION-** 0.2mg/kg IV Max Dose 12mg

ALBUTEROL SULFATE (PROVENTIL, VENTOLIN):

1. **Classification:**
   - Bronchodilator, Beta-2 Agonist
2. **Physiologic Effect:**
   - Beta-2 receptor agonist with some beta-1 activity; relaxes bronchial smooth muscle with little effect on heart rate
3. **Major Indications:**
   - Bronchospastic lung disease
   - Hyperkalemia secondary to crush injury
   - Reactive airway
4. **Primary Contraindications:**
   - Hypersensitivity
5. **Relative Contraindications:**
   - Hypersensitivity
   - Tachycardia secondary to heart condition
6. **Side Effects:**
   - Tremors
   - Palpitations
7. **Additional Information:**

   Rarely occurring, but may cause allergic reaction or paradoxical bronchospasm

ALBUTEROL SULFATE (PROVENTIL, VENTOLIN) Dose:

• Drowning	5mg Nebulized PRN, Consider: Continuous Neb 20mg/hr
• Crush Injury	**MED CONTROL**: Continuous Neb 20mg/hr
• Pneumonia	5mg Nebulized
• Reactive Airway	5mg Nebulized PRN, Max of 10mg Severe: Continuous Neb 20mg/hr

PEDIATRIC

• Lower Airway Obstruction Asthma,	
	≤ 4 years old: 2.5mg Nebulized
	≥ 5 years old: 5mg Nebulized

AMIODARONE (NEXTERONE):

1. **Classification:**
   - Class III Anti-dysrhythmic
2. **Physiologic Effects:**
   - Class III antidysrhythmic agent, which inhibits adrenergic stimulation; affects sodium, potassium, and calcium channels; markedly prolongs action potential and repolarization; decreases AV conduction and sinus node function
3. **Major Indications:**
   - Ventricular fibrillation
   - Ventricular tachycardia
4. **Primary Contraindication:**
   - AV Block without a functioning pacemaker
   - Hypersensitivity
   - Severe sinus node dysfunction
5. **Side Effects:**
   - May slow heart rate
6. **Additional Information:**
   - Amiodarone produces beta blocker-like and calcium channel blocker-like actions on the SA and AV nodes, increases the refractory period via sodium and potassium channel effects and slows intra-cardiac conduction of the cardiac action potential via sodium-channel effects
   - Amiodarone resembles thyroxine (thyroid hormone) and its binding to the nuclear thyroid receptor might contribute to some of its pharmacologic and toxic actions.

AMIODARONE (NEXTERONE) Dose:

- V-fib| V-Tach (Pulseless) — 300mg IV/IO |THEN| after 5min 150mg IV/IO, Max of 450mg

PEDIATRIC

- V-fib | V-Tach (Pulseless) — 5mg/kg IV/IO, Max of 450mg

AMIODARONE INFUSION:

- Post Resuscitation — Loading Dose: 150mg IV/IO over 10 min. Maintenance Dose: 1mg/min IV/IO
- Tachycardia | Wide Complex Stable — Loading Dose: 150mg/100mL IV/IO over 10 min. Maintenance Dose: 1mg/min IV/IO
- Tachycardia | Wide Complex Unstable — Loading Dose: 150mg/100mL IV/IO over 10 min. Maintenance Dose: 1mg/min IV/IO

PEDIATRIC

- Tachycardia, Wide Complex — **MED CONTROL**: 5mg/kg IV/IO over 20-60 min.

ASPIRIN:

1. **Classification:**
   - Antiplatelet Agent, Non-Steroidal Anti-Inflammatory
2. **Physiologic Effect:**
   - Inhibits synthesis of prostaglandin by cyclooxygenase; inhibits platelet aggregation; has antipyretic and analgesic effects
3. **Major Indications:**
   - Acute coronary syndrome
4. **Primary Contraindications:**
   - Anaphylaxis to NSAIDS
   - Active peptic ulcers
   - Lactating mother/breast feeding
   - Hemophilia
   - Pregnancy
5. **Additional Information:**
   - Aspirin can be administered to patients on anticoagulant therapy

ASPIRIN Dose:

• Acute Coronary Syndrome	160-325mg PO
• CHF	160-325mg PO

ATROPINE SULFATE (ATROPEN®, a component of MARK I® KIts and DUODOTE®):

1. **Classification:**
   - Anticholinergic, Toxicity Antidote
2. **Physiologic Effect:**
   - Decreases action of the parasympathetic nervous system increasing conduction velocity (dromotrope) and heart rate (chronotropic), enhances conduction through the AV junction
   - Decreases and dries bodily secretions (anticholinergic effect)
3. **Major Indications:**
   - Symptomatic bradycardia, bradyarrhythmias
   - Organophosphate poisoning
   - Carbamate insecticide toxicity
4. **Primary Contraindications:**
   - No absolute contraindications for ACLS
   - Hypersensitivity
5. **Additional Information:**
   - Overdose may cause anticholinergic toxidrome “Red as a beet, dry as a bone, blind as a bat, mad as a hatter, and hot as a desert”

ATROPINE SULFATE (ATROPEN®, a component of MARK I® KIts and DUODOTE®) DOSE:

• Bradycardia	1mg IV/IO q 3 min. Max of 3mg
• Nerve Agent |Organophosphate	2mg IV/IO q 5 min.
PEDIATRIC	
• Bradycardia	0.02mg/kg IV/IO PRN, Max of 2 doses (Min single dose: 0.1mg; Max single dose of 0.5mg)
• Nerve Agent | Organophosphate	0.02mg/kg IV/IO q 5 min.

CALCIUM CHLORIDE:

1. **Classification:**
   - Electrolyte, Antidote
2. **Physiologic Effect:**
   - Calcium is an essential component for proper functioning nervous, muscular, skeletal, and endocrine systems and also includes positive inotropic and dromotropic effects
3. **Major Indications:**
   - Cardiac arrest with suspected hyperkalemia
   - Hyperkalemia related to crush injury
   - Hypermagnesemia
   - Low serum calcium level
   - Overdose of calcium channel blockers
   - Topical burns (when constituted as a gel) caused by hydrofluoric acid
4. **Primary Contraindications:**
   - Digoxin toxicity
   - Hypercalcemia
   - Hypersensitivity
   - Hypokalemia
5. **Additional Information:**
   - Administer through large-bore IV, IO, or CVC
   - Incompatible with other medications, be sure to adequately flush the IV line after administration
   - Irritation with extravasation (may cause tissue necrosis)

CALCIUM CHLORIDE Dose:

• Asystole/PEA	1000mg IV/IO
• Crush Injury	**MED CONTROL**: 1g IV/IO over 2 min.
• Drug Overdose	Med Control 500-1000mg mixed in 250mL of NS or D5W IV/IO over 10-20 minutes
• V-Fib| V-Tach (Pulseless)	1000mg IV/IO
PEDIATRIC	
• Asystole | PEA	20mg/kg IV/IO Max of 1g
• V-Fib | V-Tach (Pulseless)	20mg/kg IV/IO Max of 1g

CALCIUM GLUCONATE:

1. **Classification:**
   - Electrolyte, Antidote
2. **Physiologic Effect:**
   - Bone mineral component; cofactor in enzymatic reactions; essential for neurotransmission, muscle contraction, and many signal transduction pathways
3. **Major Indications:**
   - Cardiac arrest with suspected hyperkalemia
   - Hyperkalemia related to crush injury
   - Hypermagnesemia
   - Low serum calcium level
   - Overdose of calcium channel blockers
   - Topical burns (when constituted within a gel) related to hydrofluoric acid
4. **Primary Contraindications:**
   - Digoxin toxicity
   - Hypercalcemia
   - Hypersensitivity
   - Hypokalemia
5. **Additional Information:**
   - Administer through large-bore IV, IO, or CVC
   - Incompatible with other medications, be sure to adequately flush the IV line after administration
     Irritation with extravasation (may cause tissue necrosis)

CALCIUM GLUCONATE GEL Dose:

- Hydrofluoric Acid Exposure 2.5% transdermal

Cefazolin (Ancef):

1. **Classification:**
   - Antibiotic, Antibiotic, Cephalosporin (First Generation)
2. **Physiologic Effect:**
   - Inhibits bacterial cell wall synthesis by binding to one or more of the penicillin-binding proteins (PBPs) which in turn inhibits the final transpeptidation step of peptidoglycan synthesis in bacterial cell walls, thus inhibiting cell wall biosynthesis. Bacteria eventually lyse due to ongoing activity of cell wall autolytic enzymes (autolysins and murein hydrolases) while cell wall assembly is arrested.
3. **Major Indication:**
   - Open Fracture
4. **Primary Contraindications:**
   - Hypersensitivity to cefepime, other cephalosporins, penicillins, other beta-lactam antibiotics, or any component of the formulation
5. **Additional Information:**
   - Seizure disorders: Use with caution in patients with a history of seizure disorder.
   - May be associated with increased INR, especially in nutritionally deficient patients, prolonged treatment, liver or renal disease.

Cefazolin:

• Open Fracture	Adults: 2g Slow IV/IO Push over 3-5 min. Pediatrics: 30mg/kg Slow IV/IO Push over 3-5 min. Max of 2g

Cefepime:

1. **Classification:**
   - Antibiotic, 4th generation Cephalosporin
2. **Physiologic Effect:**
   - Inhibits bacterial cell wall synthesis by binding to one or more of the penicillin-binding proteins (PBPs) which in turn inhibits the final transpeptidation step of peptidoglycan synthesis in bacterial cell walls, thus inhibiting cell wall biosynthesis. Bacteria eventually lyse due to ongoing activity of cell wall autolytic enzymes (autolysis and murein hydrolases) while cell wall assembly is arrested
3. **Major Indication:**
   - Sepsis
4. **Primary Contraindications:**
   - Hypersensitivity to cefepime, other cephalosporins, penicillins, other beta-lactam antibiotics, or any component of the formulation
5. **Additional Information:**
   - Seizure disorders: Use with caution in patients with a history of seizure disorder.
   - May be associated with increased INR, especially in nutritionally deficient patients, prolonged treatment, liver or renal disease.

Cefepime Infusion:

• Sepsis	2g mixed in 100mL of NS or D5W, IV/IO administered over 30 min.

Droperidol:

1. **Classification:**
   - Antiemetic; First Generation (Typical) Antipsychotic
2. **Physiologic Effect:**
   - Droperidol is a butyrophenone antipsychotic; antiemetic effect is a result of blockade of dopamine stimulation of the chemoreceptor trigger zone. Other effects include alpha-adrenergic blockade, peripheral vascular dilation, and reduction of the pressor effect of epinephrine resulting in hypotension and decreased peripheral vascular resistance; may also reduce pulmonary artery pressure
3. **Major Indication:**
   - Nausea ad Vomiting
   - Behavioral Emergency
4. **Primary Contraindications:**
   - Hypersensitivity to droperidol or any component of the formulation; known or suspected QT prolongation, including congenital long QT syndrome (prolonged QTc is defined as >440 msec in males or >450 msec in females)
5. **Additional Information:**
   - Arrhythmias: Use extreme caution in patients with bradycardia (<50 bpm), cardiac disease, concurrent MAO inhibitor therapy, Class I and Class III antiarrhythmics or other drugs known to prolong QT interval, and electrolyte disturbances (hypokalemia or hypomagnesemia), including concomitant drugs which may alter electrolytes (diuretics)
   - CNS depression: May cause CNS depression, which may impair physical or mental abilities
   - Extrapyramidal symptoms: May cause extrapyramidal symptoms (EPS), including pseudoparkinsonism, acute dystonic reactions, akathisia, and tardive dyskinesia (risk of these reactions is generally much lower relative to typical/conventional antipsychotics; frequencies reported are similar to placebo). Risk of dystonia (and possibly other EPS) may be greater with increased doses, use of conventional antipsychotics, males, and younger patients. Factors associated with greater vulnerability to tardive dyskinesia include older in age, female gender combined with postmenopausal status, Parkinson disease, pseudoparkinsonism symptoms, affective disorders (particularly major depressive disorder), concurrent medical diseases such as diabetes, previous brain damage, alcohol use disorder, poor treatment response, and use of high doses of antipsychotics.
   - Neuroleptic malignant syndrome (NMS): Use may be associated with neuroleptic malignant syndrome (NMS); monitor for mental status changes, fever, muscle rigidity and/or autonomic instability.
   - Orthostatic hypotension: May cause orthostatic hypotension; use with caution in patients at risk of this effect or in those who would not tolerate transient hypotensive episodes (cerebrovascular disease, cardiovascular disease, hypovolemia, or concurrent medication use which may predispose to hypotension/bradycardia).

