Harnett County EMS System
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* denotes protocols unique to the Harnett County EMS System

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* denotes protocols unique to the Harnett County EMS System

Adult Asystole / Pulseless Electrical Activity

History
- SAMPLE
- Estimated downtime
- See Reversible Causes below
- DNR, MOST, or Living Will

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

Differential
- See Reversible Causes below

Cardiac Arrest Protocol AC 3

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES →
Decomposition
Rigor mortis
Dependent lividity
Blunt force trauma
Injury incompatible with life
Extended downtime with asystole
Do not begin resuscitation

Follow Deceased Subjects Policy

NO

	Begin Continuous CPR Compressions ***Push Hard (≥ 2 inches)*** ***Push Fast (100 - 120 / min)*** ***Change Compressors every 2 minutes*** ***(sooner if fatigued)*** ***(Limit changes / pulse checks ≤ 10 seconds)*** **Ventilate 1 breath every 6 seconds** **30:2 Compression:Ventilation if no Advanced Airway** ***Monitor EtCO2*** ***if available***
	Defibrillation - AED Procedure CSP 5 *if available*
P	Cardiac Monitor
	IV or IO Access Protocol UP 6
A	**Epinephrine (1:10,000) 1 mg IV / IO**
A	**Normal Saline Bolus 500 mL IV / IO** May repeat as needed **Maximum 2 L**
	Search for Reversible Causes
	Blood Glucose Analysis Procedure ASP 4 ***if applicable***
P	Chest Decompression Procedure WTP 1 ***if applicable***
	On Scene Resuscitation / Termination of Resuscitation Protocol(s) AC 12 ***as indicated***

Notify Destination or Contact Medical Control

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

Reversible Causes
Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

Suspected Opioid Overdose
Administer Naloxone per Overdose / Toxic Ingestion Protocol TE 7

Consider Early for PEA
1. Repeated Saline Boluses for possible hypervolemia
2. Dextrose IV/IO
3. Glucagon 4 mg IV/IO/IM for suspected beta blocker or calcium channel blocker OD
4. Calcium Chloride 1 g IV/IO for suspected hyperkalemia
5. Sodium Bicarbonate 50 meq IV/IO for possible overdose, hyperkalemia, renal failure
6. Atropine 1 mg IV only for organized, narrow, PEA with rate < 60
7. Chest Decompression

Adult Cardiac Protocol Section

Adult Asystole / Pulseless Electrical Activity

- Early Transport to closet most appropriate medical facility should be initiated if the patient's cardiac rhythm is identified as PEA along with any of the following situations:
  - ROSC obtained at any time
  - Any shockable rhythm was identified during care
  - Witnessed Cardiac Arrest (Bystander or Provider)
  - Any Pediatric Patient (≤ 18 years of age)
  - Narrow Complex PEA > 40 bpm with EtCO2 ≥ 20mmHg
  - Provider Discretion
- Consider listening with stethoscope apically if, narrow complex PEA and appropriate EtCO2 readings.
  - If heart sounds are present, consider vasopressors and transport immediately.
- If ROSC obtained and patient subsequently loses pulses administer an additional epinephrine 1 mg of 1:10,000
- Epinephrine 1 mg 1:10,000 should be given every 3-5 minutes if anaphylaxis is suspected.

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to Team Focused CPR Protocol AC 11.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
- **DO NOT HYPERVENTILATE: If no advanced airway (BIAD, ETT), compression to ventilation ratio is 30:2. If advanced airway in place, ventilate 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **Passive oxygenation is appropriate in the initial phases of the Team Focused Approach / Pit-Crew Approach.**
- **Reassess and document BIAD and / or endotracheal tube placement and EtCO2 frequently, after every move, and at transfer of care.**
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation**.
- **IV access is preferred route. Follow IV or IO Access Procedure UP 6.**
- **Defibrillation:** Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
- **End Tidal CO2 (EtCO2)**
  If EtCO2 is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
  If EtCO2 spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **Special Considerations**
  Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. 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.
  Renal Dialysis / Renal Failure - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
  Opioid Overdose - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol TE 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
  Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Transcutaneous Pacing:**
  Pacing is NOT effective in cardiac arrest and pacing in cardiac arrest does NOT increase chance of survival
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.
- Discussion with Medical Control can be a valuable tool in developing a differential diagnosis and identifying possible treatment options.

Bradycardia; Pulse Present

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 / Hypothermia
- Pacemaker failure
- Sinus bradycardia
- Head injury (elevated ICP) or Stroke
- Spinal cord lesion
- Sick sinus syndrome
- AV blocks (1°, 2°, or 3°)
- Overdose

Heart Rate < 60 / min and Symptomatic:
Hypotension, Acute AMS, Ischemic Chest Pain, Acute CHF, Seizures, Syncope, or Shock secondary to bradycardia
Typically HR < 50 / min

NO → Exit to Appropriate Protocol(s)

YES

	Airway Protocol(s) AR 1, 2, 3 ***if indicated***
	Respiratory Distress Protocol AR 4 ***if indicated***
	Chest Pain: Cardiac and STEMI Protocol AC 4 ***if indicated***
	Search for Reversible Causes
B	12 Lead ECG Procedure CSP 1
	IV / IO Access Protocol UP 6
P	Cardiac Monitor
A	**Normal Saline Fluid Bolus 500 mL – 2 L NS IV / IO** *(Unless Acute CHF)* **Maximum 2 L**
P	**Atropine 1 mg IV / IO** *May repeat every 3 – 5 minutes* **Maximum 3 mg**
P	**Epinephrine 1 - 10 mcg/min IV / IO** Titrate to SBP ≥ 90 or MAP ≥ 65 mmHg
P	*Consider* **Push-Dose Epinephrine 10 mcg IV / IO** *May repeat every 2 minutes*
P	**If No Improvement Transcutaneous Pacing Procedure** ***(Consider earlier in 2nd or 3rd AVB)***

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

P	Consider Sedation **Midazolam 2.5 mg IV / IO / IN 5mg IM** **Age ≥ 65: 1 mg IV / IO / IN 2.5mg IM** Repeat every 5 minutes as needed **Maximum 10 mg**

Suspected Beta-Blocker or Calcium Channel Blocker

Follow Overdose/ Toxic Ingestion Protocol TE 7

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Bradycardia; Pulse Present

Push-Dose Vasopressor Agent

1. **Indications**
   - a. Peri-intubation hypotension
   - b. Post-arrest (post-ROSC) hypotension
   - c. Hypotension requiring initiation of vasopressor drip – prior to drip setup
   - d. Unstable bradycardia (as a supplement to other therapy)
2. **Instructions**
   - a. Draw up 1mL of 1:10,000 epinephrine
   - b. Waste 1mL of saline from a 10mL saline flush
   - c. Add the 1mL of epinephrine to the remaining 9mL of saline
     - i. This yields epinephrine in a concentration of 10mcg/mL
   - d. Place a medication added label on this syringe to identify it as a vasopressor
   - e. Administer 10mcg (1mL) every 2 minutes as needed to achieve desired blood pressure or heart rate

Norepinephrine (Levophed) Drip Rates

For the following chart, add **4mg** norepinephrine to **250mL** NS or D5W. Use **60 gtts/mL** IV Set

Desired Dose (mcg/min)	4 mcg/min	8 mcg/min	12 mcg/min	16 mcg/min	20 mcg/mi	24 mcg/min	28 mcg/min	30 mcg/min
Drip Rate (drops/min)	15 gtts/min	30 gtts/min	45 gtts/min	60 gtts/min	75 gtts/min	90 gtts/min	105 gtts/min	113 gtts/min

Norepinephrine Infusion Preparation

1) **Draw 4mL off and discard from a 250 mL bag** of NS or D5W
2) **Add 4mg** (1mg/mL) **norepinephrine** (Levophed) resulting in 250mL of a 16 microgram/milliliter solution of norepinephrine.
3) Connect and prime a **60 gtts/mL IV set** for medication administration.
4) Using high contrast sticker, label IV bag with medication name, amount added, date/time added, resulting concentration and provider initials

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Identifying signs and symptoms of poor perfusion caused by bradycardia are paramount.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological treatment given only when symptomatic, otherwise monitor and reassess.**
- **Consider hyperkalemia with wide complex, bizarre appearance of QRS complex, and bradycardia. Give Calcium Chloride or Gluconate in addition to Sodium Bicarbonate if hyperkalemia suspected.**
- **12-Lead ECG:**
  - **12 Lead ECG not necessary to diagnose and treat**
  - **Obtain when patient is stable and/or following rhythm conversion.**
- **Unstable condition**
  - **Condition which acutely impairs vital organ function and cardiac arrest may be imminent.**
  - **If at any point patient becomes unstable move to unstable arm in algorithm.**
- **Hypoxemia is a common cause of bradycardia. Ensure oxygenation and support respiratory effort.**
- **Atropine:**
  - **Atropine is considered a first line agent in symptomatic bradycardia.**
  - **Ineffective and potentially harmful in cardiac transplantation. May cause paradoxical bradycardia.**
- **Symptomatic bradycardia causing shock or peri-arrest condition:**
  - **If no IV or IO access immediately available start Transcutaneous Pacing, establish IV / IO access, and then administer atropine and/or epinephrine.**
  - **Epinephrine or Dopamine may be considered if no response to Atropine.**
- **Symptomatic condition**
  - **Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.**
  - **Symptomatic bradycardia usually occurs at rates < 50 beats per minute.**
  - **Search for underlying causes such as hypoxia or impending respiratory failure.**
- **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 CHF.**
- **Transcutaneous Pacing Procedure (TCP)**
  - **Indicated with unstable bradycardia unresponsive to medical therapy.**
  - **If time allows transport to specialty center because transcutaneous pacing is a temporizing measure.**
  - **Transvenous / permanent pacemaker will probably be needed.**
  - **Immediate TCP with high-degree AV block (2d or 3d degree) with no IV / IO access.**
- Consider treatable causes for bradycardia (Beta Blocker OD, Calcium Channel Blocker OD, etc.)

Cardiac Arrest; Adult

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES →
- Decomposition
- Rigor mortis
- Dependent lividity
- Blunt force trauma
- Injury incompatible with life
- Extended downtime with asystole or Wide Complex PEA ≤ 40 bpm

Do not begin resuscitation

Follow Deceased Subjects Policy

NO ↓

Begin Continuous CPR Compressions
Push Hard (≥ 2 inches)
Push Fast (100 - 120 / min)
Change Compressors every 2 minutes
(sooner if fatigued)
(Limit changes / pulse checks ≤ 10 seconds)

Ventilate 1 breath every 6 seconds
30:2 Compression:Ventilation if no Advanced Airway
Monitor EtCO2
if available

ALS Available

NO → AED Procedure CSP 5 *if available*

YES → **P** Cardiac Monitor

AED Procedure CSP 5 *if available*

Shockable Rhythm

NO → Continue CPR 2 Minutes
Repeat and reassess
Airway Protocol(s) AR 1, 2, 3

YES → AED Procedure CSP 5

Cardiac Monitor

Shockable Rhythm

NO → Asystole / PEA Protocol AC 1 ***as indicated***
Airway Protocol(s) AR 1, 2, 3

YES → VF / VT Protocol AC 9
Tachycardia Protocol(s) AC 6, 7 ***as indicated***
Airway Protocol(s) AR 1, 2, 3

Arrest secondary to Opioid OD?

YES →
Naloxone 0.4 - 2 mg IN / IM
Peds: 0.1 mg/kg IN
Maximum 4 mg

A *Consider*
Naloxone 0.4 - 2 mg
Peds: 0.1 mg/kg
IV / IO / IM / IN / ETT
Maximum 4 mg

NO ↓

Termination on Scene Protocol AC 12 ***as indicated***

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Cardiac Arrest; Adult

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assign responders to predetermined tasks.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
- **DO NOT HYPERVENTILATE: If no advanced airway (BIAD, ETT) compression to ventilation ratio is 30:2. If advanced airway in place, ventilate 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **It is appropriate to provide passive oxygenation when there is limited resources prior to establishing the Team Focused Approach / Pit-Crew Approach.**
- **Reassess and document BIAD and / or endotracheal tube placement and EtCO2 frequently, after every move, and at transfer of care.**
- **IV / IO access and drug delivery is secondary to high-quality chest compressions and early defibrillation**.
- **IV access is preferred route. Follow IV or IO Access Procedure.**
- **Defibrillation:**
  Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
  Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO2 (EtCO2)**
  If EtCO2 is < 10 mmHg, improve chest compressions.
  If EtCO2 spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **Special Considerations**
  Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. 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.
  Renal Dialysis / Renal Failure - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
  Opioid Overdose - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol TE 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
  Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Transcutaneous Pacing:**
  Pacing is NOT effective in cardiac arrest and pacing in cardiac arrest does NOT increase chance of survival
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.
- Discussion with Medical Control can be a valuable tool in developing a differential diagnosis and identifying possible treatment options.

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
- **O**nset **/ 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
- Women:
  More likely to have dyspnea, N/V, weakness, back or jaw pain

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

B	**12 Lead ECG Procedure CSP 1**
	Aspirin 81 mg x 4 PO (chewed) Or **325 mg PO**
	Nitroglycerin 0.4 mg Sublingual Repeat every 5 minutes x 3 *(if BP ≥ 120 mmHg)*
P	Cardiac Monitor

Acute Coronary Occlusion (ACO) *See box below*

YES → **STEMI** *See box below*

NO → **Transmit 12-Lead for ED Physician Consultation**

Concern for ACO *(per ED Physician Consult)*

NO

YES

	IV / IO Access Protocol UP 6
A	**Nitroglycerin 0.4 mg SL** Repeat every 5 minutes as needed *(if BP ≥ 100 mmHg)*
	Nitroglycerin Paste SBP > 100 - 1 Inch SBP > 150 - 1.5 Inches SBP > 200 - 2 Inches
P	**Morphine 5 mg IV / IO / IM** **Age ≥ 65: 2.5 mg IV / IO / IM** Repeat **2.5 mg** every 5 minutes as needed May Repeat every 5 minutes **Maximum of 10 mg** OR **Fentanyl 50-100 mcg IV / IO / IM / IN** **Age ≥ 65: 25-50 mcg IV / IO / IM / IN** Repeat **25-10 mcg** every 5 minutes **Maximum 200 mcg**
	Hypotension / Shock Protocol AM 5 ***if indicated***
	CHF / Pulmonary Edema Protocol AC 5 ***if indicated***

Transport based on:
STEMI
EMS Triage and Destination Plan
Immediate Notification of Facility
Immediate Transmission of ECG
if capable

Keep Scene Time to ≤ 10 Minutes

B	*If transporting to Non PCI Center* **Reperfusion Checklist**

ACO
(includes STEMI)

STEMI Definition:
- **≥ 1 mm ST segment elevation in ≥ 2 contiguous leads**

Or
- **≥ 2 mm ST/J point elevation in V2-V3 for men**

Or
- **≥ 1.5 mm ST/J point elevation in V2-V3 for women**

Or
- **ECG software diagnosis Acute MI/STEMI with signs/ symptoms noted above**

Other signs of possible ACO:
- **ST Elevation in aVR with diffuse ST depression**
- **de Winter T-Waves**
- **Wellens Syndrome**

Notify Destination or Contact Medical Control

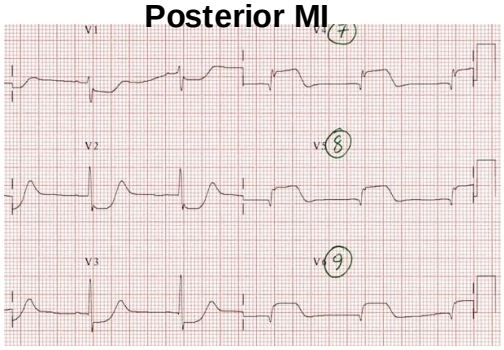
Adult Cardiac Protocol Section

Chest Pain: Cardiac and STEMI

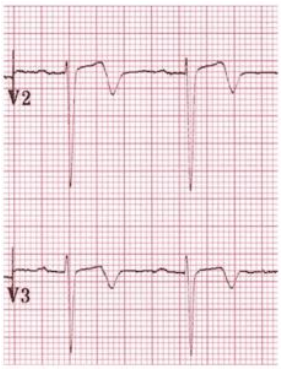
I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

SITE	FACING	RECIPROCAL
SEPTAL	V1, V2	NONE
ANTERIOR	V3, V4	NONE
ANTEROSEPTAL	V1, V2, V3, V4	NONE
LATERAL	I, aVL, V5, V6	II, III, aVF
ANTEROLATERAL	I, aVL, V3, V4, V5, V6	II, III, aVF
INFERIOR	II, III, aVF	I, aVL
POSTERIOR	NONE	V1, V2, V3, V4

Posterior MI



Wellens Syndrome



- Deeply inverted or biphasic T waves in V2-3 (may extend to V1-6)
- ECG pattern present in pain-free state
- Isoelectric or minimally-elevated ST segment (< 1mm)
- No precordial Q waves
- Preserved precordial R wave progression
- Recent history of angina

De Winter T-waves

- Tall, prominent, symmetrical T waves in the precordial leads
- Upsloping ST segment depression > 1mm at the J-point in the precordial leads
- Absence of ST elevation in the precordial leads
- Reciprocal ST segment elevation (0.5mm – 1mm) in aVR

Adult Cardiac Protocol Section

Pearls

- Patients with findings suggestive of MI are to have 12-lead EKG performed as soon as possible, ideally within the first 5 minutes of patient contact.
- ASA and Nitro are contraindicated in patients ≤ 16 years of age.
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Items in Red Text are the key performance indicators for the EMS Acute Cardiac (STEMI) Care Toolkit**
- **Nitroglycerin:**
  - **Avoid Nitroglycerin in any patient who has used Viagra (sildenafil) or Levitra (vardenafil) in the past 24 hours or Cialis (tadalafil) in the past 36 hours due to potential severe hypotension.**
  - **Nitroglycerin may cause hypotension during any type myocardial infarction. It is NOT more likely to cause hypotension in an inferior MI and should NOT be avoided unless already hypotensive.**
- **STEMI (ST-Elevation Myocardial Infarction)**
  - **Positive Reperfusion Checklist should be transported to the appropriate facility based on STEMI EMS Triage and Destination Plan.**
  - **Consider placing 2 IV sites in the left arm: Many PCI centers use the right radial artery for intervention.**
  - **Consider placing defibrillator pads on patient as a precaution.**
  - **Consider Normal Saline or Lactated Ringers bolus of 250 – 500 mL as pre-cath hydration.**
  - **Scene time goal is ≤ 10 minutes.**
  - **Document and time-stamp facility STEMI notification and make notification as soon as possible.**
  - **Document the time of the 12-Lead ECG in the PCR as a Procedure along with the interpretation (Paramedic).**
- **Cardiac related symptoms in men and women:**
  - Pressure, squeezing, fullness, or pain in the chest.
  - Pain or discomfort in one or both arms, the back, neck, jaw, or stomach.
  - Shortness of breath with or without chest pain.
  - Sweating, nausea, weakness, and/or lightheadedness.
  - **Women, diabetic patients, and the elderly often experience only weakness, shortness of breath, nausea/vomiting, and back or jaw pain.**
- If patient has taken nitroglycerin without relief, consider potency of the medication.
- Monitor for hypotension after administration of nitroglycerin and opioids.
- **EMT may administer nitroglycerin to patients from EMS supply.**

