RSI
Specialty Protocol

Medical Director: Benjamin Oei, M.D.

Austin County
EMS Protocol & Guideline

Version:	1.0
Date:	04/2019

PURPOSE

This procedure is authorized by the medical director to be performed by approved paramedics only. Rapid Sequence Induction is designed to secure the airway in any patient requiring endotracheal intubation which cannot be performed without proper sedation and paralysis, by administering neuromuscular blocking agents in combination with sedative/hypnotic agents. In the event the patient does not require sedation and/or paralytics (i.e. cardiac arrest), then all steps should be performed the same except without pharmacological therapies.

INDICATIONS

This procedure may be used when a critical need for endotracheal intubation exists. This includes, but is not limited to the following:

- Patients with airway and/or ventilatory compromise or impending respiratory failure.
- Combative patients with airway compromise or the potential for airway compromise exists.
- Closed head injured patients or those with altered mental status with airway/ventilation compromise, or the potential for airway compromise exists.
- Patients with hypoxia refractory to 100% oxygen administration or CPAP.
- Multi-systems trauma patients that require a secure airway.
- Status epilepticus if airway is compromised or anticipated to be compromised.

CONTRAINDICATIONS (Relative)

- Patients in whom a surgical airway would be difficult or impossible (i.e. massive swelling or significant neck injury).
- Patients that would be difficult, or impossible to intubate or ventilate after paralysis (i.e. unresolved upper airway obstruction or acute epiglottitis).

Patients whom are anticipated to be difficult to intubate and BLS airway management is effective in maintaining oxygenation

Paramedic

ADULT

- **Ketamine (Ketalar) -** 2 mg/kg IV
- **Succinylcholine –** 1.5 mgs/kg (only as needed for clinched teeth)
- **Rocuronium (Zemuron) -** 1 mg/kg IV –may repeat prn within 20-40 minutes at 1mg/kg
- **Midazolam** 2 mgs IV – Pressure must be > 90 mmHg
- **Ketamine (Ketalar) -** 1 mg/kg every 10 mins as needed for sedation

***** 3 intubation attempts if unsuccessful move to supraglottic airway – Adult & Pedi*****

Pediatric

- **Ketamine (Ketalar) -** 1mg/kg IV
- **Succinylcholine –** 1.5 mgs/kg - (only as needed for clinched teeth)
- **Rocuronium (Zemuron) -** 1 mg/kg IV - may repeat prn within 20-40 minutes at 1mg/kg
- **Midazolam** 0.03 mg/kg IV
- **Ketamine (Ketalar) -** 0.5 mg/kg every 10 mins as needed for sedation