Droperidol:

- Nausea/Vomiting — 1.25mg IV/IO q 15 min. Max of 2.5mg
- Behavioral Emergency — 2.5mg IV/IO; 2.5 - 5mg IM

DEXAMETHASONE (DECADRON®, DEXASONE®):

1. **Classification:**
   - Corticosteroid, Anti-Inflammatory
2. **Physiologic Effect:**
   - Potent glucocorticoid with minimal to no mineralocorticoid activity; decreases inflammation by suppressing migration of polymorphonuclear leukocytes (PMNs) and reducing capillary permeability
3. **Major Indications:**
   - Adrenal insufficiency
   - Croup
   - Pediatric asthma
4. **Primary Contraindications:**
   - Hypersensitivity
   - Cerebral malaria
   - Systemic fungal infection
5. **Additional Information:**
   - May be mixed with juice or sports drink to facilitate PO administration

DEXAMETHASONE (DECADRON) DOSE:

• Adrenal Insufficiency	10mg IV/IO
• Allergic Reaction	10mg IV/IO/IM
• Reactive Airway	10mg IV/IO/IM
PEDIATRIC	
• Adrenal Insufficiency	0.3mg/kg IV/IO Max of 10mg
• Croup	0.6mg/kg IV/IM Max of 16mg
• Lower Airway, Asthma, >2years	0.6mg/kg PO Max of 16mg **-OR-** 0.6mg/kg IV/IO/IM Max of 16mg

DEXTROSE (D10W, D50W):

1. **Classification:**
   - Glucose-elevating agent
2. **Physiologic Effect:**
   - Parenteral dextrose is oxidized to carbon dioxide and water and provides 3.4 kilocalories/gram of d-glucose
3. **Major Indications:**
   - Hypoglycemia
4. **Primary Contraindications:**
   - Anuria
   - Hyperglycemia
   - Hypersensitivity
   - Intracranial or intraspinal hemorrhage
5. **Additional Information:**
   - Ensure patient IV/IO access before administration
   - Causes tissue necrosis if extravasation occurs

DEXTROSE (D10W, D50W) DOSE:

Asystole/PEA	25g IV/IO
Diabetic Emergency	12.5-25g IV/IO
Stroke	12.5g IV/IO
V-Fib | V-Tach Pulseless	25g IV/IO
PEDIATRIC	
Altered Mental Status	D10W 0.5g/kg IV/IO Max of 250mL (5mL/kg)
Asystole/PEA	D10W 1g/kg IV/IO
V-Fib | V-Tach (Pulseless)	D10W 1g/kg IV/IO

DIAZEPAM (VALIUM):

1. **Classification:**
   - Benzodiazepine, Anticonvulsant, Skeletal Muscle Relaxant, Anxiolytic
2. **Physiologic Effect:**
   - Modulates postsynaptic effects of GABA-A transmission, resulting in an increase in presynaptic inhibition. Appears to act on part of the limbic system, as well as on the thalamus and hypothalamus, to induce a calming effect
3. **Major Indications:**
   - Agitation
   - CPR-induced consciousness
   - Seizure
   - Procedural sedation
4. **Primary Contraindication:**
   - Hypersensitivity
   - Severe respiratory depression
5. **Additional Information:**
   - Do not mix in syringe with any other injectable medication(s)
   - Diazepam is an oil based and cannot be atomized

DIAZEPAM (VALIUM) Dose:

• Airway Management	Nasal Intubation 2.5-5mg IV/IO/IM q 2 min. Max of 10mg Post Intubation Sedation 2.5-5mg IV/IO/IM q 2 min. Max of 10mg
• Behavioral Emergency	5mg IV/IO/IM q 2 min. Max of 10mg
• Bradycardia, TCP Premedication	2.5-5mg IV/IO/IM
• CPR Induced Consciousness	2.5-5mg IV/IO/IM
• Excited Delirium	5mg IV/IO/IM q 2 min. Max of 10mg
• Pain Management, Emergence	5mg IV/IO/IM q 2 min. Max of 10mg
• Seizure	Seizing on Arrival: 10mg IM Seizing with IV/IO Access: 5mg IV/IO/IM q 2 min. Max of 10mg
• Tachycardia, TCP Premedication	2.5-5mg IV/IO/IM
PEDIATRIC	
• Seizure	Seizing on Arrival: 0.1mg/kg IM Max of 5mg With IV/IO Access: 0.1mg/kg IV/IO/IM Max of 5mg, q 2 min. PRN, Total Max of 10mg

DILTIAZEM (CARDIZEM):

1. **Classification:**
   - Calcium Channel Blocker, Class IV Antidysrhythmic
2. **Physiologic Effect:**
   - Inhibits extracellular calcium ion influx across membranes of myocardial and vascular smooth muscle cells, resulting in inhibition of cardiac and vascular smooth muscle contraction and dilating main coronary and systemic arteries; no effect on serum calcium concentration; substantial inhibitory effects on cardiac conduction, acting principally at AV node, with some effects at sinus node
3. **Major Indications:**
   - Narrow complex tachycardia
   - Rapid atrial fibrillation or atrial flutter
4. **Primary Contraindications:**
   - 2^{nd} or 3^{rd} heart block
   - Hypersensitivity
   - Hypotension
   - Lown-Ganong-Levine syndrome
   - Wolf-Parkinson-White
   - Ventricular tachycardia
5. **Side Effects:**
   - Bradycardia
   - Dizziness
   - Hypotension
   - Nausea/vomiting
6. **Additional information:**
   - Monitor heart rate and blood pressure closely
   - Do not administer in conjunction with intravenous β-blocker

DILTIAZEM (CARDIZEM) Dose:

- Tachycardia | Narrow Complex 10mg IV/IO slow push q 5min. Max of 20mg

Medication Reference Guide | Epinephrine

EPINEPHRINE (ADRENALINE):

1. **Classification:**
   - Alpha/Beta Adrenergic Agonist, Vasopressor
2. **Physiologic Effect:**
   - Strong alpha-adrenergic effects, which cause an increase in cardiac output and heart rate, a decrease in renal perfusion and peripheral vascular resistance, and a variable effect on BP, resulting in systemic vasoconstriction and increased vascular permeability, strong beta-1- and moderate beta-2-adrenergic effects, resulting in bronchial smooth muscle relaxation
3. **Major Indication:**
   - Anaphylaxis
   - Bradycardia (second-line)
   - Bronchiolitis
   - Cardiac arrest
   - Croup (nebulized form)
   - Severe reactive airway disease
   - Shock
4. **Primary Contraindication:**
   - Hypersensitivity
5. **Side Effects:**
   - Hypertension
   - Palpitations
   - Respiratory difficulty
   - Restlessness
   - Tachycardia

EPINEPHRINE (ADRENALINE)1:1000:

- Allergic Reaction — 0.3-0.5mg IM, May repeat x1 in 5 min.
- Reactive Airway Disease — 0.3-0.5mg IM, **MED CONTROL**: Age > 60 years old

PEDIATRIC

- Allergic Reaction
  - <25kg 0.15mg IM q 5 min. Max of 2 doses
  - >25kg 0.3mg IM q 5 min. Max of 2 doses
- Croup | Stridor — 3mg Nebulized Max x2
- Lower Airway Obstruction | Asthma,
  - > 2 years old
  - <25kg 0.15mg IM
  - >25kg 0.3mg IM
- Bronchiolitis < 2 years old — 3mg Nebulized, Max of 2 doses

EPINEPHRINE (ADRENALINE) 1:10,000:

- Asystole | PEA — 1mg IV/IO q 3-5 min.
- Traumatic Cardiac Arrest — 1mg IV/IO q 3-5 min.
- V-Fib | V-Tach (Pulseless) — 1mg IV/IO q 3-5 min.

PEDIATRIC

- Asystole | PEA — 0.01mg/kg IV/IO q 3-5 min. Max of 1mg/dose
- Bradycardia — 0.01mg/kg IV/IO q 5 min. Max of 1mg
- Neonatal Resuscitation — 0.01-0.03mg/kg IV/IO
- V-Fib | V-Tach (Pulseless) — 0.01mg/kg IV/IO q 3-5 min. Max of 1mg for a single dose

EPINEPHRINE (ADRENALINE) INFUSION:

- Allergic Reaction — 2-30mcg/min. IV/IO
- Bradycardia — **MED CONTROL**: 2-10mcg/min. IV/IO
- CHF, SBP < 100mmHg — 2-30mcg/min. IV/IO
- Post Resuscitation — 2-30mcg/min. IV/IO

PEDIATRIC

- Allergic Reaction > 2 years old/14kg: — 0.1-1mcg/kg/min. IV/IO
- Shock > 2 years old/14kg: — 0.1-1mcg/kg/min. IV/IO

EPINEPHRINE (ADRENALINE) PUSH-DOSE:

- Allergic Reaction — 5-20mcg (0.5-2mL)IV/IO q 3-5min, Max 100mcg
- CHF, SBP < 100mmHg — 5-20mcg (0.5-2mL)IV/IO q 3-5 min.
- Delayed Sequence Intubation — 5-20mcg (0.5-2mL) IV/IO q 3-5 min.
- Post Resuscitation — 5-20mcg (0.5-2mL) IV/IO q 3-5 min.
- Rapid Sequence Intubation — 5-20mcg (0.5-2mL)IV/IO q 3-5 min.
- Sepsis — 5-20mcg (0.5-2mL) IV/IO q 3-5 min.

DOPAMINE (INOTROPINE):

1. **Classification:**
   - Inotropic agent, Catecholamine, Vasopressor
2. **Physiologic Effects:**
   - Endogenous catecholamine, acting on both dopaminergic and adrenergic neurons. Low dose stimulates mainly dopaminergic receptors, producing renal and mesenteric vasodilation; higher dose stimulates both beta-1-adrenergic and dopaminergic receptors, producing cardiac stimulation and renal vasodilation; large dose stimulates alpha-adrenergic receptors
3. **Major Indications:**
   - Bradycardia (second-line)
   - Shock
4. **Primary Contraindications:**
   - Hypersensitivity
   - Hypovolemia
   - Uncorrected tachyarrhythmias
   - Ventricular fibrillation
5. **Side Effects:**
   - Tachydysrhythmias
6. **Additional Information:**
   - Utilize with large-bore IV, IO, or CVC; can cause severe necrosis if extravasation occurs

DOPAMINE INFUSION:

• Bradycardia	**MED CONTROL:** 2-10mcg/kg/min. IV/IO
• CHF, SBP <100mmHg	10-20mcg/kg/min. IV/IO
• Post Resuscitation	10-20mcg/kg/min. IV/IO

DIPHENHYDRAMINE (BENADRYL):

1. **Classification:**
   - Antihistamine
2. **Physiologic Effect:**
   - Histamine H1-receptor antagonist of effector cells in respiratory tract, blood vessels, and GI smooth muscle
3. **Major Indications:**
   - Allergic reaction
   - Dystonia
4. **Primary Contraindications:**
   - Hypersensitivity
   - Premature infants and neonates
5. **Side Effects:**
   - Anticholinergic effects such as dry mouth, urinary retention, and constipation
   - Drowsiness

DIPHENHYDRAMINE (BENADRYL)Dose:

- Allergic Reaction — 50mg IV/IO/IM
- Drug Overdose, Dystonia — 25-50mg IV/IO/IM

PEDIATRIC

- Allergic Reaction — 1-2mg/kg IV/IO/IM Max of 50mg

ETOMIDATE (AMIDATE):

1. **Classification:**
   - General Anesthetic, Hypnotic
2. **Physiologic Effect:**
   - Etomidate is a hypnotic, short acting, anesthetic agent with amnesic properties; etomidate's action is not clearly known, but is thought to work at the g-aminobutyric acid (GABA) receptor to produce hypnosis without analgesia; IV injection is characterized by a rapid onset of hypnotic action, usually within a minute "arm to brain circulation time," etomidate is a potent suppressant of adrenal steroidogenesis producing a pharmacological adrenalectomy lasting up to 24 hours after one dose
3. **Major Indication:**
   - Induction for rapid sequence intubation
4. **Primary Contraindications:**
   - Hypersensitivity
5. **Side Effects:**
   - Apnea
   - Nausea/vomiting
   - Laryngospasm
   - Suppression of steroid synthesis in adrenal cortex
   - Transient venous pain at the site of injection
   - Transient skeletal muscle movement, myoclonic in nature
6. **Additional Information:**
   - Overdose may occur from rapid administration
   - Airway control must be monitored and under direct observation at all times
   - Patients with suspected septic shock may require a dose of corticosteroids prior to administration to prevent profound effects from adrenal insufficiency

ETOMIDATE (AMIDATE) Dose:

• Rapid Sequence Intubation	0.3mg/kg IV/IO Hypotensive: 0.15mg/kg IV/IO

FENTANYL (SUBLIMAZE):

1. **Classification:**
   - Analgesic, Synthetic Opioid
2. **Physiologic Effect:**
   - Narcotic agonist-analgesic of opiate receptors; inhibits ascending pain pathways, thus altering response to pain; increases pain threshold; produces analgesia, respiratory depression, and sedation
3. **Major Indication:**
   - Acute Pain
4. **Primary Contraindications:**
   - Hypersensitivity
5. **Side Effects:**
   - Apnea
   - Nausea and vomiting
   - Relative hypotension
6. **Additional Information:**
   - Consider lower dosing in patients who are hypotensive
   - Do not dilute Fentanyl for intranasal (IN) or intramuscular (IM) administration
   - Duration of action: 30-60 minutes
   - May be used in patients with head injury; titrate to effect to maintain BP > 110mmHg
   - Onset of action: 1-2 minutes with peak effect between 2-5 minutes

FENTANYL (SUBLIMAZE) Dose:

• Abdominal Pain	25-50mcg IV/IO/IM/IN q 2 min. Max 200mcg
• Acute Coronary Syndrome	25-50mcg IV/IO/IM/IN q 2 min. Max 200mcg
• Airway Management	
• Post Intubation Sedation	25-50mcg IV/IO q 2 min. Max of 200mcg
• Pain Management	25-50mcg IV/IO/IM/IN q 2 min. Max of 200mcg
PEDIATRIC	
• Traumatic Pain Management	1mcg/kg IV/IO/IM/IN q 5 min. Max of 100mcg, Total Max of 200mcg

FENTANYL (SUBLIMAZE) INFUSION:

• Post Intubation Sedation	Loading Dose: 0.5-2mcg/kg IV/IO push Infusion: 0.5-2mcg/kg/

GLUCOSE (ORAL):

1. **Classification:**
   - Monosaccharide
2. **Physiologic Effect:**
   - Increases blood serum glucose level by absorption through mucous membranes
3. **Major Indication:**
   - Hypoglycemia
4. **Primary Contraindication:**
   - Inability for patient to protect their own airway or follow commands

GLUCOSE (ORAL) Dose:

- Diabetic Emergency 15g PO

HYDROCORTISONE SUCCINATE (CORTEF®, SOLUCORTEF®):

1. **Classification:**
   - Corticosteroid
2. **Physiologic Effect:**
   - Glucocorticoid; elicits mild mineralocorticoid activity and moderate anti-inflammatory effects; controls or prevents inflammation by controlling rate of protein synthesis, suppressing migration of polymorphonuclear leukocytes (PMNs) and fibroblasts, and reversing capillary permeability
3. **Major Indication:**
   - Adrenal insufficiency
4. **Primary Contraindication:**
   - Hypersensitivity
5. **Additional Information:**
   - May utilize the patient's prescribed medication as needed

HYDROCORTISONE SUCCINATE (CORTEF®, SOLUCORTEF®) Dose:

- Adrenal Insufficiency 100mg IV/IO/IM

PEDIATRIC

- Adrenal Insufficiency 2mg/kg IV/IO/IM Max of 100mg

HYDROMORPHONE (DILAUDID®):

1. **Classification:**
   - Analgesic, Synthetic opiate
2. **Physiologic Effect:**
   - Narcotic agonist-analgesic of opiate receptors; inhibits ascending pain pathways, altering response to pain; increases pain threshold; produces analgesia, respiratory depression, and sedation
3. **Major Indications:**
   - Acute pain
4. **Primary Contraindications:**
   - Hypersensitivity
5. **Side Effects:**
   - Apnea
   - Nausea and vomiting
   - Relative hypotension
6. **Additional Information:**
   - 5x the potency of morphine
   - Consider lower dosing in patients who are hypotensive
   - Duration of 3-6 hours
   - May be used in patients with head injury; titrate to effect to maintain BP > 110mmHg
   - Onset of action between 2-5 minutes with peak effect between 10-20 minutes

HYDROMORPHONE (DILAUDID®) Dose:

• Abdominal Pain	0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg
• Acute Coronary Syndrome	0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg
• Airway Management	Post Intubation Sedation: 0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg
• Pain Management	0.5-1mg IV/IO/IM q 5 min. PRN, Max of 4mg
PEDIATRIC	
• Pain Management	0.01mg/kg IV/IO/IM q 5 min. PRN, Max of 2mg

HYDROXOCOBALAMIN (CYANOKIT):

1. **Classification:**
   - Cyanide Antidote
2. **Physiologic Effect:**
   - Vitamin B12 with hydroxyl group complexed to cobalt which can be displaced by cyanide resulting in cyanocobalamin that is renally excreted
3. **Major Indication:**
   - Known or suspected cyanide poisoning
4. **Primary Contraindications:**
   - Hypersensitivity
5. **Side Effects:**
   - Interference with pulse oximetry
   - Interference with certain lab
   - Infusion site reactions
   - Red colored urine (chromaturia)
   - Red colored skin
6. **Additional Information:**
   - Substrates from cyanide cause toxicity frequently during combustion in modern buildings
   - Early administration of hydroxocobalamin is key to preventing mortality in suspected cyanide poisoning

HYDROXOCOBALAMIN (CYANOKIT) INFUSION:

- Cyanide Exposure — 5g IV/IO over 15 minutes
  MED CONTROL: Additional 5g IV/IO over 15-120 min.

PEDIATRIC

- Cyanide Exposure — 70mg/kg IV/IO over 15 minutes
  MED CONTROL: Additional 70mg/kg IV/IO over 15-120 min.

IBUPROFEN (ADVIL®, MOTRIN®):

1. **Classification:**
   - Non-Steroidal Anti-Inflammatory Drug
2. **Physiologic Effect:**
   - Inhibits synthesis of prostaglandins in body tissues by inhibiting at least 2 cyclo-oxygenase (COX) isoenzymes, COX-1 and COX-2. May inhibit chemotaxis, alter lymphocyte activity, decrease proinflammatory cytokine activity, and inhibit neutrophil aggregation; these effects may contribute to anti-inflammatory activity
3. **Major Indication:**
   - Fever
4. **Primary Contraindications:**
   - Coagulation defects
   - Gastro intestinal bleeding
   - Hypersensitivity
   - Hemorrhage
   - Pregnancy
   - Thrombocytopenia
   - Significant renal impairment
5. **Additional Information:**
   - Administer PO only if the patient is able to swallow and follow commands

IBUPROFEN (ADVIL®, MOTRIN®):

- Fever Control 600mg PO

IPRATROPIUM BROMIDE (ATROVENT®):

1. **Classification:**
   - Anticholinergic
2. **Physiologic Effect:**
   - Anticholinergic (parasympatholytic) agent; inhibits vagally mediated reflexes by antagonizing acetylcholine action; prevents increase in intracellular calcium concentration caused by interaction of acetylcholine with muscarinic receptors on bronchial smooth muscle
3. **Major Indications:**
   - Reactive airway
   - Pneumonia
4. **Primary Contraindications:**
   - Hypersensitivity to ipratropium, atropine, or derivatives
5. **Additional Information:**
   - Not indicated for patients ≤ 4 years of age per the Pediatric COG

IPRATROPIUM BROMIDE (ATROVENT®) Dose:

- Reactive Airway 500mcg Nebulized
- Pneumonia 500mcg Nebulized

PEDIATRIC

- Lower Airway |Asthma, > 5 years old 500mcg Nebulized

KETAMINE HYDROCHLORIDE (KETALAR®):

1. **Classification:**
   - General Anesthetic
2. **Physiologic Effect:**
   - Produces dissociative anesthesia; blocks N-methyl D-aspartate (NMDA) receptors
3. **Major Indications:**
   - Acute pain
   - Excited delirium
   - Induction for rapid or delayed sequence intubation
4. **Primary Contraindications:**
   - Hypersensitivity
   - Angina
5. **Side Effects:**
   - Bronchial dilation
   - Hyper-salivation
   - Emergence agitation/reaction has been associated with large doses and rapid intravenous administration
   - Transient apnea associated with rapid intravenous administration
6. **Additional Information:**
   - Do not mix in the same infusion or syringe as benzodiazepines as precipitates can form
   - Duration of action: 15 minutes
   - For pain management, the administration of IV/IO Ketamine over 10-15 minutes is preferred. This assists in the reduction of emergence agitation/reaction
   - Onset of action IV/IO: seconds-1 minute, IM/IN: 4-6 minutes
   - Useful for patients in shock states as ketamine stimulates catecholamine release which can support BP, HR, and myocardial contractility
   - Useful in undifferentiated patients when immediate sedation is indicated

KETAMINE HYDROCHLORIDE (KETALAR®) Dose:

• Airway Management	Post Intubation Sedation: 1mg/kg IV/IO slow push q 15 min.
• Behavioral Emergency	4mg/kg IM Max 400mg
• CPR Induced Consciousness	1mg/kg IV/IO q 15min, Max 4mg/kg
• Delayed Sequence Intubation	2mg/kg IV/IO Hypotensive: 0.5mg/kg IV/IO
• Excited Delirium	4mg/kg IM Max of 400mg
• Pain Management	25mg mixed in 100mL NS IV/IO q 15 min. 25mg slow IV/IO push q 15 min. 50mg IM/IN q 15 min.
• Rapid Sequence Intubation	2mg/kg IV/IO Hypotensive: 0.5mg/kg IV/IO

KETAMINE HYDROCHLORIDE (KETALAR®) INFUSION:

• Post Intubation Sedation	Loading Dose: 1mg/kg IV/IO Infusion: 0.5-2mg/kg/hr IV/IO

LEVETIRACETAM (KEPPRA):

1. **Classification:**
   - Anticonvulsant, Miscellaneous
2. **Physiologic Effect:**
   - The exact mechanism by which levetiracetam exerts it's antiepileptic effect is unknown. However several studies have suggested that the mechanism may involve one or more of the following central pharmacologic effects: Inhibition of voltage-dependent N-type calcium channels; facilitation of GABA-ergic inhibitory transmission through displacement of negative modulators; reduction of delayed rectifier potassium current; and /or binding to synaptic proteins which modulate neurotransmitter release
3. **Major Indication:**
   - Status Epilepticus
4. **Primary Contraindication:**
   - Hypersensitivity, history of anaphylaxis or angioedema with treatment
5. **Side Effect:**
   - Nausea
   - Vomiting
   - Headache
   - Agitation
   - CNS Depression
6. **Additional Information:**
   - Onset of action: 5-30 minutes
   - Duration of action: 8-12 hours
   - May be mixed in 100mL and 250mL solutions if final concentration equals less than 15mg/mL

LEVETIRACETAM INFUSION:

• Seizure	60mg/kg mixed in 500mL of NS or D5W Infuse over 15 min. Max dose 4500mg.

PEDIATRIC

• Pediatric Seizure	60mg/kg mixed in 100mL or 250mL of NS or D5W (max of 15mg/mL)Infuse over 15 min. Max dose 3500 mg.

LIDOCAINE 2 %:

1. **Classification:**
   - Class Ib Antiarrhythmic, Anesthetic
2. **Physiologic Effect:**
   - Class 1b antidysrhythmic; combines with fast sodium channels and thereby inhibits recovery after repolarization, resulting in decreased myocardial excitability and conduction velocity
3. **Major Indications:**
   - Local anesthetic prior to IO bolus or infusion in conscious patients
   - Treatment of acute ventricular tachyarrhythmias
4. **Primary Contraindications:**
   - 2nd or 3rd degree heart block
   - Adams-Stokes Syndrome
   - Hypersensitivity
   - Idioventricular rhythms
   - Wolf-Parkinson-White
5. **Additional Information:**
   - Safe for use as a local anesthetic prior to IO bolus or infusion regardless of shock state

LIDOCAINE 2 % Dose:

• IO Anesthesia	40mg IO over 2 minutes; 20mg Maintenance over 1 min.
Pediatric	
• IO Anesthesia	0.5mg/kg IO over 2 min; Max of 40mg ; Maintenance ½ of loading dose

LORAZEPAM (ATIVAN):

1. **Classification:**
   - Benzodiazepine
2. **Physiologic Effects:**
   - Sedative hypnotic with short onset of effects and relatively long half-life; increases the action of gamma-aminobutyric acid (GABA), which is a major inhibitory neurotransmitter in the brain; lorazepam may depress all levels of the CNS, including limbic and reticular formation
3. **Major Indications:**
   - Behavioral emergencies
   - CPR-induced consciousness
   - Excited delirium
   - Procedural sedation
   - Seizures
4. **Primary Contraindications:**
   - Hypersensitivity
   - Narrow-angle glaucoma
   - Sleep apnea syndrome
5. **Side Effects:**
   - Respiratory depression
6. **Additional Information:**
   - Duration of action: 2 hours
   - Most likely to produce respiratory depression in patients who have taken other depressant drugs, especially alcohol and barbiturates
   - Decreased shelf life once removed from refrigeration, utilize for 30 days once stored at room temperature
   - Onset of action: IV/IO 1-3 minutes
   - Should not be mixed with other agents, or diluted with intravenous solutions

LORAZEPAM (ATIVAN) Dose:

• Airway Management	Nasal Intubation: 2-4mg IV/IO/IM Post Intubation Sedation: 2-4mg IV/IO/IM q 2min Max of 8mg
• Behavioral Emergency	2-4mg IV/IO/IM q 2 min. Max of 8mg
• Bradycardia, TCP Premedication	2-4mg IV/IO/IM
• CPR Induced Consciousness	2-4mg IV/IO/IM
• Excited Delirium	2-4mg IV/IO/IM q 2 min. Max of 8mg
• Pain Management, Emergence	2-4mg IV/IO/IM
• Seizure	Seizing on Arrival: 4mg IM Seizing with IV/IO Access: 2-4mg IV/IO/IM q 2min Max of 8mg
• Tachycardia, TCP Premedication	2-4mg IV/IO/IM

PEDIATRIC

• Seizure	Seizing on Arrival: 0.1mg/kg IM Max of 4mg
• Seizing with IV/IO Access	0.1mg/kg IV/IO/IM q 2 min. Max of 4mg

MAGNESIUM SULFATE:

1. **Classification:**
   - Class V Antidysrhythmic, Electrolyte
2. **Physiologic Effect:**
   - Depresses CNS, blocks peripheral neuromuscular transmission, produces anticonvulsant effects; decreases amount of acetylcholine released at end-plate by motor nerve impulse; slows rate of sino-atrial (SA) node impulse formation in myocardium and prolongs conduction time; promotes movement of calcium, potassium, and sodium in and out of cells and stabilizes excitable membranes
3. **Major Indications:**
   - Seizures during the third trimester of pregnancy or postpartum (eclampsia)
   - Reactive airway disease
   - Torsades De Pointes
   - VF/VT storm
4. **Primary Contraindications:**
   - Diabetic coma
   - Heart block
   - Hypercalcemia
   - Hypersensitivity
   - Hypermagnesemia
5. **Side Effects:**
   - Apnea
   - CNS depression and paralysis
   - Hypotension
6. **Additional Information:**
   - Because magnesium is removed from the body solely by the kidneys, the drug should be used with caution in patients with renal impairment
   - IV calcium gluconate or calcium chloride should be available as an antagonist to magnesium; if needed
   - Toxic accumulation may occur in renal failure
   - Evaluate patellar and deep tendon reflexes to identify magnesium toxicity