CHF / Pulmonary Edema

History
- Congestive heart failure
- Past medical history
- Medications (digoxin, Lasix, 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

	Airway Protocol(s) AR 1, 2, 3 ***as indicated***
	Chest Pain and STEMI Protocol AC 4 ***if indicated***
B	12 Lead ECG Procedure CSP 1
B	**Nitroglycerin 0.4 mg Sublingual** Repeat every 5 minutes x 3 ***if prescribed to patient and (BP >100)***
P	Cardiac Monitor
	IV / IO Access Procedure UP 6

Assess Symptom Severity

MILD
Normal Heart Rate
Elevated or Normal BP

A	**Nitroglycerin 0.4 mg SL** Repeat every 5 minutes
A	**Nitroglycerin Paste** SBP > 100 - 1 Inch SBP > 150 - 1.5 Inches SBP > 200 - 2 Inches

Improving — NO → (B) Airway NIPPV Procedure RSP 4

YES

MODERATE / SEVERE
Elevated Heart Rate
Elevated BP

B	**Airway NIPPV Procedure RSP 4**
A	**Nitroglycerin 0.4 mg SL** Repeat every 5 minutes
A	**Nitroglycerin Paste** SBP > 100 - 1 Inch SBP > 150 - 1.5 Inches SBP > 200 - 2 Inches
P	Consider **Furosemide 40 mg IV or Equal Daily Dose MAX 80mg** **ONLY IF** *Known CHF / furosemide use* *Afebrile*
P	Consider **Enalapril 1.25 mg IV** Only if SBP ≥ 190

CARDIOGENIC SHOCK
Tachycardia followed by bradycardia
Hypertension followed by hypotension

B	Remove NIPPV ***if in place***
	Adult Hypotension / Shock Protocol AM 5 ***if indicated***

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

CHF / Pulmonary Edema

Pearls

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Items in Red Text are key performance measures used to evaluate protocol compliance and care**
- **Diuretics (furosemide) and opioids have NOT been shown to improve the outcomes of EMS patients with pulmonary edema. Even though this historically has been a mainstay of EMS treatment, it is no longer routinely recommended.**
- **Nitroglycerin:**
  - **Avoid Nitroglycerin in any patient who has used Viagra (sildenafil) or Levitra (vardenafil) in the past 24 hours or Cialis (tadalafil) in the past 36 hours due to potential severe hypotension.**
  - **Nitroglycerin may cause hypotension during any type myocardial infarction. It is NOT more likely to cause hypotension in an inferior MI and should NOT be avoided unless already hypotensive.**
- **Document the time of the 12-Lead ECG in the PCR as a Procedure along with the interpretation (Paramedic).**
- **Consider myocardial infarction in all these patients. Diabetics, geriatric and female patients often have atypical pain, or only generalized complaints.**
- **Cardiac related symptoms in men and women:**
  - Pressure, squeezing, fullness, or pain in the chest.
  - Pain or discomfort in one or both arms, the back, neck, jaw, or stomach.
  - Shortness of breath with or without chest pain.
  - Sweating, nausea, weakness, and/or lightheadedness.
  - **Women, diabetic patients, and the elderly often experience only weakness, shortness of breath, nausea/ vomiting, and back or jaw pain.**
- If patient has taken nitroglycerin without relief, consider potency of the medication.
- Contraindications to opioids include severe COPD and respiratory distress. Monitor the patient closely.
- Monitor for hypotension after administration of nitroglycerin and opioids.
- Allow the patient to be in their position of comfort to maximize their breathing effort.
- **EMT may administer Nitroglycerin to patients already prescribed medication. May give from EMS supply**.

Adult Tachycardia
NARROW (≤ 0.11 sec)

History
- Age
- Past medical history (MI, Angina, Diabetes, post menopausal)
- Recent physical exertion
- Palpitations, irregular heart beat
- **T**ime (onset /duration / repetition)

Signs and Symptoms
- Chest pain, heart failure, dyspnea
- AMS
- Shock, poor perfusion, hypotension
- Pale, diaphoresis
- Shortness of breath
- Nausea, vomiting, dizziness

Differential
- Trauma vs. Medical
- Sinus Tachycardia vs. dysrhythmia
- Fever, sepsis, infection
- Pericarditis, pulmonary embolism
- Aortic dissection or aneurysm
- Overdose: Stimulants

Assess tachycardia in context of clinical condition
Identify and treat underlying cause of tachycardia

Unstable / Serious Signs and Symptoms
HR Typically ≥ 150
Hypotension, Acute AMS, Ischemic Chest Pain, Acute CHF, Seizures, Syncope, or Shock secondary to tachycardia

YES →

P	Cardioversion Procedure CSP 2
	Consider Sedation Prior to Cardioversion **Midazolam 2.5 mg IV / IO / IN** **5 mg IM** **Age ≥ 65: 1 mg IV / IO / IN** **2.5 mg IM** Repeat every 5 minutes **Maximum 10mg**
	Synchronized Cardioversion **200 Joules**

Exit to Appropriate Protocol(s)
if rhythm converts

NO ↓

B	12 Lead ECG Procedure CSP 1
P	Cardiac Monitor
	IV / IO Access Protocol UP 6

Regular Rhythm?

YES →

P	Attempt Vagal Maneuvers Procedure
	Adenosine 6 mg IV / IO Rapid push with flush May repeat **12 mg IV / IO** May repeat **12 mg IV / IO**

NO ↓

P	**Diltiazem 0.25 mg/kg IV / IO** Over 2 – 3 minutes SBP > 100 **Maximum 25 mg** If No Improvement in 15 minutes **Diltiazem 0.35 mg/kg IV / IO** **Maximum 25 mg** **OR** **Metoprolol 5 mg IV / IO** If No Improvement in 5 minutes **Repeat Metoprolol 5 mg IV / IO**
	Monitor and Reassess
	Notify Destination or Contact Medical Control

Single lead ECG able to diagnose and treat arrhythmia

12 Lead ECG not necessary to diagnose and treat, but preferred when patient is stable.

Adult Cardiac Protocol Section

Adult Tachycardia
NARROW (≤ 0.11 sec)

THE MOST IMPORTANT ASPECT IS TO DIFFERENTIATE THE TYPE OF TACHYCARDIA AND IF THE PATIENT IS STABLE OR UNSTABLE.

SEARCH FOR AND TREAT THE UNDERLYING CAUSE OF THE TACHYCARDIA SUCH AS FEVER, SHOCK, SEPSIS, RESPIRATORY DISTRESS, HYPOXIA, ETC.

Symptomatic tachycardia usually occurs at rates of 120 – 150 or greater and typically > 150 beats per minute.

Patients with symptoms related to a tachycardia < 150 beats per minute typically have impaired cardiac function such as CHF.

Pearls

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Most important goal is to differentiate the type of tachycardia and if STABLE or UNSTABLE and SYMPTOMATIC.**
- **12-Lead ECG:**
  - **12 Lead ECG not necessary to diagnose and treat**
  - **Obtain when patient is stable and/or following rhythm conversion.**
- **Unstable condition**
  - **Condition which acutely impairs vital organ function and cardiac arrest may be imminent.**
  - **If at any point patient becomes unstable move to unstable arm in algorithm.**
- **Search for underlying cause of tachycardia such as fever, sepsis, dyspnea, etc.**
- **Typical sinus tachycardia is in the range of 100 to (200 - patient's age) beats per minute.**
- **Symptomatic condition**
  - **Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.**
  - **Symptomatic tachycardia usually occurs at rates ≥ 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 CHF.**
- **If patient has history or 12 Lead ECG reveals Wolfe Parkinson White (WPW):**
  - **DO NOT administer a Calcium Channel Blocker (e.g. Diltiazem) or Beta Blockers.**
  - **Use caution with Adenosine and give only with defibrillator available.**
- **Regular Narrow-Complex Tachycardia:**
  - Vagal maneuvers and adenosine are preferred. Vagal maneuvers may convert 19% to 54 % of SVT.
  - Using passive leg raise with Valsalva is more effective.
  - Adenosine should be pushed rapidly via proximal IV site followed by 20 mL Normal Saline rapid flush.
  - Adenosine should not be used in the post-cardiac transplant patient without **Contact of Medical Control.**
  - Agencies using both calcium channel blockers and beta blockers should choose one primarily. Giving the agents sequentially requires **Contact of Medical Control**. This may lead to profound bradycardia / hypotension.
- **Irregular Narrow-Complex Tachycardia:**
  - Rate control is more important in pre-hospital setting rather than focus on rhythm conversion.
- **Synchronized Cardioversion:**
  - Recommended to treat UNSTABLE Atrial Fibrillation, Atrial Flutter and SVT.
- Monitor for hypotension after administration of Calcium Channel Blockers or Beta Blockers.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.

Adult Monomorphic Tachycardia

Wide Complex (≥0.12 sec)

History
- Age
- Past medical history (MI, Angina, Diabetes, post menopausal)
- Recent physical exertion
- Palpitations, irregular heart beat
- **T**ime (onset /duration / repetition)

Signs and Symptoms
- Chest pain, heart failure, dyspnea
- AMS
- Shock, poor perfusion, hypotension
- Pale, diaphoresis
- Shortness of breath
- Nausea, vomiting, dizziness

Differential
- Trauma vs. Medical
- Sinus Tachycardia vs. dysrhythmia
- Fever, sepsis, infection
- Pericarditis, pulmonary embolism
- Aortic dissection or aneurysm
- Overdose: Stimulants

Assess tachycardia in context of clinical condition
Identify and treat underlying cause of tachycardia

Unstable / Serious Signs and Symptoms
HR Typically > 150
Hypotension, Acute AMS, Ischemic Chest Pain, Acute CHF, Seizures, Syncope, or Shock secondary to tachycardia

YES →

P	
	Cardiac Monitor
	Cardioversion Procedure CSP 2
	Consider Sedation Prior to Cardioversion **Midazolam 2.5 mg IV / IO / IN** **5 mg IM** **Age ≥ 65: 1 mg IV / IO / IN** **2.5 mg IM** May repeat every 5 minutes **Maximum 10mg**
	<u>Wide and Irregular: 200J</u> ✱ **Monomorphic QRS (Synchronized)** ✱ **Polymorphic QRS (Not-Synchronized)** *May repeat and increase dose with subsequent cardioversion attempts*

NO

B	12 Lead ECG Procedure CSP 1
P	Cardiac Monitor
	iV / IO Protocol UP 6
P	**Consider consultation with medical control**

Regular Rhythm?

YES →

P	
	Attempt Vagal Maneuvers Procedure ***Only if regular monomorphic complex***
	<u>Consider</u> **<u>Only if regular monomorphic complex</u>** **Adenosine 6 mg IV / IO** Rapid push with flush May repeat **12 mg IV / IO**

NO

P	
	Amiodarone 150 mg IV / IO in D5W over 10 minutes May repeat if no response or if wide complex tachycardia recurs Or **Lidocaine 1 mg / kg IV / IO.** *if refractory* May repeat **1 mg / kg**
	Monitor and Reassess

Notify Destination or Contact Medical Control

<u>Monomorphic QRS:</u>
All QRS complexes in a single lead are similar in shape.

Single lead ECG able to diagnose and treat arrhythmia

12 Lead ECG not necessary to diagnose and treat, but preferred when patient is stable.

Adult Cardiac Protocol Section

Adult Monomorphic Tachycardia
Wide Complex (≥0.12 sec)

Pearls

- **DO NOT administer a Calcium Channel Blocker for wide complex tachycardia**
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Most important goal is to differentiate the type of tachycardia and if STABLE or UNSTABLE and SYMPTOMATIC.**
- **12-Lead ECG:**
  - **12 Lead ECG not necessary to diagnose and treat**
  - **Obtain when patient is stable and/or following rhythm conversion.**
- **Monomorphic QRS:**
  - **All QRS complexes in a single lead are similar in shape.**
- **Polymorphic QRS:**
  - **QRS complexes in a single lead will change shape from complex to complex.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological or electrical treatment given only when symptomatic, otherwise monitor and reassess.**
- **Unstable condition**
  - **Condition which acutely impairs vital organ function and cardiac arrest may be imminent.**
  - **If at any point patient becomes unstable move to unstable arm in algorithm.**
- **Symptomatic condition**
  - **Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.**
  - **Symptomatic tachycardia usually occurs at rates ≥ 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, etc.**
- **Typical sinus tachycardia is in the range of 100 to (220 – patients age) beats per minute.**
- **If patient has history or 12 Lead ECG reveals Wolfe Parkinson White (WPW), DO NOT administer a Calcium Channel Blocker (e.g., Diltiazem) or Beta Blockers. Use caution with Adenosine and give only with defibrillator available.**
- **Regular Wide-Complex Tachycardia:**
  - **Unstable condition:**
    - Immediate defibrillation if pulseless and begin CPR.
  - **Stable condition:**
    - Typically VT or SVT with aberrancy. Adenosine may be given if regular and monomorphic and if defibrillator available.
    - Verapamil contraindicated in wide-complex tachycardias.
    - Agencies using Amiodarone, Procainamide and Lidocaine need choose one agent primarily. Giving multiple anti-arrhythmics requires contact of Medical Control.
    - Atrial arrhythmias with WPW should be treated with Amiodarone or Procainamide
- **Irregular Tachycardia:**
  - Wide-complex, irregular tachycardia: Do not administer calcium channel, beta blockers, or adenosine as this may cause paradoxical increase in ventricular rate. This will usually require cardioversion. Contact Medical Control.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.

Adult Polymorphic Tachycardia
Wide Complex (≥ 0.12 sec)

History
- Age
- Past medical history (MI, Angina, Diabetes, post menopausal)
- Recent physical exertion
- Palpitations, irregular heart beat
- Time (onset /duration / repetition)

Signs and Symptoms
- Chest pain, heart failure, dyspnea
- AMS
- Shock, poor perfusion, hypotension
- Pale, diaphoresis
- Shortness of breath
- Nausea, vomiting, dizziness

Differential
- Cardiac arrest
- Sinus Tachycardia vs. dysrhythmia
- Fever, sepsis, infection
- Pericarditis, pulmonary embolism
- Aortic dissection or aneurysm
- Overdose

Assess tachycardia in context of clinical condition
Identify and treat underlying cause of tachycardia

Unstable / Serious Signs and Symptoms
HR Typically ≥ 150
Hypotension, Acute AMS, Ischemic Chest Pain, Acute CHF, Seizures, Syncope, or Shock secondary to tachycardia

YES →

P	Defibrillation Procedure CSP 6
	Consider Sedation Prior to Defibrillation **Midazolam 2.5 mg IV / IO / IN** **5 mg IM** **Age ≥ 65: 1 mg IV / IO / IN** **2.5 mg IM** May repeat every 5 minutes **Maximum 10mg**
	Wide and Irregular: 200J **Polymorphic QRS (Not-Synchronized)** *May repeat and increase dose with subsequent cardioversion attempts*

NO

	12 Lead ECG Procedure CSP 1
P	Cardiac Monitor
	IV or IO Access Protocol UP 6

Pulse Present?

YES → P **Consider consultation with medical control**

NO → Exit to Cardiac Arrest Protocol AC 3

QT Interval < 500 msec

P	**Amiodarone 150 mg IV / IO in D5W over 10 minutes** May repeat if no response or if wide complex tachycardia recurs Or **Lidocaine 1 mg / kg IV / IO.** *if refractory* May repeat **1 mg / kg**
	Monitor and Reassess

QT Interval > 500 msec
(Torsades de pointes)

P	*Consider* **Magnesium 2 g IV / IO** May repeat **Maximum 4g**
	Monitor and Reassess

Notify Destination or Contact Medical Control

Single lead ECG able to diagnose and treat arrhythmia

12 Lead ECG not necessary to diagnose and treat, but preferred when patient is stable.

Polymorphic QRS

QRS complexes in a single lead will change shape from complex to complex.

Adult Cardiac Protocol Section

Adult Polymorphic Tachycardia
WIDE (≥ 0.12 sec) Torsades de pointes

Pearls

- **DO NOT administer a Calcium Channel Blocker for wide complex tachycardia**
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Most important goal is to differentiate the type of tachycardia and if STABLE or UNSTABLE and SYMPTOMATIC.**
- **12-Lead ECG:**
  - **12 Lead ECG not necessary to diagnose and treat**
  - **Obtain when patient is stable and/or following rhythm conversion.**
- **Monomorphic QRS:**
  - **All QRS complexes in a single lead are similar in shape.**
- **Polymorphic QRS:**
  - **QRS complexes in a single lead will change shape from complex to complex.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological or electrical treatment given only when symptomatic, otherwise monitor and reassess.**
- **Unstable condition**
  - **Condition which acutely impairs vital organ function and cardiac arrest may be imminent.**
  - **If at any point patient becomes unstable move to unstable arm in algorithm.**
- **Symptomatic condition**
  - **Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.**
  - **Symptomatic tachycardia usually occurs at rates ≥ 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, etc.**
- **Typical sinus tachycardia is in the range of 100 to (220 – patients age) beats per minute.**
- **If patient has history or 12 Lead ECG reveals Wolfe Parkinson White (WPW), DO NOT administer a Calcium Channel Blocker (e.g., Diltiazem) or Beta Blockers. Use caution with Adenosine and give only with defibrillator available.**
- **Polymorphic / Irregular Tachycardia:**
  - **This situation is usually unstable and immediate defibrillation is warranted.**
  - If QT length is known, use for decision-making. Prolonged QT length defined as > 500 msec.
  - QT length < 500 msec:
    - Arrhythmia more likely related to ischemia or infarction and Magnesium not likely helpful.
    - May quickly deteriorate into Ventricular Fibrillation.
    - Even when terminated by defibrillation, may recur, so follow with medication therapy.
  - QT prolongation > 500 msec:
    - Magnesium more likely to be helpful.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.

