# 2024 EMS Protocols

## Patient Care Protocols V1.0

Originally Adapted 2012

## Last Revised 9/9/2024

## ACKNOWLEDGEMENTS

The Nebraska Medicine Division of Prehospital and Emergency Medical Services is pleased to provide this completely revised and updated version of EMS Protocols to the State of Nebraska. This work was accomplished with a dedicated group of providers who worked tirelessly to find a document that not only reflects a simpler, more easy to read document, but also incorporates the most current practice in medicine and trauma.

The 2024 Protocols have taken on a new look utilizing the algorithm format and color incorporation that delineates EMT, AEMT, Paramedic, and Medical Director consultation procedures.

- Updated guidelines on cardiac arrest resuscitation, back boarding, current stroke and burn care, and simplification for adult medication dosing.
- Protocols on special patients – LVAD, Tracheotomies, Ventilators.
- Protocols on mass gathering events and scene rehabilitation.

The following providers/institutions were instrumental in helping to shape these guidelines:

- Eric Ernest, MD
- Abe Campos, MD
- Shaila Coffey, MD

**INTRODUCTION:**
**All statements contained in this manual are informative only and represent that which is believed to be the highest standard of care relating to any particular set of circumstances. Due to statutory constraint, this document is labeled as protocols but the intent is for these to be used as guidelines for delivery of high quality patient care.**

**It is the intention that this manual be used as consultative material in striving for optimal patient care. It is recognized that any specific procedure is always subject to modification depending upon the circumstances of a particular case. Further, the medical control physician may deviate from these guidelines based on medical judgment.**

**This edition replaces all previous editions and becomes effective on date of signature below.**

**These guidelines and policies have been approved by:**

_____ _____
**Medical Director** **Date**

_____
**Agency Name**

## Requirement to Notify Medical Director

Given the dynamic nature of prehospital emergency care, there are certain situations that arise that the medical director would request to be notified within a timely manner (preferably during or immediately following the incident). Notification of the medical director should not take precedence over scene safety or patient care unless the process of notification of the medical director would assist in the given situation. While the list contained within this document is not meant to be exhaustive, it should be noted that use of common sense and good judgement is encouraged when choosing whether or not to notify the medical director. The following are situations that would require notification of the medical director:

- Injury/death of a provider
- Injury/death of a public safety officer for which the agency is providing care
- Willful neglect or harm inflicted to a patient in the care of a provider
- Any event requiring CISD/CISM for providers
- Event that results in a request from the media for comment
- EMS vehicle accident resulting in injury to a citizen
- Arrest of EMS provider for any reason
- Suspected drug diversion
- EMS provider suspected of being impaired by drugs and/or alcohol.
- Medication errors resulting in unintended injury of any type
- Anytime a crew is requiring the assistance of the Medical Director on scene
- Diversion of patient to nearest facility due to deterioration in patient status.

An attempt should be made to contact the medical director in accordance with the department's chain of command directly by phone or radio should any of the above occur. If unable to reach the medical director, a description of the event should be communicated via e-mail at the earliest possible time.

The provider may consider (not required) notification of the medical director if circumstances warrant:

- Transport of a provider's immediate family member
- Event involving a celebrity, politician, or senior leadership of a hospital organization

**Section**

- Patient Care Protocols
- Medications
- Procedures
- Forms
- Reference

**Note regarding medications and procedures:**

- Skills and medications recommended throughout this documented are permissible if approved by the physician medical director (demonstrated through training and competency assesment) and within the scope of the provider license level and EMS service level.

**Note regarding referenced medications:**

- All pharmaceutical agents allowable per appropriate use and included in formulary or otherwise approved by the physician medical director

**Reference for Adult Small/Medium/Large (S/M/L) Dosing**

- Small: 50 kg
- Medium: 75 kg
- Large: 100 kg
- *Note: Some dosing rounded up or down based on ease of drawing up and administering medication*

Table of Contents



Table of Contents

# Key to Protocol Utilization

**History**
- Important history items
- Circumstances of event
- SAMPLE
- Time of onset
- Duration

**Signs and Symptoms**
- Important Signs and Symptoms specific to each protocol

**Differential**
- A list of other diseases or injuries which should be considered

**Black Box**

**Highlights Important Information**

**Universal Patient Care Protocol Reference**

**Assumed all protocols utilize and will not appear on individual protocols**

**Red Box**

**Highlights Critical Information**

**May Direct to Another Protocol**

**Information Box**

Indicates Procedure

Indicates
Entry/Exit
From/to
Another protocol

Decision Point
Darker outline to highlight

**Medication Box**
**Shaded in Purple to Highlight**

**MD** **Requires Contact with Medical Control for Authorization**

| Algorithm Legend | |
|---|---|
| B | Emergency Medical Technician |
| A | Advanced Emergency Medical Technician |
| P | Paramedic |
| | Notify Destination or Contact Medical Control |

Protocol Introduction

Protocol #

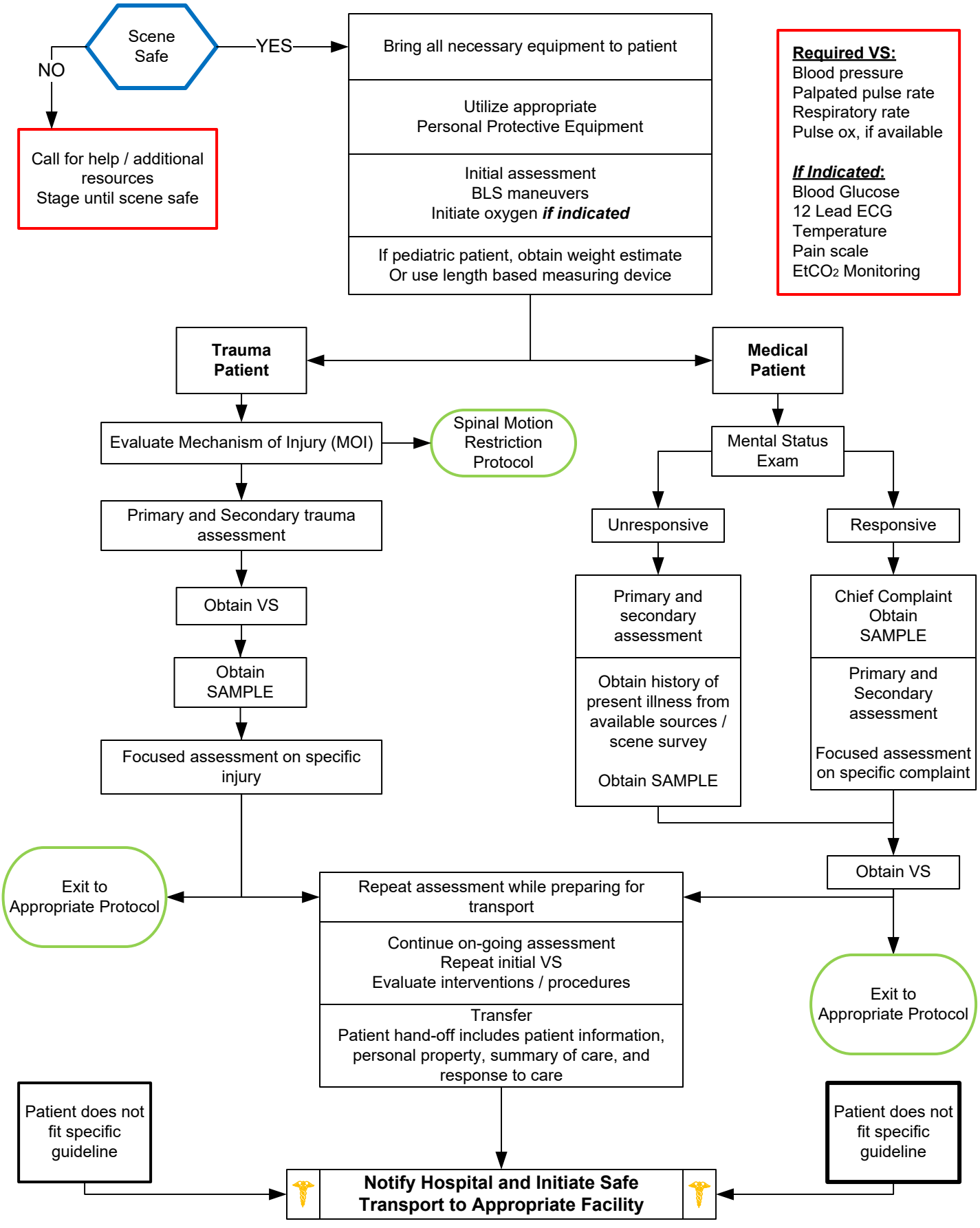
# Sections

# Protocols



**Protocol**

# Universal Patient Care



# Universal Patient Care



**Scene Safety Evaluation:** Identify potential hazards to rescuers, patient and public. Identify number of patients and utilize triage guideline if indicated. Observe patient position and surroundings.

**General:** All patient care must be appropriate to your level of training and documented in the ePCR. The ePCR narrative should be considered a story of the circumstances, events and care of the patient and should allow a reader to understand the complaint, the assessment, the treatment, why procedures were performed and why indicated procedures were not performed as well as ongoing assessments and response to treatment and interventions.

**Adult Patient:** An adult should be suspected of being acutely hypotensive when Systolic Blood Pressure is less than 90 mmHg. Diabetic patients and women may have atypical presentations of cardiac related problems such as MI. General weakness can be the symptom of a very serious underlying process. Beta blockers and other cardiac drugs may prevent a reflexive tachycardia in shock with low to normal pulse rates.

**Geriatric Patient:** Hip fractures and dislocations have high mortality. Altered mental status is not always dementia. Always check Blood Sugar and assess for signs of stroke, trauma, etc. with any alteration in a patient's baseline mental status. Minor or moderate injury in the typical adult may be very serious in the elderly.

**Pediatric Patient:** Pediatric patient is defined by those which fit on a length based measuring device, Age less than 15, weight 40 kg or less, or absence of secondary signs of puberty (underarm hair on males, breast development on females). Patients off the Broselow tape should have weight based medications until age 12 or greater or weight greater than 40 kg. Special needs children may require continued use of Pediatric based guidelines regardless of age and weight. Initial assessment should utilize the Pediatric Assessment Triangle which encompasses Appearance, Work of Breathing and Circulation (skin appearance). The order of assessment may require alteration depending on the developmental state of the pediatric patient. Generally the child or infant should not be separated from the caregiver unless absolutely necessary during assessment and treatment.

**Patient Refusal:** Patient refusal is a high risk situation. Encourage your patient to accept transport to medical facility. Encourage patient to allow an assessment, including vital signs. Documentation of the event is very important including a mental status assessment describing the patient's capacity to refuse care. Guide to Assessing capacity:

- ***Patient should be able to communicate a clear choice:*** This should remain stable over time. Inability to communicate a choice or an inability to express the choice consistently demonstrates incapacity.
- ***Relevant information is understood:*** Patient should be able to display a factual understanding of their illness or situation that requires further medical attention, the options and risks and benefits.
- ***Appreciation of the situation:*** Ability to communicate an understanding of the facts of the situation. Patient should be able to recognize the significance of the potential outcome from his or her decision.
- ***Manipulation of information in a rational manner:*** Demonstrate a rational process to come to a decision. Should be able to describe the reasoning they are using to come to the decision, whether or not the EMS provider agrees with decision.
- ***Pediatric patient refusal***: Consent or refusal cannot be signed by a minor (A minor is an individual age 18 or under UNLESS the individual is emancipated).

**Contact Medical Direction for assistance with any high-risk refusal**. Law enforcement should be involved with any involuntary transport unless patient condition and scene safety warrant rapid transport. A Mental Status Exam (MSE) is a simple clinical tool to help assess cognitive capacity for high-risk refusals.

**Special note on oxygen administration and utilization**: Oxygen is a pharmaceutical with indications, contraindications as well as untoward side effects. Utilize oxygen when indicated and not because it is available. A reasonable target SpO2 for most patients is 94-99 % regardless of delivery device.

**Pearls**

- **Minimal exam if not otherwise noted is vital signs, mental status with GCS, and location of injury or complaint.**
- **Any patient contact which does not result in transport must have a completed patient care record with explicit disposition information, patient signature, and instructions provided, or documentation as to why this information was not obtained.**
- **Patients who refuse care prior to a full assessment should be logged in a single ePCR for the incident. It should be clear that contact was made with the patient, an assessment was offered, the patient refused, and no obvious impairment was suspected (medical, traumatic, or chemical).**
- **A pediatric patient is defined by fitting on a weight based measuring device/tape, Age < 15, Weight ≤ 40 kg, or absence of signs of puberty.**
- Timing of transport should be based on patient's clinical condition and the transport policy.
- Blood Pressure is defined as a Systolic / Diastolic reading. A palpated Systolic reading may be necessary at times.
- SAMPLE: Signs / Symptoms; Allergies; Medications; PMH; Last oral intake; Events leading up to illness / injury

# Adult Behavioral

**History**
- Situational crisis
- Psychiatric illness/medications
- Injury to self or threats to others
- Medic alert tag
- Substance abuse / overdose
- Diabetes
- Head Trauma

**Signs and Symptoms**
- Anxiety, agitation, confusion
- Affect change, hallucinations
- Delusional thoughts, bizarre behavior
- Combative or violent
- Expression of suicidal / homicidal thoughts
- Impervious to Pain

**Differential**
- Alcohol Intoxication
- Toxin / Substance abuse
- Medication effect / overdose
- Withdrawal syndromes
- Depression
- Bipolar (manic-depressive)
- Schizophrenia
- Anxiety disorders

A: **For significant anxiety consider:** **Midazolam** 1-2 mg IV/IO/IN/IM -or- **Lorazepam** 1-2 mg IV/IO

Call for help Stage until scene safe

NO ← Scene Safe → YES

**Exit to Appropriate Protocol** *If indicated*

**Altered Mental Status Protocol**
**Overdose/Toxic Ingestion Protocol**
**Head Trauma Protocol**

***Assume patient has Medical cause of behavioral change***

B: Blood Glucose Analysis Procedure

Diabetic Protocol *if indicated*

**Imminent safety issue?**

YES ← Imminent safety issue? → NO

P: **Ketamine** 3-5 mg/kg **IM** May repeat x 1 dose in 5 minutes if needed *(Max 500 mg)* **S:** 150mg **M:** 200mg **L:** 300mg
P: Cardiac Monitor
B: $ETCO_2$ Monitoring

Is patient a threat to self or others?

YES ← Is patient a threat to self or others? → NO

- Consider Physical Restraint Procedure
- Consider Vascular Access

Is patient a threat to self or others?

NO ← Is patient a threat to self or others? → YES

*After 10 minutes* Is patient calm and are you able to safely provide appropriate medical care?

No ← *After 10 minutes* Is patient calm and are you able to safely provide appropriate medical care? → YES

A: **Midazolam** 5 mg **IM –or-** 2 mg **IV/IO** **-or-** **Lorazepam** 2 mg **IV/IO** PRN Q5min x 3 doses

Vascular access obtained?

YES ← Vascular access obtained? → NO

**Do not position or transport any restrained patient in such a way that could impact the patient's respiratory or circulatory status**

**Hyperactive Delirium Syndrome**
Paranoia, disorientation, hyper-aggression, hallucination, tachycardia, increased strength, hyperthermia

YES ← Hyperactive Delirium Syndrome → NO

P: **Normal Saline/Lactated Ringers** 1 L **Bolus** May repeat 500 ml **x2** **Maximum** 2 Liters
P: *Consider for hemodynamic instability* ***Sodium Bicarbonate*** 100 mEq **IV/IO**
P: Cardiac Monitor
B: $ETCO_2$ Monitoring
Cooling measures as needed

P: Cardiac Monitor
B: $ETCO_2$ Monitoring

A: **Midazolam** 2 mg **IV** -AND/OR- **Haloperidol** -OR- **Droperidol** 2.5-5mg **IV** PRN Q5min x2 doses
A: **Diphenhydramine** 25 mg **IV (Optional)**

NO ← Vascular access obtained? → YES

A: **Midazolam** 5 mg **IM** -AND/OR- **Haloperidol** -OR- **Droperidol** 5-10 mg **IM**
A: **Diphenhydramine** 50 mg **IM (Optional)**

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

General Section Protocols

# Adult Behavioral



This guideline should only be used on adult patients:

- Greater than 40 kg
- Signs of puberty
- Longer than the Broselow-Luten tape

**Pearls**

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Neuro**
- **Crew / responder safety is the main priority**
- **Any patient who is handcuffed or restrained by Law Enforcement and transported by EMS must be accompanied by law enforcement in the medic unit.**
- **Consider sedatives (Ketamine and/or benzodiazepines) for patients with history of psychosis or extreme alcohol intoxication, or a benzodiazepine for patients with other presumed substance abuse. While benzodiazepines may be indicated for patients with alcohol intoxication, consider that alcohol and benzodiazepines together may lead to respiratory depression.**
- **All patients who receive either physical or chemical restraint must be continuously observed by ALS personnel on scene or immediately upon their arrival.**
- **If cardiac rhythm changes, evaluate QTc interval with a 12-lead EKG. If QTc > 500ms, consider administering Magnesium Sulfate (2g). If QRS is greater than 0.12 s, consider administering Sodium Bicarbonate (1 mEq/kg). Consult with medical control if appropriate.**
- Be sure to consider all possible medical/trauma causes for behavior (hypoglycemia, overdose, substance abuse, hypoxia, head injury, etc.)
- Do not irritate the patient with a prolonged exam.
- Do not overlook the possibility of associated domestic violence or child abuse.
- If patient is suspected of Hyperactive delirium suffers cardiac arrest, consider a fluid bolus and sodium bicarbonate early
- Do not position or transport any restrained patient is such a way that could impact the patients respiratory or circulatory status.
- **Hyperactive Delirium Syndrome:**

Medical emergency: Combination of delirium, psychomotor agitation, anxiety, hallucinations, speech disturbances, disorientation, violent / bizarre behavior, insensitivity to pain, hyperthermia and increased strength. Potentially life-threatening and associated with use of physical control measures, including physical restraints and Tasers. Most commonly seen in male subjects with a history of serious mental illness and/or acute or chronic drug abuse, particularly stimulant drugs such as cocaine, crack cocaine, methamphetamine, amphetamines or similar agents. Alcohol withdrawal or head trauma may also contribute to the condition.

- **Extrapyramidal reactions:**

Condition causing involuntary muscle movements or spasms typically of the face, neck and upper extremities. May present with contorted neck and trunk with difficult motor movements. Typically an adverse reaction to antipsychotic drugs like Haloperidol and may occur. When recognized give **Diphenhydramine 50 mg IV / IO / IM** in adults or **1 mg/kg IV / IO / IM** in pediatrics.

- **Documentation**

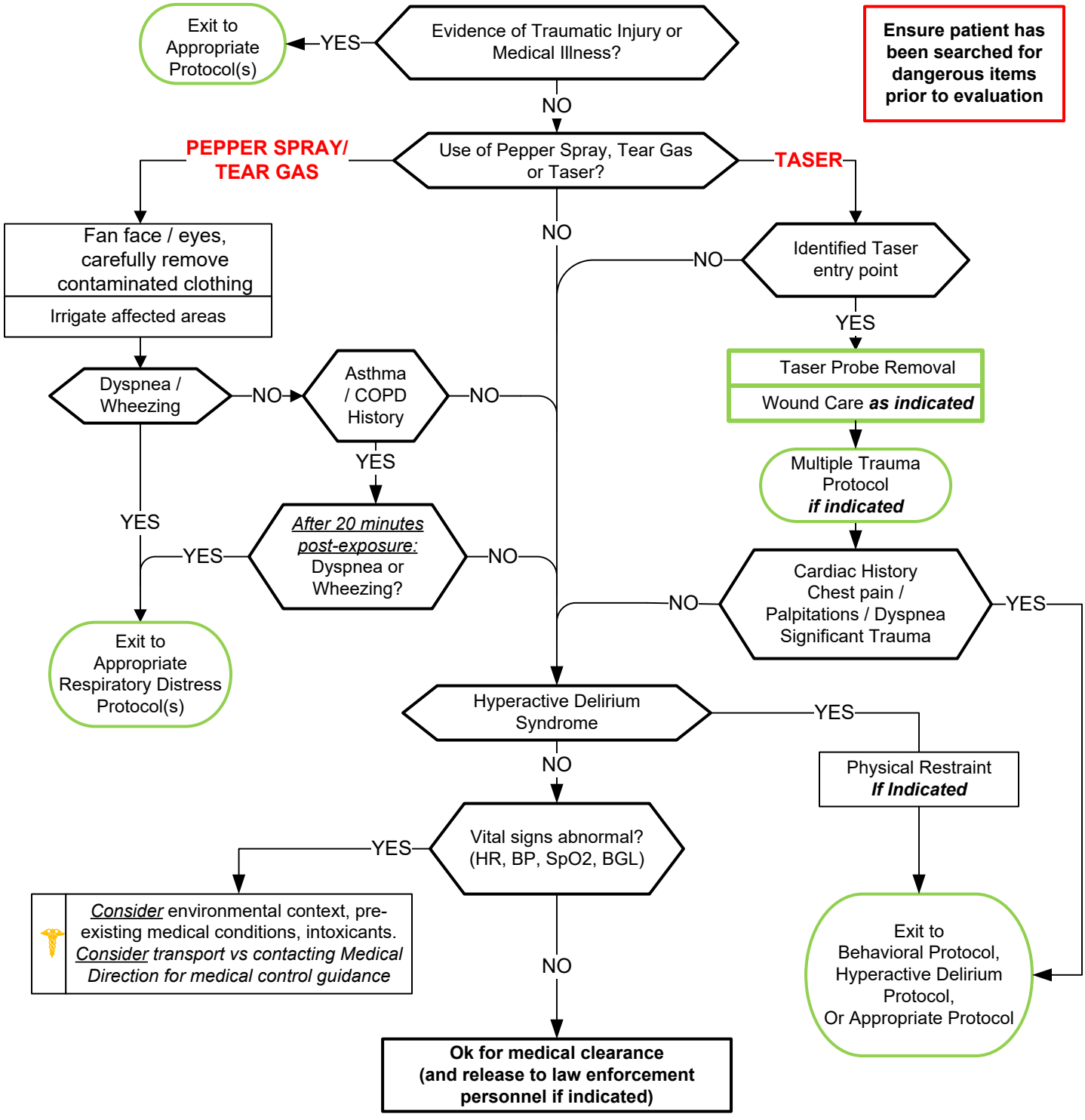
Ensure statements of self harm of harm to others are reported to Law Enforcement and documented in the ePCR.

# Medical Clearance

**History**
- Traumatic Injury
- Drug Abuse
- Cardiac History
- History of Asthma
- Psychiatric History

**Signs and Symptoms**
- External signs of trauma
- Palpitations
- Shortness of breath
- Wheezing
- Altered Mental Status
- Intoxication/Substance Abuse

**Differential**
- Hyperactive Delirium Secondary to Psychiatric Illness
- Hyperactive Delirium Secondary to Substance Abuse
- Traumatic Injury
- Closed Head Injury
- Asthma Exacerbation
- Cardiac Dysrhythmia




General Section Protocols

# Medical Clearance



- **Emergency Patient**-Any person for whom the 9-1-1/EMS system has been activated and who meets the following criteria:
  1. Has a chief complaint or suspected illness or injury
  2. Is not alert and oriented x 3 (person, place, time, or event)
  3. Requires or requests field treatment or transport
  4. Is a minor (under the age of 19) who is not accompanied by a parent or legal guardian and is or appears to be ill or injured

- If any vitals or assessments were performed, this shall be considered a patient contact and an ePCR shall be completed. A refusal signature should be obtained.

- **No Patient Found** – This is to be used when the crew arrives on scene and no one complains of any injuries of any type or a patient cannot be located. You must have a medical complaint to be considered a patient.

- **Refuse Treatment and Transport** – signature should only be used for patients that assessments are completed but do not have any interventions performed or refuse any care.
  An Assessment would be considered the following: Vital signs, cardiac monitor/12 Lead, glucometer, stroke scale, temperature, etc.

- **Accept Treatment / Refuse Transport** - signature should be obtained for patients in which a medical treatment is actually performed on the patient:
  Administration of a drug/fluid, airway procedure, electrical therapy, wound care, splinting, etc.

**Pearls**

- **Patient does not have to be in police custody or under arrest to utilize this protocol.**

- **Patients restrained by law enforcement devices must be transported accompanied by a law enforcement officer in the patient compartment who is capable of removing the devices. However when rescuers have utilized restraints in accordance with the Restraint Procedure, the law enforcement agent may follow behind the medic unit during transport if there are no safety concerns and the arrangement is agreeable to both EMS and Law Enforcement personnel on scene.**
- The responsibility for patient care rests with the highest authorized medical provider on scene.
- If an asthmatic patient is exposed to pepper spray and released to law enforcement, all parties should be advised to immediately contact EMS if wheezing/difficulty breathing occurs.
- All patients in police custody who demonstrate capacity retain the right to participate in decision making regarding their medical care and may request or refuse medical care of EMS.
- If extremity / chemical / law enforcement restraints are applied, follow Restraint Procedure.
- **Consider utilizing the behavioral guideline as indicated for patients in police custody.**
- **All patients who receive physical restraint must be continuously observed by personnel**
- **All patients who receive chemical restraint must be continuously observed by ALS personnel**
- Do not position or transport any restrained patient in such a way that could impact the patient's respiratory or circulatory status.

# Welfare Check/Lift Assist

**History**
- EMS responds to "lift assist"
- Third party called 911; patient did not request
- Other situation in which patient does not have a medical complaint or obvious injury

**Signs and Symptoms**
- Assess for medical complaint
- For patients with hypertension, particularly check for chest pain, shortness of breath, and/or neurologic changes
- For citizen assist calls, particularly check for syncope, trauma from fall, or inability to ambulate

**Differential**
- Hypertensive urgency
- Hypertensive emergency
- Syncope
- Cardiac ischemia
- Cardiac dysrhythmia
- Fracture
- Head trauma

**Medical complaint or obvious trauma?** — YES → Consider the need for additional resources → **Exit to appropriate guideline**

NO

If concerns exist for patient's well-being, or safety for independent living:
Obtain Vital Signs: HR, RR, BP, SpO2, Blood Glucose ↔ Assess the reason for fall/need for lift assist
Consider further evaluation and/or transport as needed

**Blood Glucose < 70?** — YES → Consider the need for additional resources → **Exit to Adult Diabetic Protocol**

NO

**Pulse >110 or <50**
**SBP >200 or <90**
**DBP >120**
**MAP<60**
**RR > 24 or < 6**
**Pulse ox <94%**
*(Consider abnormal vital signs in context of medical history)*

YES → **Recommend transport for evaluation. Have patient sign refusal if transport declined.** → **Notify Hospital and Initiate Safe Transport to Appropriate Facility**

NO

Re-confirm patient has no medical complaint. If taken, provide patient with vital sign results and have them contact their doctor to report results.

- Advise patient to call 9-1-1 if they develop any symptoms.
- Complete appropriate agency report and document elements of this guideline

MD **For any high risk refusals, consider online medical control prior to release of the patient** (Reference Protocol 1 Supplement)

**Consider law enforcement involvement for those patients not A&Ox3 and/or lack capacity**

General Section Protocols

# Welfare Check/Lift Assist



- **Emergency Patient**-Any person for whom the 9-1-1/EMS system has been activated and who meets the following criteria:
  1. Has a chief complaint or suspected illness or injury
  2. Is not alert and oriented x 3 (person, place, time, or event)
  3. Requires or requests field treatment or transport
  4. Is a minor (under the age of 19) who is not accompanied by a parent or legal guardian and is or appears to be ill or injured

- If any vitals or assessments were performed, this shall be considered a patient contact and an ePCR shall be completed. A refusal signature should be obtained.

- **No Patient Found** – This is to be used when the crew arrives on scene and no one complains of any injuries of any type or a patient cannot be located. You must have a medical complaint to be considered a patient.

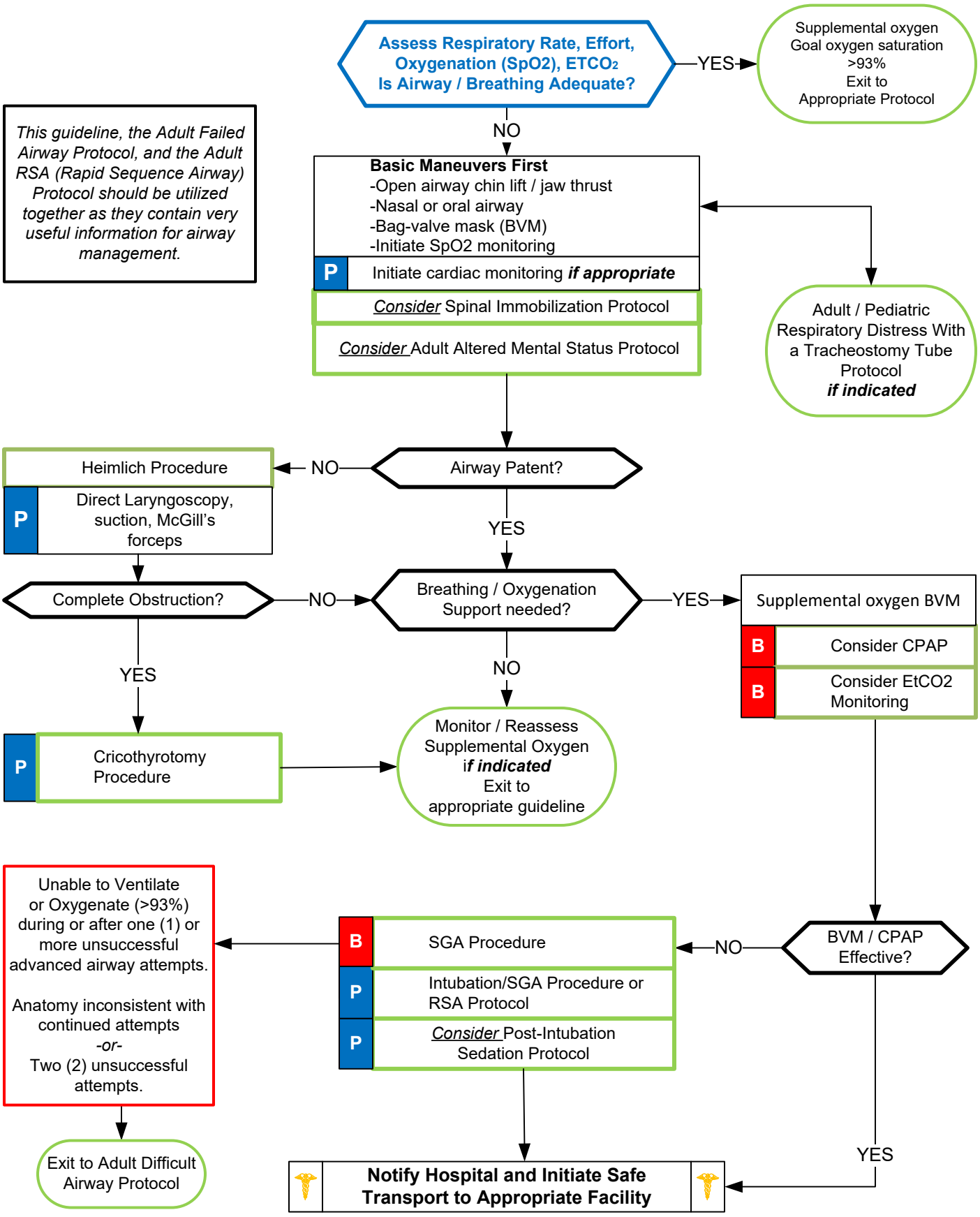
- **Refuse Treatment and Transport** – signature should only be used for patients that assessments are completed but do not have any interventions performed or refuse any care.
  An Assessment would be considered the following: Vital signs, cardiac monitor/12 Lead, glucometer, stroke scale, temperature, etc.

- **Accept Treatment / Refuse Transport** - signature should be obtained for patients in which a medical treatment is actually performed on the patient:
  Administration of a drug/fluid, airway procedure, electrical therapy, wound care, splinting, etc.

**Pearls**

- **This guideline applies to all responders**
- **Patients who are denying more severe symptoms may initially present for a "routine check". Please confirm with the patient at least twice that they have no medical complaints.**
- **All persons who request a medical evaluation are considered patients and shall have an PCR completed.**
- **Should a patient refuse evaluation and/or decline further evaluation once begun, document as much as you can. Even patients who refuse vital signs can be observed and respirations measured. The PCR narrative (if required) is key in these and all cases, and must accurately and thoroughly describe the patient encounter.**

# Adult Airway



# Adult Airway



Always weigh the risks and benefits of advanced airway placement in the field against transport. All pre-hospital advanced airways are considered high risk. If ventilation / oxygenation is adequate, transport may be the best option. The most important airway device and the most difficult to use correctly and effectively is the Bag Valve Mask (not the laryngoscope).

**Few pre-hospital airway emergencies cannot be temporized or managed with proper BVM techniques.**

**Difficult Airway Assessment**

**Difficult BVM Ventilation - MOANS:**

- **M**ask seal inadequate due to facial hair, anatomy, blood or secretions / trauma
- **O**bese or late pregnancy
- **A**ge > 55
- **N**o teeth (consider placement of nasopharyngeal airway (NPA))
- **S**tiff or increased airway pressures (Asthma, COPD, Obese, Pregnant)

**Difficult Laryngoscopy - LEMON:**

- **L**ook externally for anatomical distortions (small mandible, short neck, large tongue)
- **E**valuate 3-3-2 Rule (Mouth should fit 3 fingers, chin to neck should be 3 fingers, neck to thyroid should be 2 fingers)
- **M**allampati (difficult to assess in the field)
- **O**bstruction / Obese or late pregnancy
- **N**eck mobility

**Difficult SGA - RODS:**

- **R**estricted mouth opening
- **O**bstruction / Obese or late pregnancy
- **D**istorted or disrupted airway
- **S**tiff or increased airway pressures (Asthma, COPD, Obese, Pregnant)

**Difficult Cricothyrotomy / Surgical Airway - SHORT:**

- **S**urgery or distortion of airway
- **H**ematoma over lying neck
- **O**bese or late pregnant
- **R**adiation treatment skin changes
- **T**umor overlying neck

**Key Documentation Elements:**

- O2 sats prior to intubation
- Pre-oxygenation
- Suction used
- # of attempts (See Pearls Below)
- Use of Bougie
- Change in technique after unsuccessful attempt
- End-tidal CO2 waveform after placement

**Trauma:** *Utilize in-line cervical stabilization during advanced airway or BVM use. During airway placement the cervical collar front should be open or removed to facilitate translation of the mandible / mouth opening.*

**Pearls**

- **This guideline is only for use in patients with signs of puberty or longer than the Broselow Tape.**
- **Continuous EtCO2 monitoring is mandatory for the monitoring of all patients with an advanced airway device.**
- **If effective oxygenation and ventilation is being maintained by BVM and/or basic airway adjuncts, it is acceptable to continue with basic airway measures. Consider CPAP if appropriate.**
- **An airway is considered obtained when the patient is receiving appropriate oxygenation and ventilation.**
- **An Intubation Attempt is defined as passing the laryngoscope blade beyond the teeth with intent to place an endotracheal tube**
- **An appropriate ventilatory rate is one that maintains an EtCO2 of 35-45. Avoid hyperventilation, except in cases of metabolic acidosis (DKA, Aspirin overdose, shock)**
- **Initiation of oxygen should only occur in hypoxic patients (SpO2 <94%).**
- Do not assume hyperventilation is psychogenic– use oxygen for goal Sp02 of 94-99%.
- A gastric suctioning tube should be placed in all patients with advanced airways if time allows (paramedic skill level).
- It is important to secure the advanced airway well and consider c-collar (in absence of trauma) to better maintain placement. Manual stabilization of advanced airway should be used during all patient moves / transfers.
- **Documentation should include tube placement on scene, during transport, and at receiving hospital.**

# Adult Difficult Airway

Unable to Ventilate and Oxygenate >93%, or values consistent with clinical context, during or after one or more unsuccessful advanced airway attempts.

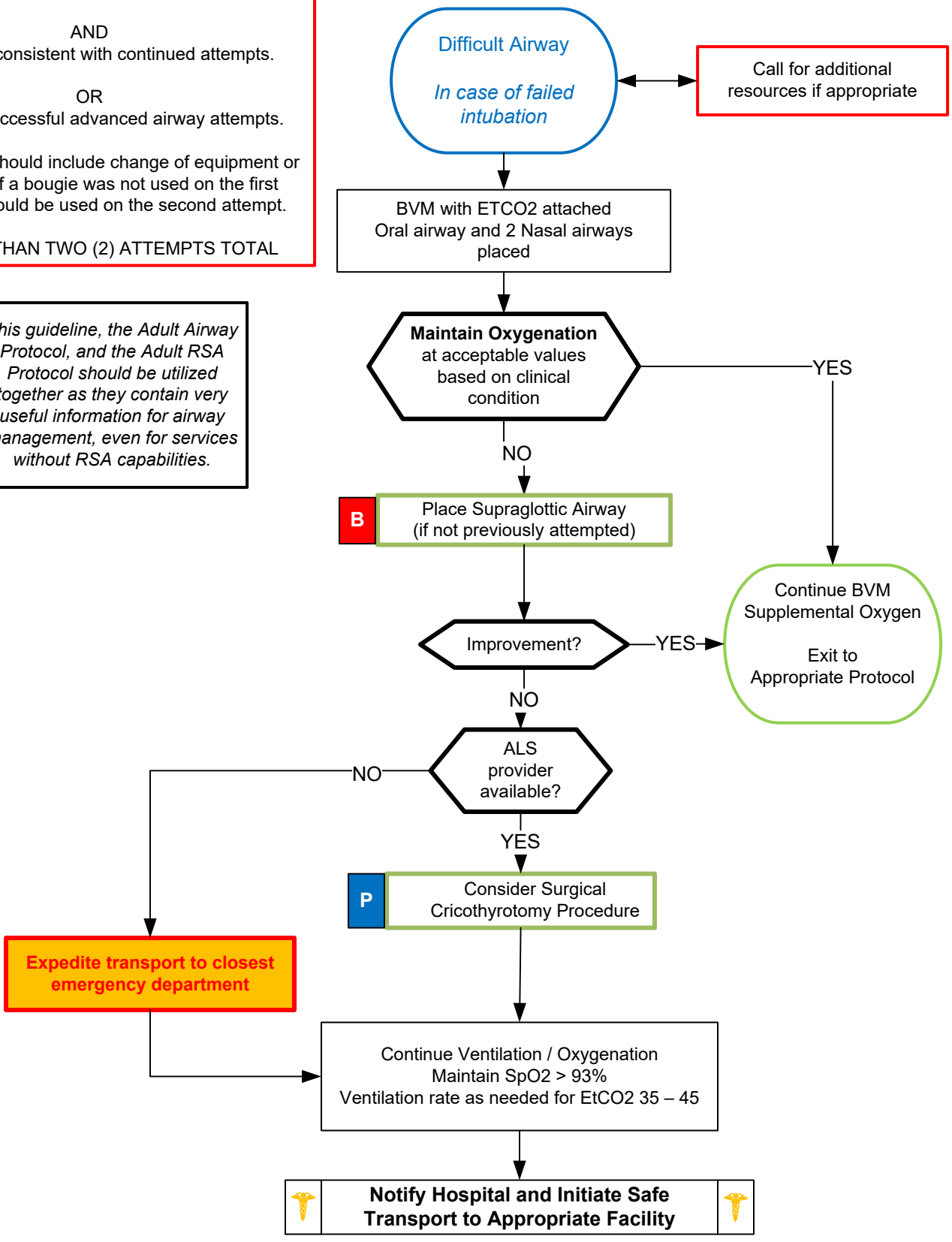
AND
Anatomy inconsistent with continued attempts.

OR
Two (2) unsuccessful advanced airway attempts.

Each attempt should include change of equipment or technique. If a bougie was not used on the first attempt, it should be used on the second attempt.

NO MORE THAN TWO (2) ATTEMPTS TOTAL

*This guideline, the Adult Airway Protocol, and the Adult RSA Protocol should be utilized together as they contain very useful information for airway management, even for services without RSA capabilities.*



# Adult Difficult Airway



A difficult airway occurs when a provider begins a course of airway management and identifies that standard airway management techniques (per the Adult Airway Protocol) will not succeed. Conditions which define a Difficult Airway:

- Failure to maintain adequate oxygen saturation after advanced airway attempts, OR
- Two (2) failed attempts at advanced airway by the most experienced pre-hospital provider on scene in a patient who requires an advanced airway to prevent death, OR
- Unable to maintain adequate oxygen saturation with BVM techniques and insufficient time to attempt alternative maneuvers. This should include appropriate airway adjuncts (oropharyngeal airway and/or 2 nasopharyngeal airways).

It should be noted that a patient with an airway complication is one who is near death or dying, not stable or improving. Patients who cannot have an advanced airway placed or who do not have an Oxygen Saturation greater than 93% do not necessarily have a failed airway. Many patients who cannot have an advanced airway placed may be easily sustained by basic airway techniques and BVM, with stable or optimal Oxygen Saturation, i.e. stable (not dropping) SpO2 values as expected based on the underlying pathophysiologic condition with otherwise reassuring vital signs.

*The most important way to avoid a difficult airway is to identify patients with expected difficult airway, difficult BVM ventilation, difficult advanced airway placement, difficult laryngoscopy and / or difficult cricothyrotomy. Please refer to the Adult Airway Protocol for information on how to identify the patient with a potentially difficult airway.*

**Positioning of patient:** In the field, improper positioning of the patient and rescuer are responsible for many failed and difficult advanced airways. Often this is dictated by uncontrolled conditions present at the scene and we must adapt. However, many times the rescuer does not optimize patient and rescuer positions. The neutral inline position or the head simply extended upon the neck are probably the best positions. The goal is to align the ear canal with the suprasternal notch in a straight line parallel to the ground.

In the **obese or late pregnant patient** elevating the torso by placing blankets, pillows or towels will optimize the position. This can be facilitated by raising the head of the cot.

**Use of cot to achieve optimal patient / rescuer position**: The cot can be elevated and lowered to facilitate advanced airway placement. With the patient on the cot, raise until the patients nose is at the level of your umbilicus which will place you at the optimal position.

**Trauma**: *Utilize in-line cervical stabilization during advanced airway placement, or BVM use. During airway placement the cervical collar front should be open or removed to facilitate translation of the mandible / mouth opening.*

**Cricothyrotomy / Surgical Airway Procedure**: Use in adult patients only, defined as signs of puberty present or longer than the Broselow Tape. Relative contraindications include: Pre-existing laryngeal or tracheal tumors, infections or abscess overlying the cricoid area, or hematoma or other anatomical landmark destruction / injury.

A patient with a difficult airway may warrant diversion to the closest emergency department for airway management and stabilization prior to transfer to a facility capable of definitive care. You must consider the benefits of immediate airway management versus the risks of a delay in definitive care for the underlying condition when making this decision. Traumatic airways would be the only exception to this guideline.

**Pearls**

- **If first attempt fails, make an adjustment and then consider:**
  - Different laryngoscope blade/Video or other optical laryngoscopy device if available
  - Gum Elastic Bougie if not already used
  - Request external laryngeal manipulation, or apply BURP maneuver (Backwards, upwards, rightward, pressure) to optimize intubation view
  - Different tube size
  - Change head positioning
- Continuous pulse oximetry should be utilized in all patients with an inadequate respiratory function.
- Continuous EtCO2 should be utilized in all patients with respiratory failure and in all patients with advanced airways.
- **Notify hospital as early as possible about a difficult airway.**
- **If scene resources allow, do not hesitate to contact Hospital for Medical Control assistance regarding decision-making for patients with a difficult airway.**

# Adult Rapid Sequence Airway

*This guideline, the Adult Airway Protocol, and the Adult Difficult Airway Protocol should be utilized together as they contain very useful information for airway management, even for services without RSA capabilities*

Can you reasonably place an advanced airway in this patient? *(Anatomy, scene considerations, transport time, other medical conditions)*

NO → Can this patient be managed with a BVM and airway adjuncts?

YES → Exit to appropriate guideline

NO

## EMT (Ventilation/Pre-Oxygenation)

$SpO_2$ > 90% and breathing spontaneously?

NO → **B** Ventilate with BVM until $SpO_2$ > 90%

YES → Apply NRB

**B** Maintain inline c-spine immobilization

## EMT (Equipment)

- **B** Attach $SpO_2$ to patient
- **B** Attach $EtCO_2$ detector to BVM
- **B** Place nasal cannula on patient (6LPM or higher) (Apneic Oxygenation)
- **B** Assist with airway equipment

**P** Consider use of push-dose pressors if SBP <90 mmHg or MAP <60

## Paramedic (Airway)

**Prepare Airway Equipment**

- Backup Adjuncts
  - Oral/Nasal adjuncts
  - Supraglottic airway device
  - Surgical airway kit
- Bougie
- ET Tubes (2 sizes)
- Laryngoscope blades (2 sizes)
- Suction (2 methods)

**B** Place supraglottic airway device

NO

**P** Place endotracheal tube (Abort if SpO2 drops below 90%)

YES

## Paramedic (Medications)

Evidence of STEMI/CHF ← Vascular Access Protocol

NO → **P** **Ketamine 3 mg/kg IV / IO**
**S: 150 mg M: 225 mg L: 300 mg**

YES → **P** **Etomidate 0.3 mg/kg IV / IO**
**S: 15 mg M: 22 mg L: 30 mg**

Concern for high potassium?
*(Renal failure/dialysis, tall T-waves, wide QRS)*

NO → **P** **Succinylcholine 2 mg/kg IV / IO**
**S: 100 mg M: 150 mg L: 200 mg**

YES → **P** **Rocuronium 1.0 mg/kg IV / IO**
**S: 50 mg M: 75 mg L: 100 mg**
-or-
**Vecuronium 0.1 mg/kg IV / IO**
**S: 5 mg M: 8 mg L: 10 mg**

**Call out SpO2 every 10 seconds after paralytic administered**

SpO2 >93% *(If needed, with BVM assistance)*

YES

Success?

NO → First Attempt?

NO → Exit to Adult Difficult Airway Protocol

YES → Post-Intubation Protocol → **Notify Hospital and Initiate Safe Transport to Appropriate Facility** → Exit to appropriate guideline

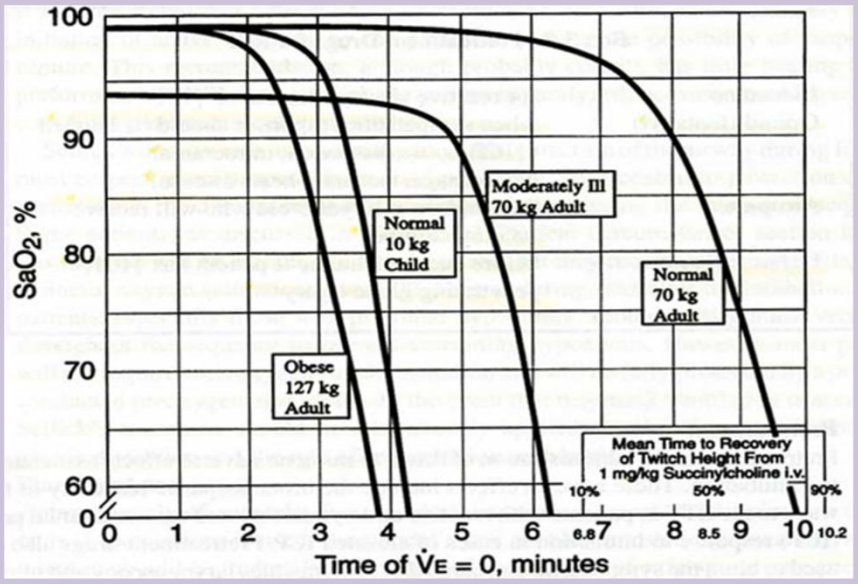
General Section Protocols

# Rapid Sequence Airway



Always weigh the risks and benefits of advanced airway placement in the field against transport. All pre-hospital advanced airways are considered high risk. If ventilation / oxygenation is adequate, transport may be the best option. The most important airway device and the most difficult to use correctly and effectively is the Bag Valve Mask.

**Few pre-hospital airway emergencies cannot be temporized or managed with proper BVM techniques.**




**Indications for RSA**
Failure to protect the airway
Inability to oxygenate
Inability to ventilate
Unstable hemodynamics/shock
GCS < 9 in trauma
Impending airway compromise
Adult patient

*All attempts should be made to get SpO2 above 90% for the RSA procedure to be considered. Improper pre-oxygenation or hypoxia presents a great risk to the patient and alternative airway management tools should be utilized.*

**Pearls**

- **Utilize RSA checklist if available**
- **All patients should be preoxygenated**
- **This guideline suggests at least 2 Paramedics present (if crew configuration allows)**
- **Divide the workload – ventilate, suction, drugs, advanced airway**
- **Succinylcholine should not be given to dialysis or renal failure patients, crush injuries, history of neuromuscular disease, or burn patients more than 24 hours out from the initial injury due to the risk of potassium release. It is ok to use in patients with acute burn injuries.**
- **Once a patient has been given a paralytic drug, *YOU* ARE RESPONSIBLE FOR VENTILATIONS if desaturation occurs**
- **Continuous Waveform Capnography and Pulse Oximetry are required for advanced airway verification and ongoing patient monitoring**
- **An airway is considered secure when the patient is receiving appropriate oxygenation and ventilation.**
- **An appropriate ventilatory rate is one that maintains an EtCO2 of 35-45. Avoid hyperventilation, except in cases of metabolic acidosis (DKA, Aspirin overdose, shock).**
- If first advanced airway attempt fails, make an adjustment and try again
- Consider change of head position, different tube size, use of bougie or video device, different laryngoscope blade, or BURP maneuver.
- Protect the patient from self extubation when the drugs wear off. Longer acting paralytics may be needed post-placement
- A gastric tube should be considered in all advanced airway placed patients to limit aspiration and decompress stomach if time allows and provider (paramedic only) is appropriately trained in placement.
- It is important to secure the advanced airway well and consider c-collar (in absence of trauma) to better maintain placement. Manual stabilization of advanced airway should be used during all patient moves / transfers.
- In the situation of medication shortages, midazolam may be substituted for etomidate and/or ketamine, however, it should be noted this is not recommended as a 1st line induction agent

# Post-Intubation Management

**Manually stabilize airway device until secured, as well as during all patient movements**

**B** Confirm presence of ETCO2 as per scope of practice

**B** Auscultate over epigastrium and both lungs to confirm breath sounds

Tube placement confirmed?

YES
- Document tube size and depth
- Secure airway device with tube holder or tape
- Maintain EtCO2 35-45 *(Increase ventilation rate to lower, decrease rate to increase)*
- If concerned for head injury, elevate head of cot to 30°

NO → Exit to Adult Failed Airway Protocol

Is patient showing signs of discomfort? *(Movement, tearing, tachycardia, hypertension, dysynchronous ventilations)*

YES → Significant ventilation difficulty, or patient pulling at lines/tubes?

YES → **P** **Rocuronium 1.0 mg/kg IV / IO**
**S: 50 mg M: 80 mg L: 100 mg**
**-or-**
**Vecuronium 0.1 mg/kg IV / IO**
**S: 5 mg M: 8 mg L: 10 mg**

NO → SBP > 100 mmHg (map 60-65)? *(Consider decreasing dose if SBP < 110)*

YES →
**A** **Fentanyl 1 mcg/kg IV / IO (max single 100 mcg)**
**S: 50 mcg M: 75 mcg L: 100 mcg**
May repeat **1/2** initial dose Q10 mins *(no max)*
*-or-*
**Morphine 0.1 mg/kg IV / IO**
**S: 4 mg M: 6 mg L: 8 mg**
*-or-*
**Hydromorphone 0.5-1 mg IV / IO**

**A** **Midazolam 0.05 mg/kg IV / IO / IN / IM**
**S: 2 mg M: 2 - 5 mg L: 5 mg**
May repeat **1-2 mg** Q10 mins *(no max)*

**P** **Ketamine 0.5 mg/kg IV / IO**
**S: 25 mg M: 40 mg L: 50 mg**
May repeat Q10 mins (no max)

*--Post-Bolus Infusion (as indicated)—*
**Ketamine 0.2 – 0.5 mg/kg/hour IV**

NO → Refer to Adult Hypotension Protocol

NO → Able to ventilate/oxygenate?

YES → Manual ventilations

**P** *Consider* gastric decompression

**B** Auscultate lung fields to confirm tube placement and assess pulmonary status
- Wheezing – albuterol
- Rales – suction

**P** Tension pneumothorax – chest decompression

**B** Ensure $O_2$ flow is adequate

**P** Ensure adequate sedation

**B** Assess for presence of appropriate EtCO2 *(Consider tube dislodgement if abnormal)*

Able to ventilate/oxygenate?

YES → **Notify Hospital and Initiate Safe Transport to Appropriate Facility**

NO → Exit to Adult Difficult Airway Protocol

General Section Protocols

# Post Intubation Management



**Always weigh the risks and benefits of advanced airway placement in the field against transport. All pre-hospital advanced airways are considered high risk. If ventilation / oxygenation is adequate, transport may be the best option. The most important airway device and the most difficult to use correctly and effectively is the Bag Valve Mask.**

**Few pre-hospital airway emergencies cannot be temporized or managed with proper BVM techniques.**

## Troubleshooting Ventilation/Oxygenation Problems

**Airway Device Troubleshooting - DOPE:**
- **D**islodgement (Check EtCO2 waveform, listen to lung sounds, check tube depth)
- **O**bstruction (Kink in tube, airway obstruction)
- **P**neumothorax (Listen to lung sounds, check tube depth, perform chest decompression)
- **E**quipment failure (Oxygen flowing, cuff inflated on tube)

**Tube Stress Signs/Symptoms:**
- Tachycardia (not due to shock) · Hypertension
- Agitation
- Crying/tearing at the eyes
- Dyssynchrony with ventilations

**Goal RASS: -3 to -5 during transport**

| Richmond Agitation and Sedation Scale (RASS) | | |
|---|---|---|
| +4 | Combative | violent, immediate danger to staff |
| +3 | Very Agitated | Pulls or removes tube(s) or catheter(s); aggressive |
| +2 | Agitated | Frequent non-purposeful movement, fights ventilator |
| +1 | Restless | Anxious, apprehensive but movements not aggressive or vigorous |
| 0 | Alert & calm | |
| -1 | Drowsy | Not fully alert, but has sustained awakening to *voice* (eye opening & contact ≥ 10 sec) |
| -2 | Light sedation | Briefly awakens to *voice* (eye opening & contact < 10 sec) |
| -3 | Moderate sedation | Movement or eye-opening to *voice* (but no eye contact) |
| -4 | Deep sedation | No response to voice, but movement or eye opening to *physical* stimulation |
| -5 | Unarousable | No response to *voice or physical* stimulation |

**Pearls**
- **Continuous capnography (EtCO2) is mandatory for the monitoring of all patients with an advanced airway.**
- **An airway is considered secure when the patient is receiving appropriate oxygenation and ventilation.**
- **An appropriate ventilatory rate is one that maintains an EtCO2 of 35-45. Avoid hyperventilation, except in cases of metabolic acidosis (DKA, Aspirin overdose, shock).**
- Do not assume hyperventilation is psychogenic– use oxygen for goal SpO2 of >93%.
- A gastric tube should be placed in all intubated patients if time allows (paramedic only).
- It is important to secure the advanced airway. Manual stabilization of the advanced airway should be used during all patient moves / transfers. Consider c-collar to better maintain placement.

# Pain Control: Adult

**History**
- Age
- Location, Duration
- Severity (1 - 10)
- If child or non-verbal use Wong-Baker faces scale
- Past medical history
- Pregnancy Status
- Drug Allergies and Medications

**Signs and Symptoms**
- Severity (pain scale)
- Quality (sharp, dull, etc.)
- Radiation
- Relation to movement, respiration
- Increased with palpation of area

**Differential**
- Per the specific protocol
- Musculoskeletal
- Visceral (abdominal)
- Cardiac
- Pleural / Respiratory
- Neurogenic
- Renal (colic)

Assess Pain Severity
Use combination of Pain Scale, Circumstances, MOI, Injury or Illness severity, Vitals

## Mild Pain? (Scale 0-4)

| | |
|---|---|
| B | • Apply ice packs to affected area<br>• Splint injured extremities<br>• Limit manipulation of affected area(s)<br>• Transport in position of maximal comfort |
| B | Screen for medication contra-indications |
| B | **Consider or assist with sip of water:**<br>**Ibuprofen:** 400-800 mg **PO**<br>*-OR-*<br>**Acetaminophen:** 325-1000 mg **PO** |
| A | **Acetaminophen:** 650-1000 mg **IV / IO**<br>***No repeat dosing***<br>***(Only if patient has not received oral dose)*** |
| A | *Please review contraindications prior to administration*<br>**Toradol** 15 - 30 mg **IV / IO / IM**<br>***No repeat dosing*** |

| | |
|---|---|
| A | *For severe cramping due to musculoskeletal injury or significant anxiety consider:*<br>**Midazolam** 1 - 2 mg **IV / IO / IN**<br>-OR-<br>**Lorazepam** 1 - 2 mg **IV / IO / IN** |

## Moderate/Severe Pain? (Scale 5-10)

Consider Vascular Access Procedure

Screen for medication contra-indications

| | |
|---|---|
| A | **Fentanyl** 1 mcg/kg **IV / IM / IO / IN**<br>**S:** 50 mcg **M:** 75 mcg **L:** 100 mcg<br>**Max initial dose 100 mcg**<br>May repeat 25-50 mcg Q10 minutes<br>**Max total doses: 3**<br>*-OR-*<br>**Morphine** 0.1 mg/kg **IV / IO / IM**<br>**S:** 4 mg **M:** 6 mg **L:** 8 mg<br>**Max initial dose 8 mg**<br>May repeat 2 – 4 mg every 10 minutes as needed<br>**Max total doses: 3**<br>*-OR-*<br>**Hydromorphone** 0.5 - 1mg **IV / IO / IM / IN**<br>**S:** 0.5 mg **M:** 0.75 mg **L:** 1 mg<br>May repeat 0.5 mg every 10 minutes as needed<br>**Max total doses: 3** |
| B | Monitor and reassess every 5 minutes |
| B | Monitor continuous SpO2 |
| B | Consider EtCO2 nasal cannula monitoring |
| P | Consider Cardiac Monitor |
| P | *For severe pain not controlled by narcotics consider:*<br>**Ketamine** 0.1-0.2 mg/kg **IV / IO / IM**<br>**S:** 15 mg **M:** 20 mg **L:** 25 mg<br>*--Post-Bolus Infusion (as indicated)—*<br>**Ketamine** 0.05 – 0.25 mg/kg/hour **IV** |
| MD | Contact Medical Control for further medication orders if pain persists |

| | |
|---|---|
| B | *--For Overmedication--*<br>**Naloxone** 0.1 mg/kg **IN/Auto (EMT)**<br>**Naloxone** 0.1 mg/kg **IV / IO (AEMT/Paramedic)**<br>May repeat as needed if appropriate response noted |

Exit back to appropriate guideline

General Section Protocols

# Pain Control: Adult




**Pearls**

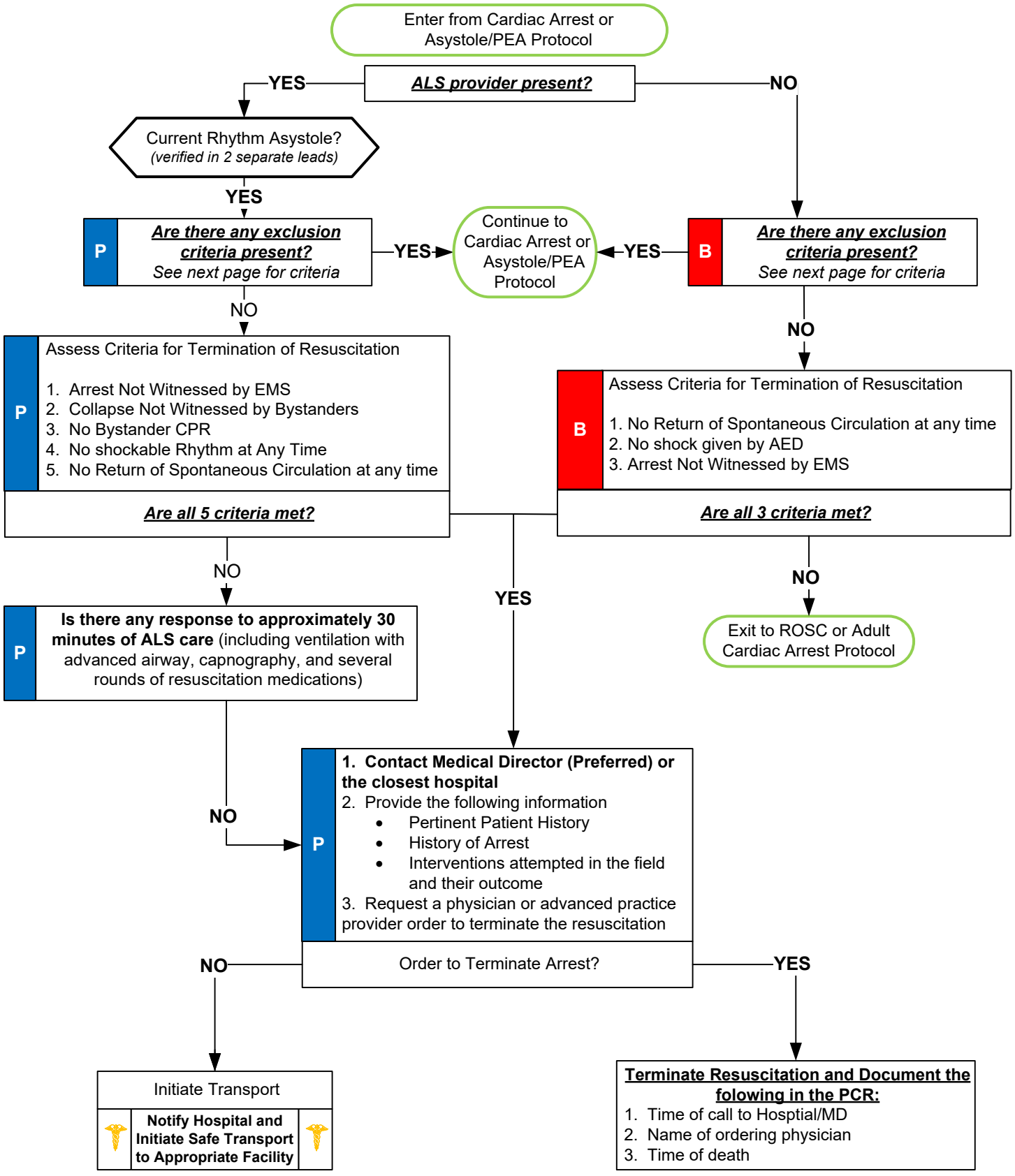
- **Recommended Exam: Respiratory Status, Mental Status, Area of Pain, Neuro**
- **Pain severity (0-10) is a vital sign to be recorded before and after IV, IO, or IN medication delivery and at patient hand off. Monitor BP and respirations closely as sedative and pain control agents may cause hypotension and/or respiratory depression.**
- **Patients may display a wide variation of response to opioid pain medication (Morphine and Fentanyl, aka "narcotics"). Consider the patient's age, weight, clinical condition, other recent drugs or alcohol, and prior exposure to opiates when determining initial opioid dosing. Weight-based dosing may provide a standard means for dose calculation, but does NOT predict patient response.**
- **Smaller than expected doses of opioids may cause respiratory depression or hypotension in the elderly, opiate naïve, volume depleted, and possibly intoxicated patients.**
- **DO NOT administer aspirin (or other NSAIDS) to patients who are pregnant.**

**Both arms of the treatment may be used in concert. For patients in Moderate pain for instance, you may use the combination of an oral medication and parenteral if no contraindications are present.**

**<u>Ibuprofen/Toradol</u> should not be used in patients with known renal transplant, patients who are taking blood thinners such as warfarin (Coumadin) or Plavix (unless given for symptoms of cardiac ischemia), in patients who have known drug allergies to NSAIDs (non-steroidal anti-inflammatory medications), with active bleeding, when intracranial bleeding is suspected, when GI Bleeding is suspected, or in patients who may need acute surgical intervention such as abdominal pain (other than suspected kidney stone), open fractures, or obvious deformities.**

- Some opioid medications may cause nausea and/or vomiting, consider co-administration of anti-emetic.
- Vital signs should be obtained before administration, 10 minutes after administration, and before patient hand off with all pain medications.
- Burn patients may require higher than usual opioid doses to effect adequate pain control. Do not hesitate to contact receiving facility regarding the pain management strategy for patients in severe pain despite appropriate medications or those with significant burns.

# Adult Termination of Resuscitation



# Adult Termination of Resuscitation



**Exclusion Criteria**

- Consider continuing resuscitation and transporting patients with the following conditions (although under certain circumstances, a base physician may order termination of resuscitation in these conditions also):
  - -Cardiac arrest associated with medical conditions that may have a better outcome despite prolonged resuscitation, including:
    - -Hypothermia
    - -Near-drowning
    - -Lightning strike
    - -Electrocution
    - -Drug Overdose
- Cardiac arrest in patients <19 years of age
- Cardiac Arrest in a public place after continuing the resuscitation for approximately 30 minutes
- Cardiac arrest in an environment where the bystanders do not accept the idea of ceasing efforts in the field. While most families understand the futility of the situation and are very accepting of field termination, some family members or bystanders can become hostile
- ROSC at some point during the resuscitation

**Pearls**

- **In patient with cardiac arrest, prehospital resuscitation is initiated with the goal of returning spontaneous circulation before permanent neurological damage occurs. Unfortunately, most patients do not respond to aggressive resuscitation attempts. In most situations, ALS practitioners are capable of performing an initial resuscitation that is equivalent to an in-hospital resuscitation attempt, and there is usually no additional benefit to emergency department resuscitation in most cases**
- **CPR that is performed during patient packaging and transport is much less effective than CPR done at the scene. Additionally, EMS personnel are at significant risk for physical injury while attempting to perform CPR in a moving ambulance while unrestrained.**
- **When cardiac arrest resuscitation becomes futile, the patient's family should become the focus of the EMS personnel. Families need to be informed of what is being done and most families understand the futility of the situation and are accepting of ceasing resuscitation efforts in the field.**
  - **Inform any family at the scene of the patient's death and facilitate early grieving**
  - **Clean up debris from the resuscitation (except for possible crime scenes)**
  - **Offer to call a friend, clergy member, and/or funeral director**
  - **Do not leave the scene until the family has adequate support**
  - **Do not leave until scene is handed over to law enforcement/medical examiner**

# Adult Cardiac Arrest

**History**
- Events leading to arrest
- Estimated downtime
- Past medical history
- Medications
- Existence of terminal illness
- Bystander CPR

**Signs and Symptoms**
- Unresponsive
- Apneic
- Pulseless

**Differential**
- Medical vs. Trauma
- VF vs. Pulseless VT
- Asystole
- PEA
- Primary Cardiac event vs. Respiratory arrest or Drug Overdose

Criteria for Death / No Resuscitation DNR

- Rescuers are exhausted or in danger
- Ice formation in the airway
- Chest wall is so stiff that compressions are impossible
- Decomposition
- Rigor mortis
- Dependent lividity
- Injury incompatible with life or traumatic arrest with asystole (except for traumatic asphyxia)

NO

YES

**Do not begin resuscitation**

**B** **Initial Resuscitation Priorities**
- **Begin manual chest compressions (Rate 100-120/min)**
- **Apply AED or cardiac monitor/defibrillator**
- **Begin ventilations with BVM, Facemask (and Impedance Threshold Device (ITD) if available)**
- Vascular Access
- Automated CPR device if available, but do not delay manual compressions while preparing the automated CPR device

**A** Consider IO Access

Consider Trauma Protocol(s) if appropriate

**AT ANY TIME**
**Return of Spontaneous Circulation (ROSC)**
↓
**Go to Post Resuscitation Protocol**

ALS On Scene

NO → Request ALS Backup

YES

**P** Cardiac Monitor
**B** EtCO2 monitor

Shockable Rhythm?

YES → Deliver Shock

NO

Continue CPR for 2 minutes- repeat and reassess

**Airway Protocol**

Shockable Rhythm

YES → Follow VF / VT Tachycardia

NO → Follow Asystole / PEA

Patient Regains Consciousness During Automated CPR But Has a Non-Perfusing Rhythm

**P** **Ketamine 3 mg/kg IV / IO (Preferred)**
**S: 200 mg M: 250 mg L:300 mg**
*-or-*
**A** **Fentanyl 1 mcg/kg IV / IO**
**S: 50 mcg M: 75 mcg L: 100 mcg**
May repeat **1-2 mg** Q10 mins *(no max)*

**A** **Midazolam 2 mg IV / IO / IN / IM**
**S: 1 mg M: 2 mg L: 4 mg**
May repeat **1-2 mg** Q10 mins *(no max)*

Mechanical CPR device available?

NO → **Remain on scene** Continue CPR

YES

Consider Medical Control

Consider TOR vs transport after 30 minutes

Consider ALS intercept

Consider TOR Protocol

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

**Team Leader / Code Commander**

Responsible for patient care
Ensures high-quality compressions
Ensures frequent compressor change
Responsible for briefing / counseling family

**Incident Commander**

Team Leader until ALS arrival
Manages Scene / Bystanders
Responsible for briefing family prior to ALS arrival

# Adult Cardiac Arrest



**Cardiac Arrest Code Commander Checklist**

- ❑ Code Commander is identified
- ❑ Time Keeper is identified
- ❑ Monitor is visible and a dedicated provider is viewing the rhythm with all leads attached
- ❑ Confirm that continuous compressions are ongoing at 100-120 beats per minute
- ❑ Defibrillations occurring at 2 minute intervals for shockable rhythms
- ❑ $O_2$ cylinder with adequate oxygen is attached to BVM (Consider passive oxygenation with nasal cannula or non rebreather mask)
- ❑ $EtCO_2$ waveform is present and value is being monitored
- ❑ Impedance Threshold Device (if equipped)
- ❑ Vascular access has been obtained (IV or IO) with IV fluids being administered
- ❑ Basic demographics and brief history have been obtained
- ❑ Gastric distention is not a factor
- ❑ Family is receiving care and is at the patient's side if desired

**Post ROSC Cardiac Arrest Checklist**

- □ Assess $EtCO_2$ (should be >20 with good waveform)
- □ Continuous visualization of cardiac monitor rhythm
- □ Check $O_2$ supply and $SpO_2$, titrate to > 94%
- □ Do not try to obtain a "normal" $EtCO_2$ by increasing respiratory rate
- □ Obtain and transmit 12 lead EKG; if STEMI evident, call STEMI ALERT to the hospital
- □ Assess for & treat bradycardias < 60 bpm
- □ Obtain Blood Pressure -- Vasopressor agent(s) indicated for SBP < 90 (map 60-65)
- □ Evaluate for post-resuscitation airway placement.
- □ Mask is available for BVM in case advanced airway fails
- □ Once in ambulance, confirm pulse, breath sounds, $SpO_2$, $EtCO_2$, and cardiac rhythm
- □ Appropriate personnel available in the back of the ambulance for transport

**Pearls**

- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation. Consider early IO placement if available and / or difficult IV access anticipated.**
- **DO NOT HYPERVENTILATE: If no advanced airway, compressions to ventilations are 30:2. If advanced airway in place ventilate 8–10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place advanced airway.**
- **Consider advanced airway after second shock and / or 2 rounds of compressions.**
- Resuscitation is based on proper planning and organized execution. Procedures require space and patient access. Make room to work. Utilize team approach by assigning responders to predetermined tasks at beginning of shift.
- Reassess, document advanced airway placement and $EtCO_2$ frequently, after every move, and at transfer of care.
- **Maternal Arrest** - Treat mother per appropriate protocol with immediate notification to receiving hospital and rapid transport. Place mother supine and perform Manual Left Uterine Displacement moving uterus to the patient's left side. IV / IO access preferably above diaphragm. Defibrillation is safe at all energy levels.
- When faced with dialysis / renal failure patient experiencing cardiac arrest, consider early administration of Calcium Gluconate and Sodium Bicarbonate to treat presumed hyperkalemia as possible etiology of arrest.
- Consider Opioid Overdose: Naloxone up to 4 mg IV / IO / IN.
- Consider possible CAUSE of arrest early: For example, resuscitated VF may be STEMI and more rapid transport is indicated. Consider traditional "Hs and Ts" for PEA: Hypovolemia, Hypoxia, Hydrogen ions (acidosis), Hyperkalemia, Hypothermia, Hypo/Hyperglycemia, Tablets/Toxins/Tricyclics, Tamponade, Tension pneumothorax, Thrombosis (MI), Thromboembolism (Pulmonary Embolism), Trauma

# Ventricular Fibrillation
# Pulseless Ventricular Tachycardia

**History**
- Estimated down time
- Past Medical History
- Medications
- Events leading to arrest
- Renal failure / Dialysis
- DNR or MOST form

**Signs and Symptoms**
- Unresponsive, apneic, pulseless
- Ventricular fibrillation or ventricular tachycardia on EKG

**Differential**
- Asystole
- Artifact / Device Failure
- Cardiac
- Endocrine / Medicine
- Drugs
- Pulmonary

Enter from Cardiac Arrest Protocol

B — Analyze, and if indicated charge AED, compressions while charging, deliver shock

P — **Defibrillate:** 200-360 Joules (Highest energy setting for monitor)

B — After Defibrillation resume CPR immediately
Apply Automated CPR Device (if available) as soon as possible
(*Limit changes / pulses checks ≤ 5 seconds*)

Vascular Access Protocol

Airway Protocol(s)

P — **Epinephrine (1 mg/10 ml) 1 mg IV / IO**
Repeat every 3-5 minutes (limit 3 doses)

B — Resume Continuous CPR Compressions for 2 minutes

P — **Amiodarone 300mg IV / IO**
May repeat once at 150 mg IV / IO
-or-
**Lidocaine 1.5 mg/kg IV / IO**
May repeat once at 0.75 mg/kg

B — After 2 minutes, check pulse and rhythm
Limit pauses to < 5 seconds

Shockable rhythm? **NO** → Pulse present? **NO** → Exit to Asystole / PEA Protocol

Pulse present? **YES** → Exit to Post Resuscitation Protocol

Shockable rhythm? **YES**

B — Charge AED, deliver shock

P — **Defibrillate:** 200-360 Joules **(or per device manufacturer recs)**

*Consider* early transport for shockable rhythms, especially if good $EtCO_2$ values and/or favorable neurologic signs

*Consider* double sequential defibrillation

Return of Spontaneous Circulation **NO** →
1. *Consider* Medical Direction
2. *Consider* termination of efforts vs. transport after 30 minutes

Return of Spontaneous Circulation **YES** → Exit to Post Resuscitation Protocol

Return of Spontaneous Circulation → **Notify Hospital and Initiate Safe Transport to Appropriate Facility**
**Consider Medical Control**

**AT ANY TIME**
**Return of Spontaneous Circulation (ROSC)**
↓
**Go to Post Resuscitation Protocol**

Torsades de Pointes
Low Magnesium States
(Malnourished / Alcoholic)
Suspected Digitalis Toxicity

P — **Magnesium Sulfate 2g IV / IO**

Renal failure, dialysis,
or suspicion for hyperkalemia
*(wide QRS, tall T-waves, bradycardia)*

P — **Calcium Gluconate 1g IV / IO**

P — **Sodium Bicarbonate 50 mEq IV / IO**

Adult Medical Protocols - Cardiac

# Ventricular Fibrillation
# Pulseless Ventricular Tachycardia



## Shockable Rhythm Timeline
## V-Fib / V-Tach

| | BLS Provider Compressions | BLS Provider Ventilations | ALS Provider Monitor / Airway | ALS Provider Medications |
|---|---|---|---|---|
| **Arrival** | Start CPR, Vascular Access and Infuse crystalloids | BVM + ITD (if available) | Shock<br>Apply cardiac monitor | Vascular Access<br>Infuse crystalloids |
| **2 minutes** | Apply Automated CPR Device (if available) | Monitor $EtCO_2$ | Shock | Epinephrine 1mg (1mg/10 ml) |
| **4 minutes** | Restart CPR immediately after pulse/rhythm check | Advanced Airway | Shock<br>Assist with advanced airway | Amiodarone 300 mg or Lidocaine 1mg/kg |
| **6 minutes** | Restart CPR immediately after pulse/rhythm check | Ongoing ventilations 8 - 10 bpm | Shock | Epinephrine 1mg (1mg/10 ml) |
| **8 minutes** | Restart CPR immediately after pulse/rhythm check | | Shock | Amiodarone 150 mg or Lidocaine 0.5 mg/kg |
| **10 minutes** | Restart CPR immediately after pulse/rhythm check | | Shock | Sodium Bicarbonate 50 mEq<br>Epinephrine 1mg (1mg/10 ml) |
| **12 minutes** | Restart CPR immediately after pulse/rhythm check | | Shock | |

**H's/T's**

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypothermia
- Hypo / Hyperkalemia
- Hypoglycemia

- Tension pneumothorax
- Tamponade; cardiac
- Toxins
- Thrombosis; pulmonary (PE)
- Thrombosis; coronary (MI)

It is always important to perform a thorough physical exam and obtain a SAMPLE history to identify any reversible causes of cardiac arrest.

**Pearls**

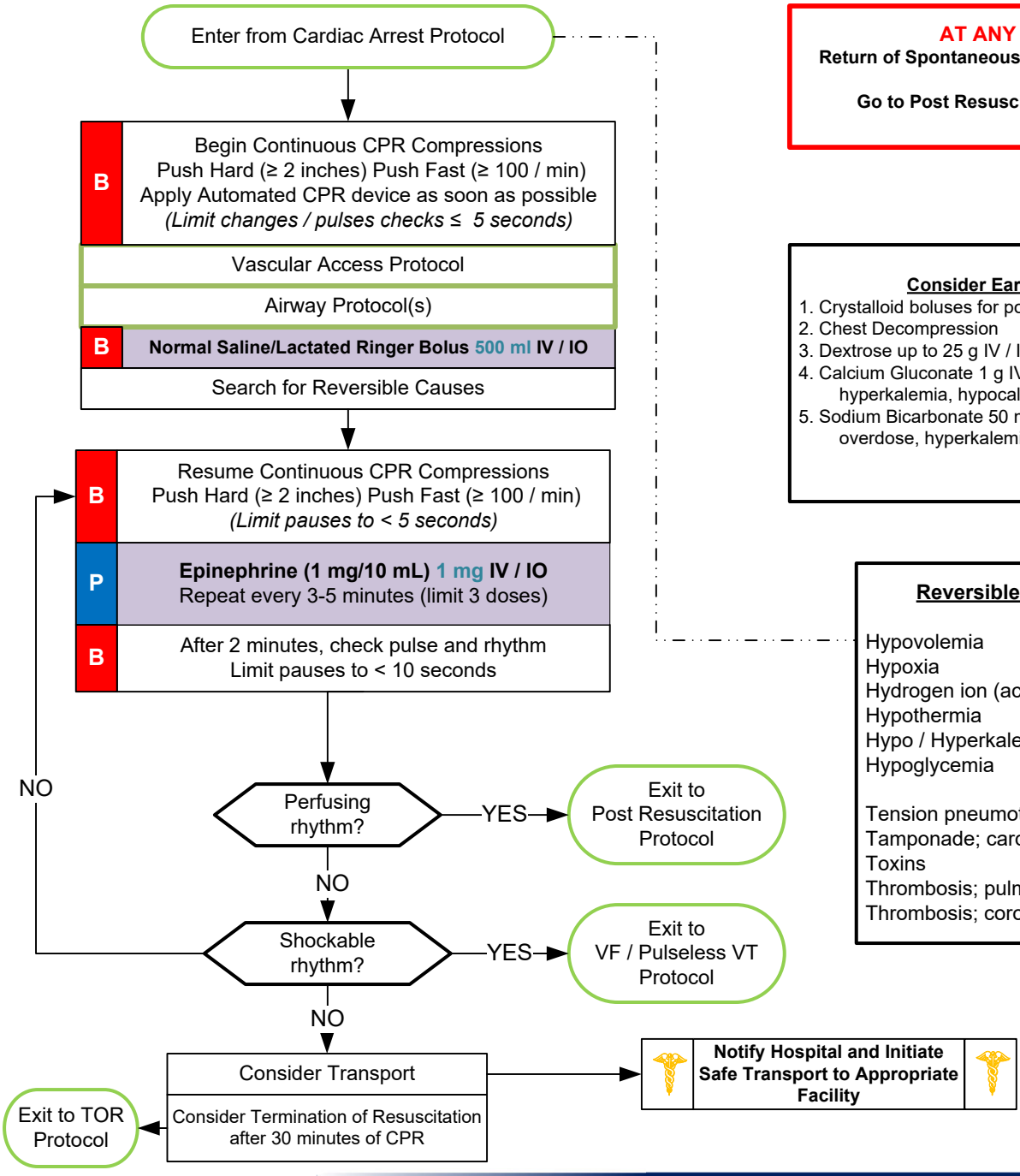
- **Recommended Exam: Mental Status**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Consider early IO placement if available and difficult IV anticipated.**
- **DO NOT HYPERVENTILATE: Ventilate 8 – 10 breaths per minute or as guided by EtCO2, with continuous, uninterrupted compressions.**
- **Calcium Gluconate and Sodium Bicarbonate are NOT compatible, line must be flushed between drug administration.**
- **Do not interrupt compressions to place advanced airway.**
- **Consider advanced airway after second shock and/or 2 rounds of compressions.**
- High quality CPR and prompt defibrillation are the keys to successful resuscitation.
- Reassess and advanced airway placement and EtCO2 frequently, after every move, and at transfer of care.
- Do not stop CPR to check for placement of advanced airway or to give medications.
- If patient is being adequately ventilated via BVM, advanced airway should be deferred until other interventions have been completed.

# Adult Asystole / PEA

### History
- Past medical history
- Medications
- Events leading to arrest
- End stage renal disease
- Estimated downtime
- Suspected hypothermia
- Suspected overdose
  - Tricyclic
  - Digitalis
  - Beta blockers
  - Calcium channel blockers
- DNR

### Signs and Symptoms
- Pulseless
- Apneic
- No electrical activity on ECG
- No heart tones on auscultation

### Differential
- Hypovolemia (Trauma, AAA, other)
- Cardiac tamponade
- Hypothermia
- Drug overdose (Tricyclic, Digitalis, Beta blockers, Calcium channel blockers)
- Massive myocardial infarction
- Hypoxia
- Tension pneumothorax
- Pulmonary embolus
- Acidosis
- Hyperkalemia



# Adult Asystole / PEA



## Non-shockable Rhythm Timeline
## Asystole / PEA

| | BLS Provider Compressions | BLS Provider Ventilations | ALS Provider Monitor / Airway | ALS Provider Medications |
|---|---|---|---|---|
| **Arrival** | Start CPR, Vascular Access and Infuse crystalloid | BVM + ITD if available | Apply cardiac monitor | Vascular Access Infuse crystalloid |
| **2 minutes** | Automated CPR Device | Monitor $EtCO_2$ | Check monitor | Epinephrine 1mg (1mg/10 ml) |
| **4 minutes** | Restart CPR immediately after pulse/rhythm check | Advanced Airway | Check monitor Assist with advanced airway | Review H's/T's Interventions as indicated |
| **6 minutes** | Restart CPR immediately after pulse/rhythm check | Ongoing ventilations 8 - 10 bpm | Check monitor | Epinephrine 1mg (1mg/10 ml) |
| **8 minutes** | Restart CPR immediately after pulse/rhythm check | | Check monitor | |
| **10 minutes** | Restart CPR immediately after pulse/rhythm check | | Check monitor | Sodium Bicarbonate 50 mEq Epinephrine 1mg (1mg/10 ml) |
| **12 minutes** | Restart CPR immediately after pulse/rhythm check | | Check monitor | |

BV

ITD=Impedance Threshold Device

**Pearls**

- Survival from PEA or Asystole is based on identifying and correcting the cause: consider a broad differential diagnosis with early and aggressive treatment of possible causes.
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Consider early IO placement if available and / or difficult IV access anticipated.**
- **DO NOT HYPERVENTILATE: Ventilate 8 – 10 breaths per minute with continuous, uninterrupted compressions, or as guided by $ETCO_2$.**
- **Do not interrupt compressions to place advanced airway.**
- **Consider advanced airway after 2 rounds of compressions (2 minutes each round)**
- Effectiveness of chest compression decreases with moving a patient. Prioritize high-quality CPR.
- There is a potential association of PEA with hypoxia so managing the airway with oxygenation early may provide benefit.
- PEA caused by sepsis or severe volume loss may benefit from higher volume of crystalloid administration.
- Return of spontaneous circulation after Asystole / PEA requires continued search for underlying cause of cardiac arrest.
- Treatment of hypoxia and hypotension are important after resuscitation from Asystole / PEA.
- Asystole is commonly an end-stage rhythm following prolonged VF or PEA with a poor prognosis.
- Discussion with Medical Direction can be a valuable tool in developing a differential diagnosis and identifying possible treatment options.
- Consider early use of the Overdose / Toxic Ingestion Protocol to guide interventions if appropriate.