MAGNESIUM SULFATE Dose:

• V-Fib | V-Tach (Pulseless), Torsades	2g IV/IO
• V-Fib | V-Tach Storm, Torsades	2g IV/IO
PEDIATRIC	
• V-Fib | V-Tach (Pulseless), Torsades	50mg/kg IV/IO Max of 2g

MAGNESIUM SULFATE INFUSION:

• Reactive Airway	2g mixed in 250mL NS/D5W IV/IO over 10 min. **MED CONTROL**: age >60
• Seizure, Eclampsia	4-6g mixed in 250mL NS/D5W IV/IO over 10 min.
• Tachycardia | Wide Complex, Torsades	**MED CONTROL**: 2g mixed in 250mL NS/D5W IV/IO over 10 min.
PEDIATRIC	
• Lower Airway | Asthma >2years old	50mg/kg/ mixed in 100mL NS/D5W IV/IO over 15 min. Max of 2g
• Tachycardia | Wide Complex, Torsades	**MED CONTROL**: 50mg/kg mixed in 100mL NS/D5W IV/IO over 20 min. Max of 2g

METHYLPREDNISOLONE (SOLU-MEDROL):

1. **Classification:**
   - Steroid-Glucocorticoid; Anti-Inflammatory
2. **Physiologic Effect:**
   - Potent glucocorticoid with minimal to no mineralocorticoid activity; modulates carbohydrate, protein, and lipid metabolism and maintenance of fluid and electrolyte homeostasis; controls or prevents inflammation by controlling rate of protein synthesis, suppressing migration of polymorphonuclear leukocytes (PMNs) and fibroblasts, reversing capillary permeability, and stabilizing lysosomes at cellular level
3. **Major Indications:**
   - Allergic reaction
   - Anaphylaxis
   - Adrenal insufficiency
   - Reactive airway
4. **Contraindications:**
   - Hypersensitivity
5. **Side Effects:**
   - Increased ICP with papilledema

METHYLPREDNISOLONE (SOLU-MEDROL) Dose:

• Adrenal Insufficiency	125mg IV/IO/IM
• Allergic Reaction	125mg IV/IO/IM
• Reactive Airway	125mg IV/IO/IM

PEDIATRIC

• Adrenal Insufficiency	2mg/kg IV/IO/IM Max 125mg
• Allergic Reaction	2mg/kg IV/IO/IM Max 125mg
• Lower Airway | Asthma >2 years old	2mg/kg IV/IO/IM Max 125mg

Metoprolol (LOPRESSOR®):

1. **Classification:**
   - Beta Blocker, Beta-1 selective
2. **Physiologic Effect:**
   - Blocks response to beta-adrenergic stimulation; cardio-selective for beta-1 receptors at low doses with little or no effect on beta-2 receptors
3. **Major Indications:**
   - Narrow complex tachycardias
   - Rapid atrial fibrillation or atrial flutter
   - VF/VT storm
4. **Primary Contraindications:**
   - Hypersensitivity
   - 2nd or 3rd degree heart block
   - Sick Sinus Syndrome
5. **Side Effects:**
   - Bradycardia
   - Hypotension
6. **Additional Information:**
   - Do not administer in conjunction with intravenous calcium channel blockers

METOPROLOL (LOPRESSOR®) Dose:

• Tachycardia | Narrow Complex	5mg IV/IO slow push q 5 min. Max of 15mg
• V-Fib | V-Tach Storm	5mg IV/IO q 5 min. Max of 15mg

MIDAZOLAM HCL (VERSED®):

1. **Classification:**
   - Benzodiazepine
2. **Physiologic Effects:**
   - Binds receptors at several sites within the CNS including the limbic system and reticular formation; effects may be mediated through gaba-aminobutyric acid (GABA) receptor system; increase in neuronal membrane permeability to chloride ions enhances the inhibitory effects of GABA; the shift in chloride ions causes hyperpolarization (less excitability) and stabilization of the neuronal membrane
3. **Major Indications:**
   - Behavioral emergencies
   - CPR-induced consciousness
   - Excited delirium
   - Induction agent for rapid or delayed sequence intubation
   - Procedural sedation
   - Seizure
4. **Primary Contraindications:**
   - Hypersensitivity
   - Narrow-angle glaucoma
5. **Side Effects:**
   - Apnea
   - Hypotension
   - Respiratory arrest
   - Respiratory depression
6. **Additional Information:**
   - Do not dilute for IM/IN administration
   - Duration of action: 30-60 minutes
   - Use with caution in conjunction with opiates due to synergistic effects
   - Onset of action: IV/IO 1.5-5 minutes; IM/IN 5-10 minutes

MIDAZOLAM HCL (VERSED®) Dose:

• Airway Management	Nasal Intubation: 2.5mg IV/IO/IM/IN Post Intubation Sedation: 5mg IV/IO/IM/IN q 2 min. Max of 20mg
• Behavioral Emergency	2.5mg IV/IO/IM/IN q 2 min. Max of 10mg
• Bradycardia, TCP Premedication	2.5-5mg IV/IO/IM/IN
• CPR Induced Consciousness	2.5mg IV/IO q 2 min. Max of 5mg
• Excited Delirium	2.5mg IV/IO/IM/IN q 2 min. Max of 10mg
• Pain Management, Emergence	2.5mg IV/IO/IM/IN
• Seizure	Seizing on Arrival: 10mg IM/IN Seizing with IV/IO Access: 2.5mg IV/IO q 2 min. Max of 10mg
• Tachycardia, TCP Premedication	2.5-5mg IV/IO/IM/IN

PEDIATRIC

• Seizure	Seizing on Arrival: 0.2mg/kg IM/IN Max of 5mg Seizing with IV/IO Access: 0.1mg/kg IV/IO q 3-5 min Max Dose 2mg; Total Max of 5mg

MORPHINE SULFATE:

1. **Classification:**
   - Opioid Analgesic
2. **Physiologic Effects:**
   - Narcotic agonist-analgesic of opiate receptors; inhibits ascending pain pathways, thus altering response to pain; produces analgesia, respiratory depression, and sedation; suppresses cough by acting centrally in medulla
3. **Major Indication:**
   - Acute pain
4. **Primary Contraindications:**
   - Acute asthma
   - Head injury
   - Hypersensitivity
   - Hypotension
   - Paralytic ileus
   - Respiratory depression
5. **Side Effects:**
   - Apnea
   - Hypotension
   - Nausea/vomiting
   - Respiratory depression
6. **Additional Information:**
   - Associated with the release of histamine when administered
   - Duration of action 4-5 hours
   - Potentiated by alcohol, barbiturates, sedatives and benzodiazepines
   - Onset of action: IV/IO 1-3 minutes; IM 5-10 minutes

- **MORPHINE SULFATE Dose:**

Abdominal Pain	2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg
Acute Coronary Syndrome	2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg
Airway Management	Post Intubation Sedation: 2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg
Pain Management	2-4mg IV/IO/IM q 2 min. PRN, Max of 10mg

PEDIATRIC

Traumatic Pain Management	0.1mg/kg IV/IO/IM q 2 min. PRN, Max of 4mg; Total Max of 10mg

NALOXONE (NARCAN):

1. **Classification:**
   - Opioid Antagonist, Reversal Agent
2. **Physiologic Effects:**
   - Competitive opioid antagonist; synthetic congener of oxymorphone
3. **Major Indication:**
   - Opiate overdose
4. **Primary Contraindication:**
   - None in the emergency setting
5. **Side Effects:**
   - Agitation
   - Nausea/vomiting
   - Pulmonary edema
   - Tachycardia
   - Withdrawal symptoms
6. **Additional Information:**
   - Naloxone is sensitive to light, steps should be taken to shield the vial from UV light until ready for usage
   - The smallest dose should be used to reverse respiratory depression, not to fully wake the patient
   - Commonly used opioids include: morphine, methadone, codeine, heroin, dilaudid, fentanyl, and hydrocodone

NALOXONE (NARCAN) Dose:

• Asystole | PEA	2mg IV/IO
• Drug Overdose	2mg IN **-AND/OR-** 0.5mg IV/IO/IM/IN q 2 min. Total Max of 4mg
• V-Fib | V-Tach (Pulseless)	2mg IV/IO

PEDIATRIC

• Altered Mental Status	0.1mg/kg IV/IO/IM/IN q 2 min. Max of 2mg
• Asystole | PEA	0.1mg/kg IV/IO
• V-Fib | V-Tach (Pulseless)	0.1mg/kg IV/IO

NITROGLYCERIN (NTG SL, NITROSTAT®, TRIDIL®):

1 Classification:

- Nitrate, Anti-Anginal, Vasodilator

2 Physiologic Effects:

- Organic nitrate which causes systemic vasodilation, decreasing preload; cellular mechanism: nitrate enters vascular smooth muscle and converted to nitric oxide (NO) leading to activation of cyclic guanosine monophosphate (cGMP) and vasodilation; relaxes smooth muscle via dose-dependent dilation of arterial and venous beds to reduce both preload and afterload, and myocardial O_2 demand, improves coronary collateral circulation; lowers BP, increases heart rate, occasionally causes paradoxical bradycardia

3. **Major Indications:**

- Acute coronary syndrome
- Congestive heart failure

4. **Primary Contraindications:**

- Bradycardia <50 bpm
- Hypersensitivity
- Hypotension
- Patients having taken Viagra, Levitra, or Cialis or other erectile dysfunction medications within 48 hours
- Right ventricular infarction

5. **Side Effects:**

- Headache
- Hypotension
- Palpitations

3 Additional Information:

- Monitor blood pressure after each dose (SL) or ever 2-5 minutes for continuous infusions
- Do not allow medication to come in contact with the clinician's skin or mucous membranes
- Obtain 12-lead ekg prior to administration when acute myocardial infarction is suspected
- Use gloves for application
- Shield from light as nitroglycerin is light sensitive

NITROGLYCERIN (NTG SL, NITROSTAT®) Dose:

• ACS (Stable Angina)	0.4mg SL q 3min. Max of 3 doses
• ACS (Unstable Angina)	0.4mg SL q 3 min.
• CHF	0.4mg SL q 5 min.

NITROGLYCERIN INFUSION (TRIDIL®):

• CHF, SBP 100-140mmHg	50-100mcg/min IV/IO
• CHF, SBP > 140mmHg	Loading Dose: 200mcg slow IV/IO push Infusion: 100-400mcg/min IV/IO

NOREPINEPHRINE (LEVOPHED®):

1. **Classification:**
   - Alpha/Beta Adrenergic Agonist, Vasopressor
2. **Physiologic Effects**
   - Strong beta-1 and alpha-adrenergic effects and moderate beta-2 effects, which increase cardiac output and heart rate, decrease renal perfusion and peripheral vascular resistance, and cause variable BP effects
3. **Major Indication:**
   - Shock
4. **Primary Contraindications:**
   - Hypersensitivity
   - Hypovolemia
5. **Side Effect:**
   - Hypertension
6. **Additional Information:**
   - Frequently reassess blood pressure and titrate dosage according to the MAP (Post ROSC MAP goal > 80 mmHg, Shock MAP goal > 65 mmHg)
   - Utilize in large-bore IV, IO, or CVC due to risk of extravasation and associated tissue necrosis

NOREPINEPHRINE (LEVOPHED®) INFUSION:

• CHF, SBP < 100mmHg	2-30mcg/min IV/IO
• Post Resuscitation	2-30mcg/min IV/IO
• Sepsis	2-30mcg/min IV/IO
• Shock	2-30 mcg/min IV/IO

ONDANSETRON HCL (ZOFRAN®):

1. **Classification:**
   - Antiemetic
2. **Physiologic Effects:**
   - Mechanism not fully characterized; selective 5-HT3 receptor antagonist; binds to 5-HT3 receptors both in peripheral and CNS, with primary effects in GI tract; has no effect on dopamine receptors and therefore does not cause extrapyramidal symptoms
3. **Major Indications:**
   - Nausea/vomiting
   - Prevention of nausea/vomiting
4. **Primary Contraindication:**
   - Hypersensitivity
5. **Side Effect:**
   - Constipation
6. **Additional Information:**
   - Most effective when administered prior to vomiting

ONDANSETRON HCL (ZOFRAN®) Dose:

• Acute Abd Pain | N/V	4mg IV/IO/IM q 15 min. Max of 8mg
• Acute Coronary Syndrome	4mg IV/IO/IM q 15 min. Max of 8mg
• Airway Management	
• Pre-Intubation	4mg IV/IO
• Delayed Sequence Intubation	4mg IV/IO
• Pain Management	4mg IV/IO/IM q 15 min. Max of 8mg
• Rapid Sequence Intubation	4mg IV/IO
PEDIATRIC	
• Nausea/Vomiting	8-15kg: 2mg IV/IO/IM q 15 min. Max of 4mg >15kg: 4mg IV/IO/IM q 15 min. Max of 8mg

PRALIDOXIME CHLORIDE (2-PAM, a component of MARK I® Kits and DUODOTE®):

1. **Classification:**
   - Cholinergic, Toxicity Antidote
2. **Physiologic Effect:**
   - Binds to organophosphates and breaks alkyl phosphate-cholinesterase bond to restore activity of acetylcholinesterase
3. **Major Indications:**
   - Nerve agent toxicity (e.g. Sarin, Soman, Tabun)
   - Organophosphate toxicity
4. **Primary Contraindication:**
   - Hypersensitivity
5.. **Additional Information:**
   - Most effective when administered early

PRADLIXIME CHLORIDE (2-PAM, a component of MARK I® Kits and DUODOTE®) Dose:

- Nerve Agent/Organophosphate — **MED CONTROL**: 1g mixed in 100mL NS/D5W IV/IO over 15 min.