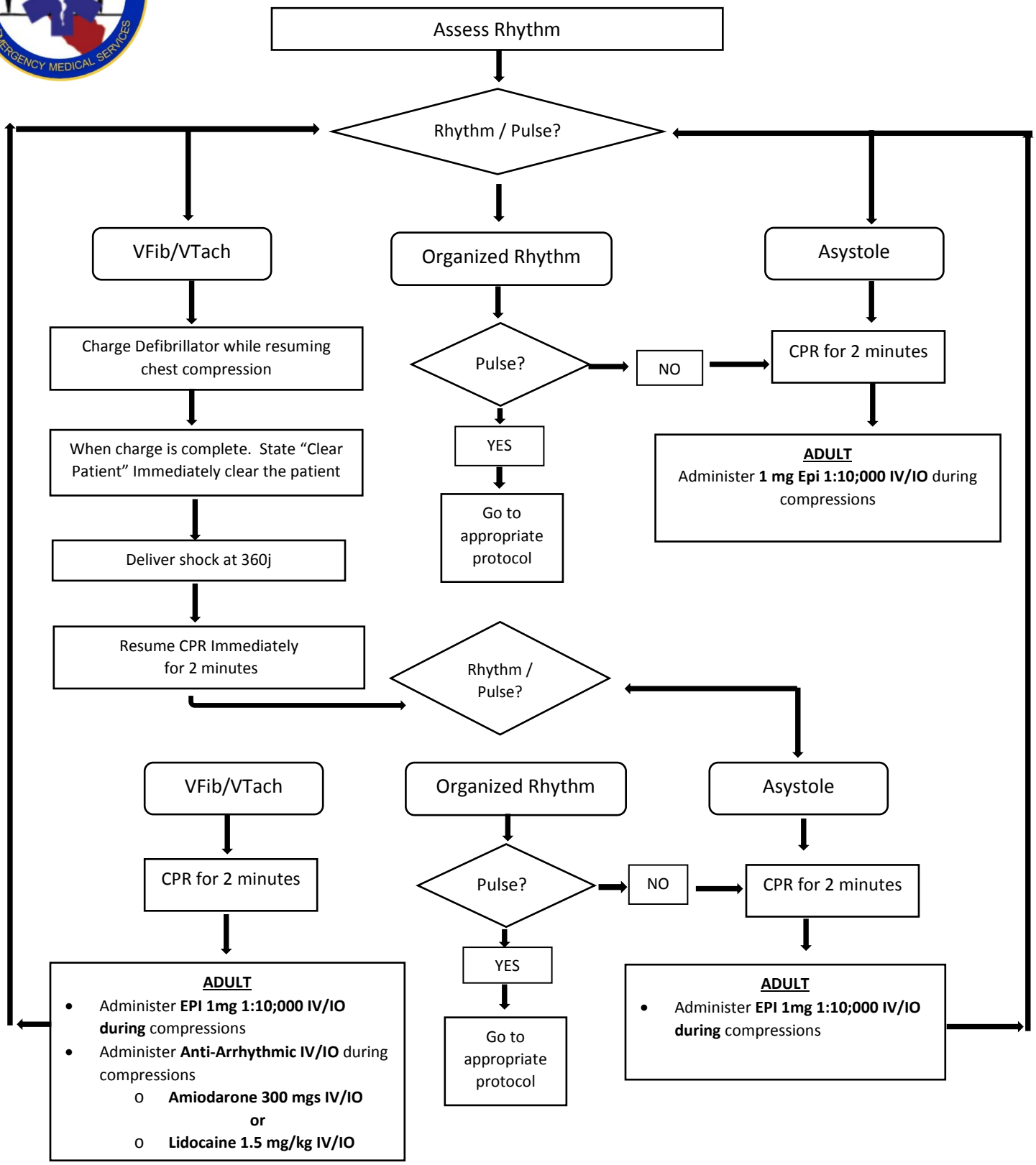
PEARLS

- In a patient with adequate oxygenation, ventilation, and normal pulmonary function, the paramedic should have several minutes of laryngoscopy time. This may not be the case with your patient. You must monitor SpO_2 continuously and initiate BVM ventilation if oxygen saturation falls below 92%.
- To ensure successful endotracheal tube placement it is imperative that the first, and subsequent attempts if needed, are the best attempts. Proper positioning of the patient, positioning yourself, and having all potential equipment readily available are paramount.
- Continually monitor SpO_2 and $ETCO_2$ after intubation and reconfirm tube placement each time the patient is moved.
- After paralysis and intubation are accomplished, continued paralysis may be necessary to manage the patient. Some sign of recovery from the initial dose of the induction agent (sedative) and paralyzing agent should be observed (i.e. skeletal muscle movement, increasing HR, increasing BP, or lacrimation) before administering **Midazolam (Versed), Ketamine (Ketalar), Rocuronium (Zemuron).**
- If the initial effects of the induction and sedation dissipate, repeating initial sedation and induction dosing should be performed.
- If patient was intubated without needing RSI, but patient's mental status improves – follow the post induction pharmacological guidelines ensuring adequate sedation before administering a paralytic (if needed).