Ventricular Fibrillation
Pulseless Ventricular Tachycardia

Cardiac Arrest Protocol AC 3

	Begin Continuous CPR Compressions **Push Hard (≥ 2 inches) Push Fast (100 - 120 / min)** **Change Compressors every 2 minutes** **(*sooner if fatigued*)** **(*Limit changes / pulse checks ≤ 10 seconds*)** **Ventilate 1 breath every 6 seconds** **30:2 Compression:Ventilation if no Advanced Airway** ***Monitor EtCO2*** ***if available***
	AED Procedure CSP 5 *if available*
P	Defibrillation Procedure CSP 6
	IV / IO Access Protocol UP 6
A	**Epinephrine (1:10,000) 1 mg IV / IO**
	Search for Reversible Causes
	Continue CPR Compressions **Push Hard (≥ 2 inches) Push Fast (100 - 120 / min)** **Change Compressors every 2 minutes** **(*sooner if fatigued*)** **(*Limit changes / pulse checks ≤ 10 seconds*)** **<u>If Rhythm Refractory</u>** **Continue CPR and give Agency specific Anti-arrhythmics and Epinephrine** **Continue CPR up to point where you are ready to defibrillate with device charged.** **Repeat pattern during resuscitation.**
P	**After 2 Defibrillations Attempts** Change vector by placing a second set of pads in new location (A-P or A-L) ***if available*** *Do not interrupt chest compressions*
P	**Amiodarone 300 mg IV / IO Bolus** May repeat if refractory **Amiodarone 150 mg IV / IO Bolus** Or **Lidocaine 1.0 mg/kg IV / IO** May repeat **1.0 mg/kg** if refractory If refractory, consider **Magnesium 2 gm IV / IO Bolus**
	After 4 Defibrillations Attempts Consider Dual Sequential Defibrillation Procedure CSP 7 ***if available***

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

- If ROSC obtained and patient subsequently looses pulses administered an additional Epinephrine 1mg of 1:10,000

- Epinephrine 1mg 1:10,000 should be given every 3-5 minutes if Anaphylaxis is suspected.

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to Team Focused CPR Protocol AC 11.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
- **DO NOT HYPERVENTILATE: If no advanced airway (BIAD, ETT) compression to ventilation ratio is 30:2. If advanced airway in place, ventilate 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **It is appropriate to utilize passive oxygenation when resources are limited prior to the implementation of the Team Focused Approach / Pit-Crew Approach.**
- **Reassess and document BIAD and / or endotracheal tube placement and EtCO2 frequently, after every move, and at transfer of care.**
- **IV / IO access and drug delivery is secondary to high-quality chest compressions and early defibrillation**.
- **IV access is preferred route. Follow IV or IO Access Procedure.**
- **Defibrillation:**
  Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause. Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO2 (EtCO2)**
  If EtCO2 is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
  If EtCO2 spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC
- **Special Considerations**
  - **Maternal Arrest** - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. 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.
  - **Renal Dialysis / Renal Failure** - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
  - **Opioid Overdose** - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol TE 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
  - **Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike** – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Magnesium Sulfate is not routinely recommended during cardiac arrest, but may help with Torsades de points, prolonged QT, low Magnesium States (malnourished / alcoholic), and suspected digitalis toxicity**
- Return of spontaneous circulation: Heart rate should be > 60 when initiating anti-arrhythmic infusions.
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.
- Discussion with Medical Control can be a valuable tool in developing a differential diagnosis and identifying possible treatment options.

Post Resuscitation

Return of Spontaneous Circulation

↓

Repeat Primary Assessment

Optimize Ventilation and Oxygenation
- Respiratory Rate 10 / minute
- Maintain SpO2 92 – 98%
- ETCO2 ideally 35 –45 mm Hg
- DO NOT HYPERVENTILATE

Airway Protocol(s) AR 1, 2, 3, 4 ***as indicated***

B — 12 Lead ECG Procedure CSP 1

IV / IO Access Protocol UP 6

P — Cardiac Monitor

Monitor Vital Signs / Reassess

Search for reversible causes

↓

Chest Pain and STEMI Protocol AC 4 ***if indicated***

Hypotension / Shock Protocol AM 5 ***as indicated***

P — *Consider* **Push-Dose Vasopressor Agent** See Physician Notes

A / P — **Optimize Systolic BP and Mean Arterial BP**
Systolic BP > 90 mmHg
Mean Arterial BP > 65 mmHg

Appropriate Arrhythmia Protocol(s) AC 2, 6, 7 ***as indicated***

Seizure Protocol UP 13 ***as indicated***

Post Intubation BIAD Management Protocol AR 8

↓

Notify Destination or Contact Medical Control

Transport Destination Decision

Post-resuscitation patient is medically complex.

Consider facility capabilities:
- 24-hour cardiac cath lab
- Medical ICU service
- Cardiology service
- Neurology service
- Pulmonology service
- Targeted Temperature Management

Arrhythmias are common and usually self limiting after ROSC

If Arrhythmia Persists follow Rhythm Appropriate Protocol

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

Adult Cardiac Protocol Section

Push-Dose Vasopressor Agent

1. **Indications**
   a. Peri-intubation hypotension
   b. Post-arrest (post-ROSC) hypotension
   c. Hypotension requiring initiation of vasopressor drip – prior to drip setup
   d. Unstable bradycardia (as a supplement to other therapy)
2. **Instructions**
   a. Draw up 1mL of 1:10,000 epinephrine
   b. Waste 1mL of saline from a 10mL saline flush
   c. Add the 1mL of epinephrine to the remaining 9mL of saline
      i. This yields epinephrine in a concentration of 10mcg/mL
   d. Place a medication added label on this syringe to identify it as a vasopressor
   e. Administer 10mcg (1mL) every 2 minutes as needed to achieve desired blood pressure or heart rate

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. Titrate FiO_2 to maintain SpO_2 of 92 - 98%.**
- **Pain/sedation:**
  Patients requiring advanced airways and ventilation commonly experience pain and anxiety.
  Unrelieved pain can lead to increased catecholamine release, ischemia, immunosuppression, and prolonged hospitalization.
  Ventilated patients cannot communicate pain / anxiety and providers are poor at recognizing pain / anxiety.
  Vital signs such has tachycardia and / or hypertension can provide clues to inadequate sedation, however they both are not always reliable indicators of patient's lack of adequate sedation.
  Pain must be addressed first, before anxiety. Opioids are typically the first line agents before benzodiazepines. Ketamine is also a reasonable first choice agent.
- **Ventilator / Ventilation strategies:**
  Tailored to individual patient presentations. Medical Control can indicate different strategies above.
  In general ventilation with BVM should cause chest rise. With mechanical ventilation a reasonable tidal volume should be about 6 mL/kg and peak pressures should be < 30 cmH20.
  Continuous pulse oximetry and capnography should be maintained during transport for monitoring.
  Head of bed should be maintained at least 10 – 20 degrees of elevation when possible to decrease aspiration risk.
- **EtCO2 Monitoring:**
  Initial End tidal CO2 may be elevated immediately post-resuscitation, but will usually normalize.
  Goal is 35 –45 mmHg but avoid hyperventilation to achieve.
- **Titrate fluid resuscitation and vasopressor administration to maintain SBP of 90 – 100 mmHg or Mean Arterial Pressure (MAP) of 65 – 80 mmHg.**
- **STEMI (ST-Elevation Myocardial Infarction)**
  Consider placing 2 IV sites in the left arm: Many PCI centers use the right radial artery for intervention.
  Consider placing defibrillator pads on patient as a precaution.
  Document and time-stamp facility STEMI notification and make notification as soon as possible.
  Document the time of the 12-Lead ECG in the PCR as a Procedure along with the interpretation (Paramedic).
- **Consider transport to facility capable of managing the post-arrest patient including hypothermia therapy, cardiology / cardiac catheterization, intensive care service, and neurology services.**
- The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring. Appropriate post-resuscitation management may best be planned in consultation with Medical Control.

Team Focused CPR

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES

Decomposition
Rigor mortis
Dependent lividity
Blunt force trauma
Injury incompatible with life
Extended downtime with asystole or Wide Complex PEA ≤ 40 bpm

Do not begin resuscitation

Follow Deceased Subjects Policy

NO

Begin Continuous CPR Compressions
Push Hard (≥ 2 inches)
Push Fast (100 - 120 / min)
Change Compressors every 2 minutes (sooner if fatigued)
(Limit changes / pulse checks ≤ 10 seconds)

Ventilate 1 breath every 6 seconds
30:2 Compression:Ventilation if no Advanced Airway
Monitor EtCO2 if available

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

First Arriving BLS / ALS Responder
Initiate Compressions Only CPR
Initiate Defibrillation Automated Procedure
if available
Call for additional resources

Second Arriving BLS / ALS Responder
Assume Compressions or
Initiate Defibrillation Automated / Manual Procedure
Place BIAD
DO NOT Interrupt Compressions
Ventilate at 6 to 8 breaths per minute

Third Arriving Responder
BLS or ALS

BLS

Establish Team Leader
(Hierarchy)
Fire Department or Squad Officer
EMT
First Arriving Responder

Rotate with Compressor
To prevent Fatigue and effect high quality compressions
Take direction from Team Leader

Fourth / Subsequent Arriving Responders
Take direction from Team Leader

Continue Cardiac Arrest Protocol AC 3

ALS

A

Establish Team Leader
(Hierarchy)
EMS ALS Personnel
Fire Department or Squad Officer
EMT
First Arriving Responder

Initiate Defibrillation Automated Procedure
Establish IV / IO Procedure
Administer Appropriate Medications
Establish Airway with BIAD if not in place

P

Initiate Defibrillation Manual Procedure
Continuous Cardiac Monitoring
Establish IV / IO Procedure
Administer Appropriate Medications
Establish Airway with BIAD if not in place

Continue Cardiac Arrest Protocol AC 3

Team Leader
ALS Personnel
Responsible for patient care
Responsible for briefing / counseling family

Incident Commander
Fire Department / First Responder Officer
Team Leader until ALS arrival
Manages Scene / Bystanders
Ensures high-quality compressions
Ensures frequent compressor change
Responsible for briefing family prior to ALS arrival

Adult Cardiac Protocol Section

Team Focused CPR

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
- **DO NOT HYPERVENTILATE: If no advanced airway (BIAD, ETT), compression to ventilation ratio is 30:2. If advanced airway in place, ventilate 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **It is appropriated to provide passive oxygenation when limited resources are on the scene and prior to the establishment of the Team Focused Approach / Pit-Crew Approach.**
- Reassess and document BIAD and / or endotracheal tube placement and EtCO2 frequently, after every move, and at transfer of care.
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation**.
- **IV access is preferred route. Follow IV or IO Access Procedure UP 6**
- **Defibrillation:** Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
  Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
  Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.
- Discussion with Medical Control can be a valuable tool in developing a differential diagnosis and identifying possible treatment options.

On Scene Resuscitation
Termination of CPR

TIME FROM BLS or ALS CPR

Age ≤ 18 — YES → Exit to Pediatric Cardiac Arrest Protocol(s) PC 1, 4, 6

NO

Downtime ≥ 15 minutes — NO → Exit to Cardiac Arrest Protocol(s) AC 1, 3, 8, 9

YES

AED / ECG Monitor
Initial Rhythm Asystole /PEA
≤ 40 bpm Wide Complex
No shock indicated — YES → Do not begin resuscitation Follow Deceased Subjects Policy

NO

20 Minutes

FR / EMS BLS + ALS CPR
> 20 minutes

EtCO2 ≥ 10 — NO → Terminate CPR Effort Follow Deceased Subjects Policy

EtCO2 ≥ 10 — YES → Continue Cardiac Arrest Protocol(s) AC 1, 3, 8, 9

30 Minutes

FR / EMS BLS + ALS
> 30 minutes

EtCO2 ≥ 20 — NO → Terminate CPR Effort Follow Deceased Subjects Policy

EtCO2 ≥ 20 — YES → Continue Cardiac Arrest Protocol(s) AC 1, 3, 8, 9

45 - 60 Minutes

FR / EMS BLS + ALS CPR
> 45 minutes

EtCO2 ≥ 20 — NO → Terminate CPR Effort Follow Deceased Subjects Policy

EtCO2 ≥ 20 — YES

Contact Medical Control

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

Adult Cardiac Protocol Section

On Scene Resuscitation / Termination of CPR

- Early Transport to closet most appropriate medical facility should be initiated if the patients cardiac rhythm is identified as PEA along with any of the following situations:
  - ROSC obtained at any time
  - Any shockable rhythm was identified during care
  - Witnessed Cardiac Arrest (Bystander or Provider)
  - Any Pediatric Patient (≤ 18 years of age)
  - Provider Discretion
  - Narrow Complex PEA > 40 bpm with EtCO2 ≥ 20mmHg

- Consider Listening with Stethoscope Apically if, Narrow Complex PEA and appropriate EtCO2 readings.
  - If Heart Sounds are present, consider vasopressors and transport immediately.

Pearls

- **General approach:**
  1. **Determine if a terminal disease is involved?**
  2. **Is there an advanced directive such as a DNR / MOST form?**
  3. **Did the patient express to your historian any desires regarding resuscitation and if so what measures?**
  4. **Remember a living will is not a DNR.**
- **Obtain a history while resuscitation efforts are ongoing. Determine the most legitimate person on scene as your information source such as a spouse, child, or sibling or Durable Health Care Power of Attorney.**
- Basic and Advanced Life Support may use for treatment decisions.

Mechanical Circulatory Support
LVAD, RVAD, and Bi-VAD

History
- SAMPLE
- Bridge to transplant
- Destination therapy
- Estimated downtime
- LVAD, RVAD, Bi-Vad, TAH
- DNR, MOST, or Living Will
- Contact with LVAD coordinator

Signs and Symptoms
- Unconsciousness
- Pulseless
- Apneic
- Poor capillary refill / skin color
- AMS or decreased mental status
- No electrical activity on ECG
- No heart tones on auscultation

Differential
- See Reversible Causes below
- Infection/Sepsis
- Hypovolemia
- Cardiac arrest
- Hemorrhage

Contact VAD coordinator:
- As quickly as possible for troubleshooting and treatment advice, but do not delay emergency treatment
- Follow patient specific emergency plan if present

Rapid assessment
Check for signs of life
Assess for adequate perfusion

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES ▶
Decomposition
Rigor mortis
Dependent lividity
Blunt force trauma
Injury incompatible with life
Extended downtime with asystole

Do not begin resuscitation

Follow Deceased Subjects Policy

NO

Unresponsive and Not breathing normally

Responsive or Unresponsive and Breathing normally

Airway Protocol(s) AR 1, 2, 3 ***if indicated***

Respiratory Distress Protocol AR 4 ***if indicated***

Assess LVAD function
Look and listen for alarms
LVAD Alarming?

YES ▶ **Go to Page 2**

◀ YES

Assess LVAD function
Look and listen for alarms
LVAD Alarming?

NO

Place stethoscope over heart

Humming sound present?

YES ▶ **Go to Page 3**

◀ YES

Humming sound present?

NO

Airway Protocol(s) AR 1, 2, 3 ***if indicated***

Respiratory Distress Protocol AR 4 ***if indicated***

Assume VAD failure
Initiate age appropriate ventilation rate

Go to Page 2

NO

Assume VAD failure
Initiate age appropriate ventilation rate

Go to Page 2

Adult Cardiac Protocol Section

Mechanical Circulatory Support
LVAD, RVAD, and Bi-VAD

History
- SAMPLE
- Bridge to transplant
- Destination therapy
- Estimated downtime
- LVAD, RVAD, Bi-Vad, TAH
- DNR, MOST, or Living Will
- Contact with LVAD coordinator

Signs and Symptoms
- Unconsciousness
- Pulseless
- Apneic
- Poor capillary refill / skin color
- AMS or decreased mental status
- No electrical activity on ECG
- No heart tones on auscultation

Differential
- See Reversible Causes below
- Infection/Sepsis
- Hypovolemia
- Cardiac arrest
- Hemorrhage

Entering from Page 1
No VAD humming heard and/or
VAD is alarming

Attempt to restart LVAD

Expose VAD control module
Expose VAD power source
Expose VAD driveline

Driveline:
- **Ensure driveline is connected firmly to control module**

Power source (batteries or main power source):
- **Ensure all power connections are firmly connected to control module**

Battery charge:
- **Check by pressing charge indicator**
- **Replace battery(s) if indicated**

LVAD restarted? Humming sound over heart?

YES → **Go to Page 3**

NO

Spare control module:
- **Attach batteries or main power source to spare control module**
- **Detach driveline and attach to spare control module**

LVAD restarted? Humming sound over heart?

YES → **Go to Page 3**

NO

Possible driveline cable fracture:
- **Quickly, but gently manipulate cable trying to restore break**
- **If successful, tape driveline in place where functioning restored**

Mechanical Circulatory Support
LVAD, RVAD, and Bi-VAD

Reassess
Patient responsive?

YES → **Rhythm analysis**
Ventricular Tachycardia?
Ventricular Fibrillation?

YES → Do Not Defibrillate

→ **Access Circulation**
Cap refill < 2 – 3 sec?
EtCO2 > 20 mmHg?
MAP > 50 mmHg?

NO → IV / IO Access Protocol UP 6
A — **Normal Saline Bolus**
500 mL IV / IO
May repeat as needed
Maximum 2 L

YES → (skip)

NO → **Rhythm analysis**
Ventricular Tachycardia?
Ventricular Fibrillation?

YES →
- AED Procedure CSP 5 ***if available***
- P — Defibrillation Procedure CSP 6

NO → **Access Circulation**
Cap refill < 2 – 3 sec?
EtCO2 > 20 mmHg?
MAP > 50 mmHg?