PEDIATRIC

- Nerve Agent/Organophosphate — **MED CONTROL**: 15mg/kg/mixed in 100mL of NS/D5W IV/IO over 15 min.

ROCURONIUM BROMIDE (ZEMURON®):

1. **Classification:**
   - Non-Depolarizing Neuromuscular Blocking Agent, Paralytic
2. **Physiologic Effect:**
   - Rocuronium bromide is a non-depolarizing neuromuscular blocking agent with a rapid to intermediate onset depending on dose and intermediate duration; it acts by competing for cholinergic receptors at the motor endplate; this action is antagonized by acetylcholinesterase inhibitors such as neostigmine and edrophonium
3. **Major Indication:**
   - Rapid or delayed sequence intubation
4. **Primary Contraindication:**
   - Hypersensitivity
5. **Side Effects:**
   - Apnea
   - Hypotension
6. **Additional Information:**
   - Consider higher dosing for hypotensive patients
   - Duration of action: 1 hour
   - Maintain sedation at appropriate intervals to for patient comfort
   - Onset of action: IV/IO 1.5-3 minutes
   - Decreased shelf life once removed from refrigeration, utilize for 30-60 days after storage at room temperature
   - While under the influence of rocuronium bromide, patients will be unresponsive and paralyzed but may be conscious if improperly sedated

ROCURONIUM BROMIDE (ZEMURON®) Dose:

• Delayed Sequence Intubation	1.2mg/kg IV/IO Hypotensive 1.6mg/kg IV/IO
• Rapid Sequence Intubation	1.2mg/kg IV/IO Hypotensive 1.6mg/kg IV/IO

SODIUM BICARBONATE:

1. **Classification:**
   - Antidote
2. **Physiologic Effect:**
   - Increases blood and urinary pH by releasing a bicarbonate ion, which in turn neutralizes hydrogen ion concentrations
3. **Major Indications:**
   - Cardiac arrest
   - Crush injury
   - Hyperkalemia
   - Tricyclic antidepressant overdose
4. **Primary Contraindications:**
   - Metabolic alkalosis
   - Hypokalemia
5. **Side Effects:**
   - Metabolic alkalosis
6. **Additional Information**:
   - Do not mix in the same syringe or IV line as calcium chloride or gluconate, as this will cause precipitation

SODIUM BICARBONATE Dose:

• Asystole | PEA	1mEq/kg IV/IO
• Crush Injury	Prior to Extrication: 100mEq mixed in 2000mL NS IV/IO Post Extrication, Hyperkalemia; **MED CONTROL**: 100mEq IV/IO push
• Drug Overdose	1-2 mEq/kg IV/IO, repeat to QRS < 120ms
• Irritant Gas, Chlorine Exposure	3mEq mixed in 2.5mL of NS; Nebulized
• V-Fib | V-Tach (Pulseless)	1mEq/kg IV/IO
PEDIATRIC	
• Asystole | PEA	1mEq/kg IV/IO
• V-Fib | V-tach (Pulseless)	1mEq/kg IV/IO

SUCCINYLCHOLINE (ANECTINE®, QUELICIN®):

1. **Classification:**
   - Depolarizing Neuromuscular Blocking Agent, Paralytic
2. **Physiologic Effect:**
   - Succinylcholine is a short-acting depolarizing skeletal muscle relaxant; like acetylcholine, it binds to cholinergic receptors in the motor neuron end plate to cause muscle depolarization (contractions and fasciculation); however, this action is sustained and the initial contraction is followed by paralysis.
3. **Major Indication:**
   - Facilitation of rapid or delayed sequence intubation
4. **Primary Contraindications:**
   - Patient or family history of malignant hyperthermia
   - Penetrating eye injury
   - Hypersensitivity
   - Hyperkalemia
   - Burns or traumatic injury sustained > 72 hours
   - Renal failure
   - Stroke or hemiparesis with onset > 72 hours
5. **Side Effects:**
   - Apnea
   - Fasciculations
   - Hyperkalemia
6. **Additional Information:**
   - Consider an increased dose in the presence of hypotension
   - Duration of action: 4-6 minutes
   - Onset of action: IV/IO 45-60 seconds
   - Succinylcholine may be come deactivated when exposed to heat even after short durations
   - While under the influence of succinylcholine, patients will be paralyzed but may be conscious improperly sedated

SUCCINYLCHOLINE (ANECTINE®, QUELICIN®) Dose:

• Delayed Sequence Intubation	1.5-2mg/kg IV/IO Hypotensive 2mg/kg IV/IO
• Rapid Sequence Intubation	1.5-2mg/kg IV/IO Hypotensive 2mg/kg IV/IO

TRANEXAMIC ACID (TXA):

1. **Classification:**
   - Antifybrinolytic Agent
2. **Physiologic Effect:**
   - Tranexamic acid is a competitive inhibitor of plasminogen activation
3. **Major Indication:**
   - Hemorrhage shock < 3 hours from the time of injury
4. **Primary Contraindications:**
   - Hemorrhage ≥ 3 hours from the time of injury
5. **Side Effects:**
   - Chest pain
   - Dizziness
   - Hypotension associated with rapid IV/IO administration
   - Nausea/Vomiting

TRANEXAMIC ACID (TXA) Dose:

- Adult TXA | Blood — 2g slow IV/IO push

PEDIATRIC

- Pediatric TXA | Blood — 15mg/kg slow IV/IO push

VECURONIUM BROMIDE:

1. **Classification:**
   - Non-Depolarizing Neuromuscular Blocking Agent, Paralytic
2. **Physiologic Effect:**
   - Vecuronium is a non-depolarizing neuromuscular blocking agent possessing all of the characteristic pharmacological actions of this class of drugs (curariform); it acts by competing for cholinergic receptors at the motor end-plate; the antagonism to acetylcholine is inhibited and neuromuscular block is reversed by acetylcholinesterase inhibitors such as neostigmine, edrophonium, and pyridostigmine.
3. **Major Indication:**
   - Rapid or delayed sequence intubation
4. **Primary Contraindication:**
   - Hypersensitivity
5. **Side Effect:**
   - Prolonged paralysis
6. **Additional Information:**
   - Onset of action: IV/IO 1.5-3 minutes when dosed at 0.3mg/kg
   - Duration of action: 45 minutes – 1 hour (dose-dependent)
   - While under the influence of vecuronium bromide, patients will be paralyzed but may be conscious if improperly sedated

VECURONIUM BROMIDE Dose:

• Delayed Sequence Intubation	0.3mg/kg IV/IO Hypotensive: 0.3mg/kg IV/IO
• Rapid Sequence Intubation	0.3mg/kg IV/IO Hypotensive: 0.3mg/kg IV/IO

ZOSYN (Piperacillin & Tazobactam):

1.**Classification:**

- Extended spectrum penicillin (Piperacillin) and a beta lactamase inhibitor (Tazobactam)

2.**Physiologic Effect:**

- Piperacillin inhibits bacterial cell wall synthesis by binding to one or more of the penicillin-binding proteins (PBPs); which in turn inhibits the final transpeptidation step of peptidoglycan synthesis in bacterial cell walls, thus inhibiting cell wall biosynthesis. Bacteria eventually lyse due to ongoing activity of cell wall autolytic enzymes (autolysins and murein hydrolases) while cell wall assembly is arrested. Piperacillin exhibits time-dependent killing. Tazobactam inhibits many beta-lactamases, including staphylococcal penicillinase and Richmond-Sykes types 2, 3, 4, and 5, including extended spectrum enzymes; it has only limited activity against class 1 beta-lactamases other than class 1C types.

3. **Major Indication:**
   - Sepsis with suspected source within the GI tract (preferred)
   - Sepsis with unknown source
   - Sepsis with suspected source: Intra-Abdominal, Pelvic Infection, Pneumonia, Skin and Soft Tissue
4. **Primary Contraindication:**
   - Hypersensitivity to penicillin's, cephalosporins, beta-lactamase inhibitors, or any component of the formulation.
5. **Side Effect:**
   - Electrolyte abnormalities: Sodium content (2.8 mEq per gram of piperacillin) should be considered in patients requiring sodium restriction. Assess electrolytes periodically in patients with low potassium reserves.
6. **Additional Information:**
   - Onset of action: IV/IO immediate after completion of 30 minute infusion
   - Duration of action:1-2 hours

ZOSYN Dose:

• Adult Sepsis	4.5g in 100mL IV/IO Infusion over 30 min.

Prehospital Radio | Phone Report Format

- "This Is" (EMS Department / Service Name) _____
- Unit # _____
- Skill level and name of clinician giving report
- Parish or Origin
- Estimated time until arrival
- Alert/Activation type (if applicable)
- Patient's Age/Sex
- History of present illness (Chief Complaint) and duration of illness
  - Relay major pertinent injuries or life threats
- Treatment rendered and impact of treatment (response to treatment)
- Patient's L.O.C and GCS
- Vital Signs:
  - Blood pressure
  - Heart Rate
  - Respiratory Rate, Quality & Breath Sounds
  - SpO_2
  - Temperature (if applicable)
  - $EtCO_2$ (if applicable)
- Pertinent medical history _____
- "Do you have any questions?"

Rapid/Delayed Sequence Intubation Checklist

Prepare Patient

- ❑ Oxygenate/Denitrogenate Patient
  - 15L/min. NRB/CPAP/BVM
- ❑ Initiate Apneic Oxygenation
  - NC 15L/min.
- ❑ Patient Positioning Optimized
  - Head of stretcher elevated to 30°
- ❑ Patient Monitoring Optimized
  - Monitor visible for all clinicians
  - SpO_2
  - EKG
  - BP
  - $EtCO_2$
- ❑ Vascular Access Established
  - 2 sites preferred
  - Reliable and tested

Prepare Equipment

- ❑ OPA/NPA (appropriately sized)
- ❑ BVM with PEEP Valve and $EtCO_2$ attached
- ❑ VL Blade/Optic
- ❑ Backup VL Blade
- ❑ DL Blade/Handle
- ❑ Backup DL Blade
- ❑ ET Tube
- ❑ Backup ET tube (1 size smaller than primary)
- ❑ Tube Holder
- ❑ Bougie/ETT Introducer
- ❑ SGA (appropriately sized)
- ❑ Cric Kit
- ❑ Suction
- ❑ Patient equipment visible to all clinicians

Establish Plan

- ❑ Address Hypotension/Hypoxia
- ❑ Evaluate patient for airway difficulty
- ❑ Verbalize induction plan
- ❑ Assign clinician roles (Airway or Medication)
- ❑ Select induction agent(s)
- ❑ Select paralytic agent
- ❑ Verbalize failed airway plan
- ❑ Complete cric evaluation

Begin Procedure

- ❑ Confirm adequate vital signs
- ❑ Administer induction agent(s)
- ❑ Administer paralytic agent
- ❑ Confirm effectiveness of administered medications
- ❑ Place ET tube/advanced airway
- ❑ Verify tube placement with $EtCO_2$
- ❑ Secure ETT/advanced airway

Post Procedure

- ❑ Revaluate vital signs
- ❑ Administer post-intubation sedation
- ❑ Place OG/NG tube (optional)
- ❑ Place esophageal temperature probe (optional)

Airway Clinician

Name _____

- Leads team throughout procedure
- Verifies/achieves optimal patient positioning
- Verifies/achieves appropriate oxygenation
- Can visualize/reach all needed equipment
- Confirms equipment function including suction
- Anticipates and plans for airway difficulties
- Completes cric evaluation
- Intubates/places advanced airway
- Verbalizes structures during airway placement
- Secures ET tube/advanced airway
- Places OG/NG Tube
- Places esophageal temperature probe

Medication Clinician

Name _____

- Supports the team throughout procedure
- Verifies/monitors patient vital signs
- Verifies/achieves vascular access
- Can visualize/access all needed equipment
- Prepares all medications
- Administers induction and paralytic agents
- Anticipates and plans for physiologic difficulties
- Assists Airway Clinician as needed
- Verifies ET tube/advanced airway placement
- Administers post intubation sedation
- Verifies all post procedure goals

Paralytic Agents

Rocuronium	1.2mg/kg IV/IO
Hypotensive	1.6mg/kg IV/IO
Succinylcholine	1.5-2mg/kg IV/IO
Hypotensive	2mg/kg IV/IO
Vecuronium	0.3mg/kg IV/IO
Hypotensive	Same as above