# Post-Resuscitation

**History**
- Respiratory arrest
- Cardiac arrest

**Signs/Symptoms**
- Return of pulse

**Differential**
- Continue to address specific differentials associated with the original dysrhythmia

**Repeat Primary Assessment**

**B**

**Optimize Ventilation and Oxygenation**
- Maintain SpO2 = > 94%
- Resp Rate 6 – 12 / minute for EtCO2 35-45*
- DO NOT HYPERVENTILATE
- Remove ITD (if previously applied)

Vascular Access Protocol ***if indicated***

Airway Protocol ***if indicated***

**A**

**ROSC Bundle**
- 12 Lead ECG Procedure
- Continuous ETCO2 Monitoring
- Maintain SpO2 = > 94%
- Cardiac Monitor

Symptomatic Bradycardia — YES → Bradycardia Protocol

NO

STEMI — YES → Chest Pain and STEMI Protocol

**Transport to STEMI Receiving Facility**

NO

Hypotension Systolic BP < 90 — YES →

**B**

**Normal Saline/Lactated Ringer Bolus**
**500 mL IV / IO**
May repeat as needed if lungs clear
**Maximum 2 L**

**P**

*Titrate to SBP ≥ 90 mmHg (map 60-65)*

**Push Dose Epinephrine 10-20 mcg IV/IO**
**Every 3-5 minutes**
**(or other push dose pressors as approved by PMD)**
**OR**
**NORepinepherine 4-30 mcg/min IV/IO**
**OR**
**Epinephrine 1-8 mcg/min IV/IO**
**OR**
**Dopamine Infusion 5-20 mcg/kg/min IV/IO**

NO

ROSC with Antiarrhythmic given — YES →

**P**

**Amiodarone 150 mg IV / IO**
Dilute in 100 mL D5W
Administer over 10 minutes
-or-
**Lidocaine 1-4 mg/min IV / IO**

NO

Post-Intubation Sedation Protocol

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

# Post-Resuscitation



**Post ROSC Cardiac Arrest Checklist**

- □ Continuous visualization of cardiac monitor rhythm
- □ Check $O_2$ supply and $SpO_2$ to titrate to >94%
- □ Do not try to obtain a "normal" $EtCO_2$ by increasing respiratory rate
  ***$EtCO_2$ will remain high for a period of time until acidotic blood circulates through the body**
- □ Obtain 12 lead EKG; if STEMI evident, call STEMI ALERT to the hospital
- □ Assess for & treat bradycardias < 60 bpm
- □ Obtain Blood Pressure -- Pressor agent(s) indicated for SBP < 90 mmHg (Map 60-65)
- □ Evaluate for post-resuscitation airway placement.
- □ Have mask available for BVM in case advanced airway fails
- □ Once in ambulance, confirm pulse, breath sounds, $SpO_2$, $EtCO_2$, and cardiac rhythm
- □ Appropriate personnel present in the back of the ambulance for transport

| Pressors | | |
|---|---|---|
| **Infusions** | | |
| **NORepinepherine**<br>**4-30 mcg/min IV / IO**<br><br>Mix 4 mg NOREpi in 250 mL D5W/NS<br>(4 mg/250 ml= 16 mcg/ml)<br>Drops per minute with micro gtt set<br><br>15 gtt/min=4mcg/min<br>30 gtt/min=8 mcg/min<br>60 gtt/min=16 mcg/min<br>90 gtt/min=24 mcg/min<br>113 gtt/min=30 mcg/min | **Epinepherine**<br>**1-8 mcg/min IV / IO**<br><br>Mix 2 mg Epi 1mg/1ml in 250 D5W/ NS<br>(2mg / 250 mL = 8 mcg/mL)<br>Drops per minute with micro gtt set<br>7.5 gtt/min = 1 mcg/min<br>15 gtt/min = 2 mcg/min<br>30 gtt/min = 4 mcg/min<br>60 gg/min = 8 mcg/min | **Dopamine**<br>**5-20 mcg/kg/min IV / IO**<br><br>(400mg/250 ml pre-mixed)<br>Drops per minute (5 mcg/kg/min)<br>(60 kg) **S:** (12 gtts/min)<br>(80 kg) **M:** (15 gtts/min)<br>(100 kg) **L:** (20 gtts/min) |
| | | **Push Dose Pressor** |
| | | **Epinepherine**<br>**10-20 mcg IV / IO**<br><br>*Every 3-5 minutes*<br>Dilute 0.1 mg epi (1mL of 1mg/ 10ml) with 9 mL NS, total of 10 mL in syringe<br>(0.1mg/10mL = 10 mcg/mL) |

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

**Pearls**

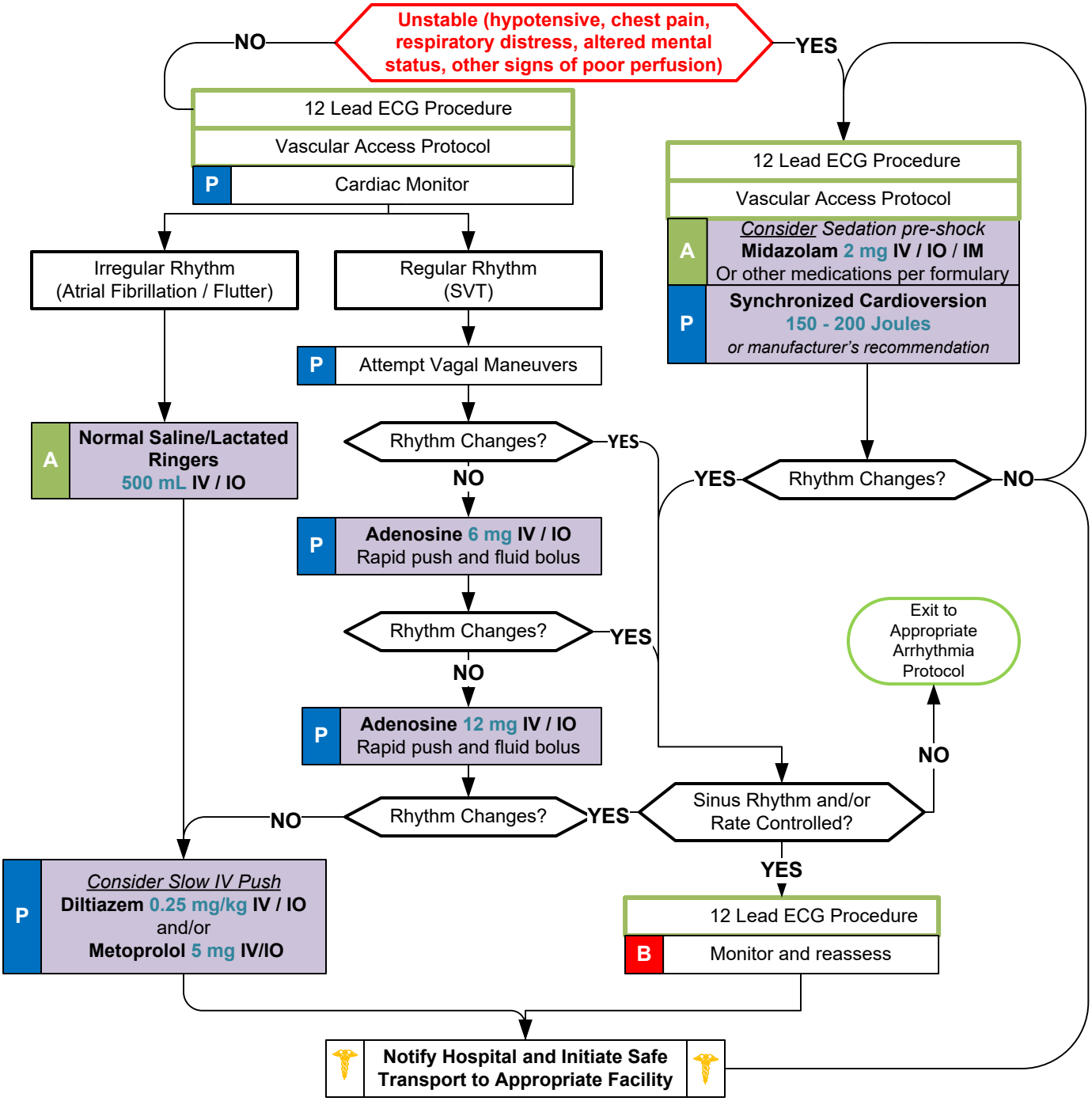
- **Recommended Exam: Mental Status, Neck, Skin, Lungs, Heart, Abdomen, Extremities, Neuro**
- **Continue to search for potential cause of cardiac arrest during post-resuscitation care.**
- **Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the post resuscitation phase and must be avoided at all costs.**
- **Initial $EtCO_2$ may be elevated immediately post-resuscitation but will usually normalize. While goal is 35 – 45 mm Hg, avoid hyperventilation.**
- **Transport to facility capable of managing the post-arrest patient including hypothermia therapy, cardiac catheterization and intensive care service.**
- Most patients immediately post resuscitation will require ventilatory assistance.
- The condition of post-resuscitation patients fluctuates rapidly and continuously and they require close monitoring. Appropriate post-resuscitation management may require consultation with medical direction.
- Common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, pneumothorax, and medication reaction to ALS drugs.
- Titrate vasopressors to maintain SBP ≥ 90 or MAP >65. Ensure adequate fluid resuscitation is ongoing.

# Adult Tachycardia
# Narrow Complex (QRS < 120 ms)

### History
- Medications (Aminophylline, Diet pills, Thyroid supplements, Decongestants, Digoxin, anti-cholinergics, TCAs)
- Diet (caffeine, chocolate)
- Drugs (nicotine, cocaine)
- Past medical history
- History of palpitations / heart racing
- Syncope / near syncope

### Signs and Symptoms
- Heart Rate > 150
- Systolic BP < 90
- Dizziness, CP, SOB, AMS, Diaphoresis
- CHF
- Potential presenting rhythm
  - Atrial/Sinus tachycardia
  - Atrial fibrillation / flutter
  - Multifocal atrial tachycardia

### Differential
- Heart disease (WPW, Valvular)
- Sick sinus syndrome
- Myocardial infarction
- Electrolyte imbalance
- Exertion, Pain, Emotional stress
- Fever
- Hypoxia
- Hypovolemia or Anemia
- Drug effect / Overdose (see HX)
- Hyperthyroidism
- Pulmonary embolus




Adult Medical Protocols - Cardiac

# Adult Tachycardia
# Narrow Complex (QRS < 120 ms)



**Pearls**

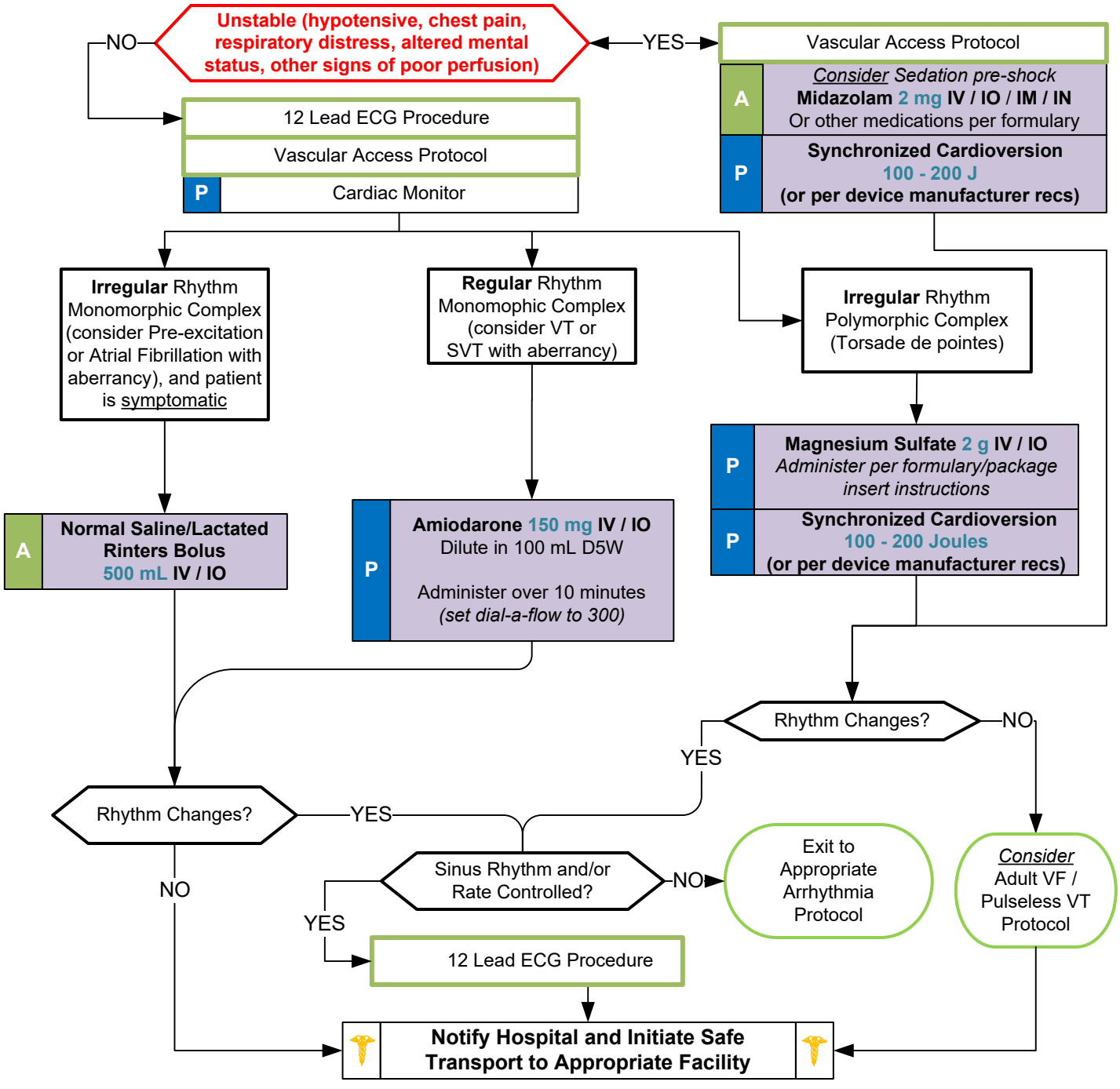
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Most important goal is to differentiate the type of tachycardia (regular vs irregular) and if stable or unstable.**
- **If at any point patient becomes unstable move to unstable arm in algorithm.**
- **For asymptomatic patients (or those with only minimal symptoms, such as palpitations) and any tachycardia with rate approximately 100-120 and a normal blood pressure, consider close observation and/or fluid bolus rather than immediate treatment with an anti-arrythmic medication. A patient's "usual" atrial fibrillation, for example, may not require emergent treatment.**
- **Symptomatic tachycardia usually occurs at rates of 120 -150 and typically ≥ 150 beats per minute. Patients symptomatic with heart rates < 150 likely have impaired cardiac function such as CHF.**
- **Serious Signs / Symptoms:**
  **Hypotension. Acutely altered mental status. Signs of shock / poor perfusion. Chest pain with evidence of ischemia (STEMI, T wave inversions or depressions.) Acute pulmonary edema. Significant breathing difficulty.**
- **Search for underlying cause of tachycardia such as fever, sepsis, dyspnea, stimulant use (including pre-workout and caffeine), etc.**
- **If patient has history of or 12 Lead ECG evidence of Wolfe Parkinson White (WPW) syndrome, DO NOT GIVE Adenosine. Cardioversion should be performed if patient becomes unstable.**
- Typical sinus tachycardia is in the range of 100 to (200 - patient's age) beats per minute.
- **Regular Narrow-Complex Tachycardias:**
  - Vagal maneuvers and adenosine are preferred. Vagal maneuvers may convert up to 25 % of SVT.
  - Adenosine should be pushed rapidly via proximal IV site followed by rapid fluid bolus.
- **Irregular Tachycardias:**
  - Adenosine will not be effective in atrial fibrillation / flutter. It may help identify rhythm but generally is not helpful.
  - Adenosine administered to these patients promotes aberrant rhythms and may cause ventricular fibrillation.
- **Synchronized Cardioversion:**
  Recommended to treat unstable Atrial Fibrillation, Atrial Flutter and Monomorphic-Regular Tachycardia (SVT.)
- Monitor for respiratory depression and hypotension associated with benzodiazepines.
- Continuous pulse oximetry is required for all SVT patients.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.

# Adult Tachycardia
# Wide Complex (QRS ≥ 120 ms)

### History
- Medications
  (Aminophylline, Diet pills, Thyroid supplements, Decongestants, Digoxin)
- Diet (caffeine, chocolate)
- Drugs (nicotine, cocaine)
- Past medical history
- History of palpitations / heart racing
- Syncope / near syncope

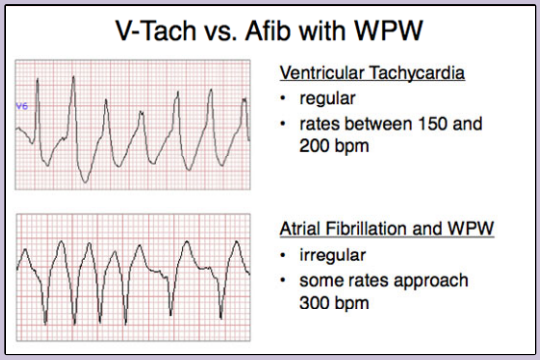
### Signs and Symptoms
- Heart Rate > 150
- Systolic BP <90
- Dizziness, CP, SOB, AMS, Diaphoresis
- CHF
- Potential presenting rhythm
  Left Bundle Branch Block
  Right Bundle Branch Blcok
  Ventricular Tachycardia

### Differential
- Heart disease (WPW, Valvular)
- Sick sinus syndrome
- Myocardial infarction
- Electrolyte imbalance
- Exertion, Pain, Emotional stress
- Fever
- Hypoxia
- Hypovolemia or Anemia
- Drug effect / Overdose (see HX)
- Hyperthyroidism
- Pulmonary embolus



# Adult Tachycardia
# Wide Complex (QRS ≥ 120 ms)






**Only amiodarone should be used in patients with in patients with pre-excitation atrial fibrillation (ie WPW) otherwise may cause paradoxical increase in the ventricular response.**

**Pearls**

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Most important goal is to differentiate the type of tachycardia (regular vs irregular) and if stable or unstable.**
- **If at any point patient becomes unstable move to unstable arm in algorithm.**
- **For asymptomatic patients (or those with only minimal symptoms, such as palpitations) and any tachycardia with rate approximately 100-120 and a normal blood pressure, consider close observation and/or fluid bolus rather than immediate treatment with an anti-arrythmic medication. A patient's "usual" atrial fibrillation with aberrancy, for example, may not require emergent treatment.**
- **A single-lead ECG is adequate to diagnose and treat an arrhythmia. A 12-lead ECG is not necessary to diagnose and treat, but is preferred when the patient is stable.**
- **Symptomatic tachycardia usually occurs at rates of 120 – 150 and typically ≥ 150 beats per minute. Patients symptomatic with heart rates < 150 likely have impaired cardiac function such as CHF.**
- **Serious Signs / Symptoms:**
  **Hypotension. Acutely altered mental status. Signs of shock / poor perfusion. Chest pain with evidence of ischemia (STEMI, T wave inversions or depressions.) Acute congestive heart failure.**
- **Search for underlying cause of tachycardia such as fever, sepsis, dyspnea, stimulant use (including pre-workout and caffeine), etc.**
- Typical sinus tachycardia is in the range of 100 to (200 – patients age) beats per minute.
- **Regular Wide-Complex Tachycardias:**
  **Unstable condition:**
  - Immediate cardioversion

  **Stable condition:**
  - Typically VT (most common) or SVT with aberrancy. Amiodarone is the appropriate treatment for stable patients. Defibrillate unstable patients.
  - Arrhythmias with suspicion of WPW should only be treated with medical control orders.
- **Irregular Tachycardias:**
  - Wide-complex, irregular tachycardia will usually require cardioversion. Consider medical control.
- **Polymorphic / Irregular Wide- Complex Tachycardia:**
  - This situation is usually unstable and immediate defibrillation is warranted.
  - When associated with prolonged QT this may be Torsades de pointes: Give 2g of Magnesium Sulfate slow IV / IO. Without prolonged QT, likely related to ischemia and Magnesium may not be helpful.
- Monitor for respiratory depression and hypotension associated with Midazolam.
- Continuous pulse oximetry is required for all Wide Complex Tachycardia Patients.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.

# Adult Bradycardia

**History**
- Past medical history
- Medications
  - Beta-Blockers
  - Calcium channel blockers
  - Clonidine
  - Digoxin
- Pacemaker

**Signs and Symptoms**
- HR < 60/min with hypotension, acute altered mental status, chest pain, acute CHF, seizures, syncope, or shock secondary to bradycardia
- Chest pain
- Respiratory distress
- Hypotension or Shock
- Altered mental status
- Syncope

**Differential**
- Acute myocardial infarction
- Hypoxia
- Pacemaker failure
- Hypothermia
- Sinus bradycardia
- Athletes
- Head injury (elevated ICP) or Stroke
- Spinal cord lesion
- Sick sinus syndrome
- AV blocks (1°, 2°, or 3°)
- Overdose

**Heart Rate < 60 / minute -AND- Symptomatic:**
Hypotension, Acute AMS, Chest Pain, Acute CHF, Seizures, Syncope, or Shock secondary to bradycardia

NO → Exit to Appropriate Protocol

YES

Dyspnea / Increased Work of Breathing, especially with hypoxia

YES → *Consider* Airway Management and / or Appropriate Respiratory Distress Protocol

NO

**Suspected Beta-Blocker or Calcium Channel Blocker**
↓
**Follow Overdose / Toxic Ingestion Protocol**

12 Lead ECG Procedure

P — Cardiac Monitor

Vascular Access Protocol

B — **Normal Saline/Lactated Ringers Bolus 500 mL IV / IO**
May repeat as needed
**Maximum 2 Liters**

P — **Atropine 1 mg IV / IO**
Repeat every 3 – 5 minutes as needed
**Maximum 2 mg**

SBP < 90? (map <65)

YES → AND / OR

P — **Push Dose Epinephrine 10-20 mcg IV/IO**
*Every 3-5 minutes*
*Titrate to SBP ≥ 90 (map >65)*
- - - - - -
**Epinepherine 2-10 mcg/min IV/IO Infusion**
*Titrate to SBP ≥ 90 (map >65)*

AND / OR →

A — *Consider Sedation:*
**Midazolam 2 mg IV / IO / IM**
Or other medications per formulary

P — **Transcutaneous Pacing**
If non-responsive to atropine. May be considered first line therapy for severe symptoms.
*(Consider early in 2nd or 3rd degree AVB)*

NO →

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

# Adult Bradycardia



| Pressors | |
|---|---|
| **Infusions** | **Push Dose Pressor** |
| **Epinepherine**<br>**2-10 mcg/min IV / IO**<br><br>Mix 2 mg Epi 1mg/1ml in 250 D5W/ NS<br>(2mg / 250 mL = 8 mcg/mL)<br>Drops per minute with micro gtt set<br>15 gtt/min = 2 mcg/min<br>30 gtt/min = 4 mcg/min<br>60 gtt/min = 8 mcg/min<br>75 gtt/min = 10 mcg/min | **Epinepherine**<br>**10-20 mcg IV / IO**<br>*Every 3-5 minutes*<br>Dilute 0.1 mg epi (1mL of 1mg/ 10ml) with 9 mL NS, total of 10 mL in syringe<br>(0.1mg/10mL = 10 mcg/mL) |

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

**Pearls**

- **Recommended Exam: Mental Status, Neck, Heart, Lungs, Neuro**
- **Bradycardia causing symptoms is typically < 50/minute. Rhythm should be interpreted in the context of symptoms and pharmacological treatment given only when symptomatic, otherwise monitor and reassess**
- **Identifying signs and symptoms of poor perfusion caused by bradycardia are paramount.**

- **Atropine vs. Transcutaneous Pacing: Caution in setting of acute MI. The use of Atropine for PVCs in the presence of an MI may worsen heart damage. Providers should not delay Transcutaneous Pacing for patients with poor perfusion in the setting of acute MI or second or third degree heart block.**
- **Atropine is ineffective in cardiac transplantation/denervation.**
- For patients who are not in second or third degree heart block, either dopamine or pacing or both may be considered for bradycardia not responsive to atropine. Prepare to utilize transcutaneous pacing early if no response to atropine; dopamine may be an effective adjunct for hypotensive patients.
- Wide complex or bizarre appearance of QRS complex with slow and peaked T waves rhythm may indicate hyperkalemia.
- Consider treatable causes for bradycardia (Beta Blocker OD, Calcium Channel Blocker OD, etc.)
- Hypoxemia is a common cause of bradycardia. Be sure to oxygenate the patient and support respiratory effort.

# Chest Pain: Cardiac and STEMI

### History
- Age
- Medications (Viagra / sildenafil, Levitra / vardenafil, Cialis / tadalafil)
- Past medical history (MI, Angina, Diabetes, post menopausal)
- Allergies
- Recent physical exertion
- **P**alliation / **P**rovocation
- **Q**uality (crampy, constant, sharp, dull, etc.)
- **R**egion / **R**adiation / **R**eferred
- **S**everity (1-10)
- **T**ime (onset /duration / repetition)

### Signs and Symptoms
- CP (pain, pressure, aching, vice-like tightness)
- Location (substernal, epigastric, arm, jaw, neck, shoulder)
- Radiation of pain
- Pale, diaphoresis
- Shortness of breath
- Nausea, vomiting, dizziness
- **Time of Onset**

### Differential
- Trauma vs. Medical
- Angina vs. Myocardial infarction
- Pericarditis
- Pulmonary embolism
- Asthma / COPD
- Pneumothorax
- Aortic dissection or aneurysm
- GE reflux or Hiatal hernia
- Esophageal spasm
- Chest wall injury or pain
- Pleural pain
- Overdose (Cocaine) or Methamphetamine

Chest Pain
Signs / Symptoms consistent with cardiac etiology

NO → Dyspnea / Atypical symptoms
Suspect cardiac etiology
(Dizziness, fatigue, nausea, high suspicion in diabetics and females)

NO → Exit to Appropriate Protocol

YES

YES

12 Lead ECG Procedure
**(Acquired within 10 min)**

**B** **Aspirin 81 mg x 4 PO (chewed)**

**P** Cardiac Monitor

**Acute MI / STEMI**
**(STEMI = 2 mm ST Segment Elevation ≥ 2 Contiguous Leads**

YES → Inferior MI?
(II, III, aVF)

YES → Right-sided 12 Lead ECG Procedure
*If elevation in V3R – V6R, **Nitroglycerin and Morphine are to be used with caution***

NO → **Transport to:**
**STEMI Receiving Hospital**
**Immediate Notification to Hospital upon confirmation of STEMI.**
**-Consider ALS/Flight Intercept**
**-Attempt to Keep Scene Time to ≤10-15 Minutes**

NO

Vascular Access, IV x2 for STEMI

Consider performing serial 12 lead ECGs every 5 minutes

Systolic BP ≥ 90

NO → *Consider* Airway Protocol → Lung Exam:
CHF / Pulmonary Edema

YES

**B** **Nitroglycerin 0.4 mg SL**
Repeat every 5 minutes as needed to 3 doses
If SBP ≥ 90 (map >65) -and- HR 50-110
*For EMT only, see pg 44 for administration criteria*

Adult Pain Control Protocol

NO → **B** **Normal Saline/Lactated Ringers Bolus**
**500 mL IV / IO**
*Repeat as needed*
**Maximum 2 L**

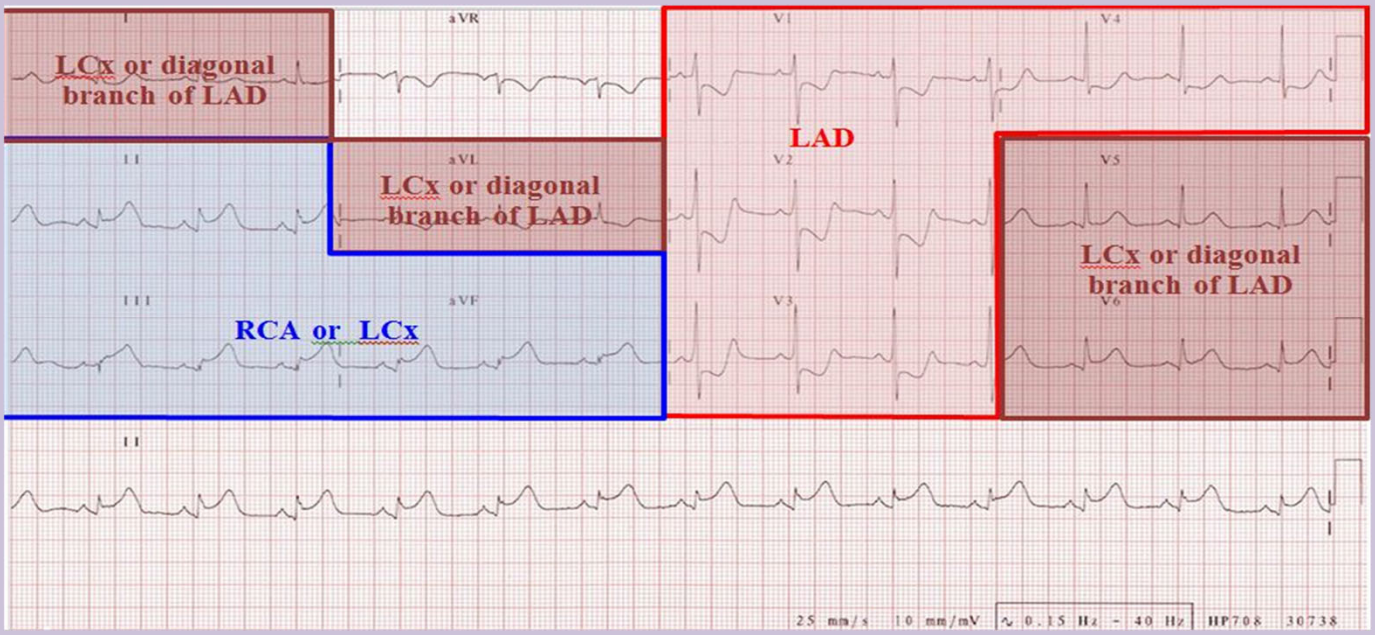
YES → Exit to Adult CHF / Pulmonary Edema Protocol

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

# Chest Pain: Cardiac and STEMI



## STEMI/Culprit Vessel Localization Aid:




ST Elevation in 2 or more leads: II, III, aVF = Inferior wall MI (vessel likely RCA or LCx)
ST Elevation in 2 or more leads: I, aVL, V5, V6 = Lateral wall MI (vessel likely LCx or LAD branch)
ST Elevation in 2 or more leads: V1, V2, V3, V4 = Septal/Anterior wall MI (vessel likely LAD)
ST Depression in V1, V2, V3 (variable)=Concern for posterior wall MI
**Look for ST depression in reciprocal leads (opposite wall) to confirm diagnosis.

**STEMI Criteria for pre-hospital cath lab activation:**

- Narrow QRS complex (< 120 ms or 0.12 sec)
- ST elevation ≥ 2mm in 2 or more anatomically adjacent V-leads
- ST elevation ≥ 2mm in 2 or more anatomically adjacent limb leads (I, II, III, aVF, aVL)
- Reciprocal ST depression
- Rule out mimics: LVH, Ventricular Rhythms, Benign Early Repolarization, Bundle Branch Block, Pericarditis

**Pearls**

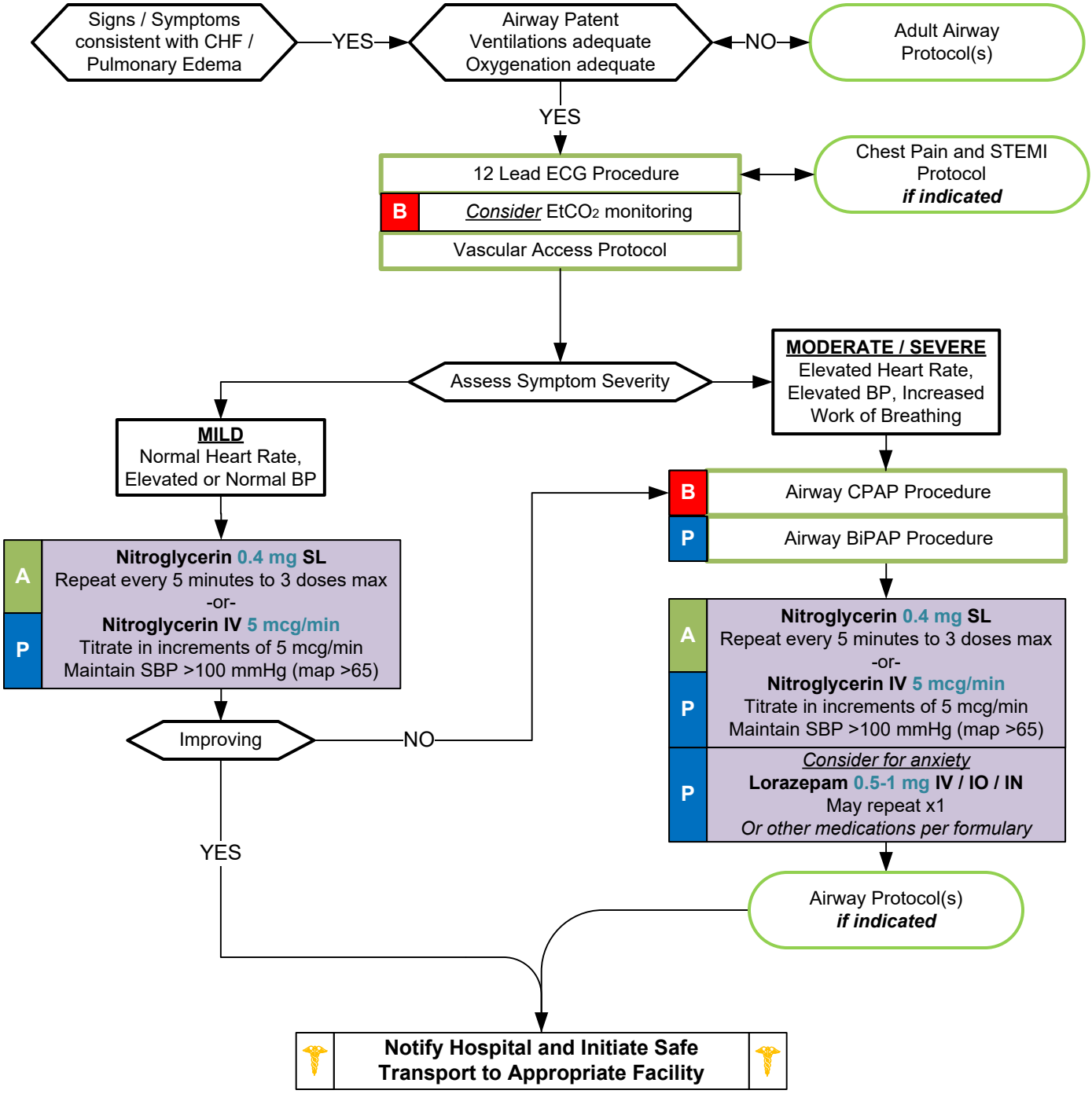
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Consider applying defibrillation patches to patients with LAD territory MI's due to high risk for cardiac arrest. RCA territory MI's have a high risk of cardiogenic shock and/or bradycardia requiring treatment.**
- **Avoid oxygen administration unless the patient is hypoxic (SpO2 <94%).**
- **Avoid Nitroglycerin in any patient who has used Viagra (sildenafil) or Levitra (vardenafil) in the past 24 hours or Cialis (tadalafil) in the past 48 hours due to potential severe hypotension.**
- **Patients with STEMI (ST-Elevation Myocardial Infarction) should be transported to a STEMI receiving facility.**
- If CHF / Cardiogenic shock resulting from inferior (II, III, aVF) MI, perform right sided ECG. If ST elevation noted in transposed V3R-V6R, nitroglycerin and/or Morphine are to be used with caution (Fentanyl is acceptable).
- If the patient has taken his/her own nitroglycerin without relief, consider potency or expiration date of the medication.
- Monitor for hypotension after administration of nitroglycerin and narcotics. Consider pressors if nonresponsive to fluid bolus.
- If a STEMI is activated, the patient's clothing should be removed from the torso up. Consider defib pad placement.
- Diabetics, geriatric and female patients often have atypical pain, or only generalized complaints. Perform a 12 lead EKG in these patients.
- Document the time and interpretation of the 12-Lead ECG in the patient care report
- **EMT may administer Nitroglycerin if the following requirements are met: Have a systolic BP of 110 mmHg or higher, EKG transmitted to receiving facility, IV established, and approved by PMD or online medical control.**

# CHF / Pulmonary Edema

**History**
- Congestive heart failure
- Past medical history
- Medications (digoxin, Lasix / furosemide, Demadex / torsemide, Viagra / sildenafil, Levitra / vardenafil, Cialis / tadalafil)
- Cardiac history -- past myocardial infarction

**Signs and Symptoms**
- Respiratory distress, bilateral rales
- Apprehension, orthopnea
- Jugular vein distention
- Pink, frothy sputum
- Peripheral edema, diaphoresis
- Hypotension, shock
- Chest pain

**Differential**
- Myocardial infarction
- Congestive heart failure
- Asthma
- Anaphylaxis
- Aspiration
- COPD
- Pleural effusion
- Pneumonia
- Pulmonary embolus
- Pericardial tamponade
- Toxic Exposure



# CHF / Pulmonary Edema



**BiPAP/CPAP Contraindications**

- Altered mental status
- Airway compromise
- High aspiration risk
- Pneumothorax
- Hypotension
- Tracheostomies
- Facial Abnormalities

**Pearls**

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Avoid Nitroglycerin in any patient who has used Viagra (sildenafil) or Levitra (vardenafil) in the past 24 hours or Cialis (tadalafil) in the past 48 hours due to potential severe hypotension.**
- **Carefully monitor the level of consciousness, BP, and respiratory status with the above interventions.**
- **If CHF / Cardiogenic shock is resulting from inferior (II, III, aVF) MI, consider right sided ECG. If ST elevation is noted in transposed V leads, nitroglycerin and/or Morphine may cause hypotension requiring fluid bolus.**
- If the patient has taken his/her own nitroglycerin without relief, consider potency or expiration date of the medication.
- Consider myocardial infarction in all of these patients. Diabetics, geriatric and female patients often have atypical pain, or only generalized complaints.
- Allow the patient to be in a position of comfort to maximize their breathing effort.
- Document BiPAP/CPAP application using the BiPAP/CPAP procedure in the ePCR. Document 12 Lead ECG using the 12 Lead ECG procedure.
- Consider Benzodiazepines IV / IO / IN to assist with BiPAP/CPAP compliance. Benzodiazepines may precipitate respiratory depression or may actually worsen compliance with BiPAP/CPAP in patients who are already tired, already with altered mental status, or who have recent history of alcohol or drug ingestion. All efforts at verbal coaching should be utilized prior to giving benzodiazepines for patients in respiratory distress.

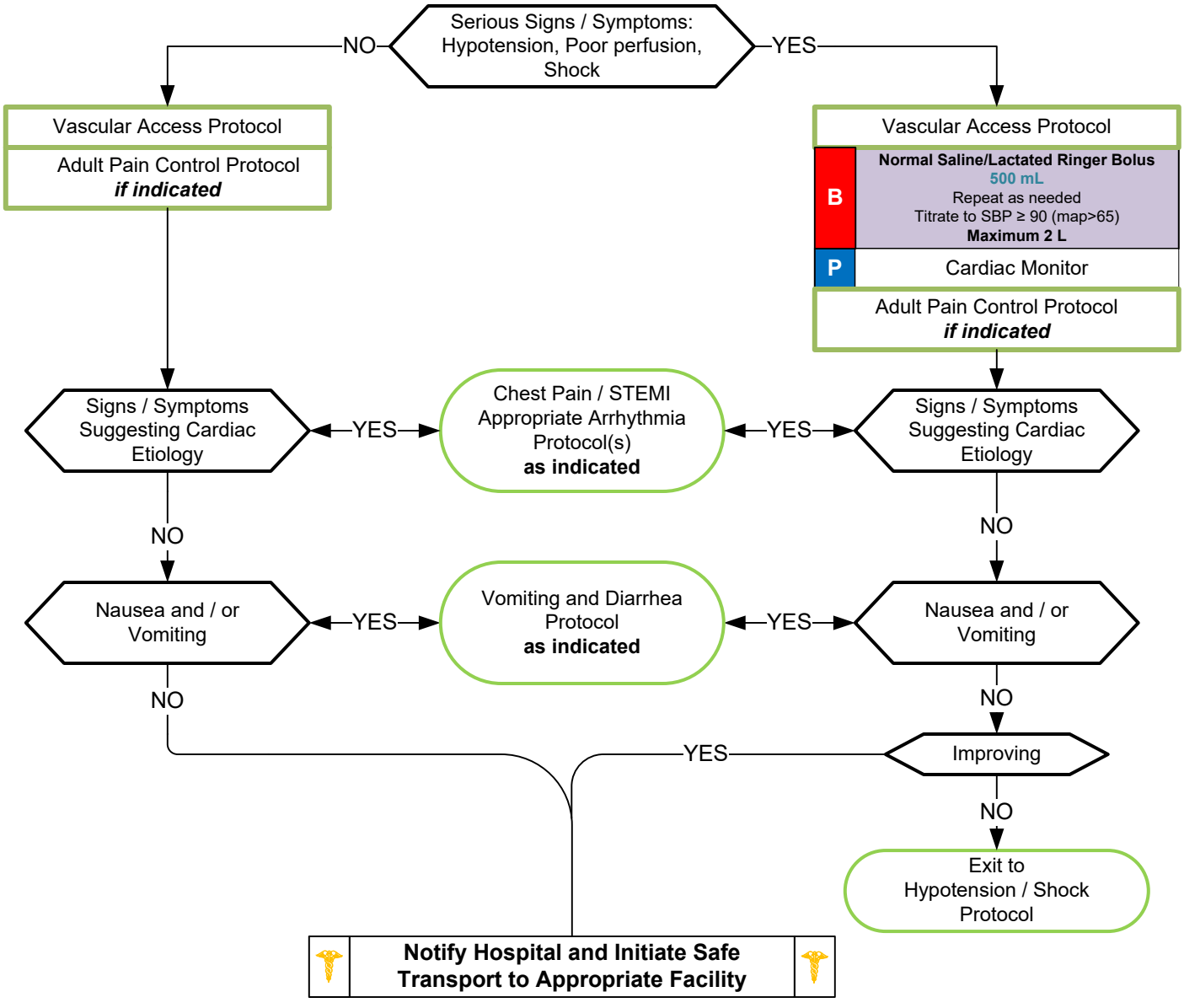
# Abdominal Pain

**History**
- Age
- Past medical / surgical history
- Medications
- Onset
- Palliation / Provocation
- Quality (crampy, constant, sharp, dull, etc.)
- Region / Radiation / Referred
- Severity (1-10)
- Time (duration / repetition)
- Fever
- Last meal eaten
- Last bowel movement / emesis
- Menstrual history (pregnancy)

**Signs and Symptoms**
- Pain (location / migration)
- Tenderness
- Nausea
- Vomiting
- Diarrhea
- Dysuria
- Constipation
- Vaginal bleeding / discharge
- Pregnancy

**Associated symptoms:**
**(Helpful to localize source)**
Fever, headache, weakness, malaise, myalgias, cough, headache, mental status changes, rash

**Differential**
- Pneumonia or Pulmonary embolus
- Liver (hepatitis, CHF)
- Peptic ulcer disease / Gastritis
- Gallbladder
- Myocardial infarction
- Pancreatitis
- Kidney stone
- Abdominal aneurysm
- Appendicitis
- Bladder / Prostate disorder
- Pelvic (PID, Ectopic pregnancy, Ovarian cyst)
- Spleen enlargement
- Diverticulitis
- Bowel obstruction
- Gastroenteritis (infectious)
- Ovarian and Testicular Torsion



# Abdominal Pain



**Abdominal Aortic Aneurysm (AAA)**

Signs/Symptoms:

- Poor perfusion in lower extremities
- Unequal pulses on left vs right side of the body
- Different BP measurements in each arm
- Abdominal/chest pain described as “tearing” or “moving down the back”
- Pulsating abdominal mass

**Pearls**

- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lung, Abdomen, Back, Extremities, Neuro**
- Document the mental status and vital signs prior to administration of anti-emetics
- Abdominal pain in women of childbearing age should be treated as pregnancy related until proven otherwise.
- The diagnosis of abdominal aneurysm should be considered with abdominal pain or back pain especially in patients over 50, elderly males complaining of testicular pain, and / or patients with shock/ poor perfusion.
- Repeat vital signs after each fluid bolus.
- Consider cardiac etiology in patients > 50, diabetics and / or women especially with upper abdominal complaints, perform a 12-lead EKG on these patients.
- Ondansetron can lengthen the QT on the ECG, observe for large changes

# Allergic Reaction / Anaphylaxis

**History**
- Onset and location
- Insect sting or bite
- Food allergy / exposure
- Medication allergy / exposure
- New clothing, soap, detergent
- Past history of reactions
- Past medical history
- Medication history

**Signs and Symptoms**
- Itching or hives
- Coughing / wheezing or respiratory distress
- Chest or throat constriction
- Difficulty swallowing
- Hypotension or shock
- Edema
- N/V

**Differential**
- Urticarial (rash only)
- Anaphylaxis (systemic effect)
- Shock (vascular effect)
- Angioedema (drug induced)
- Aspiration / Airway obstruction
- Vasovagal event
- Asthma or COPD
- CHF

Assess Symptom Severity

**MILD**

Vascular Access Protocol ***if indicated***

A — **Diphenhydramine** **25-50 mg IV / IO**

B — Monitor and Reassess
Monitor for Worsening Signs and Symptoms

**MODERATE/SEVERE**

B — **Epinephrine 0.3 mg Auto-Injector**
**-or-**
**Epinephrine (1mg/1ml)**
**0.3 – 0.5 mg IM**
Repeat in 5 minutes if no improvement

Airway Protocol(s) ***if indicated***

B — **Albuterol 2.5 mg Nebulized or**
**4 puffs via MDI with spacer**
Repeat as needed x 3

B — **Ipratropium 0.5 mg nebulized**
Repeat as needed x 1

Vascular Access Protocol

P — Cardiac Monitor

B — *Consider* EtCO2 monitoring

A — **Diphenhydramine**
**50 mg IV / IO**

B — **Albuterol 2.5 mg Nebulized or**
**2 puffs via MDI with spacer**
Repeat as needed x 2
*If indicated*

B — **Normal Saline/Lactated Ringers**
**Bolus**
**500 mL IV / IO**
Repeat as needed
**Maximum 2 Liters**

P — Consider
**Methylprednisolone**
**125 mg IV / IO**
**-or-**
**Dexamethasone**
**0.6 mg/kg IV / IO**
**(Max 10 mg)**

Consider for hypotension/cardiovascular collapse after repeat epi IM

P — *Consider*
**Epinephrine IV / IO Push-Dose**
10-20 mcg IV / IO
Every 3-5 minutes
**-or-**
**Epinephrine Infusion**
1-8 mcg/min IV / IO
Titrate SBP > (70 + 2 x Age)

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

**Cardiac Monitoring with pulse oximetry Indicated for Moderate and Severe Reactions. *Consider* $EtCO_2$ monitoring.**

Adult Medical Protocols

# Allergic Reaction / Anaphylaxis



| Pressors | |
|---|---|
| **Infusions** | **Push Dose Pressor** |
| **Epinepherine**<br>**1-8 mcg/min IV / IO**<br><br>Mix 2 mg Epi 1mg/1ml in 250 D5W/ NS<br>(2mg / 250 mL = 8 mcg/mL)<br>Drops per minute with micro gtt set<br>7.5 gtt/min = 1 mcg/min<br>15 gtt/min = 2 mcg/min<br>30 gtt/min = 4 mcg/min<br>60 gtt/min = 8 mcg/min | **Epinepherine**<br>**10-20 mcg IV / IO**<br>*Every 3-5 minutes*<br>Dilute 0.1 mg epi (1mL of 1mg/ 10ml) with 9 mL NS, total of 10 mL in syringe<br>(0.1mg/10mL = 10 mcg/mL) |

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

## Pearls

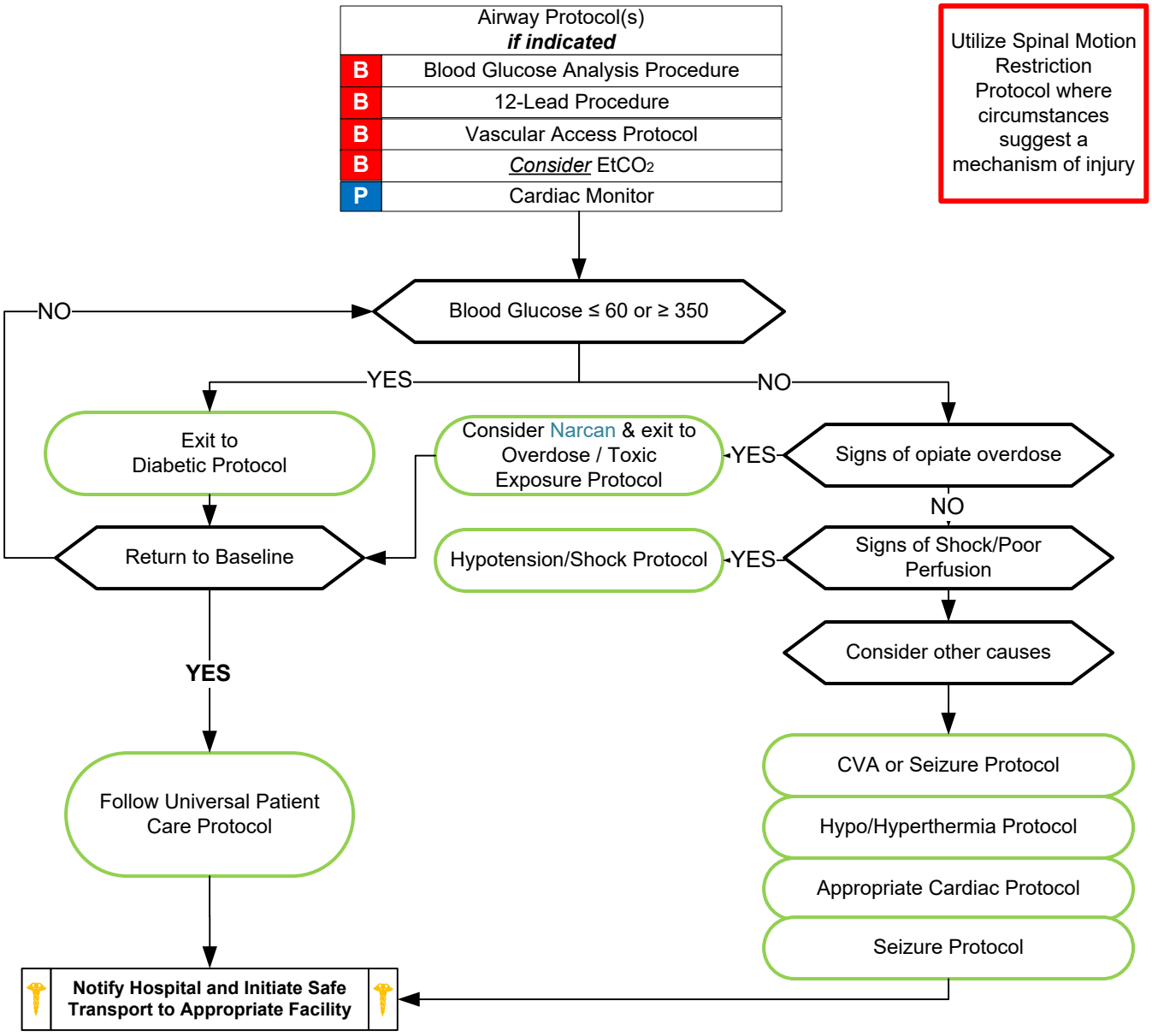
- **Recommended Exam: Mental Status, Skin, Heart, Lungs**
- **Anaphylaxis is an acute and potentially lethal multisystem allergic reaction.**
- **Epinephrine is the drug of choice and the first drug that should be administered in acute anaphylaxis (Moderate / Severe Symptoms.) IM Epinephrine should be administered in priority before or during attempts at IV or IO access.**
- **Anaphylaxis unresponsive to repeat doses of IM epinephrine may require epinephrine administration by IV push. Consider Medical Direction for refractory anaphylaxis.**
- **Symptom Severity Classification:**
  - **Mild symptoms:**
    - **Flushing, hives, itching, erythema with normal blood pressure and perfusion.**
  - **Moderate symptoms:**
    - **Flushing, hives, itching, erythema plus mild respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with normal blood pressure and perfusion.**
  - **Severe symptoms:**
    - **Skin symptoms may or may not be present, depending on perfusion. Possible Itching, erythema plus severe respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with hypotension and poor perfusion.**
- **Allergic reactions may occur with only respiratory and gastrointestinal symptoms and have no rash / skin involvement.**
- **Angioedema is seen in moderate to severe reactions and is swelling involving the face, lips or airway structures. This can also be seen in patients taking ACE-inhibitor blood pressure medications like Prinivil / Zestril (lisinopril)-typically end in -il.**
- Any patient with respiratory symptoms or extensive reaction should receive IV or IO diphenhydramine.
- The shorter the onset from symptoms to contact, the more severe the reaction.

# Altered Mental Status

### History
- Known diabetic, medic alert tag
- Drugs, drug paraphernalia
- Report of illicit drug use or toxic ingestion
- Past medical history
- Medications
- History of trauma
- Change in condition
- Changes in feeding or sleep habits

### Signs and Symptoms
- Decreased mental status or lethargy
- Change in baseline mental status
- Bizarre behavior
- Hypoglycemia (cool, diaphoretic skin)
- Hyperglycemia (warm, dry skin; fruity breath; Kussmaul respirations; signs of dehydration)
- Irritability

### Differential
- Head trauma
- CNS (stroke, tumor, seizure, infection)
- Cardiac (MI, CHF)
- Hypothermia
- Infection (CNS and other)
- Thyroid (hyper / hypo)
- Shock (septic, metabolic, traumatic)
- Diabetes (hyper / hypoglycemia)
- Toxicological or Ingestion
- Acidosis / Alkalosis
- Environmental exposure
- Pulmonary (Hypoxia)
- Electrolyte abnormality
- Psychiatric disorder



# Altered Mental Status



**Pearls**

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro.**
- **Pay careful attention to the head exam for signs of bruising or other injury.**
- Be aware of AMS as presenting sign of an environmental toxin or Haz-Mat exposure and protect personal safety and that of other responders who may already be exposed.
- It is safer to assume hypoglycemia than hyperglycemia if doubt exists. Recheck blood glucose after Dextrose or Oral Glucose.
- Do not let alcohol confuse the clinical picture. Alcoholics frequently develop hypoglycemia and may have unrecognized injuries.
- Consider Restraints if necessary for patient's and/or personnel's protection per the restraint procedure.

# CVA / Suspected Stroke

**History**
- Previous CVA, TIAs
- Previous cardiac / vascular surgery
- Associated diseases: diabetes, hypertension, CAD
- Atrial fibrillation
- Medications (blood thinners)
- History of trauma

**Signs and Symptoms**
- Altered mental status
- Weakness / Paralysis
- Blindness or other sensory loss
- Aphasia / Dysarthria
- Syncope
- Vertigo / Dizziness
- Vomiting
- Headache
- Seizures
- Respiratory pattern change
- Hypertension / hypotension

**Differential**
- See Altered Mental Status
- TIA (Transient ischemic attack)
- Seizure
- Todd's Paralysis
- Hypoglycemia
- Stroke
  Thrombotic or Embolic (~85%)
  Hemorrhagic (~15%)
- Tumor
- Trauma
- Dialysis / Renal Failure

Signs and Symptoms consistent with Stroke

Perform and document results of validated pre-hospital stroke identification screen (CPSS, LAPSS, etc)

YES → Onset <24 Hours

NO → Exit to Appropriate Protocol

Onset <24 Hours:
YES → Perform RACE Score
NO → **Transport to NEAREST Certified Stroke Center (ASRH, PSC, TSC, CSC)**

Perform RACE Score:
<5 → **Transport to NEAREST Certified Stroke Center (ASRH, PSC, TSC, CSC)**
≥5 → Transport time to Thrombectomy Capable stroke center will place patient outside tPA window

Transport time to Thrombectomy Capable stroke center will place patient outside tPA window:
YES → **Transport to NEAREST Certified Stroke Center (ASRH, PSC, TSC, CSC)**
NO → Total transport time from scene to nearest CSC is ≥30 mins

Total transport time from scene to nearest CSC is ≥30 mins:
YES → **Transport to nearest TSC if one ≤30 minues**
**If no CSC or TSC within region, transport to nearest stroke Center (ASRH, PSC)**
NO → **Transport to:**
**Comprehensive Stroke Center**
**Attempt to Keep Scene Time to ≤ 15 Minutes**
**Immediate Notification of Facility**
**Activate as Stroke Code**

**Stroke Center Types**
**ASRH: Acute Stroke Ready Hospital**
**PSC: Primary Stroke Center**
**TSC: Thrombectomy Stroke Center**
**CSC: Comprehensive Stoke Center**

**MD**
**Contact Hospital/Physician for Severe Hypertension**
*(SBP >220 mmHg &/or DBP >120 mmHg)*
**Labetalol 10-20 mg IVP over 1-2 min**
OR
**Nitroglycerin 0.4 mg SL**
-Or-
other medications in formulary as approved by PMD

- B — Blood Glucose Analysis Procedure
- 12 Lead ECG Procedure (if available)
- B — Vascular Access Protocol x2
- P — Cardiac Monitor

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

*CPSS-Cincinnati Prehospital Stroke Screen*
*LAPSS-Los Angeles Prehospital Stroke Screen*

Adult Medical Protocols

# CVA / Suspected Stroke



For further information on current recommendations regarding stroke care, including the rationale to treat or not treat hypertension in the setting of possible stroke, see the current version of: "Protocols for the Early Management of Patients With Acute Ischemic Stroke: A Protocol for Healthcare Professionals From the American Heart Association/American Stroke Association"

Available at: https://www.stroke.org/-/media/stroke-files/ems-resources/stroke-training-for-ems-professionals-ucm_488744.pdf?la=en

## Cincinnati Pre-hospital Stroke Scale

**1. FACIAL DROOP**: *Have patient show teeth or smile.*

Normal: both sides of the face move equally

**Abnormal**: one side of face does not move as well as the other side

**2. ARM DRIFT:** *Patient closes eyes & holds both arms out for 10 sec.*

Normal: both arms move the same or both arms do not move at all

**Abnormal**: one arm does not move or drifts down compared to the other

**3. ABNORMAL SPEECH**: *Have the patient say "you can't teach an old dog new tricks."*
Normal: patient uses correct words with no slurring **Abnormal**: patient slurs words, uses the wrong words, or is unable to speak

**INTERPRETATION: If any 1 of these 3 signs is abnormal, the probability of a stroke is 72%.**

**EMS RACE Stroke Scale** – Rapid Arterial oCculsion Evaluation Scale, used to predict large cerebral arterial occlusions.*

| ITEM | INSTRUCTION | | RACE Score |
|---|---|---|---|
| FACIAL PALSY | Ask the patient to show their teeth (smile) | ABSENT (symmetrical movement)<br>MILD (slightly asymmetrical)<br>MODERATE TO SEVERE (completely asymmetrical) | 0<br>1<br>2 |
| ARM MOTOR FUNCTION | Extending the arm of the patient 90 degrees (if sitting) or 45 degrees (if supine) | NORMAL TO MILD (limb upheld more than 10 seconds)<br>MODERATE (limb upheld less than 10 seconds)<br>SEVERE (patient unable to raise arm against gravity) | 0<br>1<br>2 |
| LEG MOTOR FUNCTION | Extending the leg of the patient 30 degrees (if supine) | NORMAL TO MILD (limb upheld more than 5 seconds)<br>MODERATE (limb upheld less than 5 seconds)<br>SEVERE (patient unable to raise the leg against gravity) | 0<br>1<br>2 |
| HEAD AND GAZE DEVIATION | Observe eyes and cephalic deviation to one side | ABSENT (eye movements to both sides were possible and no cephalic deviation was observed)<br>PRESENT (eyes and cephalic deviation to one side was observed) | 0<br>1 |
| APHASIA<br>If right hemiparesis | Ask the patient to follow two verbal orders:<br>- i.e., "close your eyes"<br>- i.e., "make a fist" | NORMAL (performs both tasks correctly)<br>MODERATE (performs one task correctly)<br>SEVERE (performs neither task) | 0<br>1<br>2 |
| AGNOSIA<br>If left hemiparesis | Asking:<br>- "Who's arm is this?" While showing him/her the paretic arm<br>- "Can you move your arm?" | NORMAL (no asomatognosia nor anosognosia)<br>MODERATE (asomatognosia or anosognosia)<br>SEVERE (both of them) | 0<br>1<br>2 |
| Presense of Gaze Deviation or Global Aphasia (mute, doesn't follow commands) = high likelihood of a large vessel occlusion. | | RACE SCALE TOTAL:<br>Any score above a "0" is a "Stroke Alert" | |

## LOS ANGELES PREHOSPITAL STROKE SCREEN (LAPSS)

Patient Name: _____
Rater Name: _____
Date: _____

| Screening Criteria | Yes | No |
|---|---|---|
| 4. Age over 45 years | ___ | ___ |
| 5. No prior history of seizure disorder | ___ | ___ |
| 6. New onset of neurologic symptoms in last 24 hours | ___ | ___ |
| 7. Patient was ambulatory at baseline (prior to event) | ___ | ___ |
| 8. Blood glucose between 60 and 400 | ___ | ___ |

9. Exam: *look for obvious asymmetry*

| | Normal | Right | Left |
|---|---|---|---|
| Facial smile / grimace: | ☐ | ☐ Droop | ☐ Droop |
| Grip: | ☐ | ☐ Weak Grip<br>☐ No Grip | ☐ Weak Grip<br>☐ No Grip |
| Arm weakness: | ☐ | ☐ Drifts Down<br>☐ Falls Rapidly | ☐ Drifts Down<br>☐ Falls Rapidly |

Based on exam, patient has only unilateral (and not bilateral) weakness: Yes ☐ No ☐

10. If Yes (or unknown) to all items above LAPSS screening criteria met: Yes ☐ No ☐

11. If LAPSS criteria for stroke met, call receiving hospital with "CODE STROKE", if not then return to the appropriate treatment protocol. (Note: the patient may still be experiencing a stroke if even if LAPSS criteria are not met.)

## Pearls

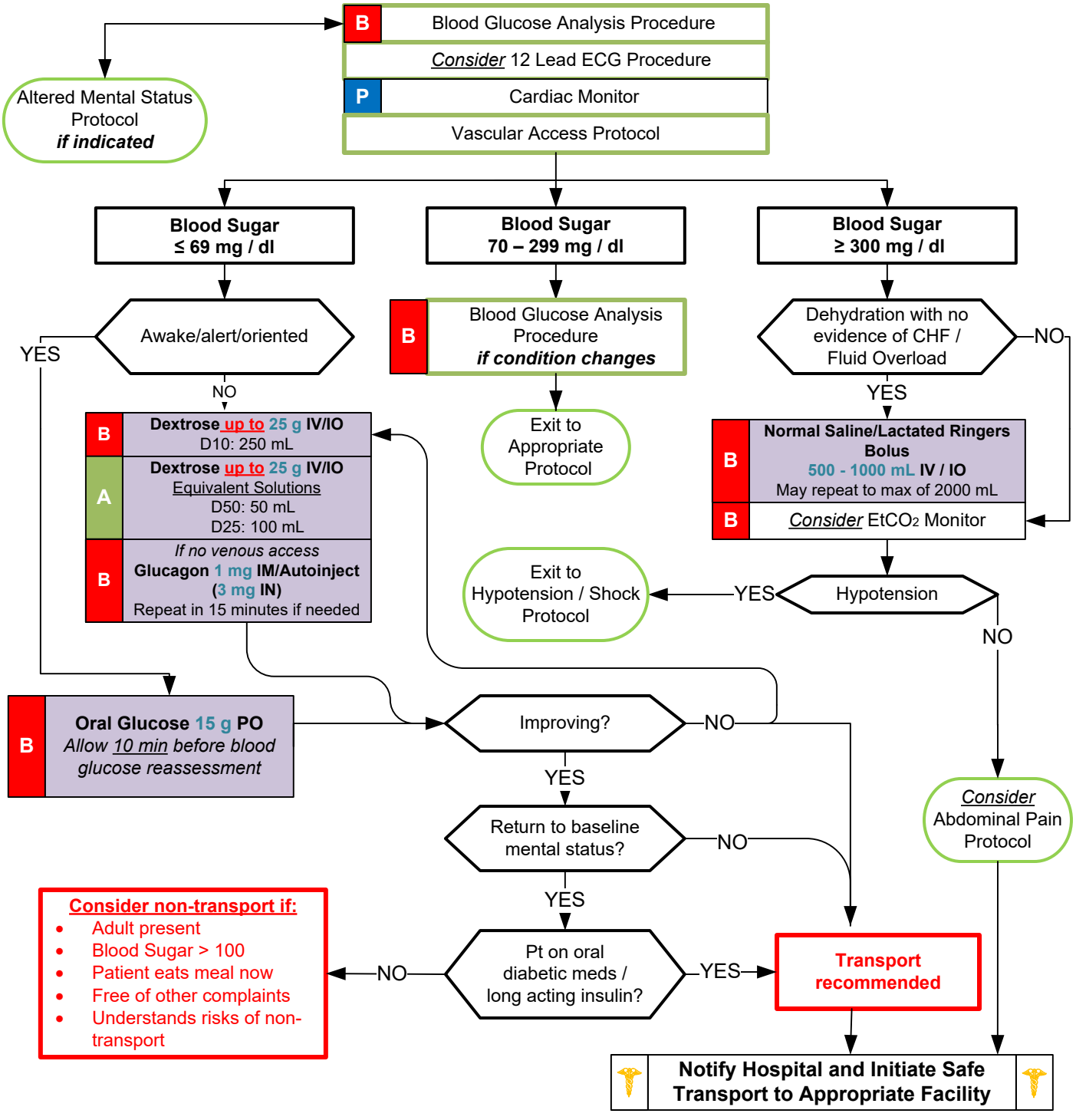
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Acute Stroke care is evolving rapidly. Time of onset / last seen normal parameters may be changed at any time depending on the capabilities and resources of the Stroke Receiving Hospital.**
- **Time of Onset or Last Seen Normal: One of the most important items the pre-hospital provider can obtain, on which all treatment decisions are based. Be very precise in gathering data to establish the time of onset and report as an actual time (i.e. 13:47 NOT "about 45 minutes ago.") Without this information patient may not be able to receive thrombolytics at facility. For patients with "Woke up and noticed stroke," Time starts when patient went to sleep or was last awake and was last known normal (NOT the time they woke up).**
- **Scene times should be generally limited to ≤ 15 minutes and the patient should be transported to capable stroke receiving facility. In-field notification of receiving facility should be performed and transport times should be minimized.**
- The differential listed on the Altered Mental Status Protocol should also be considered.
- Be alert for airway problems (swallowing difficulty, vomiting/aspiration).
- Document the results of the pre-hospital stroke identification screen (CPSS, LAPSS, etc) in the ePCR.
- Elderly patients with UTIs may show stroke signs and symptoms, always error on the side of caution
- Consider stroke mimics: Hypoglycemia, seizure, sepsis, migraine, intoxication

# Diabetic Emergencies

**History**
- Known history of diabetes
- Past medical history
- Medications
- Recent blood glucose check
- Last meal

**Signs and Symptoms**
- Altered mental status
- Combative / irritable
- Diaphoresis
- Seizures
- Abdominal pain
- Nausea / vomiting
- Weakness
- Dehydration
- Deep / rapid breathing

**Differential**
- Alcohol / drug use
- Toxic ingestion
- Trauma; head injury
- Seizure
- CVA
- Altered baseline mental status
- Sepsis



# Diabetic



Pearls

- Recommended exam: Mental Status, Skin, Respirations and effort, Neuro.
- Consider IO access to give Dextrose early in patients who are critically ill, peri-arrest and hypoglycemic, or if peripheral IVs are unsuccessful.
  -EMT may administer dextrose only through IV or a previously established IO.
- DKA is a serious condition resulting from a lack of insulin production and uncontrolled blood sugars. Patients are typically severely dehydrated and display signs of hypovolemic shock (tachycardia, hypotension, dry membranes, poor skin turgor). In addition to aggressive IV fluid resuscitation (some patients will require > 5 liters of saline in the ED) providers should consider other medical conditions that triggered the episode, such as infections or cardiac events. Obtain an EKG on a diabetic patient with abnormal vital signs.
- Consider EtCO2 monitoring when glucose levels are > 300.
- Do not administer oral glucose to patients that are not able to swallow or protect their airway.
- Quality control checks should be maintained per manufacturers recommendation for all glucometers.
- Ensure insulin pumps have been disabled.
- Patients refusing transport to medical facility after treatment of hypoglycemia:

  Oral Agents:
  Patients taking oral diabetic medications should be strongly encouraged to allow transportation to a medical facility. They are at risk of recurrent hypoglycemia that can be delayed for hours and require close monitoring even after normal blood glucose is established (12-60 hrs). Not all oral agents have prolonged action so Contact Medical Direction for advice. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal with complex carbohydrates and protein.

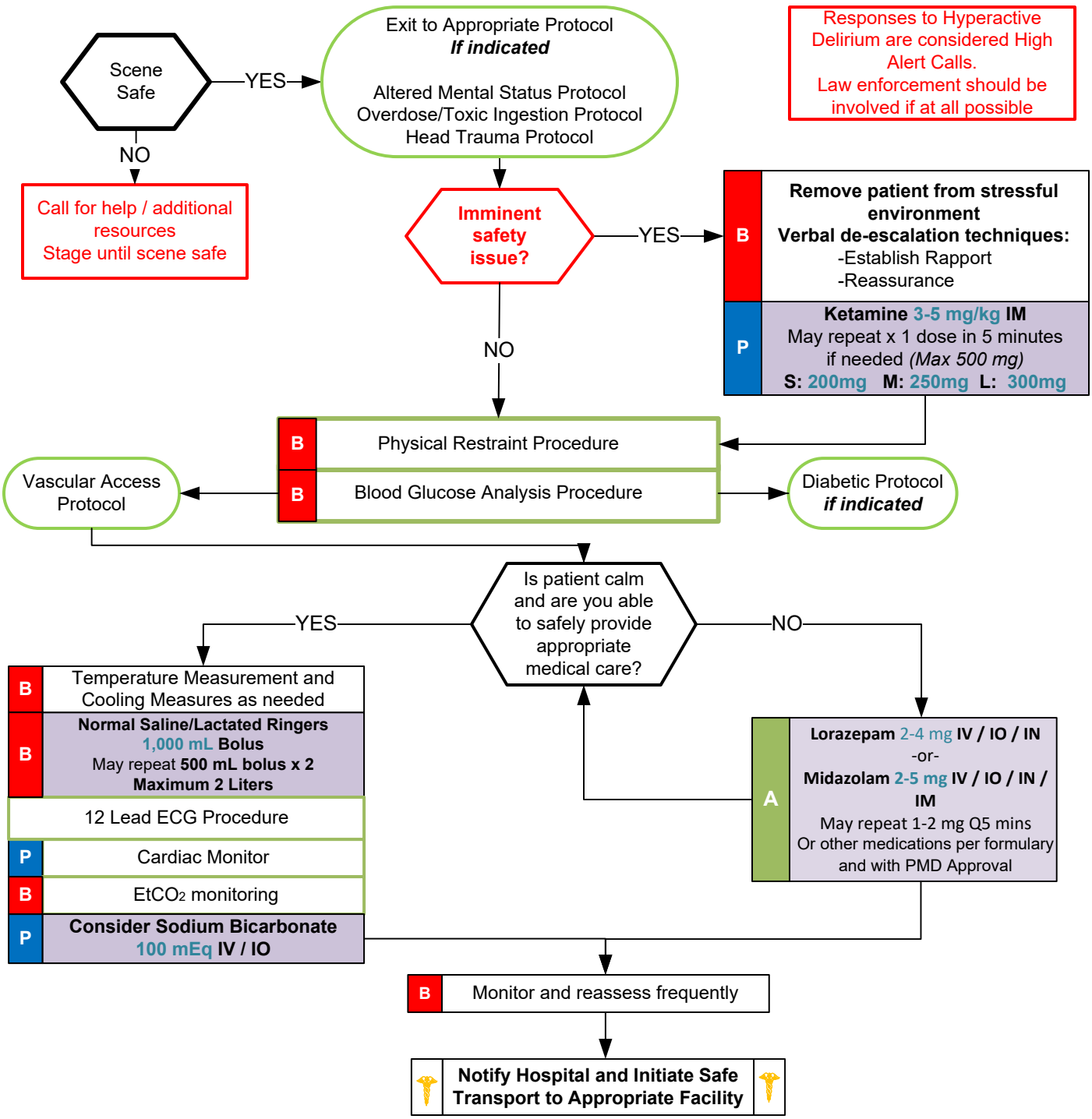
  Insulin Agents:
  Many forms of insulin now exist. Longer acting insulin places the patient at risk of recurrent hypoglycemia even after a normal blood glucose is established. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal with complex carbohydrates and protein.

# Hyperactive Delirium

**History**
- Psychiatric illness/medications
- Injury to self or threats to others
- Substance abuse / overdose
- Diabetes
- Bizarre behavior

**Signs and Symptoms**
- Anxiety, agitation, confusion
- Affect change, hallucinations
- Delusional thoughts, bizarre behavior
- Combative / Violent
- Expression of suicidal / homicidal thoughts
- Impervious to pain
- Often naked, hyperthermic, profusely diaphoretic

**Differential**
- Altered Mental Status differential
- Alcohol Intoxication
- Toxin / Substance abuse
- Medication effect / overdose
- Withdrawal syndromes
- Depression
- Bipolar (manic-depressive)
- Schizophrenia
- Anxiety disorders



# Hyperactive Delirium



**Pearls**

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Neuro**
- **Crew / responders safety is the main priority.**
- **Any patient who is handcuffed or restrained by Law Enforcement and transported by EMS must be accompanied by law enforcement in the ambulance or follow immediately behind. If no Law Enforcement in back of ambulance, handcuffs should be removed and patient otherwise physically restrained.**

- **Anyone who receives ketamine should have pulse oximetry, cardiac monitor and $EtCO_2$ monitoring**
- **Consider benzodiazepine for patients with other presumed substance abuse. While benzodiazepines may be indicated for patients with alcohol intoxication, consider that alcohol and benzodiazepines together may lead to respiratory depression.**
- **All patients who receive restraint must be continuously observed (physical-BLS only, Chemical-ALS) on scene or immediately upon their arrival. Consider bringing extra personnel during transport.**

- Once sedated, if handcuffs have been used, they may be removed by law enforcement and soft restraints should be applied to have better airway access.
- Be sure to consider all possible medical/trauma causes for behavior (hypoglycemia, overdose, substance abuse, hypoxia, head injury, etc.)
- Do not irritate the patient with a prolonged exam.
- Do not overlook the possibility of associated domestic violence or child abuse.
- **If patient is suspected of agitated delirium suffers cardiac arrest, consider a fluid bolus and sodium bicarbonate early**
- Do not position or transport any restrained patient is such a way that could impact the patients respiratory or circulatory status (ie. prone).
- **Hyperactive Delirium Syndrome:**

Medical emergency: Combination of delirium, psychomotor agitation, anxiety, hallucinations, speech disturbances, disorientation, violent / bizarre behavior, insensitivity to pain, hyperthermia and increased strength. Potentially life-threatening and associated with use of physical control measures, including physical restraints and Tasers. Most commonly seen in male subjects with a history of serious mental illness and/or acute or chronic drug abuse, particularly stimulant drugs such as cocaine, crack cocaine, methamphetamine, amphetamines or similar agents. Alcohol withdrawal or head trauma may also contribute to the condition.

# Hypertension

**History**
- Documented Hypertension
- Related diseases: Diabetes; CVA; Renal Failure; Cardiac Problems
- Medications for Hypertension
- Compliance with Hypertensive Medications
- Erectile Dysfunction medications
- Pregnancy

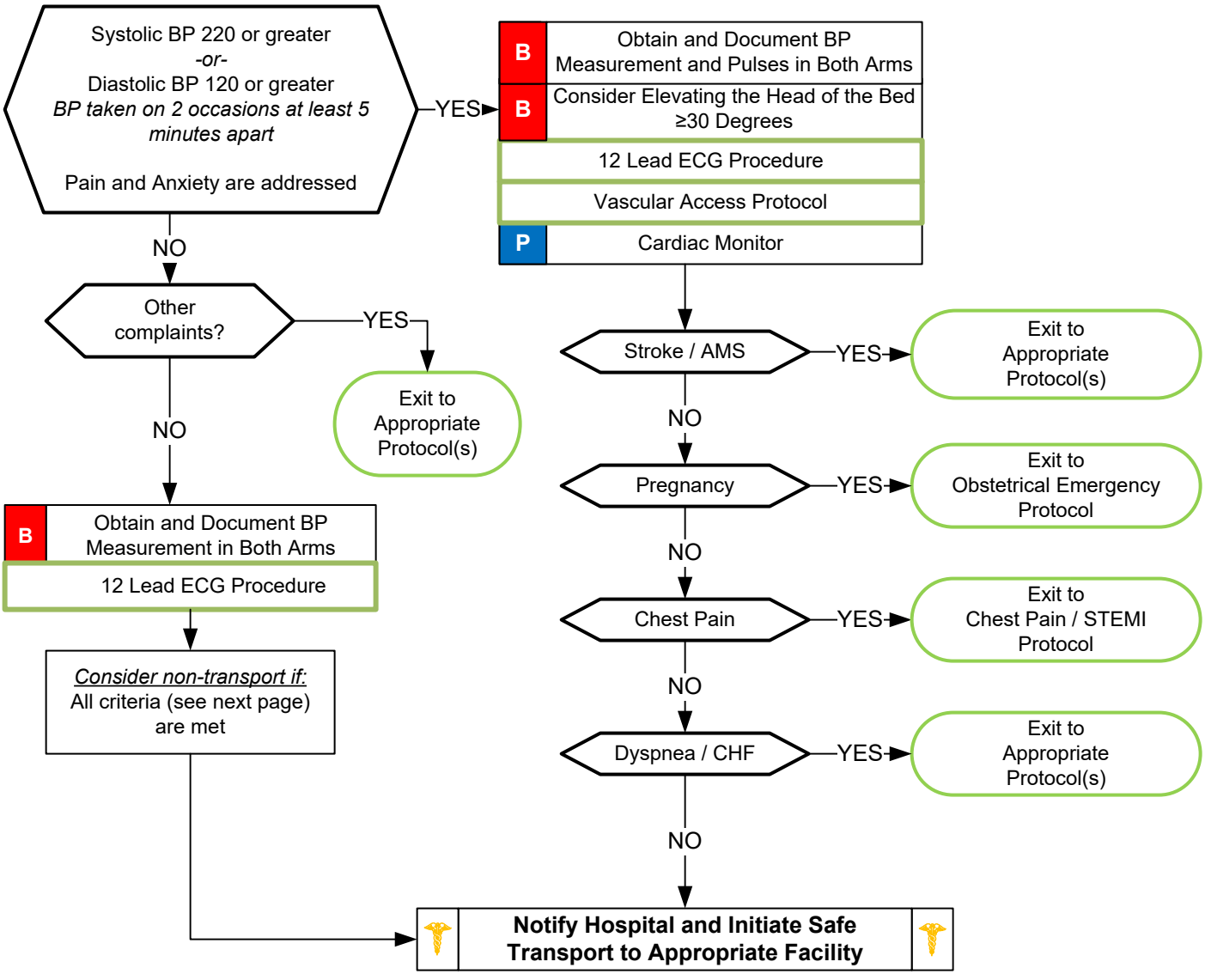
**Signs and Symptoms**

One of these
- Systolic BP 220 or greater
- Diastolic BP 120 or greater

AND at least one of these
- Severe Headache
- Chest Pain
- Dyspnea
- Altered Mental Status
- Seizure

**Differential**
- Hypertensive encephalopathy
- Primary CNS Injury
  - Cushing's Response with Bradycardia and Hypertension
- Myocardial Infarction
- Aortic Dissection / Aneurysm
- Pre-eclampsia / Eclampsia
- Drug use/intoxication
- Drug/Alcohol Withdrawal

Hypertension is not uncommon especially in an emergency setting. Hypertension is usually transient and in response to stress and / or pain. A hypertensive emergency is based on blood pressure along with symptoms which suggest an organ is suffering damage such as MI, CVA or renal failure. This is very difficult to determine in the pre-hospital setting in most cases. Aggressive treatment of hypertension can result in harm. Most patients, even with significant elevation in blood pressure, need only supportive care. Specific complaints such as chest pain, dyspnea, pulmonary edema or altered mental status should be treated based on those specific protocols.



# Hypertension



*Consider non-transport if:*

- *No chest pain*
- *No dyspnea*
- *No ischemic changes on ECG*
- *No headache*
- *No significant edema*
- *Access to primary care follow-up*
- *Patient agreeable to plan*

*Provide education for refusal and the benefits of transport*

**Pearls**

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- Elevated blood pressure is based on at least two sets of vital signs, each several minutes apart.
- Hypertensive emergency is defined as systolic > 220 or diastolic > 120 plus evidence of end organ damage (AMS, ischemic 12 Lead, etc).
- If patient is pregnant and in third trimester, consider pre-eclampsia and follow Obstetrical Emergencies Protocol.
- Symptomatic hypertension is typically revealed through end organ dysfunction to the cardiac, CNS or renal systems.
- All symptomatic patients with hypertension should be transported with their head elevated at 30 degrees.
- Ensure appropriate size blood pressure cuff utilized for body habitus.