YES →
- ✱ **Contact VAD Coordinator**
- ✱ **Transport to VAD Center**
- ✱ **Take all spare VAD equipment**
- **Notify Destination or Contact Medical Control**

NO →
- Cardiac Arrest Protocol AC 3 ***as indicated***
- Team Focused CPR Protocol AC 11 ***as indicated***
- IV / IO Access Protocol UP 6
- A — **Normal Saline Bolus 500 mL IV / IO** May repeat as needed **Maximum 2 L**
- **Contact VAD Coordinator**
- On Scene Resuscitation / Termination of Resuscitation Protocol(s) AC 12 ***as indicated***

Reversible Causes
Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

Suspected Opioid Overdose
Administer Naloxone per Overdose / Toxic Ingestion Protocol TE 7

Left Ventricular Assist Device LVAD Unresponsive or AMS

Pearls

- **Recommended exam: Mental status, skin color, capillary refill, peripheral pulses, blood pressure.**
- **Assessment of blood flow and perfusion status:**
  - **Optimal BP attained by manual BP and Doppler.**
  - **Automated BP devices can measure a BP in about 50% of attempts and is not reliable to assess perfusion**
  - **A MAP of ≥ 60 mmHg is adequate for most LVAD patients.**
  - **Skin color, skin temperature, capillary refill**
- **Mechanical Circulatory Support devices:**
  - **LVAD – Left Ventricular Assist Device**
  - **RVAD – Right Ventricular Assist Device**
  - **BiVAD – Biventricular Ventricular Assist Device**
  - **TAH – Total Artificial Heart**
- **Reasons for use:**
  - **Bridge therapy – patients awaiting transplant or anticipated recovery.**
  - **Destination therapy – advanced heart failure, not candidate for transplant, and will live rest of life with device.**
- **Pump type and assessing pulses:**
  - **Pulsatile flow pumps – older units, not commonly in use now, but generate blood flow with a pulsatile flow and patient will have a palpable pulse.**
  - **Continuous flow pumps – majority of pumps now used and create blood flow in a continuous stream, no pulsatile flow, so patient will not have a palpable pulse.**
  - **Most devices are implanted inside the chest and have an internal pump, a driveline connected from the pump to the controller unit, and a power source consisting of batteries and electrical cord for receptacles.**
- **Common complications:**
  - **Disconnection of power supply, either battery disconnect, or electrical cord to receptacle disconnection.**
  - **Driveline failure or disconnection from controller unit.**
  - **Controller failure**
  - **Blood clot formation, acute stroke, and bleeding (mucosal and gastrointestinal most common sites)**
  - **Infection**
- Abnormal heart rhythm:
  - Pseudo-PEA: Normal cardiac electrical activity in a patient who is alert and well perfused with no palpable pulse.
  - Tachyarrhythmias are usually well tolerated.
- End Tidal CO2 (EtCO2)
  - If EtCO2 is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
  - If EtCO2 spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- Transcutaneous Pacing:
  - Pacing is NOT effective in cardiac arrest and pacing in cardiac arrest does NOT increase chance of survival

Total Artificial Heart

History
- SAMPLE
- Bridge to transplant
- Destination therapy
- Estimated downtime
- LVAD, RVAD, Bi-Vad, TAH
- DNR, MOST, or Living Will
- Contact with LVAD coordinator

Signs and Symptoms
- Unconsciousness
- Pulseless
- Apneic
- Poor capillary refill / skin color
- AMS or decreased mental status
- No electrical activity on ECG
- No heart tones on auscultation

Differential
- See Reversible Causes below
- Infection/Sepsis
- Hypovolemia
- Cardiac arrest
- Hemorrhage

Rapid assessment
Check for signs of life
Assess for adequate perfusion

Contact transplant coordinator:
- As quickly as possible for troubleshooting and treatment advice, but do not delay emergency treatment
- Follow patient specific emergency plan if present

DO NOT USE ECG MONITOR
Total Artificial Heart does not generate ECG

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES → Decomposition, Rigor mortis, Dependent lividity, Blunt force trauma
Injury incompatible with life
Extended downtime
Do not begin resuscitation
Follow Deceased Subjects Policy

NO

Pulse Present?

NO → **Go to Page 2**

YES

- Airway Protocol(s) AR 1, 2, 3 ***if indicated***
- Respiratory Distress Protocol AR 4 ***if indicated***
- Altered Mental Status Protocol UP 4 ***if indicated***

→ **Check Blood Pressure**

Systolic BP ≥ 150 mmHg

A — **Nitroglycerin 0.3 / 0.4 mg SL**
Repeat every 5 minutes
as needed

Maintain SBP ≥ 90 mmHg

P — **Furosemide 40 mg IV / IO**
if available
May assist patient taking their antihypertensive medication

Maintain SBP ≥ 90 mmHg

Systolic BP < 150 mmHg And ≥ 90 mmHg

DO NOT USE:
- Manual or mechanical chest compressions
- ECG/Defibrillation/Pacing/AED devices
- Vasopressor medications
- Antiarrhythmic medications

Systolic BP < 90 mmHg

- IV / IO Access Protocol UP 6
- **A** — **Normal Saline Bolus 500 mL IV / IO**
May repeat as needed
Maximum 1 L

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Total Artificial Heart

Entering from Page 1
No Pulse Present

DO NOT USE ECG MONITOR
Total Artificial Heart does not generate ECG

Attempt to restart Total Artificial Heart

Expose Total Artificial Heart control module
Expose Total Artificial Heart power source
Expose Total Artificial Heart driveline

Driveline:
- **Ensure it is connected firmly to control module**
- **Ensure lines are not kinked or bent**

Power source:
- **Ensure all connections firmly to control module (batteries or main power source)**

Battery charge:
- **Check by pressing charge indicator**
- **Replace battery(s) if indicated**

Back up Driver
- **Change to back up driver *if available***

Pulse Present? YES → **Go to Page 1**

NO

A **Normal Saline Bolus 500 mL IV / IO**
May repeat as needed

Maximum 1 L

Pulse Present? YES → **Go to Page 1**

NO

Follow Deceased Subjects Policy

Total Artificial Heart

Pearls

- **Recommended exam: Mental status, skin color, capillary refill, peripheral pulses, blood pressure.**
- **Assessment of blood flow and perfusion status:**
  - **Manual and automated BP devices can measure a BP.**
  - **Skin color, skin temperature, capillary refill**
- **ECG and telemetry monitoring:**
  - **The artificial heart does not produce an ECG wave form or tracing.**
  - **Do not use the 12-Lead ECG or ECG monitoring as it will only show asystole.**
- **Total Artificial Heart:**
  - **Different than Ventricular Assist Device (LVAD, RVAD, or Bi-VAD)**
  - **The patient's left and right ventricles are removed and the artificial heart is connected to the right and left atria.**
  - **The patient is totally dependent on the artificial heart for circulatory support – the native heart is removed.**
  - **There are both a right and left side pump, driven by air, and each side driven by a separate driveline.**
  - **The drivelines are not electric, they are driven by air, so kinking can disrupt the pumping action.**
  - **Artificial heart produces a pulsatile wave form so the patient will have a palpable pulse when operational.**
- **Reasons for use:**
  - **Bridge therapy – patients awaiting transplant or anticipated recovery.**
  - **Destination therapy – advanced heart failure, not candidate for transplant, and will live rest of life with device.**
- **Common complications:**
  - **Most common is kinking or bending of the driveline(s) which stops air from moving and stops pumping action.**
  - **Disconnection of power supply, either battery disconnect, or electrical cord to receptacle disconnection.**
  - **Driveline failure or disconnection from controller unit.**
  - **Controller failure**
  - **Blood clot formation, acute stroke, and bleeding (mucosal and gastrointestinal most common sites)**
  - **Infection**
- **Blood pressure:**
  - **Optimal SBP is < 130 mmHg and > 90 mmHg.**
  - **Hypertension puts great strain on the pump and can cause blood to back up into the lungs and cause pulmonary edema and respiratory failure.**
  - **Epinephrine and vasopressors are ineffective, can cause hypertension, and may worsen the patient's condition.**
- Manual or mechanical chest compressions:
  - **Do not use**
- End Tidal CO2 (EtCO2)
  - Helpful in monitoring adequate perfusion status.
- Defibrillation/Cardioversion:
  - Do not use.
- Transcutaneous Pacing:
  - Do not use.

Wearable Cardioverter Defibrillator Vest

History
- SAMPLE
- Known risk for Sudden Cardiac Death
- Risk for life-threatening arrhythmia
- No implanted defibrillator
- Heart failure – cardiomyopathy
- Decreased ejection fraction

Signs and Symptoms
- Chest pain, dyspnea
- Palpitations
- Received shock from vest
- Poor capillary refill / skin color
- AMS or decreased mental status

Differential
- See Reversible Causes below
- Arrhythmia
- Infection/Sepsis
- Hypovolemia
- Cardiac arrest
- Hemorrhage

Conduct standard patient assessment
Primary/Secondary Surveys

Wearable Cardioverter-Defibrillator Vest Alarming?

YES

Device Silent or Single-Tone Gong Alert
Voice: None – silent
Voice: "Treatment given, call your doctor"
See page 2

NO

Device Siren Alert Two-Tone
Voice: "If patient is not responsive, call for help. Start CPR."
See page 2

Device Siren Alert Two-Tone
Voice: "Press response buttons to delay treatment."
"Bystanders, do not interfere."
See page 2

Cardiac Arrest

YES → Cardiac Arrest Protocol AC 3

NO

Condition requires 12-Lead ECG
And/or
Continuous telemetry monitoring

YES

- Airway Protocol(s) AR 1, 2, 3 ***as indicated***
- Chest Pain and STEMI Protocol AC 4 ***if indicated***
- Age Appropriate Protocol(s) ***as indicated***
- IV / IO Access Protocol UP 6
- **Remove cardioverter-defibrillator vest**
  1. Remove the battery
  2. Remove the vest
  3. Place ECG electrodes
  4. Place pads anterior-lateral or anterior-posterior
- AED Procedure CSP 5 ***if available***
- **P** Cardioversion - Defibrillation Procedure(s) CSP 2, 6
- **P** Cardiac Monitor

NO

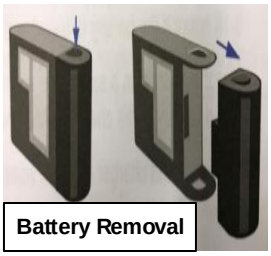
Leave Vest in Place and Operational

Exit to Age Appropriate Protocol(s)

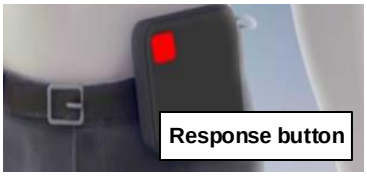
Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Wearable Cardioverter Defibrillator Vest



Battery Removal



Response button

Pearls

- **Recommended exam: Mental status, skin color, capillary refill, peripheral pulses, blood pressure.**
- **Wearable Cardioverter-Defibrillator Vest:**
  - **Device is preparing to delivery a shock to the patient:**
  - **Before device delivers a shock, it tests to see if patient is conscious – voice prompt instructs patient to press the "response" button (see diagram above).**
  - **Only the patient should press the "response" button.**
  - **Once a treatable arrhythmia is detected it takes between 25 and 60 seconds to deliver the shock.**
- **Audible and tactile warning system:**
  - **The device will provide a vibration, a siren tone, and voice prompts to check if the patient is conscious and give them an opportunity to press the "response" button to abort a shock.**
  - **See audible warning system above.**
- **Reasons for use:**
  - **Currently only device on the market is the Zoll LifeVest.**
  - **Worn by patients at risk of sudden cardiac arrest or risk of abnormal and/or lethal arrhythmia.**
- **Blue gel on the patient's skin from the device:**
  - **Electrode pads release a blue get prior to treatment to improve shock conduction and reduce burning.**
  - **Do not remove the gel if the vest is left in place during treatment.**
  - **Remove gel if vest is removed for prehospital care.**
- **Shock to providers:**
  - **Do not touch the patient when the device is instructing you that a shock will be delivered.**
  - **Providers can be shocked by the device during energy delivery if provider is touching the patient.**
- Removing the device for prehospital care:
  - The device should only be removed when ECG monitor and defibrillator is available.
  - Continuous ECG monitoring and electrode pads should be in place when vest is removed.
- Defibrillation/cardioversion with vest in place:
  - Disconnect the device from the vest before you deliver a cardioversion or defibrillation
- Transcutaneous Pacing:
  - May be utilized with vest in place – disconnect the device from the vest before you perform transcutaneous pacing.

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

Assess Symptom Severity / Suspected Exposure to Allergen

MILD
Skin Only

B	**Diphenhydramine 50 mg PO** *If not given PO prior to arrival*
	IV or IO Access Protocol UP 6 ***if indicated***
A	**Diphenhydramine 50 mg PO / IV / IM / IO**
A	**Famotidine** **20 mg PO or IV/IO Drip** 60gtt set over 5-10 minutes

B	Monitor and Reassess Monitor for Worsening Signs and Symptoms

MODERATE
2 + Body Systems

B	**Epinephrine 1:1000** **0.3 – 0.5 mg IM** Repeat every 5 minutes if no improvement *Autoinjector preferred if available*
B	**Diphenhydramine 50 mg PO** *See Pearls*
B	**Albuterol Nebulizer** **2.5 – 5 mg** Repeat as needed x 3 ***if indicated***

	IV or IO Access Protocol UP 6
A	**Diphenhydramine 50 mg IV/IM/IO** *if not given PO (See Pearls)*
A	**Albuterol Nebulizer 2.5 – 5 mg** **+/- Ipratropium 0.5 mg (DuoNeb)** Repeat as needed x 3 ***if indicated***
A	**Famotidine 20mg IV/IO Drip** 60 gtt set over 5-10 minutes
A	**Normal Saline Bolus 500 mL IV/IO** Repeat as needed **Maximum 2 Liters**
P	Worsening despite IM Epinephrine **Push-Dose Epinephrine** **10 mcg IV / IO** *May repeat every 2 minutes* and/or **Epinephrine 1:1,000,000** **1-10 mcg/min IV / IO**
P	*If peri-arrest consider* **Epinephrine 1:10,000 0.1 mg IV/IO**
P	**Methylprednisolone** **125 mg IV / IO / IM**

SEVERE
2 + Body Systems + hypotension
Or Isolated Hypotension

B	**Epinephrine 1:1000** **0.3 – 0.5 mg IM** Repeat every 5 minutes if no improvement *Autoinjector preferred if available*
B	**Albuterol 2.5 – 5 mg** Nebulizer Repeat as needed x 3 ***if indicated***
	Airway Protocol(s) AR 1 - 4 ***if indicated***
	Hypotension / Shock Protocol AM 5 ***if indicated***

Notify Destination or Contact Medical Control

Adult Medical Protocol Section

Allergic Reaction / Anaphylaxis

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdominal**
- **Anaphylaxis is an acute and potentially lethal multisystem allergic reaction.**
- **Epinephrine administration:**
  - **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.**
- **Diphenhydramine and steroid administration:**
  - **Diphenhydramine and steroids should NOT delay initial or repeated Epinephrine administration.**
  - **Diphenhydramine and steroids have no proven utility in Moderate / Severe anaphylaxis.**
  - **In Moderate and Severe anaphylaxis Diphenhydramine may decrease mental status.**
  - **Diphenhydramine should NOT be given to a patient with decreased mental status and / or a hypotensive patient as this may cause nausea and / or vomiting.**
- **Anaphylaxis unresponsive to repeat doses of IM epinephrine may require IV epinephrine administration by IV push or epinephrine infusion. Contact Medical Control for appropriate dosing.**
- **EtCO2 & SpO2 are MANDATORY but should not delay epinephrine administration.**
- **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/poor perfusion or isolated hypotension.**
- **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 blood pressure medications like Prinivil / Zestril (lisinopril)-typically end in **-il.**
- **Hereditary Angioedema** involves swelling of the face, lips, airway structures, extremities, and may cause moderate to severe abdominal pain. Some patients are prescribed specific medications to aid in reversal of swelling.
  Paramedic may assist or administer this medication per patient / package instructions.
- **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.**
- **EMR / EMT may administer Epinephrine IM and may administer from EMS supply.**
- **EMR / EMT may administer Epinephrine IM via AutoInjector or manual draw-up per IM Epi Procedure USP 4.**
- **EMR / EMT may administer diphenhydramine by oral route only and may administer from EMS supply**.
- **EMT may administer Albuterol from EMS supply.**
- The shorter the onset from exposure to symptoms the more severe the reaction.

Diabetic; Adult

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

Blood Glucose Analysis Procedure ASP 4

B — 12 Lead ECG Procedure CSP 1 ***if indicated***

IV / IO Access Protocol UP 6

P — Cardiac Monitor

Altered Mental Status Protocol UP 4 ***if indicated***

Hypotension / Shock Protocol AM 5 ***if indicated***

Suspected Stroke Protocol UP 14 ***if indicated***

Seizure Protocol UP 13 ***if indicated***

A

Blood Glucose ≤ 69 mg / dl and symptomatic
No venous access

Glucagon 1 mg IM
Repeat in 15 minutes if needed

Blood Sugar ≤ 69 mg / dl

Consider Oral Glucose Solution
May Repeat x 1

Consider Oral Solution (Juices / Food)

A

If no improvement
Dextrose Infusion
D10W Premixed 250mL Bag, Titrate to patient condition and response

Repeat Dextrose Infusion as needed until Blood Glucose 100mg/dL or greater

Blood Sugar 70 – 249 mg / dl

Blood Glucose Analysis Procedure ASP 4 ***if condition changes***

Exit to Appropriate Protocol(s)

Blood Sugar ≥ 250 mg / dl

A

Normal Saline Bolus
500 mL IV / IO
May repeat as needed
Then infuse 150 mL / hr

Monitor and Reassess Every 5 minutes Until Blood Glucose ≥ 80 mg / dl

Notify Destination or Contact Medical Control

Adult Medical Protocol Section

Diabetic; Adult

Pearls

- **Recommended exam: Mental Status, Skin, Respirations and effort, Neuro.**
- **Patients with prolonged hypoglycemia or those who are malnourished may not respond to glucagon.**
- **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.**
- **Patient's refusing transport to medical facility after treatment of hypoglycemia:**
  - Blood sugar must be ≥ 80, patient has ability to eat and availability of food with responders on scene.
  - Patient must have known history of diabetes and not taking any oral diabetic agents.
  - Patient returns to normal mental status and has a normal neurological exam with no new neurological deficits.
  - Must demonstrate capacity to make informed health care decisions. See Universal Patient Care Protocol UP 1.
  - Otherwise contact medical control.
- **Hypoglycemia with Oral Agents:**
  - Patient's taking oral diabetic medications should be 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.
  - Not all oral agents have prolonged action so Contact Medical Control or NC Poison Control Center for advice. for advice.
  - Patient's who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- **Hypoglycemia with 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.
  - Not all insulin have prolonged action so Contact Medical Control for advice.
  - Patient's who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- **Congestive Heart Failure patients who have Blood Glucose > 250:**
  - Limit fluid boluses unless they have signs of volume depletion such as, dehydration, poor perfusion, hypotension, and/or shock.
- In extreme circumstances with no IV / IO access and no response to glucagon, D50 can be administered rectally. Contact medical control for advice.