Induction Agents

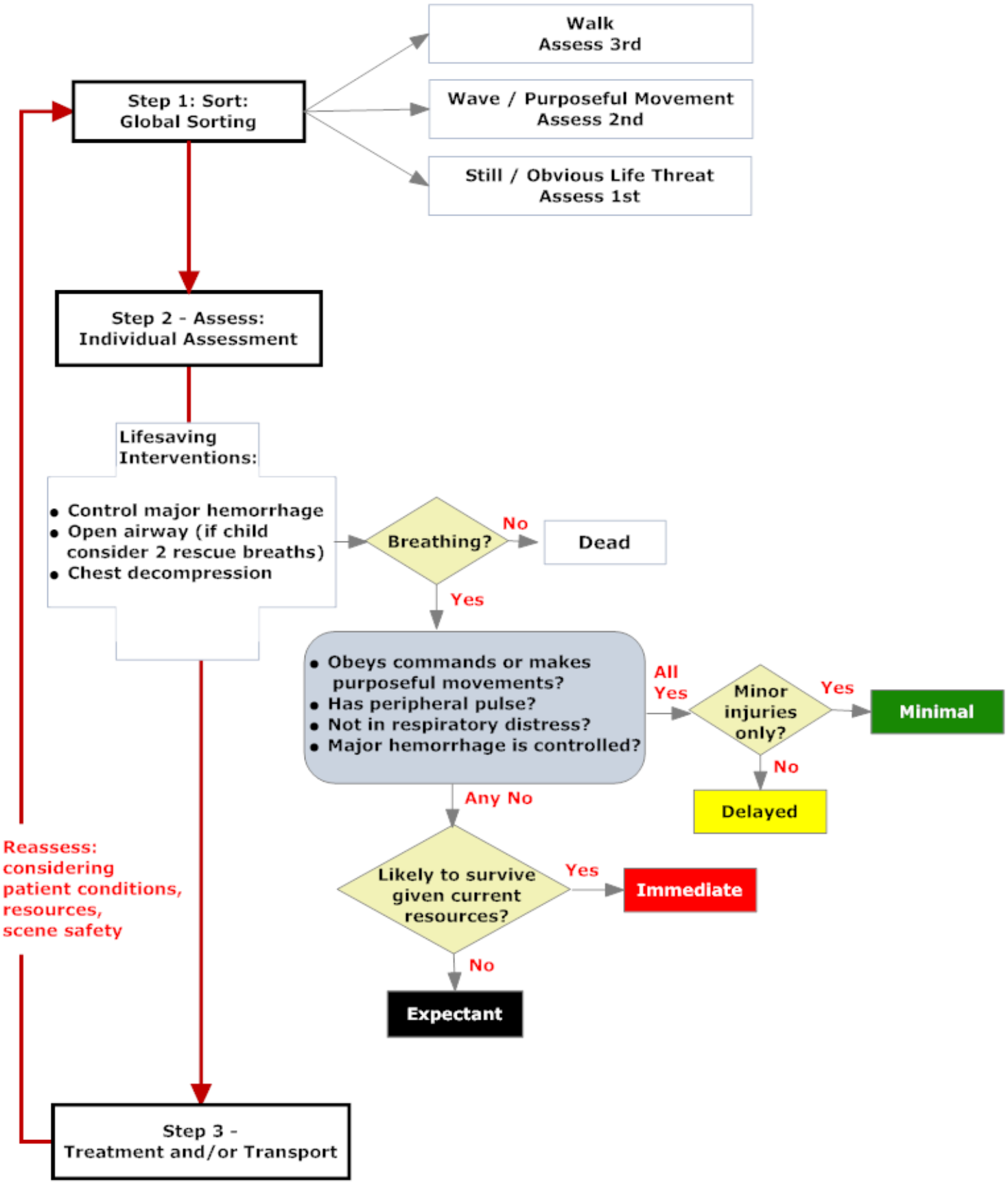
Ketamine	2mg/kg IV/IO
Hypotensive	0.5mg/kg IV/IO
Etomidate	0.3mg/kg IV/IO
Hypotensive	0.15mg/kg IV/IO
Versed	0.2mg/kg IV/IO
Hypotensive	0.1mg/kg IV/IO

Post Intubation Sedation

Fentanyl 0.5-2mcg/kg IV/IO q 2 min. PRN, Max of 200mcg
Fentanyl Infusion 0.5-2mcg/hr
Ketamine 1mg/kg IV/IO q 15 min. PRN
Ketamine Infusion 0.5mg-2mg/kg/hour
Midazolam 5mg IV/IO q 2 min. PRN, Max of 20mg

SALT Triage

SALT **-OR-** SMART triage methods may be utilized



2022 Louisiana Emergency Medical Services (EMS) Scope of Practice

Overview

This revision to the Louisiana Scope of Practice (SOP) has been reformatted to clarify questions about what the SOP prohibits, allows with special training, or is considered within the general scope of EMS professionals.

The Louisiana SOP follows the National Scope of Practice Model and then adds specific interventions at each level of training that the Louisiana EMS Certification Commission (EMSCC) has determined to be reasonable and prudent.

These expansions to the scope are designated as follows:

- Approved – The EMS Certification Commission has approved the skill at the specific training level without additional training required.
- Agency Expansion of Scope (AES) – The EMSCC recognizes that this is a reasonable and prudent expansion of a specific skill, procedure or medication that can be performed with *agency level training and approval*

TABLE 1- LEGEND

Not Approved	Approved	AES
	✓	✓*

Applicability

Eligibility

The presence of a skill or procedure in the Louisiana Scope of Practice does not automatically grant permission for a Louisiana licensed EMS professional to perform the skill or procedure. An agency medical director approved protocol must also be in place.

This Scope of Practice applies to individuals licensed by the Louisiana Bureau of Emergency Medical Services who are working for a Bureau of EMS Approved EMS Agency, or a Private Industrial Employer or hospital located in the State of Louisiana.

Refer to the following matrix for applicability. All must be answered "Yes" to utilize the Louisiana Approved Scope of Practice:

TABLE 2 SOP APPLICABILITY

Louisiana Licensed EMS Professional at defined training level	Yes ☐ No ☐
Approved EMS Agency/ Hospital	Yes ☐ No ☐
Medical Director Oversight	Yes ☐ No ☐
Agency Approved Protocols	Yes ☐ No ☐

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Requesting Expansion or Modifications to the Scope of Practice for Skills or Procedures

Each specific skill/ procedure/ medication currently approved is listed in the appropriate section of the matrix. Agency-Specific protocols may limit, but not expand the scope of practice as defined in this document.

New Procedure or Skill

If a specific skill/procedure is not clearly identified in the SOP matrix, the Medical Director or another agency approved individual may submit a formal request to the Louisiana EMSCC for clarification or expansion to the Scope of Practice to include the skill or procedure at a regularly scheduled hearing.

Training Level Based Expansion to a Skill or Procedure

Upon submission of a formal request for expansion of the LA SOP, the EMSCC will deliberate during its regularly scheduled open meeting and decide to designate the skill as Denied, Approved or if agency or state approved special training is required.

Requesting Expansion or Modifications to the Medical Director Approved Medication Section

Emergency Medical Responder (EMR) and Emergency Medical Technician (EMT)

Medication administration by Louisiana licensed Emergency Medical Responders or Emergency Medical Technicians requires a specific Skill or Procedure row defining the medication and its use in the Louisiana SOP. No expansion will be permitted without the involvement and approval of the EMSCC.

Advanced Emergency Medical Technician (AEMT)

Administration of IV medications by AEMT level provider is often a point of concern for EMS agencies and medical directors. It is not the intent of the EMSCC to artificially limit the ability of medical directors to make therapeutic or clinical care decisions, it is to define those medications that would require Special Training prior to their use in patient care.

The EMSCC follows the National Scope of Practice model for AEMTs and designates "analgesia, anti-nausea/ anti-emetics, dextrose, epinephrine, glucagon, naloxone" as approved "✓" medications. Any other medications that the individual agency or medical director wishes to use would be considered as AES (✓*) in the Louisiana Matrix and all AES requirements must be maintained.

TABLE 3 EXAMPLE OF APPROVED MEDICATION SECTION CHANGE TO SOP

Skill/ Procedure	EMR	EMT	AEMT	Paramedic
IV Medications other than analgesia, anti-nausea/ anti-emetics, dextrose, epinephrine, glucagon, naloxone			✓*	✓

2022 Louisiana Emergency Medical Services (EMS) Scope of Practice

Paramedic

The EMSCC follows the National Scope of Practice model and recognizes that medication administration by a licensed Paramedics does not require AES and that education needs for expansions to Paramedic medication administration can be safely managed by medical directors without the oversight of the EMSCC.

Agency Expanded Scope Special Training – (AES)

Agency submits the request for change to the SOP that are justifiable, are supported by research, required by practice changes, or are in common use by equivalent providers working under another states SOP. If the EMSCC approves and determines that this expansion of a skill, procedure or medication can be safely administered and monitored at the agency level, any Louisiana EMS agency electing to add the skill must:

1. Create and maintain a Medical Director and agency approved protocol defining the activity
2. Maintain documentation demonstrating that all individuals authorized by the agencies medical director to perform these skills/procedures have received initial training.
3. The documentation must specify
    1. Dates of attendance for all individuals trained
    2. Method of instruction
    3. Specific knowledge objectives that address any knowledge/ skill gaps between the skill/ procedure and those taught in the standard curricula at the level of training.
    4. Evaluation measures and Test Scores
4. If the material needed to bridge the knowledge gap is taught by an individual who is not currently licensed as a Louisiana EMS Instructor or the Medical Director approving the optional module, a brief Curriculum Vitae (C.V.) must be included which clearly indicates the instructing individual's qualifications as a Subject Matter Expert.
5. Continuing Education/ competency evaluations on the optional module must be conducted and documented at least every 24 months for every individual who has successfully completed the initial training requirements.

Examples

Example 1- Expansion of a Skill/ Procedure to a Specific Level of Training – Agency Approved

An agency working in a rural area has a requirement to transport otherwise stable patients who have a medicated IV drip containing electrolytes between facilities. Due to limited availability of personnel, they request to create a training program for specific EMT level providers to transport these patients and allow their system to better utilize their limited EMS provider resources.

A review of the SOP shows that medicated IV-line monitoring is already addressed in the matrix. After deliberation, the EMSCC decides that the request is justifiable and that there is no increase in risk to the patient or provider if they have completed the suggested Agency Approved Special Training Module (AES).

The EMSCC would then vote to amend the SOP and add the ✓* designation to the EMT level for those who meet AAST.

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If the expansion is judged to require State Approved Certification (SES) they would designate it as ✓**

	EMR	EMT	AEMT	Paramedic
Intravenous: Maintenance of Medicated IV Fluids (Electrolytes)		✓*	✓*	✓

Example 2 - Skill/ Procedure Not Currently Included in the Matrix

A medical director identifies the need for his program to operate a Balloon Pump transport unit for a specific hospital program. A review of the SOP shows that this is not currently within the Scope of Practice for Louisiana EMS professionals at any level. The Medical Director would submit a written request to the EMSCC to add this skill/ procedure to the matrix. At this point, the EMSCC would investigate and deliberate on the request at its regularly scheduled meeting. If approved, it would be added to the matrix in the appropriate section and designated as prohibited (no ✓), Special Training Required (✓*) or Approved (✓).

Skill/ Procedure	EMR	EMT	AEMT	Paramedic
Balloon Pump Transport				✓*

Example 3 – Non-Justifiable Expansion

An agency request that the SOP be amended to include Intravenous Access to the EMT Scope of Practice. In deliberation, the EMSCC determines that this is outside the SOP for this level of training and that expansion, even with additional training would not justify the change using a risk/ benefit analysis and considering alternatives.

No change would be made to the SOP document and the EMSCC would deny the request in a written response to the inquiry with the results of their deliberations.

Example 4 – Emergency or Temporary Expansion

During a declared emergency, it is determined that due a defined, time-limited problem, there is a need to allow EMT level providers to perform point of care testing and administration of IM vaccines. The SOP would not be modified. The EMSCC would publish a Letter of Clarification on the Louisiana BEMS webpage which clearly defines the requirements for these providers to perform the skill/procedure and the time-frame and limitations of this expansion.