# Hypotension / Shock

**History**
- Blood loss - vaginal or gastrointestinal bleeding, AAA, ectopic
- Fluid loss - vomiting, diarrhea, fever
- Infection
- Cardiac ischemia (MI, CHF)
- Medications
- Allergic reaction
- Pregnancy
- History of poor oral intake

**Signs and Symptoms**
- Restlessness, confusion
- Weakness, dizziness
- Weak, rapid pulse
- Pale, cool, clammy skin
- Delayed capillary refill
- Hypotension
- Coffee-ground emesis
- Tarry stools

**Differential**
- Shock
  - Hypovolemic
  - Cardiogenic
  - Septic
  - Neurogenic
  - Anaphylactic
- Ectopic pregnancy
- Dysrhythmias
- Pulmonary embolus
- Tension pneumothorax
- Medication effect / overdose
- Vasovagal
- Physiologic (pregnancy)

Diabetic Protocol ***if indicated***

B Blood Glucose Analysis Procedure

12 Lead ECG Procedure

Vascular Access Protocol

P Cardiac Monitor

B *Consider* $EtCO_2$ monitoring

Cardiac / Arrhythmia Protocol ***if indicated***

Airway Protocol(s), ***if indicated***

**Was Trauma Involved?**

**YES**

*Consider* Hypovolemic (bleeding), Neurogenic (spinal injury), Obstructive (Pneumothorax, cardiac tamponade)

**Rapid Transport** to closest Appropriate Trauma Center

B Spinal Motion Restriction Protocol ***if indicated***

B Wound Care
**Control Hemorrhage**

B **Normal Saline/Lactated Ringers 500 mL IV / IO Bolus**
Repeat as needed to keep SBP ≥ 90 (map >65) (or palpable radial pulse)
**Maximum 2000 mL**

P Chest Decompression ***if indicated***

Exit to Multiple Trauma Protocol

**NO**

*Consider* Hypovolemic (ex. Dehydration, GI bleed), Cardiogenic (ex. STEMI, CHF), Distributive (ex. Sepsis, Anaphylaxis), Obstructive (ex. PE, Tamponade)

B **Normal Saline/Lactated Ringers 500 mL IV / IO Bolus**
Repeat as needed to SBP ≥ 90 (Map >65) (or palpable radial pulse)
**Maximum 2000 mL**
**Caution with excess fluids in cardiogenic shock.**

P **Consider the presence of pulmonary edema, utilize pressors early.**

P *Consider Pressors if Still Hypotensive after 1 L:*
*Titrate to SBP ≥ 90 (map >65)*

**Push Dose Epinephrine 10-20 mcg IV / IO q 3-5 minutes**
**OR**
**NORepinepherine Infusion 4-30 mcg/min IV / IO**
**OR**
**Epinephrine Infusion 1-8 mcg/min IV / IO**
**OR**
**Dopamine Infusion 5-20 mcg/kg/min IV / IO**
**OR**
**Other pressors in formulary or as approved by PMD**

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Adult Medical Protocols

# Hypotension / Shock



| Pressors | | |
|---|---|---|
| **Infusions** | | |
| **NORepinepherine**<br>**4-30 mcg/kg/min IV / IO**<br><br>Mix 4 mg NOREpi in 250 mL D5W/NS<br>(4 mg/250 ml= 16 mcg/ml)<br>Drops per minute with micro gtt set<br><br>15 gtt/min=4mcg/min<br>30 gtt/min=8 mcg/min<br>60 gtt/min=16 mcg/min<br>90 gtt/min=24 mcg/min<br>113 gtt/min=30 mcg/min | **Epinepherine**<br>**1-8 mcg/min IV / IO**<br><br>Mix 2 mg Epi 1mg/1ml in 250 D5W/ NS<br>(2mg / 250 mL = 8 mcg/mL)<br>Drops per minute with micro gtt set<br>7.5 gtt/min = 1 mcg/min<br>15 gtt/min = 2 mcg/min<br>30 gtt/min = 4 mcg/min<br>60 gg/min = 8 mcg/min | **Dopamine**<br>**5-20 mcg/kg/min IV / IO**<br><br>(400mg/250 ml pre-mixed)<br>Drops per minute (5 mcg/kg/min)<br>(60 kg) **S:** (12 gtts/min)<br>(80 kg) **M:** (15 gtts/min)<br>(100 kg) **L:** (20 gtts/min) |
| | | **Push Dose Pressor** |
| | | **Epinepherine**<br>**10-20 mcg IV / IO**<br><br>*Every 3-5 minutes*<br>Dilute 0.1 mg epi (1mL of 1mg/ 10ml) with 9 mL NS, total of 10 mL in syringe<br>(0.1mg/10mL = 10 mcg/mL) |

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

## Pearls

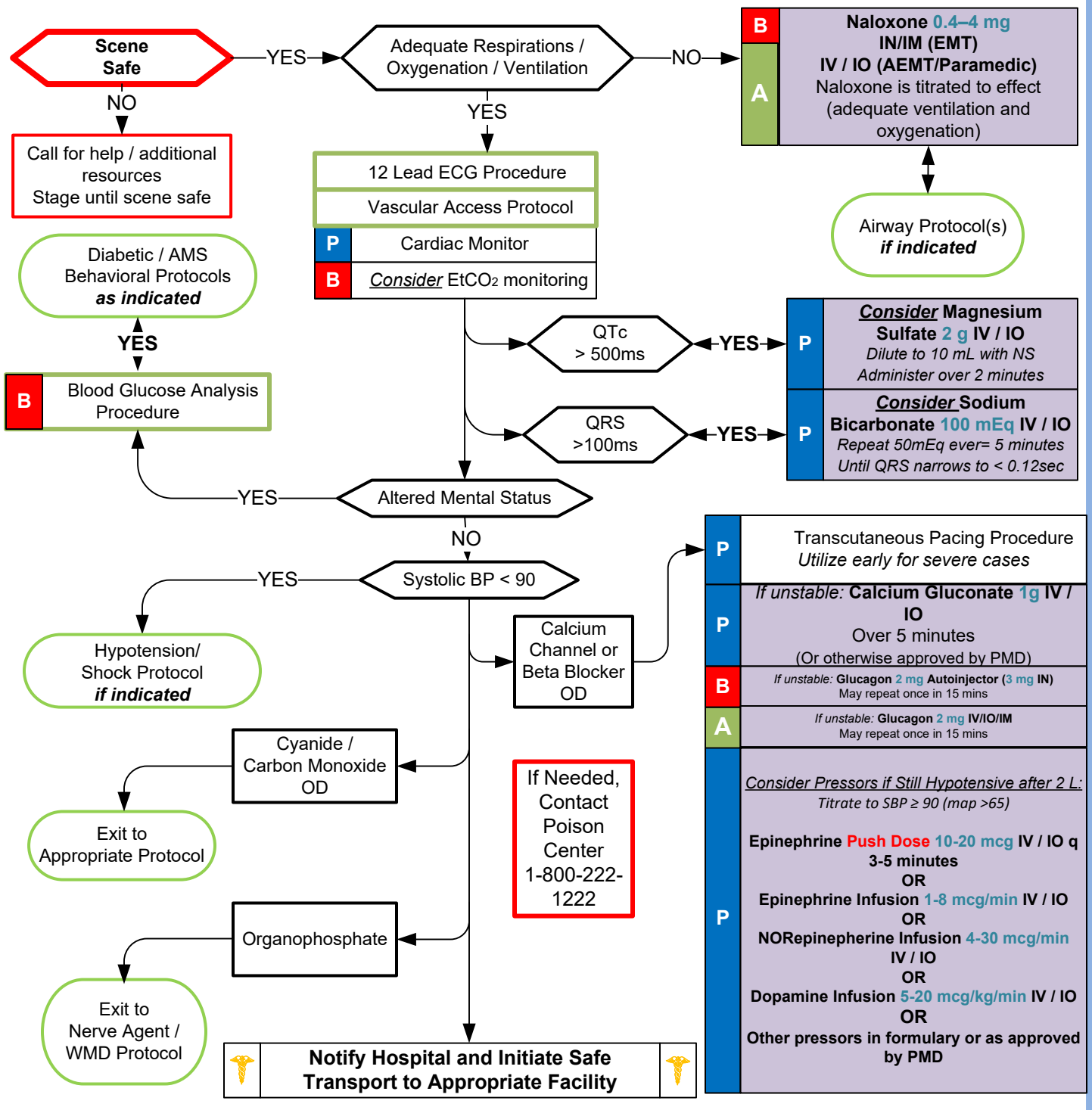
- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Hypotension is often defined as a systolic blood pressure of less than 90. This is not always reliable and should be interpreted in context and patient's typical BP if known. Shock may be present with a normal blood pressure initially. Fundamentally, shock is inadequate perfusion of body tissues.**
- **Recent evidence supports the use of NorEpi as preferred prehospital vasopressor.**
- **EtCO2 <25 mmHg may be a sign of poor perfusion**
- **Shock often is present with normal vital signs and may develop insidiously. Agitation and/or tachycardia may be the only manifestation.**
- **Patients on beta-blocker medications may not demonstrate tachycardia. Conversely, tachycardia in a patient who is on beta-blockers should warrant aggressive shock management.**
- **Consider all possible causes of shock and treat per appropriate protocol.**
- **Hypovolemic Shock:**
  Hemorrhage, trauma, GI bleeding, ruptured aortic aneurysm or pregnancy-related bleeding.
- **Cardiogenic Shock:**
  Heart failure: MI, Cardiomyopathy, Myocardial contusion, Ruptured ventrical / septum / valve / toxins.
- **Distributive Shock:**
  Sepsis (systemic infection)
  Anaphylactic
  Neurogenic: Hallmark is warm, dry, pink skin with normal capillary refill time and typically alert.
  Toxins
- **Obstructive Shock:**
  Pericardial tamponade. Pulmonary embolus. Tension pneumothorax.
  Signs may include hypotension with distended neck veins, tachycardia, unilateral decreased breath sounds or muffled heart sounds.
- For **Non-Traumatic** hypotension, Pressors should only be started after 1000 mL of NS have been given.

# Overdose / Toxic Ingestion

### History
- Ingestion or suspected ingestion of a potentially toxic substance
- Substance ingested, route, quantity
- Time of ingestion
- Reason (suicidal, accidental, criminal)
- Available medications in home
- Past medical history, medications

### Signs and Symptoms
- Mental status changes
- Hypotension / hypertension
- Decreased respiratory rate
- Tachycardia, dysrhythmias
- Seizures
- S.L.U.D.G.E.M.
- D.U.M.B.B.E.L.S

### Differential
- Tricyclic antidepressants (TCAs)
- Acetaminophen (Tylenol)
- Aspirin
- Depressants
- Stimulants
- Anticholinergic
- Cardiac medications
- Solvents, Alcohols, Cleaning agents
- Insecticides (organophosphates)



# Overdose / Toxic Ingestion



## Pressors

### Infusions

**NORepinepherine**
**4-30 mcg/min IV / IO**

Mix 4 mg NOREpi in 250 mL D5W/NS
(4 mg/250 ml= 16 mcg/ml)
Drops per minute with micro gtt set

15 gtt/min=4mcg/min
30 gtt/min=8 mcg/min
60 gtt/min=16 mcg/min
90 gtt/min=24 mcg/min
113 gtt/min=30 mcg/min

**Epinepherine**
**1-8 mcg/min IV / IO**

Mix 2 mg Epi 1mg/1ml in 250 D5W/ NS
(2mg / 250 mL = 8 mcg/mL)
Drops per minute with micro gtt set
7.5 gtt/min = 1 mcg/min
15 gtt/min = 2 mcg/min
30 gtt/min = 4 mcg/min
60 gg/min = 8 mcg/min

**Dopamine**
**5-20 mcg/kg/min IV / IO**

(400mg/250 ml pre-mixed)
Drops per minute (5 mcg/kg/min)
(60 kg) **S:** (12 gtts/min)
(80 kg) **M:** (15 gtts/min)
(100 kg) **L:** (20 gtts/min)

### Push Dose Pressor

**Epinepherine**
**10-20 mcg IV / IO**

*Every 3-5 minutes*
Dilute 0.1 mg epi (1mL of 1mg/ 10ml) with 9 mL NS, total of 10 mL in syringe
(0.1mg/10mL = 10 mcg/mL)

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

**Pearls**

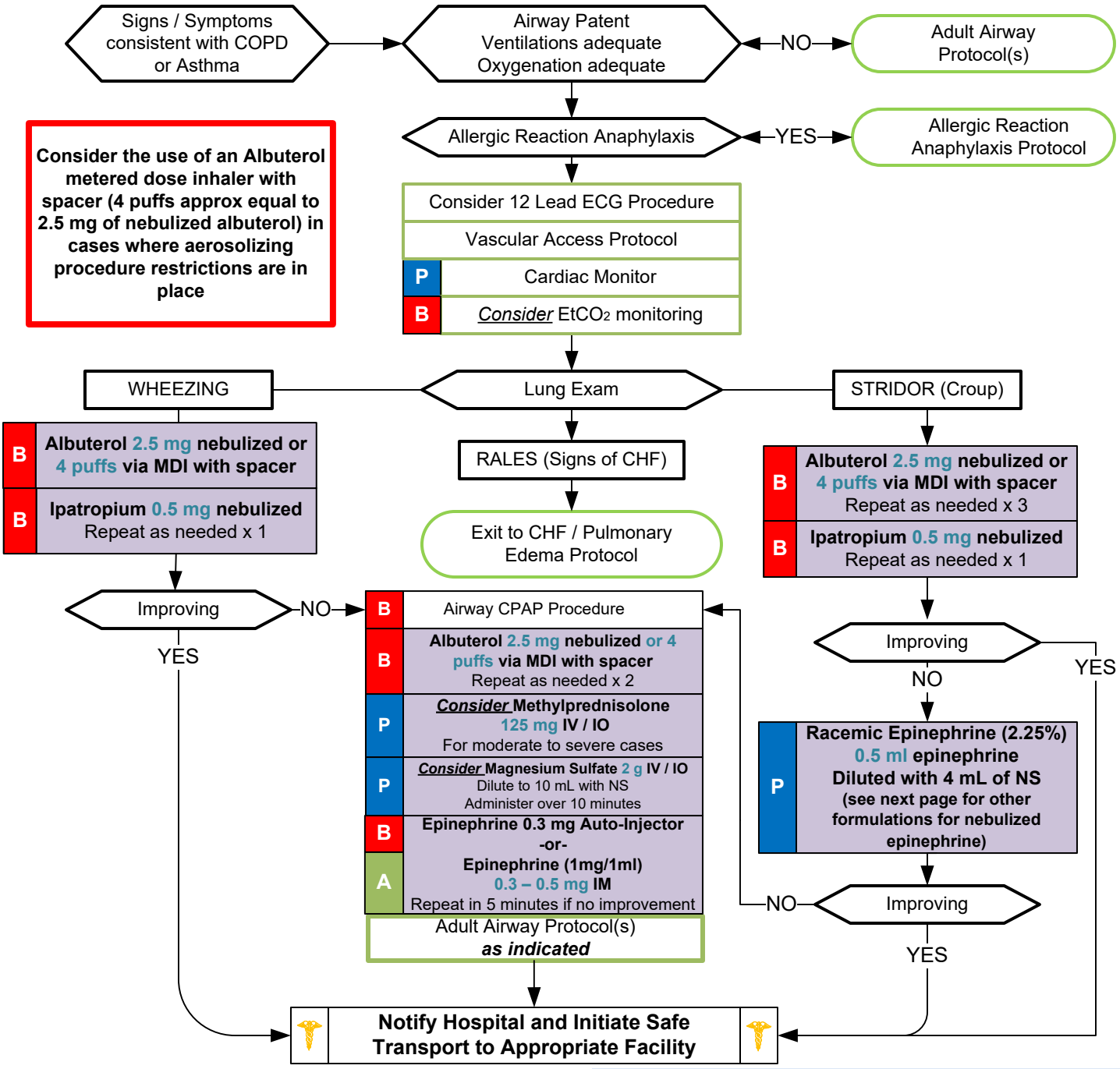
- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- Overdose or Toxin patients with significant ingestions/exposures should be monitored very closely and aggressively treated as indicated. Do not hesitate to contact medical direction for advice as certain critically ill overdose patients may quickly overwhelm medication supplies. For example, patients with a tricyclic overdose with a wide QRS and altered mental status should receive multiple sodium bicarbonate boluses until QRS narrowing and clinical improvement; patients with organophosphate toxicity with SLUDGEM syndrome may require more atropine than is usually carried on the ambulance.
- For patients with Beta-blocker and Calcium Channel blocker overdoses and hemodynamic instability, high-dose insulin is an effective treatment which should be started early. Ensure adequate pre-notification is given for such patients as it takes time to obtain and prepare medications and equipment at the receiving hospital.
- Consider the need for law enforcement to assist with involuntary transport if suicidal intent is suspected or if patient does not appear to be in a state of mind conducive to making appropriate decisions for personal safety.
- **Do not rely on patient history of ingestion, especially in suicide attempts. Make sure patient is not carrying other medications or weapons.**
- **Bring pill bottles, contents, emesis to the emergency department.**
- **Acronyms for organophosphate poisoning:**
  - **S.L.U.D.G.E.M.: Salivation, Lacrimation, Urination, Defecation, GI distress, Emesis, Miosis**
  - **D.U.M.B.B.E.L.S: Diarrhea, Urination, Miosis, Bradycardia, Bronchorrhea, Emesis, Lacrimation, Salivation.**
- **Tricyclic:** 4 major areas of toxicity: decreased mental status, dysrhythmias, seizures, hypotension, then coma and death. There may be a rapid progression from alert mental status to death.
- **Acetaminophen:** initially normal or nausea/vomiting. If not detected and treated, causes irreversible liver failure
- **Aspirin**: Early signs consist of abdominal pain and vomiting. Tachypnea and altered mental status may occur later. Renal dysfunction, liver failure, and or cerebral edema among other things can take place later.
- **Depressants:** decreased HR, decreased BP, decreased temperature, decreased respirations, non-specific pupils
- **Stimulants:** increased HR, increased BP, increased temperature, dilated pupils, seizures
- **Anticholinergic:** increased HR, increased temperature, dilated pupils, mental status changes
- **Cardiac Medications:** dysrhythmias and mental status changes
- **Solvents:** nausea, coughing, vomiting, and mental status changes
- **Insecticides:** increased or decreased HR, increased secretions, nausea, vomiting, diarrhea, pinpoint pupils
- Consider restraints if necessary for patient's and/or personnel's protection per the Restraint Procedure.
- **Nerve Agent Antidote kits** contain 2 mg of Atropine and 600 mg of pralidoxime in an autoinjector for self administration. These are available in larger quantities as part of the CHEMPACK program.
- **Consider contacting the Regional Poison Center for guidance, either directly (1-800-222-1222) or through Hospital.**

# Respiratory Distress

### History
- Asthma; COPD -- chronic bronchitis, emphysema, congestive heart failure
- Home treatment (oxygen, nebulizer)
- Medications (theophylline, steroids, inhalers)
- Toxic exposure, smoke inhalation

### Signs and Symptoms
- Shortness of breath
- Pursed lip breathing
- Decreased ability to speak
- Increased respiratory rate and effort
- Wheezing, rhonchi
- Use of accessory muscles
- Fever, cough
- Tachycardia

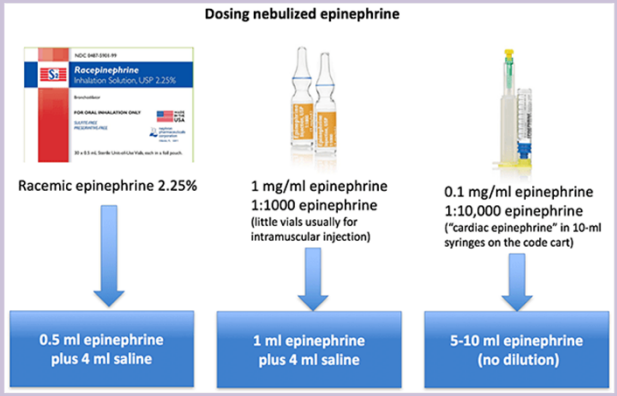
### Differential
- Asthma
- Anaphylaxis
- Aspiration
- COPD (Emphysema, Bronchitis)
- Pleural effusion
- Pneumonia
- Pulmonary embolus
- Pneumothorax
- Cardiac (MI or CHF)
- Pericardial tamponade
- Hyperventilation
- Inhaled toxin (Carbon monoxide, etc.)



# Respiratory Distress



| Factors | Asthma | COPD |
|---|---|---|
| Age when it starts | • Typically in childhood<br>• Does not generally worsen with age | • Usually in later adulthood (but as soon as the early 40s)<br>• Worsens over time |
| Triggers/Causes | • Allergens (dust, plants, animals, etc.)<br>• Weather<br>• Heredity | • Directly linked to smoking<br>• Less commonly caused by inhaled fumes, pollution, dust, and chemicals |
| Symptoms | • Patient is often symptom free between attacks | • Chronic (occur almost all the time) |
| Airflow | • Usually treatment can quickly and fully restore airflow | • Can be partly restored by quitting smoking and taking prescribed medicines |




**Key Points:**

- Asthma is reversible and typically responds well to medications (albuterol, steroids, epinephrine for severe symptoms), as the underlying problem is inflammation and smooth muscle constriction.
- COPD is generally not reversible and responds poorly to medications, as the underlying problem is chronic inflammation leading to destruction of the airway supportive tissues. This results in less elasticity which leads to decreased effectiveness of bronchodilator medications.
- Use of IM epinephrine should be used after consideration of risks vs benefits

**Pearls**

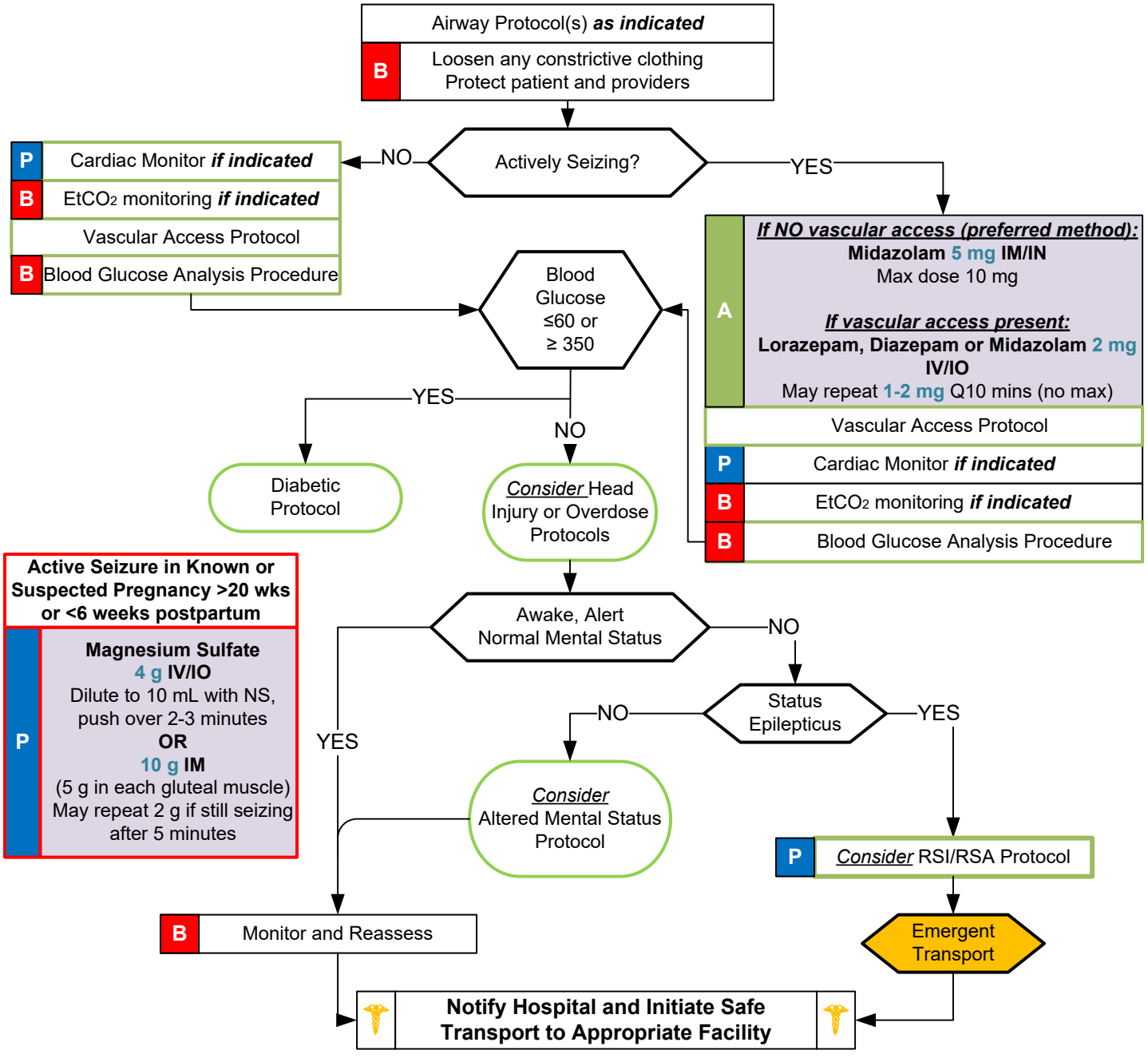
- **Recommended Exam: Mental Status, HEENT, Skin, Neck, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Pulse oximetry and End-Tidal Waveform Capnography should be monitored continuously for patients in persistent distress.**
- **Use of IM Epinephrine should be used conservatively in patients with wheezing.**
- $EtCO_2$ should be used when Respiratory Distress is significant and does not respond to initial Beta-Agonist dose.
- A silent chest in respiratory distress is a pre-respiratory arrest sign, be prepared to RSA.
- Consider Lorazepam IV / IO / IN to assist with CPAP compliance. Lorazepam may precipitate respiratory depression or may actually worsen compliance with CPAP in patients who are already tired, already with altered mental status, or who have recent history of alcohol or drug ingestion. All efforts at verbal coaching should be utilized prior to giving benzodiazepines for patients in respiratory distress.
- EMTs may administer albuterol inhaler if the inhaler is patient prescribed OR if EMT is trained in albuterol administration

# Seizure - Adult

**History**
- Reported / witnessed seizure activity
- Previous seizure history
- Medical alert tag information
- Seizure medications
- History of trauma
- History of diabetes
- History of pregnancy
- Time of seizure onset
- Document number of seizures
- Alcohol use, abuse or abrupt cessation
- Fever

**Signs and Symptoms**
- Decreased mental status
- Sleepiness
- Incontinence
- Observed seizure activity
- Evidence of trauma
- Unconscious

**Differential**
- CNS (Head) trauma
- Tumor
- Metabolic, Hepatic, or Renal failure
- Hypoxia
- Electrolyte abnormality (Na, Ca, Mg)
- Drugs, Medications, Non-compliance
- Infection / Fever
- Alcohol withdrawal
- Eclampsia
- Stroke
- Hyperthermia
- Hypoglycemia



# Seizure - Adult



- Asses for pseudo-seizures prior to administering benzodiazepines. These seizures are not true seizures and do not require benzodiazepines. The following assessment skills may be used to determine pseudo-seizures from true seizures:

  - Patients who withdraw from focal painful stimuli
  - Patients who respond to verbal commands
  - Patients who respond to focal stimulation (eyelash brush)

- If unable to confirm pseudo-seizure from above list, proceed with protocol.

**Pearls**

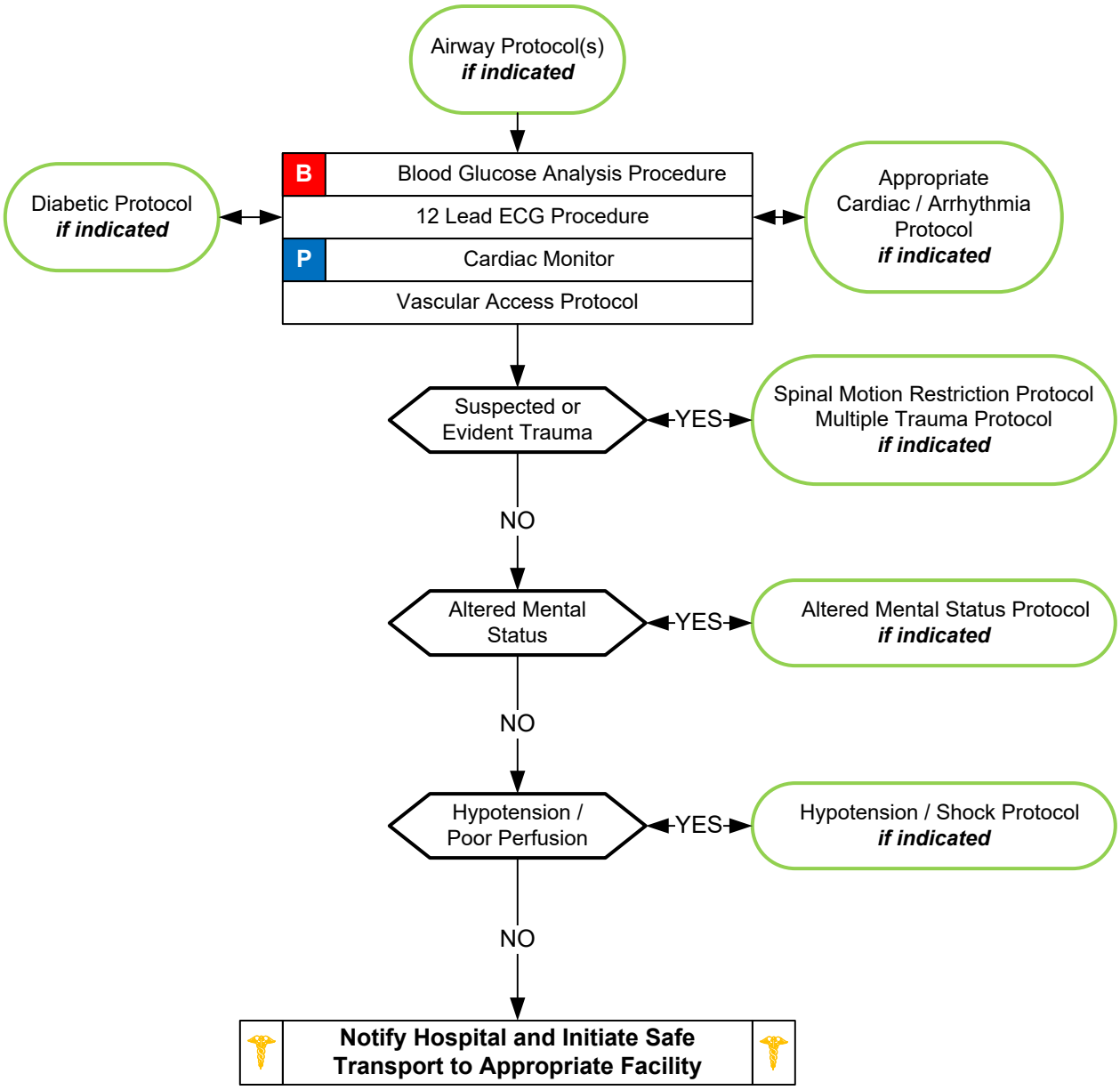
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Extremities, Neuro**
- **IN/IM routes are preferred over rectal (PR), IV or IO.**
- **- Recent evidence has shown IM midazolam is at least as safe and effective as IV lorazepam for prehospital seizures**
- **Hypoglycemia has been found to rarely be the cause of an actively seizing patient – Checking blood glucose is important but do not delay treatment of the actively seizing patient to check blood glucose**
- **For a seizure that begins in the presence of EMS, if the patient was previously conscious, alert, and oriented, take time to assess and protect the patient and providers and consider the cause. The seizure may stop, especially in patients who have prior history of self-limiting or pseudoseizures. However, do not hesitate to treat recurrent or prolonged (> 1 minute) seizure activity.**
- **For the purposes of this protocol, status epilepticus is defined as two or more successive seizures without a period of consciousness or recovery, or one prolonged seizure lasting longer than 5 minutes. This is a true emergency requiring rapid airway control, treatment, and transport. The true definition of status epilepticus requires 30 minutes of uninterrupted seizure activity, or multiple seizures without return to baseline in between.**
- **Grand mal seizures (generalized) are associated with loss of consciousness. Often incontinence and/or tongue trauma is also present.**
- **Focal seizures (petit mal) affect only a part of the body and are not usually associated with a loss of consciousness**
- **Be prepared for airway problems and continued seizures.**
- **Assess for the possibility of occult trauma or substance abuse.**
- **Be prepared to assist ventilations and/or manage the airway especially if lorazepam or midazolam is used.**
- **For any seizure in a pregnant patient, follow the OB Emergencies Protocol.**

# Syncope

**History**
- Cardiac history, stroke, seizure
- Occult blood loss (GI, ectopic)
- Females: LMP, vaginal bleeding
- Fluid loss: nausea, vomiting, diarrhea
- Past medical history
- Medications

**Signs and Symptoms**
- Loss of consciousness with recovery
- Lightheadedness, dizziness
- Palpitations, slow or rapid pulse
- Pulse irregularity
- Decreased blood pressure

**Differential**
- Vasovagal
- Orthostatic hypotension
- Cardiac syncope
- Micturition / Defecation syncope
- Psychiatric
- Stroke
- Hypoglycemia
- Seizure
- Shock (see Shock Protocol)
- Toxicological (Alcohol)
- Medication effect (hypertension)
- PE
- AAA



# Syncope



**Pearls**

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- Assess for signs and symptoms of trauma and/or head injury if associated with fall or if it's questionable whether the patient fell due to syncope.
- Consider dysrhythmias, GI bleed, ectopic pregnancy, and seizure as possible causes of syncope.
- Syncope patients should be transported as there is often a treatable etiology.
- Near-syncope is equivalent to syncope from a medical perspective.
- More than 25% of geriatric syncope is cardiac dysrhythmia based.
- Syncope is a common presentation for a multitude of life-threatening conditions such as AAA, dysrhythmia, seizure, acute blood loss, ectopic pregnancy, CHF, etc. Make sure to broaden your differential as appropriate.

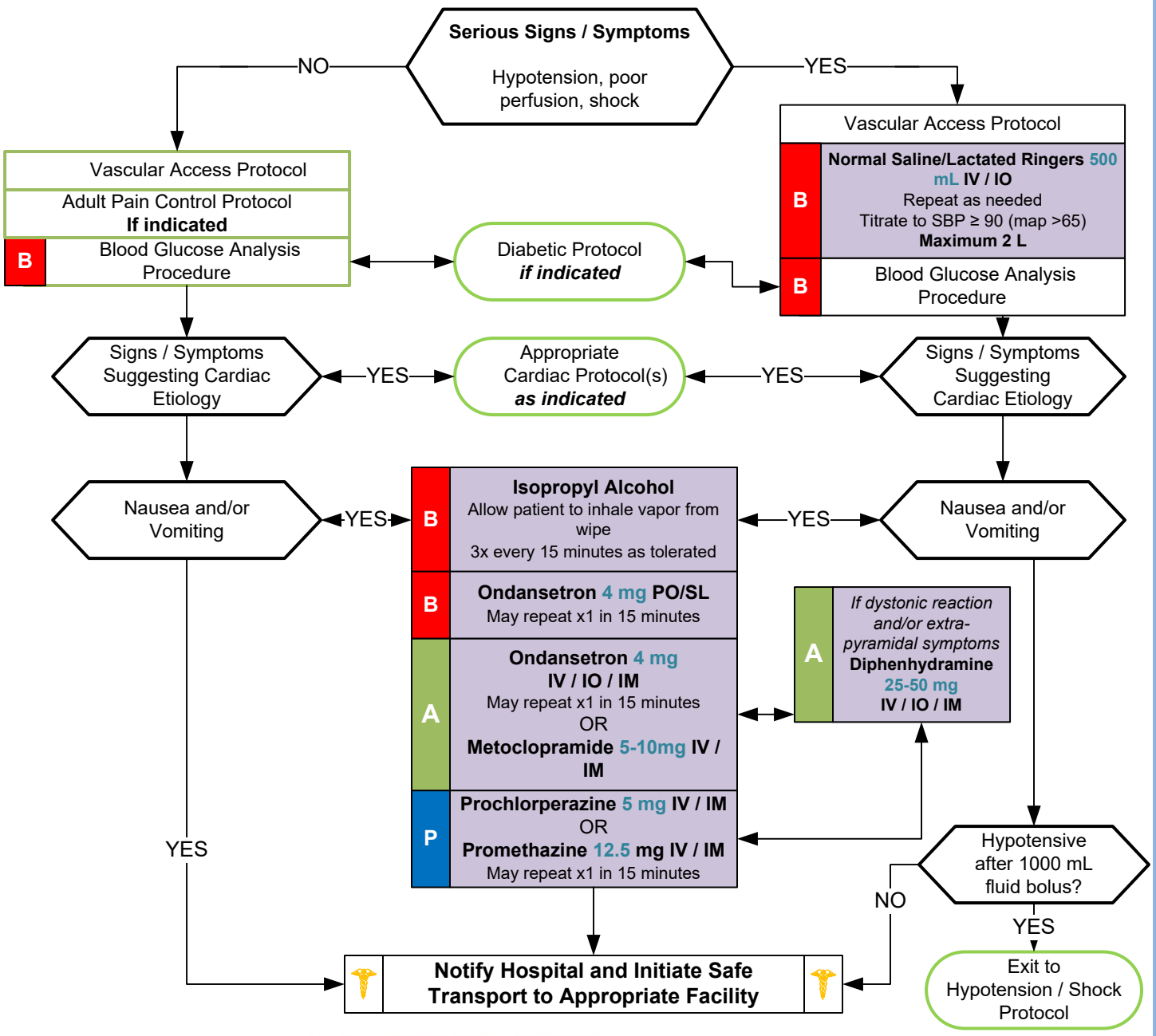
# Nausea, Vomiting and Diarrhea - Adult

**History**
- Age
- Time of last meal
- Last bowel movement/emesis
- Improvement or worsening with food or activity
- Duration of problem
- Other sick contacts
- Past medical history
- Past surgical history
- Medications
- Menstrual history (pregnancy)
- Travel history
- Bloody emesis / diarrhea

**Signs and Symptoms**
- Abdominal Pain?
- Character of pain (constant, intermittent, sharp, dull, etc.)
- Distention
- Constipation
- Diarrhea
- Anorexia
- Radiation

**Associated symptoms: (Helpful to localize source)**
Fever, headache, blurred vision, weakness, malaise, myalgias, cough, headache, dysuria, mental status changes, rash

**Differential**
- CNS (increased pressure, headache, stroke, CNS lesions, trauma or hemorrhage, vestibular)
- Myocardial infarction
- Drugs (NSAID's, antibiotics, narcotics, chemotherapy)
- GI or Renal disorders
- Diabetic ketoacidosis
- Gynecologic disease (ovarian cyst, PID)
- Infections (pneumonia, influenza)
- Electrolyte abnormalities
- Food or toxin induced
- Medication or Substance abuse
- Pregnancy
- Psychological




Adult Medical Protocols

# Nausea, Vomiting and Diarrhea - Adult



**Pearls**

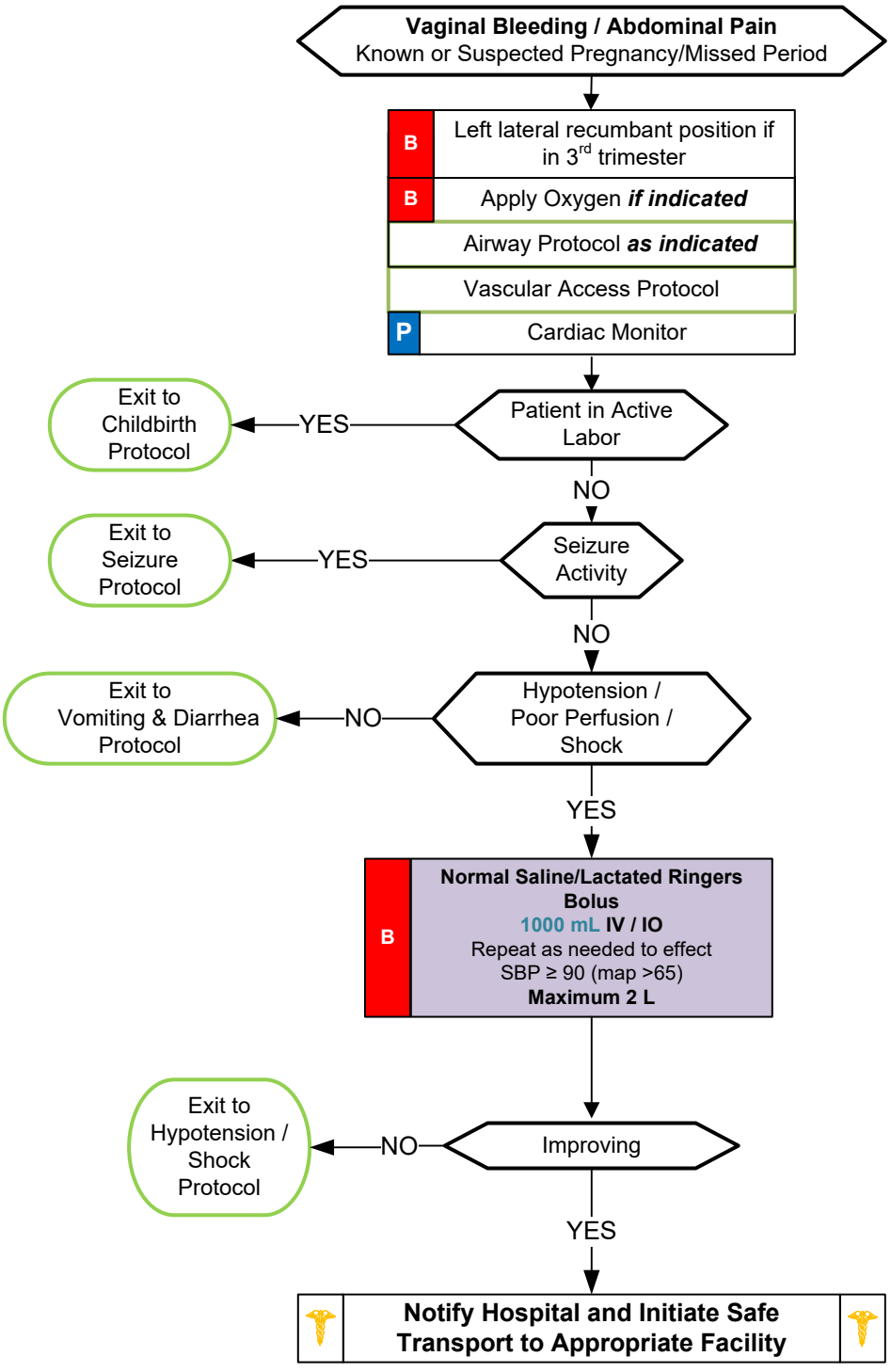
- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- Dystonic and extrapyramidal symptoms (EPS) such as facial grimacing, akathisia (restlessness), and tardive dyskinesia are possible side effects of anti-emetics. If encountered, consider administering diphenhydramine 25-50 mg IV/IM/PO)
- Isolated vomiting may be caused by pyloric stenosis (in pediatrics), bowel obstruction, and CNS processes (bleeding, tumors, or increased CSF pressures).
- IV Ondansetron (Zofran) solution may be given by any route.
- There is a risk of QT interval prolongation with many anti-emetic medications, but specifically with ondansetron. Although not required, providers should consider cardiac monitoring and obtaining a 12-lead ECG prior to administration of these medications, especially in patients who are also taking anti-psychotic, antibiotic, cardiac, or neurologic medications. If the QTc interval is close to or greater than 500ms, medical control authorization should be obtained prior to administration of medications.
- Ondansetron is not effective on acute alcohol intoxication.

# Obstetrical Emergency

**History**
- Past medical history
- Hypertension meds
- Prenatal care
- Prior pregnancies / births
- Gravida / Para

**Signs and Symptoms**
- Vaginal bleeding
- Abdominal pain
- Seizures
- Hypertension
- Severe headache
- Visual changes
- Edema of hands and face

**Differential**
- Pre-eclampsia / Eclampsia
- Placenta previa
- Placenta abruptio
- Spontaneous abortion



# Obstetrical Emergency



**Pearls**

- **Recommended Exam: Mental Status, Abdomen, Heart, Lungs, Neuro**
- Severe headache, vision changes, or RUQ pain may indicate preeclampsia.
- In the setting of pregnancy, hypertension is defined as a BP greater than 140 systolic or greater than 90 diastolic, or a relative increase of 30 systolic and 20 diastolic from the patient's normal (pre-pregnancy) blood pressure.
- Maintain patient in a left lateral position to minimize risk of supine hypotensive syndrome, which may occur as the fetus gets large enough to compress the vena cava.
- Ask patient to quantify bleeding - number of pads used per hour.
- **Any pregnant patient involved in a MVC should be seen immediately by a physician for evaluation. Greater than 20 weeks generally require several hours of fetal monitoring.** ***DO NOT suggest that the patient needs an ultrasound. Consider transport to a Trauma Center for a female over 20 weeks pregnant.***
- Magnesium may cause hypotension and decreased respiratory drive.
- A patient who is pregnant and seizing should be presumed to have eclampsia, a true medical emergency. Magnesium administration should be a priority in these patients. However, benzodiazepines may be given first due to rapidity of administration. For crews with two ALS providers, one provider should administer a benzodiazepine while the other provider establishes IV access for Magnesium.
- Automated CPR devices have been approved for use in pregnant patients. It is not well studied, however, it should be utilized to provide continuous and effective chest compressions.
- Consider tiering with ALS

# Childbirth / Labor

**History**
- Due date
- Time contractions started / how often
- Rupture of membranes
- Time / amount of any vaginal bleeding
- Sensation of fetal activity
- Past medical and delivery history
- Medications
- Gravida / Para Status
- High Risk pregnancy

**Signs and Symptoms**
- Spasmodic pain
- Vaginal discharge or bleeding
- Crowning or urge to push
- Meconium

**Differential**
- Abnormal presentation
  - Buttock
  - Foot
  - Hand
- Prolapsed cord
- Placenta previa
- Abruptio placenta

B Place patient in left lateral recumbent position

Abnormal Vaginal Bleeding / Hypertension / Hypotension / Severe Headache / Seizure

YES → Obstetrical Emergency Protocol ***as indicated***

NO

**Consider the need for additional resources early!**

B Inspect Perineum (No digital vaginal exam)

**Expedite transport to closest facility**

**Priority symptoms:**
**Crowning**
**Abnormal presentation**
**Severe vaginal bleeding**
**Multiple gestation**
**Unfavorable maternal anatomy**

**No Crowning**

B Monitor and Reassess

B Document frequency and duration of contractions

**Crowning >36 Weeks Gestation**

B Vascular Access Protocol

B Childbirth Procedure

**Prolapsed Cord**

B Hips Elevated, Knees to Chest

B Insert fingers into vagina to relieve pressure on cord

B Warm Saline Dressing Over cord

B Expedite Transport

B Apply High Flow Oxygen

**Breech Birth**

B Initiate transport, deliver only if inevitable

B Encourage Mother to refrain from pushing

B Support Presenting Parts Do Not Pull

B Apply High Flow Oxygen

**Shoulder Dystocia**

B Hips Hyper-elevated, Knees to Chest

B Apply Firm Suprapubic pressure to attempt to dislodge shoulder

B Apply High Flow Oxygen

B Expedite Transport

**Unable to Deliver**

Create air passage by supporting presenting part of infant.

Place 2 fingers along vaginal wall and push away from face Transport in Knee to Chest Position or Left Lateral Position

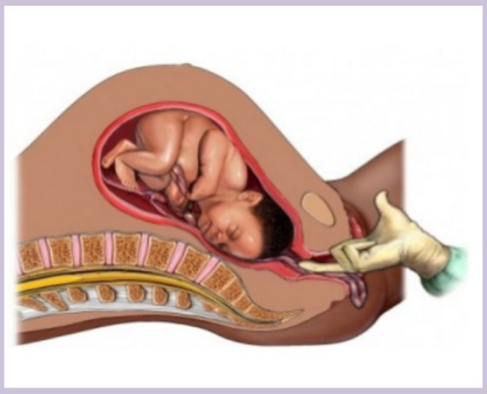
**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

**Delivery**
Go to Newly Born Protocol

Adult Obstetrical Protocols

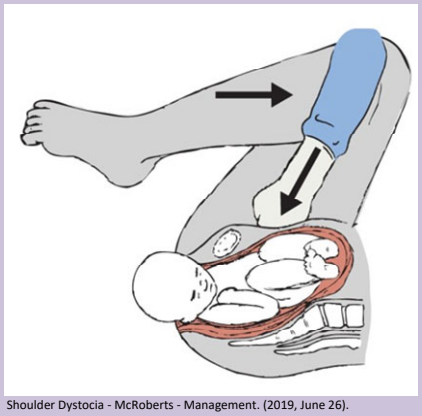
# Childbirth / Labor





National Safety Council 2011, Pregnancy & Childbirth :Prolapsed Cord

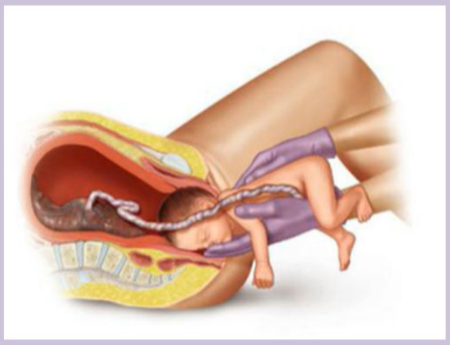
**Prolapsed Cord:** Place mother is hips elevated and knees to chest position. Then insert gloved fingers into vagina to relieve pressure on the cord. Place warm saline dressing over exposed cord, apply high flow oxygen, and expedite transport



Shoulder Dystocia - McRoberts - Management. (2019, June 26).

from https://teachmeobgyn.com/labour/emergencies/shoulder dystocia/

**Shoulder Dystocia:** Place mother is hips hyper-elevated and knees to chest position. Then apply firm suprapubic pressure. Apply high flow oxygen and expedite transport



National Safety Council 2011, Pregnancy & Childbirth:Breech Delivery

**Breech Birth:** Initiate transport and delivery only if inevitable. Encourage mother to refrain from pushing. If delivery is inevitable, support presenting parts, DO NOT pull. Place 2 fingers along vaginal wall and push away from face to create an open airway. Apply high flow oxygen, and expedite transport with patient in left lateral position or knees to chest position.

**Pearls**

- **Recommended Exam (of Mother): Mental Status, Heart, Lungs, Abdomen, Neuro**
- Document all times (delivery, contraction frequency, and length).
- If maternal seizures occur, refer to the Obstetrical Emergencies Protocol.
- After delivery, massaging the fundus (lower abdomen) will promote uterine contraction and help to control post-partum bleeding.
- Some perineal bleeding is normal with any childbirth. Large quantities of blood or free bleeding are abnormal.
- Record APGAR at 1 and 5 minutes after birth. If APGAR score < 7 at five minutes, repeat APGAR at 10 minutes.
- Record time of birth for living records
- Consider tiering with ALS

# Newly Born

**History**
- Due date and gestational age
- Multiple gestation (twins etc.)
- Meconium
- Delivery difficulties
- Congenital disease
- Medications (maternal)
- Maternal risk factors
  - substance abuse
  - smoking

**Signs and Symptoms**
- Respiratory distress
- Peripheral cyanosis or mottling (normal)
- Central cyanosis (abnormal)
- Altered level of responsiveness
- Bradycardia

**Differential**
- Airway failure
  - Secretions
  - Respiratory drive
- Infection
- Maternal medication effect
- Hypovolemia
- Hypoglycemia
- Congenital heart disease
- Hypothermia

Care of mother
Appropriate Protocol

Term Gestation
Breathing or Crying
Good Muscle Tone

YES

| | |
|---|---|
| B | Provide warmth / Dry infant<br>Clear airway ***if necessary*** |
| B | Monitor and Reassess |

No

| | |
|---|---|
| B | Warm, Dry and Stimulate<br>Clear airway **if necessary** |

Heart Rate < 100
Agonal breathing or Apnea

NO

Labored breathing /
Persistent Cyanosis

NO

YES

YES

| | |
|---|---|
| B | BVM Ventilations (every 2 secs) for 30 seconds |
| B | Pulse Oximetry |
| P | Cardiac Monitor |

NO

Heart Rate < 60

YES

| | |
|---|---|
| B | Chest Compressions |
| | Pediatric Airway Protocol(s) |
| | Vascular Access Protocol |

Heart Rate < 60

NO

| | |
|---|---|
| B | Supplemental Oxygen<br>Maintain Target SpO2 |
| B | Maintain warmth |
| B | Monitor and Reassess |
| B | Blood Glucose Analysis Procedure |
| B | **<u>If Glucose <40</u>:**<br>**Dextrose 10% (D10)**<br>**5 mL IV / IO**<br>Dilute 1 mL of D50 with 4 mL of NS |

YES

| | |
|---|---|
| B | **Normal Saline/Lactated Ringers Bolus**<br>**10 mL/kg IV / IO**<br>*May repeat x 1* |
| P | **Epinephrine 1mg/10ml**<br>**0.01 mg/kg IV / IO**<br>Every 3 to 5 minutes as needed |

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

**<u>Airway Suctioning</u>**
**Routine suctioning of the newborn is no longer recommended**

**<u>Clear amniotic fluid:</u>**
Suction only when obstruction is present and / or if BVM is needed.

**<u>Meconium present:</u>**
Non-vigorous newborns may require deep suction if no response to initial resuscitation efforts

Most newborns requiring resuscitation will respond to ventilations / BVM, compressions and / or epinephrine.

If not responding *<u>consider</u>* hypovolemia, pneumothorax and / or hypoglycemia (< 40.)

**<u>Neonate Target SpO2:</u>**
1 min – 60-65%
2 min – 65-70%
3 min – 70-75%
4 min – 75-80%
5 min – 80-85%
10 min – 85-95%

Adult Obstetrical Protocols

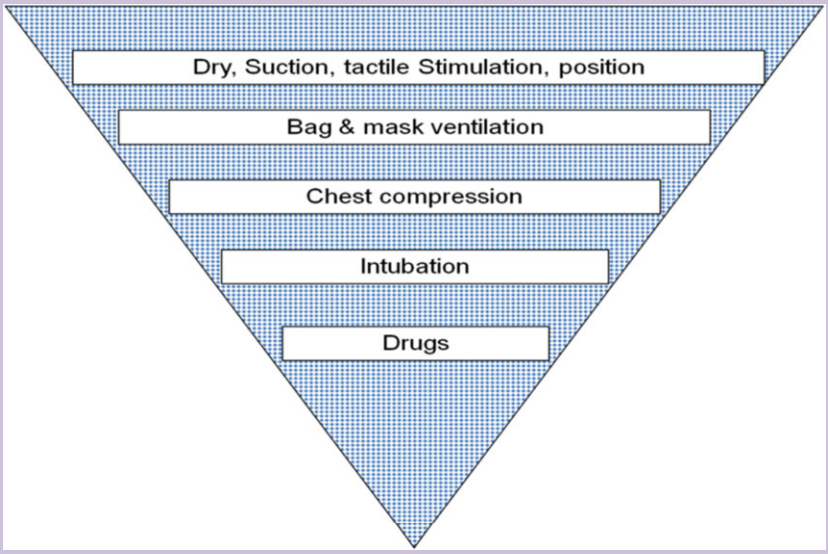
# Newly Born



## APGAR SCORING

| INDICATOR | 0 | 1 | 2 |
|---|---|---|---|
| HR | Absent | <100 | >100 |
| RR | Absent | Slow, irregular weak cry | Good vigorous cry |
| MUSCLE TONE | Flaccid, limp | Some flexion of extremities | Good flexion, active motion |
| REFLEX IRRITABILITY | NR | Weak cry and grimace | Vigorous cry, cough, sneeze |
| SKIN COLOR | Blue | Acrocyanosis | Pink |

Inverted Pyramid of Neonatal Resuscitation

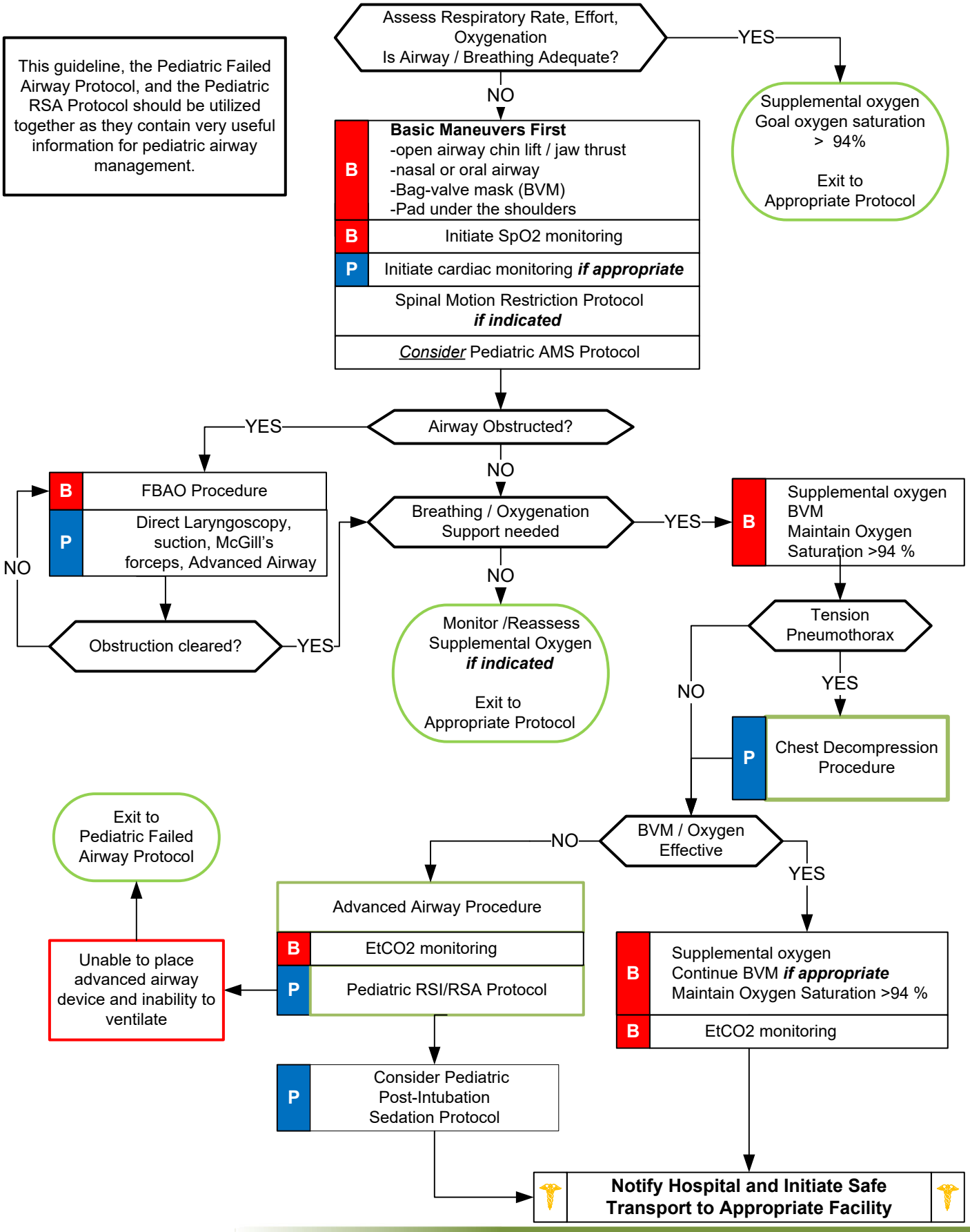



**Pearls**

- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Chest, Heart, Abdomen, Extremities, Neuro**
- **Transport mother WITH infant when at all possible.**
- **Term gestation, strong cry / breathing and with good muscle tone generally will need no resuscitation.**
- **Most important vital signs in the newly born are respirations / respiratory effort and heart rate.**
- Heart rate best assessed by auscultation of the precordial pulse followed palpation of the umbilical pulse.
- Pulse oximetry should be applied to the right side of the body.
- Approximately 10% of newborns will require some assistance to begin breathing
- CPR in newborns is 120 compressions/minute with a **3:1** compression to ventilation ratio.
- It is extremely important to keep infant warm. Hypothermia is common in newborns and worsens outcomes of nearly all postnatal complications.
- Maternal sedation or narcotics will sedate infant (Naloxone NO LONGER recommended - supportive care only).
- Maternal hyperglycemia can put newborn at risk for hypoglycemia.
- Consider hypoglycemia in infant (Heel stick < 40). It is normal for infants to have blood glucose <60 for several hours of life, hypoglycemia in the newborn is considered <40.
- D10 = D50 diluted (1 ml of D50 with 4 ml of Normal Saline)
- Record APGAR at 1 and 5 minutes after birth. If APGAR score < 7 at five minutes, repeat APGAR at 10 minutes
- Consider tiering with ALS

# Pediatric Airway

This guideline, the Pediatric Failed Airway Protocol, and the Pediatric RSA Protocol should be utilized together as they contain very useful information for pediatric airway management.



# Pediatric Airway



**KING/LARYNGEAL TUBE AIRWAYS**

| | King | Weight/ Length | Ways to Remember |
|---|---|---|---|
| Peds | 0 | < 5 kg | 0 for a 0-year-old |
| | 1 | 5–12 kg | 1 for a 1-year-old |
| | 2 | 12–25 kg | 2 for a 2-year-old |
| | 2.5 | 25–35 kg | 2.5 for 25 kg |

https://www.emsworld.com/article/1223682/tubes-kids-helpful-hints-memory-aids

**ETT Airway**

| Body weight/ age | Size (mm) | Oral depth (cm) | Nasal depth (cm) |
|---|---|---|---|
| Newly-born 3.5 kg | 3.0 | 9 | 11–11.5 |
| 1–6 months | 3.5 | 9.5–11 | 12–13 |
| 6–12 months | 4.0 | 11.5–12 | 13–14 |
| 2–3 years | 4.5 | 13–13 | 15–16 |
| 4–5 years | 5.0 | 14–14 | 17–18 |
| 6–7 years | 5.5 | 15–15.5 | 19 |
| 8–9 years | 6.0 | 16–16 | 20 |
| 10–11 years | 6.5 | 17–17 | 21 |
| 12–13 years | 7.0 | 18–18 | 22 |
| 14–16 years | 7.5 | 19 | 23 |

https://aneskey.com/equipment-for-paediatric-intensive-care/

**LARYNGEAL MASK AIRWAYS AND I-GEL AIRWAYS**

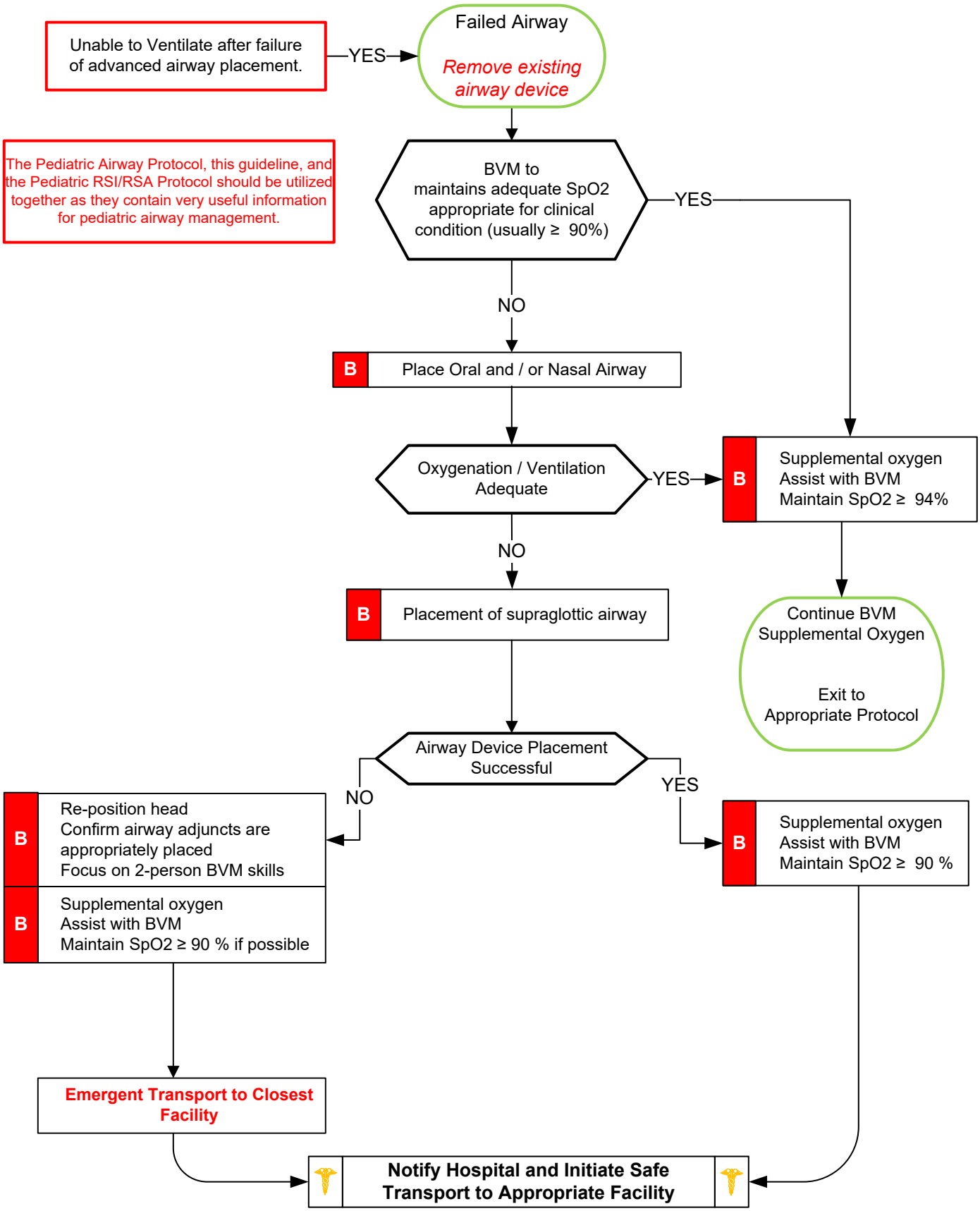
| | AuraGain, LMA Supreme, i-gel | Weight | Ways to Remember |
|---|---|---|---|
| Peds | 1 | < 5 kg | 1 for 1 hour old |
| | 1.5 | 5–10 kg | 1½ for up to 1½ years old |
| | 2 | 10–20 kg | 2 years old to 20 kg |
| | 2.5 | 20–30 kg | 2.5 for 25 kg |

https://www.emsworld.com/article/1223682/tubes-kids-helpful-hints-memory-aids

## Pearls

- **For this guideline, pediatric is defined as ≤ 15 years of age, < 40 kg in weight, lack of signs of puberty, or any patient who can be measured within the Broselow tape.**
- **Continuous waveform capnography (EtCO2) is mandatory with all advanced airway placements. Document results.**
- **If an effective airway is being maintained by BVM with continuous pulse oximetry values of > 94% or stable/improving values consistent with clinical condition (e.g. pulse oximetry in the mid 80s post-drowning), it would be most appropriate to continue with basic airway measures instead of placing an advanced airway.**
- **For the purposes of this guideline, a secure airway is when the patient is receiving appropriate oxygenation and ventilation.**
- **Ventilatory rate should generally be 30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 8-12 per minute. Goal ventilation rate should maintain EtCO2 between 35 and 45; AVOID HYPERVENTILATION.**
- Do not attempt advanced airway placement in patients who maintain a gag reflex.
- A gastric suction tube should be considered in all patients with a supraglottic airway (paramedic scope of practice only).
- It is important to secure the airway device well and consider c-collar (even in absence of trauma) to better maintain airway placement. Manual stabilization of the airway device should be used during all patient moves / transfers.
- Consider the use of a supraglottic airway (SGA) if BVM is not effective in maintaining oxygenation and/or ventilation. Examples include, but are not limited to the laryngeal mask airway (LMA), i-gel, or King laryngeal tube. This is especially important in children since endotracheal intubation is an infrequently performed skill in this age group and has not been shown to improve outcomes

# Pediatric Difficult Airway



# Pediatric Difficult Airway



**Pearls**

- **For this guideline, pediatric is defined as less than 15 years of age, < 40 kg in weight, lack of signs of puberty, or any patient which can be measured within the Broselow tape.**
- **Continuous waveform capnography (EtCO2) is mandatory with all advanced airway devices. Document results.**
- **If an effective airway is being maintained by BVM with continuous pulse oximetry values of ≥ 94% or stable/improving values appropriate to clinical condition (e.g. values in the mid 80s with a post-drowning patient), it would be most appropriate to continue with basic airway measures instead of using an advanced airway device.**
- **For the purposes of this guideline a secure airway is when the patient is receiving appropriate oxygenation and ventilation.**
- **Ventilatory rate should generally be 30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 8-12 per minute. The goal rate maintains an EtCO2 between 35 and 45 and avoid hyperventilation.**
- A gastric suction tube placement should be placed in all patients with a supraglottic airway device (paramedic scope of practice).
- It is important to secure the airway device well and consider c-collar (even in absence of trauma) to better maintain device placement. Manual stabilization of the airway device should be used during all patient moves / transfers.

# Pediatric RSI/RSA

The Pediatric Airway Protocol, the Pediatric Failed Airway Protocol, and this guideline should be utilized together as they contain very useful information for pediatric airway management.

Can this patient be appropriately managed with a BVM and airway adjuncts?

YES → Exit to appropriate guideline

NO

## Preoxygenate x 3 minutes

$SpO_2$ > 90% and breathing spontaneously?

YES

NO

- B: Ventilate with BVM until $SpO_2$ > 90%
- B: Apply NRB/NC
- B: Maintain inline c-spine immobilization

## Attach monitor devices

- B: Attach $SpO_2$ to patient
- B: Attach $EtCO_2$ detector
- B: Place nasal cannula on patient @ 6LPM
- B: Assist with airway equipment

## Airway Management

- B: **Prepare Airway Equipment**
  - Oral/Nasal adjuncts
  - Advanced airway
  - Suction (2 methods-manual/auto)
- B: Place Advanced Airway

**Success?**

NO → Exit to Pediatric Failed Airway Protocol

YES

- P: Pediatric Post-Intubation Protocol

## Vascular access and medications

Vascular Access Protocol

Known heart disease? ***(Rare)***

NO

- P: **Ketamine 2-3 mg/kg IV / IO**
  -or-
  **Etomidate 0.3 mg/kg IV / IO**
  -or-
  Other medication in formulary or approved by PMD

YES

- P: **Etomidate 0.3 mg/kg IV / IO**

Concern for high potassium? ***(Rare)***
*(e.g. Wheelchair, neuromuscular disease)*

NO

- P: **Succinylcholine 2 mg/kg IV/IO**

YES

- P: **Rocuronium 1 mg/kg IV / IO**
  **OR**
  **Vecuronium 0.1 mg/kg IV / IO**

- B: Call out $SpO_2$ every 10 seconds

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

→ Exit to appropriate guideline

Pediatric Section Protocols

# Pediatric RSA



Always weigh the risks and benefits of advanced airway management in the field against transport. All pre-hospital RSA interventions are considered high risk. If ventilation / oxygenation is adequate, transport may be the best option. The most important airway device and the most difficult to use correctly and effectively is the Bag Valve Mask.

**Few prehospital airway emergencies cannot be temporized or managed with proper BVM techniques.**

**Difficult Airway Assessment**

**Difficult SGA - RODS:**

- **R**estricted mouth opening
- **O**bstruction / Obese or late pregnancy
- **D**istorted or disrupted airway
- **S**tiff or increased airway pressures (Asthma, COPD, Obese, Pregnant)

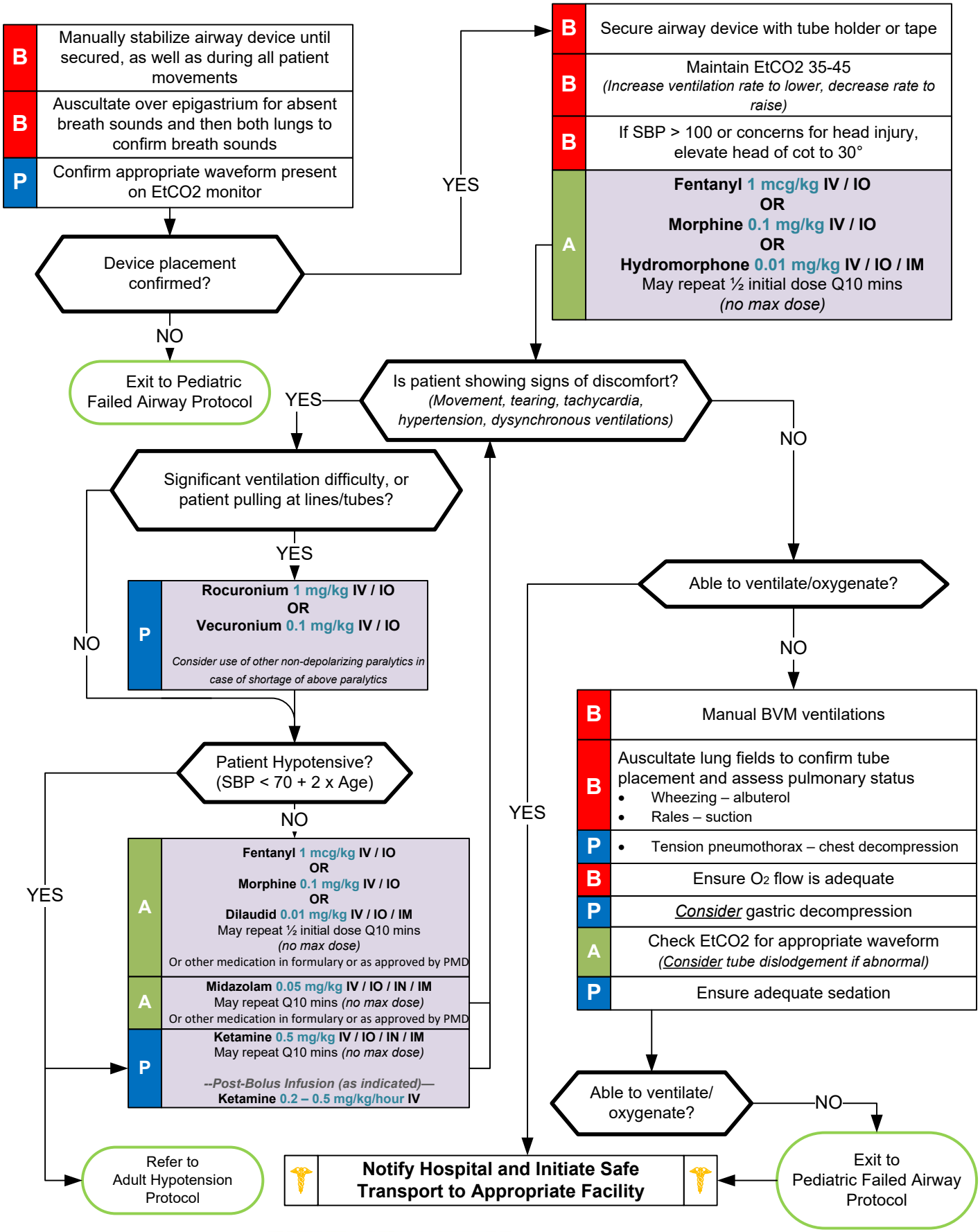
**Trauma:** *Utilize in-line cervical stabilization during King or BVM use. During airway placement the cervical collar front should be open or removed to facilitate translation of the mandible / mouth opening.*

**Indications for RSA**
Failure to protect the airway
Inability to oxygenate
Inability to ventilate
Unstable hemodynamics/shock
GCS < 9 in trauma
Impending airway compromise

**Pearls**

- **At least 2 Paramedics are highly recommended in order to perform pediatric RSA**
- **Divide the workload – ventilate, suction, drugs, airway device placement**
- **Once a patient has been given a paralytic drug, *YOU* ARE RESPONSIBLE FOR VENTILATIONS if desaturation occurs**
- **Continuous Waveform Capnography and Pulse Oximetry are required for airway device verification and ongoing patient monitoring. Of note, EMTs cannot interpret EtCO2 waveform**
- **An airway is considered obtained when the patient is receiving appropriate oxygenation and ventilation.**
- **An appropriate ventilatory rate is one that maintains an EtCO2 of 35-45. Avoid hyperventilation.**
- Protect the patient from self extubation when the drugs wear off. Longer acting paralytics and sedation may be needed post-airway placement.
- A gastric suction tube should be placed with all supraglottic airway devices to limit aspiration and decompress stomach (paramedic scope of practice)
- It is important to secure the airway device well and consider c-collar (in absence of trauma) to better maintain airway device placement. Manual stabilization of the airway device should be used during all patient moves / transfers.
- Etomidate should be used with caution in patients were sepsis is suspected due to theoretical adrenal suppression
- In the situation of medication shortages, midazolam may be substituted for etomidate and/or ketamine, however, it should be noted this is not recommended as a 1st line induction agent

# Pediatric Post Intubation Management



# Pediatric Post Intubation Management



Always weigh the risks and benefits of advanced airway management in the field against transport. All pre-hospital - RSA interventions are considered high risk. If ventilation / oxygenation is adequate, transport may be the best option. The most important airway device and the most difficult to use correctly and effectively is the Bag Valve Mask.

**Few prehospital airway emergencies cannot be temporized or managed with proper BVM techniques.**

**Difficult Airway Assessment**

**Difficult SGA - RODS:**

- **R**estricted mouth opening
- **O**bstruction / Obese or late pregnancy
- **D**istorted or disrupted airway
- **S**tiff or increased airway pressures (Asthma, COPD, Obese, Pregnant)

**Trauma:** *Utilize in-line cervical stabilization during supraglottic or BVM use. During airway placement the cervical collar front should be open or removed to facilitate translation of the mandible / mouth opening.*

**Indications for RSA**
Failure to protect the airway
Inability to oxygenate
Inability to ventilate
Unstable hemodynamics/shock
GCS < 9 in trauma
Impending airway compromise

**Pearls**

- **Continuous Waveform Capnography and Pulse Oximetry are required for airway device verification and ongoing patient monitoring. Of note, EMTs cannot interpret EtCO2 waveform.**
- **An airway is considered obtained when the patient is receiving appropriate oxygenation and ventilation.**
- **An appropriate ventilatory rate is one that maintains an EtCO2 of 35-45. Avoid hyperventilation.**
- Protect the patient from self extubation when the drugs wear off. Longer acting paralytics may be needed post-airway placement.
- A gastric suction tube should be considered with all supraglottic airway devices to limit aspiration and decompress stomach (paramedic scope of practice)
- When dosing paralytics after intubation, patient must also receive adequate sedation
- It is important to secure the airway device well and consider c-collar (in absence of trauma) to better maintain airway device placement. Manual stabilization of the airway device should be used during all patient moves / transfers.

# Pediatric Pain Control

**History**
- Age
- Location
- Duration
- Severity (1 - 10)
- If child use Wong-Baker Faces scale or FLACC score
- Past medical history
- Medications
- Drug allergies

**Signs and Symptoms**
- Severity (pain scale)
- Quality (sharp, dull, etc.)
- Radiation
- Relation to movement, respiration
- Increased with palpation of area

**Differential**
- Per the specific protocol
- Musculoskeletal
- Visceral (abdominal)
- Cardiac
- Pleural / Respiratory
- Neurogenic
- Renal (colic)

Assess Pain Severity Using FLACC or FACES

## Mild Pain (<4 on FLACC/FACES)

**B**
- Apply ice packs to affected area
- Splint injured extremities
- Limit manipulation of affected area(s)
- Transport in position of maximal comfort

**B** Screen for medication contra-indications

**B**
**Consider or assist with for patients <40 kgs:**

**Ibuprofen:**
**10 mg/kg (max 800 mg) PO**
*-OR-*
**Acetaminophen:**
**15 mg/kg (max 1000 mg) PO**
Or other medication in formulary or as approved by PMD

**A**
**Acetaminophen:**
**15 mg/kg (max 1000mg) IV / IO**
***No repeat dosing***
***(Only if patient has not received oral dose)***

*Consider* Vascular Access Protocol

**B** Monitor and Reassess

## Moderate/Severe Pain (≥4 on FLACC/FACES?

*Consider* Vascular Access Protocol

**B** Screen for medication contra-indications

**A**
**Morphine 0.05 mg/kg (>6 mo), 0.025 mg/kg (<6 mo) IV / IO**
**Max initial dose 4 mg**
May repeat every 10 minutes as needed
***OR***
**Fentanyl 1 mcg/kg IV / IO / IN**
**Max initial dose 50 mcg**
May repeat every 10 minutes as needed
**OR**
**Hydromorphone 0.01 mg/kg IV / IO**
**Max initial dose 0.5 mcg**
May repeat every 10 minutes as needed

**P**
*--For Severe Pain--*
**Ketamine 0.1 – 0.2 mg/kg IM / IV**
Dilute and push slowly over 10 minutes

*--Post-Bolus Infusion (as indicated)—*
**Ketamine 0.05 – 0.25 mg/kg/hour IV**

**P** *Consider* Cardiac Monitor

**B** *Consider* EtCO2 Monitoring

**B**
**A**
*--For Overmedication--*
**Naloxone 0.1 mg/kg IN/Auto (EMT)**
**Naloxone 0.1 mg/kg IV / IO (AEMT/Paramedic)**
May repeat as needed if appropriate response noted

Pain Relief after 1st or 2nd administration of opioid?

YES → Exit back to appropriate guideline

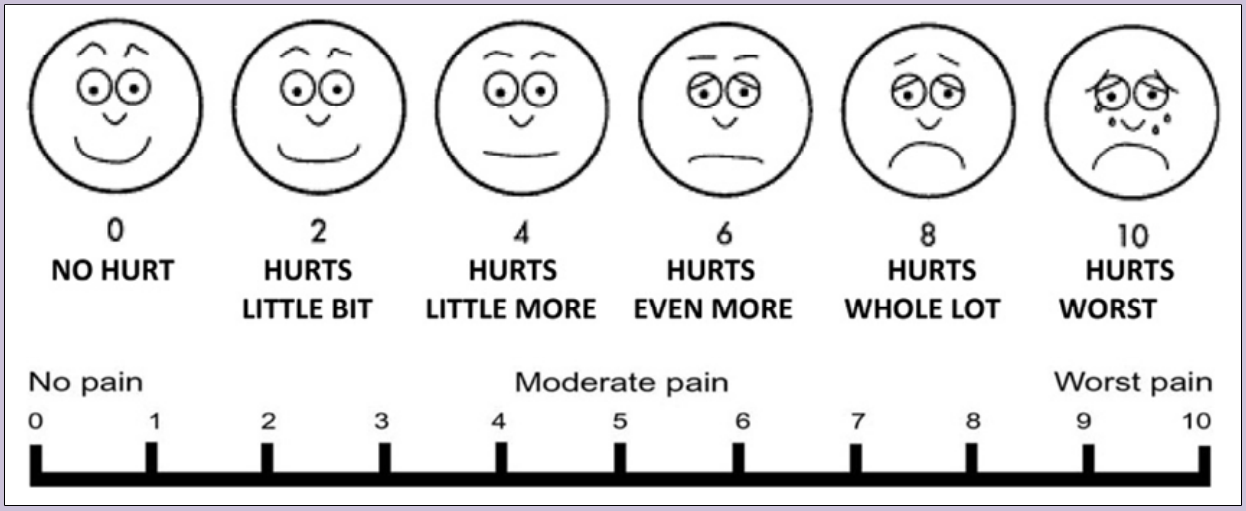
NO → **MD** *Consider* **Contact Medical Control for Further Pain Control/Repeating Protocol**

Pediatric Section Protocols

# Pediatric Pain Control



## Wong-Baker Faces Scale (4-12 years old)




*Jhaveri, Pavan & Teh, Bin & Paulino, Arnold & Blanco, Angel & Lo, Simon & Butler, E & Amato, Robert. (2012). A dose-response relationship for time to bone pain resolution after stereotactic body radiotherapy (SBRT) for renal cell carcinoma (RCC) bony metastases. Acta oncologica (Stockholm, Sweden). 51. 584-8. 10.3109/0284186X.2011.652741.*

## FLACC Pain Assessment Score (<4 years old)

| Parameter | 0 | 1 | 2 |
|---|---|---|---|
| Face | No expression | Occasional grimace | Frequent to constant quivering chin |
| Legs | Normal position or relaxed | Uneasy restless, tense | Kicking or legs drawn up |
| Activity | Lying quiet | Squirming, shifting back and forth,tense | Arched, rigid or jerking |
| Cry | No cry | Moans or whimpers | Crying steadily |
| Consolability | Content, relaxed | Reassurance, hugging | Difficult to console |

*Score: 0, no pain; 1–3, mild pain; 4–7, moderate pain; 8–10, severe pain,*
*FLACC: Face, legs, activity, cry, consolability*

https://www.joacp.org/viewimage.asp?img=JAnaesthClinPharmacol_2014_30_1_20_125692_t1.jpg

**Pearls**

- **Recommended Exam: Mental Status, Area of Pain, Neuro**
- **USE EXTREME CAUTION in administering opioids to patients less than 10kg**
- **This guideline applies to patients less than 15 years of age, weight < 40 kg, lack of signs of puberty, or who can be measured on the Broselow tape. If a patient is larger than the Broselow tape, you may use the adult pain control guideline, realizing that the adult pain control guideline is also weight-based.**
- **Pain severity (0-10) is a vital sign to be recorded pre and post IV or IN medication delivery and at disposition.**
- **For children use Wong-Baker faces scale or the FLACC score**
- **Vital signs should be obtained pre, 5 minutes post, and at disposition with all pain medications.**
- **Contraindications to opioid use include hypotension, altered mental status, or respiratory distress.**
- All patients who receive IN or IV medications must be observed 15 minutes for drug reaction.
- **Use Numeric (> 12 yrs), Wong-Baker faces (4-12 yrs) or FLACC scale (0-3 yrs) as needed to assess pain**
- Patients with acute abdominal pain should receive analgesic intervention; adequate pain control does not mask clinical findings or delay diagnosis.