RSI DOSING CHART

Weight	Ketamine	Versed	Succs	Rocuronium	Vecuronium
50 kgs	100 mg	2 mg	75 mg	50 mg	5 mg
55 kgs	110 mg	2 mg	82.5 mg	55 mg	5.5 mg
60 kgs	120 mg	2 mg	90 mg	60mg	6 mg
65 kgs	130 mg	2 mg	97.5 mg	65 mg	6.5 mg
70 kgs	140 mg	2 mg	105 mg	70 mg	7 mg
75 kgs	150 mg	2 mg	112.5 mg	75 mg	7.5 mg
80 kgs	160 mg	2 mg	120 mg	80 mg	8 mg
85 kgs	170 mg	2 mg	127.5 mg	85 mg	8.5 mg
90 kgs	180 mg	2 mg	135 mg	90 mg	9 mg
95 kgs	190 mg	2 mg	142.5 mg	95 mg	9.5 mg
100 kgs	200 mg	2 mg	150 mg	100 mg	10 mg
105 kgs	210 mg	2 mg	157.5 mg	105 mg	10.5 mg
110 kgs	220 mg	2 mg	165 mg	110 mg	11 mg
115 kgs	230 mg	2 mg	172.5 mg	115 mg	11.5 mg
120 kgs	240 mg	2 mg	180 mg	120 mg	12 mg
125 kgs	250 mg	2 mg	187.5 mg	125 mg	12.5 mg
130 kgs	260 mg	2 mg	195 mg	130 mg	13 mg
135 kgs	270 mg	2 mg	202.5 mg	135 mg	13.5 mg
140 kgs	280 mg	2 mg	210 mg	140 mg	14 mg
145 kgs	290 mg	2 mg	217.5 mg	145 mg	14.5 mg
150 kgs	300 mg	2 mg	225 mg	150 mg	15 mg
155 kgs	310 mg	2 mg	232.5 mg	155 mg	15.5 mg
160 kgs	320 mg	2 mg	240 mg	160 mg	16 mg
165 kgs	330 mg	2 mg	247.5 mg	165 mg	16.5 mg

Cardiac Arrest Resuscitation



Sodium Bicarbonate 1 mEq/kg after 10 minutes if ETT/ Supraglottic airway is placed and confirmed
Adult : 360 Joules each defibrillation

V-Fib / Pulseless V-Tach

Adult Medical

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Overview: Ventricular Fibrillation (V-fib) and pulseless ventricular Tachycardia (V-Tach) are rhythms typically generated by an irritated myocardium. Identifying, treating and ultimately stabilizing the myocardium is key to obtaining a sustained ROSC. Ensuring a good focus on 100% CPR while effectively incorporating analyzing rhythms/shocking and managing the patient's airway directly have an impact on the patient's ultimate outcome.

Definition: Erratic wide complex rhythm or regular wide complex (V-Tach) without a clear palpable pulse typically a rate no higher than 150 b/min.

EMT

- Place patient on the **Cardiac Monitor**
- Obtain **12 Lead EKG** – if applicable
- **CPR** & **AED** as appropriate to patient presentation
  - If witnessed arrest shock if indicated
  - Unwitnessed 2 minutes of uninterrupted CPR prior to AED analysis
- **Oxygen** administration as appropriate to the patient presentation
- **Airway Adjuncts** (Supraglottic Airway, OPA, NPA) EtCO2 monitoring appropriate to patient presentation
- Obtain **BGL**
- **Identify** Source/Causes

AEMT

- **IV / IO –** Normal Saline
- **Airway –** ETT- with EtCO2 monitoring
- **Vent –** if applicable
- **Epinephrine 1:10;000 -** 1mg IV/IO every 3-5 mins for duration of arrest or until ROSC is achieved - Double the dose if given ETT

Paramedic

Infusions - ROSC

- **Epinephrine infusion**: 1 mg of 1:10;000 **Epinephrine** in 100 ml of NS (10 mcg/ml), titrate to maintain BP
  or
- **Dopamine 5 to 20 mcg/kg/min** titrated to maintain systolic BP of 90 mmHg

***** Infusion goal for Blood Pressure is 90-110 mmHg systolic and diastolic of 60 mmHg*****

Anti-Arrhythmic

- **Amiodarone: 300 mg IV/IO**
  - May repeat in 5-10 min 150 mg IV/IO
  - If conversion: 150mg in 100ml over 10 min
- **Lidocaine: 1.5 mg/kg IV/IO**
  - Repeat at 0.5 – 0.75 mg/kg every 5-10 min PRN
  - Max total dose of 3 mg/kg
  - If conversion: 2-4 mg/min infusion