Airway Management/Ventilation/Oxygenation

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Airway: Nasal	√	√	√	√
Airway: Oral	√	√	√	√
Airway: Supraglottic		√	√	√
Airway Obstruction: Dislodgement by Direct Laryngoscopy with McGill Forceps			√*	√
Airway Obstruction: Manual Dislodgement Techniques	√	√	√	√
Airway Obstruction: Percutaneous Cricothyrotomy				√
Airway Obstruction: Surgical Cricothyrotomy				√*
Bag-Valve-Mask (BVM)	√	√	√	√
BiPAP Administration and Management				√
CPAP		√	√	√
Carbon Monoxide Monitoring	√*	√	√	√
Chest Decompression: Needle				√
Chest Tube Placement: Assist Only				√
Chest Tube: Monitoring and Management				√
Chest Tube/ Thoracostomy: Finger or Tube				√*
End Tidal CO_2: Monitoring and Interpretation of Wave Form Capnography	√*	√	√	√
Gastric Decompression: NG Tube				√
Gastric Decompression: OG Tube				√
Head Tilt-Chin Lift	√	√	√	√
Endotracheal Intubation				√
Jaw Thrust	√	√	√	√
Medication Assisted Intubation				√*
Mouth-to-Barrier Devices	√	√	√	√
Mouth-to-Mask	√	√	√	√
Mouth-to-Mouth	√	√	√	√

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Mouth-to-Nose	√	√	√	√
Mouth-to-Stoma	√	√	√	√
Oxygen Therapy: High Flow Nasal Cannula				√
Oxygen: Therapy: Humidifiers		√	√	√
Oxygen Therapy: Nasal Cannula	√	√	√	√
Oxygen Therapy: Non-Rebreather Mask	√	√	√	√
Oxygen Therapy: Partial-Rebreather mask		√	√	√
Oxygen Therapy: Simple Face Mask		√	√	√
Oxygen therapy: Venturi Mask		√	√	√
Pulse Oximetry	√	√	√	√
Suctioning: upper airway	√	√	√	√
Positive Pressure Ventilation Devices (Manually Triggered or Automatic Ventilators)			√	√
Suctioning: Tracheobronchial of an Intubated Patient		√	√	√
Tracheostomy Maintenance		√	√	√
Tracheostomy Tube Replacement			√	√
Transport Ventilator (Manual Adjustments)				√

Cardiovascular/Circulation

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Cardiopulmonary Resuscitation (CPR)	√	√	√	√
Cardiac Monitoring: 12 lead ECG Acquisition and Transmission		√	√	√
Cardiac Monitoring: 12 lead Electrocardiogram (interpretive)				√
Cardioversion: Electrical				√
Defibrillation: Automated/Semi-Automated	√	√	√	√
Defibrillation: Manual			√*	√
EKG Rhythm Monitoring and Interpretation of EKG Strips			√*	√
Hemorrhage Control: Direct Pressure	√	√	√	√
Hemorrhage Control: Tourniquet	√	√	√	√

Louisiana Emergency Medical Services (EMS) Scope of Practice

Hemorrhage Control: Wound Packing	√	√	√	√
Transvenous Cardiac Pacing: Monitoring and Maintenance				√
Mechanical CPR Device	√*	√	√	√
Telemetric Monitoring Devices and Transmission of Clinical Data, Including Video Data		√	√	√
Transcutaneous Pacing				√

Splinting, Spinal Motion Restriction (SMR), and Patient Restraint

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Cervical Collar	√	√	√	√
Long Spine Board	√*	√	√	√
Manual Cervical Stabilization	√	√	√	√
Seated SMR (KED, etc.)		√	√	√
Extremity Stabilization-manual	√	√	√	√
Extremity Splinting	√	√	√	√
Splint: Traction		√	√	√
Mechanical Patient Restraint		√	√	√
Emergency Moves for Endangered Patients	√	√	√	√

Medication Administration Routes (for Medications in the Approved Scope of Practice)

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Aerosolized/nebulized	√	√	√	√
Endotracheal Tube				√
Inhaled		√	√	√
Intradermal				√
Intramuscular		√*	√	√
Intramuscular: Auto-Injector	√	√	√	√

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Intranasal			√	√
Intranasal: Unit-Dosed, Premeasured	√	√	√	√
Intraosseous			√	√
Intravenous			√	√
Intravenous Pump Medication Administration			√	√
Mucosal/Sublingual	√	√	√	√
Nasogastric				√
Oral	√*	√	√	√
Rectal				√
Subcutaneous			√	√
Topical				√
Transdermal			√	√
Tetracaine topical ophthalmic drops and Morgan Lens Insertion for eye irrigation as an intervention at specific industrial Sites as part of a treatment plan for exposure to acids and caustics		√*	√*	√
Topical Anesthetic-Ophthalmic		√*	√*	√

Medical Director Approved Medications

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Use of pre-packaged epinephrine kit for IM injection for Anaphylaxis (Supplied and Carried by the EMS Agency)		√*	√	√
Use of Epinephrine (Auto-Injector) for Anaphylaxis (Supplied and Carried by the EMS Agency)	√	√	√	√
Use of Auto-Injector Antidotes for Chemical/Hazardous Material Exposures	√	√	√	√
Use of Opioid Antagonist Auto Injector for Suspected Opioid Overdose	√	√	√	√
Use of Nebulized Sodium Bicarbonate as an antidote for specific toxic inhalation at industrial sites		√*	√	√

Louisiana Emergency Medical Services (EMS) Scope of Practice

Use of patient supplied prescribed medications for special conditions (Danny's Dose)			√*	√
Immunizations		√*	√	√
Inhaled: Beta/Agonist Bronchodilator and Anticholinergic for Dyspnea and Wheezing		√	√	√
Inhaled: Monitor Patient Administered (i.e. Nitrous Oxide)			√	√
Inhaled: Meter Dose Nebulizer for beta agonist bronchodilator and anticholinergic for Dyspnea/ wheezing: Limited to *Patients Own Prescribed Medication*	√	√		
Inhaled: Opioid Antagonist for Suspected Opioid Overdose	√	√	√	√
IV Medications other than analgesia, anti-nausea/ anti-emetics, dextrose, epinephrine, glucagon, naloxone			√*	√
Maintain an Infusion of Blood or Blood Products				√
Initiation of Blood or Blood Products				√*
Oral Aspirin for Chest Pain of Suspected Ischemic Origin	√	√	√	√
Oral Glucose for Suspected Hypoglycemia	√	√	√	√
Oral Over the Counter (OTC) Analgesics for Pain or Fever	√	√	√	√
OTC Medications, Oral and Topical				√
Parenteral Analgesic for Pain			√	√
Sublingual Nitroglycerin for Chest Pain of Suspected Ischemic Origin: Limited to *Patients Own Prescribed Medication*	√	√		
Sublingual Nitroglycerin for Chest Pain of Suspected Ischemic Origin			√	√
Sublingual/ Oral Medication: Buprenorphrine				√*
Thrombolytics				√
Topical Anesthetic-Ophthalmic		√*	√	√

Louisiana Emergency Medical Services (EMS) Scope of Practice

IV Initiation/Maintenance Fluids

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Access Indwelling Catheters and Implanted Central IV Ports				√
Central Line: Monitoring				√*
Hemodynamic Monitoring: Arterial Line and Pulmonary Artery Catheter				√*
Intraosseous: Initiation, Peds or Adult			√	√
Intravenous Access			√	√
Intravenous Initiation: Peripheral			√	√
Intravenous Initiation: External Jugular				√
Intravenous: Maintenance of Non-Medicated IV Fluids		√*	√	√
Intravenous: Maintenance of Medicated IV Fluids			√*	√
Umbilical Venous Access				√*

Miscellaneous

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Assisted Delivery (Childbirth)	√	√	√	√
Assisted Complicated Delivery (Childbirth)	√*	√	√	√
Blood Chemistry Analysis				√
Blood Pressure: Automated	√	√	√	√
Blood Pressure: Manual	√	√	√	√
Blood Glucose Monitoring	√*	√	√	√
Eye Irrigation	√	√	√	√
Eye Irrigation: Hands Free Irrigation Using Sterile Eye Irrigation Device				√
Morgan Lens Insertion and eye irrigation at specific industrial Sites as part of a treatment protocol for exposure to acids and caustics		√*	√*	√

Louisiana Emergency Medical Services (EMS) Scope of Practice

Patient Transport		√	√	√
Venous Blood Sampling			√	√

Louisiana Other Skills and Procedures

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Taser Barb Removal	√	√	√	√
Urinary Catheter Maintenance and Troubleshooting		√	√	√
Digital Nerve Block				√*
ICP Monitoring				√*
Pericardiocentesis				√*
Extremity Wound Closure (Suturing/Stapling)				√*
Urinary Catheter Insertion				√*
Point of Care Ultrasound use and interpretation				√*

Mobile Integrated Healthcare, Community Wellness, Health Promotion, Prevention, and Emergency Room/Hospitals

SKILL/PROCEDURE	EMR	EMT	AEMT	PARAMEDIC
Determination of Alternate Transport Location		√*	√*	√*
Fall Prevention Assessment		√*	√*	√*
Injury Risk Assessment/Home Safety Assessment		√*	√*	√*
Treat and Release Protocol Implementation		√*	√*	√*
Care Plan Follow-Up				√*
Comprehensive Physical Exam				√*
Ear, Nose, and Throat (ENT) Assessment (Advanced)				√*
Hospital Discharge Follow-Up				√*
Medication Compliance Monitoring				√*

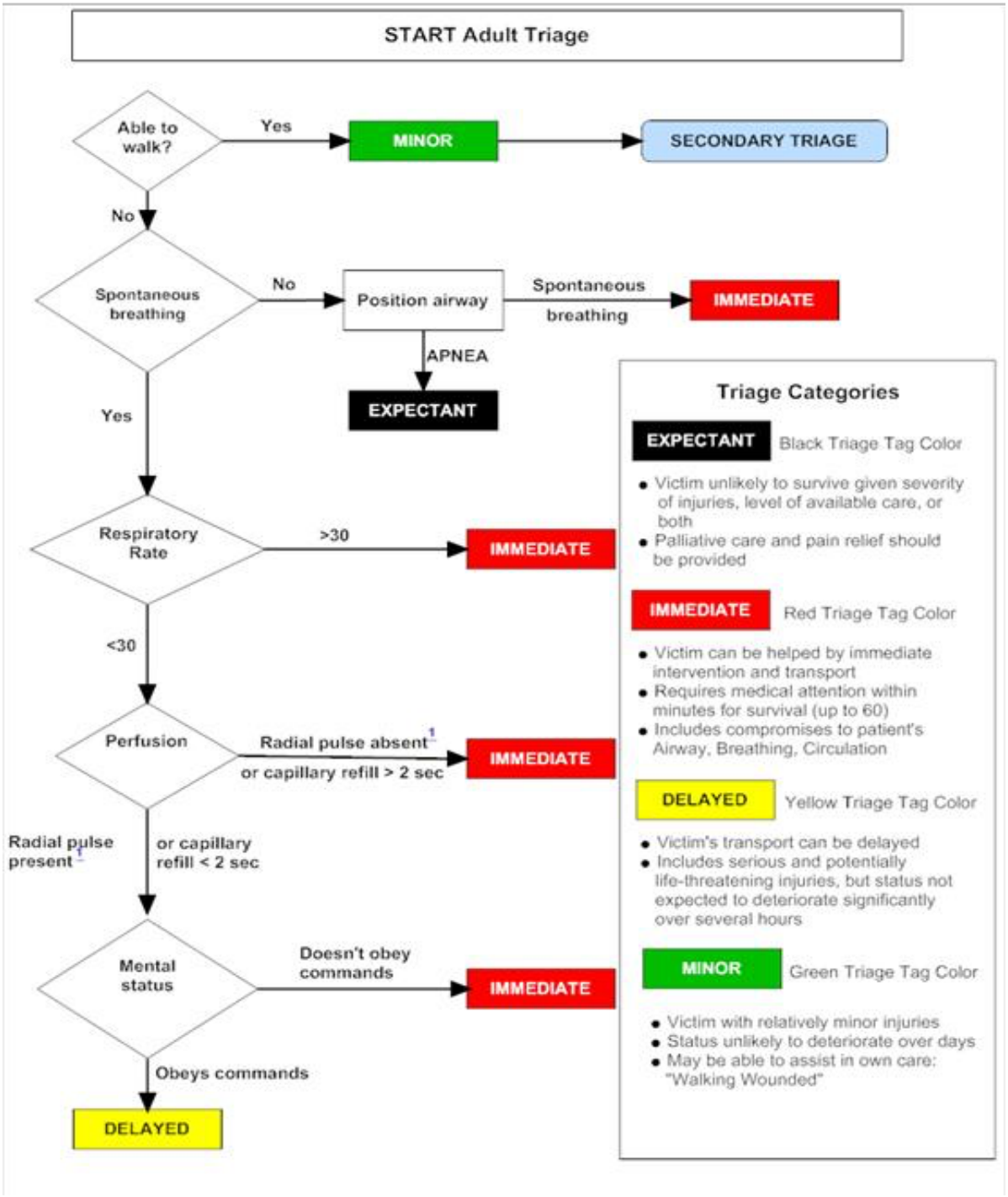
Louisiana Emergency Medical Services (EMS) Scope of Practice

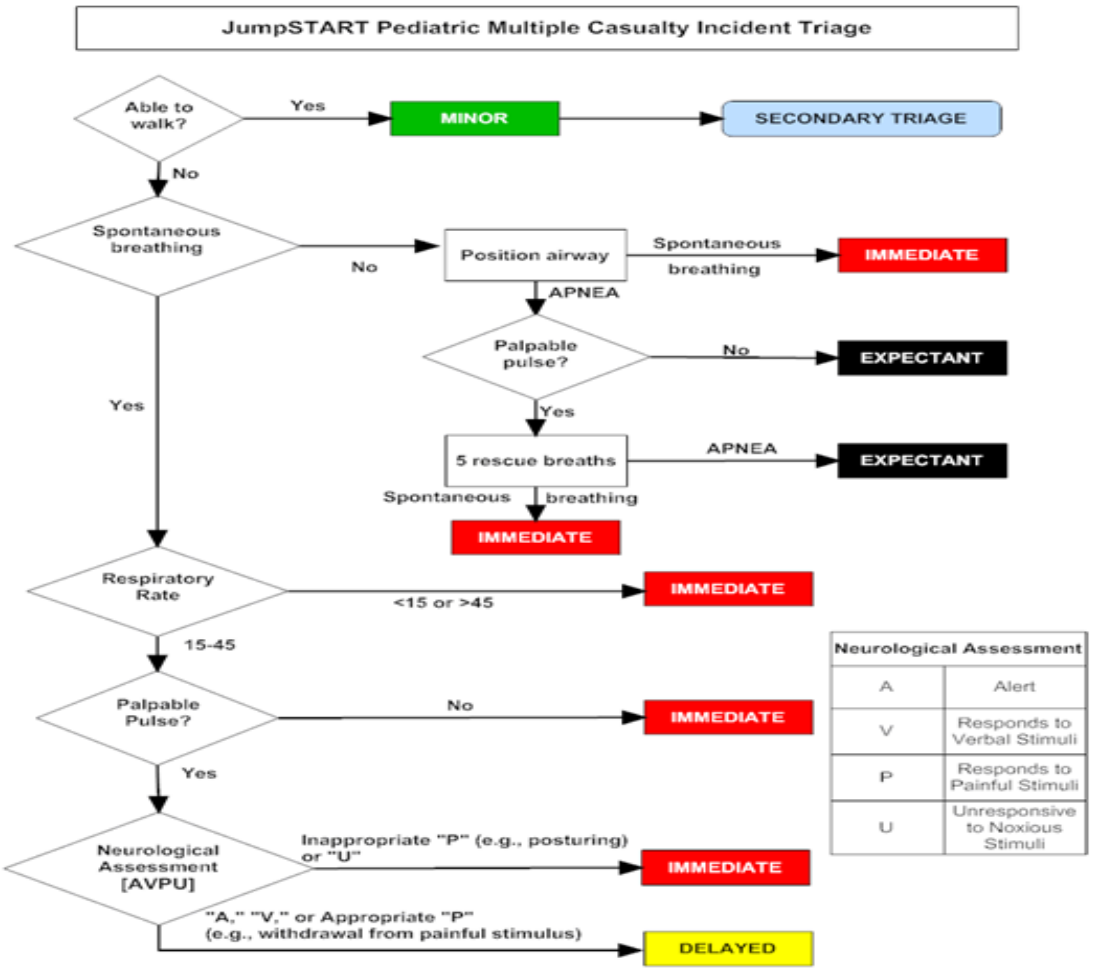
Mental Health Assessment (Advanced)				√*
Oral Health Assessment (Advanced)				√*
Social Evaluation (Advanced)				√*
Physician Extension Under Direct Tele-Medicine Supervision in Accordance with LRS 37:1271				√*
Point of Care Testing				√*
Point of Care Non-Invasive, CLIA Waived Tests or Assessments That Do Not Require Independent Provider Judgment		√*	√*	√*

START Triage |MCI

The National Incident Management System will be utilized for all MCI's. The START Triage / JumpSTART Triage guides are depicted below, this should guide triaging in the event of an MCI.