# Pediatric Pulseless Arrest

**History**
- Time of arrest
- Medical history
- Medications
- Possibility of foreign body
- Hypothermia

**Signs and Symptoms**
- Unresponsive
- Cardiac arrest

**Differential**
- Respiratory failure
  Foreign body, Secretions, Infection (croup, epiglotitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax, cardiac tamponade, pulmonary embolism
- Hypothermia
- Toxin or medication
- Electrolyte abnormalities (Glucose, Potassium)
- Acidosis

**AT ANY TIME**
**Return of Spontaneous Circulation (ROSC)**

↓

**Go to Pediatric Post Resuscitation Protocol**

Newly Born ≤ 31 days old → YES → Exit to Newly Born Protocol

NO ↓

| | |
|---|---|
| B | Begin Continuous CPR Compressions<br>Push Hard (1.5 inches Infant / 2 inches in Children)<br>Push Fast (100-120 /min)<br>Change Compressors every 2 minutes<br>(*Limit changes / pulses checks ≤ 10 seconds*) |
| | **Pediatric Airway Protocol(s)** |
| B | Apply AED |
| B | Blood Glucose Analysis Procedure |

Pediatric Diabetic Protocol ↔

**Team Leader / Code Commander**
ALS Personnel
Responsible for patient care
Ensures high-quality compressions
Responsible for briefing family

**Incident Commander**
Team Leader until ALS arrival
Manages Scene / Bystanders
Responsible for briefing family prior to ALS arrival

| | |
|---|---|
| B | **Identify and correct any airway issues** |
| B | **Initiate rapid transport to closest appropriate facility** |
| | Continue CPR<br>Repeat and reassess every 2 minutes |
| B | Initiate EtCO2 Monitoring |
| P | Cardiac Monitor |

Shockable Rhythm?

YES → Follow Pediatric VF / VT Pediatric Tachycardia Protocol

NO → Follow Pediatric Asystole / PEA Protocol

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Pediatric Section Protocols - Cardiac

# Pediatric Pulseless Arrest



- **If pediatric defibrillation patches are not available, adult patches may be used.**
- **Automated CPR devices can be used if the device fits the patient and performs adequate compressions**

**Cardiac Arrest Code Commander Checklist**

- □ Code Commander is identified
- □ Monitor is visible and a dedicated provider is viewing the rhythm with all leads attached
- □ Confirm that continuous compressions are ongoing at 100-120 beats per minute
- □ Defibrillations occurring at 2 minute intervals for shockable rhythms
- □ $O_2$ cylinder with adequate oxygen is attached to BVM
- □ $EtCO_2$ waveform is present and value is being monitored
- □ Vascular access has been obtained (IV or IO) with IV fluids being administered
- □ Underlying causes have been considered and treated early in arrest
- □ Gastric distention is not a factor
- □ Family is receiving care and is at the patient's side if desired

**Post ROSC Cardiac Arrest Checklist**

- □ ASSESS $EtCO_2$ (should be >20 with good waveform)
- □ Assign a provider to maintain FINGER on pulse during all patient movements
- □ Continuous visualization of cardiac monitor rhythm
- □ Check $O_2$ supply and $SpO_2$, TITRATE to > 94%
- □ Do not try to obtain a "normal" $EtCO_2$ by increasing respiratory rate
- □ Assess for & TREAT bradycardias < 60 bpm
- □ Obtain Blood Pressure -- Pressor agent(s) indicated for SBP < 70 + 2 x Age
- □ Evaluate for post-resuscitation airway placement
- □ When patient is moved, perform CONTINUOUS PULSE CHECK and continuous monitoring of cardiac rhythm
- □ Mask is available for BVM in case advanced airway fails
- □ Once in ambulance, confirm pulse, breath sounds, $SpO_2$, $EtCO_2$, and cardiac rhythm
- □ Appropriate personnel available in the back of the ambulance for transport

**Pearls**

- **Recommended Exam: Mental Status**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Compress ≥ 1/3 anterior-posterior diameter of chest, in infants 1.5 inches and in children 2 inches. Consider early IO placement if available and / or difficult IV access anticipated.**
- **DO NOT HYPERVENTILATE: Ventilate 8 – 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place advanced airway airway device.**
- Airway is the most important intervention in pediatric arrests. This should be accomplished quickly with BVM or supraglottic device. Patient survival is often dependent on proper ventilation and oxygenation / airway interventions.
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work. Utilize Team Focused "Code Commander" Approach assigning responders to predetermined tasks.
- Team Focused Approach / Pit-Crew Approach.
- Reassess and document airway device and EtCO2 frequently, after every move, and at transfer of care.
- In order to be successful in pediatric arrests, a cause must be identified and corrected.

# Pediatric Ventricular Fibrillation
# Pulseless Ventricular Tachycardia

**History**
- Events leading to arrest
- Estimated downtime
- Past medical history
- Medications
- Existence of terminal illness
- Airway obstruction
- Hypothermia

**Signs and Symptoms**
- Unresponsive
- Cardiac Arrest

**Differential**
- Respiratory failure / Airway obstruction
- Hyper / hypokalemia
- Hypovolemia
- Hypothermia
- Hypoglycemia
- Acidosis
- Tension pneumothorax
- Tamponade
- Toxin or medication
- Thrombosis: Coronary / Pulmonary Embolism
- Congenital heart disease

**AT ANY TIME**
**Return of Spontaneous Circulation (ROSC)**

⇩

**Go to Pediatric Post Resuscitation Protocol**

**B** **Begin Continuous CPR Compressions**
Push Hard (1.5 inches Infant / 2 inches in children) Push Fast (≥ 100 / min)
Change compressors every 2 minutes
Ongoing Ventilations (8-10 bpm)
(*Limit changes / pulses checks ≤ 5 seconds*)

Pediatric Airway Protocol(s)

Vascular Access Protocol

**B** Charge AED, Deliver shock

**P** **Defibrillation Manual Procedure 2 Joules/kg**

***CONSIDER***

**Tosades de pointes**

**P** **Magnesium Sulfate 40 mg/kg IV / IO**
May repeat every 5 minutes
**Maximum 2 g**

**B** **Resume Continuous CPR Compressions**

**P** **Epinephrine (1mg/10ml) 0.01 mg/kg IV / IO**
**Max 1 mg each dose**
(Repeat every 3-5 minutes, limit 3 doses)

**B** **Normal Saline/Lactated Ringers Bolus 20 mL/kg IV / IO**
May repeat as needed **Maximum 40 mL/kg**

**P** **Amiodarone 5 mg/kg IV / IO**
**Maximum initial dose 300 mg**
Repeat every 5 minutes, max dose 150 mg
Maximum total dose 15 mg/kg
-or-
**Lidocaine 1 mg/kg IV / IO**
Repeat in 10 minutes

**P** *Consider*
**Sodium Bicarbonate**
**1 mEq/kg IV / IO**
Max 50mEq

Shockable rhythm? **NO** → Pulse present?

Pulse present? **NO** → Exit to Pediatric Asystole / PEA Protocol

Pulse present? **YES** → Exit to Pediatric Post Resuscitation Protocol

Shockable rhythm? **YES**

**B** Charge AED, deliver shock

**P** **Defibrillation Manual Procedure 4 Joules/kg**

***Consider* early transport in all pediatric arrests**

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

**Pediatric Section Protocols - Cardiac**

# Pediatric Ventricular Fibrillation
# Pulseless Ventricular Tachycardia



## Pediatric Shockable Rhythm Timeline
## V-Fib / V-Tach

| | BLS Provider Compressions | BLS Provider Ventilations | ALS Provider Monitor / Airway | ALS Provider Medications |
|---|---|---|---|---|
| **Arrival** | Start CPR, Vascular Access and Infuse normal crystalloid | BVM | Shock 2 J/kg<br>Apply cardiac monitor | Vascular Access<br>Infuse normal saline/LR |
| **2 minutes** | Restart CPR immediately after pulse/rhythm check | Advanced Airway | Shock 4 J/kg | Epinephrine 0.01mg/kg (1mg/10ml) Max 1 mg |
| **4 minutes** | Restart CPR immediately after pulse/rhythm check | Monitor EtCO2 | Shock 4 J/kg<br>Assist with advanced airway | Amiodarone 5 mg/kg or Lidocaine 1mg/kg |
| **6 minutes** | Restart CPR immediately after pulse/rhythm check | Ongoing ventilations 8 - 10 bpm | Shock 4 J/kg | Epinephrine 0.01mg/kg (1mg/10ml) Max 1 mg |
| **8 minutes** | Restart CPR immediately after pulse/rhythm check | | Shock 4 J/kg | Sodium Bicarb 1 mEq/kg<br>*Repeat every 10 minutes* |
| **10 minutes** | Restart CPR immediately after pulse/rhythm check | | Shock 4 J/kg | Amiodarone 5 mg/kg or Lidocaine 1mg/kg |
| **12 minutes** | Restart CPR immediately after pulse/rhythm check | | Shock 4 J/kg | Epinephrine 0.01mg/kg (1mg/10ml) Max 1 mg |

**H's/T's**

- **Hypovolemia**
- **Hypoxia**
- Hydrogen ion (acidosis)
- Hypothermia
- Hypo / Hyperkalemia
- Hypoglycemia

- Tension pneumothorax
- Tamponade; cardiac
- **Toxins**
- Thrombosis; pulmonary (PE)
- Thrombosis; coronary (MI)

It is always important to perform a thorough physical exam and obtain a SAMPLE history to identify any reversible causes of cardiac arrest.

**Pearls**

- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Compress ≥ 1/3 anterior-posterior diameter of chest, in infants 1.5 inches and in children 2 inches. Consider early IO placement if available and / or difficult IV access anticipated.**
- **DO NOT HYPERVENTILATE: Ventilate 8 – 10 breaths per minute with continuous, uninterrupted compressions.**
- **Limit chest compression interruptions when placing advanced airway.**
- Continue CPR up to point where you are ready to defibrillate with device charged then deliver shock.
- Airway is a more important intervention in pediatric arrests. This should be accomplished quickly with BVM or supraglottic device. Patient survival is often dependent on proper ventilation and oxygenation / airway interventions
- In order to be successful in pediatric arrests, a cause must be identified and corrected.
- Respiratory arrest is a common cause of cardiac arrest. Unlike adults early airway intervention is critical.
- In most cases pediatric airways can be managed by basic interventions and/or BVM.
- Reassess and document airway device placement and EtCO2 frequently, after every move, and at transfer of care.

# Pediatric Asystole / PEA

**History**
- Events leading to arrest
- Estimated downtime
- Past medical history
- Medications
- Existence of terminal illness
- Airway obstruction
- Hypothermia
- Suspected abuse; shaken baby syndrome, pattern of injuries
- SIDS

**Signs and Symptoms**
- Unresponsive
- Cardiac Arrest
- Signs of lividity or rigor

**Differential**
- Respiratory failure
- Foreign body
- Hyperkalemia
- Infection (croup, epiglotitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax
- Hypothermia
- Toxin or medication
- Hypoglycemia
- Acidosis

*Consider* Pediatric Toxicology Protocol
*For suspected ingestion*

**B** **Begin Continuous CPR Compressions**
Push Hard (1.5 inches Infant / 2 inches in Children) Push Fast (≥ 100 / min)
Change Compressors every 2 minutes
Ongoing Ventilations (8-10 bpm)
(*Limit changes / pulses checks ≤ 10 seconds*)

**B** Search for Reversible Causes

**B** ***Identify and correct any airway issues***

**B** Blood Glucose Analysis Procedure

Vascular Access Protocol

Pediatric Diabetic Protocol ***as indicated***

**B** **Continue CPR**
Change Compressors every 2 minutes
(*Limit changes / pulses checks ≤ 10 seconds*)

**B** **Pulse and rhythm check every 2 minutes**

**B** **Normal Saline/Lactated Ringers Bolus**
**20 mL/kg IV / IO**
May repeat as needed **Maximum 40 mL/kg**

**P** **Epinephrine 1mg/10ml**
**0.01 mg/kg IV / IO (max 1mg)**
(0.1 mL / kg of 1mg/10ml)
(Repeat every 3-5 minutes, limit 3 doses)

**Shockable Rhythm?**
YES → Exit to Pediatric VF/VT Protocol
NO

**Perfusing rhythm?**
NO → (back to Continue CPR)
YES → Exit to Pediatric Post Resuscitation Protocol

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

***Consider* early transport in all pediatric arrests**

**AT ANY TIME**
**Return of Spontaneous Circulation (ROSC)**
▽
**Go to Pediatric Post Resuscitation Protocol**

**Reversible Causes**

**Hypovolemia**
**Hypoxia**
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia

Tension pneumothorax
Tamponade; cardiac
**Toxins**
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

***Consider* Early for PEA**

1. Crystalloid boluses
2. Dextrose up to 1 g/kg IV/IO
3. Toxicology guideline for suspected beta blocker or calcium channel blocker overdose.
4. Calcium Gluconate 100 mg/kg IV / IO for suspected hyperkalemia or hypocalcemia
5. Sodium Bicarbonate 1 mEq/kg IV / IO for possible overdose, hyperkalemia, renal failure
6. Chest Decompression

# Pediatric Asystole / PEA



## Pediatric Non-shockable Rhythm Timeline
## Asystole / PEA

| | BLS Provider Compressions | BLS Provider Ventilations | ALS Provider Monitor / Airway | ALS Provider Medications |
|---|---|---|---|---|
| **Arrival** | Start CPR, Vascular Access and Infuse normal saline/LR | BVM | Apply cardiac monitor | Vascular Access Infuse normal saline/LR |
| **2 minutes** | Restart CPR immediately after pulse/rhythm check | Advanced Airway | Check monitor | Epinephrine 0.01mg/kg (1mg/10ml) Max 1 mg |
| **4 minutes** | Restart CPR immediately after pulse/rhythm check | Monitor EtCO2 | Check monitor Assist with advanced airway | Review H's/T's Interventions as indicated |
| **6 minutes** | Restart CPR immediately after pulse/rhythm check | Ongoing ventilations 8 - 10 bpm | Check monitor | Epinephrine 0.01mg/kg (1mg/10ml) Max 1 mg |
| **8 minutes** | Restart CPR immediately after pulse/rhythm check | | Check monitor | Consider Sodium Bicarb 1 mEq/kg |
| **10 minutes** | Restart CPR immediately after pulse/rhythm check | | Check monitor | Epinephrine 0.01mg/kg (1mg/10ml) Max 1 mg |
| **12 minutes** | Restart CPR immediately after pulse/rhythm check | | Check monitor | |

**H's/T's**

- **Hypovolemia**
- **Hypoxia**
- Hydrogen ion (acidosis)
- Hypothermia
- Hypo / Hyperkalemia
- Hypoglycemia

- Tension pneumothorax
- Tamponade; cardiac
- **Toxins**
- Thrombosis; pulmonary (PE)
- Thrombosis; coronary (MI)

It is always important to perform a thorough physical exam and obtain a SAMPLE history to identify any reversible causes of cardiac arrest.

**Pearls**

- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Compress ≥ 1/3 anterior-posterior diameter of chest, in infants 1.5 inches and in children 2 inches. Consider early IO placement if available and / or difficult IV access anticipated.**
- **DO NOT HYPERVENTILATE: Ventilate 8 – 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt chest compressions when placing advanced airway.**
- Airway is a more important intervention in pediatric arrests. This should be accomplished quickly with BVM or supraglottic device. Patient survival is often dependent on proper ventilation and oxygenation / airway interventions
- In order to be successful in pediatric arrests, a cause must be identified and corrected.
- Respiratory arrest is a common cause of cardiac arrest. Unlike adults early ventilation intervention is critical.
- In most cases pediatric airways can be managed by basic interventions and/or BVM.
- Reassess and document airway device placement and EtCO2 frequently, after every move, and at transfer of care.

# Pediatric Post Resuscitation

**History**
- Respiratory arrest
- Cardiac arrest

**Signs/Symptoms**
- Return of pulse

**Differential**
- Continue to address specific differentials associated with the original dysrhythmia

Arrhythmias are common and usually self limiting after ROSC

If Arrhythmia Persists follow Pediatric Rhythm Appropriate Protocol

Repeat Primary Assessment

**B** **Optimize Ventilation and Oxygenation**
- Goal SpO2 ≥ 94%, ETCO2 35 – 45 mm Hg
- DO NOT HYPERVENTILATE

**A** **ROSC Bundle**
- Continuous ETCO2 Monitoring
- Maintain SpO2 = > 94%
- Cardiac Monitor

Vascular Access Protocol ***if indicated***

Pediatric Airway Protocol ***if indicated***

**B** **Normal Saline/Lactated Ringers Bolus**
**20 mL/kg IV / IO**
May repeat to **40 mL/kg**
if lungs remain clear

**P**
**Push-Dose Epinephrine**
**0.5mcg/kg IV/IO**
*Max 20 mcg per dose. Repeat every 3-5 minutes*
*- or-*
**NORepinepherine Infusion**
**0.05 – 0.1 mcg/kg/min IV / IO**
- or -
**Epinephrine Infusion**
**0.1 – 0.5 mcg/kg/min IV / IO**
-or -
**Dopamine Infusion**
**5-20 mcg/kg/min IV / IO**

***Titrate to SBP ≥ (70 + 2 x Age)***
Or other medication in formulary or as approved by PMD

**Hypotension Age Based**

**0 – 28 Days**
*< 60 mmHg*

**1 Month to 1 Year**
*< 70 mmHg*

**1 to 10 Years**
*< 70 + ( 2 x age) mmHg*

**11 Years and older**
*< 90 + ( 2 x age) mmHg*

Hypotension Age based — YES → Pediatric Diabetic Protocol
NO
Blood Glucose ≤ 70 or ≥ 300 — YES → Pediatric Diabetic Protocol
NO
Symptomatic Bradycardia — YES → Pediatric Bradycardia Protocol
NO
Symptomatic Tachycardia — YES → Pediatric Tachycardia Protocol
NO
Trauma Related — YES → Multiple Trauma Protocol
NO

Pediatric Post-Intubation Sedation Protocol ***If indicated***

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Pediatric Section Protocols - Cardiac

# Pediatric Post Resuscitation



**Post ROSC Cardiac Arrest Checklist**

- □ Assess $EtCO_2$
- □ Continuous visualization of cardiac monitor rhythm
- □ Check $O_2$ supply and $SpO_2$ to titrate to SpO2 94-99%
- □ Do not try to obtain a "normal" $EtCO_2$ by increasing respiratory rate
- □ Obtain 12 lead EKG
- □ Assess for & treat bradycardias < 60 bpm. Resume chest compressions if pulse drops below 60 bpm with signs of poor perfusion despite oxygenation and ventilation
- □ Obtain Blood Pressure – Consider pressor agent(s) for SBP < 70 + 2 x Age
- □ Evaluate for post-resuscitation airway placement.
- □ Mask is available for BVM in case advanced airway fails
- □ Once in ambulance, confirm pulse, breath sounds, $SpO_2$, $EtCO_2$, and cardiac rhythm
- □ Appropriate personnel present in the back of the ambulance for transport

**Pressors**

**Infusions**

| **NORepinepherine**<br>**0.05-0.1 mcg/kg/min IV / IO**<br>*Titrate to SBP > 70 + 2 x Age*<br><br>Mix 4 mg NOREpi in 250 mL D5W/NS<br>(4 mg/250 ml= 16 mcg/ml)<br>Drops per minute with micro gtt set<br>(0.1 mcg/kg/min)<br><br>(5 kg) S: (2gtts/min)<br>(15 kg) M: 5 gtts/min)<br>(30 kg) L: (10 gtts/min) | **Epinepherine**<br>**0.1-0.5 mcg/kg/min IV / IO**<br>*Titrate to SBP > 70 + 2 x Age*<br><br>Mix 2 mg Epi 1mg/1ml in 250 D5W/ NS<br>(2mg / 250 mL = 8 mcg/mL)<br><br>(5 kg) S: (4 gtts/min)<br>(15 kg) M: 12 gtts/min)<br>(30 kg) L: (24 gtts/min) | **Dopamine**<br>**5-20 mcg/kg/min IV / IO**<br><br>(400 mg/250 mL pre-mixed)<br>Drops per minute with micro gtt set<br>(5 mcg/kg/min)<br>(5 kg) **S:** (1 gtts/min)<br>(15 kg) **M:** (3 gtts/min)<br>(30 kg) **L:** (6 gtts/min) |
|---|---|---|

**Push Dose Pressor**

**Epinepherine**
**0.5 mcg/kg IV / IO**
**Max 20 mcg per dose**

*Every 3-5 minutes*
Dilute 0.1 mg epi (1mL of 1mg/ 10ml) with 9 mL NS, total of 10 mL in syringe
(0.1mg/10mL = 10 mcg/mL)

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

**Pearls**

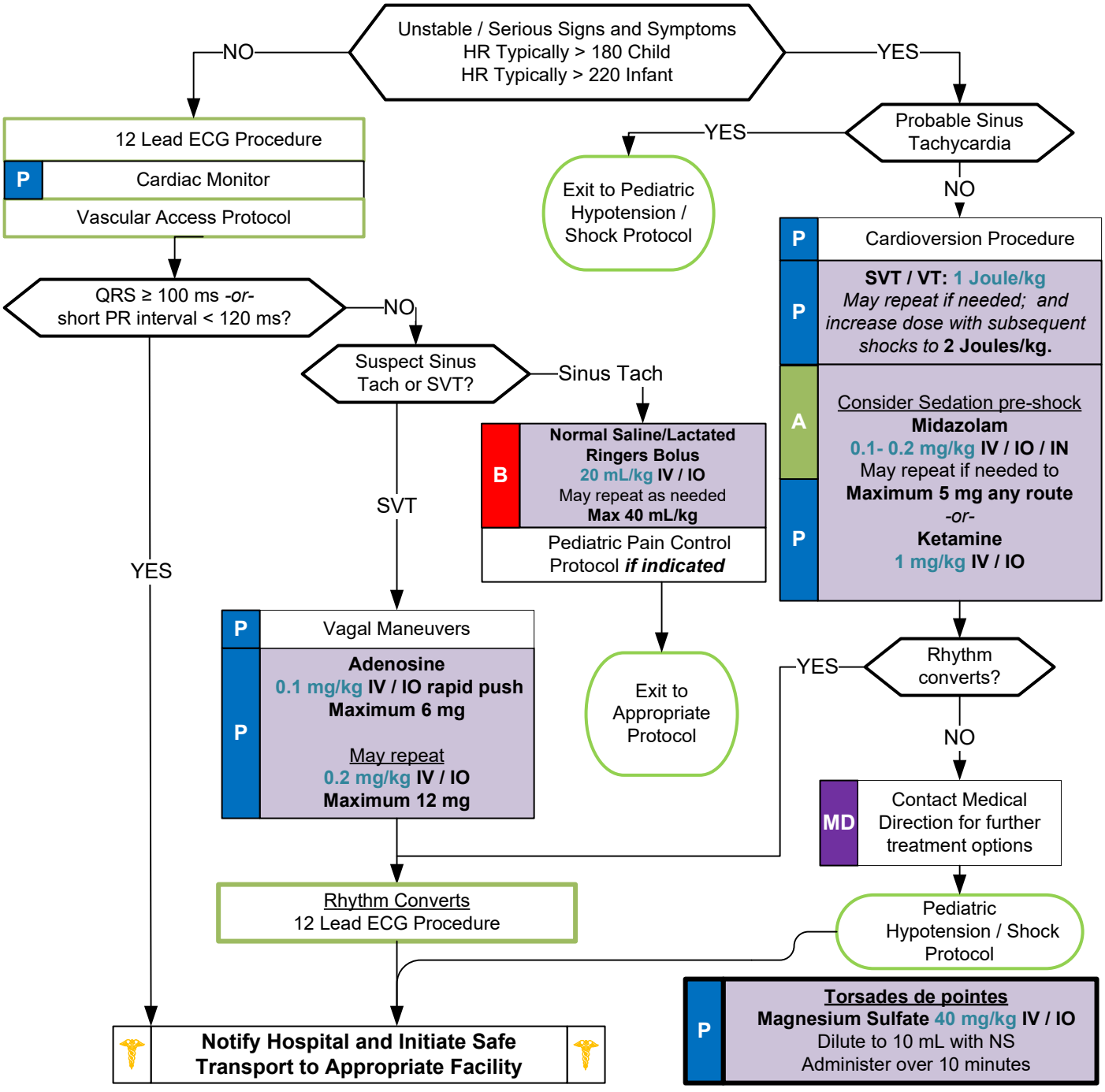
- **Recommended Exam: Mental Status, Neck, Skin, Lungs, Heart, Abdomen, Extremities, Neuro**
- **Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the post resuscitation phase and must be avoided at all costs.**
- **Initial $EtCO_2$ may be elevated immediately post-resuscitation but will usually normalize. While goal is 35 – 45 mm Hg, avoid hyperventilation.**
- Most patients immediately post resuscitation will require ventilatory assistance.
- The condition of post-resuscitation patients fluctuates rapidly and continuously and they require close monitoring. Appropriate post-resuscitation management may require consultation with medical control.
- Common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, pneumothorax, and medication reaction to ALS drugs.
- If utilized, titrate epinephrine drip to maintain age-appropriate SBP. Ensure adequate fluid resuscitation is ongoing.

# Pediatric Tachycardia

**History**
- Past medical history
- Medications or Toxic Ingestion (Aminophylline, Diet pills, Thyroid supplements, Decongestants, Digoxin)
- Drugs (nicotine, cocaine)
- Congenital Heart Disease
- Respiratory Distress
- Syncope or Near Syncope

**Signs and Symptoms**
- Heart Rate: Child > 180/bpm
  Infant > 220/bpm
- Pale or Cyanosis
- Diaphoresis
- Tachypnea
- Vomiting
- Hypotension
- Altered Level of Consciousness
- Pulmonary Congestion
- Syncope

**Differential**
- Heart disease (Congenital)
- Hypo / Hyperthermia
- Hypovolemia or Anemia
- Electrolyte imbalance
- Anxiety / Pain / Emotional stress
- Fever / Infection / Sepsis
- Hypoxia
- Hypoglycemia
- Medication / Toxin / Drugs (see HX)
- Pulmonary embolus
- Trauma
- Tension Pneumothorax



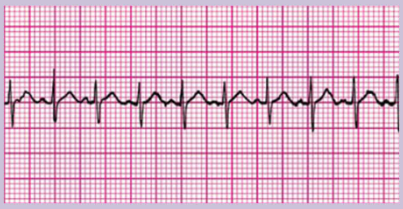

Pediatric Section Protocols - Cardiac

# Pediatric Tachycardia



## Examples of Tachycardia

**Sinus Tachycardia**



AHA PALS 2013

**Supraventicular Tachycardia(SVT)**

AHA PALS 2013

**Torsades de pointes**

AHA PALS 2013

**Pearls**

- **Take careful consideration in WPW, as giving AV nodal medications (i.e. adenosine) can worsen condition.**
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Serious Signs and Symptoms:**
  - **Respiratory distress / failure.**
  - **Signs of shock / poor perfusion with or without hypotension.**
  - **Altered Mental Status**
  - **Sudden collapse with rapid, weak pulse**
- **Narrow Complex Tachycardia (≤100 ms):**
  - Sinus tachycardia: P waves present. Variable R-R waves. Infants usually < 220 beats / minute. Children usually < 180 beats / minute.
  - SVT: > 90 % of children with SVT will have a narrow QRS (≤0.09 seconds.) P waves absent or abnormal. R-R waves not variable. Usually abrupt onset. Infants usually > 220 beats / minute. Children usually > 180 beats / minute.
  - Atrial Flutter / Fibrillation
- **Wide Complex Tachycardia (≥ 0.09 seconds):**
  - SVT with aberrancy.
  - VT: Uncommon in children. Rates may vary from near normal to > 200 / minute. Most children with VT have underlying heart disease / cardiac surgery / long QT syndrome / cardiomyopathy.
- **Torsades de Pointes / Polymorphic (multiple shaped) Tachycardia:**
  - Rate is typically 150 to 250 beats / minute.
  - Associated with long QT syndrome, hypomagnesaemia, hypokalemia, many cardiac drugs.
  - May quickly deteriorate to VT.
- **Vagal Maneuvers:**
  - Breath holding. Blowing a glove into a balloon. Have child blow out “birthday candles” or through an obstructed straw. Infants: May put a bag of ice water over the upper half of the face careful not to occlude the airway.
- Separating the child from the caregiver may worsen the child's clinical condition.
- Pediatric pads should be used in children < 10 kg or Broselow color Purple if available. Adult sized pads can be used if pediatric pads are not available.
- Monitor for respiratory depression and hypotension if Benzodiazepines are used.
- Continuous pulse oximetry is required for all SVT Patients if available.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.
- Generally, the maximum sinus tachycardia rate is 220 – the patient’s age in years.

# Pediatric Bradycardia

**History**
- Past medical history
- Foreign body exposure
- Respiratory distress or arrest
- Apnea
- Possible toxic or poison exposure
- Congenital disease
- Medication (maternal or infant)

**Signs and Symptoms**
- Decreased heart rate
- Delayed capillary refill or cyanosis
- Mottled, cool skin
- Hypotension or arrest
- Altered level of consciousness

**Differential**
- Respiratory failure
  - Foreign body
  - Secretions
  - Infection (croup, epiglotitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax
- Hypothermia
- Toxin or medication
- Hypoglycemia
- Acidosis

Airway Patent
Oxygenation / Ventilation
Adequate

NO → Pediatric Airway Protocol(s)

YES

B Identify underlying cause

B Blood Glucose Analysis Procedure ↔ Pediatric Diabetic Protocol ***if indicated***

Vascular Access Protocol

P Cardiac Monitor

**Suspected Beta-Blocker or Calcium Channel Blocker Overdose/ Exposure/Ingestion**

⇩

**Follow Pediatric Toxicology Protocol**

AMS /
Continued Poor Perfusion /
Shock

YES →

B **Normal Saline/Lactated Ringers**
**Bolus: 20 mL/kg IV / IO**
Repeat as needed
**Max 40 mL/kg**

NO

Heart Rate < 60
Poor Perfusion / Shock

YES →

P *Consider* **Atropine**
**0.02 mg/kg IV / IO**
**Max 1 mg per dose**
Repeat every 5 minutes

P *Consider*
**Push-Dose Epinephrine**
**0.5 mcg/kg IV/IO**
**Max 20 mcg (2 mL) per dose**
*Every 3-5 minutes*
-or-
**Epinephrine Infusion**
**0.1 – 0.5 mcg/kg/min IV/IO**

P ***Consider*** **Transcutaneous Pacing Procedure**

Pediatric Airway Protocol(s) ***as indicated***

***If sedation is needed:***

A **Midazolam 0.1 - 0.2 mg/kg IV / IO / IN**
May repeat in 3-5 minutes as needed
**Max total dose 5 mg**
*-or-*
**Fentanyl 1 mcg/kg IV / IO / IN**
**(Max initial dose 75 mcg)**
May repeat 0.5 mcg/kg every 5 minutes as needed
**Max total dose 150 mcg**

P *-or-*
**Ketamine 1 mg/kg IV / IO**

Or other medication in formulary or as approved by PMD

NO

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

# Pediatric Bradycardia



| Pressors | |
|---|---|
| **Infusions** | **Push Dose Pressor** |
| **Epinepherine**<br>**0.1-0.5 mcg/kg/min IV / IO**<br>*Titrate to SBP > 70 + 2 x Age*<br><br>Mix 2 mg Epi 1mg/1ml in 250 D5W/NS<br>(2mg / 250 mL = 8 mcg/mL)<br><br>(5 kg) S: (4 gtts/min)<br>(15 kg) M: 12 gtts/min)<br>(30 kg) L: (24 gtts/min) | **Push-Dose Epinephrine 0.5 mcg/kg IV/IO**<br>*Max 20 mcg per dose. Repeat every 3-5 minutes*<br><br>*Titrate to SBP ≥ 70 + 2 x Age*<br>*Dilute 0.1mg epi (1mL of 1mg/10ml) with 9mL NS. Total of 10mL in syringe*<br>*(0.1mg/10mL = 10 mcg/mL)* |

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

**Pearls**

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Use pre-made Drug dosage reference for drug dosages if applicable.**
- The majority of pediatric arrests are due to airway problems.
- Most maternal medications pass through breast milk to the infant, consider narcotic overdose.
- Hypoglycemia, severe dehydration and narcotic effects may produce bradycardia.
- Pediatric patients requiring transcutaneous pacing require the use of pads appropriate for pediatric patients when available
- Transcutaneous pacing should be considered early in bradycardic patients with shock.

# Pediatric Allergic Reaction

**History**
- Onset and location
- Insect sting or bite
- Food allergy / exposure
- Medication allergy / exposure
- New clothing, soap, detergent
- Past medical history / reactions
- Medication history

**Signs and Symptoms**
- Itching or hives
- Coughing / wheezing or respiratory distress
- Chest or throat constriction
- Difficulty swallowing
- Hypotension or shock
- Edema

**Differential**
- Urticaria (rash only)
- Anaphylaxis (systemic effect)
- Shock (vascular effect)
- Angioedema (drug induced)
- Aspiration / Airway obstruction
- Vasovagal event
- Asthma / COPD / CHF

Assess Symptom Severity

## MILD

Vascular Access Protocol *if indicated*

A — **Diphenhydramine 1 mg/kg IV / IM / IO Max 50 mg**

B — Monitor and Reassess Monitor for Worsening Signs and Symptoms

**Cardiac Monitoring with continuous pulse oximetry indicated for Moderate and Severe Reactions. Consider $EtCO_2$ monitoring.**

## MODERATE/SEVERE

B — **Epinephrine 0.15mg Auto-Injector -or- Epinephrine (1 mg/1 ml) 0.15 mg IM Max 0.5 mg** Repeat in 5 minutes if no improvement

B — **Albuterol 2.5 mg nebulized** Repeat as needed x 3 *if indicated*

Vascular Access Protocol

A — **Diphenhydramine 1 mg/kg IV / IM / IO Max 50 mg**

Pediatric Airway Protocol(s) *if indicated*

A — **Normal Saline/Lactated Ringers Bolus: 20 mL/kg IV / IO** Repeat as needed to keep SBP > 70 + 2 x Age **Max 40 mL/kg**

P — Cardiac Monitor

B — *Consider* $EtCO_2$ monitoring

P — *Consider* **Solumedrol 1 mg/kg IV / IO Max 125 mg -or- Dexamethasone 0.6 mg/kg IV / IO (Max 10 mg)**
Or other medication in formulary or as approved by PMD

P — *Consider if continued hypotension following second IM epi injection*
**Epinephrine IV / IO Push-Dose 0.5 mcg/kg (0.1 mL/kg) Max 20 mcg (2 mL) per dose** *Every 3-5 minutes* -or- **Epinephrine Infusion 0.1 – 0.5 mcg/kg/min IV/IO**
*Titrate SBP > (70 + 2 x Age)*

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Pediatric Section Protocols

# Pediatric Allergic Reaction



| Pressors | |
|---|---|
| **Infusions** | **Push Dose Pressor** |
| **Epinepherine**<br>**0.1-0.5 mcg/kg/min IV / IO**<br>*Titrate to SBP > 70 + 2 x Age*<br><br>Mix 2 mg Epi 1mg/1ml in 250 D5W/NS<br>(2mg / 250 mL = 8 mcg/mL)<br><br>(5 kg) S: (4 gtts/min)<br>(15 kg) M: 12 gtts/min)<br>(30 kg) L: (24 gtts/min) | **Push-Dose Epinephrine 0.5 mcg/kg IV/IO**<br>*Max 20 mcg per dose. Repeat every 3-5 minutes*<br><br>*Titrate to SBP ≥ 70 + 2 x Age*<br>*Dilute 0.1mg epi (1mL of 1mg/10ml) with 9mL NS. Total of 10mL in syringe*<br>*(0.1mg/10mL = 10 mcg/mL)* |

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

**Pearls**

- **Recommended Exam: Mental Status, Skin, Heart, Lungs**
- **Anaphylaxis is an acute and potentially lethal multisystem allergic reaction.**
- **Epinephrine is the drug of choice and the first drug that should be administered in acute anaphylaxis (Moderate / Severe Symptoms – airway involvement and/or hypotension.) IM Epinephrine should be administered in priority before or during attempts at IV or IO access.**
- **Anaphylaxis unresponsive to repeat doses of IM epinephrine may require IV epinephrine administration by IV push or epinephrine infusion. Contact hospital for medical direction orders if indicated.**
- **Symptom Severity Classification:**
  - **Mild symptoms:**
    - **Flushing, hives, itching, erythema with normal blood pressure and perfusion.**
  - **Moderate symptoms:**
    - **Flushing, hives, itching, erythema plus respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with normal blood pressure and perfusion.**
  - **Severe symptoms:**
    - **Flushing, hives, itching, erythema plus respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with hypotension and poor perfusion. Skin symptoms may not be present due to poor perfusion.**
- **Allergic reactions may occur with only respiratory and gastrointestinal symptoms and have no rash / skin involvement.**
- **Angioedema is seen in moderate to severe reactions and is defined as swelling involving the face, lips or airway structures. This can also be seen in patients taking blood pressure medications like Prinivil, Zestril, or lisinopril (typically end in -il).**
- **Fluids and Medication should be titrated to maintain a SBP >70 + (age in years x 2) mmHg.**
- **EMT may administer Albuterol if patient already prescribed, or nebulized if appropriately trained.**
- **Patients with moderate and severe reactions should receive a 12 lead ECG and should be continually monitored, but this should NOT delay administration of epinephrine.**
- The shorter the onset from exposure to symptoms the more severe the reaction.

# Pediatric Altered Mental Status

### History
- Past medical history
- Medications
- Recent illness
- Irritability
- Lethargy
- Changes in feeding / sleeping
- Diabetes
- Potential ingestion
- Trauma

### Signs and Symptoms
- Decrease in mentation
- Change in baseline mentation
- Decrease in Blood sugar
- Cool, diaphoretic skin
- Increase in Blood sugar
- Warm, dry, skin, fruity breath, kussmaul respirations, signs of dehydration

### Differential
- Hypoxia
- CNS (trauma, stroke, seizure, infection)
- Thyroid (hyper / hypo)
- Shock (septic-infection, metabolic, traumatic)
- Diabetes (hyper / hypoglycemia)
- Toxicological
- Acidosis / Alkalosis
- Environmental exposure
- Electrolyte abnormatilities
- Psychiatric disorder

Utilize Spinal Motion Restriction Protocol where circumstances suggest a mechanism of injury.

Pediatric Airway Protocol(s) ***if indicated***

B — Blood Glucose Analysis Procedure

12 Lead ECG Procedure

P — Cardiac Monitor

B — *Consider* $EtCO_2$ monitoring

Vascular Access Protocol

Blood Glucose ≤ 70 or ≥ 350

NO → Blood Glucose ≤ 70 or ≥ 350

YES → Exit to Diabetic Protocol

NO → Signs of Overdose

YES → Consider Narcan & Exit to Pediatric Overdose / Toxic Exposure Protocol

NO → Consider Other Causes

Consider Other Causes → Exit to Pediatric Seizure Protocol

Consider Other Causes → Exit to Hypo or Hyperthermia Protocol

Consider Other Causes → Exit to Pediatric Hypotension / Shock Protocol

Consider Other Causes → Exit to Trauma Protocol

Consider Other Causes → Appropriate Pediatric Cardiac / Arrhythmia Protocol ***as indicated***

Return to Baseline

**YES** → Follow Universal Patient Care Protocol

Follow Universal Patient Care Protocol → **Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Pediatric Section Protocols

# Pediatric Altered Mental Status



**Pearls**

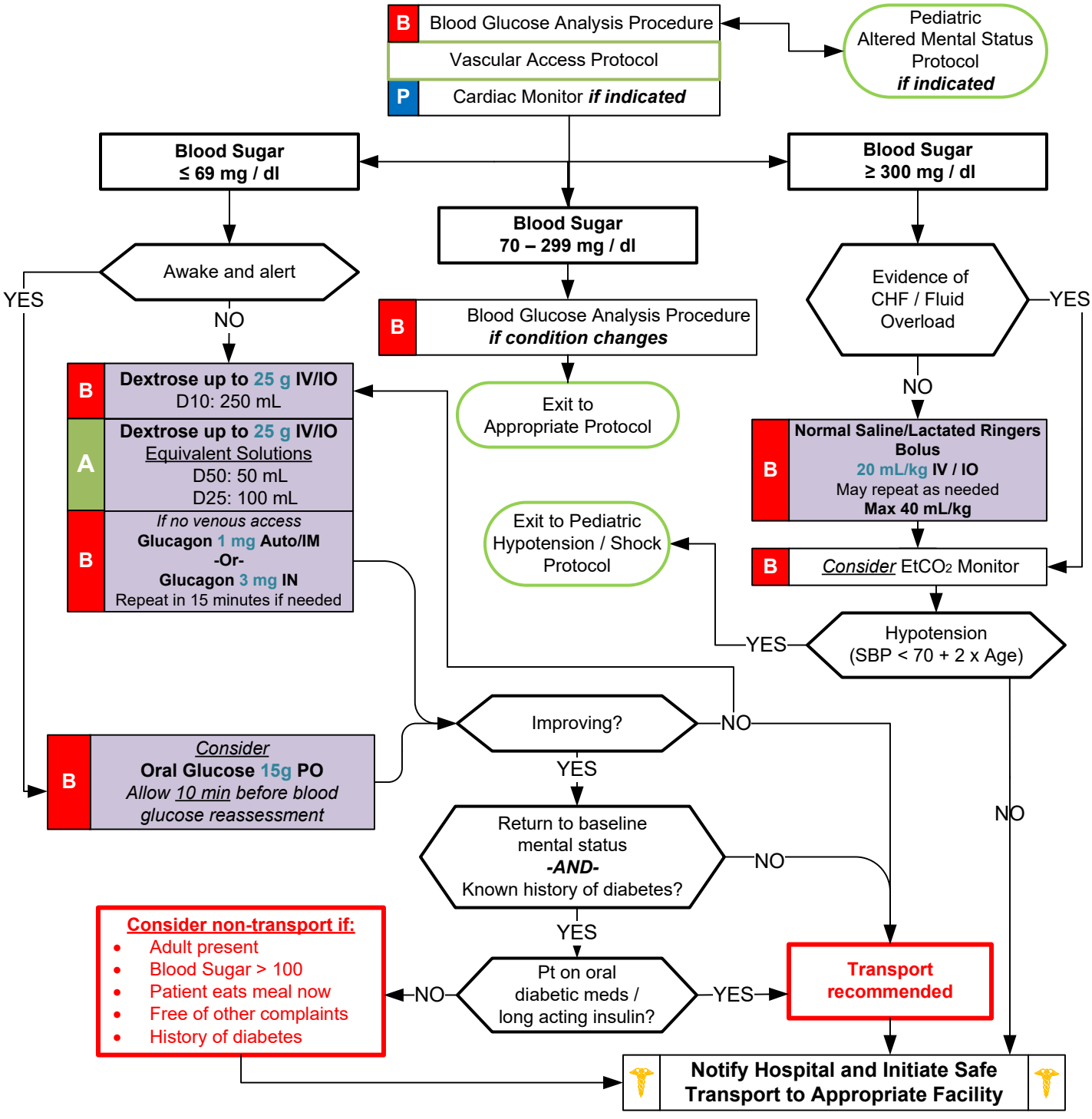
- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Pay careful attention to the head exam for signs of bruising or other injury.**
- Be aware of AMS as presenting sign of an environmental toxin or Haz-Mat exposure and protect personal safety.
- It is safer to assume hypoglycemia than hyperglycemia if doubt exists. Recheck blood glucose after Dextrose
- Consider alcohol, prescription drugs, illicit drugs and Over the Counter preparations as a potential etiology.
- Consider Restraints if necessary for patient's and/or personnel's protection per the restraint procedure.

# Pediatric Diabetic

**History**
- Past medical history
- Medications
- Recent blood glucose check
- Last meal

**Signs and Symptoms**
- Altered mental status
- Combative / irritable
- Diaphoresis
- Seizures
- Abdominal pain
- Nausea / vomiting
- Weakness
- Dehydration
- Deep / rapid breathing

**Differential**
- Alcohol / drug use
- Toxic ingestion
- Trauma; head injury
- Seizure
- CVA
- Altered baseline mental status.




Pediatric Section Protocols

# Pediatric Diabetic



**Pearls**

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- Do not administer oral glucose to patients that are not able to swallow or protect their airway.
- **It may be necessary to utilize different concentrations of dextrose in clinical practice. Make D10 by taking 10 mL of D50 and dilute with 40 mL of NS (i.e. discard dextrose in the D50 syringe until you have 10mL left. Then in the same syringe draw up 40mL of NS. You now have 50mL of D10.) Make D25 by taking 25 mL of D50 and dilute with 25 mL of NS (i.e. discard dextrose in the D50 syringe until you have 25mL left. Then in the same syringe draw up 25mL of NS. You now have 50mL of D25.)**
- Quality control checks should be maintained per manufacturers recommendation for all glucometers.
- Do not rely on the patient's glucose monitoring system. Ensure that blood sugar is obtained from agency's device
- **Patient Refusal:**

  Adult caregiver must be present with pediatric patient. Blood sugar must be 100 or greater and patient has ability to eat and availability of food with responders on scene. Patient must have a known history of diabetes and not be taking any oral diabetic agents (i.e. insulin only). Otherwise contact hospital for medical direction advice.

# Pediatric Hypotension / Shock

**History**
- Blood loss
- Fluid loss
- Vomiting
- Diarrhea
- Fever
- Infection

**Signs and Symptoms**
- Restlessness, confusion, weakness
- Dizziness
- Tachycardia
- Hypotension (Late sign)
- Pale, cool, clammy skin
- Delayed capillary refill
- Dark-tarry stools

**Differential**
- Shock
  - Hypovolemic
  - Cardiogenic
  - Septic
  - Neurogenic
  - Anaphylactic
- Trauma
- Infection
- Dehydration
- Congenital heart disease
- Medication or Toxin

B Blood Glucose Analysis Procedure

Vascular Access Protocol

P Cardiac Monitor

Pediatric Airway Protocol(s) ***if indicated***

Pediatric Diabetic Protocol ***if indicated***

History, Exam and Circumstances often suggest **Type of Shock:**
**Was trauma involved?**

*Consider* Anaphylaxis or other Pediatric Protocol

**YES**

***Consider*** **Hypovolemic (bleeding), Neurogenic (spinal injury), Obstructive (Pneumothorax)**

**Rapid Transport** to closest Appropriate Trauma Center

B Spinal Motion Restriction Procedure ***if indicated***

B Wound Care and Tourniquet (if indicated)
**Control Hemorrhage**

B **Normal Saline/Lactated Ringers Bolus**
**20 mL/kg IV / IO**
Repeat as needed to keep
SBP ≥ 70 + 2 x Age
**Maximum 40 mL/kg**

P Chest Decompression Procedure ***if indicated***

Exit to Multiple Trauma Protocol

**NO**

***Consider*** **Hypovolemic (ex. Dehydration, GI bleed), Cardiogenic (ex. Heart failure), Distributive (ex. Sepsis, Anaphylaxis), Obstructive (ex. PE, Tamponade)**

B **Normal Saline/Lactated Ringers Bolus**
**20 mL/kg IV / IO**
Repeat as needed to keep
SBP ≥ 70 + 2 x Age
**Maximum 40 mL/kg**

B Caution with excess fluids in cardiogenic shock; *consider* the presence of pulmonary edema and limit IV fluids.

P For non-traumatic shock
After 40 mL/kg liter fluid bolus contact medical control for additional IV bolus orders.
Consider:

**Push-Dose Epinephrine**
**0.5 mcg/kg IV/IO**
Max 20 mcg per dose. Repeat every 3-5 minutes
- or-
**NORepinephrine Infusion**
**0.05 – 0.1 mcg/kg/min IV / IO**
-or-
**Epinephrine Infusion**
**0.1 – 0.5 mcg/kg/min IV / IO**
- or -
**Dopamine Infusion**
**5-20 mcg/kg/min IV / IO**

**Titrate to SBP ≥ (70 + 2 x Age)**
Or other medication in formulary or as approved by PMD

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Pediatric Section Protocols

# Pediatric Hypotension / Shock



## Pressors

### Infusions

**NORepinepherine**
**0.05-0.1 mcg/kg/min IV / IO**
*Titrate to SBP > 70 + 2 x Age*

Mix 4 mg NOREpi in 250 mL D5W/NS
(4 mg/250 ml= 16 mcg/ml)
Drops per minute with micro gtt set
(0.1 mcg/kg/min)

(5 kg) S: (2gtts/min)
(15 kg) M: 5 gtts/min)
(30 kg) L: (10 gtts/min)

**Epinepherine**
**0.1-0.5 mcg/kg/min IV / IO**
*Titrate to SBP > 70 + 2 x Age*

Mix 2 mg Epi 1mg/1ml in 250 D5W/ NS
(2mg / 250 mL = 8 mcg/mL)

(5 kg) S: (4 gtts/min)
(15 kg) M: 12 gtts/min)
(30 kg) L: (24 gtts/min)

**Dopamine**
**5-20 mcg/kg/min IV / IO**

(400 mg/250 mL pre-mixed)
Drops per minute with micro gtt set
(5 mcg/kg/min)
(5 kg) **S:** (1 gtts/min)
(15 kg) **M:** (3 gtts/min)
(30 kg) **L:** (6 gtts/min)

### Push Dose Pressor

**Epinepherine**
**0.5 mcg/kg IV / IO**
**Max 20 mcg per dose**

*Every 3-5 minutes*
Dilute 0.1 mg epi (1mL of 1mg/ 10ml) with 9 mL NS, total of 10 mL in syringe
(0.1mg/10mL = 10 mcg/mL)

*The above suggested formulation of pressors encapsulate the more common prehospital form of these medications. If performing interfacility transport and/or patient is already on an IV pump, the concentration may vary. Please consult with PMD for variation in administration instructions.*

## Pearls

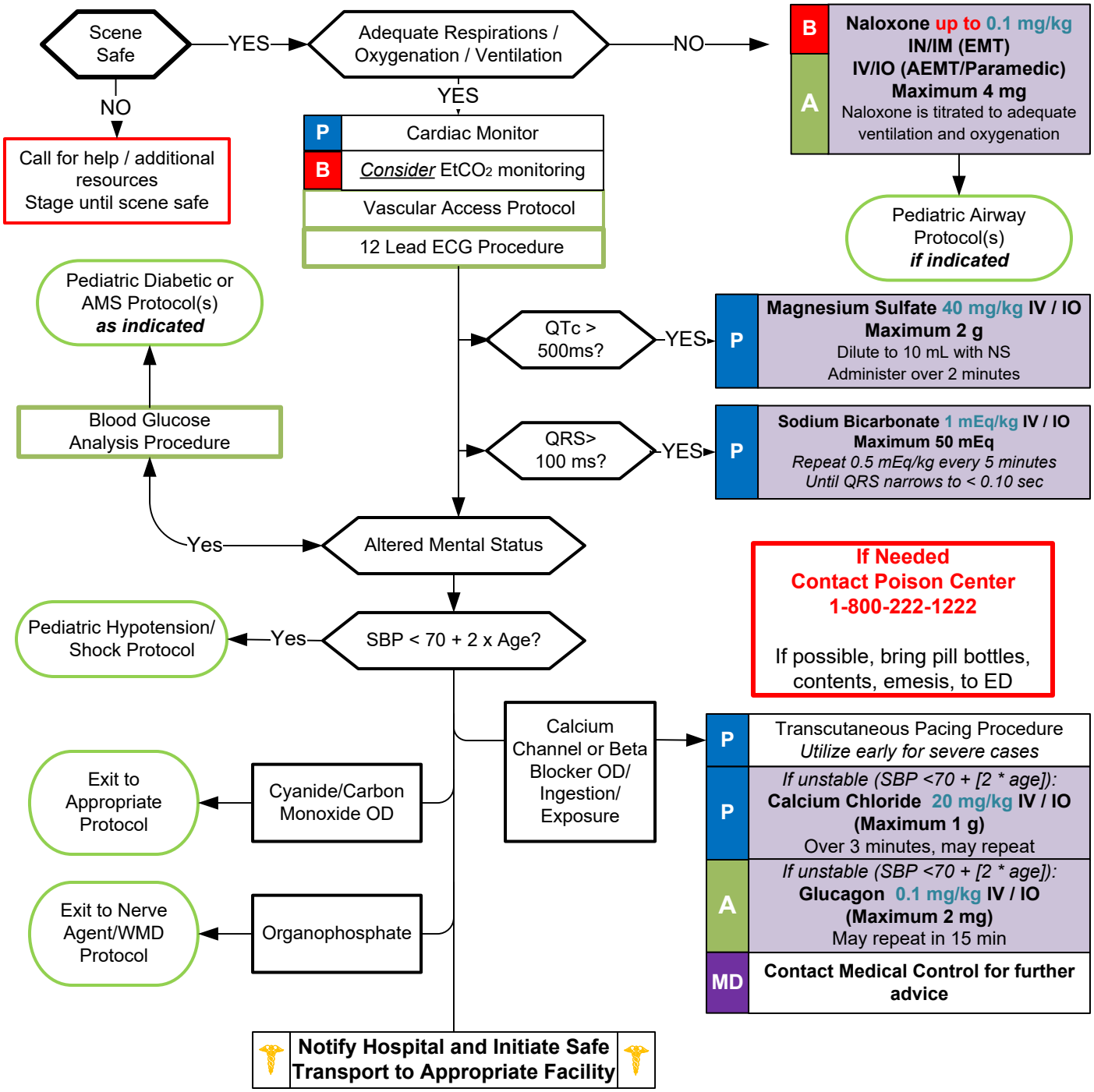
- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Lowest normal blood pressure by age: < 31 days: > 60 mmHg. 31 days to 1 year: > 70 mmHg. Greater than 1 year: 70 + 2 x age in years.**
- **Consider all possible causes of shock and treat per appropriate guideline. Majority of decompensation in pediatrics is airway related.**
- **Decreasing heart rate and hypotension occur late in children and are signs of imminent cardiac arrest.**
- **Shock may be present with a normal blood pressure initially.**
- **Shock often is present with normal vital signs and may develop insidiously. Tachycardia may be the only manifestation.**
- **Consider all possible causes of shock and treat per appropriate guideline.**
- **Hypovolemic Shock:**
  Hemorrhage, trauma, dehydration, excessive vomiting or diarrhea.
- **Cardiogenic Shock:**
  Heart failure: Congenital heart disease, Cardiomyopathy, Myocardial contusion, Ruptured ventrical / septum / valve / toxins.
- **Distributive Shock:**
  Sepsis
  Anaphylactic
  Neurogenic: Hallmark is warm, dry, pink skin with normal capillary refill time and typically alert.
  Toxins
- **Obstructive Shock:**
  Pericardial tamponade.
  Pulmonary embolus.
  Tension pneumothorax.
  Signs may include hypotension with distended neck veins, tachycardia, unilateral decreased breath sounds or muffled heart sounds.

# Pediatric Overdose / Toxic Ingestion

**History**
- Ingestion or suspected ingestion of potentially toxic substance
- Substance ingested, route, quantity
- Time of Ingestion is important
- Reason (suicidal, accidental, criminal)
- Available medications in home
- Past medical history, medications, past psychiatric history

**Signs and Symptoms**
- Mental status changes
- Hypotension / hypertension
- Decreased respiratory rate
- Tachycardia, dysrhythmias
- Seizures
- **S**alivation, **L**acrimation, **U**rination; increased, loss of control, **D**efecation / Diarrhea, **G**I Upset; Abdominal pain / cramping, **E**mesis, **M**uscle Twitching

**Differential**
- Tricyclic antidepressants
- Acetaminophen
- Depressants
- Stimulants
- Anticholinergic
- Cardiac medications
- Solvents, Alcohols, Cleaning agents
- Insecticides (organophosphates)



# Pediatric Overdose / Toxic Ingestion



**Pearls**

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Do not rely on patient history of ingestion, especially in suicide attempts. Make sure patient is still not carrying other medications or has any weapons. Bring bottles, contents, emesis to ED.**
- **Age specific blood pressure 0 – 28 days > 60 mmHg, 1 month - 1 year > 70 mmHg, 1 - 10 years > 70 + (2 x age)mmHg and 11 years and older > 90 mmHg.**
- **Magnesium Sulfate is known to cause hypotension after administration. Consider a fluid bolus of 10 cc/kg prior to administration**
- **Tricyclic:** 4 major areas of toxicity: seizures, dysrhythmias, hypotension, decreased mental status or coma; rapid progression from alert mental status to death.
- **Acetaminophen:** initially normal or nausea/vomiting. If not detected and treated, causes irreversible liver failure
- **Aspirin**: Early signs consist of abdominal pain and vomiting. Tachypnea and altered mental status may occur later. Renal dysfunction, liver failure, and or cerebral edema among other things can take place later.
- **Depressants:** decreased HR, decreased BP, decreased temperature, decreased respirations, non-specific pupils
- **Stimulants:** increased HR, increased BP, increased temperature, dilated pupils, seizures
- **Anticholinergic:** increased HR, increased temperature, dilated pupils, mental status changes
- **Cardiac Medications:** dysrhythmias and mental status changes
- **Solvents:** nausea, coughing, vomiting, and mental status changes
- **Insecticides:** increased or decreased HR, increased secretions, nausea, vomiting, diarrhea, pinpoint pupils
- Consider restraints if necessary for patient's and/or personnel's protection per the Restraint Procedure.
- **Nerve Agent Antidote kits** contain 2 mg of Atropine and 600 mg of pralidoxime in an autoinjector for self administration or patient care.
- Consider contacting the Regional Poison Control Center (1-800-222-1222) for guidance. Any advice given should be relayed to Medical Control for definitive orders.

# Pediatric Respiratory Distress

**History**
- Time of onset
- Possibility of foreign body
- Past Medical History
- Medications
- Fever / Illness
- Sick Contacts
- History of trauma
- History / possibility of choking
- Ingestion / OD
- Congenital heart disease

**Signs and Symptoms**
- Wheezing / Stridor / Crackles / Rales
- Nasal Flaring / Retractions / Grunting
- Increased Heart Rate
- AMS
- Anxiety
- Attentiveness / Distractability
- Cyanosis
- Poor feeding
- JVD / Frothy Sputum
- Hypotension

**Differential**
- Asthma / Reactive Airway Disease
- Aspiration
- Foreign body
- Upper or lower airway infection
- Congenital heart disease
- OD / Toxic ingestion / CHF
- Anaphylaxis
- Trauma

Pediatric Airway Protocol(s)

NO ← **Airway Patent**
**Ventilations adequate**
**Oxygenation adequate** → Yes

Consider Pediatric Allergic Reaction/Anaphylaxis Protocol

Maintain position of comfort, keep close to caregiver

Vascular Access Protocol ***If indicated***

P — Cardiac Monitor

Lung Exam
Signs / Symptoms

## WHEEZING

B — **Albuterol 2.5 mg Nebulized**
*Repeat as needed x3*

B — **Ipratropium 0.5 mg Nebulized**
*With first albuterol treatment*

P — *Consider*
**Solumedrol 1 mg/kg IV / IO**
**Max 125 mg**

NO ← **Worsening?**

YES

P — **Magnesium Sulfate**
**40 mg/kg IV / IO**
**Maximum 2 g**
Dilute to 10 mL with NS
Administer over 2 minutes

Pediatric Airway Protocol(s)
***As indicated***

**Worsening?** — YES → A — **Epinephrine (1mg/1ml)**
**0.15 mg IM (Max 0.5 mg)**

Pediatric Airway Protocol(s)
***As indicated***

## STRIDOR

B — *Consider*
**Nebulized Humidified $O_2$**
**Normal Saline 3mL in Nebulizer**
*Repeat as needed*

P — **Racemic Epinephrine (2.25%)**
**Nebulized**
**0.5 ml** Diluted in 4 mL of NS
(see back for other formulations)

**Worsening?**

YES → A — **Epinephrine (1mg/1ml)**
**0.15 mg IM (Max 0.5 mg)**

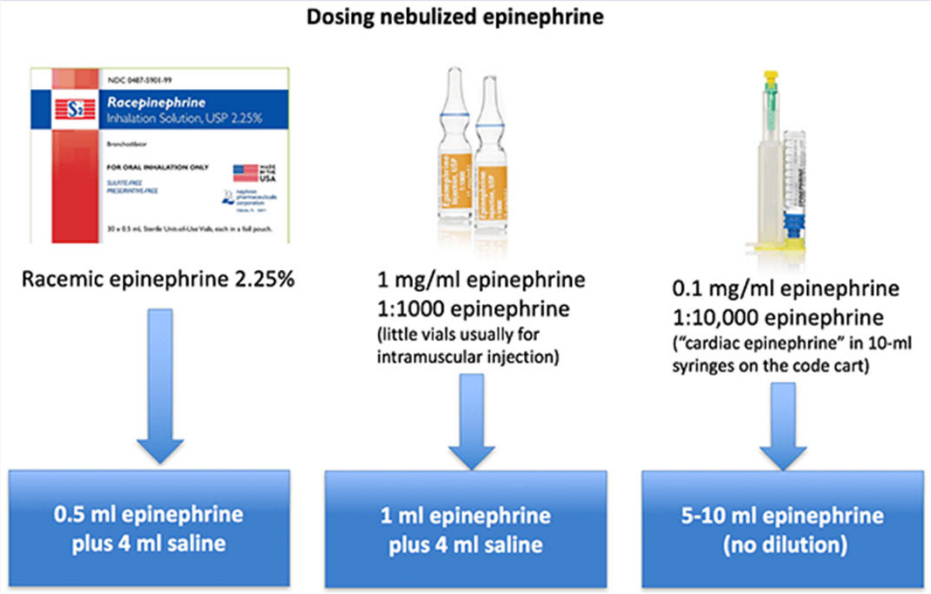
NO

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Pediatric Section Protocols

# Pediatric Respiratory Distress






**Pearls**

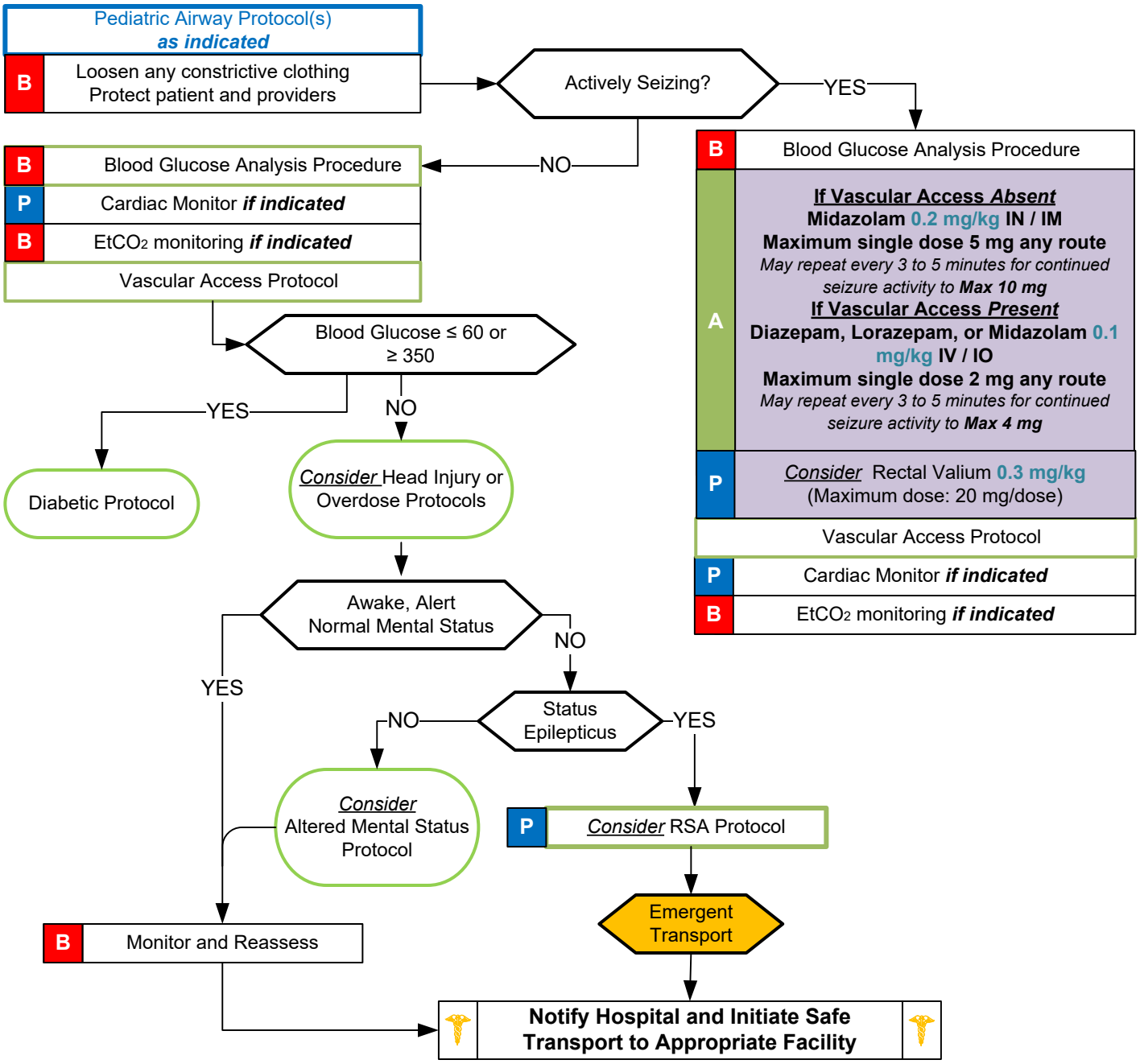
- **Recommended Exam: Mental Status, HEENT, Skin, Neck, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Pulse oximetry should be monitored continuously in the patient with respiratory distress.**
- **EMT can administer albuterol if properly trained**
- **Consider IV access when Pulse oximetry remains < 94 % after first beta agonist treatment. Also consider a crystalloid bolus of 20 mL/kg in pediatric patients in respiratory distress; these patients are often dehydrated.**
- **Magnesium Sulfate is known to cause hypotension after administration. Consider a fluid bolus of 10 cc/kg prior to administration**
- Do not force a child into a position, allow them to assume position of comfort. They will protect their airway by their body position.
- The most important component of respiratory distress is airway control.
- Bronchiolitis is a viral infection typically affecting infants which results in wheezing which may not respond to beta-agonists. Consider Epinephrine if patient < 18 months and not responding to initial beta-agonist treatment.
- Croup typically affects children < 2 years of age. It is a viral infection with possible fever, gradual onset, and no drooling is noted.
- Epiglottitis typically affects children > 2 years of age. It is a bacterial infection with fever, rapid onset, and often stridor. The patient typically wants to sit up to keep airway open, drooling is common. ***Airway manipulation may worsen the condition. Avoid airway device insertion in patients with suspected epiglottitis.***
- In patients using levalbuterol (Xopenex) you may substitute the patient's levalbuterol for Albuterol in the protocol.

# Pediatric Seizure

**History**
- Fever, Sick contacts
- Prior history of seizures
- Medication compliance
- Recent head trauma
- Whole body vs unilateral seizure activity
- Duration, Single/multiple
- Congenital Abnormality

**Signs and Symptoms**
- Fever; hot, dry skin
- Seizure activity
- Incontinence
- Tongue trauma
- Rash
- Nuchal rigidity
- Altered mental status

**Differential**
- Simple Febrile seizure
- Infection
- Head trauma, Medication or Toxin
- Hypoxia or Respiratory failure
- Hypoglycemia
- Metabolic abnormality / acidosis
- Tumor



# Pediatric Seizure



**Pearls**

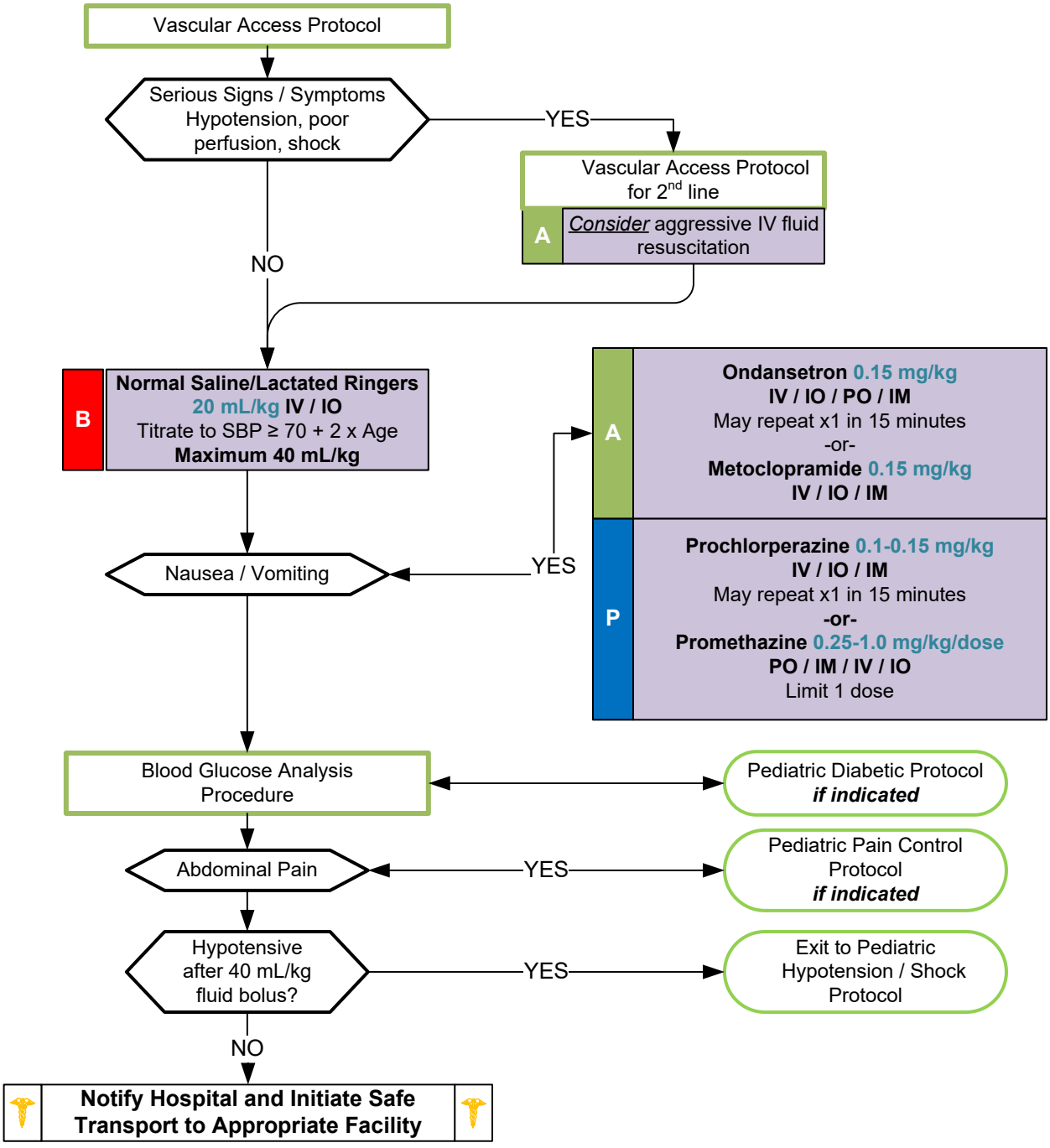
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Extremities, Neuro**
- Simple Febrile Seizures are most common in ages 6mos – 5 years. They are by definition generalized seizures with no seizure history in the setting of any grade of fever, with an otherwise normal neurologic and physical exam and recent history. It may be reasonable to observe these seizures, while treating fever with acetaminophen or ibuprofen and passive cooling measures (i.e. undressing), for up to five minutes. Any seizure confirmed to last for more than five minutes should be treated with medication.
- All first time seizures (non-febrile) should be transported for evaluation at a hospital. Consult with Medical Direction if any questions arise.
- Do not delay treatment of seizure activity to check a blood sugar (hypoglycemia has been found to rarely be the cause of actively seizing patient)
- IN/IM routes are preferred over rectal (PR), IV or IO
- Addressing the ABCs and verifying blood glucose is as important as stopping the seizure.
- Be prepared to assist ventilations especially if a benzodiazepine is used. Avoiding hypoxemia is extremely important.
- In an infant, a seizure may be the only evidence of a closed head injury.
- Status epilepticus is defined as two or more successive seizures without a period of consciousness or recovery. This is a true emergency requiring rapid airway control, treatment, and transport.
- Assess for possibility of occult trauma and substance abuse, overdose or ingestion / toxins.

# Pediatric Vomiting / Diarrhea

**History**
- Age
- Time of last meal
- Last bowel movement / emesis
- Improvement or worsening with food or activity
- Other sick contacts
- Past Medical History
- Past Surgical History
- Medications
- Travel history
- Bloody Emesis or diarrhea

**Signs and Symptoms**
- Pain
- Distension
- Constipation
- Diarrhea
- Anorexia
- Fever
- Cough,
- Dysuria

**Differential**
- CNS (Increased pressure, headache, tumor, trauma or hemorrhage)
- Drugs
- Appendicitis
- Gastroenteritis
- GI or Renal disorders
- Diabetic Ketoacidosis
- Infections (pneumonia, influenza)
- Electrolyte abnormalities



# Pediatric Vomiting / Diarrhea



| Heart Rate (beats/min) | | | Respiratory Rate (breaths/min) | |
|---|---|---|---|---|
| **Age** | **Awake** | **Asleep** | **Age** | **Normal** |
| Neonate (<28 d) | 100-205 | 90-160 | Infant (<1 y) | 30-53 |
| Infant (1-12 mos) | 100-190 | | | |
| Toddler (1-2 y) | 98-140 | 80-120 | Toddler (1-2 y) | 22-37 |
| Preschool (3-5 y) | 80-120 | 65-100 | Preschool (3-5 y) | 20-28 |
| School-age (6-11 y) | 75-118 | 58-90 | School-age (6-11 y) | 18-25 |
| Adolescent (12-15 y) | 60-100 | 50-90 | Adolescent (12-15 y) | 12-20 |
| *Reference: PALS Guidelines, 2015* | | | | |

| Blood Pressure (mmHg) | | | | |
|---|---|---|---|---|
| **Age** | | **Systolic** | **Diastolic** | **Systolic Hypotension** |
| Birth (12 h) | <1 kg | 39-59 | 16-36 | <40-50 |
| | 3 kg | 60-76 | 31-45 | <50 |
| Neonate (96 h) | | 67-84 | 35-53 | <60 |
| Infant (1-12 mos) | | 72-104 | 37-56 | <70 |
| Toddler (1-2 y) | | 86-106 | 42-63 | <70 + (age in years × 2) |
| Preschool (3-5 y) | | 89-112 | 46-72 | |
| School-age (6-9 y) | | 97-115 | 57-76 | |
| Preadolescent (10-11 y) | | 102-120 | 61-80 | <90 |
| Adolescent (12-15 y) | | 110-131 | 64-83 | |

**Pearls**

- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Heart Rate: One of the first clinical signs of dehydration is almost always increased heart rate. Tachycardia increases as dehydration becomes more severe, very unlikely to be significantly dehydrated if heart rate is close to normal.**
- Beware of only vomiting (i.e. no diarrhea) in children. Pyloric stenosis, bowel obstruction, and CNS processes (bleeding, tumors, or increased CSF pressures) all often present with isolated vomiting.

# Multi-System Trauma

## History
- Time and mechanism of injury
- Damage to structure or vehicle
- Location in structure or vehicle
- Others significantly injured or dead
- Speed and details of MVC
- Restraints / protective equipment
- Past medical history
- Medications

## Signs and Symptoms
- Pain, swelling
- Deformity, lesions, bleeding
- Altered mental status or unconscious
- Hypotension or shock
- Arrest

## Differential (Life threatening)
- Chest: Tension pneumothorax
  Flail chest
  Pericardial tamponade
  Open chest wound
  Hemothorax
- Intra-abdominal bleeding
- Pelvis / Femur fracture
- Spine fracture / Cord injury
- Head injury (see Head Trauma)
- Extremity fracture / Dislocation
- HEENT (Airway obstruction)
- Hypothermia

Consider Crush Injury Protocol for entrapped victims, request additional medical resources early.

Assessment of Serious Signs / Symptoms (ABC and LOC)

Adult/Pediatric Airway Protocol(s) ***if indicated***

Spinal Immobilization Protocol

**Occlude any open chest wounds**

Patients in cardiac arrest due to trauma do not require resuscitation attempts if any of the following criteria are met:
- Blunt trauma with asystole (after chest decompression)
- Penetrating trauma with no signs of life and asystole, after chest decompression procedures have been considered
- Obviously fatal injuires (decapitation, etc.)

**VS / Perfusion / GCS**

NORMAL

- B: Vascular Access Protocol
- P: Cardiac Monitor
- Splint Suspected Fractures
  Consider Pelvic Binding if patient becomes unstable
  Control External Hemorrhage
- **Transport** to closest Appropriate Trauma Center

ABNORMAL

- P: Consider Chest Decompression or Finger Thoracostomy Procedure (**if indicated**)
- Control External Hemorrhage
- **Rapid Transport** to closest Appropriate Trauma Center
  **Limit Scene Time ≤ 10 minutes**
  **Provide Early Notification**
- Vascular Access Protocol
  *2 large-bore access points*
- B: **Normal Saline/Lactated Ringers Bolus IV / IO**
  **Peds:** 20 mL/kg
  **Adults:** 500 mL
  *Repeat to keep SBP ≥ 90, SBP ≥ 70 + 2 x Age, or palpable radial pulse*
  **Maximum 60 mL/kg** *or* **2 L**

Adult/Pediatric Hypotension / Shock Protocol

- P: Cardiac Monitor
- Head Trauma Protocol ***if indicated***
- Remove clothing, fully expose
- B: **Splint Suspected Fractures**
  **Place Pelvic Binder if pelvic fractures are suspected**
  **Soft Tissue Injury Management**

P: *Consider use of TXA*
***Adults:** 1 g*
*Mix in 100 ml NS and administer over 10 min*

Adult/Pediatric Pain Control Protocol ***if appropriate***

Apply warm blankets, prevent hypothermia

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Wound care considerations
- Direct Pressure
- Pressure Dressing
- Tourniquet(s)
- Wound Packing

Do not delay transport for multi-trauma patients, but time spent on-scene addressing ABC's is always time well spent.

Trauma and Burn Protocols

# Multiple Trauma



## National Guideline for the Field Triage of Injured Patients

### RED CRITERIA
***High Risk for Serious Injury***

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

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

### YELLOW CRITERIA
***Moderate Risk for Serious Injury***

| Mechanism of Injury | EMS Judgment |
|---|---|
| • High-Risk Auto Crash<br>– Partial or complete ejection<br>– Significant intrusion (including roof)<br>• >12 inches occupant site OR<br>• >18 inches any site OR<br>• Need for extrication for entrapped patient<br>– Death in passenger compartment<br>– Child (age 0–9 years) unrestrained or in unsecured child safety seat<br>– Vehicle telemetry data consistent with severe injury<br>• Rider separated from transport vehicle with significant impact (eg, motorcycle, ATV, horse, etc.)<br>• Pedestrian/bicycle rider thrown, run over, or with significant impact<br>• Fall from height > 10 feet (all ages) | **Consider risk factors, including:**<br>• Low-level falls in young children (age ≤ 5 years) or older adults (age ≥ 65 years) with significant head impact<br>• Anticoagulant use<br>• Suspicion of child abuse<br>• Special, high-resource healthcare needs<br>• Pregnancy > 20 weeks<br>• Burns in conjunction with trauma<br>• Children should be triaged preferentially to pediatric capable centers<br><br>**If concerned, take to a trauma center** |

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

**Pearls**

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lung, Abdomen, Extremities, Back, Neuro**
- **Scene times should not be delayed for procedures. These should be performed en route when possible.**
- **Rapid transport of the unstable trauma patient to the closest, most appropriate facility is the goal.**
- **Bag valve mask is an acceptable method of managing the airway if pulse oximetry can be maintained ≥ 94%**
- Geriatric patients should be evaluated with a high index of suspicion. Often occult injuries are more difficult to recognize and patients can decompensate unexpectedly with little warning.
- Mechanism is the most reliable indicator of serious injury.
- Do not overlook the possibility of associated domestic violence or abuse.
- Sucking chest wounds should be managed with an occlusive dressing. Monitor the patient for signs of a developing tension pneumothorax and treat as indicated.
- Abdominal eviscerations should be treated by covering the exposed abdominal contents with moistened gauze.
- Tourniquet placement should be over a singular long bone proximal to any hemorrhage, arterial or venous, that cannot be controlled with direct pressure. Record the time placed in the ePCR and consider pain management.
- If the first tourniquet does not control the hemorrhage, a second one may be placed proximal to the first tourniquet.
- Permissible to use hemostatic dressings for control of external hemorrhage

# Head Trauma

**History**
- Time of injury
- Mechanism (blunt vs. penetrating)
- Loss of consciousness
- Bleeding
- Past medical history
- Medications
- Evidence for multi-trauma

**Signs and Symptoms**
- Pain, swelling, bleeding
- Altered mental status
- Unconscious
- Respiratory distress / failure
- Vomiting
- Major traumatic mechanism of injury
- Seizure

**Differential**
- Skull fracture
- Brain injury (Concussion, Contusion, Hemorrhage or Laceration)
- Epidural hematoma
- Subdural hematoma
- Subarachnoid hemorrhage
- Spinal injury
- Abuse

DO NOT HYPERVENTILATE

Ventilate to maintain EtCO2 35 – 45 mmHg

Spinal Immobilization Protocol ***if indicated***

Multiple Trauma Protocol ***if indicated***

Vascular Access Protocol

Adult / Pediatric Altered Mental Status Protocol ***if indicated***

Adult / Pediatric Seizure Protocol ***if indicated***

Blood Glucose Analysis Procedure

P Cardiac Monitor

B *Consider* $EtCO_2$ monitoring

Adult / Pediatric Diabetic Protocol ***if indicated***

**Brain Herniation**
Unilateral or bilateral dilation of pupils / posturing with unconsciousness and Cushing's Triad Vital signs

- Elevate head of cot or backboard 30°
- Ensure sedation and pain control is adequate

**Assess Mental Status Record GCS and spontaneous extremity movements**

Assess GCS

>8

**If GCS ≤ 13**, transport to closest appropriate Trauma Center

≤ 8

**Rapid Transport** to closest Appropriate trauma center

Supplemental oxygen Maintain SpO2 ≥ 94 %

Adult / Pediatric Airway / RSA Protocol(s)

B **Maintain EtCO2** 35 – 45 mmHg

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

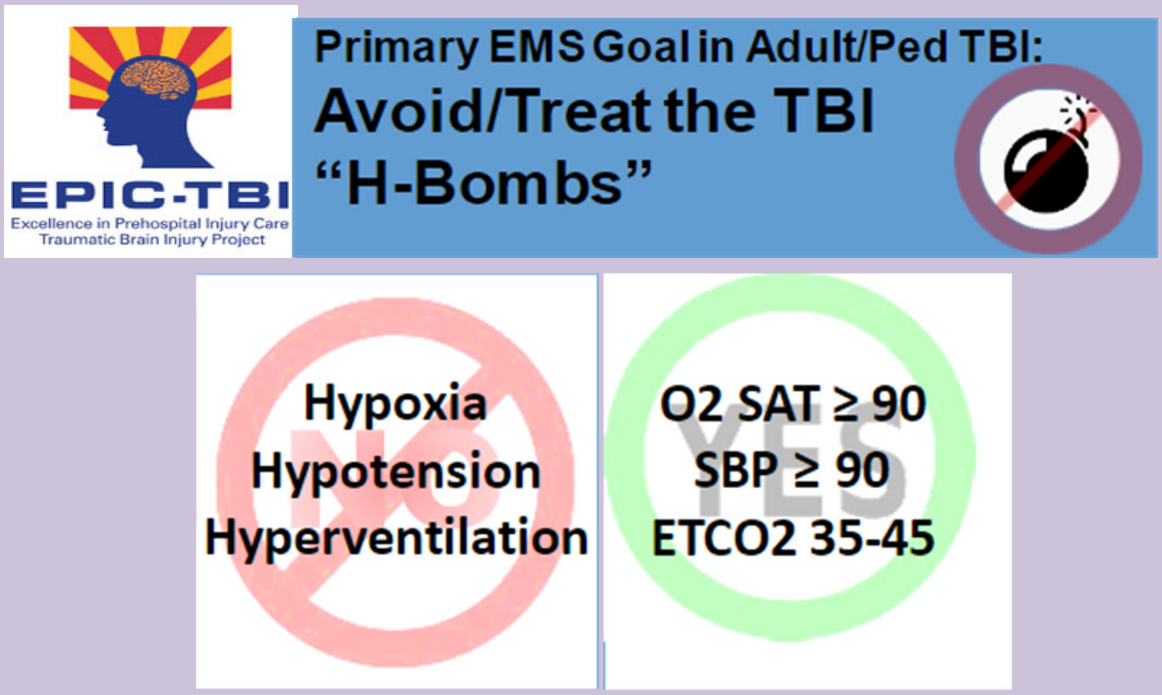
# Head Trauma



Secondary brain injury is an indirect result of the injury. It results from processes initiated by the initial trauma. It occurs in the hours and days following the primary injury and plays a large role in the brain damage and death that result from TBI.