Dialysis / Renal Failure

History
- Peritoneal or Hemodialysis
- Anemia
- Catheter access noted
- Shunt access noted
- Hyperkalemia

Signs and Symptoms
- Hypotension
- Bleeding
- Fever
- Electrolyte imbalance
- Nausea and / or vomiting
- Altered Mental Status
- Seizure
- Arrhythmia

Differential
- Congestive heart failure
- Pericarditis
- Diabetic emergency
- Sepsis
- Cardiac tamponade

Cardiac Arrest — YES → P: **Calcium Chloride 1g IV / IO (Or Calcium Gluconate 2g IV / IO)**; **Sodium Bicarbonate 50 mEq IV / IO** → Exit to Appropriate Cardiac Protocol(s) ***as indicated***

NO

Shunt / Fistula Bleeding — YES →
- **Apply firm finger tip pressure to bleeding site**
- Apply dressing but avoid bulky dressing
- Dressing must not compress fistula / shunt as this will cause clotting of the shunt

NO

- Blood Glucose Analysis Procedure ASP 4
- Diabetic Protocol AM 2 ***as indicated***
- B: 12 Lead ECG Procedure CSP 1
- IV / IO Access Procedure UP 6
- P: Cardiac Monitor
- CHF / Pulmonary Edema Protocol AC 5 ***as indicated***

Dialysis Capable Facilities:
- Betsy Johnson Hospital
- Cape Fear Valley Medical Center
- Johnston Memorial – Smithfield
- Moore Regional Hospital
- UNC Medical Center
- UNC Rex
- WakeMed Raleigh

NO

SBP < 90 or MAP < 65 mmHg — YES → A: **Normal Saline Bolus 250 mL** Repeat as needed **Maximum 1 L** *If lungs remain clear*; Hypotensive / Shock Protocol AM 5 ***as indicated***

NO

Peaked T Wave QRS ≥ 0.12 sec — YES → P: **Calcium Chloride 1 gm IV / IO (Or Calcium Gluconate 2g IV / IO)**; **Sodium Bicarbonate 50 mEq IV / IO**

NO

Notify Destination or Contact Medical Control

Adult Medical Protocol Section

Dialysis / Renal Failure

Pearls

- **Recommended exam: Mental status. Neurological. Lungs. Heart.**
- **Preferably transport to medical facility capable of providing dialysis treatment.**
- **Do not take Blood Pressure or start IV in extremity which has a shunt / fistula in place.**
- **Access of shunt indicated in the dead or near-dead patient only with no IV or IO access.**
- **If hemorrhage cannot be controlled with firm, uninterrupted direct pressure, application of tourniquet with uncontrolled dialysis fistula bleeding is indicated.**

Hemodialysis:

Process which removes waste from the blood stream and occurs about three times each week.
Some patients do perform hemodialysis at home.

Peritoneal dialysis:

If patient complains of fever, abdominal pain, and / or back pain, bring the peritoneal dialysis fluid bag, which has drained from the abdomen, to the hospital.

Complications of Dialysis Treatment:

Hypotension:

Typically responds to small fluid bolus of 250 mL Normal Saline.
May result in angina, AMS, seizure or arrhythmia.

Filtration and decreased blood levels of some medications like some seizure medications:

Disequilibrium syndrome:

Shift of metabolic waste and electrolytes causing weakness, dizziness, nausea and / or vomiting and seizures.

Equipment malfunction:

Air embolism.
Bleeding.
Electrolyte imbalance.
Fever.

Fever:

Consider sepsis in a dialysis patient with any catheter extending outside the body.

- Always consider Hyperkalemia in all dialysis or renal failure patients.
- Sodium Bicarbonate and Calcium Chloride / Gluconate should not be mixed. Ideally give in separate lines.
- Renal dialysis patients have numerous medical problems typically. Hypertension and cardiac disease are prevalent.

Hypertension

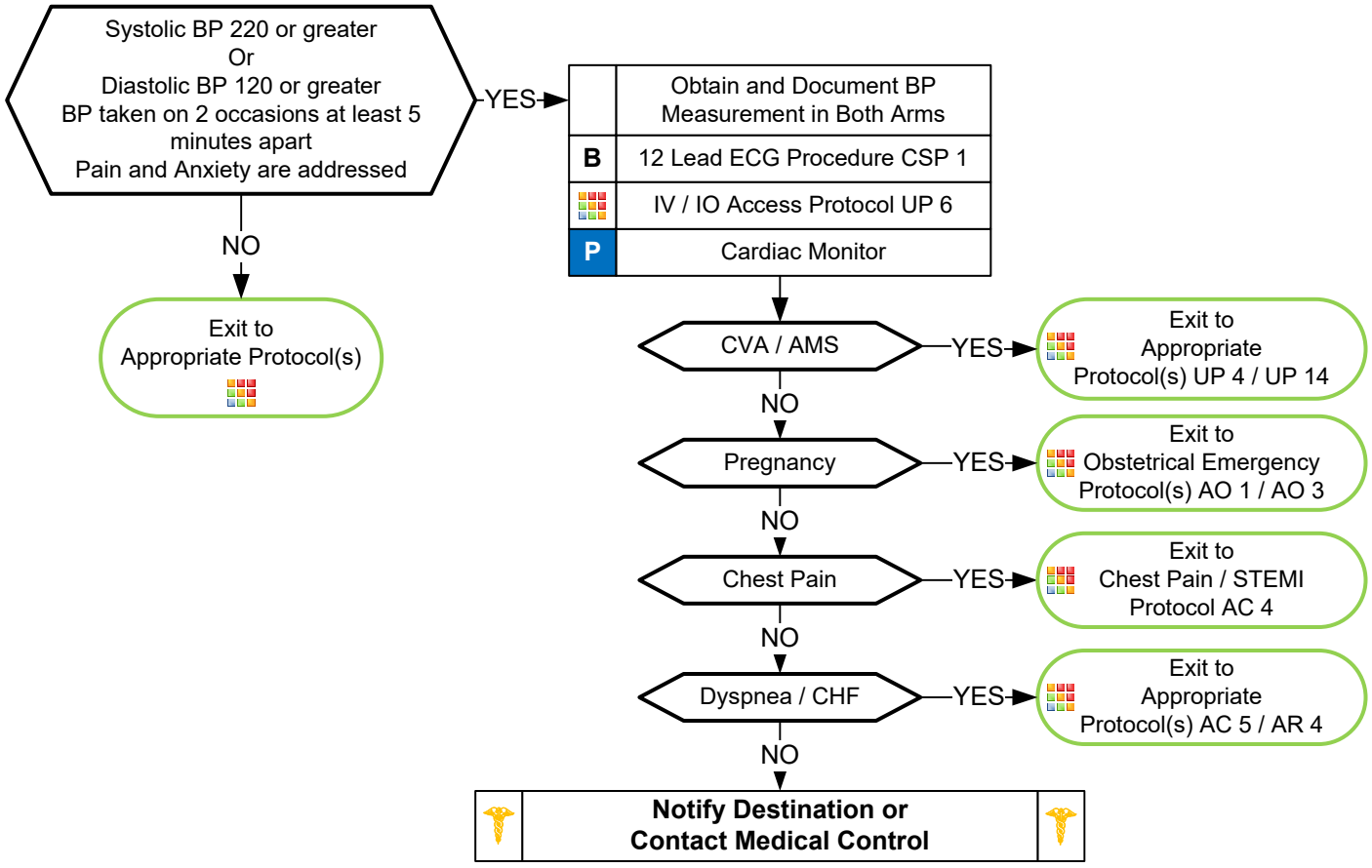
History
- Documented Hypertension
- Related diseases: Diabetes; CVA; Renal Failure; Cardiac Problems
- Medications for Hypertension
- Compliance with Hypertensive Medications
- Erectile Dysfunction medications
- Pregnancy

Signs and Symptoms
One of these
- Systolic BP 220 or greater
- Diastolic BP 120 or greater

AND at least one of these
- 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

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 specific protocols and consultation with Medical Control.



Adult Medical Protocol Section

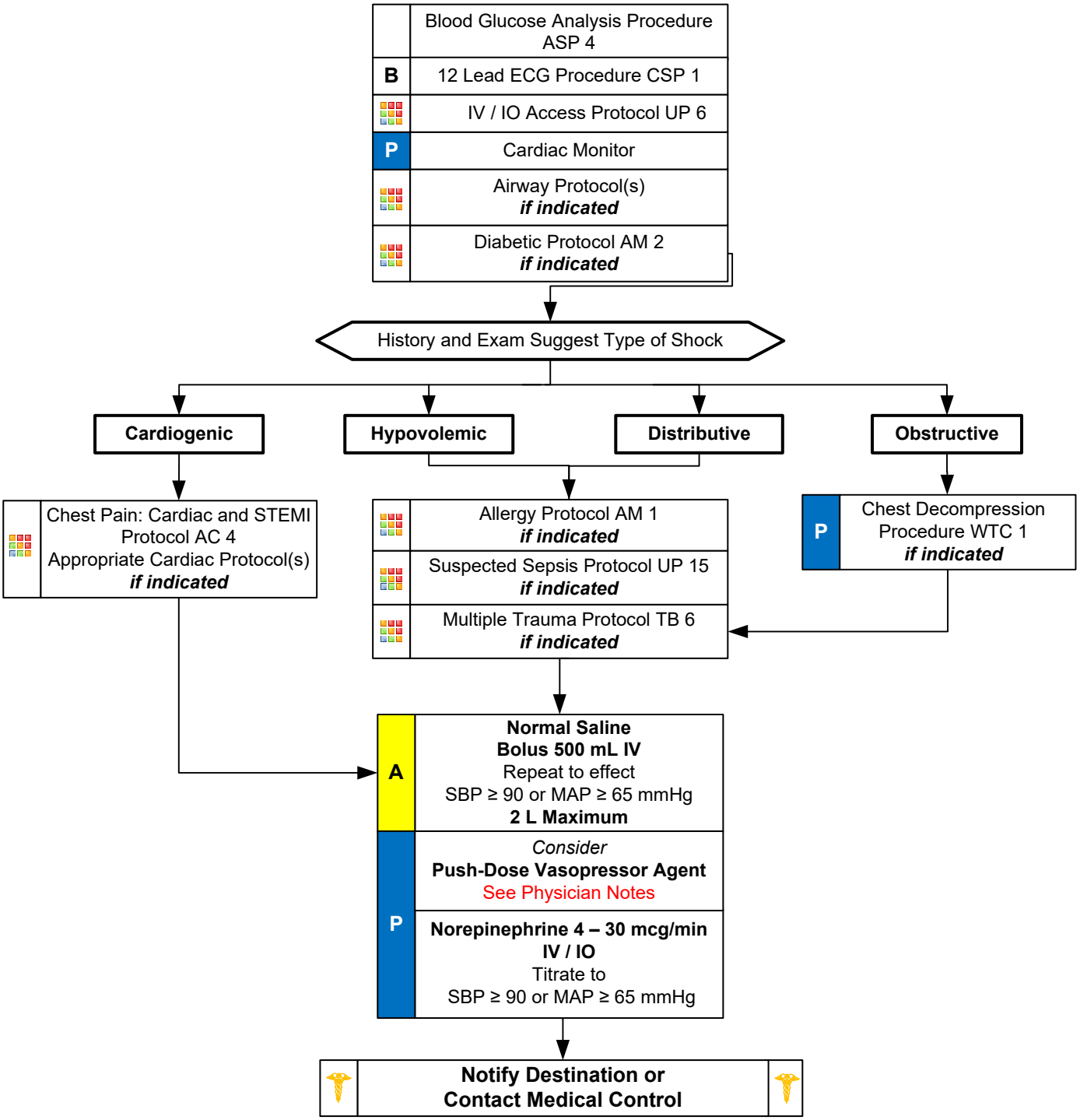
Pearls
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- Elevated blood pressure is based on two to three sets of vital signs.
- Symptomatic hypertension is typically revealed through end organ dysfunction to the cardiac, CNS or renal systems.
- All symptomatic 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
- Ectopic pregnancy
- Dysrhythmias
- Pulmonary embolus
- Tension pneumothorax
- Medication effect / overdose
- Vasovagal
- Physiologic (pregnancy)
- Sepsis



Adult Medical Protocol Section

Hypotension / Shock

Norepinephrine (Levophed) Drip Rates

For the following chart, add **4mg** norepinephrine to **250mL** NS or D5W. Use **60 gtts/mL** IV Set

Desired Dose (mcg/min)	4 mcg/min	8 mcg/min	12 mcg/min	16 mcg/min	20 mcg/mi	24 mcg/min	28 mcg/min	30 mcg/min
Drip Rate (drops/min)	15 gtts/min	30 gtts/min	45 gtts/min	60 gtts/min	75 gtts/min	90 gtts/min	105 gtts/min	113 gtts/min

Norepinephrine Infusion Preparation

1) **Draw 4mL off and discard from a 250 mL bag** of NS or D5W
2) **Add 4mg** (1mg/mL) **norepinephrine** (Levophed) resulting in 250mL of a 16 microgram/milliliter solution of norepinephrine.
3) Connect and prime a **60 gtts/mL IV set** for medication administration.
4) Using high contrast sticker, label IV bag with medication name, amount added, date/time added, resulting concentration and provider initials

Pearls

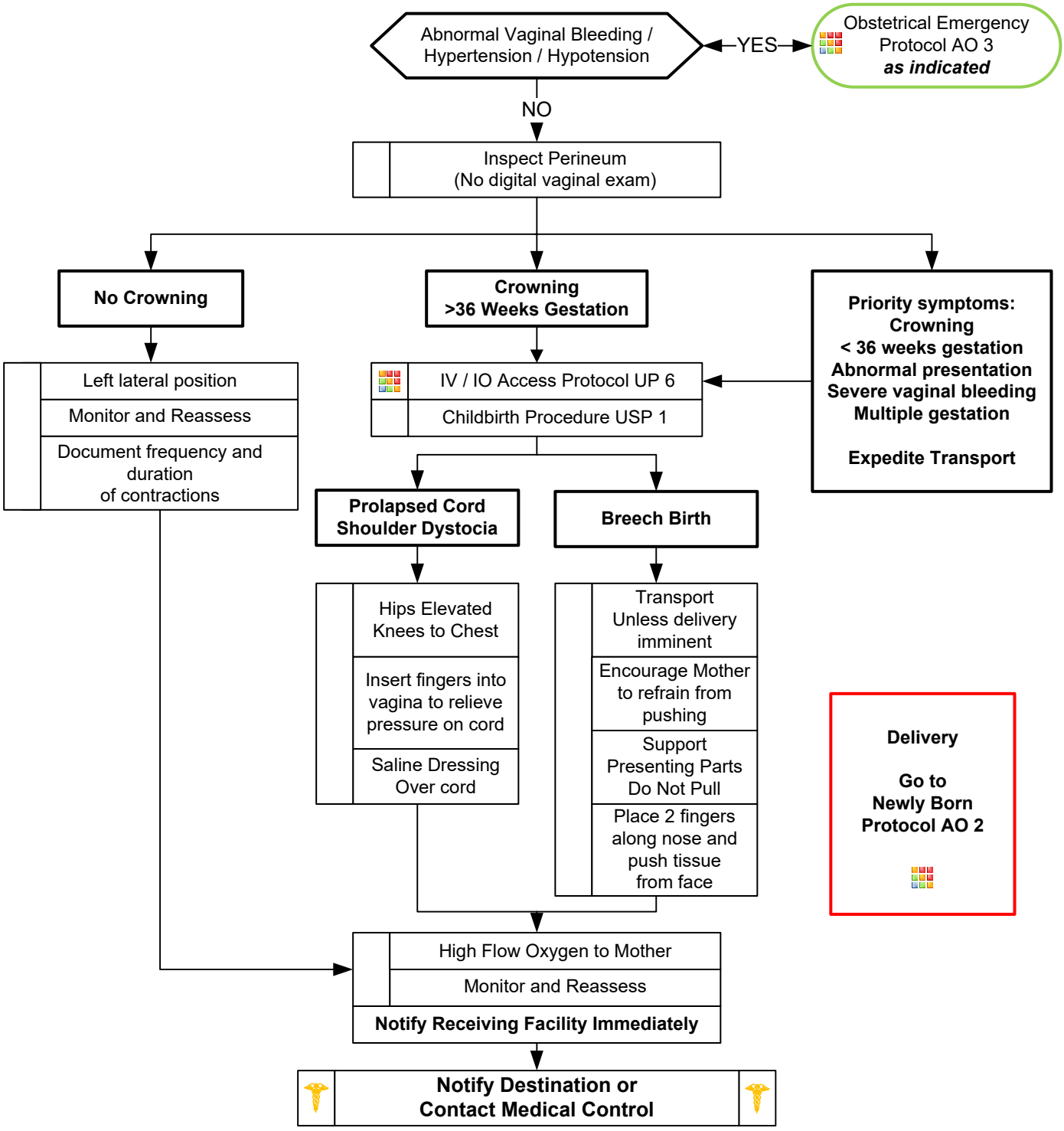
* **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
* **Hypotension can be defined as a systolic blood pressure of less than 90. This is not always reliable and should be interpreted in context and patients typical BP if known.**
* **Shock may be present with a normal blood pressure initially or even elevated blood pressure.**
* **Shock is often present with normal vital signs and may develop insidiously. Tachycardia may be the first and only sign.**
* **Consider all possible causes of shock and treat per appropriate protocol.**
* **Hypovolemic Shock;**
  Hemorrhage, trauma, GI bleeding, ruptured aortic aneurysm or pregnancy-related bleeding.
  Tranexamic Acid (TXA):.
  TXA is NOT indicated and should NOT be administered where trauma occurred > 3 hours prior to EMS arrival.
* **Cardiogenic Shock:**
  Heart failure: MI, Cardiomyopathy, Myocardial contusion, Ruptured ventrical / septum / valve / toxins
* **Distributive Shock:**
  Sepsis, Anaphylactic, Neurogenic & Toxins:
  Hallmark is warm, dry, pink skin with normal capillary refill time and typically alert.
* **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.
* **Acute Adrenal Insufficiency or Congenital Adrenal Hyperplasia:**
  Body cannot produce enough steroids (glucocorticoids/ mineralocorticoids.)
  May have primary or secondary adrenal disease, congenital adrenal hyperplasia, or more commonly have stopped a steroid like prednisone. Injury or illness may precipitate.
  Usually hypotensive with nausea, vomiting, dehydration and/ or abdominal pain.
  If suspected, Paramedic should give Methylprednisolone 125 mg IM / IV / IO or Dexamethasone 10 mg IM / IV / IO. Use steroid agent specific to your drug list.
  May administer prescribed steroid carried by patient IM / IV / IO. Patient may have Hydrocortisone (Cortef or Solu-Cortef). Dose: < 1y.o. give 25 mg, 1-12 y.o. give 50 mg, and > 12 y.o. give 100 mg or dose specified by patient's physician.