START Triage – Assess, Treat, Find Color, Tag, and Move on





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.

Triage Categories

EXPECTANT Black Triage Tag Color

- Victim unlikely to survive given severity of injuries, level of available care, or both
- Palliative care and pain relief should be provided

DELAYED Yellow Triage Tag Color

- Victim's transport can be delayed
- Includes serious and potentially life-threatening injuries, but status not expected to deteriorate significantly over several hours

IMMEDIATE Red Triage Tag Color

- Victim can be helped by immediate intervention and transport
- Requires medical attention within minutes for survival (up to 60)
- Includes compromises to patient's Airway, Breathing, Circulation

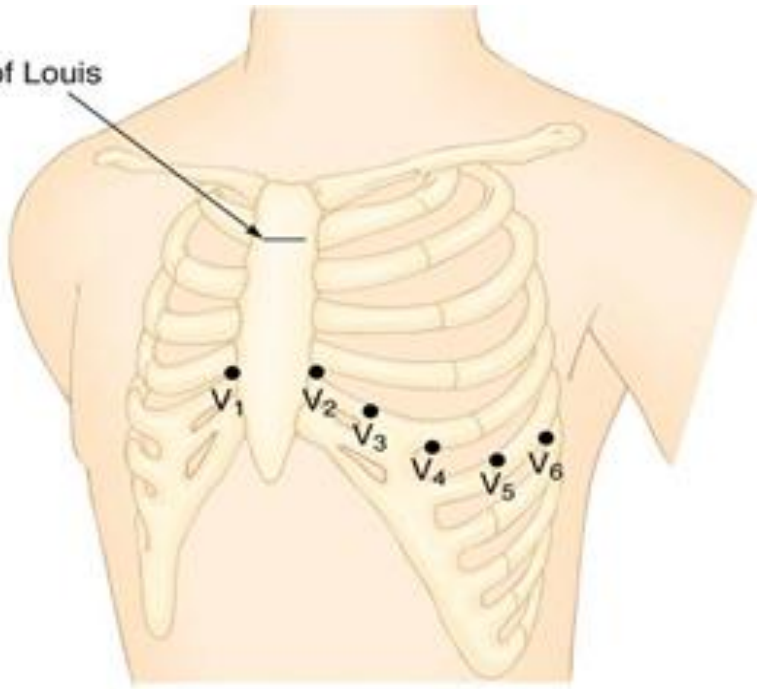
MINOR Green Triage Tag Color

- Victim with relatively minor injuries
- Status unlikely to deteriorate over days
- May be able to assist in own care: "Walking Wounded"

12 Lead | STEMI Criteria

12 Lead EKG Electrode Placement

Lead V_1 The electrode is at the fourth intercostal space just to the right of the sternum.
Lead V_2 The electrode is at the fourth intercostal space just to the left of the sternum.
Lead V_3 The electrode is at the line midway between leads V_2 and V_4.
Lead V_4 The electrode is at the midclavicular line in the fifth interspace.
Lead V_5 The electrode is at the anterior axillary line at the same level as lead V_4.
Lead V_6 The electrode is at the midaxillary line at the same level as lead V_4.



Chest Lead Placement

Definition of STEMI

- STE > 1mm in at least two contiguous leads, with the exception of leads V2-V3
- STE > 2mm in leads V2-V3 in men > 40 years of age
- STE > 2.5 mm in leads V2-V3 in men < 40 years of age
- STE > 1.5 mm in leads V2-V3 in women
- STE ≥ 0.5mm in posterior leads V7-V9

STEMI Equivalents

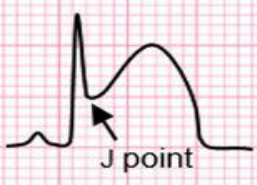
- STE >1mm in AVR and V1 (Left Main Occlusion/3 Vessel Disease)
- Whellen's Sign (between episodes of chest pain)
- Sgarbossa Criteria

Wall Affected	Leads	Artery(s) Involved	Reciprocal Changes
Anterior	V_2-V_4	Left coronary artery, Left Anterior descending (LAD)	II, III, aV_F
Anterolateral	I, aV_L, V_3-V_6	LAD and diagonal branches, circumflex and marginal branches	II, III, aV_F
Anteroseptal	V_1-V_4	LAD	II, III, aV_F
Inferior	II, III, aV_F	right coronary artery (RCA)	I, aV_L
Lateral	I, aV_L, V_5, V_6	Circumflex branch or left coronary artery	II, III, aV_F
Posterior	V_8, V_9	RCA or circumflex artery	V_1-V_4 (R greater than S in V_1 & V_2, ST-segment depression, elevated T wave)
Right Ventricular	V_{4R}-V_{6R}	RCA	None

STEMI Equivilents

Conventional STEMI

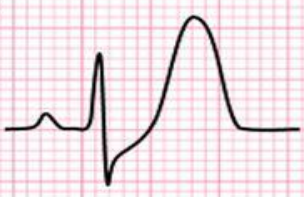
A



Elevation of ST segment at (or 40-60 ms after) the J point

De Winter syndrome

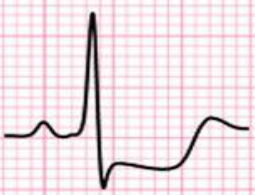
B



J-point depression and upsloping ST depression in V1-V6 that continues into tall, positive symmetrical T-waves, often with 1-2 mm ST elevation in aVR

Posterior STEMI

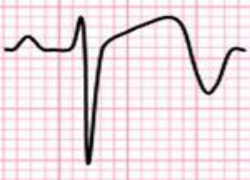
C



ST depression ≥0.05 mV (horizontal or downsloping and concave) in V1-V3 (or V4) especially if there is a tall R in V1/V2 with R/S ratio >1 in V2

Wellens sign A

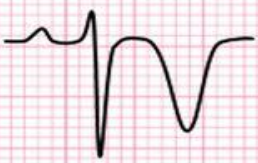
D



Biphasic anterior T waves, not always accompanied by chest pain

Wellens sign B

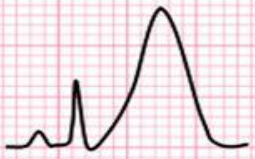
E



Deeply inverted anterior T waves, not always accompanied by chest pain

Hyperacute T wave

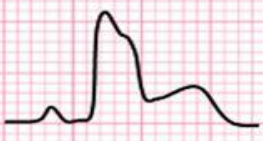
F



Tall, often asymmetrical, broad-based anterior T-waves often associated with reciprocal ST depression

Sgarbossa criterion 1

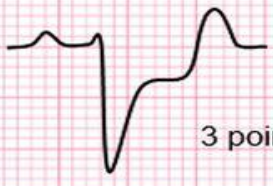
G



ST elevation ≥0.1 mV concordant to the QRS in any of the leads I, aVL, V4 to V6.

Sgarbossa criterion 2

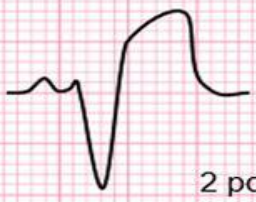
H



ST depression ≥0.1 mV concordant to the QRS in any of the leads V1 to V3.

Sgarbossa criterion 3[modified]

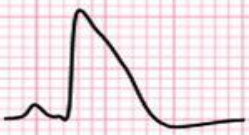
I



ST elevation with amplitude >25% of the depth of the preceding S-wave with discordant QRS complex (leads V1 to V3)

"Shark fin"

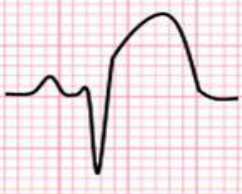
J



J-point transitioning in a convex ST-segment (T wave indistinguishable from ST-segment due to extreme ST deviation)

Acute ischemia in LVH

K



ST elevation >25% of QRS amplitude AND (ST elevation in 3 contiguous leads, or T-wave inversions in the anterior leads)

Asatryan, et al. JACC 2019

Toxidrome Identification Guide

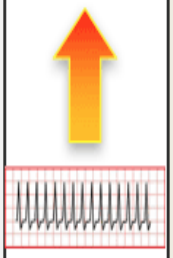
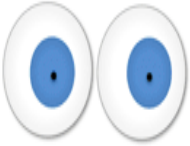
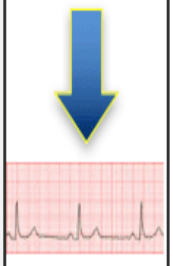
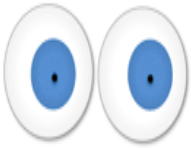
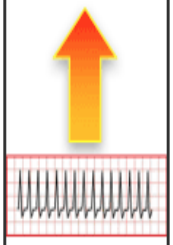
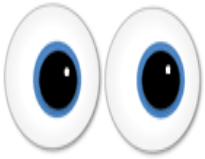
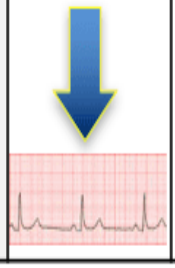
	HR & BP	Resp.	Temperature	Pupils	Bowel Sounds	Diaphoresis
Anticholinergic **Anticholinergics** –Atropine, scopolamine, glycopyrrolate benztropine, trihexyphenidyl **Antihistamines** – Chlorpheniramine, Cyproheptadine, Doxylamine, Hydroxyzine, Dimenhydrinate, Diphenhydramine, Meclizine Promethazine		No change		Dilated 		
Cholinergic Organic Phosphorous Compounds: Carbamates • Arecholine, Pilocarpine, Urecholine (Betanechol), Carbachol, Choline, Metacholine, Mushrooms	No change	No change	No change	Pinpoint 		
Opioid Morphine • Codeine • Tramadol • Heroin • Meperidine • Diphenoxylate • Hydromorphone • Fentanyl • Methadone • Propoxyphene • Pentazocine • DXM • Oxycodone • Hydrocodone				Pinpoint 		
Sympathomimetic Caffeine, cocaine, amphetamines, methamphetamines, Ritalin, LSD, Theophylline, MDMA				Dilated 		
Sedative-Hypnotic anti-anxiety agents, muscle relaxants, antiepileptics and preanesthetic medications –Barbituates –Benzodiazepines				No change 		

Table 1 Vision, aphasia, neglect emergent large vessel occlusion screening tool

Stroke VAN

How weak is the patient? Raise both arms up	☐ Mild (minor drift) ☐ Moderate (severe drift—touches or nearly touches ground) ☐ Severe (flaccid or no antigravity) ☐ Patient shows no weakness. Patient is VAN negative

(exceptions are confused or comatose patients with dizziness, focal findings, or no reason for their altered mental status then basilar artery thrombus must be considered; CTA is warranted)

Visual disturbance	☐ Field cut (which side) (4 quadrants) ☐ Double vision (ask patient to look to right then left; evaluate for uneven eyes) ☐ Blind new onset ☐ None
Aphasia	☐ Expressive (inability to speak or paraphasic errors); do not count slurring of words (repeat and name 2 objects) ☐ Receptive (not understanding or following commands) (close eyes, make fist) ☐ Mixed ☐ None
Neglect	☐ Forced gaze or inability to track to one side ☐ Unable to feel both sides at the same time, or unable to identify own arm ☐ Ignoring one side ☐ None

Patient must have weakness plus one or all of the V, A, or N to be VAN positive. VAN positive patients had 100% sensitivity, 90% specificity, positive predictive value 74%, and negative predictive value 100% for detecting large vessel occlusion.
CTA, CT angiography; VAN, vision, aphasia, and neglect.

Source: Teleb MS, Ver Hage A, Carter J, et al. J NeruoIntervent Surg