- Ischemia (insufficient blood flow)
- Cerebral hypoxia (insufficient oxygen in the brain)
- Hypotension (low blood pressure)
- Cerebral edema (swelling of the brain)
- Raised intracranial pressure (the pressure within the skull).
- Hypercapnia (excessive carbon dioxide levels in the blood)
- Acidosis (excessively acidic blood)
- Infection (generally delayed)

If intracranial pressure gets too high, it can lead to deadly brain herniation, in which parts of the brain are squeezed past structures in the skull.




**Pearls**

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Back, Neuro**
- Increased intracranial pressure (ICP) may cause hypertension and bradycardia (Cushing's Response).
- Hypotension usually indicates injury or shock unrelated to the head injury and should be aggressively treated.
- An important item to monitor and document is a change in the level of consciousness by serial examination.
- Consider Restraints if necessary for patient's and/or personnel's protection per the Restraint Procedure.
- Limit IV fluids unless patient is hypotensive.
- Concussions are traumatic brain injuries involving any of a number of symptoms including confusion, LOC, vomiting, or headache. Any prolonged confusion or mental status abnormality which does not return to normal within 15 minutes or any documented loss of consciousness should be evaluated by a physician ASAP.

# Spinal Motion Restriction

**History**
- Type of injury
- Mechanism: blunt / fall / penetrating
- Time of injury
- LOC
- Medical history
- Medications

**Signs and Symptoms**
- Pain, swelling
- Deformity / step-off
- Altered sensation / motor function
- Bradycardia
- Hypotension
- Paralysis
- Headache
- Shooting pain

**Differential**
- Fracture
- Spinal cord injury
- Muscle strain
- Muscle spasm
- Ligamentous injury

**Perform a risk-benefit analysis if full precautions are questionable.**

**Routine use of the long spine board is NOT recommended.**

Entry from appropriate guideline
Circumstances warrant spinal motion restriction consideration- See Protocols Below

**N**euro Exam: Any focal deficit? — YES →

NO

**S**ignificant mechanism of injury?
High-energy events such as ejection, high falls, and abrupt deceleration crashes — YES →

NO

**A**lertness: Alteration in mental status? — YES →

NO

**I**ntoxication: Any evidence of?
Includes Drugs and/ or Alcohol — YES →

NO

**D**istracting Injury:
Any painful injury that might distract the patient from the pain of a C-spine injury? — YES →

NO

**S**pinal Exam:
Point tenderness over the spinous process(es) or pain to ROM? — YES →

NO

**Spinal Motion Restriction Not Required** → Exit to Appropriate protocol(s)

**Apply**
**Cervical Immobilization Device**

**Restrict Spinal Movement**

Follow
Spinal Precautions Procedure

**AMBULATORY**
Bring stretcher to patient, assist patient onto stretcher with minimal spinal movement, and then secure patient to stretcher

**NONAMBULATORY**
Use Long Spine Board (OR any of the multiple equivalent devices) to TRANSFER patient to stretcher with minimal spinal movement, remove the device, then secure to stretcher.

May use multiple providers to transfer patient to stretcher using in-line spinal techniques such as log roll / straddle slide to maintain spinal precautions without a device, then secure to stretcher

# Spinal Motion Restriction



**Pearls**

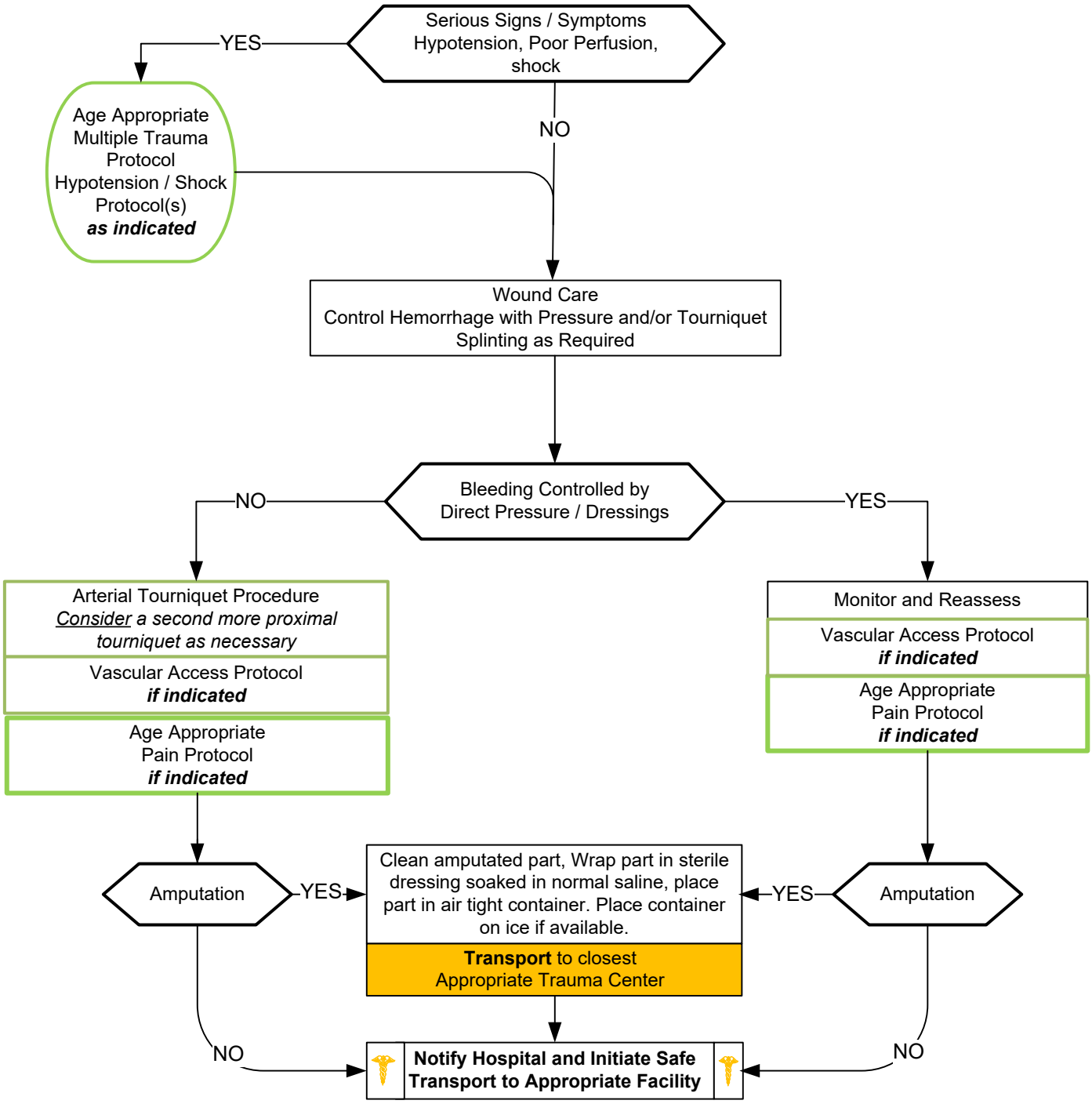
- **Recommended Exam: Mental Status, Skin, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Patients meeting all the above criteria do not require spinal motion restriction. However, patients who fail one or more criteria above require spinal motion restriction, but does NOT mandate use of the long spine board for immobilization.**
- **Long spine boards are NOT considered standard of care in most cases of potential spinal injury. Spinal motion restriction with cervical collar, and securing patient to cot, while padding all void areas is appropriate.**
- **Spinal motion restriction is always utilized in at-risk patients. This includes cervical collar, securing to stretcher, minimizing movement/ transfers. and maintenance of in-line spine stabilization during any necessary movement/ transfers. This includes the elderly, or others with body or spine habitus preventing them from lying flat.**
- **Consider spinal motion restriction in patients with arthritis, cancer, dialysis, and underlying spine or bone disease.**
- Range of motion (ROM) is tested by touching chin to chest (look down), extending neck (look up), and turning head from side to side (chin to each shoulder) only in patients without posterior cervical mid-line pain. ROM should NOT be assessed if patient has midline spinal tenderness. Patient's range of motion should not be assisted, they must be able to complete alone.
- **EMR may participate in spinal motion restriction** per Agency Medical Director.
- **<u>Immobilization on a long spine board is not necessary where:</u>**
  **Penetrating trauma to the head, neck or torso with no signs and/ or symptoms of spinal injury.**
- **<u>Concerning mechanisms that may result in spinal column injury:</u>**
- **Fall from ≥ 3 feet and/ or ≥ 5 stairs or steps. Ground level falls in patients ≥ 65 years of age.**
- **MVC ≥ 30 mph, rollover, and/or ejection**
- **Motorcycle, bicycle, other mobile device, or pedestrian-vehicle crash**
- **Diving or axial load to spine**
- **Electric shock**

# Extremity Trauma

**History**
- Type of injury
- Mechanism: crush / penetrating / amputation
- Time of injury
- Open vs. closed wound / fracture
- Wound contamination
- Medical history
- Medications

**Signs and Symptoms**
- Pain, swelling
- Deformity
- Altered sensation / motor function
- Diminished pulse / capillary refill
- Decreased extremity temperature

**Differential**
- Abrasion
- Contusion
- Laceration
- Sprain
- Dislocation
- Fracture
- Amputation



# Extremity Trauma



**Pearls**

- **Recommended Exam: Mental Status, Extremity, Neuro**
- **Tourniquets should be applied to the proximal extremity over a singular long bone (femur or humerus) only**
- Record tourniquet time if used
- Peripheral neurovascular status is important and should be examined and recorded.
- Time is critical in amputation injuries.
- Hip dislocations and knee and elbow fracture / dislocations have a high incidence of vascular compromise.
- Urgently transport any injury with vascular compromise and any amputation; time is especially critical in these cases.
- Blood loss may be concealed or not apparent with extremity injuries.
- Lacerations should be evaluated for repair within 8 hours from the time of injury.
- Multiple casualty incident or obvious life threat: Consider Tourniquet Procedure first instead of direct pressure.

# Crush Syndrome Trauma

**History**
- Entrapped and crushed under heavy load > 30 minutes
- Extremity / body crushed
- Building collapse, trench collapse, industrial accident, pinned under heavy equipment

**Signs and Symptoms**
- Hypotension
- Hypothermia
- Abnormal ECG findings
- Pain
- Anxiety

**Differential**
- Entrapment without crush syndrome
- Entrapment without significant crush
- Altered mental status

Scene Safe

YES → Age Appropriate Airway Protocol(s) ***as indicated***

NO → Call for help / additional resources
Stage until scene safe

- B: Vascular Access Protocol x2
- 12 Lead ECG Procedure
- B: **Normal Saline/LR 1 L Bolus then 500 mL/hr IV / IO (Peds: 20 mL/kg IV / IO then 3 x maintenance rate)**
- P: Cardiac Monitor

***Abnormal EKG findings suggestive of hyperkalemia:**
- Peaked T Waves on 12 Lead
- QRS ≥ 120 ms
- QTc ≥ 500 ms
- Loss of P wave
- Bradycardia

Abnormal ECG* / Hemodynamically unstable

YES:
- B: Apply an arterial tourniquet proximal to the affected extremity
- P: **Sodium Bicarbonate IV / IO**
  **Adult: 100 mEq**
  **Peds: 1 mEq/kg**
- P: **Calcium Gluconate IV / IO**
  **Adult: 1 g**
  **Peds: 20 mg/kg**
  Over 3 minutes

NO:

If entrapped > 45 minutes and unable to administer normal saline/LR bolus prior to extrication, **apply arterial tourniquet to entrapped extremity**.

- P: ***Immediately Prior to Extrication***
  **Sodium Bicarbonate IV / IO**
  **Adult: 100 mEq**
  **Peds: 1 mEq/kg**
- P: *Consider*
  **Calcium Gluconate IV / IO**
  **Adult: 1 g**
  **Peds: 20 mg/kg**
  **Over 3 minutes**

Cardiac arrest?

YES → Exit to Age Appropriate Cardiac Arrest / Pulseless Arrest / Arrhythmia Protocol(s) ***as indicated***

NO:
- Adult / Pediatric Pain Control Protocol
- B: Frequent reassessment
- B: Monitor for fluid overload

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Consider
Multiple Trauma Protocol
Hypothermia / Hyperthermia Protocol(s)
***as indicated***

Trauma and Burn Protocols

# Crush Syndrome Trauma



**Pearls**

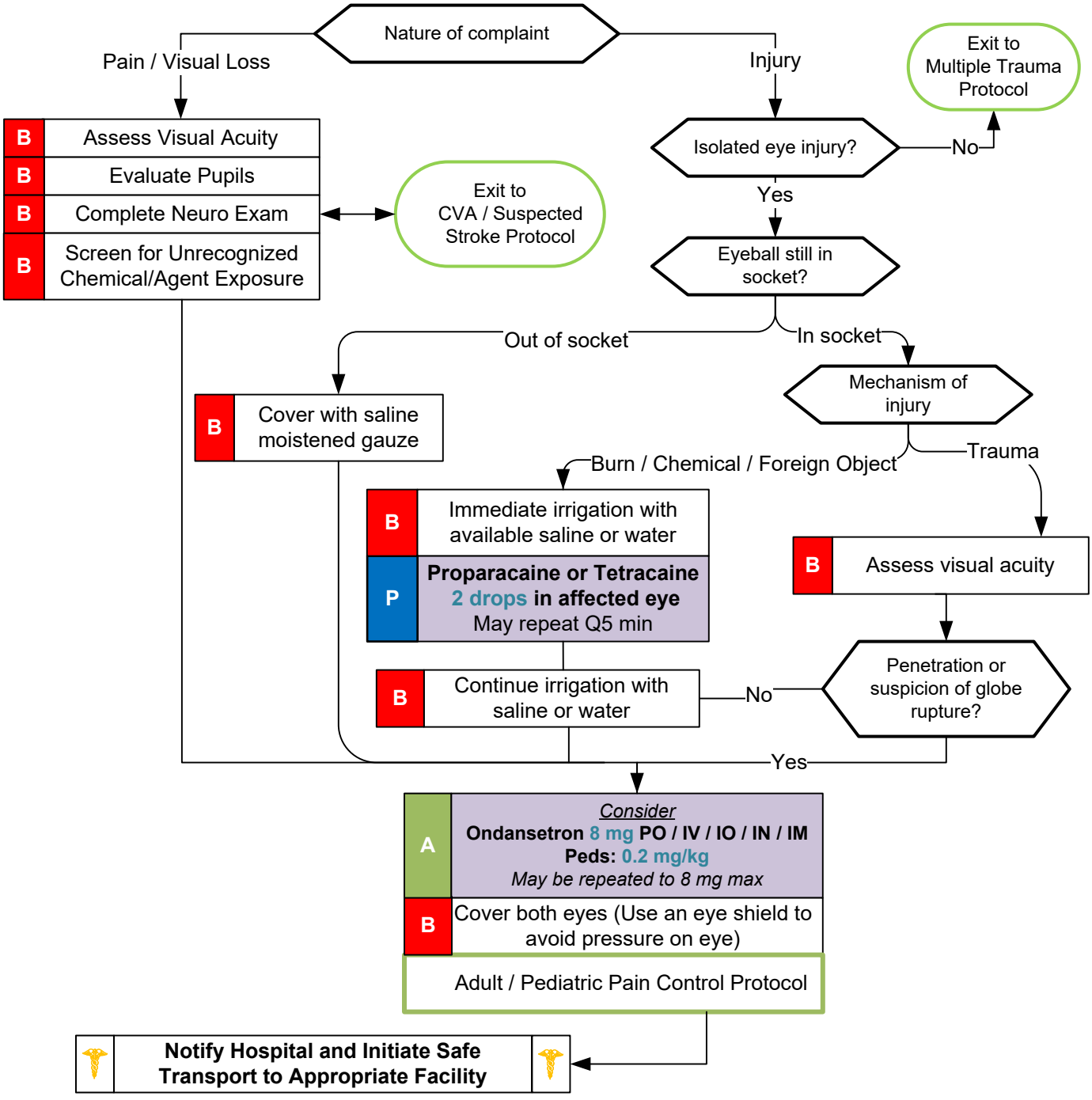
- **Recommended exam: Mental Status, Musculoskeletal, Neuro**
- **Scene safety is of paramount importance as typical scenes pose hazards to rescuers. Call for appropriate resources.**
- For entrapment greater than 45 minutes, significant fluid shifts can occur after extrication resulting in hemodynamic instability. If unable to administer fluid bolus per protocol prior to extrication, apply a tourniquet to the entrapped extremity.
- Hyperkalemia from crush syndrome can produce ECG changes described in protocol, but may also cause a bizarre, wide complex rhythm. Wide complex rhythms should also be treated using the VF/Pulseless VT Protocol.
- Patients may become hypothermic even in warm environments.
- Pediatric IV Fluid maintenance rate: 4 mL per first 10 kg of weight + 2 mL per second 10 kg of weight + 1 mL for every additional kg in weight.
- **Sodium Bicarbonate and Calcium Gluconate are not compatible, DO NOT mix these drugs together in the same IV line.**

# Eye Injury / Complaint

**History:**
- Time of injury/onset
- Blunt/penetrating/chemical
- Open vs. closed injury
- Involved chemicals/MSDS
- Wound Contamination
- Medical History
- Tetanus status
- Normal visual acuity
- Medications

**Signs and Symptoms:**
- Pain, swelling, blood
- Deformity, contusion
- Visual deficit
- Leaking aqueous/vitreous humor
- Upwardly fixed eye
- "Shooting" or "streaking" light
- Visible contaminants
- Rust ring
- Lacrimation

**Differential:**
- Abrasion/Laceration
- Globe rupture
- Retinal nerve damage/detachment
- Chemical/thermal burn/agent of terror
- Orbital fracture
- Orbital compartment symdrome
- Neurological event
- Acute glaucoma
- Retinal artery occlusion




Trauma and Burn Protocols

# Eye Injury / Complaint



**Visual Acuity Testing**

- Have the patient read normal-sized text at arm's length
- Have the patient count fingers held in front of their face
- Assess for recognition of motion (hand waving)
- Assess for light perception

Visual acuity should be tested in each eye individually, then both eyes together. Allow patient to wear glasses (if available) if they normally would wear them, and document whether or not vision was tested with corrective eyewear (including contacts).

**Pearls:**

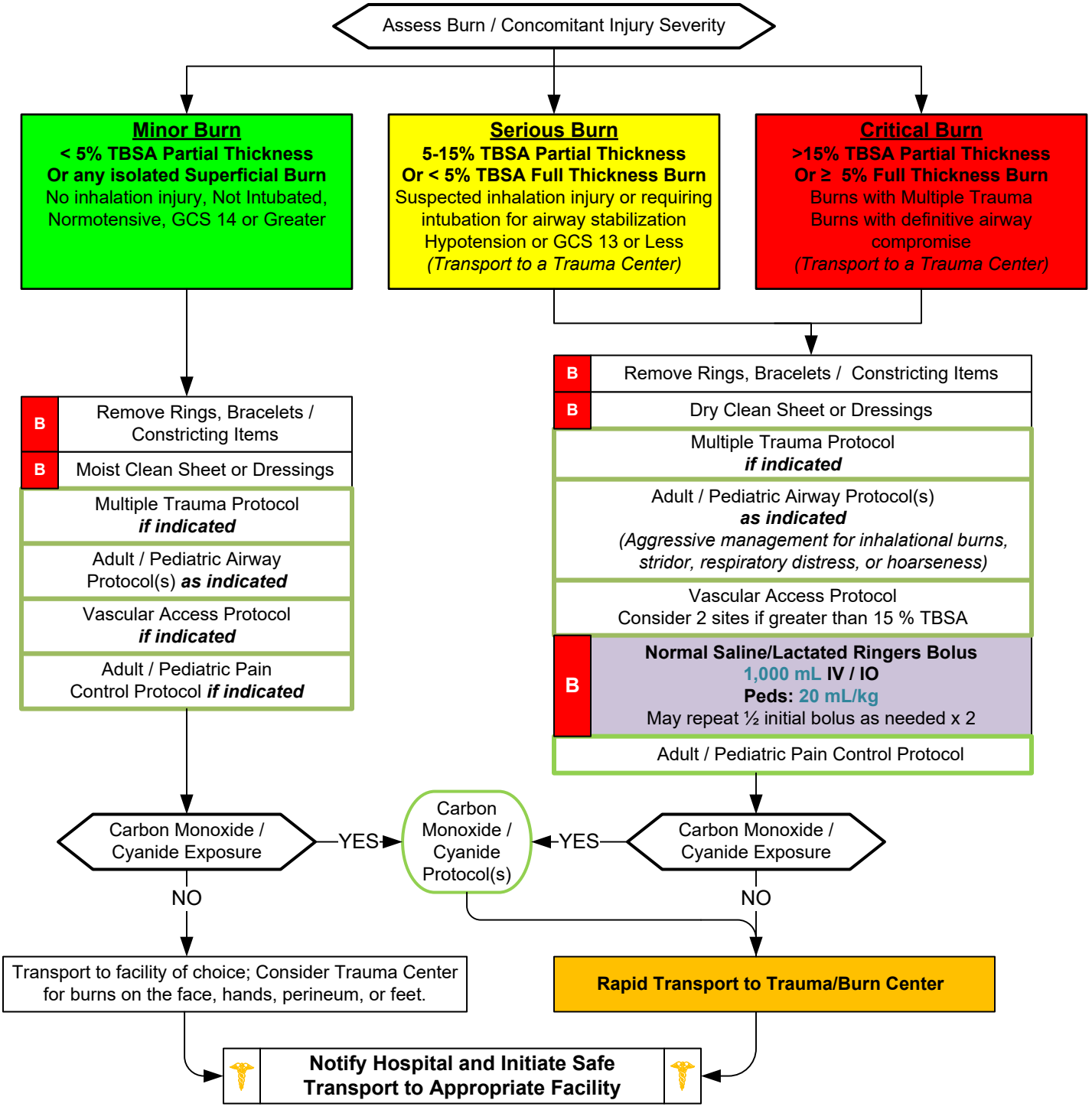
- **Remove contact lens whenever possible.**
- **Continue irrigation on scene and during transport.**
- Normal visual acuity can be present even with severe eye injury
- Any chemical or thermal burn to the face/eyes should raise suspicion of respiratory insult
- Orbital fractures raise concern of globe or nerve injury and need repeated assessments of visual status
- Always cover both eyes to prevent further injury due to coordinated eye movements.
- Use shields, not pads, for physical trauma to eyes. Pads can be used for the unaffected eye.
- Do not remove impaled objects
- Suspected globe rupture or compartment syndrome requires emergent hospital intervention.

# Thermal Burns

**History**
- Type of exposure (heat, gas, chemical)
- Inhalation injury
- Time of Injury
- Past medical history and Medications
- Other trauma
- Loss of Consciousness
- Tetanus/Immunization status

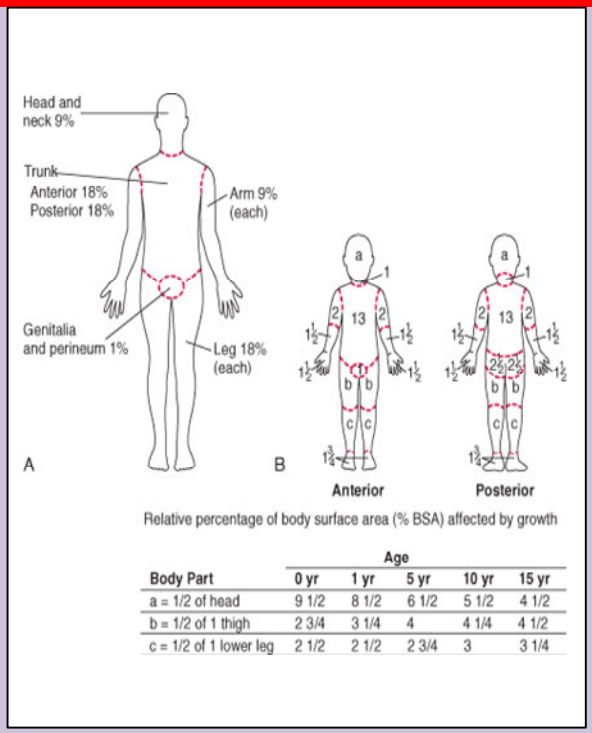
**Signs and Symptoms**
- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/ distress could be indicated by hoarseness/wheezing

**Differential**
- Superficial (1st Degree) red - painful (Don't include in TBSA)
- Partial Thickness (2nd Degree) blistering
- Full Thickness (3rd Degree) painless/charred or leathery skin
- Thermal injury
- Chemical – Electrical injury
- Radiation injury
- Blast injury



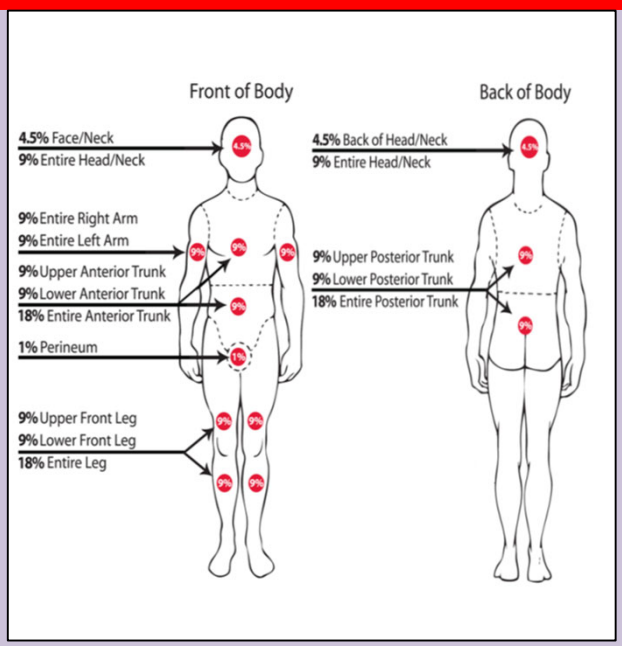
# Thermal Burns






Relative percentage of body surface area (% BSA) affected by growth

| Body Part | Age 0 yr | 1 yr | 5 yr | 10 yr | 15 yr |
|---|---|---|---|---|---|
| a = 1/2 of head | 9 1/2 | 8 1/2 | 6 1/2 | 5 1/2 | 4 1/2 |
| b = 1/2 of 1 thigh | 2 3/4 | 3 1/4 | 4 | 4 1/4 | 4 1/2 |
| c = 1/2 of 1 lower leg | 2 1/2 | 2 1/2 | 2 3/4 | 3 | 3 1/4 |




Estimate spotty areas of burn by using the size of the patient's palm as 1 %

## Rule of Nines

- Seldom do you find a complete isolated body part that is injured as described in the Rule of Nines.
- More likely, it will be portions of one area, portions of another, and an approximation will be needed.
- For the purpose of determining the extent of serious injury, differentiate the area with minimal or superficial (1st) burn from those of partial (2nd) or full (3rd) thickness burns.
- For the purpose of determining Total Body Surface Area (TBSA) of burn, include only Partial and Full Thickness burns. Report the observation of other superficial (1st degree) burns but do not include those burns in your TBSA estimate.

## Pearls

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro**
- **Notate how much IV fluid given and report to hospital on delivery of patient**

**Critical or Serious Burns:**

- ***> 5-15% total body surface area (TBSA) partial or full thickness burns, or***
- ***Full thickness burns > 5% TBSA for any age group, or***
- ***Circumferential burns of extremities, or***
- ***Electrical or lightning injuries, or***
- ***Suspicion of abuse or neglect, or***
- ***Inhalation injury, or***
- ***Chemical burns, or***
- ***Burns of face, hands, perineum, or feet***

These patients require direct transport to a Trauma Center. Local facility should be utilized only if critical interventions such as airway management are not possible in the field.

- Burn patients are often trauma patients, evaluate for multisystem trauma.
- Assure whatever has caused the burn is no longer contacting the injury. (Stop the burning process!)
- **Early advanced airway is required when the patient experiences significant inhalation injuries.** If appropriate airway management cannot be achieved in the field, go to the nearest emergency department for stabilization prior to transfer to the Trauma Center.
- Circumferential burns to extremities are dangerous due to potential vascular compromise secondary to soft tissue swelling.
- ***Burn patients are prone to hypothermia*** - never apply ice or cool the burn, must maintain normal body temperature.
- Evaluate the possibility of child abuse with children and burn injuries.
- Never administer IM pain injections to a burn patient.
- IO access through burns is allowed if no other vascular access site is available
- Always consider the possibility of child abuse in children with burn injuries

# Chemical Burns / Exposures

**History**
- Type of exposure (heat, gas, chemical)
- Inhalation injury
- Time of Injury
- Past medical history / Medications
- Other trauma
- Loss of Consciousness
- Tetanus/Immunization status

**Signs and Symptoms**
- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/ wheezing / Hypotension

**Differential**
- Superficial (1st Degree) red - painful (Don't include in TBSA)
- Partial Thickness (2nd Degree) blistering
- Full Thickness (3rd Degree) painless/charred or leathery skin
- Thermal injury
- Chemical injury
- Radiation injury
- Blast injury

**Assure Chemical Source is NOT Hazardous to Responders. ACTIVATE HOSPITAL DECON TEAM as needed.**

All chemical burns should have transport to a Trauma Center considered.

Assess Burn / Concomitant Injury Severity

**Minor Burn**
**< 5% TBSA Partial Thickness**
**Or any isolated Superficial Burn**
No inhalation injury, Not Intubated, Normotensive
GCS 14 or Greater

**Serious Burn**
**5-15% TBSA Partial Thickness**
**Or < 5% Full Thickness Burn**
**Or any "minor" burn involving HF**
Suspected inhalation injury or requiring intubation for airway stabilization
Hypotension or GCS 13 or Less

**Critical Burn**
**>15% TBSA Partial Thickness**
**Or ≥ 5% Full Thickness Burn**
Burns with Multiple Trauma
Burns with definitive airway compromise

Eye Injury?
- YES → Irrigate Involved Eye(s) with **Normal Saline** for 15 minutes, May repeat as needed
- No

Contact Hospital and Regional Poison Control Center for advice as needed (1-800-222-1222)

Brush any powder or dry chemicals off skin and remove any clothing from contaminated area

Hydrofluoric acid or fluorine gas exposure
- YES → If available, obtain HF exposure kit from work site
  Apply **Calcium Gluconate** gel to exposed area
  Apply continuously until pain is relieved
- No

Carbolic acid (phenol) exposure?
- YES → Flush contact area with alcohol first (if available) prior to saline irrigation
- No

Respiratory Symptoms
- YES → P **2.5% Calcium Gluconate Nebulized over 20 minutes (DO NOT Nebulize Calcium Chloride)**
- No

Hemodynamic Instability
- YES → P **Calcium Chloride IV/IO**
  **Adult:1 g Peds 20 mg/kg**
  **Repeat every 10 minutes if hemodynamic instability persists**
- No

Flush contact area with water or normal saline for 20 minutes

Exit to Thermal Burns Protocol

# Chemical Burns / Exposures



- **Pearls**
- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro**
- **Refer to Rule of Nines to estimate total body surface area affected by exposure**
- **Chemical Burns:**
  Refer to Decontamination Procedure.
  Normal Saline or Sterile Water is preferred, however if not available, do not delay irrigation using tap water. Other water sources may be used based on availability. Flush the area as soon as possible with the cleanest readily available water or saline solution using copious amounts of fluids.
- **Carbolic Acid (phenol)** – This chemical is hydrophobic, therefore will not be efficiently decontaminated by water/saline irrigation alone. Alcohol (any form) should be used as the initial flush if available, however do not unnecessarily delay copious irrigation with water or saline.
- **Hydrofluoric acid / fluorine gas** – These substances cause extensive tissue destruction due to their ability to penetrate tissues more easily than other substances. All exposures to these chemicals should be considered serious or critical and transported to a burn center for evaluation due to potential delayed toxicity. Calcium ions are readily bound by the fluoride ions, which contributes to pain and possible hemodynamic instability (even cardiac arrest). Calcium gluconate should be given intravascularly for any signs of hemodynamic instability. Pain is an indication of ongoing tissue destruction. Even small areas of exposure can be incredibly painful. **DO NOT** nebulize calcium chloride as this can cause further tissue damage. Calcium gluconate should be given via nebulizer if available for respiratory symptoms.

# Electrical Burns / Electrocution

**History**
- Type of exposure (lightning, residential power, high-voltage)
- Voltage exposure
- Time of Injury
- Past medical history / Medications
- Other trauma
- Loss of Consciousness
- Tetanus/Immunization status

**Signs and Symptoms**
- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/ wheezing / Hypotension

**Differential**
- Superficial (1st Degree) red - painful (Don't include in TBSA)
- Partial Thickness (2nd Degree) blistering
- Full Thickness (3rd Degree) painless/charred or leathery skin
- Thermal injury
- Internal electrical injury
- Blast injury

**Assure Electrical Source is NO longer in the area with patient before touching patient. Electrical source should also be locked/tagged out.**

Assess Burn / Concomitant Injury Severity

**Minor Burn**
**< 5% TBSA Partial Thickness**
**Or any isolated Superficial Burn**
Not Intubated, Normotensive
GCS 14 or Greater

**Serious Burn**
**5-15% TBSA Partial Thickness**
**Or < 5% Full Thickness Burn**
Requiring intubation for airway stabilization
Hypotension or GCS 13 or Less

**Critical Burn**
**>15% TBSA Partial Thickness**
**Or ≥ 5% Full Thickness Burn**
Burns with Multiple Trauma
Burns with definitive airway compromise

Airway Protocol(s) ***if indicated***
Vascular Access Protocol

Conscious?
- NO → B: *In the setting of lightning strikes, cardiac arrests are triaged as Red instead of Black, and managed as a priority.*
- B: AED Procedure
- P: Cardiac Monitor
- YES → 12 Lead ECG Procedure
- P: Cardiac Monitor

Cardiac Arrest?

NO:
- *Consider* Blast Injury Protocol
- *Consider* Thermal Burn Protocol
- *Consider* Age Appropriate Arrhythmia Protocol

YES:
- Age Appropriate Cardiac Arrest / Pulseless Arrest Protocol(s) ***as indicated***

**Transport** to closest appropriate Trauma/Burn Center

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

# Electrical Burns / Electrocution



## Pearls

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro**
- **Refer to Rule of Nines: Remember the extent of the obvious external burn from an electrical source, does not always reflect more extensive internal damage not seen.**
- **Lightning Strikes:**
  Lightning strikes should be treated as electrical burns, blast injuries, and multiple trauma due to the extreme forces produced. Cardiac arrests are often easily resuscitated with defibrillation attempts with resultant good neurologic outcomes, therefore should be triaged as Red in the setting of a mass casualty incident.
- **Electrical Burns:**
  DO NOT contact patient until you are certain the source of the electrical shock is disconnected.
  Attempt to locate contact points (generally there will be two or more.) A point where the patient contacted the source and a point(s) where the patient is grounded. Sites will generally be full thickness. **Do not refer to as entry and exit sites or wounds.**
  Cardiac Monitor: Anticipate ventricular or atrial irregularity including VT, VF, atrial fibrillation and / or heart blocks.
  Attempt to identify the nature of the electrical source (AC / DC), the amount of voltage, and the amperage the patient may have been exposed to during the electrical shock.

# Blast Injury / Incident

**History**
- Type of exposure (heat, gas, chemical)
- Inhalation injury
- Time of Injury
- Past medical history / Medications
- Other trauma
- Loss of Consciousness
- Tetanus/Immunization status

**Signs and Symptoms**
- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/ wheezing / Hypotension

**Differential**
- Superficial (1st Degree) red - painful (Don't include in TBSA)
- Partial Thickness (2nd Degree) blistering
- Full Thickness (3rd Degree) painless/charred or leathery skin
- Thermal injury
- Chemical – Electrical injury
- Radiation injury
- Blast injury

**Nature of Device:** Agent / Amount. Industrial Explosion. Terrorist Incident. Improvised Explosive Device.
**Method of Delivery:** Incendiary / Explosive
**Nature of Environment:** Open / Closed.
**Distance from Device:** Intervening protective barrier. Other environmental hazards,
**Evaluate for:** Blunt Trauma / Crush Injury / Compartment Syndrome / Traumatic Brain Injury / Concussion / Tympanic Membrane Rupture / Abdominal hemorrhage or Evisceration, Blast Lung Injury and Penetrating Trauma.

**Scene Safety / Quantify and Triage Patients / Load and Go with Assessment & Treatment Enroute**

Multiple Patients (MCI)?
- NO → Thermal / Chemical / Electrical Burn or Exposure
- YES → MCI Triage Protocol

Thermal / Chemical / Electrical Burn or Exposure
- YES → Thermal Burn / Chemical and Electrical Burn Protocol

Radiation Burn or Exposure
- YES → Radiation Incident Protocol

Crush Injury
- YES → Crush Syndrome Trauma Protocol

Multiple Trauma Protocol ***if indicated***
Adult / Pediatric Airway Protocol(s) ***as indicated***
Vascular Access Protocol ***if indicated***
P Cardiac Monitor ***if indicated***
B *Consider* $EtCO_2$ Monitor

B **Normal Saline/Lactated Ringers Bolus IV / IO**
**Adult:** 1,000 mL
**Peds:** 20 mL/kg
Repeat as needed to keep SBP > 90, SBP > 70 + 2 x Age,
or palpable radial pulse
**Maximum 2 L or 40 mL/kg**

Blast Lung Injury
- YES → B Apply oxygen to maintain SpO2 ≥ 94 % *Monitor for pulmonary edema (see **Pearls**)*
- YES → P Chest Decompression Procedure ***if indicated***
- YES → Adult / Pediatric Airway Protocol(s) ***as indicated***
- NO → Adult / Pediatric Pain Control Protocol ***if indicated***

**Rapid Transport** to closest appropriate **Trauma Center**

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

**Consider the need for additional resources early. Activate departmental MCI, disaster, or HazMat protocols as indicated.**

Trauma and Burn Protocols

# Blast Injury / Incident



**Pearls**

- **Types of Blast Injury:**
  - Primary Blast Injury: From pressure wave.
  - Secondary Blast Injury: Impaled objects. Debris which becomes missiles / shrapnel.
  - Tertiary Blast Injury: Patient falling or being thrown / pinned by debris.
  - Most Common Cause of Death: Secondary Blast Injuries.
- **Triage of Blast Injury patients:**
  - Blast Injury Patients with Burn Injuries Must be Triaged using the Thermal / Chemical / Electrical Burn Destination Protocols for Critical / Serious / Minor Trauma and Burns
- **Blast Lung Injury:**
  - Blast Lung Injury is characterized by respiratory difficulty and hypoxia. Can occur (rarely) in patients without external thoracic trauma. More likely in enclosed space or in close proximity to explosion.
  - Symptoms: Dyspnea, hemoptysis cough, chest pain, wheezing and hemodynamic instability.
  - Signs: Apnea, tachypnea, hypopnea, hypoxia, cyanosis and diminished breath sounds.
  - Blast Lung Injury patients may require early intubation but positive pressure ventilation may exacerbate the injury, avoid hyperventilation.
  - Air transport may worsen lung injury as well and close observation is mandated. Tension pneumothorax may occur requiring chest decompression. Be judicious with fluids as volume overload may worsen lung injury.
- **Safety Considerations:**
  - Attempt to determine source of the blast to include any potential threat for particalization of hazardous materials.·
  - Evaluate scene safety to include the source of the blast that may continue to spill explosive liquids or gases.
  - Conditions that led to the initial explosion may be returning and lead to a second explosion.
  - Patients who can, typically will attempt to move as far away from the explosive source as they safely can.
  - If concern exists for intentional explosion, consider potential threat for a secondary device.
  - Evaluate surroundings for suspicious items; unattended back packs or packages, or unattended vehicles.
  - Protect the airway and cervical spine, however, beyond the primary survey, care and a more detailed assessment should be deferred until the patient is in the ambulance.
  - If there are signs the patient was carrying the source of the blast, notify law enforcement immediately and most likely, a law enforcement officer will accompany your patient to the hospital.
  - Consider the threat of structural collapse, contaminated particles and / or fire hazards.
  - **Assess for secondary devices**

# Radiation Incident

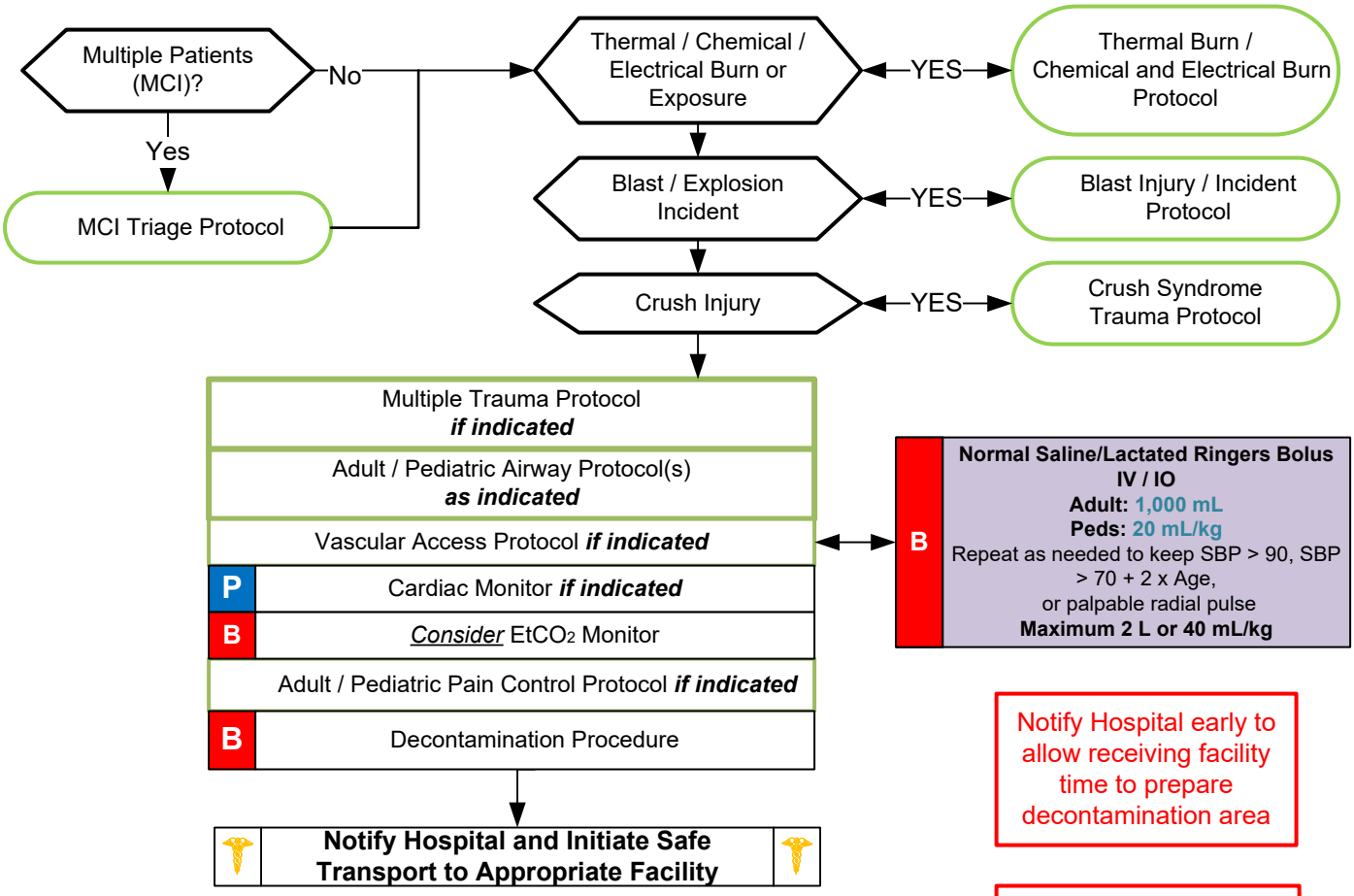
**History**
- Type of exposure (heat, gas, chemical)
- Inhalation injury
- Time of Injury
- Past medical history / Medications
- Other trauma
- Loss of Consciousness
- Tetanus/Immunization status

**Signs and Symptoms**
- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/ wheezing / Hypotension

**Differential**
- Superficial (1st Degree) red - painful (Don't include in TBSA)
- Partial Thickness (2nd Degree) blistering
- Full Thickness (3rd Degree) painless/charred or leathery skin
- Thermal injury
- Chemical – Electrical injury
- Radiation injury
- Blast injury

**Radiation Exposure does not change the acute treatment of patients.**
**Evaluate and treat traumatic and medical complaints per appropriate guidelines.**

**Scene Safety / Appropriate PPE incl. N95/ Quantify and Triage Patients / Load and Go with Assessment & Treatment Enroute**




Notify Hospital early to allow receiving facility time to prepare decontamination area

Ensure appropriate departmental HazMat/ Decontamination protocols are activated

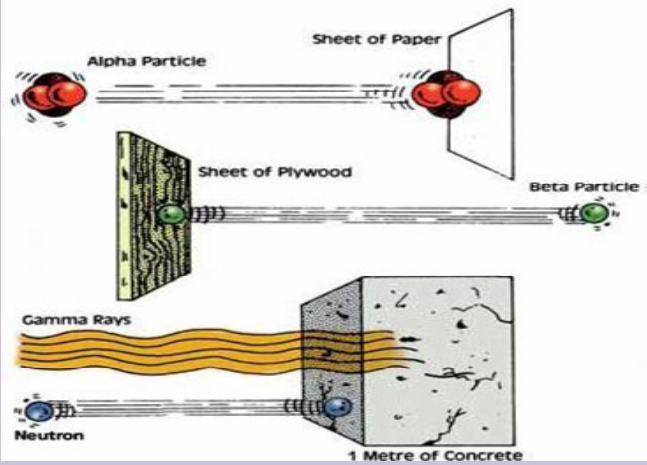
***Collateral Injury:*** **Most all injuries immediately seen will be a result of collateral injury**, such as heat from the blast, trauma from concussion, treat collateral injury based on typical care for the type of injury displayed.·

***Qualify:*** Determine exposure type; external irradiation, external contamination with radioactive material, internal contamination with radioactive material.·

***Quantify:*** Determine exposure (generally measured in Grays/Gy). *Information may be available from those on site who have monitoring equipment, do not delay transport to acquire this information.*

Trauma and Burn Protocols

# Radiation Incident




**Time Phases of Radiation Injury**
**(Exposure Dose vs Clinical Outcome)**

| Exposure Dose (Gy) | Prodrome Severity | Manifest Illness - Symptom Severity | | | Prognosis |
|---|---|---|---|---|---|
| | | Hematologic | Gastrointestinal | Neurologic | |
| 0.5 to 1.0 | + | + | 0 | 0 | Survival almost certain |
| 1.0 to 2.0 | +/++ | + | 0 | 0 | Survival >90 percent |
| 2.0 to 3.5 | ++ | ++ | 0 | 0 | Probable survival |
| 3.5 to 5.5 | +++ | +++ | + | 0 | Death in 50% at 3.5 to 6 wks |
| 5.5 to 7.5 | +++ | +++ | ++ | 0 | Death probable in 2-3 wks |
| 7.5 to 10 | +++ | +++ | +++ | 0* | Death probable in 1-2.5 wks |
| 10 to 20 | +++ | +++ | +++ | +++ | Death certain in 5-12 days |
| > 20 | +++ | +++ | +++ | +++** | Death certain in 2-5 days |

**Abbreviations:** Gy: dose in Grey;
0: no effects; +: mild; ++: moderate; +++: severe or marked

* Hypotension
** Also cardiovascular collapse, fever, shock

Modified from : Waselenko, JK, MacVittie, TJ, Blakely, WF, et al. Medical management of the acute radiation syndrome: Recommendations of the strategic national stockpile radiation working group. Ann Int Med 2004; 140:1039.

## Pearls

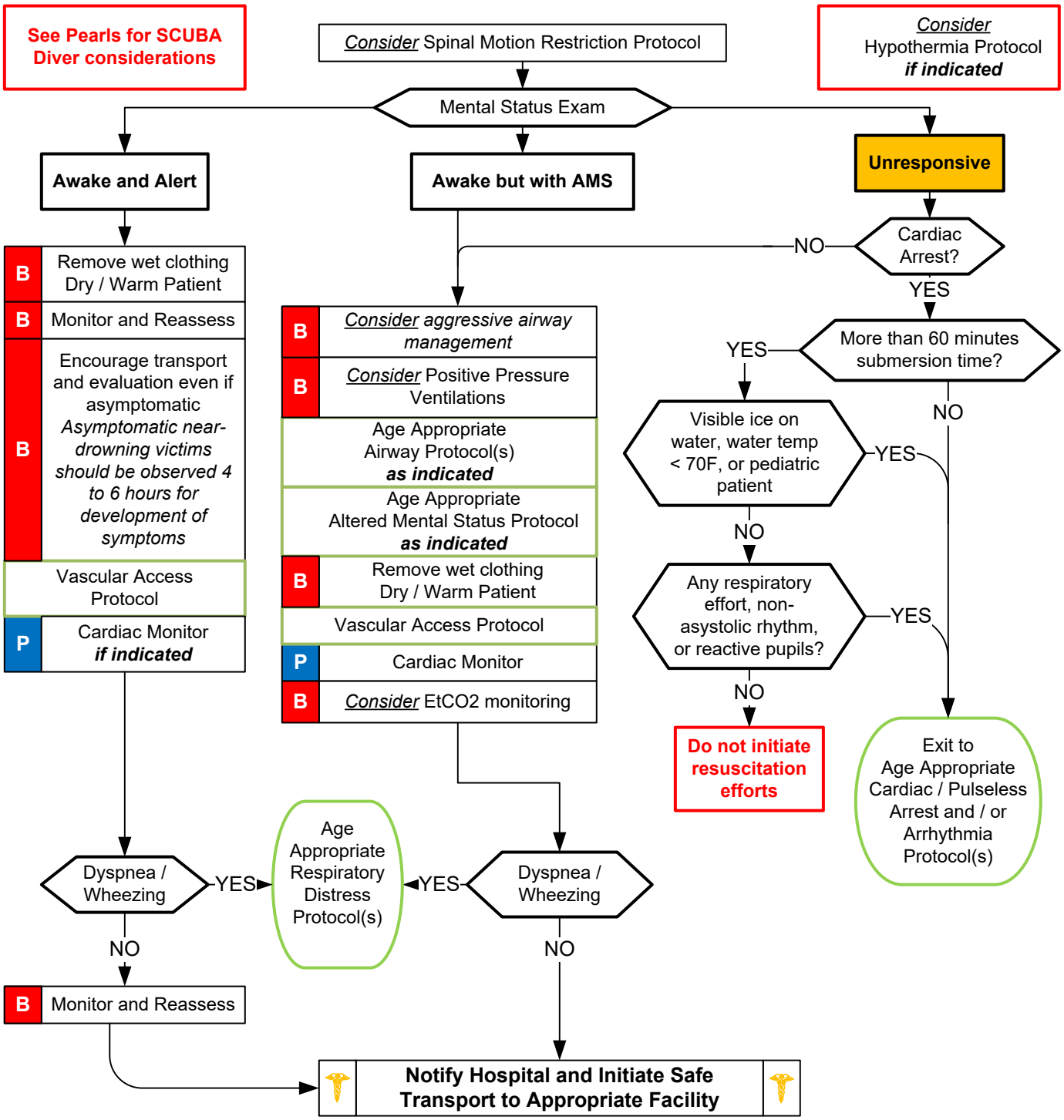
- **If appropriate, life-saving interventions may be performed in the Hot or Warm zones, but should be restricted to critical interventions such as supraglottic airway placement, chest decompression, and tourniquet application.**
- Dealing with a patient with a radiation exposure can be a frightening experience. Do not ignore the ABC's, a dead but decontaminated patient is not a good outcome.
- Normal Saline or Sterile Water is preferred, however if not available, do not delay irrigation using tap water. Other water sources may be used based on availability. Flush the area as soon as possible with the cleanest readily available water or saline solution using copious amounts of fluids.
- **Three methods of exposure:**
  - External irradiation
  - External contamination
  - Internal contamination
- **Two classes of radiation:**
  - Ionizing radiation (greater energy) is the most dangerous and is generally in one of three states: Alpha Particles, Beta Particles and Gamma Rays.
  - Non-ionizing (lower energy) examples include microwaves, radios, lasers and visible light.
- Radiation burns with early presentation are unlikely, it is more likely this is a combination event with either thermal or chemical burn being presented as well as a radiation exposure. Where the burn is from a radiation source, it indicates the patient has been exposed to a significant source, (> 250 rem).
- Patients experiencing radiation poisoning are not contagious. Cross contamination is only a threat with external and internal contamination.
- Typical ionizing radiation sources in the civilian setting include soil density probes used with roadway builders and medical uses such as x-ray sources as well as radiation therapy. Sources used in the production of nuclear energy and spent fuel are rarely exposure threats as are military sources used in weaponry. Nevertheless, these sources are generally highly radioactive and in the unlikely event they are the source, consequences could be significant and the patient's outcome could be grave.
- **The three primary methods of protection from radiation sources:**
  - Limiting time of exposure
  - Distance from
  - Shielding from the source
- Dirty bombs ingredients generally include previously used radioactive material and combined with a conventional explosive device to spread and distribute the contaminated material.
- Refer to WMD / Nerve Agent Protocol for dirty contamination events.
- If there is a time lag between the time of exposure and the encounter with EMS, key clinical symptom evaluation includes: Nausea/ Vomiting, hypothermia/hyperthermia, diarrhea, neurological/cognitive deficits, headache and hypotension.
- **Inform hospital early to mobilize hospital resources at receiving facilities**

# Drowning / Submersion Injury

**History**
- Submersion in water regardless of depth
- Possible history of trauma ie: diving board
- Duration of immersion
- Temperature of water or possibility of hypothermia
- Degree of water contamination

**Signs and Symptoms**
- Unresponsive
- Mental status changes
- Decreased or absent vital signs
- Vomiting
- Coughing, Wheezing, Rales, Rhonci,Stridor
- Apnea

**Differential**
- Trauma
- Pre-existing medical problem
- Pressure injury (diving)
- Barotrauma
- Decompression sickness
- Post-immersion syndrome



# Drowning / Submersion Injury



Diver's Alert Network
(919)-684-9111
24-hour emergency medical consultation

Decompression injuries (i.e. "The Bends", nitrogen narcosis, air emboli) can occur after an ascent from any depth when using SCUBA equipment. Typical symptoms include severe joint pain, chest pain, breathing difficulty, or altered mental status. ***These patients should be transported to the nearest hyperbaric facility unless other confounding injuries are present (burns, major trauma).*** **Avoid air transport** (unless low altitudes can be maintained) as this will exacerbate the decompression injury further. Consider Diver's Alert Network and medical direction consultation to assist with the management of these patients.

After 60 minutes of submersion the likelihood of successful resuscitation approaches zero, and the risk to rescuers increases. Unless special circumstances are present (i.e. visible ice on water, pediatric victim) consider transitioning efforts from rescue to recovery after 60 minutes. Utilize hospital for medical direction consultation as appropriate.

Positive pressure ventilation should be considered for any drowning victim with respiratory difficulty or unresponsiveness. CPAP would be appropriate for the awake and alert patient, and a BVM for any patient requiring ventilatory assistance following a submersion/drowning injury.

**Pearls**

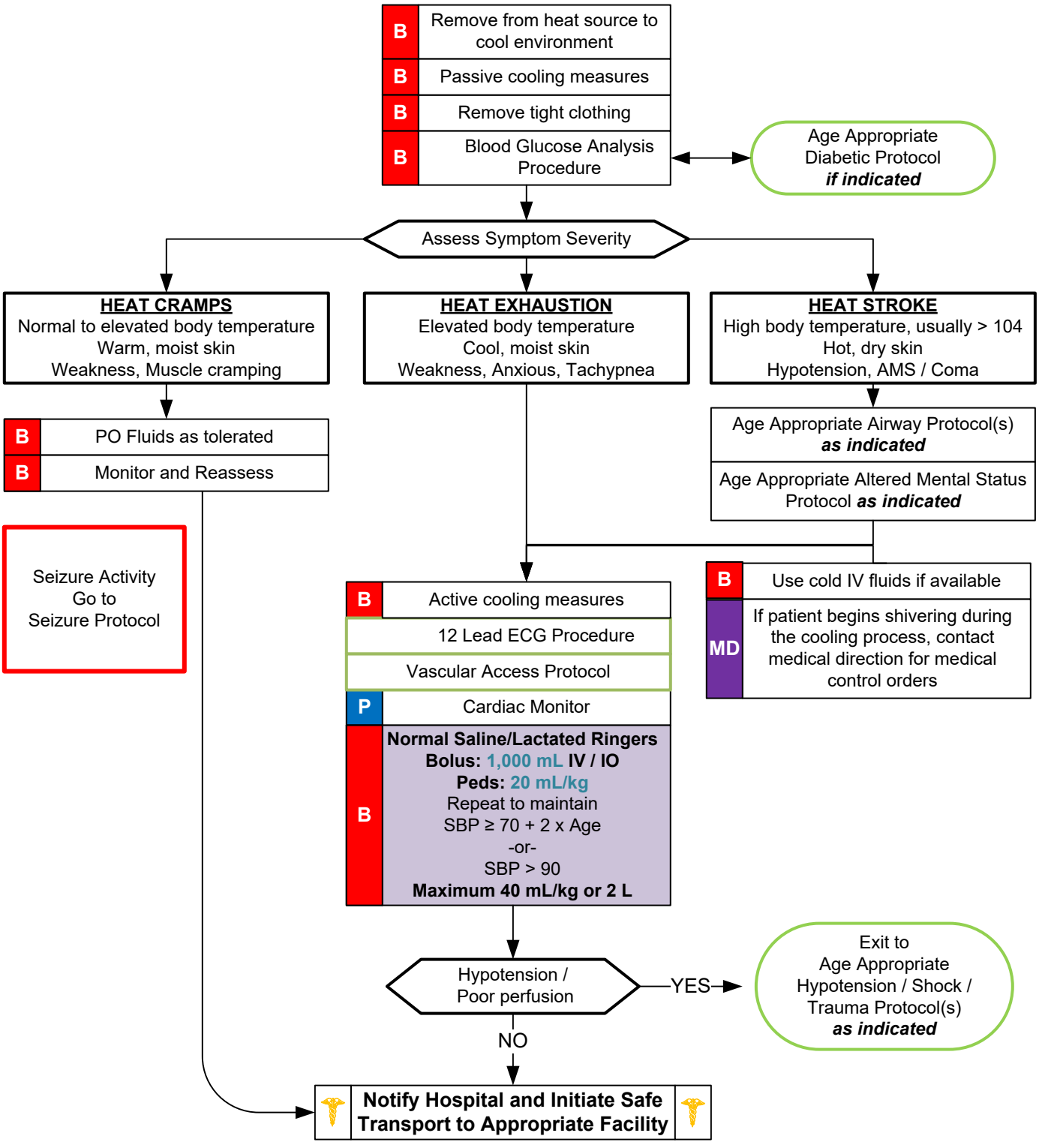
- **Recommended Exam: Trauma Survey, Head, Neck, Chest, Abdomen, Pelvis, Back, Extremities, Skin, Neuro**
- **Ensure scene safety. Drowning is a leading cause of death among would-be rescuers.**
- **Allow appropriately trained and certified rescuers to remove victims from areas of danger.**
- **With cold water submersion there is an increased chance of survival even with cardiac arrest and prolonged submersion. Initiate resuscitation, consider medical direction consultation early.**
- Have a high index of suspicion for possible spinal injuries
- Hypothermia is often associated with drowning and submersion injuries.
- All victims should be transported, even if asymptomatic, for evaluation due to potential for worsening over the next several hours.
- With pressure injuries (decompression / barotrauma), consider transport to or availability of a hyperbaric chamber.
- Post-drowning patients who are awake and cooperative but with respiratory distress may benefit from CPAP.
- **If the patient is in cardiac arrest and the core temperature is below 86 degrees F (30 degrees C) then defibrillate 1 time if indicated. Further defibrillation attempts should be deferred until the patient has been warmed to at least 86 degrees F (30 degrees C)**

# Hyperthermia

**History**
- Age, very young and old
- Exposure to increased temperatures and / or humidity
- Past medical history / Medications
- Time and duration of exposure
- Poor PO intake, extreme exertion
- Fatigue and / or muscle cramping

**Signs and Symptoms**
- Altered mental status / coma
- Hot, dry or sweaty skin
- Hypotension or shock
- Seizures
- Nausea

**Differential**
- Fever (Infection)
- Dehydration
- Medications
- Hyperthyroidism (Storm)
- Delirium tremens (DT's)
- Heat cramps, exhaustion, stroke
- CNS lesions or tumors



# Hyperthermia



**Passive Cooling**

- Extricate to cooler environment
- Remove all clothing
- Limit physical activity

**Active Cooling**

- Ice packs to axilla, groin, and neck
- Cold IV fluids
- Fan with cold air
- Mist with tepid water
- Immersion in cool water
- Cold oral fluids if alert

Most cases of heat exhaustion do not require intensive treatment.

Consider using the Scene Rehabilitation protocol for mild cases of heat exhaustion without confounding medical issues.

**Pearls**

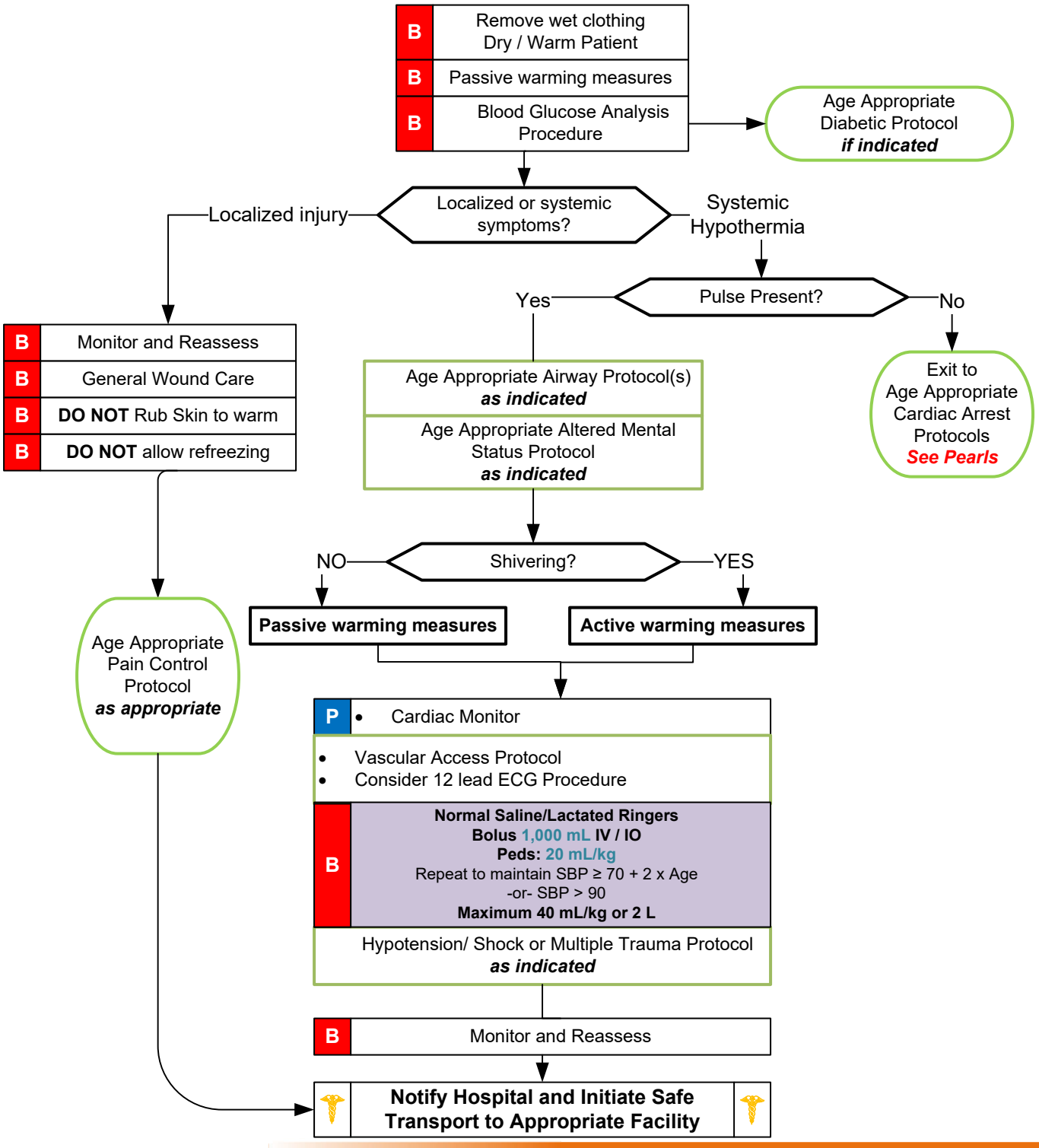
- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Neuro**
- Obtain core temperature (rectal temperature) when feasible to do so.
- Extremes of age are more prone to heat emergencies (i.e. young and old). Obtain and document patient temperature if able.
- Predisposed by use of: tricyclic antidepressants, phenothiazines, anticholinergic medications, and alcohol.
- Cocaine, Amphetamines, and Salicylates may elevate body temperatures.
- Sweating generally disappears as body temperature rises above 104° F (40° C).
- Intense shivering may occur as patient is cooled. Treat with benzos and/or rocuronium per guidelines.
- Antipyretic therapy not indicated in environmental hyperthermia
- **Heat Cramps** consists of benign muscle cramping 2° to dehydration and is not associated with an elevated temperature.
- **Heat Exhaustion** consists of dehydration, salt depletion, dizziness, fever, mental status changes, headache, cramping, nausea and vomiting. Vital signs usually consist of tachycardia, hypotension, and an elevated temperature.
- **Heat Stroke** consists of dehydration, tachycardia, hypotension, temperature >104° F (40° C), and an altered mental status.

# Hypothermia / Frostbite

**History**
- Age, very young and old
- Exposure to decreased temperatures but may occur in normal temperatures
- Past medical history / Medications
- Drug use: Alcohol, barbituates
- Infections / Sepsis
- Length of exposure / Wetness / Wind chill

**Signs and Symptoms**
- Altered mental status / coma
- Cold, clammy
- Shivering
- Extremity pain or sensory abnormality
- Bradycardia
- Hypotension or shock

**Differential**
- Sepsis
- Environmental exposure
- Hypoglycemia
- CNS dysfunction
  - Stroke
  - Head injury
  - Spinal cord injury



# Hypothermia / Frostbite



**Passive Rewarming**
- Extricate from cold environment
- Remove wet clothing

**Active Rewarming**
- Increase ambient temperature
- Apply blankets
- Administer warm IV fluids
- Heating packs to axilla and groin
- Warm humidified oxygen

After the first round of ACLS meds, delay any further cardiac medications or defibrillation attempts until the patient's temperature is at least 86 degrees F (30 degrees C).

**After Drop**

After drop, otherwise known as rewarming collapse (or rewarming shock) is a sudden drop in blood pressure in combination with a low cardiac output which may occur during active treatment of a severely hypothermic person. This occurs when vasodilation in response to warming forces cold blood from the extremities to be recirculated back to the core, resulting in a further drop in the core body temperature. This can result in ventricular fibrillation or sudden cardiovascular collapse. There is theoretical concern that external rewarming rather than internal rewarming may increase the risk. Since internal rewarming is logistically challenging in the pre-hospital environment, ***active rewarming should not be performed if the patient has cooled beyond the point of shivering.***

**Pearls**

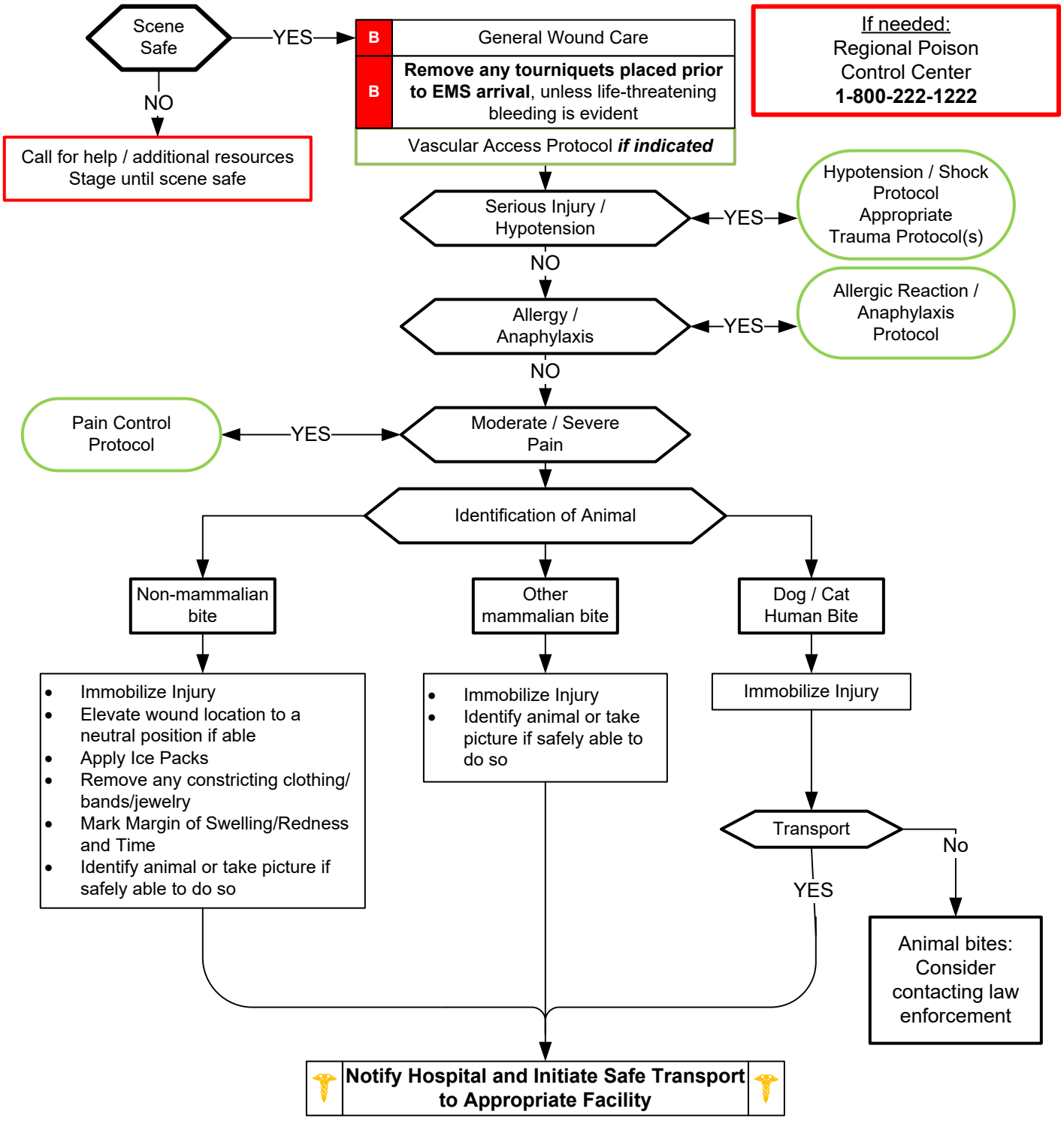
- **Recommended Exam: Mental Status, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Hypothermia categories:**
  Mild 90 – 95 degrees F ( 32 – 35 degrees C)
  Moderate 82 – 90 degrees F ( 28 – 32 degrees C)
  Severe < 82 degrees F ( < 28 degrees C)
- **Mechanisms of hypothermia:**
  Radiation: Heat loss to surrounding objects via infrared energy ( 60 % of most heat loss.)
  Convection: Direct transfer of heat to the surrounding air.
  Conduction: Direct transfer of heat to direct contact with cooler objects (important in submersion.)
  Evaporation: Vaporization of water from sweat or other body water losses.
- Contributing factors of hypothermia: Extremes of age, malnutrition, alcohol or other drug use.
- If the temperature is unable to be measured, treat the patient based on the suspected temperature.
- **CPR:**
  - **Severe hypothermia may cause cardiac instability. Rough handling of the patient theoretically could cause ventricular fibrillation. This is controversial and not clearly supported in research studies. Advanced airway and CPR techniques should not be withheld due to this concern, but in severe hypothermia airway management should be performed by the most experienced provider.**
  - **Below 86 degrees F (30 degrees C) ACLS medications may not be effective. One initial round of medications may be administered, however further treatments (other than chest compressions and airway management) should be deferred until the patient has been warmed to at least 86 degrees F (30 degrees C). Contact medical direction.**
  - **If the patient's temperature is below 86 degrees F (30 degrees C) then defibrillate 1 time if indicated. Further defibrillation attempts should be deferred until the patient has been warmed to at least 86 degrees F (30 degrees C). Contact medical control for direction.**
  - **Hypothermia may produce severe bradycardia so take at least 45 seconds to palpate for a pulse.**
- Hot packs can be activated and placed in the armpit and groin area if available. Care should be taken not to place the packs directly against the patient's skin.

# Bites and Envenomations

**History**
- Type of bite / sting
- Description or bring creature / photo with patient for identification
- Time, location, size of bite / sting
- Previous reaction to bite / sting
- Domestic vs. Wild
- Tetanus and Rabies risk
- Immunocompromised patient

**Signs and Symptoms**
- Rash, skin break, wound
- Pain, soft tissue swelling, redness
- Blood oozing from the bite wound
- Evidence of infection
- Shortness of breath, wheezing
- Allergic reaction, hives, itching
- Hypotension or shock

**Differential**
- Animal bite
- Human bite
- Snake bite (poisonous)
- Spider bite (poisonous)
- Insect sting / bite (bee, wasp, ant, tick)
- Infection risk
- Rabies risk
- Tetanus risk




Environmental Protocols

# Bites and Envenomations



**Pearls**

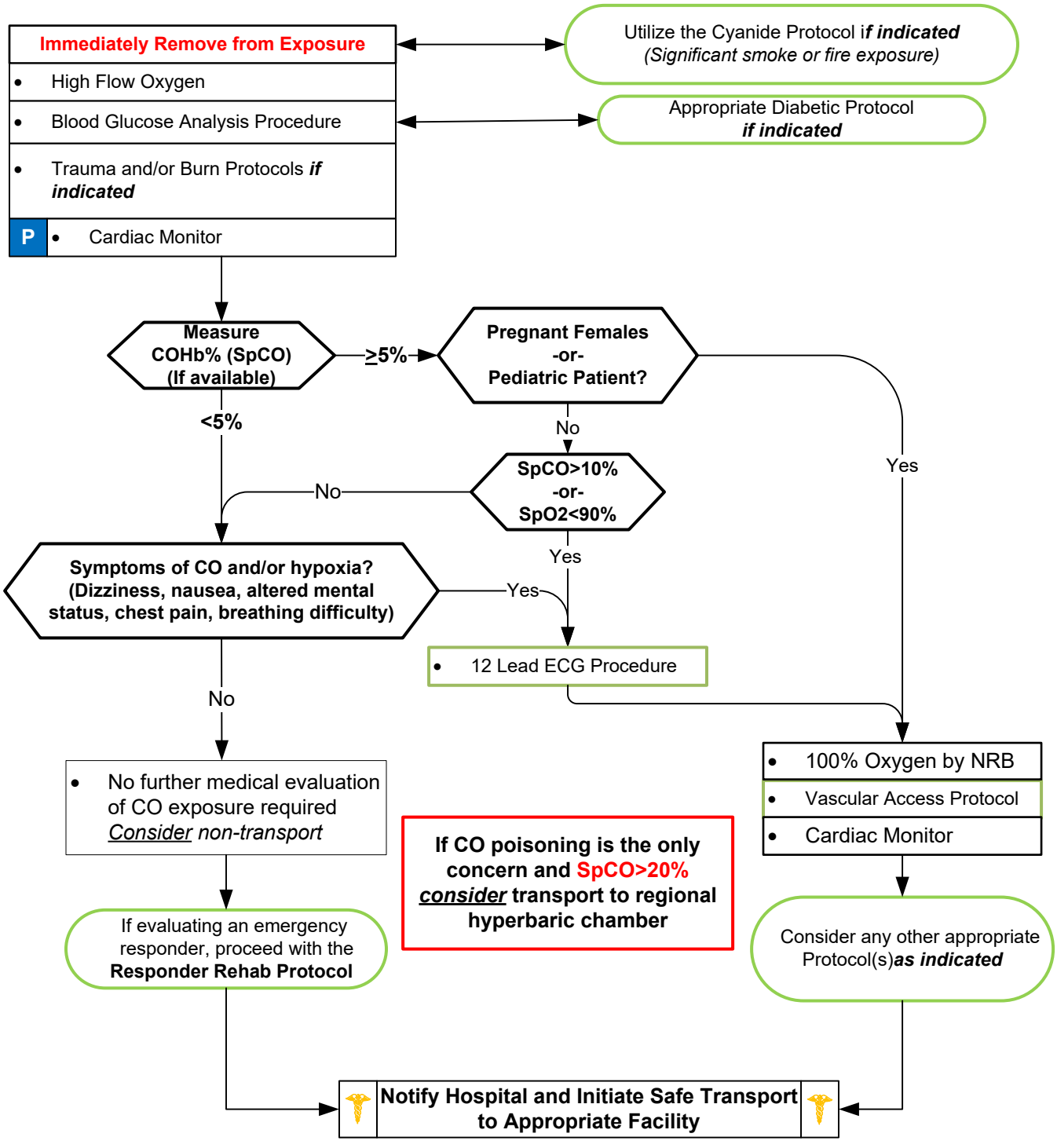
- **Recommended Exam: Mental Status, Skin, Extremities (Location of injury), and a complete Neck, Lung, Heart, Abdomen, Back, and Neuro exam if systemic effects are noted**
- Human bites have higher infection rates than animal bites due to normal mouth bacteria.
- Carnivore bites are much more likely to become infected and all have risk of Rabies exposure.
- Cat bites may progress to infection rapidly due to a specific bacteria (Pasteurella multicoda).
- Poisonous snakes in this area are generally of the pit viper family (rattlesnake). Other poisonous exotic species may be found at zoos, pet stores, or in rare cases at private residences (legally or illegally).
- Coral snake bites are rare: Very little pain but very toxic. "Red on yellow - kill a fellow, red on black - venom lack."
- If no pain or swelling, envenomation is unlikely. About 25 % of snake bites are “dry” bites.
- Black Widow spider bites tend to be minimally painful, but over a few hours, muscular pain and severe abdominal pain may develop (spider is black with red hourglass on belly).
- Brown Recluse spider bites are minimally painful to painless. Little reaction is noted initially but tissue necrosis at the site of the bite develops over the next few days (brown spider with fiddle shape on back).
- Evidence of infection: swelling, redness, drainage, fever, red streaks proximal to wound.
- Immunocompromised patients are at an increased risk for infection: diabetes, chemotherapy, transplant patients.
- Consider contacting the Regional Poison Control Center or Hospital for guidance (1-800-222-1222).

# Carbon Monoxide Exposure

**History**
- Firefighter/Structure Fire victim
- Suspected CO exposure
- Suspected source/duration exposure
- Age, possible pregnancy
- Reason (accidental, suicidal)
- Measured atmospheric levels
- Past medical history, meds

**Signs and Symptoms**
- Altered mental status/dizziness
- Headache, Nausea/Vomiting
- Chest Pain/Respiratory distress
- Neurological impairments
- Vision problems/reddened eyes
- Tachycardia/tachypnea
- Arrhythmias, seizures, coma

**Differential**
- Effects of other toxic fire byproduct
- Acute cardiac event
- Acute neurological event
- Flu/GI illness
- Acute intoxication
- Diabetic Ketoacidosis
- Headache of non-toxic origin




Environmental Protocols

# Carbon Monoxide Exposure



**Pearls**

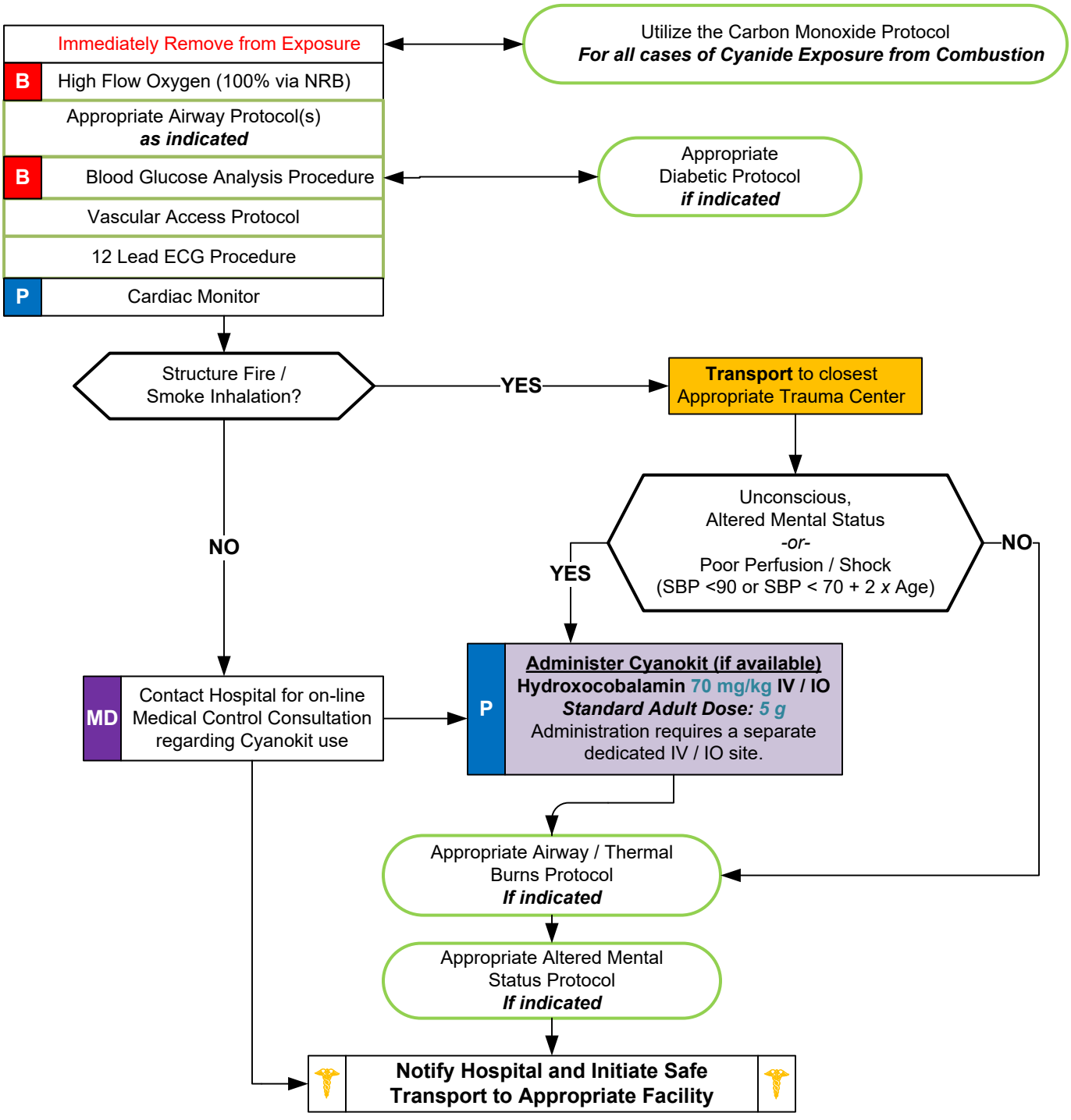
- **Recommended exam: Neuro, Skin, Heart, Lungs, Abdomen, Extremities**
- **Scene safety is priority.**
- Consider both CO and Cyanide with any product of combustion
- Normal environmental CO level does not exclude CO poisoning.
- **Fetal hemoglobin has a greater attraction for CO than maternal hemoglobin. Females who are known to be or possibly pregnant should be advised that EMS-measured SpCO levels reflect the adult's level, and that fetal COHb levels may be higher. Recommend Hospital eval for any CO exposed pregnant person.**
- The absence (or low detected levels of) of COHb is not a reliable predictor of firefighter or victim exposure to other toxic byproducts of fire
- In obtunded fire victims, consider Cyanide treatment protocol
- The differential list for CO Toxicity is extensive. Attempt to evaluate other correctable causes when possible
- Chronic CO exposure is clinically significant; therefore advice on smoking cessation is important medical instruction
- Chronic smokers can have expected 5-7% SpCO levels

# Cyanide Exposure

**History**
- Smoke inhalation
- Exposure to cyanide
- Eating large quantity of fruit pits
- Industrial exposure
- Trauma
- Reason: Suicide, criminal, accidental
- Past Medical History
- Time / Duration of exposure

**Signs and Symptoms**
- AMS
- Malaise, weakness, flu like illness
- Dyspnea
- GI Symptoms; N/V; cramping
- Dizziness
- Seizures
- Syncope
- Reddened skin
- Chest pain

**Differential**
- Diabetic related
- Infection
- MI
- Anaphylaxis
- Renal failure / dialysis problem
- Head injury / trauma
- Co-ingestant or exposures



# Cyanide Exposure



Cyanokit® Administration

- **Reconstitute**: Add 200 mL of 0.9% Sodium Chloride to the vial using the transfer spike. Fill to the line.
- **Mix**: The vial should be repeatedly inverted or rocked, **not shaken**, for at least 60 seconds prior to infusion.
- **Infuse**: Use vented intravenous tubing provided with Cyanokit®, hang and infuse over 15 minutes.