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



Adult Obstetrical Protocol Section

Childbirth/ Labor

Pearls

- **Recommended Exam (of Mother): Mental Status, Heart, Lungs, Abdomen, Neuro**
- **Record APGAR at 1 minute and 5 minutes after birth. Do not delay resuscitation to obtain APGAR.**
- **If neonate requiring resusciation, move quickly to AO 2 Newly Born Protocol**
- **After delivery, massaging the uterus (lower abdomen) will promote uterine contraction and help to control post-partum bleeding.**
- **Tranexamic Acid (TXA):**
  Postpartum hemorrhage: NOT indicated and should NOT be administered where birth occurred > 3 hours prior to EMS arrival.
- **Transport or Delivery?**
  Decision to transport versus remain and deliver is multifactorial and difficult. Generally it is preferable to transport. Factors that will impact decision include: number of previous deliveries; length of previous labors; frequency of contractions; urge to push; and presence of crowning.

Apgar score

	Score 2	Score 1	Score 0
Appearance	Pink	Extremities blue	Pale or blue
Pulse	> 100 bpm	< 100 bpm	No pulse
Grimace	Cries and pulls away	Grimaces or weak cry	No response to stimulation
Activity	Active movement	Arms, legs flexed	No movement
Respiration	Strong cry	Slow, irregular	No breathing

- **Maternal positioning for labor:**
  Supine with head flat or elevated per mother's choice. Maintain flexion of both knees and hips. Elevated buttocks slightly with towel. If delivery not imminent, place mother in the left, lateral recumbent position with right side up about 10 – 20°.
- **Umbilical cord clamping and cutting:**
  Place first clamp about 10 cm from infant's abdomen and second clamp about 5 cm away from first clamp.
- **Multiple Births:**
  Twins occur about 1/90 births. Typically manage the same as single gestation. If imminent delivery call for additional resources, if needed. Most twins deliver at about 34 weeks so lower birth weight and hypothermia are common. Twins may share a placenta so clamp and cut umbilical cord after first delivery. Notify receiving facility immediately.
- Document all times (Contraction onset, contraction duration and frequency, delivery, APGAR 1 and 2, and placenta delivery).
- If maternal seizures occur, refer to the Obstetrical Emergencies Protocol.
- Some perineal bleeding is normal with any childbirth. Large quantities of blood or free bleeding are abnormal.

Newly Born

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

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

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

In a non-vigorous infant whose respirations are not improving after warming, drying, and stimulating within 30 seconds, move quickly to Positive Pressure Ventilation with BVM

Breathing or Crying?
Term Gestation?
Good Muscle Tone?

ALL YES →
- **Warm, Dry, and Stimulate infant**
- **Infant with mother if possible *(skin-to-skin)***
- **Maintain normal temperature**
- Bulb suction airway only if needed
- Monitor and Reassess
- **Notify Destination or Contact Medical Control**

ANY NO ↓
- **Warm, Dry and Stimulate**
- **Bulb suction airway if needed**
- ***If not breathing within 30 seconds move quickly to next step: BVM***

Agonal breathing or Apnea?
Or
Heart Rate < 100 / min
Or
Labored breathing/ Persistent cyanosis
If not improving within 30 seconds move quickly to next step

YES →
- Position and clear airway if necessary
- **BVM Ventilations with or without O_2**
- **Ventilation Rate: 40 – 60 breaths/ minute**
- **B** Pulse Oximetry Right Hand
- **P** Cardiac Monitor 3 or 4 – Lead

Heart Rate < 100

YES →
- Check chest movement
- Change airway position
- Change BVM Technique
- **Add O_2 if not already providing**
- Pediatric Airway Protocol(s) AR 5, 6 ***if no improvement***

NO ↓

Heart Rate < 60

YES →
- **Chest Compressions *See Pearls***
- ***Compression 1:2:3 and BVM breath; repeat***
- Pediatric Airway Protocol(s) AR 5, 6
- IV or IO Access Protocol UP 6
- **A** **Epinephrine 1:10,000**
- **0.01 mg /kg IV / IO**
- Every 3 to 5 minutes as needed
- **A** **Normal Saline Bolus**
- **10 mL / kg IV / IO**
- If not responding to epinephrine
- *May repeat x 1*
- Blood Glucose Analysis Procedure ASP 4
- **A** **<u>Blood Glucose < 40 mg/dL</u>**
- **Administer 2 mL/kg of D10 IV / IO**
- Repeat as needed CBG ≥ 40 mg/dL

NO ↓
- ***Supplemental Oxygen***
- ***(See Pearls for expected SpO_2)***
- Maintain warmth
- Monitor and Reassess

Notify Destination or Contact Medical Control

Adult Obstetrical Protocol Section

Newly Born

Pearls

- **Recommended Exam: Quality of Cry, Muscle tone, Respirations, Heart Rate, Pulse Oximetry, and Gestational Age**
- **Majority of newborns do not require resuscitation, only warming, drying, stimulating, and cord clamping.**
  - **With term gestation, strong cry/ breathing, and good muscle tone, generally will not need resuscitation.**
  - **If no resuscitation needed, skin-to-skin contact with the mother is best way to maintain warmth of infant.**
  - **Maintain warmth of infant following delivery adjuncts; cap/ hat, plastic wrap, thermal mattress, radiant heat.**
  - **Most important vital signs in the newly born are heart rate, respirations, and respiratory effort.**
  - **About 10% of newborns need assistance to help them start breathing after birth.**
  - **About 1% of newborns require intensive resuscitation to restore/ support cardiorespiratory functions.**
- **Airway:**
  - **Positive Pressure Ventilations with BVM is the most important treatment in a newborn with poor respirations and/ or persistent bradycardia (HR < 100 BPM).**
  - **When BVM is needed, ventilation rate is 40 – 60 breaths per minute.**
  - **Adequacy of ventilation/ is measured mainly by increase in heart rate as well as chest rise.**
  - **If heart rate or respirations are not improving after 30 to 60 seconds of resuscitation, place BIAD or endotracheal tube.**
  - **Routine suctioning is no longer recommended, bulb suction only if needed.**
- **Breathing:**
  - **Oxygen is not necessary initially, but if infant is not responding with increased heart rate or adequate breathing, add oxygen to the BVM.**
- **Circulation/ Compressions:**
  - **Heart rate is critical during first few moments of life and is best monitored by 3 or 4 lead ECG, as pulse assessment is difficult in the neonate. Heart Rate is best tool for gauging resuscitation success.**
  - **If heart rate remains < 60 BPM after 30 to 60 seconds of BVM/ resuscitation, begin compressions.**
  - **With BIAD or ETT in place, compressions and ventilation should be coordinated with compression, compression, compression, then ventilation. (3:1 ratio with all events totaling 120 per minute)**
  - **2-thumbs encircling chest and supporting the back is recommended. Limit interruptions of chest compressions.**
- **If infant not responding to BVM, compressions, and/ or epinephrine, consider hypovolemia, pneumothorax, and/ or hypoglycemia (< 40 mg/dL).**
- **Document 1 and 5 minute APGAR in PCR or ePCR. DO NOT delay or interrupt resuscitation to obtain an APGAR score.**
- **Meconium staining:**
  - **Infant born through meconium staining who is NOT vigorous:**
  - **Bulb suction mouth and nose and provide positive pressure ventilation.**
  - **Direct endotracheal suctioning is no longer recommended.**
- **Expected Pulse Oximetry readings following birth:**
  - ***(Accurate only in infant NOT requiring resuscitation)***
  - **1 minute 60 – 65%**
  - **2 minutes 65 – 70%**
  - **3 minutes 70 – 75%**
  - **4 minutes 75 – 80%**
  - **5 minutes 80 – 85%**
  - **10 minutes 85 – 95%**
- Pulse oximetry should be applied to the right upper arm, wrist, or palm.
- Cord clamping:
  - Recommended to delay for 1 minute, unless infant requires resuscitation.
- Maternal sedation or narcotics will sedate infant (Naloxone NO LONGER recommended, use supportive care only).
- D10 = D50 diluted (1 ml of D50 with 4 ml of Normal Saline) or **D10 solution at 2 mL/kg IV / IO.**
- **In the NEONATE, D10 is administered at 2 mL/kg.** *(NOT 5 mL/kg in the pediatric patient after the first month of life.)*

Apgar score

	Score 2	Score 1	Score 0
Appearance	Pink	Extremities blue	Pale or blue
Pulse	> 100 bpm	< 100 bpm	No pulse
Grimace	Cries and pulls away	Grimaces or weak cry	No response to stimulation
Activity	Active movement	Arms, legs flexed	No movement
Respiration	Strong cry	Slow, irregular	No breathing

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

Known or Suspected Pregnancy Missed Period Vaginal Bleeding Abdominal Pain

YES

- Left lateral recumbant position
- Blood Glucose Analysis Procedure ASP 4
- IV / IO Access Protocol UP 6
- P — Cardiac Monior
- Abdominal Pain Vomiting and Diarrhea Protocol UP 3 ***if indicated***
- Diabetic Protocol AM 2 / PM 2 ***if indicated***
- Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***

NO

Exit to Appropriate Protocol(s)

Uncontrolled vaginal hemorrhage with signs of shock

YES

P — **TXA 1 g over 10 minutes IV / IO** *See Pearls*

Seizure Activity

YES

P — **Midazolam 2.5 mg IV / IO / IN** May repeat every 5 minutes as needed

Midazolam 5 mg IM

Maximum 10 mg

Magnesium Sulfate 4 g IV / IO Over 2 – 3 minutes May repeat 2 g x 1

NO

Childbirth / Labor Protocol AO 1 ***if indicated***

Monitor and Reassess

Notify Destination or Contact Medical Control

Adult Obstetric Protocol Section

Obstetrical Emergency

Pearls

- **Recommended Exam: Mental Status, Abdomen, Heart, Lungs, Neuro**
- **Midazolam 5 – 10 mg IM is effective in termination of seizures. Do not delay IM administration with difficult or no IV or IO access. With active seizure activity, benzodiazepine is a priority over magnesium sulfate.**
- **Magnesium Sulfate should be administered as quickly as possible. May cause hypotension and decreased respiratory drive, but more likely in doses higher than 6 gm.**
- **Any pregnant patient involved in a MVC should be seen immediately by a physician for evaluation. Greater than 20 weeks generally require 4 to 6 hours of fetal monitoring. DO NOT suggest the patient needs an ultrasound but emphasize patient needs 4 to 6 hours of fetal monitoring.**
- **Tranexamic Acid (TXA):**
  - **Postpartum hemorrhage: NOT indicated and should NOT be administered where birth occurred > 3 hours prior to EMS arrival.**
  - **Vaginal hemorrhage (not associated with pregnancy): May give with uncontrolled hemorrhage and/or signs of shock.**
- **Ectopic pregnancy:**
  - Implantation of fertilized egg outside the uterus, commonly in or on the fallopian tube. As fetus grows, rupture may occur. Vaginal bleeding may or may not be present. Many women with ectopic pregnancy do not know they are pregnant. Usually occurs within 5 to 10 weeks of implantation. Maintain high index of suspicion with women of childbearing age experiencing abdominal pain.
- **Preeclampsia:**
  - Occurs in about 6% of pregnancies. Defined by hypertension and protein in the urine. RUQ pain, epigastric pain, N/V, visual disturbances, headache, and hyperreflexia are common symptoms.
  - In the setting of pregnancy, hypertension is defined as a BP > 140 systolic or > 90 diastolic mmHg, or a relative increase of 30 systolic and 20 diastolic from the patient's normal (pre-pregnancy) blood pressure.
  - Risk factors: < 20 years of age, first pregnancy, multi-gestational pregnancy, gestational diabetes, obesity, personal or family history of gestational hypertension.
- **Eclampsia:**
  - Seizures occurring in the context of preeclampsia. Remember, women may not have been diagnosed with preeclampsia.
- Maintain patient in a left lateral position, right side up 10 - 20° to minimize risk of supine hypotensive syndrome.
- Ask patient to quantify bleeding - number of pads used per hour.

Adult Airway

Assess Respiratory Rate, Effort, Oxygenation
Is Airway/ Breathing Adequate?

YES → Supplemental oxygen
Goal oxygen saturation ≥ 92%
Exit to
Appropriate Protocol(s)

NO

	Basic Maneuvers First - Open airway chin lift/ jaw thrust - Nasal and/ or oral airway(s) - Bag-valve mask (BVM) +/- PEEP
	Spinal Motion Restriction Procedure/ Protocol TB 8 ***if indicated***
	Altered Mental Status Protocol UP 4 ***if indicated***
	Respiratory Distress with a Tracheostomy Tube Protocol AR 10 ***if indicated***

Capnography Monitoring

- **End-tidal (EtCO2) monitoring is mandatory following placement of an endotracheal tube.**
- **EtCO2 monitoring is mandatory following placement of a BIAD once available on scene.**

Protocols AR 1, 2, and 3 should be utilized together (even if agency is not using Drug Assisted Airway Protocol) as they contain useful information for airway management.

Airway Obstructed

YES →

	Airway Foreign Body Obstruction Procedure AP 13
A	Direct Laryngoscopy *Optional*
P	Airway Cricothyrotomy Surgical Procedure AP 5 ***if indicated***

NO

Breathing/ Oxygenation Support needed?

YES →

	Supplemental Oxygen BVM Maintain Oxygen Saturation ≥ 92 %
B	*Consider* NIPPV Procedure RSP 4
	BIAD Procedure AP 2 ***if indicated***
A	Oral/Video/Nasotracheal Intubation Procedure AP 6, 7, 8
P	Chest Decompression Procedure WTP 1 ***if indicated***
	Consider Airway Drug Assisted Protocol AR 3 ***if available***
	Post-intubation/ BIAD Management Protocol AR 8 ***if indicated***

NO

Monitor / Reassess
Supplemental Oxygen
if indicated

Exit to
appropriate protocol(s)

Failed Airway:

Unable to Ventilate and Oxygenate ≥ 90% during or after one (1) or more unsuccessful intubation attempts

and/or
Anatomy inconsistent with continued attempts

and/or
Three (3) unsuccessful attempts by most experienced Paramedic/ AEMT.

Exit to
Adult Failed Airway Protocol AR 2

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Airway: Adult

Pearls

- **Pulse Oximetry & End Tidal Capnography is MANDATORY with all Advanced Airways. Document results.**
- **See Pearls section of protocols AR 2 and 3.**
- **For the purposes of this protocol a secure airway is when the patient is receiving appropriate oxygenation and ventilation.**
- **If an effective airway is being maintained by BVM with continuous pulse oximetry values of 92% - 98%, it is acceptable to continue with basic airway measures instead of using a BIAD or Intubation.**
- **Ventilation rate should be 10 - 12 per minute to maintain a EtCO2 of 35 – 45 and avoid hyperventilation.**
- **Anticipating the Difficult Airway and Airway Assessment**
  - **Difficult BVM Ventilation (ROMAN): R**adiation treatment/ **R**estriction; **O**bese/ **O**bstruction/ **O**B – 2d and 3d trimesters/ **O**bstructive sleep apnea; **M**ask seal difficulty (hair, secretions, trauma); **A**ge ≥ 55; **N**o teeth.
  - **Difficult Laryngoscopy (LEON): L**ook externally for anatomical problems; **E**valuate 3-3-2 (Mouth opening should equal 3 of patients finger's width, mental area to neck should equal 3 of patient's finger's width, base of chin to thyroid prominence should equal 2 of patients finger's width); **O**bese, obstruction, OB – 2d and 3d trimesters; **N**eck mobility limited.
  - **Difficulty BIAD (RODS): R**adiation treatment/ **R**estriction; **O**bese/ **O**bstruction/ **O**B – 2d and 3d trimesters/ **O**bstructive sleep apnea; **D**istorted or disrupted airway; **S**hort thyromental distance/ **S**mall mandible.
  - **Difficulty Cricothyrotomy / Surgical Airway (SMART): S**urgery scars**; M**ass or hematoma**, A**ccess or anatomical problems**; R**adiation treatment to face, neck, or chest; **T**umor.
- **Complete an Airway Evaluation Form with any BIAD or Intubation procedure where medications are used to facilitate.**
- **Nasotracheal intubation:**
  - **Procedure requires spontaneous breathing and may require considerable time, exposing patient to critical desaturation.**
  - **Contraindicated in combative, anatomical disrupted or distorted airways, increased ICP, severe facial trauma, basal skull fracture, and head injury. Orotracheal route is preferred.**
- **Intubation attempt defined as laryngoscope blade passing the teeth or endotracheal tube passed into the nostril**
- **If first intubation attempt fails, make an adjustment and try again: (Consider change of provider in addition to equipment).**
- AEMT and Paramedics should consider using a BIAD first, and if intubation attempt is unsuccessful..
- During intubation attempts use External Laryngeal Manipulation to improve view of glottis.
- It is important to secure the endotracheal tube well to better maintain ETT placement. Manual stabilization of endotracheal tube should be used during all patient moves / transfers.
- **DOPE: D**isplaced tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment failure.