Metabolic

- **Calcium Chloride 500 – 1000mg IV/IO -** May repeated x1 in 10 min if known renal PT or if hyperkalemia is suspected.
- **Sodium Bicarbonate** 1mEq/kg IV/IO - Then 0.5 mEq/kg q 10 min
- **Magnesium Sulfate** 1-2 G IV/IO for refractory state and/or for **torsades-de-pointes** - May repeat once

PEARLS

- **Amiodarone**, when administered with Vaughan Williams Class I antiarrhythmic (i.e. **Lidocaine**) has been shown to precipitate torsades-de-pointes, and/or post-arrest hypotension. However, if the patient remains refractory to **Amiodarone**, **Lidocaine** should be administered.
- **Magnesium Sulfate** is the first-line antiarrhythmic medication for suspected torsades-de-pointes.
- If unable to determine if rhythm is **Ventricular Fibrillation** or **Asystole** – treat as **Asystole.**
- Initial airway management should be performed by the insertion of a King Tube during the initial stages of cardiac arrest resuscitation. EtCO2 detection, bilateral breath sounds, and adequate chest rise are confirmation of proper placement. Once ROSC has been achieved the King Tube can be replaced with an ET tube unless contraindicated or difficult airway is anticipated.
- Anti-arrhythmic, vasopressors and when appropriate metabolic drug dosing may overlap in administering between shocks. Ensure the IV/IO line is flushed completely to ensure mixing of medications does not happen in the IV tubing.
- In cases where resuscitation is prolonged, prior to transporting to the ER, an ET tube can replace the King Tube unless contraindicated or difficult airway is anticipated.
- Treatable causes may include the 6 H's and 6 T's
  - Hypovolemia, hypoxia, hydrogen ion (acidosis), hypo-/hyper-electrolytes, hypo-/hyper-glycemia, hypo-/hyper-thermia
  - Tablets (overdose), trauma, tamponade (cardiac), tension pneumothorax, thrombosis (heart), thrombosis (lungs).

Confirmed or Suspected CVA- According to AHA standards, these patient should be taken to an stroke facility within 3 hours, the area RAC has extended that to 5 hours

Comprehensive center-very similar to level-1 trauma center
Primary center-can handle most of what the level-1 can, just not in-house coverage 24 hours
Support Center- provides a rapid CT, TPA and transfer to a higher level hospital as needed

Area Stroke Centers

Comprehensive (Level I) Stroke Facility

CHI St Lukes Health Baylor College Of Medicine Medical Center- **Contact # 832-355-2121**

Harris Health System Ben Taub Hospital – **Contact # 713-873-2446**

Houston Methodist Hospital – **Contact # 713-441-2245**

Memorial Hermann Hospital - **Contact# 713-704-8229**

Primary (Level II) Stroke Facilities

CHI St. Joseph Regional Health Center (Bryan) – **Contact # 979-776-4974**

College Station Medical Center – **Contact # 979-764-5111**

Houston Methodist West Hospital – **Contact # 832-522-0911**

Memorial Hermann Katy Hospital – **Contact # 281-644-7111**

Memorial Hermann Memorial City Medical Center - **Contact # 713-242-3070**

Support (Level III) Stroke Facilities

Baylor Scott & White Medical Center (Brenham)– **Contact # 979-337-5050**

Bellville St. Joseph Health Center – **Contact # 979-413-7269**

If the patient does not meet TPA Criteria, consider transporting to a comprehensive stroke center for care.

If patient symptoms are over the 3 hour window, consider transporting to a comprehensive stroke center.

Stroke (CVA)

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Overview: Stroke/CVA patients are considered a time sensitive patient and a primary or comprehensive stroke center is the definitive care destinations which these patients benefit from early arrival. Only patients who are viable or suspected to be viable for treatment(s) should be transported emergency, all other patients should be non-emergency transport.