**Pearls**

- **Recommended exam: Neuro, Skin, Heart, Lungs, Abdomen, Extremities**
- **Scene safety is priority. Do not enter a suspected cyanide ingestion scene without proper SCBA equipment.**
- Consider both CO and Cyanide with any product of combustion.
- Continue high flow oxygen regardless of pulse ox readings (readings will not be accurate following cyanokit use).
- Receiving Facility can facilitate toxicology consultation to assist with treatment recommendations.
- **Hydroxocobalamin is not compatible with most medications. A separate dedicated vascular access point is required for administration.**

# Nerve Agent Exposure/Organophosphate Poisoning

**History**
- Exposure to chemical, biologic, radiologic, or nuclear hazard
- Potential exposure to unknown substance/hazard
- **Farmer with exposure to pesticide**

**Signs and Symptoms**
- **S**alivation
- **L**acrimation
- **U**rination; increased, loss of control
- **D**efecation / Diarrhea
- **GI** Upset; Abdominal pain / cramping
- **E**mesis
- **M**uscle Twitching
- Seizure Activity
- Respiratory Arrest

**Differential**
- Nerve agent exposure (e.g., VX, Sarin, Soman, etc.)
- **Organophosphate exposure (pesticide)**
- Vesicant exposure (e.g., Mustard Gas, etc.)
- Respiratory Irritant Exposure (e.g., Hydrogen Sulfide, Ammonia, Chlorine, etc.)

Scene Safe Appropriate PPE

YES

B Decontamination Procedure ***as indicated***

B High Flow Oxygen

Appropriate Airway Protocol(s) ***as indicated***

B Blood Glucose Analysis Procedure

P Cardiac Monitor

Trauma/Burn Protocol(s) ***if indicated***

Diabetic Protocol(s) ***if indicated***

NO

- Call for additional resources
- Stage until scene safe
- If confirmed nerve agent release, contact Dispatch for CHEMPAK activation.

Symptom Severity

**Asymptomatic**

B Monitor and reassess every 15 minutes. Initiate treatment as indicated.

**Minor Symptoms:**
**Respiratory Distress + SLUDGEM**

B **Nerve Agent Kit IM**
**2 Doses Rapidly**
if available
*(Each kit contains atropine 2 mg and pralidoxime 600 mg)*

Vascular Access Protocol

P **Atropine 2 mg IV / IO**
**Peds: 0.05 mg/kg**
Repeat every 5 - 10 minutes until symptoms resolve ***(respiratory distress and airway secretions)***

MD Contact Medical Control
For further treatment options

**Major Symptoms:**
**Altered Mental Status, Seizures, Respiratory Distress, Respiratory Arrest**

B **Nerve Agent Kit IM**
**3 Doses Rapidly**
if available
*(Each kit contains atropine 2 mg and pralidoxime 600 mg)*

Vascular Access Protocol

Altered Mental Status Protocol ***If indicated***

P **Atropine 2 mg IV / IM / IO**
**Peds: 0.05 mg/kg**
Repeat every 3 - 5 minutes until symptoms resolve ***(respiratory distress and airway secretions)***

**Seizure Activity**
Go to
Seizure Protocol

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

**Initiate MCI Triage Protocol if indicated**

Environmental Protocols

# Nerve Agent Exposure/Organophosphate Poisoning

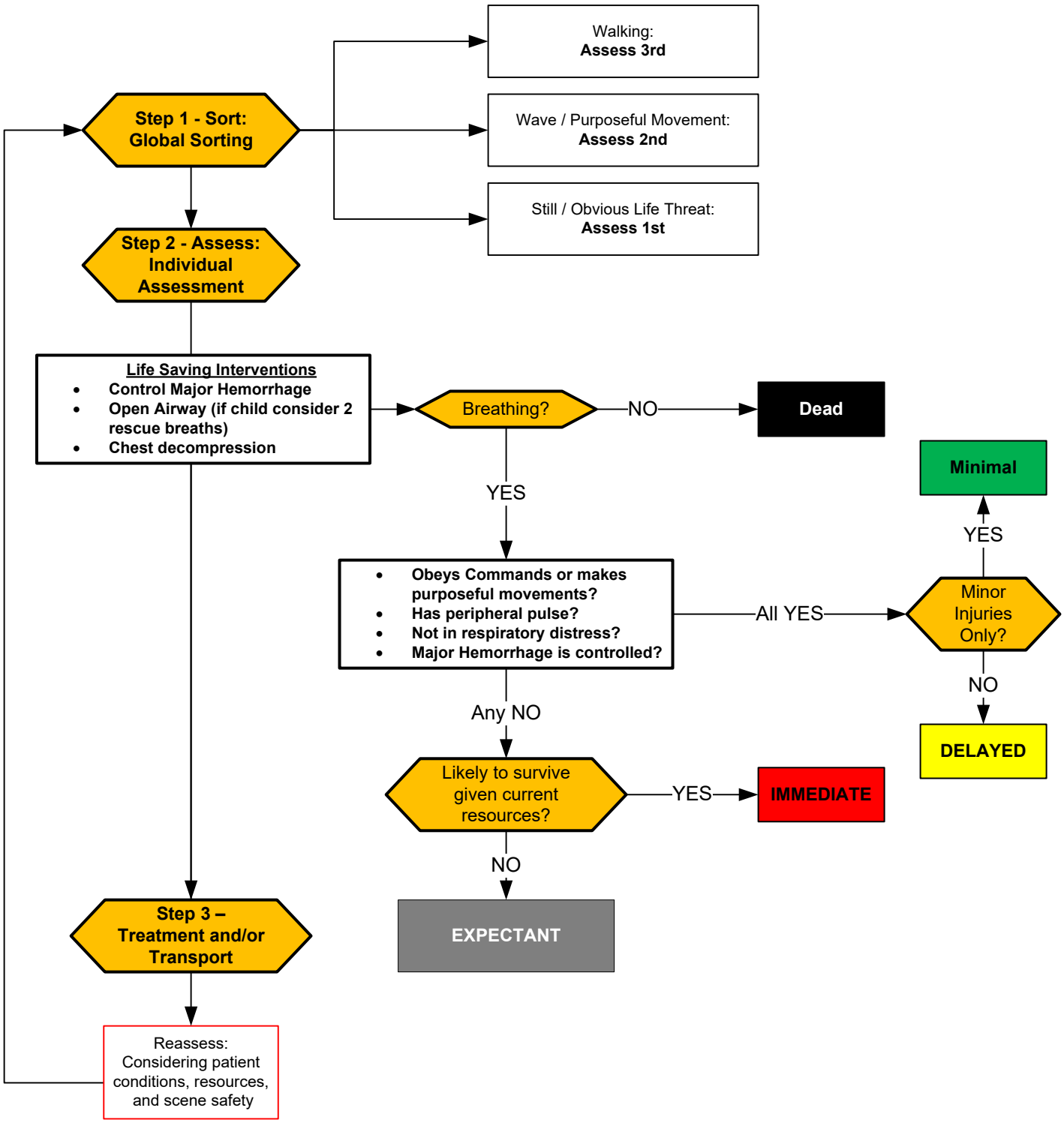


**Pearls**

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Gastrointestinal, Neuro**
- **Follow local HAZMAT protocols for decontamination and use of personal protective equipment.**
- **Nerve Agent Kits should only be administered for symptomatic treatment. DO NOT administer Nerve Agent Kits for prophylaxis even in asymptomatic patients with a known nerve agent exposure.**
- **Contact Medical Direction early for treatment recommendations**
- **Each Nerve Agent Kit contains 600 mg of Pralidoxime (2-PAM) and 2 mg of Atropine. Also known as Duodote kits.**
- **Seizure Activity: Any benzodiazepine by any route is acceptable.**
- For patients with major symptoms, there is no limit for atropine dosing.
- Carefully evaluate patients to ensure they not from exposure to another agent (e.g., narcotics, vesicants, etc.)
- **The main symptom that the atropine addresses is excessive secretions so atropine should be given until salivation / rales improves.**
- Fire/EMS personnel may carry, self-administer or administer a Duodote kit to themselves or a fellow responder per protocol.

# MCI – SALT Triage

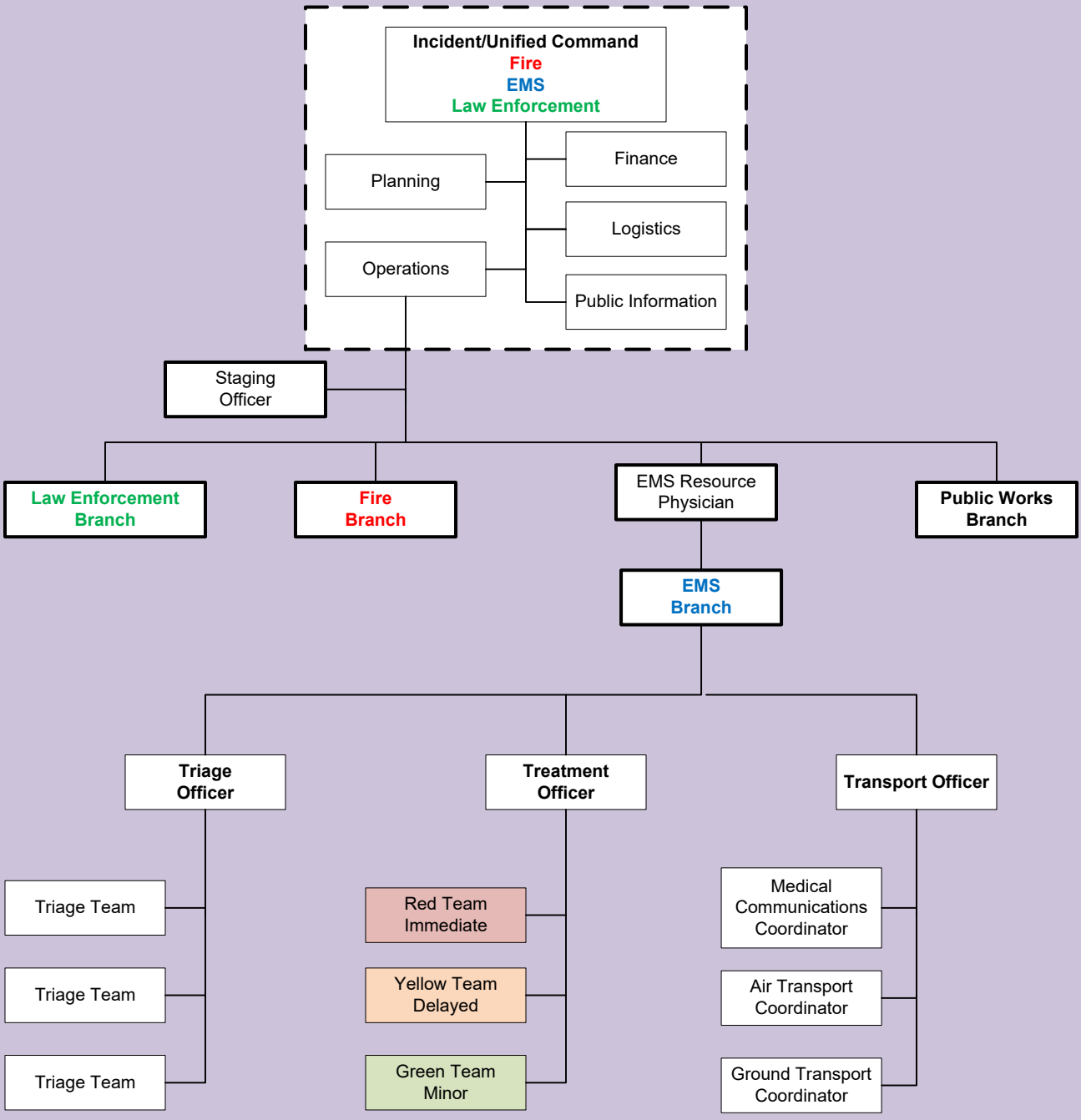
* All infants with signs of life who are patients in an MCI are automatically triaged as "IMMEDIATE" or "red tag"



# MCI – Triage



## Sample Medical Incident Command Structure




**Pearls**

- **Follow local HAZMAT protocols for decontamination and use of personal protective equipment.**
- **Notify local hospitals as soon as possible to activate hospital resources and to assist with distribution and tracking of patients.**
- **Begin triage with the patient closest to you.**
- **Be aware of safety hazards and request additional resources early.**
- All infants with signs of life should be triaged category RED.

# Special Event Rehabilitation

Injury / Illness / Complaint should be treated using appropriate treatment guideline beyond need for oral or IV hydration.

**Initial Process**

1. Patients logged into Event Rehabilitation Documentation
2. VS Assessed / Recorded (If HR > 110 then obtain Temp)
3. Patients assessed for signs / symptoms

**Significant Complaint**
Cardiac Complaint: Signs / Symptoms
Respiratory Complaint: Serious Signs / Symptoms
Respiratory Rate < 8 or > 40
Systolic Blood Pressure ≤ 90 (or ≤ 70 + 2 x Age)

YES → Exit to Appropriate Protocol

NO

Heat *-or-* Cold stress

YES → **COLD STRESS**

B **Active Warming Measures**
Dry patient, place in warm area
Hot packs to axilla and / or groin
Remove wet clothing

YES → **HEAT STRESS**

B **Active Cooling Measures**
Forearm immersion, cool shirts, cool mist fans etc. for 10 – 20 Minutes.
Remove all protective gear and unnecessary clothing.

NO

B **Rehydration Techniques**
12 – 32 oz Oral Fluid over 20 minutes

B Reassess individual after 20 Minutes
Recheck Vital Signs

Nausea / Vomiting?

YES → Vomiting / Diarrhea Protocol

NO

Temp ≥ 100.6
HR ≥ 110
SBP ≤ 90 (or ≤ 70 + 2 x Age)
*-or-*
Persistent symptoms

YES → Extend rehabilitation time until VS improve

*Consider* transport

NO

**OK to discharge Individual**

**VITAL SIGN CAVEATS**

***Blood Pressure:***
Prone to inaccuracy in noisy or chaotic environments. Must be interpreted in context.

Individuals with Systolic BP ≥ 160 or Diastolic BP ≥ 100 may need extended rehabilitation. However this does not necessarily prevent them from returning to the event.

***Temperature:***
Individuals may have increased temperature during rehabilitation.

Special Response Protocols

# Special Event Rehabilitation



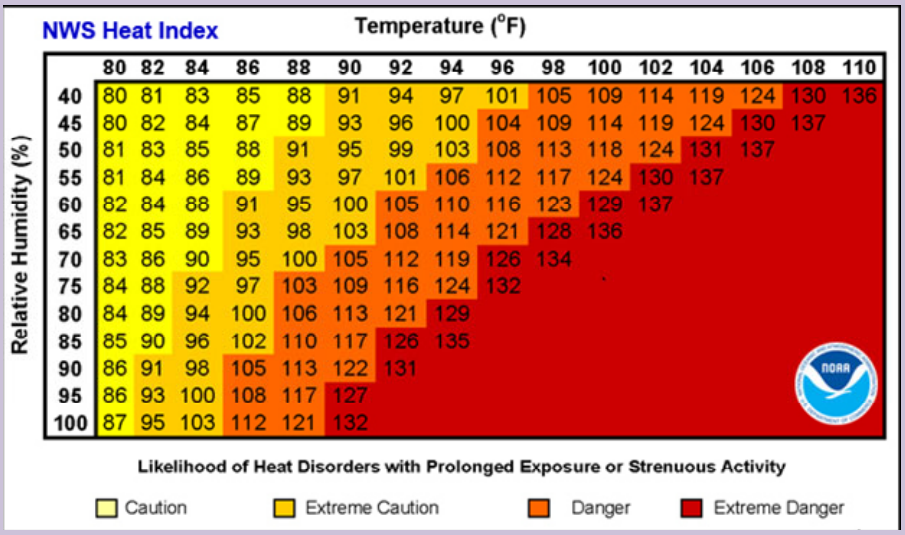
**General Principles of event rehabilitation:**

- Remove patient to a controlled environment
- Warm/Cool as appropriate
- Rest, limit physical exertion
- Encourage oral hydration

Most patients will improve significantly after 15-20 minutes.

If unable to tolerate oral hydration, vital signs are significantly abnormal, or symptoms persist after 15-20 minutes in rehab, consider transport to a hospital, IV hydration, or extend time in rehab.

***Utilize warming and cooling techniques from the Hyperthermia and Hypothermia protocols.***




NOAA Heat Index Chart

**Pearls**

- **This guideline should be utilized for evaluating patrons of certain special events that may or may not otherwise meet the definition of a patient.**
- **Senior Medic Officer on-scene has full authority in deciding when individuals meet the definition of a patient and/or require further treatment or transport.**
- **Recommend documentation under this guideline, individuals who are evaluated only at the rehabilitation center require a narrative-based patient log entry under one Standby ePCR for all of these individuals (provided they do not receive IV therapy, cardiac monitoring, or other ALS interventions). However, if a patient receives ALS care and/or is transported to an emergency department, the patient requires a separate run number and full ePCR like any other patient.**
- **Those taking anti-histamines, blood pressure medication, diuretics or stimulants are at increased risk for cold and heat stress.**
- **Establish rehab location such that it provides shelter, privacy and freedom from smoke or other hazards.**
- **Event circumstances may warrant special protocols as approved by the Medical Director.**

# Responder Rehabilitation

**This Protocol should be considered for any incident posing exertional risk or unusual danger to emergency responders. Examples would include working fires, prolonged search/rescue/recovery operations, prolonged law enforcement or EMS operations, or extreme weather conditions.**

**Use of this guideline is optional and should be superceded by agency-specific rehabilitation protocols. It is provided as a resource for situations where an appropriate agency-specific rehabilitation policy or guideline does not exist, or at the discretion of the Rehab Sector Commander.**

**Remove:**
PPE
Body Armor
Chemical Suits
SCBA
Turnout Gear
Other equipment as indicated

**Continue:**
Heat and Cold Stress treatment techniques from Special Event Rehab Protocol

**Initial Process**
1. Accountability Log initiated
2. VS assessed and recorded
3. Pulse oximetry, respirations and SpCO (if available)
4. Personnel assessed for signs / symptoms

Rehab personnel should use this Protocol in combination with the Special Event Rehabilitation Protocol

**15 Minute Rest Period**
*(Responders should consume at least 8 ounces of balanced electrolyte solution)*

Pulse Rate > 85% NFPA Age Predicted Maximum
*-or-*
SBP ≤ 90
YES → Vascular Access Protocol
**B** **Normal Saline/LR Bolus**
**1,000 mL IV / IO**
**May repeat up to 2 L**
*Until Pulse Rate is 110 or less*
*And*
*Systolic BP is 100 or greater*
NO

Systolic BP ≥ 160
*-or-*
Diastolic BP ≥ 100
YES
NO

Respirations < 8 or > 40
YES
NO

Pulse oximetry < 90 %
SpCO > 10 %
YES
NO

Temperature ≥ 100.6
YES
NO

Re-evaluate in 15-20 minutes.
**Improvement?**
*Consider* transport if no improvement.
NO
YES

Mandatory Rest Period
**Encourage oral hydration**

**Discharge Responder from Rehabilitation Section**

**Specific Injury / Illness / Complaint should be treated using appropriate treatment guideline beyond need for oral or IV hydration.**

**Rehab Sector Commander has full authority to determine when responders may return to duty.**

| NFPA Age Predicted 85 % Maximum Heart Rate | |
|---|---|
| 20 - 25 | 170 |
| 26 - 30 | 165 |
| 31 - 35 | 160 |
| 36 - 40 | 155 |
| 41 - 45 | 152 |
| 46 - 50 | 148 |
| 51 -55 | 140 |
| 55 - 60 | 136 |
| 61 - 65 | 132 |

# Responder Rehabilitation



**Per NFPA 1584**

- **Responders should undergo rehabilitation following use of a second 30-minute SCBA cylinder, after use of a single 45-minute or 60-minute cylinder, or after 40 minutes of intense work without SCBA.**
- **Members should rest for a minimum of 20 minutes if the above occurs.**

**Pearls**

- **This guideline is to be utilized for public safety responders (usually firefighters) on the scene of an incident.**
- **Rehab Sector Commander has full authority in deciding when responders may return to duty.**
- **Utilize this guideline in conjunction with the rehab steps and guidance in the Special Event Rehabilitation Protocol.**
- **May be utilized with adult responders on fire, law enforcement, rescue, EMS, and training scenes.**
- **Responders taking anti-histamines, blood pressure medication, diuretics or stimulants are at increased risk for cold and heat stress.**
- Rehabilitation Section is an integral function within the Incident Management System.
- Establish section such that it provides shelter, privacy and freedom from smoke or other hazards.

# Emergencies Involving Left Ventricular Assist Devices (LVAD)

**History**
- End-Stage Heart Failure
- Patient has surgically-implanted pump that assists the action of one or both ventricles.
- Patient may or may not be on a list for cardiac transplantation

**Signs and Symptoms**
- The flow through many of these devices is not pulsatile, therefore THE PATIENT MAY NOT HAVE A PULSE AT BASELINE. For this reason pulse oximetry readings may also be inaccurate
- Altered Mental Status may be the only indicator of a problem
- Consider both VAD-related and non-VAD-related problems

**Differential**
- Stroke
- Cardiac Arrest
- Dysrhythmia different from patient's baseline
- Infection
- Bleeding (VAD patients are anticoagulated)
- Dehydration
- Cardiac Tamponade
- Device problem such as low battery or disconnected cable

Signs or Symptoms of possible device malfunction or failure (hypoperfusion)

YES

Determine Type of Device and Assess any Alarms
**CALL VAD COORDINATOR and DISCUSS PLAN WITH CAREGIVERS**
Consider: changing device batteries, reconnect cables

Pulsatile Flow Device (Less common)

Measure pulse and blood pressure. If no pulse or blood pressure, providers should use the device's **HAND PUMP** to maintain perfusion.

Continuous Flow Device (Most common)

B — ***Auscultate chest for whirring mechanical pump sound.*** Assess patient for hypoperfusion: Altered Mental Status, pallor, diaphoresis. **Pulses and a blood pressure will not be detectable with this type of device.**

B — CPR may be initiated only when: you confirm pump has stopped, restart efforts have failed, and patient is unsponsive with no detectable signs (no pulse or blood pressure, and signs of hypoperfusion).

NO

Problem with Circulation, perfusion, SYMPTOMATIC dysrhythmia not at patient's baseline, any other problems

NO — YES

1. Place an IV, consider fluid bolus
2. Cardiac monitor
3. Obtain a 12-lead EKG
4. Treat symptomatic dysrhythmias
5. If indicated, place defib pads away from LVAD site and ICD.

Exit to Appropriate guideline(s)
Treat as per usual guideline.

**Check for GO bag (extra cables/batteries) Call LVAD coordinator early**

**Consider calling LVAD coordinator before initiating CPR. Check for advance directives.**

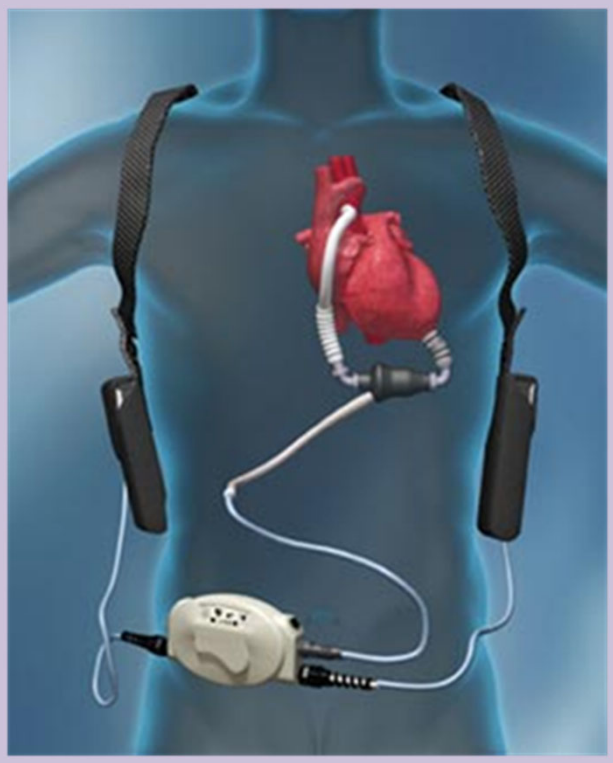
**Transport all LVAD patients to appropriate LVAD Center if available, otherwise closest facility**
**This includes critical and cardiac arrest patients.**

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

Special Response Protocols

# Emergencies Involving Left Ventricular Assist Devices (LVAD)





- **Due to lack of peripheral pulses in LVAD patients, mean arterial pressure (MAP) can be obtained with a manual BP cuff and a doppler device**

**Consider referencing the LVAD EMS Field Guide at (https://www.mylvad.com/medical-professionals/resource-library/ems-field-guides)**

**Pearls**

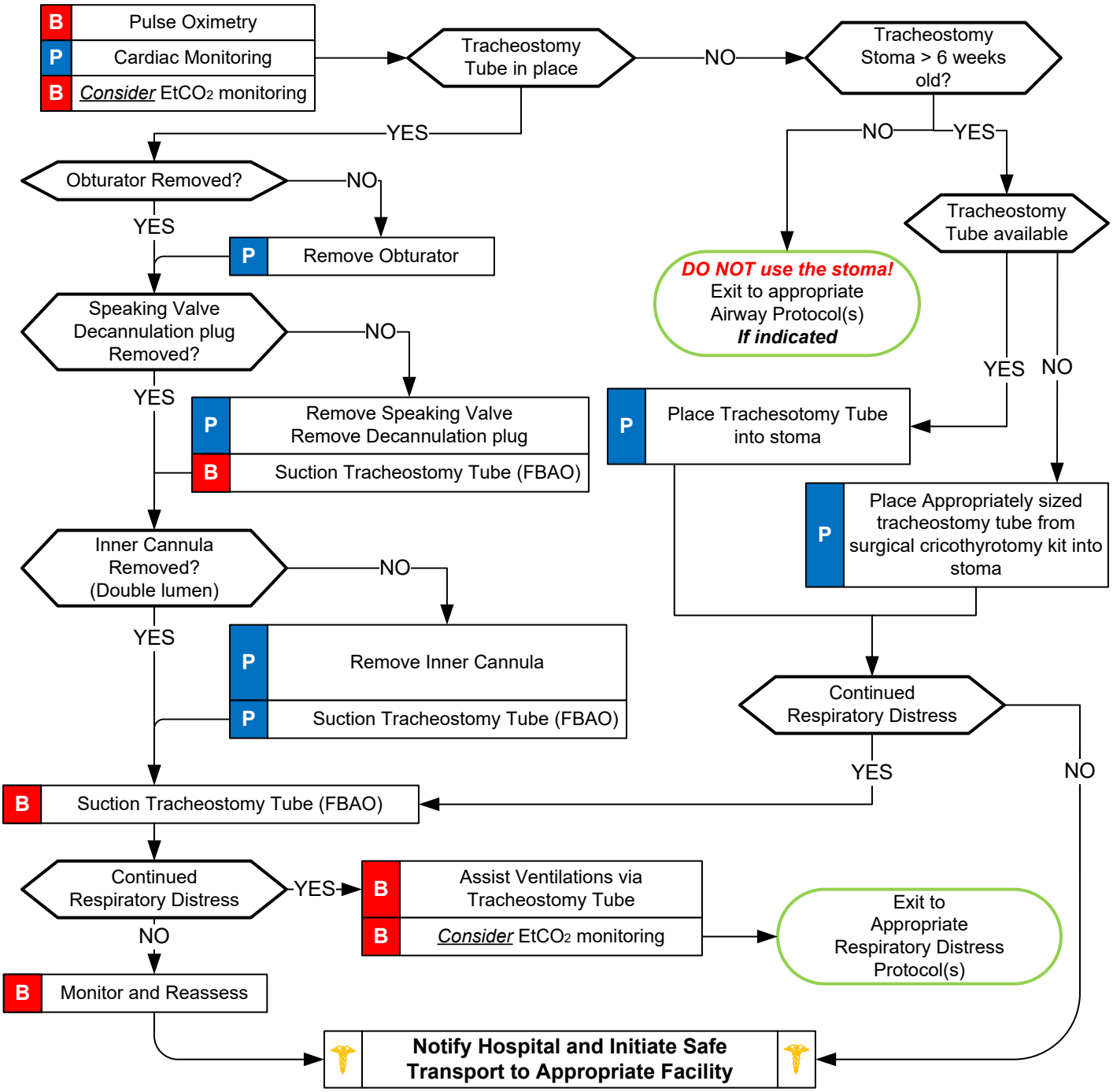
- **ALWAYS talk to family/caregivers as they have specific knowledge and skills. CALL THE VAD COORDINATOR EARLY as per patient/family instructions or as listed on the device. They are available 24/7 and should be an integral part of the treatment plan.**
- **You do not need to disconnect the controller or batteries in order to defibrillate, cardiovert, or acquire a 12 lead ECG.**
- **Deciding when to initiate Chest Compressions is very difficult. Consider that chest compressions may cause death by exsanguination if the device becomes dislodged. However, if the pump has stopped the heart will not be able to maintain perfusion and the patient will likely die. Ideally, plan the decision in advance with a responsive patient and the VAD coordinator. If a VAD patient is unresponsive and pulseless with a non-functioning pump and has previously indicated a desire for resuscitative efforts, begin compressions. Contact the VAD coordinator and medical control.**
- Common complications in VAD patients include Stroke and TIA (incidence up to 25%), bleeding, dysrhythmia, and infection.
- The cardiac monitor will reveal the underlying rhythm, this is not typically affected by the VAD device.
- VAD patients typically have low ejection fractions, hence why they received the VAD to aid in circulation and increased afterload.
- VAD patients are preload dependent. Consider that a FLUID BOLUS can often reverse hypoperfusion.
- Transport patients with ALL device equipment including any instructions, hand pumps, backup batteries, primary and secondary controllers, as well as any knowledgeable family members or caregivers.

# Respiratory Distress With a Tracheostomy Tube

**History**
- Birth defect (tracheal atresia, tracheomalacia, craniofacial abnormalities)
- Surgical complications
- Trauma (post-traumatic brain or spinal cord injury)
- Medical condition (bronchial or pulmonary dysplasia, muscular dystrophy)

**Signs and Symptoms**
- Nasal flaring and attempts to cough
- Chest wall retractions (with or without abnormal breath sounds)
- Copious secretions noted coming out of the tube
- Faint breath sounds on both sides of chest despite significant respiratory effort
- Cyanosis or AMS

**Differential**
- Allergic reaction
- Asthma
- Aspiration
- Septicemia
- Foreign body
- Infection
- Congenital heart disease
- Medication or toxin
- Trauma



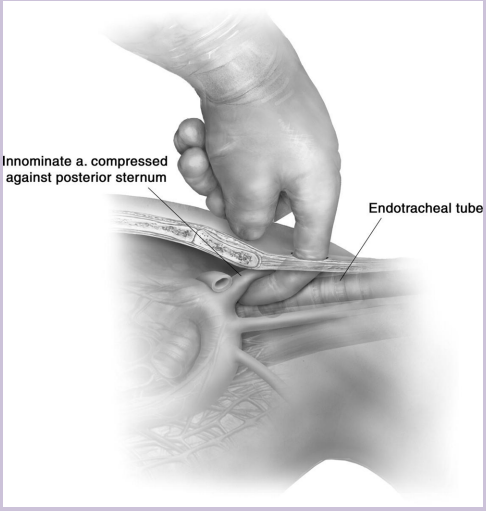

Special Response Protocols

# Respiratory Distress With a Tracheostomy Tube



**In case of massive hemorrhage in a recently placed stoma. It is possible a fistula has formed with the Innominate Artery:**

1. **Overinflate the tracheostomy balloon.**
2. **Attempt to compress the innominate artery with one finger through the stoma and compress inferiorly with external pressure with the thumb.**




*Operative Techniques in Thoracic and Cardiovascular Surgery* 2009 1466-72

## Pearls

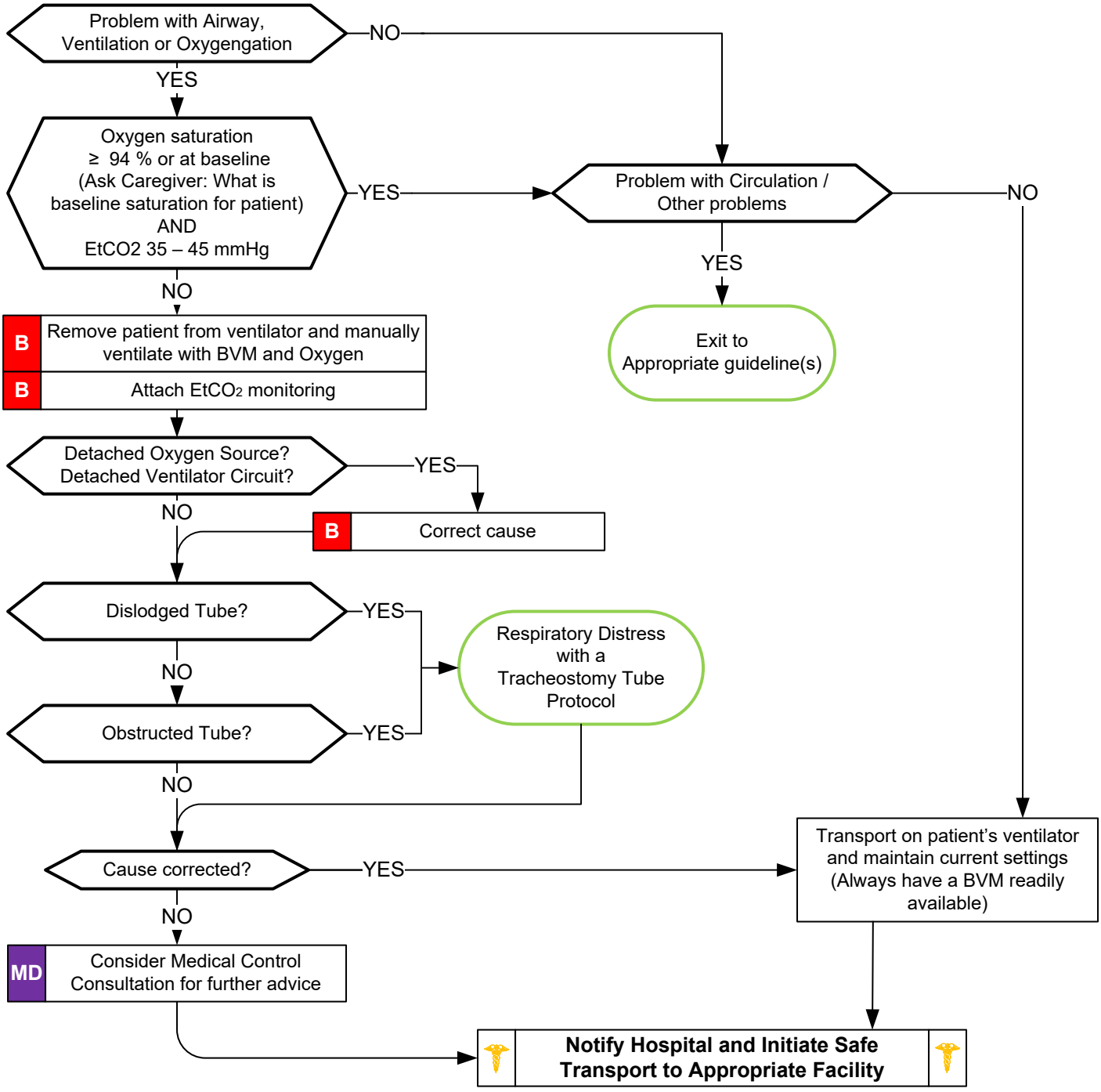
- **Always talk to family / caregivers as they have specific knowledge and skills.**
- **A tracheostomy stoma that is less than 6 weeks old should not be manipulated. The stoma has not fully matured and there is an increased risk of creating a false passage outside of the trachea if attempts are made to replace a dislodged tube.**
- Use patient's equipment if available and functioning properly.
- Estimate suction catheter size by doubling the inner tracheostomy tube diameter and rounding down.
- Suction depth: Ask family/caregiver. No more than 3 to 6 cm (1-3 inches) typically. Instill 2 – 3 mL of NS before suctioning.
- Do not suction more than 10 seconds each attempt and pre-oxygenate before and between attempts.
- DO NOT force suction catheter. If unable to pass, then tracheostomy tube should be changed.
- Always deflate tracheal tube cuff before removal.
- Continual pulse oximetry and EtCO2 monitoring if available.
- **DOPE: D**isplaced tube, **O**bstruction, **P**neumothorax and **E**quipment failure.

# Emergencies Involving Ventilators

**History**
- Birth defect (tracheal atresia, tracheomalacia, craniofacial abnormalities)
- Surgical complications (damage to phrenic nerve)
- Trauma (post-traumatic brain or spinal cord injury)
- Medical condition (bronchopulmonary dysplasia, muscular dystrophy)

**Signs and Symptoms**
- Transport requiring maintenance of a mechanical ventilator
- Power or equipment failure at residence

**Differential**
- Disruption of oxygen source
- Dislodged or obstructed tracheostomy tube
- Detached or disrupted ventilator circuit
- Cardiac arrest
- Increased oxygen requirement / demand
- Ventilator failure




Special Response Protocols

# Emergencies Involving Ventilators

Special Response Protocols

**Alarms:**

If an alarm sounds, always start at the patient and work your way back to the ventilator. Check for the following:

1. Apneic patient
2. Dislodged/misplaced tube
3. Obstruction
4. Disconnected tubes/circuits
5. Oxygen supply
6. Pressure alarms
7. Pneumothorax
8. Equipment/Power Failure

- Settings are typically set for that specific patient, these should not be changed unless directed by the patient or physician familiar with the device.
- Have a BVM nearby and ready for use at ALL times
- If the vent begins to alarm and the problem cannot be found and solved within 10 seconds, switch to BVM immediately and continue to assess for the problem.
- If the patient goes into cardiac arrest, the vent needs to be removed and BVM ventilations started.
- Cardiac, SpO2, and Capnography monitoring are required on all vent patients, with serial vital signs occurring every 10 minutes.

- If patient is part of Project Austin, please reference care guide for additional instructions

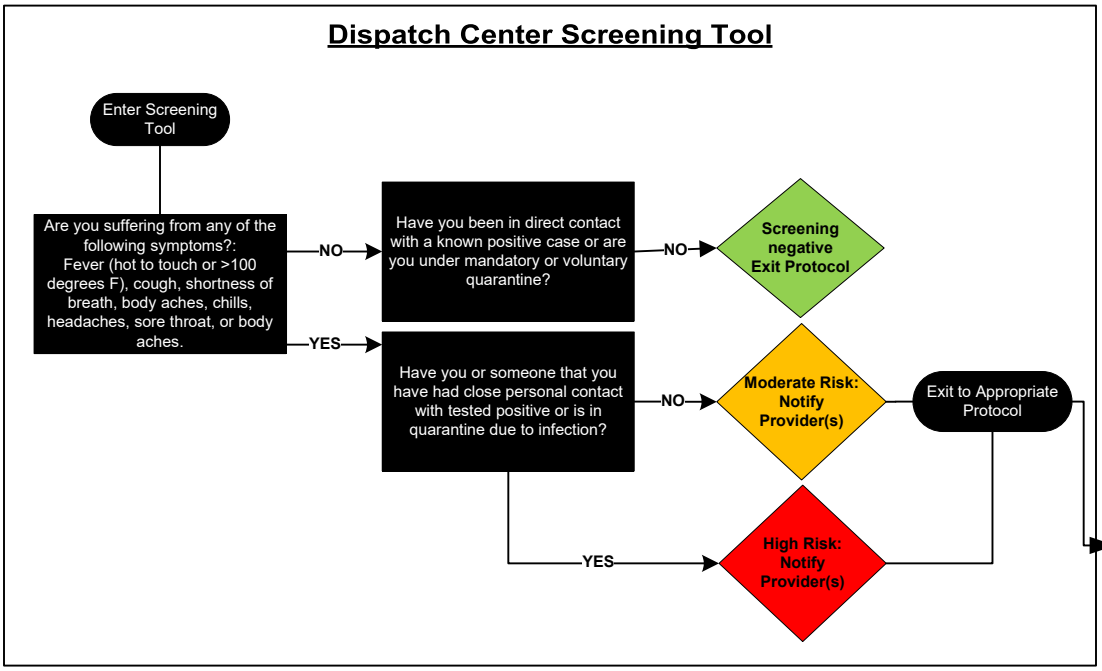
**Pearls**

- **Always talk to family / caregivers as they have specific knowledge and skills.**
- Always use patient's equipment if available and functioning properly.
- Continuous pulse oximetry and end tidal CO2 monitoring must be utilized during assessment and transport.
- **DOPE: D**isplaced tube, **O**bstruction, **P**neumothorax and **E**quipment failure.
- Unable to correct ventilator problem: Remove patient from ventilator and manually ventilate using BVM. Take patient's ventilator to hospital even if not functioning properly.
- Typical alarms: Low Pressure / Apnea: Loose or disconnected circuit, leak in circuit or around tracheostomy site.
  Low Power: Internal battery depleted.
  High Pressure: Plugged / obstructed airway or circuit.

# Infectious Respiratory Disease Protocol



## Dispatch Center Screening Tool




***Evolving Protocol:***
Protocol subject to change at any time dependent on changing outbreak locations.

Monitor for protocol updates

**DISPATCH ONLY EMS TRANSPORT UNIT**

Alert any EMS providers of a potential exposure patient before they arrive on scene

## EMS

**Do not rely solely on dispatch personnel to identify a potential exposure patient:**

- EMD may be constrained by time and caller information.
- Obtain a travel history/exposure history and assess for clinical signs and symptoms.
- Limit number of providers necessary for care to limit potential exposures
- Maintain 6 ft (minimum) distancing from patient while interviewing until mask can be placed.

**EMS Immediate Concern**

Traveler from area with known respiratory disease with or without symptoms
Traveler from affected areas within past 21 days
**AND**
Fever, cough, shortness of breath, headache, joint/muscle aches, vomiting/diarrhea

NO → Exit to Appropriate Patient Care Protocols

YES

EMS Personal Protective Equipment (PPE)

**Patient:**

- Place standard surgical mask on patient
- Use non-rebreather mask if oxygen is needed
- In unable to tolerate mask, have patient cover mouth and nose when coughing.

**Providers utilize:**

- Contact, Droplet, and Airborne Precautions
- Eye protection
- N95 Mask (or higher) or PAPR (Facemasks may be used if a respirator is not available)
- Exam Gloves
- Goggles/face shield
- Disposable Gown
- Create negative pressure in care compartment (See Pearls)

**Personnel in ambulance cab utilize:**

- N95 Mask (or higher) or PAPR
- Remove all PPE except N95 or high and perform hand hygiene PRIOR to entering the cab of the ambulance

***Aerosol generating procedures:***
(NIPPV/Nebulizer therapy/Intubation/Suctioning)

Try to avoid if possible. If unavoidable, contact medical control. Use highest level of PPE with face/eye protection (PAPR with hood preferred). If possible, keep rear compartment doors open during procedure.

**Recommend the use of HEPA filter with intubations, BVM, and ventilator circuits.**

**If there is a known shortage of respirators and gowns, those items should be prioritized for aerosol-generating procedures.**

EMS General Treatment Considerations

**Notify Hospital and Initiate Safe Transport to Appropriate Facility**

# Infectious Respiratory Disease Protocol



**EMS Personnel Documentation Requirements**

**Maintain Records**

- Of 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.

**EMS Equipment/Transport Unit Decontamination**

**Wash Hands:**
Thoroughly after transferring patient care and/or cleaning ambulance

**Safely clean vehicles used for transport:**

- Follow standard operating procedures for the containment and disposal of regulated medical waste.
- Follow standard operating procedures for containing and reprocessing used linen.

**Wear appropriate PPE when:**

- 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 respiratory 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-recommended disinfectant** in accordance with manufacturer's recommendations.

**Pearls**

- Transport
  - **Limit transport of the patient only** (No family or others unless absolutely necessary, have family ride in cab and apply PPE)
  - Occupants in cab of vehicle all should wear N95 Mask (or higher) or PAPR.
  - Limit number of providers in vehicle required to provide patient care in order to limit exposures
  - Ensure use of all PPE for crew and passengers when aerosol generating procedures utilized
- Negative pressure in care compartment
  - Door or window available to separate driver and care compartment space:
    - Close door/window between driver and care compartment and operate rear exhaust fan on full/high.
  - No door or window available to separate driver and care compartment space:
    - Open outside air vent in driver's compartment and set rear exhaust fan to full/high.
  - Set vehicle ventilation system to non-recirculating to bring in maximum outside air.
  - Use recirculating HEPA ventilation system, if equipped.
- Airborne precautions:
  - Standard PPE with fit-tested N95 mask (or PAPR respirator) and utilization of a disposable gown, single pair of gloves, and face shield/goggles.
    - Level appropriate for COVID-19, Aspergillus, Tuberculosis, Measles (rubeola), Chickenpox (varicella-zoster), smallpox, influenza, Rhinovirus, Norovirus, and Rotavirus.
- 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 is not inactivated by alcohol-based cleaners. Washing with soap and water is indicated
- Droplet precautions:
  - Standard PPE plus a standard surgical mask for providers who accompany patients in the treatment compartment and a surgical mask or NRB O2 mask for the patient.
    - This level is utilized when Influenza, Meningitis, Mumps, Streptococcal pharyngitis, Pertussis, Adenovirus, Rhinovirus, SARS, and undiagnosed rashes.
- 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).

**For most current criteria to guide evaluations of patients under investigation:**
http://www.cdc.gov

## MEDICATION TABLE OF CONTENTS

## ACETAMINOPHEN (TYLENOL)

**ACTION:** Not fully understood, likely acts both centrally and peripherally

**INDICATIONS:**

- Mild to Moderate pain

**CONTRAINDICATIONS:**

- Liver disease
- Allergy

**PRECAUTIONS:**

- Current alcohol abuse or recent significant alcohol ingestion (>3 drinks)

**ADVERSE REACTIONS/SIDE EFFECTS:** (usually very short-lived)

- Gastrointestinal discomfort

**ADMINISTRATION:**

Pain

- PO (All Levels)
  325-1000 mg PO
- IV (AEMT and Paramedic Only)
  ≥50 kg: 650 mg-1000 mg once, no repeat dosing
  <50 kg: 15 mg/kg once, no repeat dosing (max dose 1000 mg)

**PEDIATRIC CONSIDERATIONS:**

- 10 mg/kg PO

**SPECIAL NOTES:**

- Ensure that the patient has not taken acetaminophen within 6 hours prior to administration
- Ask about prescription pain medications, sleep aids, cough/cold/flu relievers, and headache medications, as many of these come in combination with acetaminophen

## ADENOSINE (ADENOCARD)

**ACTION:** Slows conduction through AV node of the heart. It is cleared very rapidly, having a half-life of less than 10 seconds.

**INDICATIONS:**

- Conversion of paroxysmal supraventricular tachycardia (narrow complex tachycardia) to normal sinus rhythm (NSR)
- Conversion of regular wide complex tachycardia (Ventricular tachycardia or uncertain).

**CONTRAINDICATIONS:**

- Heart block
- Sick sinus syndrome, atrial fibrillation or atrial flutter
- Aberrant conduction rhythms (WPW)

**PRECAUTIONS:**

- Frequently followed by several seconds of asystole. Provide emotional support to the patient.

**ADVERSE REACTIONS/SIDE EFFECTS:** (usually very short-lived)

- Dyspnea and bronchoconstriction (especially in patients with asthma and COPD)
- Palpitations and chest pain
- Hypotension
- Facial flushing and headache
- At the time of conversion, a variety of new rhythms may appear on the ECG. Short-lasting first, second or third degree heart block or *transient* asystole may result after administration. Due to the drug's short half-life, these effects are *generally* self-limiting.
- At a dose of 12 mg, there are usually no hemodynamic side effects, i.e. hypotension.

**ADMINISTRATION:**
Adenosine IV/IO injection must be given rapidly. This can be facilitated by: 1) using the IV/IO med port closest to the patient, 2) following the med with a fluid flush to assure all of the drug has cleared the IV tubing, 3) using a larger bore IV catheter, and 4) elevating the arm during administration. Further orders must come from a medical control physician.

<u>Narrow complex tachycardia</u>

- 6 mg rapid IVP followed by a rapid flush OR diluting 6 mg in 10-20 ml NS flush and administering via IVP
- If rhythm does not convert or does not slow enough to allow diagnosis, a second dose of 12 mg may be givne prior to medical control contact

**PEDIATRIC CONSIDERATIONS:**

- First dose is 0.1 mg/kg (max 6 mg single dose) IV/IO rapid push.
- Second dose can be given if no response (or transient response) at a dose of 0.2 mg/kg (max 12 mg single dose).

**SPECIAL NOTES:**

- After the administration of adenosine, a rhythm other than PSVT may be evident. This should result in the selection of a different form of treatment.
- Always perform a 12 lead prior to drug administration. If patient is not stable enough to administer drugs, cardioversion is the treatment of choice
- Document effect on rhythm via EKG strip

## ALBUTEROL (PROVENTIL, VENTOLIN)

**ACTION:** Sympathomimetic bronchodilator (beta$_2$-adrenergic agonist)

**INDICATIONS:**

- For relief of acute bronchospasm (reversible airway obstruction)

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to albuterol

**PRECAUTIONS:**

- Beta-receptor blocking agents and albuterol inhibit the effect of each other.
- Use with caution in patients with heart disease, hypertension, diabetes, the elderly and those being treated with antidepressants.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Hypertension and headache
- Arrhythmias and chest pain
- Nervousness and shakiness
- Rare: May produce immediate allergic reactions or paradoxical bronchospasm, which can be life threatening. Discontinue treatment immediately if this occurs.

**ADMINISTRATION:**

BLS with medication training

- Pour one unit dose bottle (2.5 mg = 3 ml of 0.083% solution) into nebulizer reservoir.
- Connect nebulizer to oxygen source at 4 to 6 liters per minute (depending on manufacturer).
- Have patient breathe as calmly and deeply as possible until no more mist is found in the nebulizer chamber (5 - 15 minutes). Routine nebulizer therapy should be accomplished by instructing the patient to close his/her lips tightly around the mouthpiece. If the patient cannot follow instructions, this is an indication to start providing BVM respirations.
- Continuous nebulizer treatments (with reassessment in between) may be given to all ages as indicated.
- Restart patient on oxygen at appropriate concentration if indicated.

ALS

- In the intubated patient or a patient on CPAP, albuterol should be administered with an adapter that permits in-line nebulization.

**PEDIATRIC CONSIDERATIONS:**

BLS with medication training

- Continuous nebs, at adult strength, may be given.

ALS

- Continuous nebs at adult strength, may be given.

**SPECIAL NOTES:**

- May begin treatment prior to IV therapy. This may decrease anxiety in the patient.
- Nebulizer treatments for a patient with active tuberculosis should be performed in well-ventilated areas (outside patient compartment if possible). Providers should use appropriate respiratory protection.

## AMIODARONE (CORDARONE)

**ACTION:** Amiodarone is considered a "broad spectrum" antiarrhythmic medication. It has multiple and complex effects on the electrical activity of the heart such as: 1) A delay in the rate at which the heart repolarizes. 2) A prolongation in the action potential of the heart. 3) A slowing of the speed of electrical conduction. 4) A reduction in the SA nodal firing rate. 5) A slowing of conduction through accessory pathways. In addition to being an antiarrhythmic, Amiodarone also causes blood vessels to dilate. This effect can result in a drop in blood pressure.

**INDICATIONS:**

- Ventricular tachycardias (with and without a pulse)
- Ventricular fibrillation (VF)
- As prophylaxis following successful conversion of VF or VT or ICD firing
- WPW and PSVT

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to Amiodarone or its components including iodine
- Patients in cardiogenic shock
- Sinus bradycardia and second or third degree AV block (be ready to pace patient if severe bradycardia occurs)

**PRECAUTIONS:**

- As with all antiarrhythmics, Amiodarone may cause a worsening of existing arrhythmias or precipitate a new arrhythmia.
- May produce vasodilation and hypotension.
- May have negative inotropic effects
- Watch for prolongation of QT interval
- ½ life is extremely long ( up to 40-60 days)
- Use with caution if renal failure is present due to extremely long ½ life.
- May interact with beta-blockers such as atenolol, propranolol, metoprolol, or certain calcium-channel blockers such as verapamil or diltiazem, resulting in excessively slow heart rates.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Hypotension, bradycardia, and arrhythmias
- Prolonged QT interval
- Cardiac arrest

**ADMINISTRATION:**
Patient must be on ECG monitor and Vital signs should be monitored at least every 5 minutes.
Adult with pulse

- 150 mg IV/IO over 10 minutes (100 mL of D5W or NS). May repeat once

Adult without pulse (VF/VT)

- 300 mg IV/IO push. May repeat one time at dose of 150 mg IV/IO

**PEDIATRIC CONSIDERATIONS:**
VF/Pulseless VT

- Pediatric without puse: 5 mg/kg IV/IO (max single dose 300 mg). May repeat twice to a maximum of 15 mg/kg

As an antiarrhythmic in pediatrics

- Do not use in neonates!
- Contact Medical Control Physician for possible initial bolus of 5 mg/kg IV/IO over 20 minutes (mixed in 50-100 mL of D5W or NS).

**SPECIAL NOTES:**
1. Draw up slowly, Amiodarone will foam and you will not be able to use it. Flush line with saline/lactated ringers after use

## ASPIRIN (BAYER)

**ACTION:** Analgesic; anticoagulant that slows the blood clotting mechanism in the body, and may help to reduce the damage caused by an acute myocardial infarction

**INDICATIONS:**

- Suspected cardiac ischemia

**CONTRAINDICATIONS:**

- Allergy to aspirin or other non-steroidal anti-inflammatory agents (includes many non-aspirin/non-Tylenol pain relievers such as Advil and Alleve)
- Active GI bleeding
- Aortic dissection

**PRECAUTIONS:**

- Recent internal bleeding (within last 3 months)
- Known bleeding diseases
- Recent surgery
- Possibility of pregnancy
- Allergies to ANY pain medication
- Patients with a history of asthma may take if they have tolerated ASA in the past and are not currently having asthma-related symptoms.
- Should not be administered to OB/Pregnant patients

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Bleeding

**ADMINISTRATION:**

Chest pain/STEMI (BLS with medication training or ALS)

- Have the patient chew 324 mg (generally one adult or four children's) aspirin.
- The patient may drink a small amount of liquid after chewing the tablets, if desired.
- Further orders must come from a medical control physician.

**PEDIATRIC CONSIDERATIONS:**

- Do not give to patients < 12 years without physician order.

**SPECIAL NOTES:**

- Being on current anticoagulant therapy (e.g. Coumadin) is not necessarily a reason to withhold aspirin. Consult with Medical Control Physician if there are questions.

## ATROPINE

**ACTIONS:** Antiarrhythmic, anticholinergic-antimuscarinic; blocks action of acetylcholine in parasympathetic nervous system

**INDICATIONS:**

- For symptomatic bradyarrhythmias (< 50/minute), either supraventricular or ventricular in origin
- In RSI to pre-treat for prevention of bradycardia in children
- AV block with narrow QRS complex
- Organophosphate poisoning
- Bradycardia due to beta-blocker and/or calcium channel blocker overdose/toxicity

**CONTRAINDICATIONS:**

- Acute hemorrhage

**PRECAUTIONS:**

- Should be given rapidly to avoid paradoxical effect.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Supraventricular or ventricular tachycardia, ventricular fibrillation
- Blurred vision, dry eyes, dilated pupils

**ADMINISTRATION:**

For perfusing symptomatic bradycardia

- Administer atropine 1 mg IV/IO push every 5 minutes as needed to a total dose of 3 mg.

Organophosphate poisoning or nerve agent exposure with respiratory symptoms

- Administer atropine 2 mg IV/IO push every 5-10 minutes until respiratory distress and airway secretions resolve
- Contact Medical Control Physician for further orders. Doses may be considerably larger than standard dosing.

**PEDIATRIC CONSIDERATIONS:**

For symptomatic bradycardia (including beta-blocker and/or calcium channel blocker OD)

- Administer 0.02 mg/kg IV/IO
- Minimum single dose 0.1 mg and maximum single dose 0.5 mg

For organophosphate poisoning or nerve agent exposure with respiratory symptoms

- Administer 0.05 mg/kg IV/IO push every 5-10 minutes until respiratory distress and airway secretions resolve

**SPECIAL NOTES:**

- Atropine is not indicated in the ACLS algorithm for pulseless (asystole/PEA) adult or pediatric patients.
- Second degree and complete heart block are generally unresponsive to atropine. In these situations, transcutaneous pacing is the treatment of choice.
- Atropine will not have a clinical effect in those patients whom have undergone heart transplant

## CALCIUM CHLORIDE

**ACTION:** Electrolyte modifier; essential for the transmission of nerve impulses in cardiac muscle contraction

**INDICATIONS:**

- Used as antidote for calcium channel blocker overdoses
- Magnesium sulfate overdoses
- Black Widow spider bite
- Hyperkalemia with widened QRS or hemodynamic instability
- Consider administration if patient receiving multiple unit blood transfusion

**CONTRAINDICATIONS:**

- Hypercalcemia
- Absence of indications

**PRECAUTIONS:**

- Rapid administration of calcium in a beating heart may produce slowing of the cardiac rate.
- Patients taking digitalis may have increased ventricular irritability and calcium may produce digitalis toxicity.
- DO NOT mix with sodium bicarb. In the presence of sodium bicarbonate, it will precipitate calcium slats or carbonates

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Syncope
- Arrhythmias, bradycardia, and cardiac arrest
- Tissue necrosis at injection site

**ADMINISTRATION:**

- Dosage in adults: 1,000 mg (1 g) IVP over 10 minutes
- May push faster in cardiac arrest situations

**PEDIATRIC CONSIDERATIONS:**

- 20 mg/kg slow IV push over 10 minutes

**SPECIAL NOTES:**

- It is best to warm the drug to body temperature prior to administration
- If heart is beating, rapid administration of calcium salts can produce bradycardia and/or arrest. RAPID INJECTION CAN CAUSE HYPOTENSION, BRADYCARDIA and DEATH
- May increase cardiac irritability, i.e. PVCs, particularly in the presence of digitalis
- Local infiltration will cause tissue necrosis

## CALCIUM GLUCONATE

**ACTION:** Electrolyte modifier; essential for the transmission of nerve impulses in cardiac muscle contraction

**INDICATIONS:**

- Symptomatic hyperkalemia
- Hypocalcemia, especially from acute causes such as hydrofluoric acid or fluorine gas exposure
- Calcium channel blocker overdose or toxicity; including: verapamil (Calan, Isoptin), diltiazem (Cardizem), nifedipine (Procardia, Adalat), nicardipine (Cardene, Vasonase), nimodipine (Nimotop), amlodipine, felodipine, flunarizine, bepridil, isradipine, nisoldapine, nitrendapine
- Respiratory depression following administration of magnesium sulfate
- Consider administration if patient receiving multiple unit blood transfusion

**CONTRAINDICATIONS:**

- Not to be used routinely during resuscitation unless hyperkalemia, hypocalcemia, or calcium channel blocker toxicity is suspected.

**PRECAUTIONS:**

- Rapid administration of calcium in a beating heart may produce slowing of the cardiac rate.
- Patients taking digitalis may have increased ventricular irritability and calcium may produce digitalis toxicity.
- In the presence of sodium bicarbonate, it will precipitate calcium salts or carbonates.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Syncope
- Arrhythmias, bradycardia, and cardiac arrest
- Tissue necrosis at injection site

**ADMINISTRATION:**

- Dosage in adults: 1,000 mg (1 g) of 10% solution (1.0 ml = 100 mg).
- Administer as a slow push over 2-5 minutes in a critical situation.

**PEDIATRIC CONSIDERATIONS:**

- Initial dose is 60-100 mg/kg (max 3 g) *slowly* IV or IO. Repeat doses for pediatric patients are not recommended.

**SPECIAL NOTES:**

- If infiltration occurs, notify physician at receiving hospital immediately upon arrival so that antidotal therapy can begin immediately.

## DEXTROSE

**ACTION:** Hyperglycemic; increases circulating blood sugar levels

**INDICATIONS:**

- Suspected or known hypoglycemia (BS < 70 mg/dL)

**CONTRAINDICATIONS:**

- None

**PRECAUTIONS:**

- May cause CNS symptoms in the alcoholic patient.
- Should not be used as a diagnostic agent in the patient with altered LOC unless the BS is known to be < 70 mg/dL or, if the BS cannot be determined and patient is known to be diabetic.
- If CVA or head trauma is suspected as the cause of altered mental status, ensure BGL check prior to administration.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- May aggravate HTN and CHF
- May cause tissue necrosis at injection site if infiltration occurs

**ADMINISTRATION:**
Repeat blood sugar measurement 5-10 minutes after administration.

Blood sugar < 80 mg/dl in a conscious, alert patient

- Administer 12.5g of D10 or D50 IV/IO and recheck a blood sugar. Administer additional dose if no change.

Blood sugar < 40 mg/dL with or without altered LOC

- Establish IV/IO of NS TKO in large vein.
- Administer 25g of D10 or D50 IV/IO x 1.

**PEDIATRIC CONSIDERATIONS:**
For neonates between birth and 29 days old

- 0.5 g/kg (5 mL/kg) IV/IO of 10% dextrose in water ($D_{10}W$). **$D_{50}W$ must be diluted 1:4 with NS to achieve $D_{10}W$.**

For infants between 1 month and 2 years old

- 1.0 g/kg (5 mL/kg) IV/IO of 25% dextrose in water ($D_{25}W$). **$D_{50}W$ must be diluted 1:1 with NS to achieve $D_{25}W$.**

**SPECIAL NOTES:**

- All patients whose hypoglycemia is due to oral hypoglycemic agents should be transported.
- If infiltration occurs, notify physician at receiving hospital immediately upon arrival so that antidotal therapy can begin immediately.

ALS services

- In patients with BGL < 40 mg/dL, IV/IO dextrose is considered first/second line treatments over oral agents.

# Dextrose (Oral)

B-PO
A-PO
P-PO

## DEXTROSE

**ACTION:** Hyperglycemic; increases circulating blood sugar levels

**INDICATIONS:**

- Suspected or known hypoglycemia (BS < 70 mg/dL)

**CONTRAINDICATIONS:**

- If patient is unable to follow simple commands
- If patient cannot protect their airway

**PRECAUTIONS:**

- Airway must be carefully maintained
- Should not be used as a diagnostic agent in the patient with altered LOC unless the BS is known to be < 70 mg/dL or, if the BS cannot be determined and patient is known to be diabetic.

**ADMINISTRATION:**

- Logroll patient to prevent aspiration and place in the recovery position
- Check blood sugar
- Administer 1 tube (Approximately 15-31 gm per tube) in downside cheek of log-rolled patient
- Administer slowly, monitoring absorption. Maintain adequate airway
- Repeat BS measurement

**PEDIATRIC CONSIDERATIONS:**

- The initial dosage is one half of the adult dose

**SPECIAL NOTES:**

- All patients whose hypoglycemia is due to oral hypoglycemic agents should be transported. Medical Control Physician consult required before patient can refuse transport

<u>BLS with medication training</u>

- In patients with decreased level of consciousness from hypoglycemia, IV/IO dextrose and/or glucagon are considered first-line treatment

<u>ALS services</u>

- In patients with BGL < 40 mg/dL, IV/IO dextrose and/or glucagon is considered first/second line treatments over oral agents.

## DIAZEPAM (VALIUM)

**ACTIONS:** Sedative/hypnotic; provides conscious sedation/amnesia; anticonvulsant

**INDICATIONS:**

- Sustained and/or recurrent seizures

**CONTRAINDICATIONS:**

- Known hypersensitivity, head injury
- Should be used with caution in patinets with altered mental status, hypotension, or acute narrow angle glaucoma

**PRECAUTIONS:**

- Respiratory depression may occur with IV administration, especially if given too rapidly
- Respiratory support may be required
- Use with caution in pregnant patients, persons ingesting alcohol, or persons ingesting sedatives

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Lightheadedness, motor impairment, ataxia, impairment of mental and psychomotor function, confusion, slurred speech, amnesia
- Additive effet with ethanol
- Irritability and excitation may be seen paradoxicaly

**ADMINISTRATION:**

- Adult dosing: Administer 2 mg SLOW IV/IO.  May repeat 1-2 mg every 10 minutes

**PEDIATRIC CONSIDERATIONS**:

- Pediatric dosing: Administer 0.1 mg/kg SLOW IVP/IO with maximum single dose of 2 mg
- May repeat every 3-5 minutes for continued seizure activity to maximum total dose of 4 mg
- Rectal Dose: Administer up to 0.2 mg/kg; maximum total dose 10 mg

**SPECIAL NOTES:**

- Diazepam is a controlled substance and its use must be documented according to the Controlled Substance policy

## DILTIAZEM (CARDIZEM)

**ACTION:** Calcium Channel Blocker, Coronary Vasodilator, Antidysrhythmic

**INDICATIONS:**

- Atrial Fibrillation or Atrial Flutter
- Paroxysmal Supraventricular Tachycardia
- Angina due to coronary artery spasm

**CONTRAINDICATIONS:**

- Sick sinus syndrome except in the presence of a functioning ventricular pacemaker
- Patients with second- or third degree AV block except in the presence of a functioning ventricular pacemaker
- Patients with severe hypotension or cardiogenic shock
- Patients who have demonstrated hypersentivity to the drug
- Intravenous diltiazem and intravenous beta-blockers should not be administered together or in close proximity (within a fe hours)
- Patients with atrial fibrillation or atrial flutter associated with an accessory bypass tract such as in WPW syndrome or short PR syndrome
- Patients with ventricular tachycardia

**PRECAUTIONS:**

- Additive effects in prolonging AV conduction when using beta-blockers or digitalis concomitantly with diltiazem HCl
- Avoid use/use caution in patients with heart failure patients as diltiazem has negative inotropic effects that can worsen heart failure

**ADMINISTRATION:**

- Adult dosing: Bolus 0.25 mg/kg IV slow push over 2-5 minutes (Avg dose : 20 mg)
- Consider second dose 0.35 mg/kg IV slow push over 2-5 min (Avg dose: 20 mg)
- Consider continuous infusion 5-15 mg/hr

**PEDIATRIC CONSIDERATIONS:**

- Not indicated in pediatric patients

**SPECIAL NOTES:**

- When given to a conscious patient, you may note nausea, vomiting, and hypotension
- Ensure slow push as rapid bolus can cause significant hypotension/side effects

## DIPHENHYDRAMINE (BENADRYL)

**ACTION:** Antihistamine ($H_1$ receptor antagonist); blocks the effects of histamine

**INDICATIONS:**

- In anaphylaxis as an adjunct to epinephrine
- In allergic reactions
- Combative/aggressive patients
- Extrapyramidal (Parkinsonian-like, thick tongue, neck distortion) symptoms

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to diphenhydramine HCL
- Acute asthma attacks
- Newborn or premature infants

**PRECAUTIONS:**

- Benadryl has an atropine-like action, therefore use with caution in patients with bronchial asthma, hyperthyroidism, cardiovascular disease, hypertension, and COPD.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Drowsiness and sedation
- Dizziness and headache
- Blurred vision
- Palpitations and chest tightness
- Wheezing and thickening of bronchial secretions
- Hypotension
- Hallucinations, paradoxical excitement and convulsions (especially in children)

**ADMINISTRATION:**

- Administer Benadryl 25 mg IV/IO/IM.

**PEDIATRIC CONSIDERATIONS:**

- Initial dose is 1.0 mg/kg slow IV/IO/IM

**SPECIAL NOTES:**

- Benadryl in the injectable form has a rapid onset of action.

## DOPAMINE (DOPASTAT, INTROPIN)

**ACTION:** Chemical precursor of norepinephrine that stimulates dopaminergic, $\alpha_1$-adrenergic, and β-adrenergic receptors in a dose-related fashion; inotropic, vasopressor; increases BP and cardiac output, and improves blood flow through the kidneys

**INDICATIONS:**

- Symptomatic hypotension in the absence of hypovolemia

**CONTRAINDICATIONS:**

- Hypotension due to hypovolemia

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Arrhythmias (supraventricular or ventricular tachycardia), palpitations and chest pain
- Dyspnea
- Hypotension
- Dilated pupils
- Tissue necrosis at IV site

**ADMINISTRATION:**

- Comes prepared 400 mg dopamine in 250 ml $D_5W$ bags (1600 mcg/ml). May infuse 2-20 micrograms/kg/min titrated to satisfactory hemodynamic performance prior to medical control contact.
- When administering a dopamine infusion, 60 gtt tubing should be used.

For 400 mg dopamine hydrochloride in 250 ml $D_5W$ bags (1600 mcg/ml) using 60 gtt tubing set

| Weight | 5 mcg/kg/min | 10 mcg/kg/min | 15 mcg/kg/min | 20 mcg/kg/min |
|---|---|---|---|---|
| **50 kg or 110 lb** | 9 gtts/min | 18 gtts/min | 28 gtts/min | 38 gtts/min |
| **60 kg or 132 lb** | 11 gtts/min | 22 gtts/min | 34 gtts/min | 45 gtts/min |
| **70 kg or 154 lb** | 13 gtts/min | 26 gtts/min | 39 gtts/min | 53 gtts/min |
| **80 kg or 176 lb** | 15 gtts/min | 30 gtts/min | 45 gtts/min | 60 gtts/min |
| **90 kg or 198 lb** | 18 gtts/min | 34 gtts/min | 51 gtts/min | 68 gtts/min |
| **100 kg or 220 lb** | 19 gtts/min | 37 gtts/min | 56 gtts/min | 75 gtts/min |
| **110 kg or 242 lb** | 21 gtts/min | 41 gtts/min | 62 gtts/min | 83 gtts/min |
| **120 kg or 264 lb** | 23 gtts/min | 45 gtts/min | 68 gtts/min | 90 gtts/min |

Manual drip rate calculation

- **Dose (mg/hr) = [(desired mcg x kg) / 1000] X 60** *(Desired mcg = 2-10)*
- **Volume (mL/hr) = (dose x 250 mL) / 400 mg** *(Dose is mg/hr from previous calculation)*
- Drip rate (gtt/min) is the same as volume (mL/hr) if 60 gtt tubing set is used.
- If a different tubing set is used, multiple the volume (mL/hr) value by the tubing set drip factor and divide by 60 to get drips per minute.

**PEDIATRIC CONSIDERATIONS:**

- May infuse 5-10 micrograms/kg/min titrated to satisfactory hemodynamic performance prior to medical control contact.

**SPECIAL NOTES:**

- If infiltration occurs, discontinue medication and notify physician at receiving hospital immediately upon arrival so that antidotal therapy can begin immediately.

# DUODOTE

A DuoDote Chemical Agent Treatment Kit contains an auto-injector with 2 mg of atropine and an auto-injector with 600 mg of pralidoxime (2-PAM) chloride. These are antidotes to be used when a first responder becomes symptomatic from contact with a nerve agent or organophosphate agent (i.e. pesticides, herbicides).

**ACTIONS:**
Atropine = blocks muscarinic effects of nerve agents (e.g. bronchorrhea, bronchoconstriction).
2-PAM Chloride = Reactivates cholinesterase outside the CNS which has been inactivated by organophosphate pesticides and related compounds.

**INDICATIONS:**
- Recognition of the existence of a potential chemical or organophosphate agent release.
- Some or all of the signs and symptoms consistent with exposure to a nerve agent, including:
  - SLUDGEM: S-salivation, L-lacrimation, U-urination, D-defecation, G-GI symptoms & cramps, E-emesis, Miosis.
  - Difficulty breathing.
  - Agitation: confusion, seizures or coma.

**CONTRAINDICATIONS:**
- Not to be used as a prophylactic mode of protection.

**PRECAUTIONS:**
- Atropine must be administered before 2-PAM CL

**ADVERSE REACTIONS/SIDE EFFECTS:**
- Blurred or double vision
- Dizziness
- Headache
- Tachycardia
- Weakness
- Nausea

**ADMINISTRATION:**
- Scene safety – Use appropriate PPE and assure adequate decontamination of the patient.
- Manage airway, breathing, circulation as needed
- Start IV with normal saline/lactated ringers to sustain systolic BP over 90 mm/hg.
- Monitor ECG.

<u>For moderate symptoms (respiratory distress, SLUDGEM)</u>
- Administer 2 kits rapidly, then repeat the atropine auto-injector every 5-10 minutes (if available) until symptoms improve.

<u>For severe symptoms (altered mental status, seizures, respiratory arrest)</u>
- Administer 3 kits rapidly, then repeat the atropine auto-injector every 3-5 minutes (if available) until symptoms improve.

**PEDIATRIC CONSIDERATIONS:**
- Contact Medical Control Physician.

**SPECIAL NOTES:**
- Some patients will need high-pressure ventilation to successfully ventilate them. Because these patients may need up to 70 cm/$H_2O$ to provide adequate ventilation, use a Bag Valve Mask to ventilate the patient.
- Hold each auto-injector in place for 10 seconds so the medication can be completely injected.
- If a DuoDote Kit is not available, atropine should be administered IV/IO per the Nerve Agent Exposure guideline.
- The use of a DuoDote Kit is based on the patient's signs and symptoms, not the suspicion or presence of a nerve agent.

# Epinephrine 1 mg/ml

B-IM
A-IM
P-IM

## EPINEPHRINE 1 MG/ML(GENERIC), ADRENALINE (BRAND)

**ACTION:** Stimulates both  - and  - adrenergic receptors; bronchodilator, cardiac stimulator, and peripheral vasoconstrictor

**INDICATIONS:**

- Allergic reaction from stings, and ingested, inhaled, injected, or absorbed allergens resulting in the following: increased heart rate, decreased BP, respiratory distress, GI upset, hives, facial or airway swelling
- Anaphylaxis with evidence of difficulty communicating, muscle retraction, nasal flaring, and/or swelling of tongue or throat
- Status asthmaticus, or asthma as a second line treatment after nebulization

**CONTRAINDICATIONS:**

- None during profound anaphylaxis or respiratory distress
- Epinephrine 1 mg/ml concentration must only be given IM, DO NOT administer IV/IO route

**PRECAUTIONS:**

- Take caution in patients >50 years of age or known coronary artery disease as results in increased myocardial demand
- May precipitate with sodium bicarbonate if tubing is not flushed between drugs.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Nervousness, restlessness, and tremors
- Headache and HTN
- Arrhythmias and angina

**ADMINISTRATION:**

- Take caution before administering epinephrine in patents >50 years of age unless a life-threatening situation is present.

For severe or life-threatening reactions (anaphylactic shock or impending respiratory or cardiac arrest)

- Administer 0.3 mg (0.3 mL) of epinephrine 1 mg/mL IM. May repeat dose in 5 minutes if symptoms not improved
- Follow with Benadryl 50 mg IV/IO/IM for suspected severe allergic reaction

For acute asthma attacks, if albuterol neb(s) have been unsuccessful

- 0.3 mg (0.3 mL) of epinephrine 1 mg/mL IM for patients >12 years of age

For refractory symptoms (anaphylaxis, severe shock, severe asthma) with concern for imminent respiratory or cardiac arrest

- If symptoms have not improved following administration of two doses of 0.3 mg epinephrine 1 mg/mL IM, consider starting an epinephrine infusion.  See Epinephrine Infusion medication reference page

**PEDIATRIC CONSIDERATIONS:**

For severe reactions (see above for definition)

- Administer 0.15 mg (0.15 mL) of epinephrine 1 mg/mL or weight-based dosing 0.01 mg/kg (ml/kg)  IM.  Maximum dose 0.5 mg per dose
- Repeat dose in 5 minutes if symptoms not improved

For acute asthma attacks with unsuccessful neb treatment

- Administer 0.15 mg (0.15 mL) of epinephrine 1 mg/mL IM or weight based dosing 0.01 mg/kg (ml/kg) IM.  Maximum dose 0.5 mg per dose

For refractory symptoms (anaphylaxis, severe shock, severe asthma) with concern for imminent respiratory or cardiac arrest

- If symptoms have not improved following administration of two doses of 0.15 mg epinephrine 1 mg/mL IM, consider starting epinephrine infusion.  See Epinephrine Infusion medication reference page
-

**SPECIAL NOTES:**

IM is the initial route of choice for anaphylactic shock and should be administered in the 1 mg/mL concentration.
**Epinephrine 1 mg/mL concentration should never be given intravenously unless appropriately diluted**

## EPINEPHRINE 1 mg/10 mL (ADRENALINE)

**ACTION:** Stimulates both alpha and beta adrenergic receptors; bronchodilator, cardiac stimulator, and peripheral vasoconstrictor

**INDICATIONS:**

- Cardiac arrest rhythms: VF, pulseless VT, asystole, and pulseless electrical activity (PEA)

**CONTRAINDICATIONS:**

- None during cardiac arrest

**PRECAUTIONS:**

- Note the concentration is diluted compared to allergic reaction/asthma dose. This concentration should be given IV/IO
- May precipitate with sodium bicarbonate if tubing is not flushed between drugs

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Arrhythmias and angina
- Headaches and elevated blood pressure
- May induce or exacerbate ventricular ectopy, especially in patients receiving digitalis

**ADMINISTRATION:**

Adult cardiac arrest (V-fib, V-tach, asystole, PEA)

- Administer 1 mg IV/IO push and circulate with CPR.
- Follow drug administration with defibrillation if indicated.
- May repeat 1 mg IV/IO every 3-5 mnutes

For refractory symptoms (anaphylaxis, severe shock, severe asthma) with concern for imminent respiratory or cardiac arrest

- If shock remains following IV fluid boluses or IM epinephrine, begin epinephrine infusion if indicated. See Epinephrine Infusion medication reference page

**PEDIATRIC CONSIDERATIONS:**

Pediatric cardiac arrest

- Refer to the weight based resuscitation tape and administer one dose of 0.01 mg/kg IV/IO push every 3-5 minutes
- Follow drug administration with defibrillation if indicated
- May repeat dose of 0.01 mg/kg IV/IO push every 3-5 minutes

Respiratory Stridor

- Administer 0.5 mg (5 ml) of Epinephrine 1 mg/10 mL via nebulizer

For refractory symptoms (anaphylaxis, severe shock, severe asthma, persistent hypotension, imminent arrest)

- If shock remains despite IV fluid boluses or IM epinephrine, being epinephrine infusion if indicated. See Epinephrine Infusion medication reference page

**SPECIAL NOTES:**

- Epinephrine infusions should only be initiated after contact with a Medical Control Physician.

## EPINEPHRINE Infusion/Push Dose Pressor

**ACTION:** Stimulates both alpha and beta adrenergic receptors; bronchodilator, cardiac stimulator, and peripheral vasoconstrictor

**INDICATIONS:**

- Anaphylaxis with shock
- Hypotension unresponsive to fluid resuscitation
- Symptomatic bradycardia

**CONTRAINDICATIONS:**

- None

**PRECAUTIONS:**

- Take caution in patients >50 years of age or known coronary artery disease as results in increased myocardial demand
- May precipitate with sodium bicarbonate if tubing is not flushed between drugs.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Arrhythmias and angina
- Headaches and elevated blood pressure
- May induce or exacerbate ventricular ectopy, especially in patients receiving digitalis

**ADMINISTRATION:**

Epinephrine Infusion:

- Mix 2 mg of Epi 1 mg/10 mL in 250 NS (2 mg/250 mL = 8 mcg/mL)
- Administer 1-8 mcg/min, titrating BP to SBP >90 mmHg
- Drops per minute with micro gtt set:
  - 7.5 gtt/min = 1 mcg/min
  - 15 gtt/min = 2 mgc/min
  - 30 gtt/min = 4 mcg/min
  - 60 gtt/min = 8 mcg/min

Push Dose Pressor

- Remove 1 mL from saline flush
- Replace discarded saline in syringe with 1 mL (0.1 mg) of epinephrine 1 mg/10 mL making 10 mcg/mL of epi
- Administer 10-20 mcg IV/IO every 3-5 minutes as needed to maintain SBP >90

**PEDIATRIC CONSIDERATIONS:**

Epinephrine Infusion:

- Mix 2 mg of Epi 1 mg/10 mL in 250 NS (2 mg/250 mL = 8 mcg/mL)
- Administer 1-8 mcg/min, titrating BP to SBP >(70 + 2 x Age)
- Drops per minute with micro gtt set:
  - 7.5 gtt/min = 1 mcg/min
  - 15 gtt/min = 2 mgc/min
  - 30 gtt/min = 4 mcg/min
  - 60 gtt/min = 8 mcg/min

Push Dose Pressor

- Remove 1 mL from saline flush
- Replace discarded saline in synringe with 1 mL (0.1 mg) of epinephrine 1 mg/10 mL making 10 mcg/mL of epi
- Administer 10-20 mcg IV/IO every 3-5 minutes as needed to maintain SBP >(70 + 2 x Age)

## ETOMIDATE (AMIDATE)

**ACTION:** Nonbarbiturate hypnotic and general anesthetic without analgesic activity; has a minimal effect on myocardial activity, BP and respirations; onset: 30 – 60 seconds; duration: 3 – 5 min.

**INDICATIONS:**

- For general anesthesia in conjunction with pharmacological paralysis in rapid sequence induction (RSI) in patients who have a systolic BP > 80.

**CONTRAINDICATIONS:**

- Hypersensitivity
- Systolic BP < 80 (adults)

**PRECAUTIONS:**

- Make sure all RSI medications and airway equipment are prepared prior to induction.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Hypotension
- Transient pain at IV site
- Transient clonic jerking of skeletal muscle
- Nausea and/or vomiting
- Hiccoughs
- Laryngospasm
- Transient adrenal suppression (seen mostly with repeat dosing)
- Allergic reactions (rare)

**ADMINISTRATION:**

RSI

- Administer 0.3 mg/kg IV/IO over 30-60 seconds
- Approved simplified adult dosing: Small (20 mg), Medium (25 mg), and Large (30 mg)
- Maintain patent airway, and assist respirations as necessary with BVM and O2.

**PEDIATRIC CONSIDERATIONS:**

- Administer 0.3 mg/kg IV/IO over 30-60 seconds

## FENTANYL (SUBLIMAZE)

**ACTION:** Binds with opiate receptors in the CNS altering the perception of and emotional response to pain.

**INDICATIONS:**

- Musculoskeletal pain
- Burns
- Chest pain
- Sedation of intubated patients

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to Fentanyl

**PRECAUTIONS:**

- Use with caution in asthma, COPD, hepatic or renal disease and bradyarrhythmias.
- Because this drug can decrease respirations, be prepared to assist ventilations and to administer the narcotic antagonist Naloxone (Narcan).
- May cause skeletal and/or thoracic muscle rigidity if given rapidly.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Respiratory depression, apnea, sedation, and confusion
- Bradycardia
- Seizures may occur
- Hypertension or hypotension
- Dry eyes, blurred vision, and vomiting

**ADMINISTRATION:**

Pain Control

- Initial dose: 1 mcg/kg (max single dose 100 mcg) may be administered IV, IO, IN, or IM
- Approved simplified dosing: Small (50 mcg), Medium (75 mcg), and Large (100 mcg)
- May repeat ½ of initial dose every 10 minutes if pain remains uncontrolled, for a total of 3 doses

Sedation

- Same as above

**SPECIAL NOTES:**

- Vital signs must be checked before and after dose.
- If respiratory depression or hypotension occurs after using, ventilate the patient and administer 0.5 mg of naloxone (Narcan) IV/IO push or IN/IM.
- Hospital must be notified when Fentanyl is given, and authorizing physician name must be documented on run form.
- Fentanyl is a controlled substance and its use must be documented according to the “Controlled Substance” policy.
- The maximum fluid volume for IN delivery is 1 mL per nostril. Total dose should be split between both nares, using atomizer, if available. IN route should not be used if a large amount of secretions is present.