Adult, Failed Airway

Definition of Failed Airway:
Unable to Ventilate and Oxygenate ≥ 90% during
or after one (1) or more unsuccessful intubation attempts

and/or
Anatomy inconsistent with continued attempts

and/or
Three (3) unsuccessful attempts by most experienced Paramedic/AEMT.
Each attempt should include change in approach or equipment

NO MORE THAN THREE (3) ATTEMPTS TOTAL

Capnography Monitoring

- **End-tidal (EtCO2) monitoring is mandatory following placement of an endotracheal tube.**
- **EtCO2 monitoring is mandatory following placement of a BIAD once available on scene.**

Protocols AR 1, 2, and 3 should be utilized together (even if agency is not using Drug Assisted Airway as they contain useful information for airway management.

Failed Airway ↔ Call for additional resources if available

BVM
Adjunctive Airway NP / OP
Maintains
Oxygen Saturation
92% - 98%

YES → Continue BVM
Supplemental Oxygen
Exit to
Appropriate Protocol(s)

NO

B	Attempt Airway Blind Insertion Airway Device Procedure AP 2
A	Airway Video Laryngoscopy Device Procedure AP 8 ***if available***
P	Airway Cricothyrotomy Surgical Procedure AP 5
	Supplemental oxygen BVM with Airway Adjuncts Maintain Oxygen Saturation 92% - 98%
	Post-intubation BIAD Management Protocol AR 8

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Adult, Failed Airway

Pearls

- **Capnography Monitoring (EtCO2):**
  - **Continuous Waveform Capnography and Pulse Oximetry are required for intubation verification and ongoing patient monitoring (Not validated and may prove impossible in the neonatal population - verification by two (2) other means is recommended in this population.)**
  - **Capnography verification and monitoring is required for BIAD verification and monitoring once available on scene.**
- **For the purposes of this protocol a secure airway is when the patient is receiving appropriate oxygenation and ventilation.**
- **If an effective airway is being maintained by BVM with continuous pulse oximetry values of ≥ 90%, it is acceptable to continue with basic airway measures.**
- **Ventilation rate should be 10 - 12 per minute to maintain a EtCO2 of 35-45 and avoid hyperventilation.**
- **Anticipating the Difficult Airway and Airway Assessment**
  - **Difficult BVM Ventilation (ROMAN): R**adiation treatment/ **R**estriction; **O**bese/ **O**bstruction/ **O**B – 2d and 3d trimesters/ **O**bstructive sleep apnea; **M**ask seal difficulty (hair, secretions, trauma); **A**ge ≥ 55; **N**o teeth.
  - **Difficult Laryngoscopy (LEON): L**ook externally for anatomical problems; **E**valuate 3-3-2 (Mouth opening should equal 3 of patients finger's width, mental area to neck should equal 3 of patient's finger's width, base of chin to thyroid prominence should equal 2 of patients finger's width); **O**bese, obstruction, OB – 2d and 3d trimesters; **N**eck mobility limited.
  - **Difficulty BIAD (RODS): R**adiation treatment/ **R**estriction; **O**bese/ **O**bstruction/ **O**B – 2d and 3d trimesters/ **O**bstructive sleep apnea; **D**istorted or disrupted airway; **S**hort thyromental distance/ **S**mall mandible.
  - **Difficulty Cricothyrotomy / Surgical Airway (SMART): S**urgery scars**; M**ass or hematoma**, A**ccess or anatomical problems**; R**adiation treatment to face, neck, or chest; **T**umor
- **Complete an Airway Evaluation Form with any BIAD or Intubation procedure where medications are used to facilitate.**
- **Nasotracheal intubation:**
  - **Procedure requires spontaneous breathing and may require considerable time, exposing patient to critical desaturation.**
  - **Contraindicated in combative, anatomically disrupted or distorted airways, increased ICP, severe facial trauma, basal skull fracture, and head injury. Orotracheal route is preferred.**
- **Intubation attempt defined as laryngoscope blade passing the teeth or endotracheal tube passed into the nostril.**
- **If first intubation attempt fails, make an adjustment and try again: (Consider change of provider in addition to equipment)**
- AEMT and Paramedics should consider using a BIAD if oral-tracheal intubation is unsuccessful.
- During intubation attempts use External Laryngeal Manipulation to improve view of glottis.
- It is important to secure the endotracheal tube well to better maintain ETT placement. Manual stabilization of endotracheal tube should be used during all patient moves / transfers.
- **DOPE: D**isplaced tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment failure.

Airway, Drug Assisted

Indications for Drug Assisted Airway
Failure to protect the airway
and/or
Unable to oxygenate
and/or
Unable to ventilate
and/or
Impending airway compromise

Capnography Monitoring
- **End-tidal (EtCO2) monitoring is mandatory following placement of an endotracheal tube.**
- **EtCO2 monitoring is mandatory following placement of a BIAD once available on scene.**

Protocols AR 1, 2, and 3 should be utilized together (even if agency is not using Drug Assisted Airway Protocol) as they contain useful information for airway management.

Preoxygenate 100% O2

IV / IO Access Protocol UP 6 (preferably 2 sites)

P — Assemble Airway Equipment
Suction equipment
Alternative Airway Device

Hypoxic Or Hypotensive Or Dangerously Combative?

YES →

P — **Airway Management**
Ketamine 2 mg/kg IV / IO

Airway Management + Dangerously Combative
Ketamine 400 mg IM
Ketamine 2 mg/kg IV / IO

Correct Hypoxia and/or Hypotension

Adult Airway
Adult Failed Airway
Protocol(s) AR 1, 2
as indicated

Hypotension / Shock
Protocol AM 5
as indicated

Hypoxia corrected
Hypotension corrected
Dangerously Combative condition corrected
Patient still requires intubation?

YES → (back to P: Ketamine / Rocuronium / Intubate / Placement Verified)

NO

NO →

P — **Ketamine 2 mg/kg IV / IO**
May repeat x 1

Rocuronium 1.5 mg/kg IV / IO
May repeat x 1

Intubate trachea
(Direct AP 6 or Video AP 7)

Placement Verified By:
Continuous SPO2 & Capnography
ASP 5, 6

Consider
Restraints: Physical Procedure USP 5

Awakening or Moving after intubation

NO → Exit to Appropriate Protocol(s)

YES

Exit to Post-intubation / BIAD Management Protocol AR 8

Procedure will remove patient's protective airway reflexes and ability to breath.

You must be sure of your ability to intubate before beginning this procedure.

Must have two (2) Paramedics on scene

Red Text
are the key performance indicators used to evaluate protocol compliance.

An Airway Evaluation Form must be completed on every patient who receives Rapid Sequence Intubation.

Airway Respiratory Protocol Section

Airway, Drug Assisted

Consider Push-Dose Vasopressor Agent

1. **Indications**
   - a. Peri-intubation hypotension
   - b. Post-arrest (post-ROSC) hypotension
   - c. Hypotension requiring initiation of vasopressor drip – prior to drip setup
   - d. Unstable bradycardia (as a supplement to other therapy)
2. **Instructions**
   - a. Draw up 1mL of 1:10,000 epinephrine
   - b. Waste 1mL of saline from a 10mL saline flush
   - c. Add the 1mL of epinephrine to the remaining 9mL of saline
     - i. This yields epinephrine in a concentration of 10mcg/mL
   - d. Place a medication added label on this syringe to identify it as a vasopressor
   - e. Administer 10mcg (1mL) every 2 minutes as needed to achieve desired blood pressure or heart rate

Pearls

- **Capnography Monitoring (EtCO2):**
  - **Continuous Waveform or Quantitative Capnography and Pulse Oximetry are required for intubation verification and ongoing patient monitoring (Not validated and may prove impossible in the neonatal population - Verification by two (2) other means is recommended in this population.)**
  - **Capnography verification and monitoring is required for BIAD verification and monitoring once available on scene**
- **Agencies must maintain a separate Performance Improvement Program specific to Drug Assisted Airway.**
- **This procedure requires at least 2 Paramedics. See Pearls section of protocols AR 1 and 2.**
- **For the purposes of this protocol a secure airway is when the patient is receiving appropriate oxygenation and ventilation.**
- **If an effective airway is being maintained by BVM with continuous pulse oximetry values of ≥ 90%, it is acceptable to continue with basic airway measures.**
- **Ventilation rate:**
  - **30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 10 - 12 per minute. Maintain EtCO2 between 35 - 45 and avoid hyperventilation.**
- **Hypoxia and/or Hypotension:**
  - **Increased risk of cardiac arrest when a sedative with paralytic medications are administered while hypoxic and/ or hypotensive.**
  - **Resuscitation and correction of hypoxia and/ or hypotension are paramount prior to use of these combined agents.**
  - **Ketamine administration allows time for appropriate resuscitation of hypoxia and/or hypotension while managing the airway.**
- **Ketamine for airway intervention and/ or sedation purposes:**
  - **Ketamine may be used in pediatric patients (fit within a Pediatric Medication/ Skill Resuscitation System product, ≤ 15 years of age, or ≤ 49 kg) with DIRECT ONLINE MEDICAL ORDER by the system MEDICAL DIRECTOR or ASSISTANT MEDICAL DIRECTOR only.**
  - **Agencies using Ketamine in the pediatric population must also be using in their adult population.**
- **KETAMINE:**
  - **Ketamine may be used with and without a paralytic agent in conjunction with either an OPA, NPA, BIAD or endotracheal tube. (BIAD is preferred over endotracheal tube until hypoxia and/ or hypotension are corrected).**
  - **Ketamine may be used during the resuscitation of hypoxia or hypotension in conjunction with airway management. Once hypoxia and hypotension are corrected, use of a sedative and paralytic can proceed if indicated.**
  - **Ketamine may be used in the dangerously combative patient requiring airway management IM. IV / IO should be established as soon as possible.**
  - **Ketamine may be used for sedation once a BIAD or ETT are established and confirmed.**
  - **Agencies using Ketamine must follow Standards Policy: Medial Policy Section Ketamine Program Requirements. Medical Policy 2.**
- **Intubation attempt defined as laryngoscope blade passing the teeth or endotracheal tube passed into the nostril.**
- **If first intubation attempt fails, make an adjustment and try again: (Consider change of provider in addition to equipment)**
- **NC EMS Airway Evaluation Form:**
  - **Fully complete and have receiving healthcare provider sign confirming BIAD or endotracheal tube placement.**
  - **Complete online in region specific *ReadyOp* and upload completed form.**
  - **Complete when any drug is used for airway management.**
- Paramedics / AEMT should consider using a BIAD if oral-tracheal intubation is unsuccessful.
- Drug Assisted Airway is not recommended in an urban setting (short transport) when able to maintain oxygen saturation ≥ 90 %.
- **DOPE: D**isplaced tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment failure.

Airway: Adult COPD / Asthma 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.)

	Adult Airway Protocol(s) ***as indicated***
	Adult Allergic Reaction / Anaphylaxis Protocol AM 1 ***as indicated***
B	12 Lead ECG Procedure CSP 1
B	Continuous SPO2 & ETCO2 Monitoring
A	IV/ IO Access Protocol UP 6
P	Cardiac Monitor / ETCO2

Following Assessment

WHEEZING

B	**Albuterol Nebulizer 2.5 – 5 mg** Repeat as needed x 3

STRIDOR

B	**Albuterol Nebulizer 2.5 – 5 mg** Repeat as needed x 3
A	**Epinephrine Nebulizer 1 mg (1:1000) / 2 mL NS** May repeat x 1

	Adult Airway Protocol(s) ***as indicated***
B	Airway NIPPV Procedure RSP 4
A	**Albuterol Nebulizer 2.5 – 5 mg +/- Ipratropium 0.5 mg** Repeat as needed x 3 ***if indicated***
A	Consider **Epinephrine 1:1000 0.3 – 0.5 mg IM**
P	**Methylprednisolone 125 mg IV / IO / IM**
P	**Magnesium Sulfate 2g in 250ml D5W IV / IO** Infuse with 10 gtts/set 1 drop per second

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Airway: Adult COPD / Asthma Respiratory Distress

Pearls

- **Continuous pulse oximetry and End-tidal CO2 monitoring is required.**
- **Recommended Exam: Mental Status, HEENT, Skin, Neck, Heart, Lungs, Abdomen, Extremities, Neuro**
- **This protocol includes all patients with respiratory distress, COPD, Asthma, Reactive Airway Disease, or Bronchospasm.**
- **Patients may also have wheezing and respiratory distress with viral upper respiratory tract infections and pneumonia.**
- **Combination nebulizers containing albuterol and ipratropium:**
  - **Patients may receive more than 3 nebulizer treatments, treatments should continue until improvement.**
  - **Following 3 combination nebulizers (DuoNeb), it is preferable to continue albuterol solely with subsequent treatments as there is no proven benefit to continual use of ipratropium.**
- **Epinephrine:**
  - **If allergic reaction or anaphylaxis is suspected, give immediately and repeat until improvement.**
  - **If allergic reaction is not suspected, administer with failure to improve and/ or impending respiratory failure.**
- **Consider Magnesium Sulfate with no improvement and/ or impending respiratory failure. Likely more effective with asthmatic exacerbation and less so with COPD exacerbation.**
- **Non-Invasive Positive Pressure Ventilation (NIPPV: CPAP or Bi-Level/ BiPap):**
  - **May be used with COPD, Asthma, Allergic reactions, CHF.**
  - **Consider early in treatment course.**
  - **Consider removal if SBP remains < 100 mmHg and not responding to other treatments.**
- For patients with levalbuterol (Xopenex) prescription or patients who are significantly tachycardic, EMS provider may use levalbuterol nebulizer in place of albuterol nebulizer throughout protocol at 1.25 mg/dose when available.
- A silent chest in respiratory distress is a pre-respiratory arrest sign.
- **EMR/ EMT:**
  - **The use of Epinephrine IM is limited to the treatment of anaphylaxis**
  - **Administration of diphenhydramine is limited to the oral route only**.
- A silent chest in respiratory distress is a pre-respiratory arrest sign.
- **EMT may administer Albuterol from EMS supply.**

Pediatric Airway

Assess Respiratory Rate, Effort, Oxygenation
Is Airway / Breathing Adequate?

YES → Supplemental oxygen
Goal Oxygen Saturation
92% - 98%
Exit to Appropriate Protocol(s)

NO

	Basic Maneuvers First -open airway chin lift / jaw thrust -nasal or oral airway -Bag-valve mask (BVM)
	Spinal Motion Restriction Procedure / Protocol TB 8 ***if indicated***
	Consider AMS Protocol UP 4
	Respiratory Distress with a Tracheostomy Tube Protocol AR 10 ***if indicated***

Capnography Monitoring

- **End-tidal (EtCO2) monitoring is mandatory following placement of an endotracheal tube.**
- **EtCO2 monitoring is mandatory following placement of a BIAD once available on scene.**

Protocols AR 3, 5, and 6 should be utilized together (even if agency is not using Drug Assisted Airway Protocol) as they contain useful information for airway management.

Airway Obstructed → YES

	Airway Foreign Body Obstruction Procedure AP 13
A	Direct Laryngoscopy
P	Airway Cricothyrotomy Needle Procedure AP 20 **See Pearls Section**

NO

Breathing / Oxygenation Support needed → YES

	Supplemental Oxygen BVM Maintain Oxygen Saturation 92% - 98%
B	Airway BIAD Device Procedure AP 2 ***if indicated***
A	Oral / Tracheal Intubation Procedure AP 6/AP 7
P	Chest Decompression Procedure WTP 1 ***if indicated***
P	Consider Airway Drug Assisted Protocol AR 3 ***if available***
P	Post-intubation / BIAD Management Protocol AR 8 ***if indicated***

NO

Monitor /Reassess Supplemental Oxygen
if indicated

Exit to Appropriate Protocol(s)

Failed Airway:

Unable to Ventilate and Oxygenate ≥ 90% during or after one (1) or more unsuccessful intubation attempts

and/ or
Anatomy inconsistent with continued attempts

and/ or
Three (3) unsuccessful attempts by most experienced Paramedic/ AEMT.

Exit to Pediatric Failed Airway Protocol AR 6

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Pediatric Airway

Pearls

- **Capnography Monitoring (EtCO2):**
  - **Continuous Waveform and Pulse Oximetry are required for intubation verification and ongoing patient monitoring (Not validated and may prove impossible in the neonatal population - verification by two (2) other means is recommended in this population.)**
  - **Capnography verification and monitoring is required for BIAD verification and monitoring once available on scene.**

This protocol is for use in patients who FIT within a Pediatric Medication/Skill Resuscitation System Product.

- **For the purposes of this protocol a secure airway is when the patient is receiving appropriate oxygenation and ventilation.**
- **If an effective airway is being maintained by BVM with continuous pulse oximetry values of 92% - 98%, it is acceptable to continue with basic airway measures.**
- **Ventilation Rate:**
  - **30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 10 - 12 per minute. Maintain EtCO2 between 35 - 45 and avoid hyperventilation.**
- **Ketamine for airway intervention and/ or sedation purposes:**
  - **Ketamine may be used in pediatric patients (fit within a Pediatric Medication/Skill Resuscitation System product, ≤ 15 years of age, or ≤ 49 kg) with DIRECT ONLINE MEDICAL ORDER by the system MEDICAL DIRECTOR or ASSISTANT MEDICAL DIRECTOR only.**
- **KETAMINE:**
  - **Ketamine may be used with or without a paralytic agent in conjunction with either an OPA, NPA, BIAD or endotracheal tube. BIAD is preferred over endotracheal tube until hypoxia and/ or hypotension are corrected.**
  - **Ketamine may be used during the resuscitation of hypoxia or hypotension in conjunction with airway management. Once hypoxia and hypotension are corrected, use of a sedative and paralytic can proceed if indicated.**
  - **Ketamine may be used in the dangerously combative patient requiring airway management IM. IV/ IO should be established as soon as possible.**
  - **Ketamine may be used for sedation once a BIAD or endotracheal tube are established and confirmed.**
- **Intubation:**
  - **Attempt defined as laryngoscope blade passing the teeth or endotracheal tube passed into the nostril.**
  - **Use of a stylet is recommended in all pediatric intubations.**
  - **Endotracheal tube: Depth = 3 x the diameter of the ETT. Estimated Size = 16 + age (years) / 4. Term newborn = 3. 5 mm.**
  - **If First intubation attempt fails, make an adjustment and try again: (Consider change of provider in addition to equipment)**
- **NC EMS Airway Evaluation Form:**
  - **Fully complete and have receiving healthcare provider sign confirming BIAD or endotracheal tube placement.**
  - **Complete online in region specific *ReadyOp* and upload completed form.**
  - **Complete when Ketamine, Etomidate, Succinylcholine and/ or Rocuronium or used to facilitate use of a BIAD and/ or endotracheal intubation.** Paramedics/ AEMT should consider using a BIAD if endotracheal intubation is unsuccessful.
- Secure the endotracheal tube well and consider c-collar in pediatric patients (even in absence of trauma) to better maintain ETT placement. Manual stabilization of endotracheal tube should be used during all patient moves / transfers.
- **Airway Cricothyrotomy Percutaneous Needle Procedure:**
  - **Indicated as a lifesaving / last resort procedure in pediatric patients < 10 years of age.**
  - **Very little evidence to support it's use and safety.**
  - **A variety of alternative pediatric airway devices now available make the use of this procedure rare.**
  - **≥ 10 years: Surgical cricothyrotomy or commercial kits based on agency preference recommended.**
- **DOPE: D**isplaced tracheostomy tube/ ETT, **O**bstructed tracheostomy tube/ ETT, **P**neumothorax and **E**quipment failure.