Definition: A Stroke is the rapid deterioration of brain function due to a disturbance in blood supply to the brain. This can be caused from ischemia which is a lack of blood flow from a blockage, or hemorrhage which is the leakage of blood. As a result, the affected area of the brain cannot function causing speech impairment, hemi-paresis, paralysis and visual changes. The goal of the Provider is to quickly recognize the signs and symptoms, determine the onset, and expedite transport to a Stroke Center, or the closest appropriate facility capable of diagnosing, treating, and managing the patient.

EMT

- **Oxygen** administration as appropriate to the patient presentation, SPO2 must be maintained greater than 95%
- **Airway Adjuncts** (Supraglottic Airway, OPA, NPA), EtCO2 monitoring appropriate to patient presentation
- Obtain **BGL**
- 12 Lead ECG acquisition
- NPO and keep head elevated at least 30 degrees
- Obtain a time frame of when the patient was last seen normal

AEMT

- Establish IV / IO of Normal Saline
- **Dextrose 25% or 50**% IV 25g – if blood sugar is less than 60, use with caution. Do not administer is a cerebral bleed is suspected
- **Ondansetron** – 4mg IV, may repeat once

Paramedic

- **Labetalol** 10 mgs or **Metoprolol** 5 mg – if the patients SBP is greater than 200 mmHg and/or DBP is greater than 130 – Do not repeat *******Do not decrease BP greater than 20%******

Left (Dominate) Hemisphere
- Right Visual Field Deficit
- Right Hemiparesis
- Right Hemisensory Loss
- Left Gaze Deviation
- Aphasia - Expressive or Receptive

Typical Sign: Right Side Aphasia

Right (Non-Dominate) Hemisphere
- Right Gaze Deviation (right gaze preference)
- Left Hemi-inattention (neglect)
- Left visual field deficit
- Left Hemiparesis
- Left Hemisensory Loss

Typical Sign: Left Side, Neglect

Cerebellum
- Dyscoordination
- Imbalance with a wide based gait

Brainstem
- Quadriparesis
- Sensory loss in all 4 limbs
- Crossed signs (face&body)
- Hemiparesis
- Hemisensory
- Vertigo
- Oropharyngeal Weakness
  - Dysarthria
  - Dysaphagia
- Decreased Consciousness
- Nausea & Vomiting
- Hiccups
- Abnormal Respirations
- Abnormal Eye Movement

Typical Sign: Both sides

Symptoms Suggestive of Hemorrhage

Subarachnoid – Intolerance to light, neck stiffness and pain

Intracerebral – Focal signs such as hemiparesis – similar to an ischemic stroke

PEARLS
- Blood Pressure decrease in the first 24 hrs of an ischemic stroke is associated with worse neurological outcomes.
- If intubation is necessary action must be taken to reduce the stimulation associated with laryngoscopy
- Use **only** the amount of **Oxygen** required to achieve adequate oxygenation
- Consider utilization of Air Medical services for rapid transport for outlying/extended transport situations.
- Consider administering ½ dose post intubation non-depolarizing paralytics to reduce duration of paralization to allow for neuro assessment by the ED Physician
- Do not administer aspirin
- Treat Hypoglycemia and Seizures according to protocol

TRANSPORT PEARLS
- **Indications for COMPREHENSIVE Stroke Center or a Stroke Center (Level 1 Stroke Alert):**
  - Patients suspected to be experiencing a *hemorrhagic stroke* (acute onset of severe deficits and/or gaze shift)
  - Younger patients (or less than 80 years old with no significant co-morbidities)
  - Patients whose symptom onset cannot be determined (i.e. during sleep) or symptoms >3 hours in duration
  - Any stroke presentation with unresolving neuro deficits where mechanical thrombectomy (neurosurgery) may be needed
- **The following patients <types> would benefit from rapid transport to a PRIMARY Stroke Center (Level 2 Stroke Alert):**
  - Patients with onset of neurological signs/symptoms NO GREATER than 3 hours
  - Patients that meet criteria to receive thrombolytics for ischemic stroke

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STEMI
Adult Medical

Medical Director: Benjamin Oei, M.D.