**PEDIATRIC CONSIDERATIONS:**

- Intranasal fentanyl is an excellent method of controlling acute musculoskeletal pain in pediatric patients who otherwise do not need vascular access.

# Glucagon

B-IM/Nasal/AutoInj
AIM/Nasal/AutoInj
P-IM/Nasal/AutoInj



**GLUCAGON**

**ACTION:** Antihypoglycemic, converts stored liver glycogen to glucose, resulting in circulating blood sugar

**INDICATIONS:**

- Suspected or known hypoglycemia (BS < 70 mg/dL) in diabetic patents, if symptomatic and IV cannot be established.
- Beta blocker overdose or toxicity; including: acebutolol (Sectral), alprenolol, atenolol (Tenormin), betaxolol (Betoptic, Kerlone), bevantolol, bisoprolol, carteolol (Cartrol), flestolol, labetalol (Normadyne, Trandate), levobumolol (Betagan), metoprolol (Lopressor), nadolol (Corgard), oxprenolol, penbutolol (Levatol), pindolol (Visken), propranolol (Inderal, Blocadren, Timoptic), sofalol, timolol
- Calcium channel blocker overdose or toxicity; including: verapamil (Calan, Isoptin), diltiazem (Cardizem), nifedipine (Procardia, Adalat), nicardipine (Cardene, Vasonase), nimodipine (Nimotop), amlodipine, felodipine, flunarizine, bepridil, isradipine, nisoldapine, nitrendapine

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to glucagon

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Occasional nausea and vomiting

**ADMINISTRATION:**

For hypoglycemia

- Administer 3 mg/kg IV via slow infusion (over 60 sec.)
- When IV access is unavailable, an initial dose of glucagon may be given prior to contact with medical control
- Glucagon comes with one unit (1 mg) of powdered glucagon and 1 ml of diluting solution
- Inject diluting solution into powdered glucagon vial. Shake gently until solution is clear and draw up medication into syringe
- Inject SQ or IM into abdomen, buttocks, thigh or upper arm.
- Turn patient to one side in case vomiting should occur.
- If patient wakes up and is able to swallow, give a fast acting carbohydrate immediately.
- Repeat blood glucose measurement
- Further orders must come from monitoring physician.
- For intranasal, administer 3 mg via package instructions

For beta-blocker or calcium channel blocker overdose or toxicity:

- Administer 2 mg IV or IO if hemodynamic instability is present
- Higher doses may be required, contact a Medical Control Physician for further orders
- Incident of nausea and vomiting is increased with higher doses of glucagon; consider pretreatment with an antiemetic

**PEDIATRIC CONSIDERATIONS:**

For hypoglycemia:

- Administer 0.1 mg/kg (max 1 mg in a single dose) IM/SubQ.

For beta-blocker or calcium channel blocker overdose or toxicity:

- Administer 0.1 mg/kg (max 2 mg in a single dose) IM/SubQ

**SPECIAL NOTES:**

- For conscious patients, simple, oral carbohydrates are most effective
- If the family has already given patient glucagon, a dose may be administered prior to Medical Control Physician contact if still unconscious after 15 minutes.
- All patients whose hypoglycemia is due to oral hypoglycemic agents should be transported.
- Glucagon only works if patient has adequate glycogen stores. In patients with inadequate stores, Dextrose should be

ALS

- For severe hypoglycemia (blood sugar < 40 mg/dL), dextrose IV/IO is treatment of choice

BLS with medication training:

- In the patient with decreased LOC, glucagon is preferred over oral dextrose.
- Services with medication training must have glucometry capabilities

## HYDROMORPHONE (DILAUDID)

**ACTION:** Narcotic analgesic

**INDICATIONS:**

- Musculoskeletal pain
- Burns
- Chest pain of suspected cardiac origin
- Kidney stones
- Sedation after advanced airway management

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to hydromorphone
- Hypotension (systolic BP<90 systolic in adults)

**PRECAUTIONS:**

- Use with caution in asthma, COPD
- Be prepared to assist ventilations and to administer narcotic antagonist (Naloxone) as needed

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Respiratory depression, apnea, sedation, and confusion
- Bradycardia, dry eyes, blurred vision, and vomiting

**ADMINISTRATION:**

Pain Control

- Administer 0.5-1 mg IV/IO/IM slowly. 2 additional doses of 0.5 mg each can be administered if pain management has not been achieved with initial dose. Vital signs must be checked after each dose.
- Approved simplified dosing: Small (0.5 mg), Medium (0.5-1 mg), Large (1 mg)
- If respiratory depression or hypotension occurs after using, ventilate the patient and administer 0.4-1 mg of naloxone IV/IO push. This dose may be repeated every 2-3 minutes if necessary and desired effects are noted

Sedation

- Same as above

**PEDIATRIC CONSIDERATIONS:**

- < 12 years may be given an initial dose of 0.01 mg/kg (max initial dose 0.5 mg) IV/IO/IM on standing order. 2 additional doses may be given every 10 minutes if pain manaPatients gement has not been achieved with initial dose.

## HYDROXOCOBALAMIN (CYANOKIT)

**ACTIONS:** When given IV, hydroxocobalamin binds cyanide ions to form Cyanocobalamin (vitamin B12) which is then excreted in the urine.

**INDICATIONS:**

- Known cyanide poisoning.
- Smoke inhalation victims who show clinical evidence of closed-space smoke exposure (soot in mouth or nose, sooty sputum) and are either comatose, in shock, or in cardiac arrest.

**CONTRAINDICATIONS:**

- None in the prehospital setting.

**PRECAUTIONS:**

- May cause transient elevation of blood pressure.
- Will cause red colored urine (for up to 5 weeks) and red colored skin (for up to 2 weeks). The red color of the blood serum and urine will interfere with colorimetric laboratory tests for several days.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Redness of skin and mucous membranes may be prominently noted.
- Other less common reactions include eadache, dizziness, restlessness, eye irritation, throat irritation, dyspnea, pulmonary edema, chest tightness, hypertension, tachycardia, palpitations, nausea, vomiting, diarrhea, abdominal pain, dysphagia, red urine, and hives.

**ADMINISTRATION:**

- Administer 5 gm IV/IO over 15 min
- The 5 gram Cyanokit consists of 1 vial, with 5 grams of hydroxocobalamin powder. Each 5 g must be reconstituted with 200 mL of Normal Saline.
- Follow full instructions accompanying the CYANOKIT® for preparation and administration, including use of a transfer spike for normal saline addition to the vial(s), rocking, but not shaking the vial for 60 seconds prior to administration, and administering the infusion from the vial(s).

**PEDIATRIC CONSIDERATIONS:**

- Standard pediatric dose is 70 mg/kg (max single dose 5 g). Follow administration procedure as above.

**SPECIAL NOTES:**

- Hydroxocobalamin is incompatible with many other medications, therefore a separate dedicated vascular access site should be obtained and used for the infusion.

## IBUPROFEN (ADVIL)

**ACTION:** Analgesic; Non-Steroidal Anti-Inflammatory Drug (NSAID)

**INDICATIONS:**

- Mild to moderate pain

**CONTRAINDICATIONS:**

- Allergy to aspirin or other non-steroidal anti-inflammatory agents (includes many non-aspirin/non-Tylenol pain relievers such as Advil and Alleve)
- Active GI bleeding
- Aortic dissection
- Kidney disease
- Current use of anti-coagulant or anti-platelet medication

**PRECAUTIONS:**

- Recent internal bleeding (within last 3 months)
- Known bleeding diseases
- Recent surgery
- Possibility of pregnancy
- Allergies to ANY pain medication
- Patients with a history of asthma may take if they have tolerated ASA in the past and are not currently having asthma-related symptoms.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Bleeding

**ADMINISTRATION:**

Pain

- 400-800 mg PO

**PEDIATRIC CONSIDERATIONS:**

Pain

- 10 mg/kg PO-Do not use under 6 months of age

**SPECIAL NOTES:**

- None

## IPRATROPIUM BROMIDE

**ACTION:** Anticholinergic bronchodilator

**INDICATIONS:**

- For relief of acute bronchospasm (reversible airway obstruction) in COPD patients only

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to Atrovent
- Hypersensitivity to atropine (chemically related)

**PRECAUTIONS:**

- Use with caution in patients with heart disease, hypertension, glaucoma and the elderly.
- Ipratropium may worsen the condition of glaucoma if it gets into the eyes. Having the patient close their eyes during nebulization may prevent this.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- More common: cough, dry mouth or unpleasant taste
- Less common or rare: vision changes, eye burning or pain, dizziness, headache, nausea, nervousness, palpitations, sweating, trembling, increased wheezing or dyspnea, chest tightness, rash, hives or facial swelling

**ADMINISTRATION:**

- Place 0.5 mg (2.5 mL) in nebulizer chamber with albuterol and connect nebulizer to oxygen source at 4 to 6 liters per minute (depending on manufacturer).
- Have patient breathe as calmly and deeply as possible until no more mist is found in the nebulizer chamber (5-15 minutes). An acceptable alternative to using the mouthpiece would be to attach the nebulizer reservoir to an oxygen mask, i.e. remove the bag from a non-rebreather nebulizer reservoir and do not use the T-piece or the mouthpiece. If a mask is used, adjust the mask to prevent mist from getting into the patient's eyes.
- One nebulizer treatment with ipratropium bromide may be given to reactive airway disease patients prior to contact with medical control. If further nebulization is indicated, ipratropium bromide may be repeated one time, then albuterol-only nebs should be given.
- In the intubated patient, ipratropium bromide should be administered with an adapter that permits in-line nebulization

**PEDIATRIC CONSIDERATIONS:**

In combination with albuterol, nebulized aerosol is connected to 6–8 liters per minute of oxygen.

- Less than 1 year of age: contraindicated
- Age 1 year but less than 2 years: 0.25 mg (1.25 mL) by nebulized aerosol
- Age 2 and older: 0.5 mg (2.5 mL) by nebulized aerosol
- One ipratropium bromide treatment may be given to children suffering from reactive airway disease prior to contact with medical control. If further nebulization is indicated, albuterol-only nebs should be given.

**SPECIAL NOTES:**

- Nebulizer treatments for patients with active tuberculosis should be performed in well-ventilated areas (outside patient compartment if possible). Providers should use approved respiratory protection.

# KETAMINE (KETALAR)

**ACTION:** Dissociative anesthetic

**INDICATIONS:**

- Induction of anesthesia for RSI procedures
- For pain control as an adjunct to narcotic medications
- For sedation of the intubated patient with a systolic BP < 100
- Control of the aggressive hyperactive delirium or severe agitation patient when an imminent safety threat is posed to providers, bystanders, or patients

**CONTRAINDICATIONS:**

- Patients in whom significant blood pressure elevation would be a serious hazard
- Known hypersensitivity to the drug

**PRECAUTIONS:**

- Emergence reactions occur in approximately 12% of patients. The incidence is least in young patients (< 15 years of age) and the elderly (> 65 years of age). Emergence also occurs less frequently when given IM.
- Use with caution in patients with known cardiac disease or evidence of cardiac strain (STEMI, CHF).
- Monitor vital signs frequently in patients with hypertension.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Hypertension, tachycardia, hypotension, bradycardia, arrhythmia
- Increased intracranial pressure, emergence reaction (vivid imagery, hallucinations, delirium, confusion, excitement, irrational behavior)
- Anorexia, nausea, vomiting, hypersalivation
- Respiratory stimulation, respiratory depression, apnea (after rapid injection), laryngospasm, other airway obstruction.

**ADMINISTRATION:**

<u>For RSI/RSA induction</u>

- Administer 3 mg/kg IV via slow infusion (over 60 sec.)
- Approved simplified dosing: Small (200 mg), Medium (250 mg), Large (300 mg)
-

<u>For sedation of the intubated patient with systolic BP < 100</u>

- Administer 0.5 mg/kg IV/IO/IM, may repeat every 10 minutes on standing orders
- Approved simplified dosing: Small (30 mg), Medium (40 mg), Large (50 mg)
-

<u>For use in controlling aggressive patients who pose an imminent safety threat</u>

- Administer 3 mg/kg mg IM. May repeat x1 if adequate sedation not achieved in 5 minutes
-

<u>For pain control</u>

- Administer 0.1-0.2 mg/kg IV/IO over 1–2 minutes. Maximum single dose 25 mg.
- Reassess in 5–10 minutes. If pain remains moderate to severe, contact medical control before administering a second dose of ketamine

**SPECIAL NOTES:**

- There are multiple concentrations of ketamine available and providers should be aware of which concentrations they are using for each indication
- Ketamine concentrations >50 mg/mL should not be given IV or should be diluted first.
- If an emergence reaction is recognized, administer a dose of a benzodiazepine (midazolam or lorazepam)

# KETOROLAC (TORADOL)

**ACTION:** Analgesic; Non-Steroidal Anti-Inflammatory Drug (NSAID)

**INDICATIONS:**

- Acute Pain, especially musculoskeletal pain and renal colic
- Antipyretic

**CONTRAINDICATIONS:**

- Allergy to aspirin or other non-steroidal anti-inflammatory agents (includes many non-aspirin/non-Tylenol pain relievers such as Advil and Alleve)
- Active GI bleeding
- Aortic dissection
- Kidney disease
- Current use of anti-coagulant or anti-platelet medication

**PRECAUTIONS:**

- Recent internal bleeding (within last 3 months)
- Known bleeding diseases
- Recent surgery
- Possibility of pregnancy
- Allergies to ANY pain medication
- Patients with a history of asthma may take if they have tolerated ASA in the past and are not currently having asthma-related symptoms.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Bleeding

**ADMINISTRATION:**

- Adult Dosing: 15 mg IV/IO x1, 30 mg IM x1
- No repeat dosing

**SPECIAL NOTES:**

- None

# LABETALOL

**ACTION**: Beta-adrenergic blocker

**INDICATIONS:**

- Used alone or in combination with other agents in the management of hypertension
- Management of angina pectoris
- Treatment of hypertension in the setting of acute myocardial infarction.
- Control hypertension in acute CVA (with online medical control approval)

**CONTRAINDICATIONS:**

- Uncompensated congestive heart failure
- Pulmonary edema
- Cardiogenic shock
- Bradycardia or heart block

**PRECAUTIONS:**

- General anesthesia, IV Phenytoin, and Verapamil may cause additive myocardial depression
- May decrease the beta effects of Dopamine or Dobutamine
- Additive bradycardia may occur with digitalis glycosides
- Additive hypotension may occur with other antihypertensives, alcohol or nitrates
- May alter effectiveness of insulin or oral hypoglycemic agents
- May decrease effectiveness of beta-adrenergic bronchodilators.

**ADMINISTRATION:**

- Adult dosing: 10 – 20 mg slow IV push over 1-2 minutes (max adult dose 300 mg)

**SPECIAL NOTES**:

- Use cautiously within 14 days of MAO inhibitor therapy

# LIDOCAINE, XYLOCAINE

**ACTION**: Anesthetic agent

**INDICATIONS:**

- Pain reduction and anesthesia for the conscious patient who has had an intraosseous needle placed
- Symptomatic ventricular dysrhythmias
- Sustained ventricular tachycardia
- Ventricular fibrillation/pulseless ventricular tachycardia

**CONTRAINDICATIONS**:

- Hypersensitivity to lidocaine
- SA, AV, or intraventricular blocks

**ADVERSE REACTIONS/SIDE EFFECTS:**

- CNS effects including seizure
- CV effects including bradycardia

**ADMINISTRATION**:

Anesthesia for IO placement

- Slowly administer 40 mg (max) of 2% preservative free lidocaine into the IO site

Ventricular fibrillation/pulseless ventricular tachycardia

- Administer 1 mg/kg IV/IO. May repeat once at 0.5 mg/kg.

**PEDIATRIC CONSIDERATIONS:**

Anesthesia for IO placement

- Slowly administer 0.5 mg/kg of 2% preservative free lidocaine into the IO site (40 mg max)

Ventricular fibrillation/pulseless ventricular tachycardia

- Administer 1 mg/kg IV/IO.

**Special Considerations:**

- Insertion of the IO in conscious patients has been noted to cause moderate to severe discomfort from fluids flowing into
- the medullary space It is recommended to slowly infuse lidocaine into the site allowing a few minutes for the lidocaine to
- work before pushing the bolus of saline to clear the site.

## LORAZEPAM (ATIVAN)

**ACTION:** Enhances inhibitory neurotransmitter GABA at CNS; produces anxiolytic, muscle relaxant, anticonvulsant, sedative, and antiemetic effect.

**INDICATIONS:**

- Anxiety
- Seizure control
-

**CONTRAINDICATIONS:**

- Pre-existing CNS depression
- Narrow-angle glaucoma
- Severe uncontrolled pain
- Severe hypotension
- Pregnancy (unless actively seizing)

**PRECAUTIONS:**

- Renal or hepatic impairment
- Compromised pulmonary function
- Concomitant CNS depressant use

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Drowsiness
- Confusion
- Blurred vision
- Slurred speech
- Hypotension
- Headache

**ADMINISTRATION:**

Anxiety

- Administer 1-2 mg IV/IO. Contact Medical Control for additional doses.
- Controlling aggressive patients who pose an imminent safety threat:
- Administer 0.05 mg/kg IV/IO/IM. If additional sedation required, consider using midazolam

Seizure control

- Administer 2 mg IV/IO. May repeat 2 mg if no effect seen 5 minutes after initial administration. Max 4 mg may be given, then contact Medical Control for additional doses.

**PEDIATRIC CONSIDERATIONS:**

For anxiety

- Administer 0.05 mg/kg IV/IO to a maximum dose of 2 mg.

For seizure control

- Administer 0.1 mg/kg IV/IO (max single dose 2 mg) every 3-5 minutes to a maximum dose of 4 mg. Contact Medical Control for additional doses.

## MAGNESIUM SULFATE

**ACTION:** Electrolyte; central nervous system depressant; anticonvulsant; antiarrhythmic

**INDICATIONS:**

- Torsades de pointes
- Severe asthma
- Obstetrical: to resolve seizures associated with eclampsia; contractions in premature labor
- Digitalis toxicity
- Tricyclic overdose

**CONTRAINDICATIONS:**

- Heart block
- Shock
- Hypocalcaemia
- Renal disease
- Hypermagnesemia

**PRECAUTIONS:**

- Be prepared to give calcium chloride if respiratory depression occurs.
- Use with caution in renal failure.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Dizziness or drowsiness; altered level of consciousness
- Respiratory depression
- Hypotension (from rapid administration)
- Arrhythmias

**ADMINISTRATION:**

- If respiratory depression develops after administration, consult with medical control physician regarding calcium chloride administration.

<u>For severe asthma, QTc>500 or Torsades de pointes</u>

- Administer 2 gm (4 cc of a 50% solution) diluted in 10 cc of NS and administer by slow IV/IO.

<u>For eclampsia</u>

- Administer 4 grams of magnesium sulfate diluted in 10cc NS over 2-3 minutes before contacting Medical Control Physician

**PEDIATRIC CONSIDERATIONS:**

- Do not give to patients < 12 years without Medical Control Physician order.
- Initial dose is 40 mg/kg IV or IO diluted in 10 cc of NS and administered over 10 minutes. Max initial dose of 2 grams

## METHYLPREDNISOLONE (SOLUMEDROL)

**ACTIONS:** Anti-inflammatory

**INDICATIONS:**

- Allergic Reactions
- Reactive Airway Diseases
- Adrenocortical Insufficiency

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to methylprednisolone

**PRECAUTIONS:**

- Transient rise in blood pressure is possible due to electrolyte and water retention
- Use extreme caution in patient's with acute myocardial infarction

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Agitation/Anxiety
- Increased thirst/hunger
- Weight gain

**ADMINISTRATION:**

- 125 mg IV/IO,

**PEDIATRIC CONSIDERATIONS**:

- 1 mg/kg IV/IO, with maximum dose of 125 mg

**SPECIAL NOTES:**

- None

## METOCLOPRAMIDE (REGLAN)

**ACTION:** Anti-emetic

**INDICATIONS:**
- Nausea
- Gastroparesis

**CONTRAINDICATIONS:**
- Parkinson's disease
- Hypersensitivity to metoclopramide
- Mechanical obstruction

**PRECAUTIONS:**
- The effects of metoclopramide on gastrointestinal motility are antagonized by anticholinergic drugs and narcotic analgesics
- Additive sedative effects can occur when metoclopramide is given with alcohol, sedatives, hypnotics, narcotics, or tranquilizers.

**ADMINISTRATION:**
- Adult dosing: 10 mg slow IV push over 2 minutes every 6 hours

**PEDIATRIC CONSIDERATIONS:**
- Pediatric dosing: 0.1-0.2 mg/kg slow IV push every 6 hours. Max initial dose of 10 mg

**SPECIAL NOTES:**
- Extra-pyramidal symptoms may be treated by administering diphenhydramine 50 mg IV (Peds: 1 mg/kg, max 50 mg) over 2 minutes

## METOPROLOL (LOPRESSOR)

**ACTION**: Beta-adrenergic blocker

**INDICATIONS:**

- Used alone or in combination with other agents in the management of hypertension or tachycardia
- Management of angina pectoris
- Treatment of hypertension in the setting of acute myocardial infarction.

**CONTRAINDICATIONS:**

- Uncompensated congestive heart failure
- Pulmonary edema
- Cardiogenic shock
- Bradycardia or heart block
- Recent cocaine use

**PRECAUTIONS:**

- General anesthesia, IV Phenytoin, and Verapamil may cause additive myocardial depression
- May decrease the beta effects of Dopamine or Dobutamine
- Additive bradycardia may occur with digitalis glycosides
- Additive hypotension may occur with other antihypertensives, alcohol or nitrates
- May alter effectiveness of insulin or oral hypoglycemic agents
- May decrease effectiveness of beta-adrenergic bronchodilators.

**ADMINISTRATION:**

- Adult dosing: 2.5 – 5 mg slow IV push over 2 minutes, may repeat every 5 minutes as needed (max 15 mg)

**PEDIATRIC CONSIDERATIONS:**

- Pediatric administration not indicated

**SPECIAL NOTES:**

- Use cautiously within 14 days of MAO inhibitor therapy

# MIDAZOLAM (VERSED)

**ACTIONS:** Sedative/hypnotic; provides conscious sedation/amnesia; anticonvulsant

**INDICATIONS:**

- Sedation of the intubated patient or for procedures such as transcutaneous pacing or cardioversion
- Status seizures
- Combative behavior that compromises patient care
- Anxiety associated with trauma and burns
- Induction for RSI (Note: this is a not recommended as first line agent)

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to midazolam or benzodiazepines
- Pregnancy (unless actively seizing)
- Sustained SBP < 90 mm Hg

**PRECAUTIONS:**

- Be prepared to ventilate the patient and support cardiovascular system.
- Use with caution when used concomitantly with narcotics, EtOH, or any other CNS depressant.
- Obtain physician order before administering to any patient with hypotension (BP < 90 systolic).

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Headache
- May cause mental, respiratory and cardiovascular depression
- Arrhythmias; cardiac arrest
- Hypotension

**ADMINISTRATION:**

Transcutaneous Pacing and Cardioversion

- 2 mg IV/IO/IN (1/2 dose in each nostril)

Post-intubation sedation

- 0.05 mg/kg IV/IO initial dose, may repeat 1-2 mg every 5-10 minutes as needed
- Approved simplified dosing: Small (2 mg), Medium (2-5 mg), Large (5 mg)

Status seizures

- 2 mg IV/IO/IN, may repeat every 3-5 minutes until cessation of seizure activity. Max total dose 10 mg.
- Contact Medical Control Physician for further orders

Anxiety or agitation

- 1-2 mg IV/IO/IN

Induction of RSI

- 5-10 mg IV/IO/IN

**PEDIATRIC CONSIDERATIONS**:

- Dosage listed on the Broselow tape is an induction dose (0.3 mg/kg) and is not for seizures.

Transcutaneous Pacing and Cardioversion

- 0.1 – 0.2 mg/kg (max dose = 5 mg) IV/IO/IN

Post-intubation sedation

- 0.05 mg/kg IV/IO, may repeat every 10 minutes as needed, no max

Status seizures

- 0.1 – 0.2 mg/kg (max dose = 5 mg) IV/IO or 0.2 mg/kg (max dose = 5 mg) intranasal

Anxiety or agitation

- 0.05 mg/kg (max dose = 2 mg) IV/IO or 0.1 mg/kg (max dose = 2 mg) intranasal

**SPECIAL NOTES:**

- Midazolam is a controlled substance and its use must be documented according to the "Controlled Substance" policy.
- Patients being paced may tolerate procedures without sedation. Administer only if indicated.

## MORPHINE SULFATE

**ACTION:** Narcotic analgesic; increases venous capacity and decreases systemic vascular resistance

**INDICATIONS:**

- Chest pain of suspected cardiac origin
- Musculoskeletal pain
- Kidney stones
- Pulmonary edema
- Burns

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to morphine sulfate
- Hypotension (systolic BP < 90 systolic in adults)

**PRECAUTIONS:**

- Use with caution in asthma and COPD.
- Be prepared to assist ventilations and to administer the narcotic antagonist naloxone (Narcan).

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Respiratory depression, hypotension, sedation, and confusion
- Bradycardia, dry eyes, blurred vision, and vomiting

**ADMINISTRATION:**

For pain control or post intubation sedation:

- Administer 0.1 mg/kg (max initial dose = 8 mg) IV/IO slowly.
- 2 additional doses of 2-4 mg each can be administered if pain management has not been achieved with initial dose. Vital signs must be checked after each dose.
- Approved simplified dosing: Small (4 mg), Medium (6 mg), Large (8 mg)
- If respiratory depression or hypotension occurs after using, ventilate the patient and administer 0.4 - 1 mg of naloxone
- (Narcan) IV/IO push or IN. This dose may be repeated every 2 - 3 minutes if necessary and desired effects are noted.
- Hospital must be notified when morphine is given, and authorizing physician's name must be documented on run form.

**PEDIATRIC CONSIDERATIONS:**

For pain control or post intubation sedation:

- Administer 0.05 mg/kg (max initial dose 5 mg) IV/IO
- Two additional half doses may be given every 10 minutes if pain management has not been achieved with initial dose.

SPECIAL NOTES:

- Morphine is a controlled substance and its use must be documented according to the "Controlled Substance" policy..

## NALOXONE (NARCAN)

**ACTION:** Narcotic antagonist

**INDICATIONS:**

- Respiratory depression (< 10/min.) from narcotic overdoses such as: morphine (Roxanol, Duramorph), fentanyl, meperidine (Demerol), heroin, codeine, hydrocodone (Vicodin, Vicoprofen, Norco), oxycodone (Percodan, Percocet, OxyContin), oxymorphone (Numorphan), hydromorphone (Dilaudid), diphenoxylate (Lomotil), propoxyphene (Darvon, Darvocet), and pentazocine (Talwin)
- As a diagnostic tool in coma of unknown origin
- Pinpoint pupils, suspected overdose from narcotics

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to Naloxone

**PRECAUTIONS:**

- Short half-life; monitor patient closely and prepare to re-dose if deterioration occurs.
- **Naloxone should be titrated to the patient's respiratory status, not the level of consciousness**. In the patient with a protected airway (i.e. gag reflex, or advanced airway present), adequate respirations, and GCS of 10 - 14, use discretion regarding the administration of naloxone.
- Patient restraints may be required following reversal of some narcotics. Consider applying these prior to the administration of naloxone.
- IN naloxone does not always work, and is less likely to be effective in someone who is inhaling vasoconstrictors (cocaine, meth).

**ADVERSE REACTIONS/SIDE EFFECTS:**

- In the chronic narcotic abuser, may precipitate withdrawal symptoms, including seizures, violent behavior, nausea/ vomiting, miscarriage or premature labor.
- Hypotension or hypertension

**ADMINISTRATION:**

Respiratory depression from narcotic overdose

- Administer 0.4 – 2 mg IV/IO, titrate to effect
- Administer 0.4 – 4 mg IN, titrate to effect

**PEDIATRIC CONSIDERATIONS:**

Respiratory depression from narcotic overdose

- Administer 0.1 mg (max 2 mg) IV/IO/IN, titrate to effect

**SPECIAL NOTES:**

- Follow-up dosing will generally be 1-2 mg every 2-3 minutes up to a total 4 Mg.
- If no response after 10 mg, it is unlikely to be effective.
- Remarkably safe and effective
- The maximum fluid volume for IN delivery is 1 mL per nostril. Total dose should be split the dose between both nares, using atomizer, if available. IN route should not be used if a large amount of secretions is present.

## NITROGLYCERINE (NITRO-BID, NITRO-DUR, IMDUR, NITROL)

**ACTION:** Antianginal, coronary and peripheral vasodilator

**INDICATIONS:**

- Chest pain of suspected cardiac origin
- Pulmonary edema
- Hypertension (only on physician order)

**CONTRAINDICATIONS:**

- Allergy or known hypersensitivity to nitroglycerin
- Head trauma
- Hypovolemia, hypotension (BP < 90 systolic in adults), and shock
- Recent sildenafil [Viagra, Levitra (24 hrs.) or Cialis (48 hrs.)] ingestion

**PRECAUTIONS:**

- BLS: May be administered only to patients for whom it is prescribed.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Headache, dizziness, and weakness
- Tachycardia, fainting, and hypotension

**ADMINISTRATION:**

- Establish IV NS TKO.
- Inquire about Viagra, Levitra or Cialis use.

BLS

- Assist patient in taking nitroglycerine as prescribed by personal physician.
- If systolic BP drops < 90 after any nitroglycerine, discontinue nitroglycerine and administer a 250 cc fluid bolus if appropriately trained.

ALS: For myocardial ischemia or pulmonary edema:

- Give 0.4 mg nitroglycerine tablet or one metered dose NITROGLYCERINE spray sublingually. Repeat vitals.
- Repeat tablet or spray sublingually every 5 minutes as long as pain or pulmonary edema persists and patient is not hypotensive, regardless if patient has taken own prescription.
- Notify medical control that nitroglycerine has been given.

ALS: CHF/Pulmonary Edema

- If SBP ≥ 140 give 0.4 mg nitroglycerine SL every 3-5 min to patient response.

ALS: For hypertension

- Obtain physician order.

**PEDIATRIC CONSIDERATIONS:**

- Do not give to patients < 12 years without physician order.

**SPECIAL NOTES:**

- Consider utilizing the age-appropriate pain control guideline if pain is unrelieved by nitroglycerin.
- Nitroglycerin is effective in relieving angina pectoris. Other conditions such as esophageal spasm can respond as well, thus improvement of symptoms following nitroglycerin administration is not necessarily diagnostic of cardiac ischemia
- Use caution in/avoid nitroglycerin use in patients with inferior MI on 12 lead EKG as they are preload dependent and nitroglycerin decreases preload, which may cause patient to become more hypotensive

## NOREPINEPHRINE (LEVOPHED)

**ACTION:** Stimulates dopaminergic, $\alpha_1$-adrenergic, and β-adrenergic receptors in a dose-related fashion; inotropic, vasopressor; increases BP and cardiac output, and improves blood flow through the kidneys

**INDICATIONS:**

- Symptomatic hypotension in the absence of hypovolemia
- Symptomatic bradycardia that is unresponsive to atropine therapy

**CONTRAINDICATIONS:**

- Hypotension due to hypovolemia
- The presence of any type of vascular thrombosis

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Arrhythmias (supraventricular or ventricular tachycardia), palpitations and chest pain
- Dyspnea
- Hypotension
- Dilated pupils
- Tissue necrosis at IV site

**ADMINISTRATION:**

- Inject 4 mg norepinephrine glass ampule into 250 ml $D_5W$ or NS bags (16 mcg/ml). May infuse 4 – 30 mcg/min (0.05-2 mcg/kg/min) titrated to satisfactory hemodynamic performance prior to medical control contact.
- When administering a norepinephrine infusion, 60 gtt tubing should be used.

For 4 mg norepinephrine in 250 ml $D_5W$/NS bags (16 mcg/ml) using 60 gtt tubing set

| **gtt/min** | **mcg/min** |
|---|---|
| 9 gtts/min | 19 gtts/min |
| 11 gtts/min | 22 gtts/min |
| 13 gtts/min | 26 gtts/min |
| 15 gtts/min | 30 gtts/min |
| 17 gtts/min | 34 gtts/min |
| 19 gtts/min | 37 gtts/min |
| 21 gtts/min | 41 gtts/min |
| 23 gtts/min | 45 gtts/min |

Manual drip rate calculation

- **Dose (mg/hr) = [desired mcg / 1000] X 60**
- **Volume (mL/hr) = (dose x 250 mL) / 4 mg** *(Dose is mg/hr from previous calculation)*
- Drip rate (gtt/min) is the same as volume (mL/hr) if 60 gtt tubing set is used.
- If a different tubing set is used, multiple the volume (mL/hr) value by the tubing set drip factor and divide by 60 to get drips per minute.

**PEDIATRIC CONSIDERATIONS:**

- May infuse 0.1 micrograms/kg/min titrated to satisfactory hemodynamic performance prior to medical control contact. Maximum of 0.5 mcg/kg/min prior to medical control contact

**SPECIAL NOTES:**

- If infiltration occurs, discontinue medication and notify physician at receiving hospital immediately upon arrival so that antidotal therapy can begin immediately.

## ONDANSETRON (ZOFRAN)

**ACTION:** Antinausea, antiemetic. Blocks serotonin, both peripherally on vagal nerve terminals and centrally in chemoreceptor trigger zone.

**INDICATIONS:**

- Patients experiencing nausea or vomiting

**PRECAUTIONS:**

- Use with caution in setting of prolonged QT interval

**CONTRAINDICATIONS:**

- There are no absolute contraindications to the use of Zofran.

**ADVERSE EVENTS**

- Overdose may produce a combination of CNS stimulation or depressant effects.
- QT interval prolongation

**SIDE EFFECTS**

- Frequent: Anxiety, dizziness, drowsiness, headache, fatigue, constipation, diarrhea, hypoxia, and urinary retention.
- Occasional: Abdominal pain, fever, feeling of cold, paresthesia, weakness, headache
- Rarely: hypersensitivity reaction, blurred vision, QT prolongation

**ADMINISTRATION:**

- Administer 4 mg IV/IO/IM/PO push over 2-5 minutes. May repeat x1 if no improvement in 10 minutes
- Monitor patient for vomiting and potential airway compromise.

**PEDIATRIC CONSIDERATIONS:**

- Pediatric dose is 0.15 mg/kg (max dose = 8 mg). May repeat x1 if no improvement in 15 minutes

**SPECIAL CONSIDERATIONS:**

- The IV formulation of zofran can be given orally and is very effective, especially in infants and young children. It can be mixed with juice to improve the likelihood of ingestion.

## OXYGEN

**ACTION:** Increases arterial oxygen tension ($SaO_2$) and hemoglobin saturation

**INDICATIONS:**

- Pre-existing baseline oxygen needs
- Smoke, carbon monoxide, or toxic gas inhalation
- Hypoxia ($SpO_2$ < 94%) from any cause
- Respiratory distress, poor capillary refill or other indications of poor oxygenation
- Unresponsive patient
- Obstetric patients with known or suspected complications

**CONTRAINDICATIONS:**

- None in the prehospital setting

**PRECAUTIONS:**

- This guideline refers to spontaneously breathing and adequately ventilating patients only.
- High concentration $0_2$ in some cases (emphysema and asthma) may depress respiratory drive; be prepared to assist ventilation, but don't allow patients to become severely hypoxic for fear of respiratory arrest.
- Agitation or restlessness can be a sign of hypoxia.
- Do not use in the presence of open flames.
- Treatment for anxiety or hyperventilation should be directed at reassurance and coaching to slow breathing prior to oxygen administration. If the possibility of another underlying cause exists (i.e. pulmonary embolus, asthma, MI) then the patient should be treated with oxygen. DO NOT treat any patient by having them breathe into a paper bag or $O_2$ mask that is not supplied with $O_2$.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Nonhumidified oxygen can dry mucous membranes, but humidified $O_2$ is not indicated in the prehospital setting.

**ADMINISTRATION:**

- Deliver via nasal cannula @ 2 - 6 lpm or non-rebreather mask @ 10 - 15 lpm as condition warrants.
- Humidified oxygen should be considered for epiglottitis and non-traumatic nose bleed
- High flow nasal cannula (30-60 L/min in adults, 0.5-2 L/kg/min in pediatrics)-*See special notes*
- Attempt to obtain and document pulse oximetry readings before and during oxygen therapy.

**PEDIATRIC CONSIDERATIONS:**

- Use pediatric mask or blow-by if mask is not tolerated.

**SPECIAL NOTES:**

- If oximetry is unavailable, patients should receive oxygen if suspicion of hypoxia or poor perfusion.
- If delivering oxygen via high flow nasal cannula, make sure to consider overall available oxygen supply, freezing of supply lines under extended use, and provider competency with high flow devices.

## PROCHLORPERAZINE (COMPAZINE)

**ACTION:** Antiemetic

**INDICATIONS:**
- Nausea/vomiting
- Migraine headache

**CONTRAINDICATIONS:**
- Hypersensitivity
- Comatose patients
- Patients that have received large amounts of CNS depressants
- Do not use in pediatric patients under 2 years of age or under 20 lbs.

**PRECAUTIONS:**
- Use caution when administering with other anti-psychotic or dopaminergic medications.

**ADMINISTRATION:**
- Adult dosing: 5 – 10 mg slow IV push over 2 minutes, every 4 hours as needed

**PEDIATRIC CONSIDERATIONS:**
- Administer 0.1-0.15 mg/kg with max one time dose of 2.5 mg. May repeat once in 15 minutes.
- Use caution in pediatric patients as they are more prone to extrapyramidal symptoms from prochlorperazine use

**SPECIAL NOTES:**
- May potentiate the effects of narcotics, sedatives, hypnotics, and alcohol
- Extra-pyramidal symptoms may be treated by administering diphenhydramine 50 mg IV over 2 minutes

## PROMETHAZINE (PHENERGAN)

**ACTION**: Anti-emetic

**INDICATIONS:**
- Treatment and prevention of nausea and vomiting

**CONTRAINDICATIONS:**
- Hypersensitivity to phenothiazines
- Comatose patients
- CNS depression due to drugs
- Children < 2yrs old, or critically ill or dehydrated
- Lactation

**PRECAUTIONS:**
- CNS depressants -may increase, prolong or intensify the sedative action
- Anticholinergics - use caution
- MAO inhibitors - use caution.

**ADMINISTRATION:**
- Adult dosing: 12.5 – 25 mg IM every 4 hours as needed.

**PEDIATRIC CONSIDERATIONS:**
- Pediatric dosing: > 2 years: 0.25 – 1 mg/kg (max 25 mg) PO/IM. Administer only once
- Not indicated for patients <2 years old

**SPECIAL NOTES:**
- Use cautiously in patients with hypertension, epilepsy, sleep apnea, cardiovascular disease, impairment of the liver, and pregnancy
- May caused marked drowsiness.
- Black Box Warning [US Boxed Warning]: Promethazine injection can cause severe tissue injury (including gangrene) regardless of the route of administration. Tissue irritation and damage may result from perivascular extravasation, unintentional intra-arterial administration, and intraneuronal or perineuronal infiltration. In addition to gangrene, adverse events reported include tissue necrosis, abscesses, burning, pain, erythema, edema, severe spasm of distal vessels, phlebitis, thrombophlebitis, venous thrombosis, sensory loss, paralysis, and palsies. Surgical intervention including fasciotomy, skin graft, and/or amputation have been necessary in some cases. Therefore the preferred method of administration is IM only.

## PROPARACAINE (OPTHANE, ALACANE)

**ACTION:** Topical ophthalmic anesthetic

**INDICATIONS:**

- Suspected corneal abrasion
- Burns to the eye
- Foreign body in eye

**CONTRAINDICATIONS:**

- Hypersensitivity
- Ruptured globe

**PRECAUTIONS:**

- The patient should never be allowed to rub or touch eyes.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Transient burning or stinging sensation

**ADMINISTRATION:**

- 1-2 drops in each affected eye, do NOT touch tip of dropper to affected eye.
- May repeat every 15 minutes

**PEDIATRIC CONSIDERATIONS:**

- Administer 1-2 drops in each affected eye; may repeat every 15 minutes as needed.

**SPECIAL CONSIDERATIONS:**

- Patient should be transported if this medication has been given. If patient refuses transportation by ambulance, explain that they need to have additional medical care and need to be seen at an emergency department.
- Do not give the remaining medication to the patient for later use. Repeated use of topical eye anesthetics can result in delayed healing and infection.
- Solution must be kept refrigerated prior to use.
- Solution must be clear. If solution is yellow, do not use.

## RACEMIC EPINEPHRINE (ASTHMANEFRIN)

**ACTION:** Elicits agonistic action on alpha, beta-2, and beta-2 receptors resulting in bronchial smooth muscle relaxation, cardiac stimulation, skeletal muscle vasodilation, and stimulates glycogenolysis in the liver.

**INDICATIONS:**

- Croup
- Asthma

**CONTRAINDICATIONS:**

- Epiglottitis
- Coadministration with MAOIs (mono amine oxidase inhibitors)

**PRECAUTIONS:**

- Careful administration in patients with heart disease

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Tachycardia
- Headache
- Nausea
- Anxiety

**ADMINISTRATION:**

- 0.5 mg Racemic Epinephrine mixed with 3 mL of Normal Saline, nebulized at 6-8 lpm over 15 minutes.

**PEDIATRIC CONSIDERATIONS:**

- Blow by nebulizer recommended, monitor vital signs and lung sounds.

**SPECIAL CONSIDERATIONS:**

- Solution must be kept refrigerated prior to use.
- Solution must be clear. If solution is yellow, brown, pink, or contains a precipitate - do not use.

## ROCURONIUM BROMIDE (ZEMURON)

**ACTION:** Non-depolarizing neuromuscular blocking agent; onset: 1 - 2 min.; duration: 30 – 40 min; paralysis onset decreases and duration of maximal effect increases with increasing doses

**INDICATIONS:**
- When further muscle paralysis is necessary following RSI
- Head injuries with agitation or uncontrolled motor activity that may threaten the airway or spine, or increase intracranial pressure
- As an initial paralytic when succinylcholine is contraindicated

**CONTRAINDICATIONS:**
- Hypersensitivity
- Concern for inability to provide appropriate airway management

**PRECAUTIONS:**
- Clinicians must provide total ventilatory support after rocuronium has been administered.
- The safety of this drug in pregnancy has not been established.
- Measures to control anxiety (i.e. Versed) and pain must be utilized for the patient receiving paralytics.

**ADVERSE REACTIONS/SIDE EFFECTS:**
- Prolonged apnea/respiratory paralysis
- Inability to perform adequate neurological exam
- Quinidine, magnesium and certain antibiotics may intensify paralysis.

**ADMINISTRATION:**
- Must be refrigerated
- Administer 1 mg/kg IV/IO.
- Approved simplified dosing: Small (60 mg), Medium (80 mg), Large (100 mg)
- May be given on standing order if further paralysis is needed following intubation.

**PEDIATRIC CONSIDERATIONS:**
- Administer 1 mg/kg.
- May be given on standing order if further paralysis is needed following intubation.

## SODIUM BICARBONATE

**ACTION:** Systemic hydrogen ion buffer; aids in the correction of metabolic acidosis

**INDICATIONS:**

- Tissue acidosis and acidemia resulting from cardiac arrest and cardiopulmonary resuscitation
- Pre-existing metabolic acidosis or hyperkalemia
- Hyperactive delirium associated with cocaine or methamphetamine use
- QRS widening due to ingestion of a substance with sodium channel blockade properties
- Prophylaxis for systemic acidemia prior to extrication following prolonged entrapment with crush injury

**CONTRAINDICATIONS:**

- None; when used in the treatment of metabolic acidosis

**PRECAUTIONS:**

- $EtCO_2$ readings will temporarily elevate following administration of sodium bicarbonate. In cardiac arrest, this does not necessarily imply that tissues have adequate metabolic function.
- May precipitate with concurrent administration of other medications. Flush tubing well between administrations of other drugs.

**ADVERSE REACTIONS/SIDE EFFECTS:**

- May cause hypernatremia, hyperosmolality, hypokalemia, and hypocalcaemia
- Fluid retention

**ADMINISTRATION:**

For tricyclic overdose

- If bradyarrhythmias, multifocal PVC's, V-tach, hypotension, or widened QRS (>100 ms) are present, administer 2 amps (100 mEq) IV/IO of sodium bicarbonate. Administer an additional 50 mEq (1 ampule) every 5 minutes until QRS narrows to < 100 ms.

For crush syndrome or prolonged entrapment

- Administer 2 amps (100 mEq) IV/IO immediately prior to extrication.
- Ensure adequate IV fluid hydration has been initiated.

For hyperactive delirium symptoms

- Administer 2 amps (100 mEq) IV/IO once patient has been safely restrained and vascular access has been obtained.
- Ensure adequate IV fluid hydration has been initiated.

**PEDIATRIC CONSIDERATIONS:**

- Initial dose is 1.0 mEq/kg IV/IO.
- Repeated doses are 0.5 mEq/kg IV/IO.

**SPECIAL NOTES:**

- In cardiac arrests of short duration, adequate ventilation and effective chest compressions limit accumulation of $CO_2$, thus, in the early phases of resuscitation, buffer agents are generally unnecessary.
- DO NOT mix with calcium chloride/gluconate. In the presence of calcium chloride/gluconate, it will precipitate calcium salts or carbonates.

## SUCCINYLCHOLINE (ANECTINE)

**ACTION:** Depolarizing neuromuscular block; onset: 30 – 60 seconds (peak 2 – 3 min.); duration: 3 – 10 min.

**INDICATIONS:**
- When rapid muscle paralysis is necessary to facilitate emergency advanced airway placement

**CONTRAINDICATIONS:**
- Hypersensitivity
- Neuromuscular disease - (i.e. ALS, chronic para/quadriplegia, myasthenia gravis, multiple sclerosis, muscular dystrophy)
- Hyperkalemia
- Penetrating eye injury
- History of malignant hyperthermia
- Burns, multiple traumatic and soft tissue injuries > 24 hours old
- Acute or chronic renal failure with K+ > 5.0 mEq/L
- Suspected or known fractured larynx that prevents proper performance of Selleck's maneuver
- Known anatomical airway anomalies
- Increased intraocular pressure (relative contraindication)

**PRECAUTIONS:**
- Make sure all RSI medications are prepared prior to induction.
- Pre-oxygenate the patient as much as possible.
- Must be prepared to intubate the patient immediately. An alternative method of ventilation (BVM with 100% O2) must be available.
- Have an assistant prepare to perform Selleck's maneuver to prevent regurgitation/aspiration.
- Be prepared to treat arrhythmias appropriately according to ACLS protocols.
- Measures to control anxiety (i.e. Versed) and pain must be utilized for the patient receiving paralytics.

**ADVERSE REACTIONS/SIDE EFFECTS:**
- Dysrhythmias
- Prolonged apnea, respiratory depression, or bronchospasm
- Malignant hyperthermia (rare)
- Increase in serum potassium
- Increased intracranial pressure (ICP)
- Inability to perform adequate neurological exam

**ADMINISTRATION:**
- Administer 1.5 mg/kg IV/IO in adults.
- Approved simplified dosing: Small (100 mg), Medium (150 mg), Large (200 mg)
- Continuous $SpO_2$ monitoring and BP monitoring must be utilized and documented.
- If additional paralysis is needed consider Rocuronium.
- If consistent and dramatic rise in temperature is observed, utilize whatever means available to lower the patient's body temperature. Open external windows (weather permitting) or turn on air conditioning. Apply cold packs to the patient. Notify medical control and the receiving physician of the occurrence.
- If transport distance to the receiving facility is significant (>10 minutes), the crew may elect to divert to the closest facility that has the antidote to treat malignant hypothermia (dantrolene).

**PEDIATRIC CONSIDERATIONS:**
- Initial dose is 2.0 mg/kg IV/IO.

**SPECIAL NOTES:**
- If succinylcholine is contraindicated, Rocuronium should be considered.

## TRANEXAMIC ACID (TXA)

**ACTION:** Forms a reversible complex that displaces plasminogen from fibrin resulting in inhibition of fibrinolysis, also inhibits the proteolytic activity of plasmin

**INDICATIONS:**
- Concern for closed head injury/traumatic brain injury
- Age: >18 years and the following:
- Signs and symptoms consistent with severe hemorrhage (internal or external)
  - -Hemodynamic instability in the setting of hemorrhagic shock:
    - -SBP <90 mmHg
    - -Pulse rate >110 bpm
    - -Tachypnea >24 breaths per min
    - -Evidence of peripheral vasoconstriction including cool, pale skin and delayed capillary refill or >2 sec
  - -Medical staff can consult with medical control for those patients who may benefit from this medication including impending hemodynamic instability
- Duration since the time of initial injury is less than 180 min (3 hours). Prefer <60 min from initial traumatic insult

**CONTRAINDICATIONS:**
- Hypersensitivity
- Time from initial traumatic insult >180 min or unknown time of injury
- Patients who have contraindication to antifibrinolytic therapy agents
- Medical control discretion

**PRECAUTIONS:**
- May cause CNS depression
- Visual defects (color vision change, visual loss) and retinal venous and arterial occlusions have been reported. Discontinue if ocular changes occur
- Seizure history
- Venous and arterial thrombosis or thromboembolism

**ADVERSE REACTIONS/SIDE EFFECTS:**
- Hypotension (with rapid IV injection
- Allergic dermatitis
- Diarrhea, nausea, and vomiting
- Blurred vision

**ADMINISTRATION:**
- Treat any life-threatening injuries
- If the patient remains hemodynamically unstable and it is suspected that the patient will continue to require aggressive colloid administration in the next 24 hours, administer Tranexamic Acid loading dose initial bolus of 1g/100 ml NS over 10 min IV.
- Maintenance dose 1 g/500 ml. Infusing at 60 ml/hr for total infusion of 8 hours
- During initial report to receiving facility and at transition of care, report of time of injury, time of TXA loading dose, and time of maintenance infusion started should be given.

**SPECIAL NOTES:**
- None

## VECURONIUM (NORCURON)

**ACTION**: Non-depolarizing neuromuscular blocking agent; onset: 2–4 minutes and generally lasts 25–40 minutes; paralysis onset decreases and duration of maximal effect increases with increasing doses

**INDICATIONS:**

- When further muscle paralysis is necessary following RSI
- Head injuries with agitation or uncontrolled motor activity that may threaten the airway or spine, or increase intracranial pressure
- As an initial paralytic when succinylcholine is contraindicated

**CONTRAINDICATIONS:**

- Hypersensitivity
- Concern for inability to provide appropriate airway management

**PRECAUTIONS:**

- Clinicians must provide total ventilatory support after rocuronium has been administered.
- The safety of this drug in pregnancy has not been established.
- Measures to control anxiety (i.e. Midazolam) and pain must be utilized for the patient receiving paralytics

**ADVERSE REACTIONS/SIDE EFFECTS:**

- Prolonged apnea/respiratory paralysis
- Inability to perform adequate neurological exam
- Quinidine, magnesium and certain antibiotics may intensify paralysis

**ADMINISTRATION:**

- Administer 0.1 mg/kg IV/IO.
- Approved simplified dosing: Small (6 mg), Medium (8 mg), Large (10 mg)
- May be given on standing order if further paralysis is needed following intubation.

**PEDIATRIC CONSIDERATIONS:**

- Administer 0.1 mg/kg.
- May be given on standing order if further paralysis is needed following intubation.

## PROCEDURE TABLE OF CONTENTS

# AUTOMATED EXTERNAL DEFIBRILLATION (AED)

**INDICATIONS**

1. Patients in cardiac arrest (pulseless, non-breathing).

**PROCEDURE**

1. If multiple rescuers available, one rescuer should provide uninterrupted chest compressions while the AED is being prepared for use.
2. **Turn on AED first**, apply defibrillator pads per manufacturer recommendations. Avoid placing directly over an implanted device (pacemaker, AICD).
3. Remove any medication patches on the chest and wipe off any residue.
4. If necessary, connect defibrillator leads: white to the anterior chest pad and the red to the posterior or lateral pad.
5. Activate AED for analysis of rhythm.
6. Stop CPR and clear the patient for rhythm analysis. Keep interruption in CPR as brief as possible.
7. Defibrillate if appropriate by depressing the "shock" button. Assertively state "CLEAR" and visualize that no one, including yourself, is in contact with the patient prior to defibrillation. Biphasic defibrillators will determine the correct joules accordingly.
8. Begin CPR (chest compressions and ventilations) immediately after the delivery of the defibrillation.
9. After 2 minutes of CPR, analyze rhythm and defibrillate if indicated. Repeat this step every 2 minutes.
10. If "no shock advised" appears, perform CPR for two minutes and then reanalyze.
11. Transport and continue treatment as indicated.
12. Keep interruption of CPR compressions as brief as possible. High-quality CPR is a key to successful resuscitation.
13. If pulse returns please use the Post Resuscitation Protocol.

**PEDIATRIC CONSIDERATIONS**

1. Age < 8 years, use Pediatric Pads if available and can be placed appropriately without touching each other.
2. If pediatric pads are not available, adult pads may be used if they can be placed appropriately without touching each other. Consider anterior-posterior placement.

# Automated Chest Compression Device: LUCAS CPR Device

## INTRODUCTION

The LUCAS CPR Device is an automated device designed to deliver uninterrupted chest compressions to a victim of cardiac arrest.

These instructions are for the LUCAS CPR device, if using alternate device, please consult brand's operating instructions.

## INDICATIONS

1. Patients at least 12 years of age (or appropriately fits in the device with ability to have the CPR pad make contact with the chest)
2. Patients in cardiac arrest from **non-traumatic causes**

## CONTRAINDICATIONS

1. Extenuating traumatic cardiac arrest
2. Patients who are too large to fit in the device
3. Patients in which the compression pad does not correctly size the patient (generally pediatrics)

## GENERAL INSTRUCTIONS (Refer to user guide for specifics)

1. **Backplate Placement** - The backplate should be centered on the nipple line and the top of the backplate should be located just below the patient's armpits. In cases for which the patient is already on the stretcher, place the backplate underneath the thorax. This can be accomplished by log-rolling the patient or raising the torso (Placement should occur during a scheduled discontinuation of compressions.

2. **Position the Compressor**

· Turn the LUCAS Device on (the device will perform a 3 second self test).
· Remove the LUCAS device from its carrying case using the handles provided on each side.
· With the index finger of each hand, pull the trigger to ensure the device is set to engage the backplate. Once this is complete, you may remove your index finger from the trigger loop.
· Approach the patient from the side opposite the person performing manual chest compressions.
· Attach the claw hook to the backplate on the side of the patient opposite that where compressions are being provided .
· Place the LUCAS device across the patient, between the staff member's arms who is performing manual CPR.
· At this point the staff member performing manual CPR stops and assists attaching the claw hook to the plate on their side .
· Pull up once to make sure that the parts are securely attached.

3. **Adjust the Height of the Compression Arm**

· Use two fingers (V pattern) to make sure that the lower edge of the Suction Cup is immediately above the end of the sternum. If necessary, move the device by pulling the support legs to adjust the position
· Press the Adjust Mode Button on the control pad (This will allow you to easily adjust the height of the compression arm).
· To adjust the start position of the compression arm, manually push down the SUCTION CUP with two fingers onto the chest (without compressing the patient's chest)
· Once the position of the compression arm is satisfactory, push the green PAUSE button (This will lock the arm in this position), then remove your fingers from the SUCTION CUP.
· If the position is incorrect, press the ADJUST MODE BUTTON and repeat the steps.

4. **Start Compressions**

· If the patient is not intubated and you will be providing compression to ventilation ratio of 30:2 push ACTIVE (30:2) button to start
· If the patient is intubated and you will be providing continuous compressions push ACTIVE (continuous) button Begin manual CPR compressions while preparing the patient for the LUCAS Device

5. **Strap patients wrists into Velcro straps on each arm of the LUCAS Device.**
6. **If there is failure or malfunction of device return to manual CPR immediately**

# Blood Administration

P

**Mechanism of Injury/Nature of Illness with Patients >5 years old with:**

- Signs of massive hemorrhage
- Traumatic injury (Penetrating or Blunt)
- Suspected dissecting/rupturing aneurysm (Abdominal or Thoracic)
- GI Bleeding
- Signs of intra-abdominal bleeding

**Physiological Parameters**

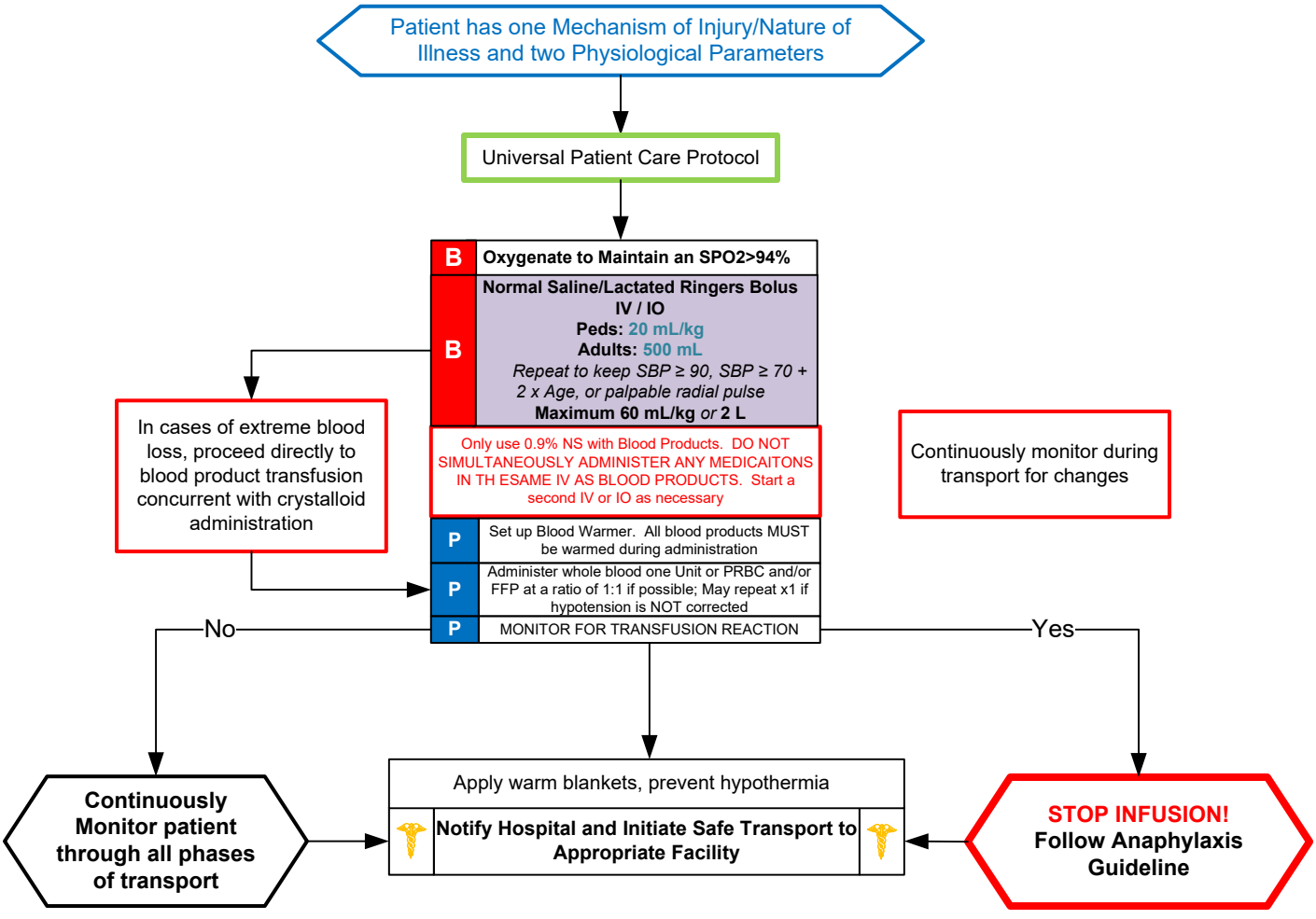
- Systolic (SBP) <90 mmHg
- HR > 120 bpm
- Shock Index (SI) >1
- Pediatric Patients >5 y/o whose VS are consistent with blood loss as defined by their weight or age-based parameters
- Consider MAP <60 as an additional indication with parameters above

**Definitions**

- Shock Index (SI): HR/SBP=SI

**Required Documentation**

- In EHR, document Rh type, amount, unit lot number, and expiration date for EVERY unit administered to patient



# Blood Administration

P

**INDICATIONS**

· Any patient where Blood Product Administration is indicated in the blood administration guideline, or where as ordered by a Physician

***IF ADMINISTERING A O POSITIVE BLOOD PRODUCT TO A FEMALE UNDER THE AGE OF 50 YEARS OF AGE, YOU MUST HAVE A PHYSICIAN'S ORDER.***

**PROCEDURE**

· Large bore IV access available. Separate IV sites are needed for FFP and PRBC products
· Normal Saline IV fluid initiated
· Remove Units from storage to be administered.
· Verify Correct Patient
· Verify Blood Component is correct (Correct type, Correct component).
· Verify Expiration Date
· Confirm Temperature monitor in each unit is appropriate (not out of range/red)
· Check for discoloration or gas bubbles present
· Check and document patient's temperature
· If patient has apparent capacity and condition allows, discuss the procedure with the patient
· Prime the tubing set and blood warmer if applicable
· EMS provided blood and blood products must be warmed during administration
· Interfacility blood administration does not have to be warmed
· Initiate blood product administration and set appropriate rate
· Second temperature must be taken at this time (15 minutes into transfusion) and documented.
· This must be repeated for EACH and EVERY unit of Blood Product administration
· If a reaction occurs, STOP infusion and follow appropriate guideline. Retain all blood product and tubing for source testing
· Document the procedure, time, and results
· Blood product type, expiration date, and lot number MUST be documented for EACH blood product unit administered
· Patient temperature must be documented prior to and 15 minutes after initiation of EACH and EVERY blood product administration

# Blood Glucose Analysis

**CLINICAL INDICATIONS**

Patients with suspected hypoglycemia (diabetic emergencies, change in mental status, bizarre behavior, etc.)

**PROCEDURE**

1. Gather and prepare equipment.
2. Insert test strip into glucometer and verify that display is waiting for a blood sample.
3. Blood samples for performing glucose analysis can be obtained through a finger-stick or when possible simultaneously with intravenous access.
4. Place correct amount of blood on reagent strip or site on glucometer per the manufacturer's instructions.
5. Time the analysis as instructed by the manufacturer.
6. Document the glucometer reading and treat the patient as indicated by the analysis and appropriate guideline.
7. Repeat glucose analysis as indicated for reassessment after treatment and as per appropriate guideline.
8. Perform Quality Assurance on glucometers at least once every 30 days, if any clinically suspicious readings are noted, and/or as recommended by the manufacturer and document in the log.

**PEDIATRIC CONSIDERATIONS**

1. For neonates, obtain blood sample via a heel-stick rather than finger-stick.

## Carbon Monoxide Oximetry Device

**INTRODUCTION**

Carbon monoxide oximetry devices, such as the Rad57, can be use to evaluate potential carbon monoxide poisoning in patients or firefighters.

**INDICATIONS**

Patients exhibiting the following signs and symptoms:

1. Flu-like symptoms
2. Dyspnea
3. Headache
4. Chest pain
5. Lethargy
6. Nausea/vomiting
7. Hallucinations or giddiness
8. Seizures
9. Multiple victims/patients from same residence/building exhibiting similar signs and symptoms

**PROCEDURE**

1. Obtain a history of potential carbon monoxide exposure and history of smoking.
2. Secure or maintain the airway
3. Provide oxygenation and ventilation as needed
4. Apply finger probe to patient using the correct technique.
   A. If patient SpCO = 0-5%, no further evaluation for carbon monoxide exposure is necessary.
   B. If patient SpCO = 5-10%with **no altered mental status, not pregnant and no symptoms**, no further evaluation necessary.
   C. If patient SpCO = 5-10%, **pregnant, with no altered mental status and no symptoms**, treat with 100% $O_2$ and transport for further evaluation.
   D. If patient SpCO = 5-10%, **with symptoms** listed above (regardless of the presence of altered mental status), treat with 100% O2 and transport for further evaluation
   E. If patient SpCO > 10%, treat with 100% $O_2$ and transport for further evaluation.

**SPECIAL NOTE**

1. Patients requiring further evaluation should be transported according to the destination recommendations in the Carbon Monoxide Exposure Protocol.

## SYNCHRONIZED CARDIOVERSION

**INDICATIONS**

1. Unstable patient with a tachydysrhythmia (rapid atrial fibrillation, supraventricular tachycardia, ventricular tachycardia)
2. Patient is not pulseless (the pulseless patient requires unsynchronized cardioversion, i.e. defibrillation)

**PROCEDURE**

1. Ensure the patient is attached properly to a monitor/defibrillator capable of synchronized cardioversion.
2. Have all equipment prepared for unsynchronized cardioversion/defibrillation if the patient fails synchronized cardioversion and the condition worsens.
3. Consider the use of pain or sedating medications per guideline.
4. Set energy selection to the appropriate setting.
5. Set monitor/defibrillator to synchronized cardioversion mode (press the “Sync” button once pads are connected).
6. Make certain all personnel are clear of patient.
7. Press and **hold** the shock button to cardiovert. Stay clear of the patient until you are certain the energy has been delivered. NOTE: It may take the monitor/defibrillator several cardiac cycles to “synchronize”, so there may a delay between activating the cardioversion and the actual delivery of energy.
8. Note patient response and perform immediate unsynchronized cardioversion/defibrillation if the patient’s rhythm has deteriorated into pulseless ventricular tachycardia/ventricular fibrillation.
9. If the patient’s condition is unchanged, repeat steps 2 to 8 above, using escalating energy settings.
10. Repeat until maximum setting or until efforts succeed. Consider discussion with Medical Control if cardioversion is unsuccessful after 2 attempts.
11. Note procedure, response, and time in the patient care report (ePCR).

# CHEST NEEDLE DECOMPRESSION

**INDICATIONS**

1. To relieve a tension pneumothorax evidenced by:
   A. Absent breath sounds
   B. Distended neck veins
   C. Falling systolic blood pressure
   D. Narrowing pulse pressure
   E. Central cyanosis
   F. Tracheal deviation
   G. Pulseless electrical activity
   H. Increased tympany
   I. Increased respiratory difficulty

**PRECAUTIONS**

1. Crepitus and/or subcutaneous air may be present with a simple or tension pneumothorax.
2. Always insert needle over (cephalad to) rib to avoid neurovascular bundle.
3. **Any self-occluding IV catheter must not be used for this procedure**.

**PROCEDURE**

1. This procedure may be performed on a patient when indications are present prior to physician order.
2. On the appropriate side, identify 2nd intercostal space in the mid clavicular line or the 5th intercostal space in the anterior mid-axillary line
3. Needle insertion
   A. In adults, use a 10-14 g. 3" needle through catheter.
   B. Position tip of needle over 3rd rib and insert.
   C. Advance needle into chest walking the needle up over the inferior rib at 45° angle to the chest wall and parallel to sternum. At pleural cavity a slight "give" is felt.
   D. Advance further into chest until bevel clears pleura. Do not advance the needle any further than is necessary to advance the catheter.
4. Advance the catheter over the needle and then remove needle.
5. Connect 3-way stopcock after air release is complete, ensure stopcock is in the closed position.
6. Secure catheter to chest.
7. 3-way stopcok will occasionally need to be opened to "burp" the chest, assess lung sounds and SpO2 to determine this.

**PEDIATRIC CONSIDERATIONS**

1. In children < 12 years, use a 14 g. 1 ¾" needle through catheter instead.

**SPECIAL NOTES**

1. Rush of air and/or tube fogging and/or patient improvement indicates correct placement.
2. In the majority of circumstances, bilateral decompression will be required.
3. Once needle is placed, pre-hospital personnel should not remove it.

# CHILDBIRTH

**INDICATIONS**
Imminent delivery with crowning

**CONTRAINDICATIONS**
If umbilical cord is the presenting part, **DO NOT DELIVER**. Use a gloved finger to relieve pressure on the cord and transport emergently to the closest appropriate facility.

**PRECAUTIONS**
If the infant is in a breech position, transport rapidly, discourage mother from pushing, but do not attempt to prevent delivery by applying direct pressure to the infant.

**PROCEDURE**
1. Delivery should be controlled so as to allow a slow controlled delivery of the infant. This will prevent injury to the mother and infant.
2. Support the infant's head as needed.
3. Check the umbilical cord surrounding the neck. If it is present, slip it over the head. If unable to free the cord from the neck, double clamp the cord and cut between the clamps.
4 Routine suctioning of the airway with a bulb syringe is not recommended, unless respiratory distress is evident.
5. Grasping the head with hands over the ears, gently pull down to allow delivery of the anterior shoulder.
6. Gently pull up on the head to allow delivery of the posterior shoulder.
7. Slowly deliver the remainder of the infant.
8. If more than 2 min has elapsed since birth, clamp the cord 2 inches from the abdomen with 2 clamps and cut the cord between the clamps.
9. Record APGAR scores at 1 and 5 minutes and timestamp time of birth with dispatch.
10. Follow the **Newly Born Protocol** for further treatment.
11. The placenta will deliver spontaneously, usually within 5 minutes of the infant. Do not force the placenta to deliver.
12. Massaging the uterus may facilitate delivery of the placenta and decrease bleeding by facilitating uterine contractions.

# CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)

## INTRODUCTION

Continuous Positive Airway Pressure has been shown to rapidly improve vital signs, gas exchange, the work of breathing, decrease the sense of dyspnea, and decrease the need for advanced airway in patients who suffer from shortness of breath from asthma, COPD, pulmonary edema, CHF, and pneumonia. In patients with CHF, CPAP improves hemodynamics by reducing preload and afterload.

## INDICATIONS

1. Any patient who is complaining of shortness of breath for reasons other than pneumothorax and:
   A. Is awake and oriented
   B. Is over 12 years old and is able to fit the CPAP mask
   C. Has the ability to maintain an open airway (GCS > 10)
   D. A respiratory rate greater than 20 breaths per minute and exhibits adequate breathing
   E. Has a systolic blood pressure above 90 mmHg
   F. Uses accessory muscles during respirations
   G. Sign and Symptoms consistent with asthma, COPD, pulmonary edema, CHF, or pneumonia

## CONTRAINDICATIONS

1. Patient is in respiratory arrest
2. Patient is suspected of having a pneumothorax
3. Patient has a tracheostomy
4. Patient is not adequately breathing

## PRECAUTIONS

1. Use caution if patient:
   A. Has impaired mental status and is not able to cooperate with the procedure
   B. Has failed at past attempts at noninvasive ventilation
   C. Has active upper GI bleeding or history of recent gastric surgery
   D. Complains of nausea or vomiting
   E. Has excessive secretions
   F. Has a facial deformity that prevents the use of CPAP
   G. Hypotension (<90 mmHg SBP, or MAP <60)
2. Advanced airway should be performed if:
   A. Respiratory or cardiac arrest
   B. Unresponsive to verbal stimuli (GCS is < 9) and attending paramedic is able to perform RSI or attempt advanced airway.

## PROCEDURE

1. Make sure patient does not have a pneumothorax!
2. **EXPLAIN THE PROCEDURE TO THE PATIENT**
3. Ensure adequate oxygen supply to ventilation device (100% when starting therapy and until SaO2 is >95%)
4. Place the patient on continuous pulse oximetry and capnography
5. Place the delivery device over the mouth and nose
6. Secure the mask with provided straps or other provided devices
7. Start with 5 cm H2O of PEEP, may increase as needed
8. Check for air leaks
9. Monitor and document the patient's respiratory response to treatment
10. Monitor vital signs at least every 5 minutes. CPAP can cause BP to drop.
11. Continue to coach patient to keep mask in place and readjust as needed
12. If respiratory status deteriorates, remove device and consider intermittent positive pressure ventilation with or without advanced airway.
13. Medications can be nebulized inline as needed per appropriate guideline.
14. A benzodiazepine may be considered for the anxious patient, and may be repeated x1 as needed.

## REMOVAL PROCEDURE

1. CPAP therapy needs to be continuous and should not be removed unless the patient can not tolerate the mask or experiences continued or worsening respiratory failure.
2. Intermittent positive pressure ventilation and/or advanced airway should be considered if the patient is removed from CPAP therapy.

## DEFIBRILLATION - MANUAL

**INDICATIONS**
Cardiac arrest with ventricular fibrillation or pulseless ventricular tachycardia

**CONTRAINDICATIONS**
None in cardiac arrest

**PROCEDURE**
1. **Ensure that Chest Compressions are adequate and interrupted only when absolutely necessary.**
2. Clinically confirm the diagnosis of cardiac arrest and identify the need for defibrillation.
3. Apply defibrillation hands free pads (recommended to allow more continuous CPR) or paddles to the patient's chest in the proper position. These can be applied either anterior-posterior (over sternum and middle of back), or anterior-lateral (over upper right chest and lower lateral left chest). Attempt to avoid placing pads directly over implanted devices or medication patches.
4. Set the appropriate energy level if needed, these devices are usually programmed to the correct dose.
5. Charge the defibrillator to the selected energy level. **Continue chest compressions while the defibrillator is charging.**
6. **Hold Compressions, assertively state, "CLEAR" and visualize that no one, including yourself, is in contact with the patient.**
7. Deliver the shock by depressing the **flashing red shock button.**
8. Immediately resume chest compressions and ventilations for 2 minutes. After 2 minutes of CPR, analyze rhythm and check for pulse only if appropriate for rhythm.
9. Repeat the procedure every two minutes as indicated by patient response and ECG rhythm.
10. Keep interruption of CPR compressions as brief as possible. High quality CPR is a key to successful resuscitation.

## Dual Sequential Defibrillation

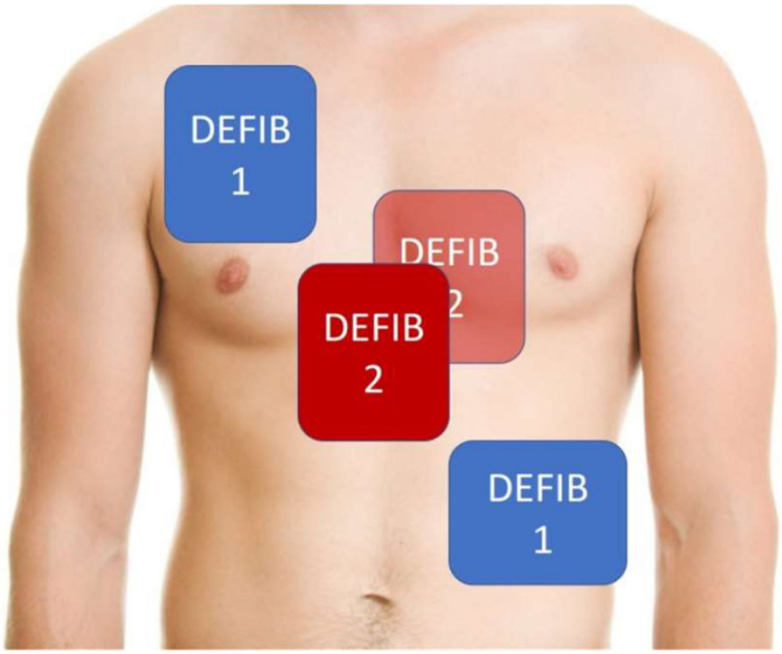
**INDICATIONS**
1. Patients in cardiac arrest who have Ventricular Fibrillation (VF) resistant to traditional external defibrillation

**CONTRAINDICATIONS**
1. Dual sequential defibrillation in the pediatric patient has insufficient evidence for use and therefore should not be used in the pediatric population
2. In an adult, there are no relative or absolute contraindications

**PROCEDURE**
1. After a third shock has been delivered unsuccessfully to a patient in VF, prepare the second external defibrillator for a double sequential defibrillation
2. Apply posterior debrillation pad of the monitor during the first compression pause
3. Apply anterior defibrillation pad during second compression pause. ENSURE PADS ARE NOT OVERLAPPING
4. Complete full 2 minute CPR cycle
5. During next rhythm check, if patient continues to be in VF, charge both defibrillators to 200 J (biphasic) or 360 J (monophasic)
6. Resume CPR while defibrillators charge
7. Once both defibrillators are fully charged, make sure everyone is clear of patient and have 1 provider simultaneously push shock buttons on defibrillators
8. Immediately resume CPR.

**PEDIATRIC CONSIDERATIONS**
1. Dual sequential defibrillation in the pediatric patient has insufficient evidence for use and therefore should not be used in the pediatric population

Recommended Pad Placement:



B
A
P

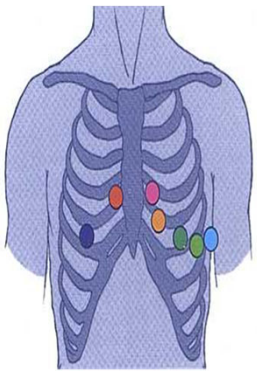
## 12 Lead ECG Systematic Approach

**Note: EKG Interpretation for paramedic scope of practice only. EMT/ AEMT can apply/ acquire an EKG (Step 2)**

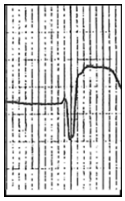
### 1) RATE, RHYTHM, R TO R

### 2) PLACE ELECTRODES

**Right Arm (RA)** = Right forearm
**Right Leg (RL)** = Right calf
**Left Arm (LA)** = Left forearm
**Left Leg (LL)** = Left calf
**V1** = 4th ICS right of sternum
**V2** = 4th ICS left of sternum
**V3** = Between V2 and V4
**V4** = 5th ICS at left midclavicular line
**V5** = Level with V4 at left anterior axillary line
**V6** = Level with V4 at left midaxillary line
**$V_3R$ - $V_6R$ =** Same positioning as $V_3$-$V_6$ only **RIGHT** side



### 3) FIND INJURY PATTERNS


**ST Elevation**


**Flipped T**


**ST Depression**


**Q-wave**


**Posterior in $V_1$-$V_2$**

### 4) IDENTIFY LOCATION

| | | | |
|---|---|---|---|
| I LATERAL | $aV_R$ | $V_1$ SEPTAL | $V_4$ ANTERIOR |
| II INFERIOR | $aV_L$ LATERAL | $V_2$ SEPTAL | $V_5$ LATERAL |
| III INFERIOR | $aV_F$ INFERIOR | $V_3$ ANTERIOR | $V_6$ LATERAL |

### 5) ARE THERE RECIPROCAL CHANGES?

| Location | Arterial Supply | Injury / Ischemia changes in: | Reciprocal |
|---|---|---|---|
| Septal | LAD | $V_1$ – $V_2$ | None |
| Anterior | LCA/LAD | $V_3$-$V_4$ | II, III, & aVF |
| Inferior | RCA | II, III, aVF | I, aVL, $V_1$-$V_4$ |
| Lateral | Circumflex | aVL, $V_5$, $V_6$ | $V_1$-$V_3$ |
| Right Ventricle | RCA | $V_3R$, $V_4R$, $V_5R$, $V_6R$ | $V_2$-$V_4$ |
| Posterior | RCA/Circumflex | None | $V_1$-$V_2$ |

### 6) IF INFERIOR MI - IS IT RIGHT SIDED?

**Right Side MI:**
A. Inferior MI on standard 12-Lead ECG
B. ST ↑ > in lead III than in II
C. ST ↑ in $V_1$ (could go through $V_6$)
D. ST ↓ in $V_2$ (less than ½ ↑ in AVF)
E. ST ↑ in $V_3R$ –$V_6R$

### 7) IF INFERIOR MI - IS IT POSTERIOR?

**Posterior MI:**
A. Inferior MI on Standard 12-Lead ECG
B. Tall & wide R-wave in $V_1$ & $V_2$
C. ST↓ with upright T wave in $V_1$ & $V_2$

B
A
P

## END-TIDAL CARBON DIOXIDE DETECTION

**INTRODUCTION:**
Carbon dioxide ($CO_2$) is a byproduct of respiration. Approximately 5% of the exhaled air of a healthy patient is carbon dioxide. End-tidal $CO_2$ ($EtCO_2$) detection devices are useful in identifying the correct placement of an advanced airway.

**INDICATIONS**
1. To assist in determining correct advanced airway placement patients > 15 kg (33 lb.)
2. Assess respiratory status in spontaneously breathing patients

**PRECAUTIONS**
1. In low perfusion states, such as cardiac arrest,CO2 will not wash out through the lungs as it would normally and provides a low EtCO2 reading unless adequate CPR is being performed.
2. $EtCO_2$ detectors should always be used in conjunction with other assessments such as lung sounds, chest rise, absence of gastric sounds, tube fogging, and pulse oximetry. Never rely entirely on $EtCO_2$ detection as the sole method of assessment for tube placement.
3. A patient who has received mouth to mouth ventilation may exhibit false positive readings – these will be short lived and will wash out with full tidal volume breaths.
4. A patient that has recently consumed carbonated beverages may cause a false positive reading if ventilation is attempted through a tube placed in the esophagus – this will also be short lived.

**PROCEDURE**
1. Attach the mainstream capnography sensor to the advanced airway or apply nasal cannula $EtCO_2$ to spontaneously breathing patient.
2. Change the waveform on the cardiac monitor to select $EtCO_2$
5. The $EtCO_2$ detector should NEVER be removed after placement has been confirmed. This is a single patient use device.
6. Document results of $EtCO_2$ detection on run report form.

**SPECIAL NOTES**
1. Do NOT store the sensor with the adapter already attached.
2. An EMT may not perform EtCO2 waveform interpretation, may only perform test


## Foreign Body Airway Obstruction

**INDICATIONS**

Sudden onset of respiratory distress often with coughing, wheezing, gagging, or stridor due to a foreign-body obstruction of the upper airway.

**PROCEDURE**

1. Assess the degree of foreign body obstruction
   A. Do not interfere with a mild obstruction allowing the patient to clear their airway by coughing.
   B. In severe foreign-body obstructions, the patient may not be able to make a sound. The victim my clutch his/her neck in the universal choking sign.
2. **For an infant**, deliver 5 back blows (slaps) followed by 5 chest thrusts repeatedly until the object is expelled or the victim becomes unresponsive.
3. **For a child**, perform a subdiaphragmatic abdominal thrust until the object is expelled or the victim becomes unresponsive.
4. **For adults**, a combination of maneuvers may be required.
   A. First, subdiaphragmatic abdominal thrusts should be used in rapid sequence until the obstruction is relieved.
   B. If abdominal thrusts are ineffective, chest thrusts should be used. Chest thrusts should be used primarily in morbidly obese patients and in the patients who are in the late stages of pregnancy.
5. If the victim becomes unresponsive, begin CPR immediately but look in the mouth before administering any ventilations. If a foreign-body is visible, remove it.
6. **Do not perform blind finger sweeps in the mouth and posterior pharynx. This may push the object farther into the airway.**
7. In unresponsive patients, paramedic providers should visualize the posterior pharynx with a laryngoscope to potentially identify and remove the foreign-body using Magill forceps.
8. For copious secretions, ALS providers may advance a suction catheter into the trachea to remove the secretions.
9. If secretions are viscous in nature, a saline jet may be squirted into the trachea prior to suctioning to dilute secretions.
10. Document the methods used and result of these procedures in the patient care report (ePCR).

# Personal Protective Equipment

**Levels of Protection:**

Guided by OSHA (Office of Safety Health Administration) and NIOSH National Institute of Occupational Health as well as other regulatory bodies thru un-funded mandates and policy.

Level A: Fully encapsulated and requires self contained breathing apparatus (SCBA), chemical resistant boots and gloves

Level B: SCBA or supplied air source and is a hooded chemical resistant suit in addition to gloves and boots (not fully encapsulated)

Level C: Powered air purifying respirator (PAPR), hooded chemical resistant suit, boots and gloves.