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Overview: Acute Coronary Syndrome (ACS) cannot be dismissed by the patient and/or medic. Early recognition and thorough assessment of frank and obscure signs and symptoms will help guide the medic to a good, comprehensive care plan.

Definition: ACS is any patient, without discrimination of age, history, etc., presenting with chest pain, peri-chest pain, and/or other frank or obscure signs and symptoms associated with cardiac event indicating inadequate tissue perfusion of the myocardium.

EMT

Ensure proper skin prep and placement of 12 Lead EKG leads is performed

- Place patient on the **Cardiac Monitor**
- Obtain **12 Lead EKG**
- If inferior wall infarct is suspected conduct a **right side 12 Lead EKG** - Typical signs of an inferior wall infarction include hypotension, bradycardia, nausea, vomiting, hiccoughing, distended neck veins, and clear lung sounds.
- If diagnostic print out states *****Acute MI***** notify responding Paramedic and EMS 1 if not on scene.
- Transmit EKG to appropriate hospital if applicable – If unable to transmit the 12 Lead EKG contact the receiving hospital and request a phone number to text or an email to send the 12 Lead EKG
- Notify responding Paramedic and/or EMS 1 which facility the 12 Lead was transmitted to
- **324 mgs ASA** PO if patient has not already taken any
- Obtain **BGL**
- **Oxygen** administration as appropriate to the patients presentation

AEMT

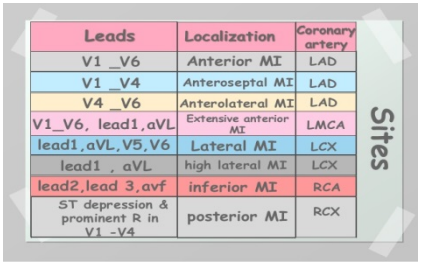
- Establish IV of Normal Saline – Bilateral IV's if possible – **Avoid IV access near the wrist due to possible radial PCI.**
- If a right ventricular infarct is suspected, administer up to 20 ml/kg of normal saline- titrated to blood pressure

Paramedic

- **Contact receiving hospital physician to discuss transmitted EKG & Possible Cath Lab activation**
- **Nitroglycerin Spray SL,** 0.4 mg as needed to relieve chest pain/discomfort. Discontinue if BP drops below 90 mmHg systolic.
- **Nitroglycerin Paste,** dermal 1 inch. Apply to upper left chest – Discontinue SL Nitro spray once paste is placed.
- **Morphine Sulfate -** 2-10 mg IV **or Fentanyl -** 2 mcg/kg IVP as needed for pain
- **Ondansetron** 4mg or **Diphenhydramine** 12.5 – 25 mg – for nausea and vomiting
- **Diphenhydramine** 25mg – for hypotension secondary to Morphine administration
- **Heparin** 5000 unit bolus IVP

SITE	FACING	RECIPROCAL
INFERIOR	II, III, aVF	I, aVL
HIGH LATERAL	I, aVL	II, III, aVF
ANTERIOR	V1, V2, V3, V4	NONE
POSTERIOR	NONE	V1, V2, V3, V4

I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral



PEARLS

- May withhold advanced treatment if cardiac ischemia is not suspected based on history, examination, and ECG findings.
- Acute Coronary Syndromes may present atypically (without chest pain), especially in female and/or diabetic patients. Other presentations that may require a 12-lead ECG include: dizziness, palpitations, SOB, nausea/vomiting/ABD pain, acid indigestion/heartburn, upper extremity/neck/jaw pain, back or shoulder pain, weakness, general malaise, or syncope/near syncope.
- Morphine provides added benefit of reducing cardiac work load, however, Fentanyl can be utilized in place of Morphine or if Morphine does not provide adequate pain relief.
- Oral anticoagulant therapy (i.e. daily Warfarin, Xarelto, ASA, etc.) is not a contraindication to **Aspirin** administration
- **Nitroglycerin** is the drug of choice for relieving ischemic chest pain and should be administered prior to opiates.
- **Nitroglycerin** should be used with extreme caution in a patient having a right ventricular infarction, and may be administered prior to an IV being established only when a 12-lead ECG shows no indication of possible right ventricular infarction.
- **Nitroglycerin** must be used with caution in the patient who has taken a phosphodiesterase inhibitor (Viagra, Cialis, Levitra, etc…) within 24 hours. A significant BP drop occurrence post **Nitroglycerin** administration should be anticipated.
- A developing Left Bundle Branch Block (LBBB) should be treated like ST Elevation, and makes the patient a candidate for cardiac catheterization and/or thrombolytic therapy (See STEMI Protocol).
- If a patient has recurring symptoms, the time of onset is considered to be when the symptoms became constant.