Level D: work uniform; requires only coveralls and safety shoes/boots

**Level A**

**Level B**


**Level C**

**Level D**

# Donning Procedure


**Donning Step 1: Don Gown**

- Double check gown for defect and untie any knots in the PPE
- Don the gown by inserting your arms into the sleeves with the opening to the back
- Tie the neck and waist ties in bows that are easy to release as this will facilitate easy removal by eliminating the need to struggle with untying knots


**Donning Step 2: Don N95 Respirator**

- Hold the respirator in the palm of your hand with straps facing the floor
- Place N95 respirator on your face covering your nose and mouth
- Pull the bottom strap over the top of your head and place at the nape of your neck below the ear.
- Pull the upper strap over and place it behind your head towards the crown of your head
- Mold the nose piece using pads of fingers over the cheeks and bridge of your nose to obtain a tight seal. Be careful not to pinch the nose
- Perform a seal check by taking a few deep breaths and feeling around the mask for escaping air to ensure there is good seal against the skin

# Donning Procedure

**Donning Step 3: Don Face Shield and/or Goggles**

- Don the face shield so that the foam headpiece rests on your forehead.
- If you are wearing goggles, ensure they are not interfering with the fit of the N95 respirator and are sitting comfortably and secure over your eyes.
- Eyeglasses are not a substitute for eye protection. If you are wearing glasses for vision support, ensure they also are secure and comfortable.
- At no time should eye protection be readjusted in the patient care area.
- If face shield or goggles fog up it is likely because there is not a good seal of the N95 respirator to the healthcare workers face


**Donning Step 5: Don Gloves**

- Don patient care gloves to a size that is comfortable and conducive to providing patient care
- Prior to donning gloves, the gown cuff may need to be pulled towards the knuckles to prevent the gown sleeves from riding up.
- Ensure there is no skin exposed between the gown and glove cuffs.
- The white cuff of the gown should be completely covered by the glove.

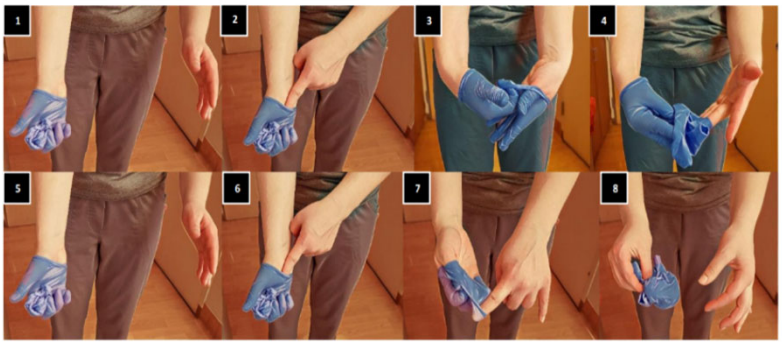
# Doffing Procedure

**Doffing Step 1: Doff Gown**

- Carefully untie the gown at the waist and neck
- Doff the gown folding the outside of the gown tightly inward into a ball to contain the contaminated side
- Once your gown is contained, separate the gown from the gloves and place gently into the linen hamper

**Doffing Step 2: Doff Gloves**

- Remove the gloves utilizing “glove in glove” technique
- Take your dominant hand and pinch the palm of the non-dominant hand and remove glove
- Ball the removed glove into the hand of the remaining glove
- Slide pointer finger of the free hand under the cuff of the remaining glove and remove
- Place gently into the waste



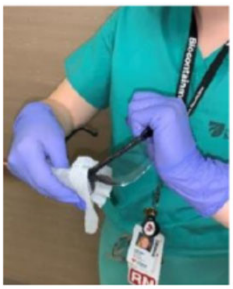
**Doffing Step 3: Don Clean Gloves**

- New gloves are donned in order to handle the disinfectant wipes safely

**Doffing Step 4: Doff Face Shield or Eye Protection**

- To remove it, bend slightly forward and grasp the elastic headband on both sides of your head and pull it forward

# Doffing Procedure

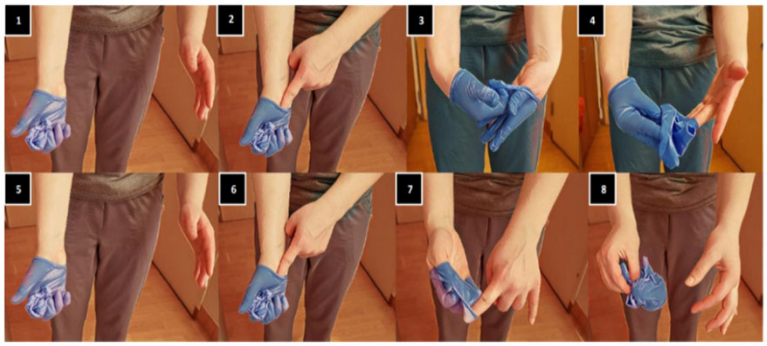


**Doffing Step 5: Disinfect Face Shield or Eye Protection**

- Once your face shield has been removed, grab a EPA approved disinfectant wipe and disinfect the surface of the Face Shield
- The surface must remain wet for the appropriate wet time
- Place clean face shield with the strap facing down and the shield facing upward

**Doffing Step 6: Doff N95**

- After extended use of N95, lean near area where brown bag for UV decon is located and remove N95 one strap at a time
- First remove the bottom strap with both hands and let dangle
- Then remove the top strap of N95 with both hands and place gently into the trash


**Doffing Step 7: Doff Gloves**

- Remove the gloves utilizing “glove in glove” technique
- Take your dominant hand and pinch the palm of the non-dominant hand and remove glove
- Ball the removed glove into the hand of the remaining glove
- Slide pointer finger of the free hand under the cuff of the remaining glove and remove
- Place gently into the waste

# Injections: SubQ and IM



**Clinical Indications:**

- When medication administration is necessary and the medication must be given via the SQ or IM route (not auto-injector), or as an alternative route in selected medications.

**Procedure:**

1. Receive and confirm medication order or perform according to standing orders.
2. Prepare equipment and medication expelling air from the syringe.
3. Explain the procedure to the patient and reconfirm patient allergies.
4. The most common site for subcutaneous injection is the arm.
    - Injection volume should not exceed 1 cc.
5. The possible injection sites for intramuscular injections include the arm, buttock and thigh.
    - Injection volume should not exceed 1 cc for the arm
    - Injection volume should not exceed 2 cc in the thigh or buttock.
6. The thigh should be used for injections in pediatric patients and injection volume should not exceed 1 cc.
7. Expose the selected area and cleanse the injection site with alcohol.
8. Insert the needle into the skin with a smooth, steady motion

    **SQ: 45-degree angle skin pinched** **IM: 90-degree angle skin flattened**

9. Aspirate for blood
10. Inject the medication.
11. Withdraw the needle quickly and dispose of properly without recapping.
12. Apply pressure to the site.
13. Monitor the patient for the desired therapeutic effects as well as any possible side effects.
14. Document the medication, dose, route, and time on/with the patient care report (PCR).

** EMT may administer Epinephrine for anaphylaxis, by IM route, if approved by the system medical director.*

B
A
P

## Intranasal Medication Administration

**INDICATIONS**

1. For use in adult and pediatric patients for whom IV/IO access is anticipated or known to be difficult to obtain.
2. Naloxone, midazolam, fentanyl, dilaudid, ketamine, glucagon, and lorazepam are the ONLY medications approved for administration via IN. See the respective medication guideline for correct dosing.

**PRECAUTIONS**

1. Do not use in patients with epistaxis (nose bleed) or with excessive nasal discharge or congestion.

**PROCEDURE**

1. Determine the appropriate medication dose per medication protocol.
2. Draw the medication into the syringe and place the atomizer device on the end of syringe and screw into place.
3. Gently place the atomizer into the nare, stop when resistance is met.
4. Rapidly administer the medication.
5. Document the results in the patient care record.

**SPECIAL NOTES**

**Maximum volume delivery per nostril should be no greater than 1mL.**

# Intraosseous (IO) Infusion

A
P

**INDICATIONS**

- Patients in critical need of vascular access for volume replacement or medication administration and who have either poor vein selection or in whom one or two intravenous attempts have failed. If a patient needs immediate access for medications or fluid therapy, the EZ-IO may be used in patients who are alert and oriented.
- Pediatric needle (PD) weight guide = up to 39 kg, Adult needle (AD) >40 kg, bariatric needle (LD) as indicated by patient tissue depth over insertion site.
- Decreased level of consciousness (GCS < 6 with no purposeful movement) due to medical or traumatic insult or injury
- If alternative device is used, follow manufacturing recommended indications, contraindications, and procedures

**CONTRAINDICATIONS**

- Fracture of bone to be used for insertion
- Joint replacement adjacent to insertion bone
- Severe osteoporosis or tumor of the selected extremity
- Infection over the insertion site • Inability to locate landmarks for insertion
- Excessive tissue over the insertion site which precludes identification of landmarks

**PROCEDURE**

- Assemble and prepare all equipment and BSI, including a bag of IV fluid with tubing purged.
- Prep site with Betadine or alcohol prep.
- Locate the appropriate landmarks for insertion site:
  - **Proximal Tibia** – Insertion site is approximately 2 cm below the patella and approximately 2 cm (depending on patient anatomy) medial to the tibial tuberosity.
  - **Distal Tibia** - Insertion site is located approximately 3 cm proximal to the most prominent aspect of the medial malleolus. Place one finger directly over the medial malleolus; move approximately 2 cm (depending on patient anatomy) proximal and palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone.
  - **Distal Femur** - Insertion site is located approximately 2-3 cm above the patella in the center of the femur. Place one finger directly over the femur above and adjacent to the patella. Ensure that your insertion site is completely perpendicular to the bone.
  - **Proximal Humerus** – Insertion site is located directly on the most prominent aspect of the greater tubercle. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site. Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body).
- Open the EZ-IO cartridge and attach the needle set to the driver (there should be a snap).
- Remove the cap from the needle by rotating clockwise until loose and pulling it free.
- Stabilizing the bone with one hand, position the driver over the site at a 90 degree angle to the bone surface and power the needle through the skin only to the bone surface.
- Ensure the 5 mm mark (closest to the flange) on the catheter is visible. If the mark is not visible, do not proceed as the needle set is not long enough to penetrate the IO space.
- Apply gentle pressure to drill and power needle set into the bone until a sudden lack of resistance is felt. • While supporting the needle set with one hand, pull straight back on the driver to detach it from the needle set.
- Grasping the hub firmly with one hand, rotate the stylet counter clockwise until loose, pull it from the hub, place it in the stylet cartridge, and place in a biohazard container.
- Confirm placement by: visible blood at the tip of the stylet, free flow of IV fluid without evidence of leakage or extravasation. A cold and hard area on the extremity below the insertion site is sign of extravasation.

# Intraosseous (IO) Infusion

A
P

• If the patient responds to pain (GCS>8), administer Lidocaine, 40 mg IO slowly (30 sec.) (Pediatric dose – 0.5 mg/kg).

• Rapidly infuse a 10 cc flush of N.S.

• Secure catheter and IV tubing with tape.

• Watch for soft tissue swelling.

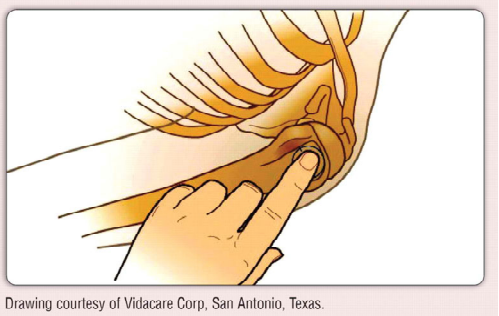
**PEDIATRIC CONSIDERATIONS**

In addition to the tibial site, the distal femur is an approved site for placement of the EZ-IO. The placement procedure is the same as above except for the following:

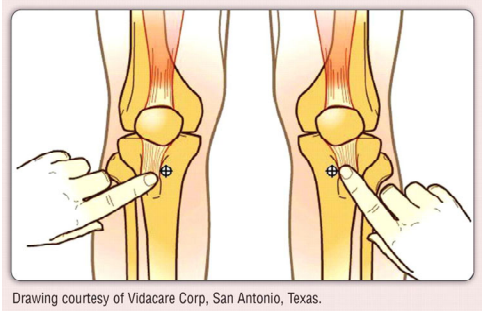
1. Locate the appropriate landmarks for insertion site:
   a. Femoral placement = patella, distal condyles of femur.
   b. Appropriate placement location = 3 finger widths above and exactly between the distal condyles of the femur.

**SPECIAL NOTES**

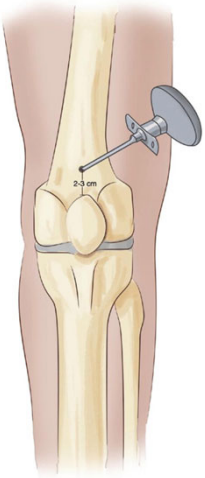
1. If drip rate is slow, flush with 10 cc IV fluid. If slow drip continues, consider using pressure bag, inflate until the green shaded area is shown on the inflation bulb.
2. All medications and blood or blood products that are given via the IV route may be given IO.
3. Device may be left in place for up to 24 hours.
4. The device can be removed by grasping the catheter hub and rotating while pulling gently. A syringe can be attached if a larger handle is desired (rotate clockwise while pulling straight back).

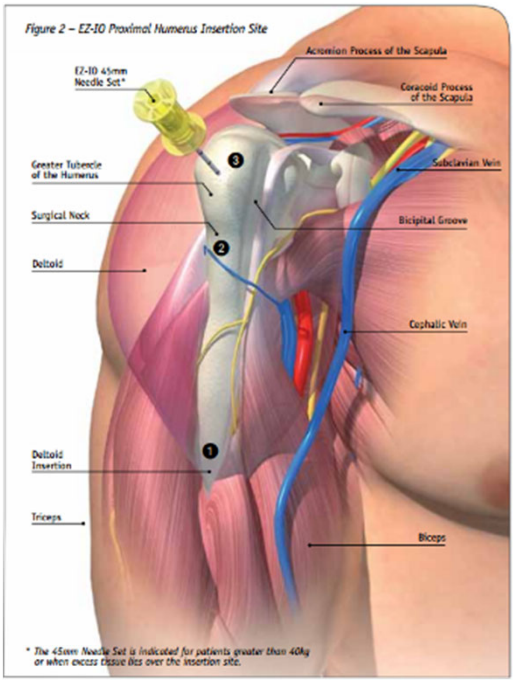


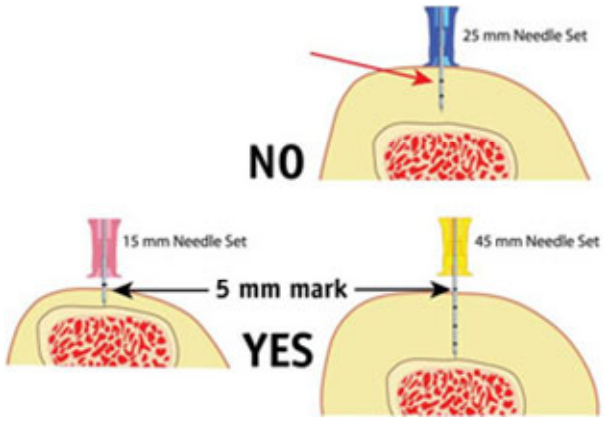
Drawing courtesy of Vidacare Corp, San Antonio, Texas.



Drawing courtesy of Vidacare Corp, San Antonio, Texas.



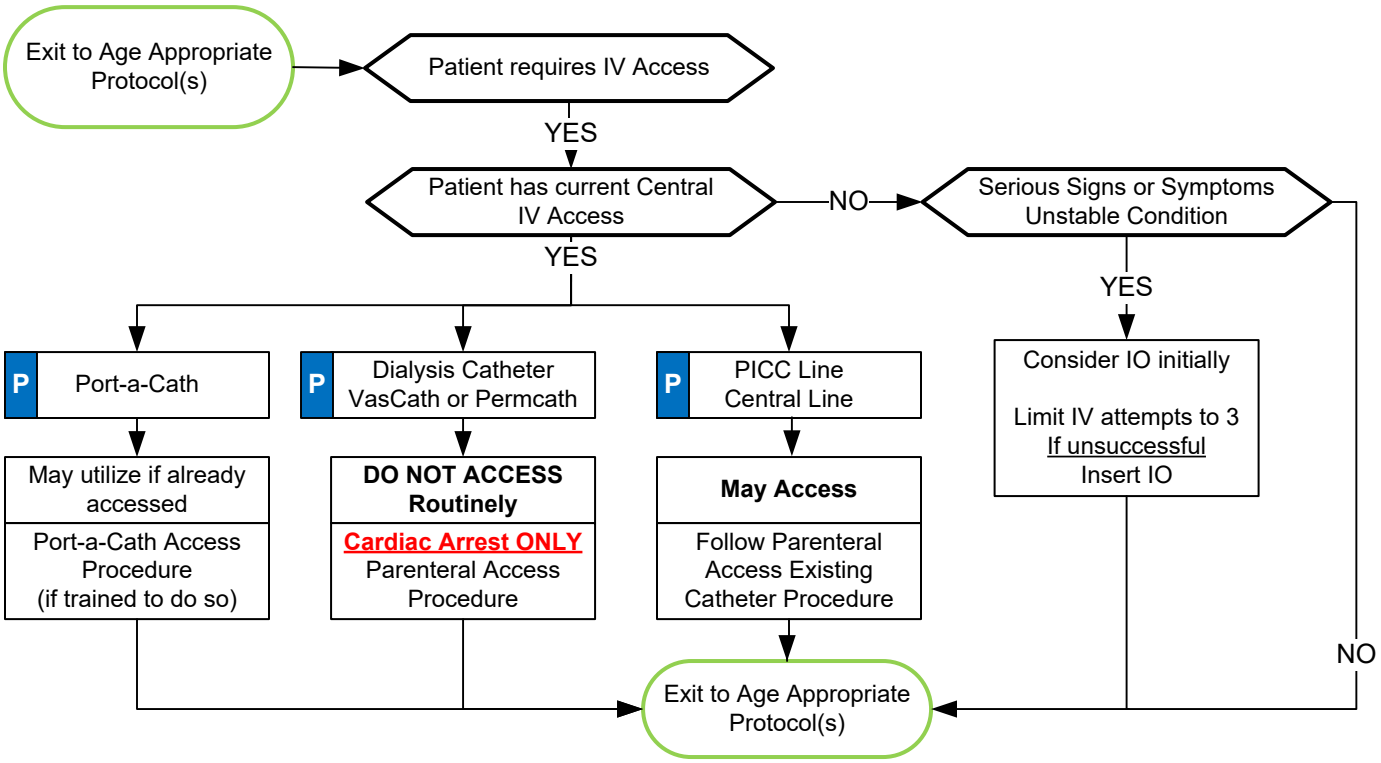
# IV or IO Access & Infusion

P

**History**
- Due date and gestational age
- Multiple gestation (twins etc.)
- Meconium
- Delivery difficulties
- Congenital disease
- Medications (maternal)
- Maternal risk factors
  - substance abuse
  - smoking

**Signs and Symptoms**
- Respiratory distress
- Peripheral cyanosis or mottling (normal)
- Central cyanosis (abnormal)
- Altered level of responsiveness
- Bradycardia

**Differential**
- Airway failure
  - Secretions
  - Respiratory drive
- Infection
- Maternal medication effect
- Hypovolemia
- Hypoglycemia
- Congenital heart disease
- Hypothermia

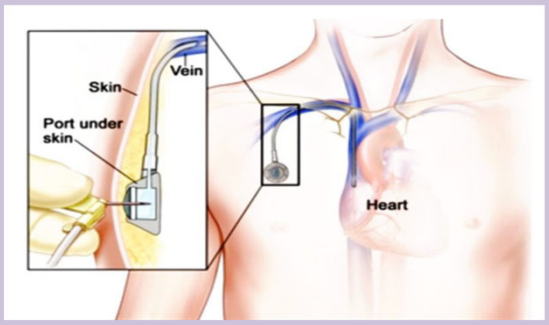



**Pearls**
- **Frequent encounter of patients with IV access devices and confusion as to which device can be accessed and used by EMS providers.**
- **If unclear about device use, always ask "Is this device used for dialysis?"**
- **When accessing central catheter, always ensure sterility of catheter connection point by cleaning port with alcohol, or similar disinfectant, 2 – 3 times prior to access.**
- **Central line catheters placed for administration of chemotherapy, medications, electrolytes, antibiotics, and blood are available to EMS providers for access and administration of fluids, medications, antibiotics, and blood products.**
- **Central line catheters placed for hemodialysis are NOT available for access by EMS providers unless the patient is in cardiac arrest.**
- Long term IV access is frequently needed for a variety of indications:
  - Medication administration such as antibiotics, pain relief, or chemotherapy
  - Administration of IV nutrition or feeding
  - Need for multiple IV line access or recurrent blood sampling
  - Poor vasculature requiring repeated attempts at IV access
  - End-stage renal disease requiring hemodialysis
- Common complications of central access devices:
  - Infection
  - Damage to vasculature
  - Air embolism
  - Loss of patency due to clogging or clotting
  - Pneumothorax

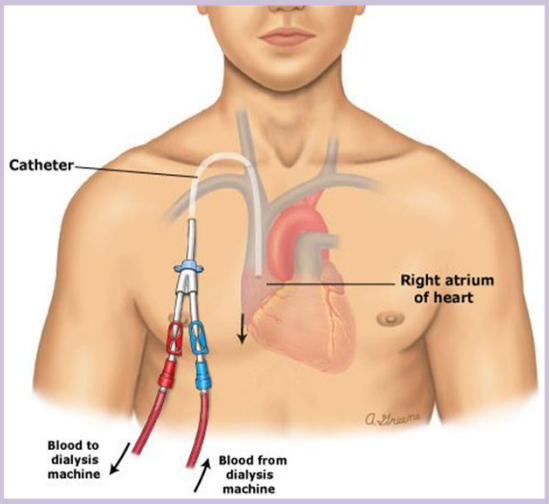
# IV or IO Access & Infusion

## Types of IV catheters:

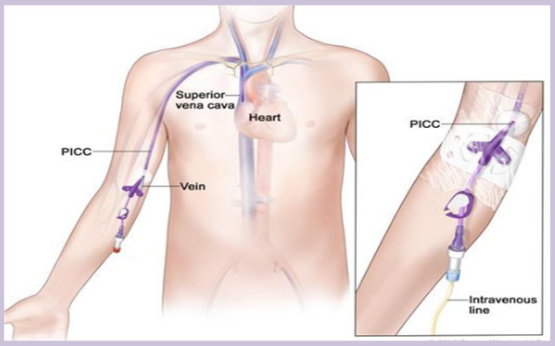
**Port-a-Cath® :**
Surgically implanted device allowing easy access to venous system.
The port and the catheter are all placed beneath the skin.
Requires a special kit and a specific needle to access.
**Paramedic does NOT routinely access this device.**
**Paramedic may utilize if already accessed with needle/ extension.**
**Paramedic may access if trained on procedure with access to proper equipment.**



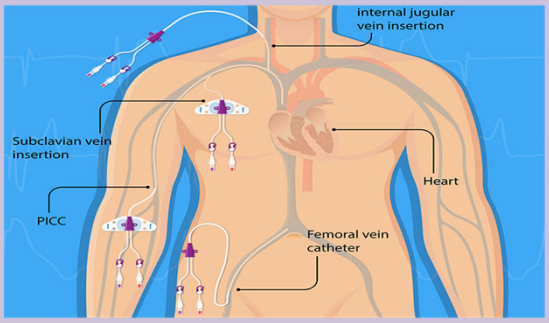

**Dialysis Catheter:**
Surgically implanted device used to access the vasculature for hemodialysis.
May be tunneled under the skin with access on outside of skin surface or may be non-tunneled with greater portion of catheter on outside of skin surface.
Catheter has a RED port indicating use for dialysis:
Most catheters have a RED port and a BLUE port.
Some catheters have a RED port and a WHITE port.
Dialysis catheters may be used for both short and long-term dialysis and should not accessed or used for delivery of fluids, medications, antibiotics, or blood products as it increases risk of infection, which then requires removal and subsequent loss of dialysis access.
**Paramedics do NOT routinely access this device.**
**Paramedics MAY access during cardiac arrest only (Only if IV or IO access cannot be established.)**




**PICC (Peripherally Inserted Central Catheters):**
Long catheter inserted into a vein in arm or leg (less common) with the tip of the catheter positioned into the central circulation.
Used for long-term IV fluids, medication administration, blood administration or blood draws.
May have 1 or 2 ports (possibly more, but less common.)
Port ends usually white, blue, or purple. (May be red, less common and is not used for dialysis.)
**Paramedics may access and utilize following clean technique.**




**Central Lines:**
Catheter placed in large vein in the neck, under the clavicle, or in the groin.
Used for long-term IV fluids, medication administration, blood administration or blood draws.
May have 1 - 4 ports (possibly more, but less common.)
Port ends usually white, blue, or purple. (May be red, less common and is not used for dialysis.)
**Paramedics may access and utilize following sterile technique.**




# Intravenous (IV) Access & Infusion

**PROCEDURE**

1. Inspect the IV solution for vessel/packaging integrity, expiration date, cloudiness, discoloration, leaks, and/or the presence of particles.
2. Using a 10ml syringe filled with Normal Saline (or larger), connect to the Lock set-up (e.g. extension set, "J" loop, etc.), and prime the tubing, flushing all air bubbles from the tubing.
3. Place a tourniquet around the patient's extremity above the expected IV access site to restrict venous flow only. Avoid (if possible) extremities with suspected fracture/trauma, extremities sharing the same side as previous surgical procedures (e.g. lymph node dissection, mastectomy, etc.), and extremities with other access types (e.g. dialysis fistula, PICC line, etc.).
4. Select an IV access site and use the largest catheter bore necessary based upon the patient's condition and size of vein. Paramedic should consider as an initial IV access, the right Antecubital (R-AC) site for ALL SUSPECTED STOKE PATIENTS, 18 gauge IV or larger.
5. Prep the skin with an antiseptic solution.
6. Insert the needle with the bevel up into the skin at a 15-30 degree angle in a steady, deliberate motion until flashback is visualized in the catheter.
7. Advance the catheter into the vein. Never reinsert the needle through the catheter. Dispose of the needle without recapping into an appropriate biohazard container.
8. Draw blood samples when appropriate.
9. Remove the tourniquet and connect the primed Normal Saline IV lock with 10ml prefilled syringe connected.
10. Aspirate the syringe slightly ensuring blood return and venous access patency. Flush the remaining contents of the Normal Saline syringe. Be sure to visualize and/or palpate above the IV access site for infiltration.
11. Cover the site with a sterile dressing and secure Normal Saline IV lock.
12. Disconnect the syringe from the Normal Saline lock and discard.
13. Label the Normal Saline IV lock with date and time, catheter gauge, and name/ID of the person completing the procedure.
14. Document the procedure, time and result (success) on/with the patient care report (PCR).

**CONSIDERATIONS FOR 1000 cc NORMAL SALINE or LACTATED RINGERS BAG**

1. Bleeding or potential bleeding from traumatic or non-traumatic causes, e.g. ectopic pregnancy, GI bleed, abdominal pain
2. Hypotension/dehydration from other causes, i.e. septicemia, hypothermia, anaphylaxis, spinal cord injury, protracted vomiting or diarrhea
3. Burn patients with arrhythmia, hypotension, delayed transport times, or need for analgesia
4. Diabetics with BS > 240 mg/dL, with signs of dehydration or when it is unclear if the situation is diabetic ketone acidosis.
5. Fluid challenges
6. Cardiac or respiratory arrest.

**CONSIDERATIONS FOR 500 cc NORMAL SALINE or LACTATED RINGERS BAG**

1. Anticipated need for medication administration in non-hypovolemic medical conditions such as chest pain, isolated head injuries with brief LOC, confusion or amnesia, seizures, hypoglycemia, shortness of breath, drug overdose, tachycardia > 120, hypertension with systolic BP > 200 and CVAs.
2. All non-traumatic pediatric patients (≤ 12 years) requiring IV.

**INDICATIONS/SALINE LOCK**

1. Any patient > 12 years, not requiring volume replacement or multiple medication administration.

**PEDIATRIC CONSIDERATIONS**

1. In the arrested or unconscious patient < 8 years, IO is the preferred vascular access route.

**SPECIAL NOTES**

1. For penetrating, thoracic, or abdominal trauma and all trauma patients with a systolic BP < 90 or pulse > 120, attempts at IV insertion should not delay transport. Obtain IV access enroute in these patients unless there is prolonged extrication.
2. Distal sites, such as the forearm, are preferred in non-critical patients. The antecubital and external jugular site can be used in cases where rapid cannulation is required, i.e. cardiac arrest or severe trauma.
3. Hickman catheters®, peripherally inserted central catheter (PICC), implanted central venous access lines (Portacath®) and AV shunts should not be used for prehospital venous access, except by trained paramedics only, when the patient is in critical need of venous access and an IV is unavailable. Avoid placing IVs in the same extremity as shunts if possible.
4. Document site, type fluid, rate, needle gauge, and total volume infused.
5. If IV solutions have been “setup” (tubing inserted into bag) prior to use, the date and time of the setup must be documented on the IV bag. This setup must be used within 24 hours of the time it was prepared.

# Nebulizer Inhalation Therapy

**Clinical Indications:**

- Patients experiencing bronchospasm.

**Procedure:**

1. Gather the necessary equipment.
2. Assemble the nebulizer kit.
3. Instill the premixed drug (such as Albuterol or other approved drug) into the reservoir well of the nebulizer.
4. Connect the nebulizer device to oxygen at 4 - 6 liters per minute or adequate flow to produce a steady, visible mist.
5. Instruct the patient to inhale normally through the mouthpiece of the nebulizer. The patient needs to have a good lip seal around the mouthpiece.
6. The treatment should last until the solution is depleted. Tapping the reservoir well near the end of the treatment will assist in utilizing all of the solution.
7. Monitor the patient for medication effects. This should include the patient's assessment of his/her response to the treatment and reassessment of vital signs, ECG, and breath sounds.
8. Assess and document peak flows before and after nebulizer treatments.
9. Document the treatment, dose, and route on/with the patient care report (PCR).

# Parenteral Access: Existing Catheters

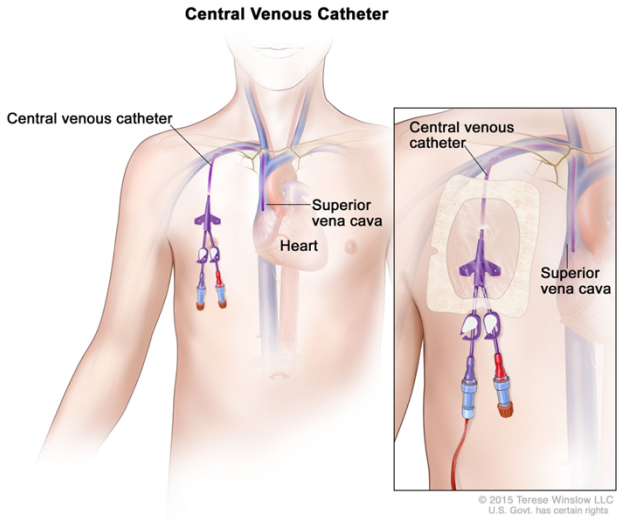
P

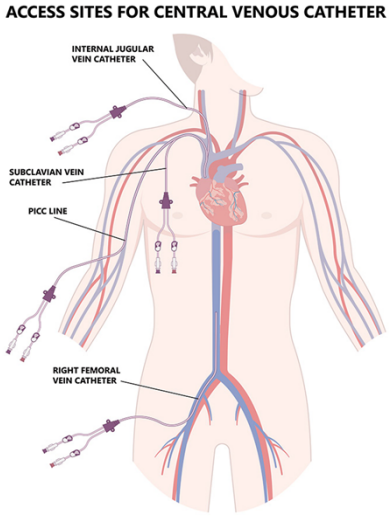
**Clinical Indications:**

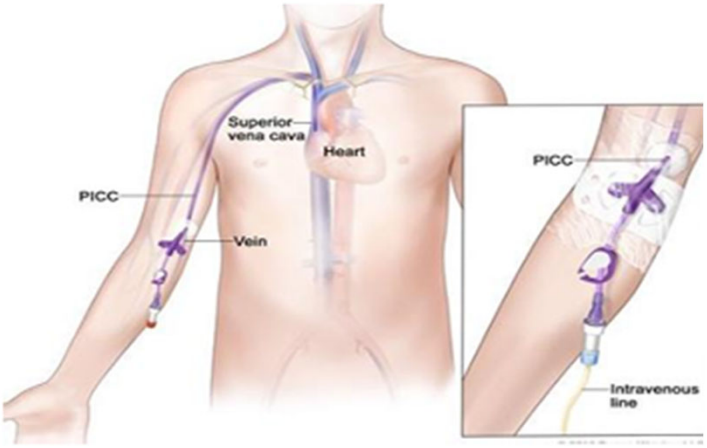
- Inability to obtain adequate peripheral access.
- Access of an existing venous catheter for medication or fluid administration.
- Central venous access in a patient in cardiac arrest.

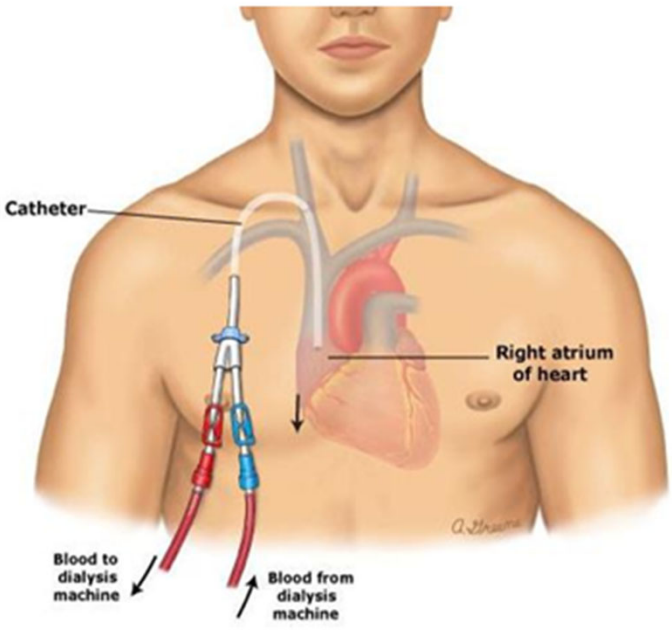
**Procedure:**

1. Clean the port of the catheter with alcohol wipe.
2. Using sterile technique, withdraw 5-10 ml of blood and discard syringe in sharps container.
3. Using 5cc of normal saline, access the port with sterile technique and gently attempt to flush the saline.
4. If there is no resistance, no evidence of infiltration (e.g., no subcutaneous collection of fluid), and no pain experienced by the patient, then proceed to step 5. If there is resistance, evidence of infiltration, pain experienced by the patient, or any concern that the catheter may be clotted or dislodged, do not use the catheter.
5. Begin administration of medications or IV fluids slowly and observe for any signs of infiltration. If difficulties are encountered, stop the infusion and reassess.
6. Record procedure, any complications, and fluids/medications administered in the Patient Care Report (PCR).



# Port-a-Cath Access

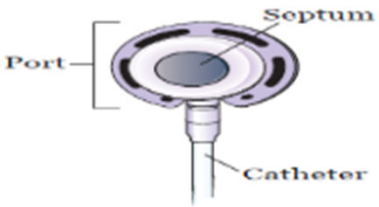
P

**Clinical Indications:**

- Patient requires IV fluids or access for potential IV fluid need
- Patient requires IV medication or access for potential IV medication need
- Patient requires venous blood sample

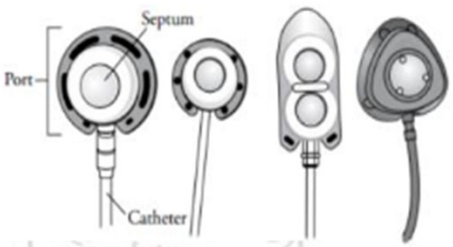
**Clinical Contraindications:**

- Redness, edema, pain, or drainage over the site
- Possible disruption in device
- Improper functioning of device



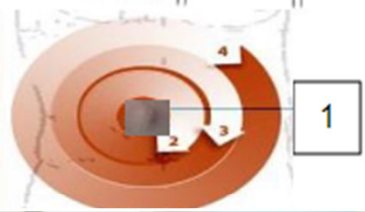

**Equipment Needed:**

- Huber needle 20 gauge, 1 in L-shaped or linear (DO NOT USE Standard Angiocath)
- Sterile gloves
- Apply face mask to provider and patient
- 10 ml syringe
- Cleaning pads (Alcohol/Chlorhexidine)
- IV extension tubing or Huber needle with extension combination



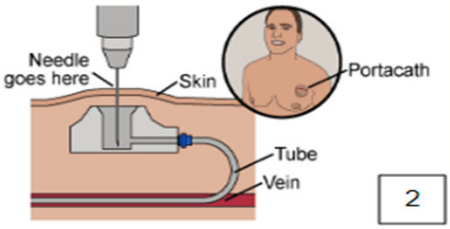

**Procedure:**

- Wash hands and don clean gloves
- Clean site over port with cleaning pads using circular motion
- Start over port and make circle larger, extending away from port
- Repeat this step x 3 (3 new cleaning pads each time)
- Allow to dry completely




- Open sterile gloves and use inside of package as a sterile field
- Place the following onto the sterile field from it's respective packaging:
- Keep all items sterile as you place onto sterile field
- IV extension set or may be combined with Huber needle as one unit
- Huber needle
- 10 mL syringe
- Don sterile gloves
- Attach IV extension tubing to the Huber needle or use combined kit
- Draw up 10 mL of NS into syringe and attach to IV extension tubing
- Using your non-dominate hand:
  - Locate edges of port to stabilize
  - Locate septum of port with tip of finger


- Insert Huber needle into center of port (septum) at a 90° angle
- Using firm, but gentle pressure, push the needle through the skin
- Continue downward pressure until needle touches the metal base of the port
- Aspirate blood using the 10 mL syringe
- Once aspiration is noted, then flush the port with 10 mL syringe of NS
- Place Tegaderm dressing over the port and Huber needle site
- Attach IV set-up tubing to the IV extension set as indicated




B
A
P

## IMPEDANCE THRESHOLD DEVICE (ITD) - RESQPOD™

**INTRODUCTION**

An inspiratory impedance threshold device is a valve used in cardiopulmonary resuscitation (CPR) to decrease intrathoracic pressure and improve venous return to the heart.

**INDICATIONS**

1. The ITD may be utilized to assist with control of ventilatory rate and improve cardiac preload for patients who are receiving CPR.
2. It may be utilized with an endotracheal tube, supraglottic airway device, or with a BVM.

**CONTRAINDICATIONS**

1. The ITD should not be utilized for patients who have spontaneous respirations. It should be removed from the endotracheal tube/BVM once spontaneous respirations have returned.
2. The ITD should not be used for traumatic cardiac arrest.

**PROCEDURE**

1. Ensure airway is adequate per airway/failed airway guideline.
2. Place the ITD between the airway device and the EtCO2 detector (for intubated/supraglottic patients) or between the bag and mask (for patients ventilated with the BVM).
3. Flip the red switch to the “on” position so that the respiratory timing lights flash.
4. Provide a ventilation after each flash of the LED timing lights.
5. Perform chest compressions as indicated.
6. Once there is return of spontaneous circulation, remove the ITD. Place the device near the patient’s head so that it may be replaced if the patient rearrests, and can be used to guide ventilations once removed. The ITD should also be removed if the patient has spontaneous respirations.
7. Carefully monitor the placement of the endotracheal tube after movement of the patient, placement of the ITD, and/or removal of the ITD.
8. Document the procedure and results in the Patient Care Report (PCR).

BVM

Capno Sensor

ResQPOD

Advanced Airway

# Pacing (Transcutaneous)

P

**Clinical Indications:**

- Patients with symptomatic bradycardia (less than 60 per minute) with signs and symptoms of inadequate cerebral or cardiac perfusion such as:
  - Chest Pain
  - Hypotension
  - Pulmonary Edema
  - Altered Mental Status, Confusion, etc.
  - Ventricular Ectopy
- Asystole, pacing must be done early to be effective.
- PEA, where the underlying rhythm is bradycardic and reversible causes have been treated.

**Procedure:**

1. Attach standard four-lead monitor.
2. Apply defibrillation/pacing pads to chest and back:
   - One pad to left mid chest next to sternum
   - One pad to mid left posterior chest next to spine.
3. Rotate selector switch to pacing option.
4. Adjust heart rate to 70 BPM for an adult and 100 BPM for a child.
5. Note pacer spikes on EKG screen.
6. Slowly increase output until capture of electrical rhythm on the monitor.
7. If unable to capture while at maximum current output, stop pacing immediately.
8. If capture observed on monitor, check for corresponding pulse and assess vital signs.
9. Consider the use of sedation or analgesia if patient is uncomfortable.
10. Document the dysrhythmia and the response to external pacing with ECG strips in the PCR.

# Physical Restraints

## INTRODUCTION

The use of physical restraints should be a judicious choice carefully considered by the highest credentialed EMS provider and the crew present. The ultimate goal of physical restraint is safety for the patient and caregivers.

## INDICATIONS

1. Combative Patient
2. ETOH
3. Post Advanced Airway Management
4. Self Abusive Patient
5. Danger to self or others

## PRECAUTIONS

1. Adequate personnel should be present in order to safely apply the restraints. At a minimum there should be at least one person assigned to each patient extremity with one additional crew member to apply the restraints.
2. Chemical restraint may be required prior to the application of physical restraints.
3. Once restraints are applied, they shall not be removed until arrival at the ED.

## PROCEDURE

1. Make a plan and coordinate with law enforcement.
2. Prepare equipment.
3. Physically control patient
4. Apply wrist restraints first to an immobile object
   A. One arm goes above head
   B. One arm goes down by the patient's side
5. Apply ankle restraints to an immobile object
6. CSM checks every 5 minutes

## PEDIATRIC CONSIDERATIONS

1. Consider KED or equivalent for pediatric patients

## SPECIAL NOTES

1. It is never acceptable to place the patient in a prone position while restrained
2. The patient shall never be sandwiched between long spine boards or hog tied
3. If handcuffs are used, a law enforcement officer shall accompany the patient or follow immediately behind the medic unit

# Pulse Oximetry

**Clinical Indications:**

- Patients with suspected hypoxemia.

**Procedure:**

1. Apply probe to patient's finger or any other digit as recommended by the device manufacturer.
2. Allow machine to register saturation level.
3. Record time and initial saturation percent on room air if possible on/with the patient care report (PCR).
4. Verify pulse rate on machine with actual pulse of the patient.
5. Monitor critical patients continuously until arrival at the hospital. If recording a one-time reading, monitor patients for a few minutes as oxygen saturation can vary.
6. Document percent of oxygen saturation every time vital signs are recorded and in response to therapy to correct hypoxemia.
7. In general, normal saturation is 97-99%. Below 94%, suspect a respiratory compromise.
8. Use the pulse oximetry as an added tool for patient evaluation. Treat the patient, not the data provided by the device.
9. The pulse oximeter reading should never be used to withhold oxygen from a patient in respiratory distress or when it is the standard of care to apply oxygen despite good pulse oximetry readings, such as chest pain. Supplemental oxygen is not required if the oxyhemoglobin saturation is >= 94%, unless there are obvious signs of heart failure, dyspneic, or hypoxic to maintain to 94%.
10. Factors which may reduce the reliability of the pulse oximetry reading include but are not limited to:
    - Poor peripheral circulation (blood volume, hypotension, hypothermia)
    - Excessive pulse oximeter sensor motion
    - Fingernail polish (may be removed with acetone pad)
    - Carbon monoxide bound to hemoglobin
    - Irregular heart rhythms (atrial fibrillation, SVT, etc.)
    - Jaundice
    - Placement of BP cuff on same extremity as pulse ox probe.

# QUIK TRACH

**INDICATIONS**

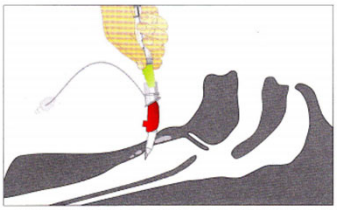
1. Failed airway in an adult patient

**PROCEDURE**

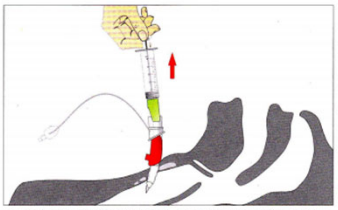
1. Ensure pre-oxygenation is being performed/attempted
2. Prepare equipment
3. Place patient in a supine position. Assure stable positioning of neck region and hyperextend the neck
3. Identify the cricothyroid membrane and using aseptic technique, clean the site with alcohol wipes
4. Puncture the cricothyroid ligament at a 90° angle
5. Partially advance cannula until air can be aspirated into the syringe
6. Change angle of insertion to 60°, and advance cannaul into trachea to the level of the stopper
7. Remove the stopper
8. Advance cannula only into the trachea until flange rests on the neck
9. Remove needle/syringe and dispose into sharps container
10. Secure the device in place and connect appropriate sized BVM
11. Ventilate patient, assess for bilateral lung sounds, confirm with capnography
12. Reassess continuously

**SPECIAL NOTES**

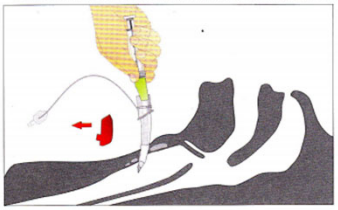
1. If the patient becomes conscious after procedure, consider the post intubation guideline



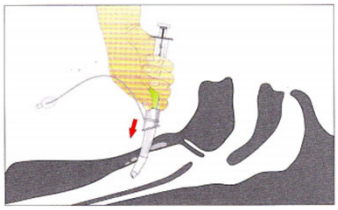
Hyperextend the head. Evacuate the cuff completely. Locate the cricothyroid membrane by palpation of the depression between the thyroid and cricoid cartilage and puncture. Because of the sharp tip and conical shape of the needle, an incision is not necessary. The opening of the trachea is obtained by dilating the skin which reduces the risk of bleeding.
Insert the Quicktrach II further towards the trachea up to the stopper. The stopper prevents the needle from being inserted too deep and therefore avoids perforation of the posterior tracheal



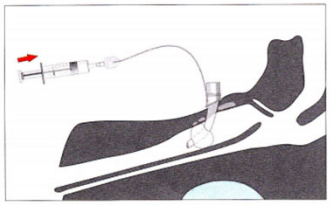
Aspirate air with the syringe to determine the position of the cannula. If this is possible, the needle is in the trachea.



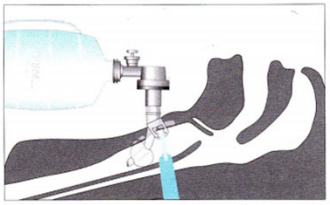
Remove the stopper from the plastic cannula.



Push the plastic cannula forward with the thumb until the safety clip audibly clicks into position. This indicates that the tip of the metal needle is covered by the plastic cannula to prevent trauma



Inflate the cuff with the prepared syringe (10ml).



Secure the plastic cannula with the foam necktape. Ventilate the patient via the 15mm standard connector.

# Spinal Motion Restriction

B
A
P

**Clinical Indications:**

- Need for Spinal Motion Restriction as determined by protocol.
- **Protocols for appropriate use of long spine board (LSB) OR any equivalent device below:**

1. **Spine boards or similar rigid devices, ideally should NOT be used during transport or during inter-facility transfers.** They should be utilized for extrication and / or patient transfers, as well as support for chest compressions. They DO NOT improve outcomes and can induce pain, agitation / anxiety, respiratory compromise, and decreased tissue perfusion at pressure points.

2. Devices such as the long or short spine board, scoop stretcher, soft-body splints, etc., should be considered extrication devices rather than transport-devices. Instead, use of Spinal Motion Restriction which includes a rigid cervical collar, manual in-line spine stabilization, maintaining spinal alignment with movement and transfers, and securing to the ambulance stretcher.
3. Penetrating trauma to head, torso, or back with no evidence of spinal injury does not require Spinal Motion Restriction.

**Procedure:**

1. Gather LSB, scoop, ambulance cot, or other Spinal Motion Restriction device, securing devices, and appropriate C-collar.
2. Explain the procedure to the patient and assess / record neurological exam and pulse status.
3. Place the patient in an appropriately sized C-collar while maintaining in-line stabilization of the C-spine by second provider. In-line stabilization should not involve traction / tension, but rather maintain the head in a neutral, midline position while the first rescuer applies the collar.
4. Once the collar is secure, the second rescuer should still maintain their position to ensure stabilization (the collar is helpful but will not do the job by itself.)
5. If indicated, place patient on a Spinal Motion Restriction device with log-roll or similar technique dependent on circumstances, if patient is supine or prone. During extrication or where otherwise unable to be placed prone or supine, place on Spinal Motion Restriction device by the safest method available that allows maintenance of in-line spinal stability.
6. Stabilize the patient with straps / head rolls / tape / other devices as needed. Once the head is secured to the Spinal Motion Restriction device / stretcher, the second rescuer may release manual in-line stabilization. **Once the patient arrives at the stretcher, REMOVE the rigid Spinal Motion Restriction device while maintaining spinal alignment using log-roll or multi-rescuer lift techniques and transfer and secure to the stretcher for transport.**
7. NOTE: Spinal precautions may be achieved by many methods. Never force a patient into a certain position to immobilize them. Such situations may require a second rescuer to maintain manual stabilization throughout the transport to the hospital. Special equipment such as football players in full pads and helmet may remain immobilized with helmet and pads in place.
8. Document the time of the procedure in the patient care report (PCR).

# SUPRAGLOTTIC AIRWAY

**INTRODUCTION**

Supraglottic airways are designed to provide a patent airway in a cardiac arrest, or as a rescue airway. It is designed to provide a patent airway for patients without an intact gag reflex. This device is designed to be placed blindly. The gastric access lumen allows for passage of a gastric tube up to 18 Fr for gastric suctioning.

**INDICATIONS**

1. Patients in cardiac arrest
2. Patients with respiratory arrest
3. Medication assisted airway management with advanced airway

**CONTRAINDICATIONS**

1. Intact gag reflex
2. Patient's height/weight less than manufacturer's recommendations for device
3. Known esophageal disease
4. Caustic substance ingestion
5. Known or suspected airway burns
6. Anaphylaxis with respiratory symptoms
7. Known or suspected airway obstruction.

**PROCEDURE**

## King LTS-D

1. Apply tongue-jaw lift and introduce the lubricated KING airway into the corner of the mouth
2. Advance the tip under the base of the tongue while rotating the tube back to the midline
3. Without exerting excessive force, advance tube until the base of the connector is aligned on the teeth or gums
4. Inflate the cuff to manufacturer recommendations
5. Attach the BVM and Capnography. While gently bagging the patient to assess ventilation, simultaneously withdraw the airway until ventilation is easy and free flowing (large tidal volume with minimal airway resistance and chest rise/ fall)
6. Secure the device using tape or commercial tube holder
7. Lubricate and insert a 16 Fr. gastric tube into the gastric access lumen, maintain constant suctioning available, suction as needed

## I-Gel

1. Apply chin lift and introduce the i-Gel airway into the corner of the mouth
2. Advance the tip over the base of the tongue
3. Without exerting excessive force, advance tube until resistance is met
4. Attach the BVM. While gently bagging the patient to assess ventilation, gently advance the device to ensure it is seated against the larynx. Gurgling may be heard, however the device will seal and provide adequate ventilation and protection against aspiration.
5. Secure the device using twill tape or medical tape.
6. Lubricate and insert a gastric tube into the gastric access lumen per size recommendations on the i-Gel packaging.

## LMA

1. Fully deflate the mask for insertion.
2. Generously lubricate the posterior surface of the cuff and airway tube
3. Place the patient's head in a neutral or sniffing position. Hold LMA with distal tip pointing toward the palate
4. Press the tip of the mask against the hard palate. Maintain pressure against the palate, continue to rotate the mask inwards in a circular motion following the curvature of the hard and soft palate
5. Continue until resistance is felt. The distal end should now be in contact with the upper esophageal sphincter
6. Maintain inward pressure, secure the mask into position by taping cheek to cheek across the fixation tab. Should be done prior to inflation. Inflate with the minimum amount of air needed to achieve an effective seal

**SPECIAL NOTE**

1. It may be advisable to partially insert the gastric tube before introduction of the device into the patient, in an attempt to slow any return of gastric contents through the gastric lumen. There is no check valve on that lumen to prevent backflow.

## SURGICAL CRICOTHYROTOMY

**ACTION**
To ventilate a patient who has a complete airway obstruction that cannot be ventilated adequately by any other means.

**INDICATIONS**
Complete airway obstruction caused by:
1. Foreign body obstruction of the proximal airway
2. Laryngeal fracture
3. Laryngeal edema caused by inhaled materials, burns, or anaphylaxis
4. Epiglottitis
5. Massive Maxillofacial injury causing complete upper airway obstruction

**CONTRAINDICATIONS**
1. Ability to ventilate patient by any other means (BVM, oral airways, rescue airway)
2. Laryngeal fractures that have distorted or obliterated landmarks
3. Less than 8 years of age

**PRECAUTIONS**
1. May cause false passage, subcutaneous emphysema, and bleeding.
2. Use with caution in patients with bleeding disorders.

**PROCEDURE**
1. If possible, provide optimal $O_2$ saturation of the patient before starting the procedure.
2. Take appropriate BSI precautions
3. Identify the cricothyroid membrane and clean with Iodine swabsticks.
4. Make a vertical mid-line incision approximately 1.5” long with a #10 scalpel over the cricothyroid membrane into the underlying strap of muscle.

A. Insert the tracheal hook into the membrane perpendicular to the trachea. Once the tracheal hook is in the trachea, rotate towards the patient’s feet and lift upward and caudad (towards the patient’s feet) traction.

5. Use the scalpel to open transversely into the trachea through the cricothyroid membrane, maintain opening with curved hemostats.
6. Using cricoid pressure, insert gum elastic bougie into the incision.
7. Introduce a 6.0 tracheostomy tube perpendicular to the trachea, rotating as it is advanced (Tracheal Tube introducer may be used in place of the gum elastic bougie).
8. Inflate the cuff with 5-6 cc of air.
9. Confirm placement with $EtCO_2$, auscultating epigastric area and bilateral lung sounds.
10. Secure tube with appropriate method or device.
11. Consider positioning patient on backboard and secure head with speedblocks.
12. Monitor patient for evidence of subcutaneous air.

**PEDIATRIC CONSIDERATIONS**
1. Contraindicated in children under 8 years of age.

**SPECIAL NOTES**
1. The tube must be left in place when a patient is pronounced dead in the field.
2. Clean, disinfect, and return tracheal hook and hemostats to the kit after use.

# TASER PROBE REMOVAL

**INTRODUCTION**
Taser probes are barbed metal projectiles that may embed themselves up to 13 mm into the skin.

**INDICATIONS**
1. Patient with uncomplicated conducted electrical weapon (Taser®) probes embedded subcutaneously in non-sensitive areas of skin.

**CONTRAINDICATIONS**
1. Patients with conducted electrical weapon (Taser®) probe penetration in vulnerable areas of body as mentioned below should be transported for further evaluation and probe removal
   A. Skin above level of clavicles
   B. Spine
   C. Genitalia
   D. Suspicion that probe might be embedded in bone, blood vessel, or other sensitive structure.
   E. Eye involvement

**PROCEDURE**
1. Ensure wires are disconnected from weapon.
2. Stabilize skin around probe using non-dominant hand.
3. Grasp probe by metal body with pliers or hemostats to prevent puncture wounds to EMS personnel.
4. Remove probe in single quick motion.
5. Wipe wound with antiseptic wipe and apply dressing.

# TOURNIQUETS

**INTRODUCTION**

Tourniquets have long been a source of controversy because of the problems associated with their use (ischemia, nerve injury, etc). Recent advances in military medicine have improved the design and allowed for increased use for civilian EMS.

**INDICATIONS**

1. Penetrating trauma from firearms and stabbings involving severe hemorrhage
2. Incidents involving blast injuries to extremities
3. Incidents resulting from industrial or farm accidents involving severe hemorrhage
4. Multiple causality injuries and lack of resources to handle hemorrhage control
5. Severe hemorrhage uncontrolled by direct pressure

**CONTRAINDICATIONS**

1. Any bleeding that can be managed by direct pressure, elevation, or cold pack administration.
2. Major bleeding to a non-extremity

**PROCEDURE**

1. Recognition that bleeding is uncontrollable with direct pressure
2. Apply tourniquet to the proximal segment of the bleeding limb
3. Tighten device until bleeding is stopped and secure device
4. Transport patient to trauma center and report time of placement

**SPECIAL NOTE**

If transport to trauma center will be greater than 30 minutes, reassess tourniquet for possible removal

## FINGER/TUBE THORACOSTOMY

**INDICATIONS**
1. Traumatic cardiac arrest
2. Signs of tension pneumothorax with severe hemodynamic compromise:
   A. Acute respiratory distress or failure AND/OR
   B. Hypotension not responsive to fluid bolus

**CONTRAINDICATIONS**
1. None in above situation

**EQUIPMENT**
1. Sterile gloves
2. Eye protection/face shield
3. Chlorhexidine or betadine prep
4. #10 blade (preferred) scalpel
5. Hemostats or kelly clamp
6. Skin marking pen (optional)
7. Chest tube (for tube thoracostomy)
8. Suturing material with needle driver (for tube thoracostomy)
9. Foam tape (or equivalent) (for tube thoracostomy)
10. Vacuum/water seal device (for tube thoracostomy)

### FINGER VS TUBE THORACOSTOMY

**FINGER THORACOSTOMY INDICATIONS**
1. Immediate decompression in trauma:
   - Tension pneumothorax in a patient with cardiopulmonary arrest or severe respiratory distress.
   - Hemodynamic instability with suspected pleural space pathology (e.g., tension pneumothorax or massive hemothorax).
2. Pre-hospital or emergency setting:
   - When rapid decompression is needed, and chest tube placement may delay treatment.
3. Unavailability of chest tubes or equipment:
   - Initial decompression before transitioning to tube thoracostomy in a controlled setting.

**TUBE THORACOSTOMY INDICATIONS**
1. Definitive management of pleural pathology
   - Traumatic pneumothorax or hemothorax
   - Empyema or pleural effusion requiring drainage
   - Post-finger thoracostomy stabilization
2. Non-emergency situations
   - Controlled setting where there is time ot perform a sterile procedure

**PROCEDURE**
1. Utilize universal precautions including face and eye protection.
2. With arm abducted, find and mark the area at the anterior 4th or 5th intercostal space at the anterior (or between anterior & mid-axillary) (within the triangle of safety).
3. Clean the area as best as possible with an antiseptic swab stick in a circular motion starting from the inside and working out.
4. Make a 2-3 inch transverse incision through the skin along the 5th rib, to depth of the rib.
5. Utilizing Rochester Pean (Kelly), penetrate parietal pleura.
   A. Penetration is accomplished with a gently, steady push (while feeling for a sudden “give” or “pop”).
   B. Depth should generally NOT exceed 3 cm past targeted rib.
   C. USE CAUTION. Contents in thoracic cavity MAY BE UNDER PRESSURE. Penetration into the thoracic cavity may dramatically release this pressure. Biohazard precautions and the use of personal protective equipment are necessary.
6. Bluntly dissect intercostal muscle wide enough to carefully insert finger into pleural cavity.
7. Insert finger along the track into the pleural cavity and perform sweep.
   A. Insure that adhesions between parietal and visceral (if present) are gently released.
   B. Be careful as there may be fractured ribs with jagged edges that may puncture glove/skin of paramedic.
8. Remove finger and monitor patient for improvement or complications.
9. Each wound should be circled with a permanent marker and labeled EMS-R or EMS-L to identify incisions made by EMS in the event of autopsy or criminal investigation.
10. Consider Vent Chest Seal if patient spontaneously breathing

CONT’D FOR TUBE THORACOSTOMY
1. Insert appropriately sized chest tube with Kelly clamp into incision site directing the tube cephalad and posteriorly
   A. Ensure to clamp end of tube not being placed into thoracic cavity to prevent return of blood
2. Once tube is inserted, remove clamp to evaluate for return of air and/or blood
3. Connect to suction tubing coming from vacuum/water seal device
4. Setup vacuum/water seal device per manufacturer’s recommendations
5. Suture tube in place

# Ultrasound (PAUSE) Protocol

B
A
P

Prior Training and Authorization Required From Physician Medical Director Prior to Use

**Step 1: Pleural Line Exam**

Place transducer with indicator towards head at second intercostal space along mid-clavicular line.

Identify two rib shadows and pleural line

Lung sliding or comet tail artifact present

Pneumothorax

Yes

Consider needle throacostomy

No

Repeat above steps for third and fourth intercostal spaces

Repeat above steps for other side of chest

**Step 2: Focused Transthoracic Exam**

Subxyphoid Approach

Place probe inferior to xiphoid process with indicator to patient's right

Parasternal long approach

Place probe left of sternum at third or fourth intercostal space with indicator to patient's left hip

Identify the heart

Is there cardiac motion

No

Consider Stopping Resuscitation

Yes

Identify the pericardial line

Is there an anechoic space between the heart and the pericardial line?

No

No Pericardial Effusion

Continue resuscitation

Yes

Is there cardiac motion

Notify hospital of need for pericardiocentesis

**Step 3: Focused Abdominal Exam**

Place transducer with indicator towards head at RUQ, mid-axillary line

Place transducer with indicator towards head at LUQ, mid-axillary line

Place transducer with indicator towards head above the pubic symphysis

Place transducer with indicator towards patient's right just above the pubic symphysis

Presence of anechoic areas surrounding the liver, spleen or bladder

Normal

No

Yes

Positive FAST EXAM

Exit to Appropriate Protocol

Transport to Trauma Center

# Wound Care

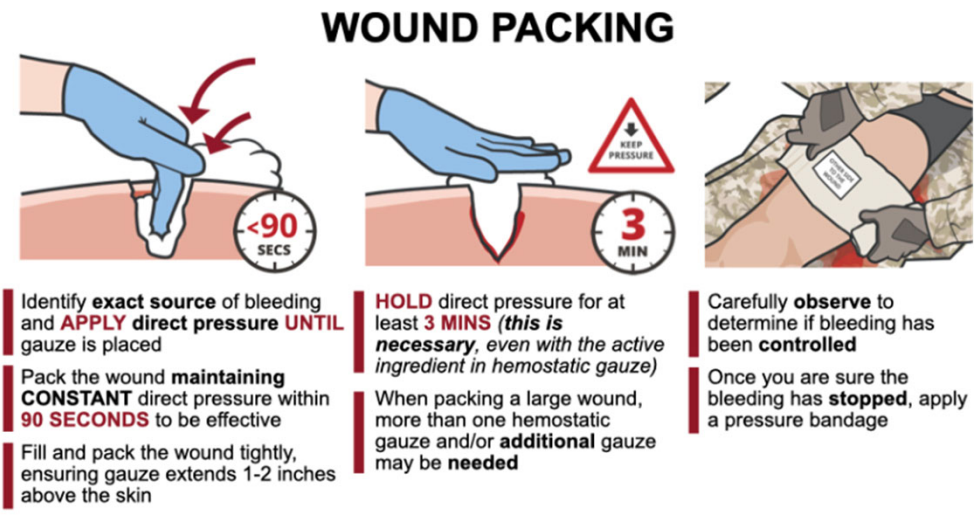
## INDICATIONS

Protection and care for open wounds prior to and during transport.

## GENERAL WOUND CARE PROCEDURES

1. Use personal protective equipment, including gloves, gown, and mask as indicated.
2. If active bleeding, elevate the affected area if possible and hold direct pressure. Do not rely on "compression" bandage to control bleeding, unless you are able to frequently re-evaluate the wound for adequate hemostasis. Direct manual pressure is much more effective.
3. Consider tourniquet early for extremity bleeding unable to be controlled with direct pressure.
4. Once bleeding is controlled, irrigate severely contaminated wounds with saline as appropriate (this may have to be avoided due to extreme pain or if bleeding was difficult to control). Consider analgesia per protocol prior to irrigation.
5. Cover wounds with sterile gauze/dressings. Check distal pulses, sensation, and motor function to ensure the bandage is not too tight.
6. Monitor wounds and/or dressings throughout transport for bleeding.
7. Document the wound and assessment and care in the patient care report (PCR).

## Instructions for Wound Packing



# Reference

## ALS Tiering for BLS Services

I. **Purpose**

This policy defines which patient conditions are appropriate for EMT versus the minimum of an AEMT.

II. **Definitions**

A. Basic Life Support Provider: Providers trained and certified to the EMT credentialing level.

B. Advanced Life Support Provider: Providers trained and certified to a minimum of the AEMT credentialing level.

III. **Procedure**

A. Patients with the following presentations should be considered for ALS transport:

1. Accident/assault victim with multiple trauma or significant mechanism of injury (qualify for Trauma Team Activation) including but not limited to:
    a. Falls from a distance of > 20 feet
    b. Ejection from a vehicle
    c. Death in the same passenger compartment
    d. Extrication time > 20 minutes
    e. Rollover
    f. High speed auto crash with any of the following:
        i. Initial speed > 40 mph
        ii. Major auto deformity > 20 inches
        iii. Passenger compartment intrusion > 12 inches
        iv. Steering wheel deformity
        v. Auto-pedestrian/auto-bicycle injury with significant (> 5mph) impact
        vi. Pedestrian thrown or run over
    g. Motorcycle crash > 20mph or with separation of rider
2. Airway compromise
3. Altered level of consciousness: persistent, alternating, unknown etiology, or GCS < 14
4. Anaphylaxis
5. Respiratory distress
6. Burns: major partial or full thickness, hydrofluoric acid or fluorine gas exposure, respiratory or facial, or when pain control is indicated
7. Chest pain and/or heart problems
8. Cardiac or respiratory arrest
9. Cerebrovascular accident or stroke symptoms
10. Near drowning
11. Electrical injury
12. Fractures: bilateral femur, pelvic, or open fractures (suspected or known), or when pain control is indicated
13. Heatstroke with altered level of consciousness
14. Hemorrhage: internal or external, with evidence of shock
15. Obstetrical: known or suspected complications, including, but not limited to, breech, prematurity, multiple births, or pre-eclampsia
16. Overdoses, drug reactions, and poisonings associated with GCS < 13
17. Penetrating trauma to head, neck, or torso
18. Syncopal episode in any patient > 35 years old
19. Seizures: prolonged or repetitive, initial episode or unknown etiology
20. Any patient whose vital signs fall within these ranges should considered for ALS transport

| Age | Blood Pressure | Pulse | Respirations |
|---|---|---|---|
| >11 Yrs. | <90 or >200 systolic or >120 diastolic | <50 or >150 | <10 or >30 |
| 3-11 Yrs. | <80 systolic | <60 or >150 | <15 or >30 |
| 3mo-2Yrs. | <70 systolic | <80 or >160 | <20 or >40 |
| Birth-2 Mo | <50 systolic | <100 or >180 | <30 or >50 |

## ALS Tiering for BLS Services

B. Patients meeting the following criteria may be may be transported BLS:

1. Accident/assault victims with minor trauma
2. Altered level of consciousness: brief and improving, and GCS of 14 or 15, or altered level of consciousness that represents the baseline and stable mental status of the patient.
3. Burns: minor (<20% total body surface area (TBSA) in adults, <10% TBSA if <12 or >60 years)
4. Fractures: simple
5. Lacerations: minor
6. Obstetrical: uncomplicated
7. Psychiatric or suicidal patients that do not require more than two point light physical restraint
8. Seizure: febrile or with known history and improving LOC
9. Syncopal episode in any patient <35 years old

IV. **Special Notes**

A. If in doubt as the appropriate level of transport, contact a supervisor or medical control for assistance

B. If a supervisor or medical control is not readily available default to ALS level of transport

C. If any patient presentation results in a high priority (lights and sirens) transport, ALS tiering is strongly encouraged

# Common Medications

## Commonly Prescribed Medications

| Generic Name | Brand Name | Typical Use |
|---|---|---|
| **Acetaminophen/butalbital/caffeine** | **Americet** | **Analgesics, non-narcotic** |
| Acetaminophen/codeine | Tylenol with Codeine | Analgesics, narcotic |
| **Acetaminophen/hydrocodone** | **Vicodin, Norco** | **Analgesics, narcotic** |
| Acetaminophen/oxycodone | Endocet, Oxycet, Percocet | Analgesics, narcotic |
| **Acetaminophen/propoxyphene-N** | **Darvocet** | **Analgesics, narcotic** |
| Acetaminophen/tramadol | Ultracet | Analgesics, non-narcotic |
| **Acyclovir** | **Zovirax;Zovirax Topical** | **Antivirals, herpes genitalis** |
| Albuterol Aerosol | Proventil, Ventolin, Volmax Vospire | Adrenergic agonists, bronchodilators |
| **Albuterol/ipratropium** | **Combivent** | **Anticholinergics, bronchodilators** |
| Alendronate | Fosamax | Bisphosphonates, osteoporosis |
| **Allopurinol** | **Aloprim; Zyloprim** | **Antigout agents** |
| Alprazolam | Xanax | Anxiety disorder |
| **Amitriptyline** | **Elavil; Vanatrip** | **Depression** |
| Amlodipine | Norvasc | Hypertension, angina |
| **Amlodipine/benazepril** | **Lotrel** | **Hypertension** |
| Amoxicillin | Amoxicot, Trimox | Antibiotics, penicillins |
| **Amoxicillinpotassium clavulanate** | **Augmentin** | **Anitbiotics, penicillins** |
| Amphetamine/dextroamphetamine | Adderall | Adrenergic agonists, amphetamines |
| **Aspirin, enteric-coated** | **Entaprin** | **Analgesics, non-narcotic, antipyretics** |
| Atenolol | Tenormin | Antiadrenergics, beta blocking, HTN |
| **Atomoxetine** | **Strattera** | **ADHD** |
| Atorvastatin | Lipitor | Antihyperlipidemics |
| **Azithromycin** | **Zithromax, Z-Pak** | **Antibiotics, macrolide** |
| Benazepril | Benazepril Hydrochloride | Antihypertension |
| **Benzonatate** | **Tessalon** | **Cough** |
| Bisoprolol/hydrochlorothiazide | Ziac | Hypertension |
| **Budesonide** | **Nasal Rhinocort** | **Rhinitis, allergic, asthma** |
| Buproprion | Sustained-Release Wellbutrin | Depression, smoking cessation |
| **Buspirone HCl** | **BuSpar** | **Anxiety disorder** |
| Captopril | Capoten | Hypertension, heart failure |
| **Carisoprodol** | **Soma** | **Pain, musculoskeletal** |
| Carvediol | Coreg | Hypertension, heart failure |
| **Cefdinir** | **Omnicef** | **Antibiotics, cephalosporin** |
| Cefprozil | Cefzil | Antibiotics, cephalosporin |
| **Celecoxib** | **Celebrex** | **Arthritis, osteoarthritis, pain** |
| Cephalexin | Keflex | Antibiotics, cephalosporin |
| **Cetirizine** | **Zyrtec** | **Rhinitis, allergic, urticaria** |
| Chlorpheniramine maleate/hydrocodone | S-T Forte 2 | Cough, common cold |
| **Ciprofloxacin** | **Cipro** | **Infection, fluoroquinolones** |
| Citalopram | Celexa | Depression |
| **Clarithromycin extended-release** | **Biaxin** | **Antibiotics, macrolide** |
| Clindamycin | Cleocin HCl | Antibiotic |
| **Clonazepam** | **Klonopin** | **Seizures, absence, panic disorder** |
| Clonidine | Catapres | Hypertension, withdrawal, pain-cancer |
| **Clopidogrel** | **Plavix** | **Stroke, myocardial infarction** |
| Clotrimazole/betamethasone | Lotrisone | Antifungals |
| **Codeine/promethazine** | **Codeine** | **Cough, common cold** |
| Cyclobenzaprine | Flexeril | Pain, musculoskeletal |
| **Desloratadine** | **Clarinex** | **Rhinitis, allergic** |
| *Desogestrel/ethinyl estradiol* | Apri | Contraception |
| **Diazepam** | **Valium** | **Anxiety disorder, seizures** |
| Diclofenac | Cataflam | Arthritis, osteoarthritis |
| **Digoxin** | **Lanoxin** | **Heart failure, atrial fibrillation** |
| Diltiazem | Cardizem | Hypertension, atrial fibrillation |
| **Divalproex Sodium** | **Depakote** | **Seizures, mood stabilization** |
| Donepezil | Aricept | Alzheimer's disease |
| **Doxazosin** | **Cardura** | **Hypertension** |
| Doxycycline | Adoxa | Antibiotics |
| **Drospirenone/ethinyl estradiol** | **Yasmin** | **Contraception** |
| Enalapril | Vasotec | Hypertension, heart failure |
| **Escitalopram** | **Lexapro** | **Depression** |
| Esomeprazole | Nexium | Ulcer, esophagitis |
| **Estradiol** | **Alora, Climara** | **Menopause, breast cancer** |
| Estrogens, conjugated | Cenestin | Menopause, prostate cancer |

## Commonly Prescribed Medications

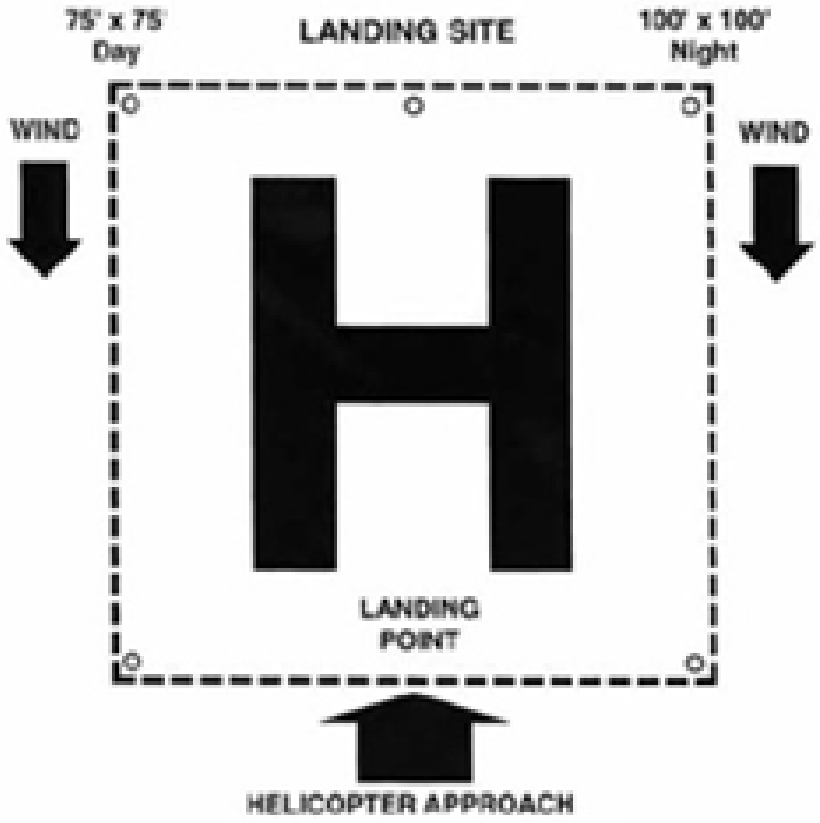
| Generic Name | Brand Name | Typical Use |
|---|---|---|
| **Estrogens, conjugated/medroxyprogesterone** | **Premphase, Prempro** | **Menopause** |
| Ethinyl estradiol/levonorgestrel | Alesse, Aviane | Contraception |
| **Ethinyl estradiol/norelgestromin** | **Ortho Evra** | **Contraception** |
| Ethinyl estradiol/norgestimate | Mononessa | Contraception |
| **Ezetimibe** | **Zetia** | **Hypercholesterolemia** |
| Famotidine | Pepcid | Ulcer |
| **Fenofibrate** | **Lipidil Supra** | **Hypercholesterolemia** |
| Fentanyl (transdermal) | Actiq | Analgesics, narcotic |
| **Ferrous Sulfate** | **N/A** | **Anemia** |
| Fexofenadine | Allegra | Rhinitis, allergic |
| **Fluconazole** | **Diflucan** | **Candidiasis, meningitis, antifungals** |
| Fluoxetine | Prozac | Panic disorder, depression |
| **Fluticasone** | **Flonase, Flovent** | **Rhinitis, allergic, asthma** |
| Fluticasone/salmeterol | Advair Diskus | Asthma, COPD |
| **Folic Acid** | **N/A** | **Anemia** |
| Fosinopril | Monopril | Hypertension |
| **Furosemide** | **Lasix** | **Hypertension** |
| Gabapentin | Neurontin | Seizures, pain |
| **Gemfibrozil** | **Lopid** | **Hypercholesterolemia** |
| Glimepiride | Amaryl | Diabetes mellitus |
| **Glipizide** | **Glucotrol** | **Diabetes mellitus** |
| Glyburide | DiaBeta, Glycron | Diabetes mellitus |
| **Glyburide/metformin** | **Glucovance** | **Diabetes mellitus** |
| Insulin | Isophane, Humulin | Diabetes mellitus |
| **Hydrochlorothiazide** | **Aquazide** | **Hypertension** |
| Hydroxyzine | Atarax, Hyzine | Anxiety, urticaria |
| **Ibuprofen** | **Advil, Motrin** | **Arthritis, osteoarthritis, analgesics** |
| Insulin Glargine | N/A | Diabetes mellitus |
| **Insulin Lispro** | **Humalog** | **Diabetes mellitus** |
| Irbesartan | Avapro | Hypertension |
| **Isosorbide Mononitrate** | **Imdur** | **Angina pectoris** |
| Lansoprazole | Prevacid | Ulcer, esophagitis |
| **Latanoprost** | **Xalatan** | **Glaucoma** |
| Levofloxacin | Levaquin | Antibiotics, fluoroquinolones |
| **Levothyroxine** | **Synthroid** | **Hypothyroidism** |
| Lisinopril | Prinivil, Zestril | Hypertension |
| **Lisinopril/hydrochlorothiazide** | **Prinzide** | **Hypertension** |
| Lorazepam | Ativan | Anxiety disorder |
| **Losartan** | **Cozaar** | **Hypertension** |
| Losartan/hydrochlorothiazide | Hyzaar | Hypertension |
| **Lovastatin** | **Altocor** | **Hypercholesterolemia** |
| Meclizine | Antivert | Motion sickness, vertigo |
| **Medroxyprogesterone** | **Depo-Provera** | **Contraception** |
| Metaxalone | Skelaxin | Pain |
| **Metformin** | **Glucophage** | **Diabetes mellitus** |
| Methylphenidate | Ritalin | ADHD, ADD |
| **Methylprednisolone** | **Solu-Medrol** | **Corticosteroids** |
| Metoclopramide | Reglan | Nausea, GERD, acid reflux |
| **Metoprolol Succinate** | **Lopressor** | **Hypertension, MI** |
| Metronidazole | Flagyl | Antibiotics |
| **Minocycline** | **Arestin** | **Antibiotics** |
| Mometasone | Nasonex | Rhinitis |
| **Montelukast** | **Singulair** | **Rhinitis, asthma** |
| Mupirocin | Bactroban | Skin infections |
| **Naproxen** | **Aflaxen, Anaprox** | **Arthritis, analgesics, non-narcotic** |
| Nifedipine extended-release | Procardia | Hypertension, angina |
| **Nitrofurantoin** | **Macrobid** | **Antibiotics** |
| Nortriptyline | Aventyl, Pamelor | Depression |
| **Olanzapine** | **Zyprexa** | **Schizophrenia, bipolar, mania** |
| Olopatadine | Patanol | Conjunctivitis |
| **Omeprazole** | **Prilosec** | **Ulcer** |
| Oxybutynin | Ditropan | Dysuria |
| **Oxycodone** | **OxyContin** | **Analgesics, narcotic** |

# Common Medications

## Commonly Prescribed Medications

| Generic Name | Brand Name | Typical Use |
|---|---|---|
| **Pantoprazole** | **Protonix** | **Esophagitis** |
| Paroxetine | Paxil | Anxiety |
| **Penicillin VK** | **N/A** | **Antibiotics, penicllin** |
| Phenazopyridine | Pyridium, Eridium | Dysuria |
| **Phenytoin** | **Dilantin** | **Seizures** |
| Pimecrolimus | Elidel | Dermatitis |
| **Pioglitazone** | **Actos** | **Diabetes mellitus** |
| Polyethylene Glycol 3350 | N/A | Constipation |
| **Potassium Chloride** | **Cena K, K-Dur, K-Lor, Klor-con** | **Hypokalemia** |
| Pravastatin | Pravachol | Stroke, hypercholesterolemia |
| **Prednisone** | **Deltasone** | **Corticosteroids** |
| Promethazine | Adgan | Nausea |
| **Propranolol** | **Inderal** | **Hypertension, anxiety, tremors** |
| Quetiapine | Seroquel | Schizophrenia, mood disorder |
| **Quinapril** | **Accupril** | **Hypertension** |
| Rabeprazole | Aciphex | Ulcer, esophagitis |
| **Raloxifene** | **Evista** | **Osteoporosis** |
| Ramipril | Altace | Hypertension, CHF |
| **Ranitidine** | **Zantac** | **Ulcer, esophagitis** |
| Risedronate | Actonel | Paget's disease |
| **Risperidone** | **Risperdal** | **Schizophrenia, bipolar, mania** |
| Rofecoxib | Vioxx | Arthritis, osteoarthritis |
| **Rosiglitazone** | **Avandia** | **Diabetes mellitus** |
| Sertraline | Zoloft | Panic disorder, depression |
| **Sildenafil** | **Viagra** | **Erectile dysfunction** |
| Simvastatin | Zocor | Stroke, hypercholesterolemia |
| **Spironolactone** | **Aldactone** | **Hypertension** |
| Sumatriptan | Imitrex | Migraine |
| **Tamsulosin** | **Flomax** | **Benign prostatic hyperplasia** |
| Temazepam | Restoril | Insomnia |
| **Terazosin** | **Hytrin** | **Hypertension** |
| Tizanidine | Zanaflex | Spasticity |
| **Tolterodine** | **Detrol** | **Incontinence** |
| Topiramate | Topamax | Seizures |
| **Tramadol** | **Ultram** | **Analgesics, non-narcotic** |
| Trazodone | Desyrel | Depression |
| **Triamcinolone** | **Acetonide Nasal, Aristocort** | **Rhinitis** |
| Triamterene/hydrochlorothiazide | Dyazide | Hypertension |
| **Trimethoprim/Sulfamethoxazole** | **Bactrim** | **Antibiotics** |
| Valacyclovir | Valtrex | Herpes genitalis |
| **Valdecoxib** | **Bextra** | **Osteoarthritis** |
| Valsartan | Diovan | Hypertension, CHF |
| **Venlafaxine** | **Effexor** | **Anxiety disorder, depression** |
| Verapamil | Calan | Arrhythmia, ventricular, HTN |
| **Warfarin** | **Coumadin** | **DVT/PE treatment/prevention, atrial fib** |
| Zolpidem | Ambien | Insomnia |

## HELICOPTER LANDING ZONE




**WARNING**
**PILOTS MUST BE NOTIFIED OF POWER LINES AS THEY ARE INVISIBLE FROM THE AIR!**

**Special Notes**

A. LZ should be flat with no more than a 10 degree slope
B. LZ command should be established for radio contact
C. Radio frequency should be given to HEMS dispatch
D. Advise dispatch/flight team of any possible obstacles surrounding the LZ
    a. Trees, power lines, water bodies, rocks, cars, etc
E. High visibility vests should be utilized in congruency with NDOT standards for roadways
F. Do not aim lights at aircraft
    a. Two sets of headlights creating an X is acceptable but must be dimmed/turned off during landing
    b. Aiming headlights into wind NOT recommended unless they will be turned off (parks lights only) as this can blind the pilot
    c. Best practice is LEO/FF/EMS vehicles with red/blue lights and no headlights or other LZ lights
    d. Avoid strobes, lasers, or anything else that would shine directly into the aircraft
G. Do not approach aircraft until told to do so by flight team
H. Secure ALL loose articles: hats, personal items, etc.

# Pediatric Vital Signs

## Normal Pediatric Vital Signs

### Pediatric Vital Signs

| Age | Weight (kilograms) | Pulse | Respirations | Systolic BP | Diastolic BP |
|---|---|---|---|---|---|
| Premature | 1 | 145 | < 40 | 42 +/- 10 | 21 +/- 8 |
| Premature | 1-2 | 135 | -- | 50 +/- 10 | 28 +/- 8 |
| Newborn | 2-3 | 125 | -- | 60 +/- 10 | 37 +/- 8 |
| 1 month | 4 | 120 | 24-35 | 80 +/- 16 | 46 +/- 16 |
| 6 month | 7 | 130 | -- | 89 +/- 29 | 60 +/- 10 |
| 1 year | 10 | 120 | 20-30 | 96 +/- 30 | 66 +/- 25 |
| 2-3 years | 12-14 | 115 | -- | 99 +/- 25 | 64 +/- 25 |
| 4-5 years | 16-18 | 100 | -- | 99 +/- 20 | 65 +/- 20 |
| 6-9 years | 20-26 | 100 | 12-25 | 100 +/- 20 | 65 +/- 15 |
| 10-12 years | 32-42 | 75 | -- | 112 +/- 20 | 68 +/- 15 |
| Over 14 years | > 50 | 70 | 12-18 | 120 +/- 20 | 75 +/- 15 |