Minimum of 2 quality 12 leads should be performed on any patient that receives a 12 lead to identify trending

Sepsis
Adult Medical

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Overview: In severe sepsis, the body's response to an infection (bacterial, fungal, viral or parasitic) causes the balance between inflammatory and anti-inflammatory chemical responses and becomes mismatched. A massive release of pro-inflammatory mediators creates an uncontrolled inflammatory response. This systemic inflammatory response is known as SIRS (systemic inflammatory response syndrome).

Definition: Patients who present with findings indicating a systemic infection. These indications are not isolated to the febrile state of the patient. Septic patients may present hyper-hypo-and even normal-thermic. Trending VS with a thorough history and physical will largely indicate the patient's septic status

EMT

- **Oxygen** administration as appropriate to the patient presentation, SPO2 must be maintained greater than 94%
- **Airway Adjuncts** (Supraglottic Airway, OPA, NPA), EtCO2 monitoring appropriate to patient presentation
- **High Flow Oxygen** – Consider **CPAP** for patients with moderate to severe associated respiratory distress/crackles
- Obtain **BGL**
- 12 Lead ECG acquisition
- **Acetaminophen**: 960 mg PO or rectal for fever greater than 100 degrees

AEMT

- **IV's**, 18g if possible. **IO** if Unable to obtain IV and appropriate to patient presentation
- **Normal Saline bolus**, 20ml/kg in first 20 min (goal).
    - **Re-bolus**: 20 ml/kg titrated to patient presentation

Paramedic

Blood Pressure Control – if applicable

- **Epinephrine IV infusion,** 1 mg of **1 :10;000-Epinephrine** in a 100 NS bag - titrated to maintain BP 90 mmHg or greater
  Or
- **Dopamine 5 to 20 mcg/kg/min** titrated to maintain systolic BP 90 mmHg or greater
- Refer to **RSI** protocol as indicated by patient presentation

*****Septic Shock*****

1. Suspected Infection
2. Signs of Hypoperfusion, such as AMS, Mottled or Cool Extremities
3. SIRS or Systemic Inflammatory Response Syndrome, look for 2 or more of the following criteria
-HR >100-110
-Respiratory Rate >24
-Temp > 100.4 or < 96.8
-End Tidal CO2 >35

Hospital Notification

Ensure to state "Septic Patient" to the Charge Nurse or Nurse

PEARLS

- Patients presenting with sepsis have a high morbidity and mortality rate, especially with increased age and/or co-morbidities. Early recognition and treatment of these patients is key to improving patient outcomes. EMS focus is on aggressive fluid administration and maintaining Oxygenation.
- Fluid administration should not routinely be withheld from patients presenting with pulmonary edema. Managing patients with significant preexisting pulmonary edema with CPAP and/or RSI with PEEP in conjunction with fluid administration is acceptable.
- Septic patients often require 60 ml/kg (or more) of fluid administration in the first hour of initiating treatment.
- Prevent hypothermia by keeping cool patients warm, and inversely, passively treat hyperthermic patients by removing clothing/uncovering.
- ~60% of septic patients will, at some point, require the use of vasopressors. If a vasopressor is needed, use in conjunction with fluid resuscitation.
- "Typical" signs and symptoms of sepsis may not present progressively, especially in aggressive development of sepsis. These cases can be described as "gross onset of symptoms without explanation" (general weakness, tachycardia, tachypneic, hypotensive). Monitor and assess closely for **atypical** manifestation of sepsis.
- **Ketamine** is the preferred RSI sedation drug over Etomidate.