Pediatric Failed Airway

Unable to Ventilate and Oxygenate ≥ 90% during
or after one (1) or more unsuccessful intubation attempts.
and/or
Anatomy inconsistent with continued attempts.
and/or
Three (3) unsuccessful attempts by most experienced Paramedic / AEMT.
Each attempt should include change in approach or equipment

NO MORE THAN THREE (3) ATTEMPTS TOTAL

Call for additional resources if available

Failed Aiway

BVM
Adjunctive Airway NP / OP
Maintains
Oxygen Saturation
92% - 98%

YES → Continue BVM
Supplemental Oxygen

Exit to
Appropriate
Protocol(s)

NO

A Airway Video Laryngoscopy Device Procedure AP 8 ***if available***

B Attempt Airway Blind Insertion Airway Device Procedure AP 2

P Airway Cricothyrotomy Needle Procedure AP 20 **See Pearls Section**

BIAD / Cricothyrotomy
Successful
Or
Oxygenation / Ventilation
Adequate

YES → Exit to
Post-intubation /
BIAD Management
Protocol AR 8

NO

Capnography Monitoring

- **End-tidal (EtCO2) monitoring is mandatory following placement of an endotracheal tube.**
- **EtCO2 monitoring is mandatory following placement of a BIAD once available on scene.**

Protocols AR 3, 5, and 6 should be utilized together (even if agency is not using Drug Assisted Airway Protocol) as they contain useful information for airway management.

Supplemental oxygen
BVM with Airway Adjuncts
Maintain Oxygen Saturation
92% - 98%

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Pediatric Failed Airway

Pearls

* **Capnography Monitoring (EtCO2):**
  Pulse Oximetry & End Tidal Capnography is MANDATORY with all Advanced Airways. Document results. (Not validated and may prove impossible in the neonatal population - verification by two (2) other means is recommended in this population.)

This protocol is for use in patients who FIT within a Pediatric Medication/Skill Resuscitation System Product.

* **For the purposes of this protocol a secure airway is when the patient is receiving appropriate oxygenation and ventilation.**
* **If an effective airway is being maintained by BVM with continuous pulse oximetry values of 92% - 98%, it is acceptable to continue with basic airway measures.**
* **Ventilation rate:**
  30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 10 - 12 per minute. Maintain EtCO2 between 35 - 45 and avoid hyperventilation.
* **Ketamine for airway intervention and/ or sedation purposes:**
  Ketamine may be used in pediatric patients (fit within a Pediatric Medication/Skill Resuscitation System product, ≤ 15 years of age, or ≤ 49 kg) with DIRECT ONLINE MEDICAL ORDER by the system MEDICAL DIRECTOR or ASSISTANT MEDICAL DIRECTOR only.
* **KETAMINE:**
  Ketamine may be used with or without a paralytic agent in conjunction with either an OPA, NPA, BIAD or endotracheal tube. BIAD is preferred over endotracheal tube until hypoxia and/ or hypotension are corrected.
  Ketamine may be used during the resuscitation of hypoxia or hypotension in conjunction with airway management. Once hypoxia and hypotension are corrected, use of a sedative and paralytic can proceed if indicated.
  Ketamine may be used in the dangerously combative patient requiring airway management IM. IV/ IO should be established as soon as possible.
  Ketamine may be used for sedation once a BIAD or endotracheal tube are established and confirmed.
* **Intubation:**
  Attempt defined as laryngoscope blade passing the teeth or endotracheal tube passed into the nostril.
  Use of a stylet is recommended in all pediatric intubations.
  Endotracheal tube: Depth = 3 x the diameter of the ETT. Estimated Size = 16 + age (years) / 4. Term newborn = 3. 5 mm.
  If First intubation attempt fails, make an adjustment and try again: (Consider change of provider in addition to equipment)
* **NC EMS Airway Evaluation Form:**
  Fully complete and have receiving healthcare provider sign confirming BIAD or endotracheal tube placement.
  Complete online in region specific *ReadyOp* and upload completed form.
  Complete when Ketamine, Etomidate, Succinylcholine and/ or Rocuronium or used to facilitate use of a BIAD and/ or endotracheal intubation. Paramedics/ AEMT should consider using a BIAD if endotracheal intubation is unsuccessful.
* Secure the endotracheal tube well and consider c-collar in pediatric patients (even in absence of trauma) to better maintain ETT placement. Manual stabilization of endotracheal tube should be used during all patient moves / transfers.
* **Airway Cricothyrotomy Percutaneous Needle Procedure:**
  Indicated as a lifesaving / last resort procedure in pediatric patients < 10 years of age.
  Very little evidence to support it's use and safety.
  A variety of alternative pediatric airway devices now available make the use of this procedure rare.
  Agencies who utilize this procedure must develop a written procedure, establish a training program, maintain equipment and submit procedure and training plan to the State Medical Director/ Regional EMS Office.
  ≥ 10 years: Surgical cricothyrotomy or commercial kits based on agency preference recommended.

DOPE: Displaced tracheostomy tube/ ETT, **O**bstructed tracheostomy tube/ ETT, **P**neumothorax and **E**quipment failure

Pediatric Asthma
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 / Distractibility
- 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) 3, 5 - 7 ***as indicated***
	Pediatric Reaction / Anaphylaxis Protocol PM 1 ***as indicated***
B	12 Lead ECG Procedure CSP 1
A	IV / IO Access Protocol UP 6 ***if indicated***
P	Cardiac Monitor

Following Assessment

WHEEZING / Asthma

B	**Albuterol Nebulizer 1.25 - 2.5 mg** Repeat as needed x 3

STRIDOR / Croup

B	**Albuterol Nebulizer 1.25 - 2.5 mg** Repeat as needed x 3
A	**Epinephrine Nebulizer 1 mg (1:1000) in 2 mL NS** May repeat x 1

	Pediatric Airway Protocol(s) 3, 5 - 7 ***as indicated***
A	**Albuterol Nebulizer 1.25 - 2.5 mg +/- Ipratropium 0.5 mg (DuoNeb)** Repeat as needed x 3 ***if indicated***
A	No response: Consider **Epinephrine 1:1000 0.01 mg / kg IM Maximum 0.3 mg**
P	**Methylprednisolone 2 mg / kg IV / IO / IM Maximum 125 mg**
P	**Magnesium Sulfate 40 mg/kg IV / IO** Infuse over 10 – 20 minutes Maximum 2 g

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Pediatric Asthma
Respiratory Distress

Pearls

- **Albuterol dosing: ≤ 1 year of age 1.25 mg; 1 – 6 y/o 1.25 – 2.5 mg; 6 – 14 y/o 2.5 mg; ≥ 15 years 2.5 – 5 mg.**
- **Recommended Exam: Mental Status, HEENT, Skin, Neck, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Items in Red Text are key performance measures used to evaluate protocol compliance and care.**
- **This protocol includes all patients with respiratory distress, Asthma, Reactive Airway Disease, croup, or bronchospasm.**
- **Patients may also have wheezing and respiratory distress with viral upper respiratory tract infections and pneumonia.**
- **Pulse oximetry AND End-tidal CO2 should be monitored continuously if available.**
- **Combination nebulizers containing albuterol and ipratropium (DuoNeb):**
  Patients may require more than 3 nebulizer treatments, treatments should continue until improvement.
  Following 3 combination nebulizers (DuoNeb), it is preferable to continue albuterol solely with subsequent treatments as there is no proven benefit to continual use of ipratropium.
- **Epinephrine:**
  If allergic reaction or anaphylaxis is suspected, give immediately and repeat until improvement.
  If allergic reaction is not suspected, administer with no improvement and/ or impending respiratory failure.
- **Consider Magnesium Sulfate with impending respiratory failure and/ or no improvement.**
- **Consider IV access when Pulse oximetry remains ≤ 92 % after first beta-agonist nebulizer treatment.**
- **Do not force a child into a position, allow them to assume position of comfort, typically the tripod position.**
- Bronchiolitis is a viral infection typically affecting infants which results in wheezing which may not respond to beta-agonists. Consider Epinephrine nebulizer if patient < 18 months and not responding to initial beta-agonist treatment.
- Croup typically affects children < 2 years of age. It is viral, possible fever, gradual onset, no drooling is noted.
- Epiglottitis typically affects children > 2 years of age. It is bacterial, with fever, rapid onset, possible stridor, patient wants to sit up to keep airway open, drooling is common. Airway manipulation may worsen the condition.
- In patients using levalbuterol (Xopenex) you may use Albuterol for the first treatment then use the patient's supply for repeat nebulizers or agency's supply.
- A silent chest in respiratory distress is a pre-respiratory arrest sign.
- **EMR/ EMT:**
  The use of Epinephrine IM is limited to the treatment of anaphylaxis.
  Administration of diphenhydramine is limited to the oral route only.

Post-intubation / BIAD Management

Capnography Monitoring

- **End-tidal (EtCO2) monitoring is mandatory following placement of an endotracheal tube.**
- **EtCO2 monitoring is mandatory following placement of a BIAD once available on scene.**

Protocols AR 1, 2, 3, 5, and 6 should be utilized together (even if agency is not using Drug Assisted Airway Protocol) as they contain useful information for airway management.

ETT or Blind Insertion Airway Device Successful

NO → Exit to Appropriate Adult or Pediatric Airway Protocol(s) 1 – 7

YES

Continue Airway Adjuncts
Maintain SpO2
92% - 98%
Ventilate Age Appropriate breaths / minute
May require faster rate
See Pearls

B	12 Lead ECG Procedure CSP 1 ***as indicated***
A	IV / IO Access Protocol UP 6 (preferably 2 sites)
P	Cardiac Monitor
P	Transport Ventilator Procedure ***If available***

Awakening or Moving after Intubation / BIAD Placement

Evidence of Anxiety / Agitation

NO → Notify Destination or Contact Medical Control

YES

P

Ketamine 2.0 mg/kg IV / IO

Fentanyl 50-100 mcg IV / IO / IM / IN
Age ≥ 65: 25-50 mcg IV / IO / IM / IN
Repeat **25-10 mcg** every 5 minutes **Maximum 200 mcg**
Peds: 1 mcg/kg IV / IO / IM / IN
May repeat 0.5 mcg/kg every 5 minutes
Maximum 2 mcg/kg
Or
Morphine 5 mg IV / IO / IM
Age ≥ 65: 2.5 mg IV / IO / IM
Repeat **2.5 mg** every 5 minutes as needed
Peds: 0.1 mg/kg up to Max 5mg
IV / IO / IM
May Repeat every 5 minutes
Maximum of 10 mg

Midazolam 2.5 mg IV / IO
Age ≥ 65: 1 mg
Repeat every 5 minutes as needed
Maximum 10 mg
Pediatric: 0.2 mg / kg IV / IO / IN

Consider long term paralytic (see pearls)
Rocuronium 1 mg / kg IV / IO
if needed for patient movement
Not indicated in Pediatrics

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Post-intubation / BIAD Management

** Refer to Length-Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Rocuronium may only be administered by technicians who are approved to perform Drug Assisted Intubation by the Harnett County EMS System Medical Director.

Consider Push-Dose Vasopressor Agent for any of the following indications:

1. **Indications**
   a. Peri-intubation hypotension
   b. Post-arrest (post-ROSC) hypotension
   c. Hypotension requiring initiation of vasopressor drip – prior to drip setup
   d. Unstable bradycardia (as a supplement to other therapy)
2. **Instructions**
   a. Draw up 1mL of 1:10,000 epinephrine
   b. Waste 1mL of saline from a 10mL saline flush
   c. Add the 1mL of epinephrine to the remaining 9mL of saline
      i. This yields epinephrine in a concentration of 10mcg/mL
   d. Place a medication added label on this syringe to identify it as a vasopressor
   e. Administer 10mcg (1mL) every 2 minutes as needed to achieve desired blood pressure or heart rate

Pearls

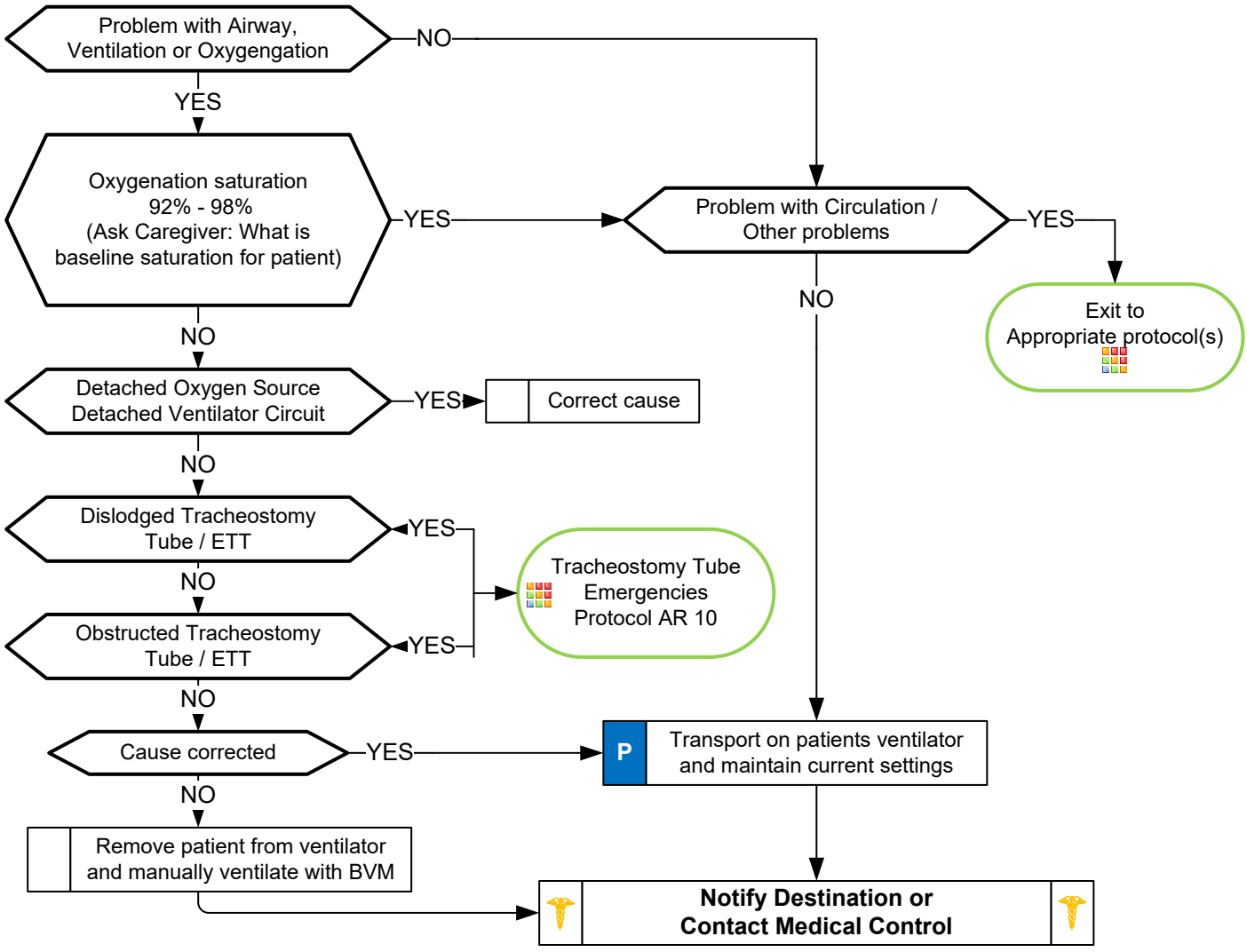
- Continuous pulse oximetry and capnography is **MANDATORY**.
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Neuro**
- **Patients requiring advanced airways and ventilation commonly experience pain and anxiety.**
- **Unrelieved pain can lead to increased catecholamine release, ischemia, immunosuppression, and prolonged hospitalization.**
- **Ventilated patients cannot communicate pain/ anxiety and providers are poor at recognizing pain/ anxiety.**
- **Vital signs such has tachycardia and/ or hypertension can provide clues to inadequate sedation, however they are not always reliable indicators of a patient's lack of adequate sedation.**
- **Sedation strategy:**
  Pain is the primary reason patients experience agitation and must be addressed first.
  Opioids and/ or Ketamine are the first line agents, alone or in combination.
  Benzodiazepines may be utilized if patient is not responding to adequate opioid and/ or Ketamine doses.
  Paralysis is considered a last resort, only when patients are not responding to opioid, Ketamine, or benzodiazepines.
  Patients that have received paralytics may be experiencing pain with no obvious signs or symptoms.
  Consider sedation early after giving paralytics, especially in patients receiving Rocuronium.
- **Ventilation rate:**
  Guidelines: 30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 10 – 12 per minute.
  Maintain EtCO2 between 35 - 45 and avoid hyperventilation.
- **Ventilator/ Ventilation strategies will need to be tailored to individual patient presentations. Medical director can indicate different strategies above.**
- In general, ventilation with BVM should cause chest rise. With mechanical ventilation a reasonable tidal volume should be about 6 - 8 mL/kg and peak pressures should be < 30 cmH_20. Plateau Pressures should be < 30 cmH_20.
- Head of bed should be maintained at least 10 – 20 degrees of elevation when possible, to decrease aspiration risk.
- With abrupt clinical deterioration, if mechanically ventilated, disconnect from ventilator to assess lung compliance.
- **DOPE: D**isplaced tracheostomy tube/ ETT, **O**bstructed tracheostomy tube/ ETT, **P**neumothorax and **E**quipment failure.

Ventilator Emergencies

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



Airway Respiratory Protocol Section

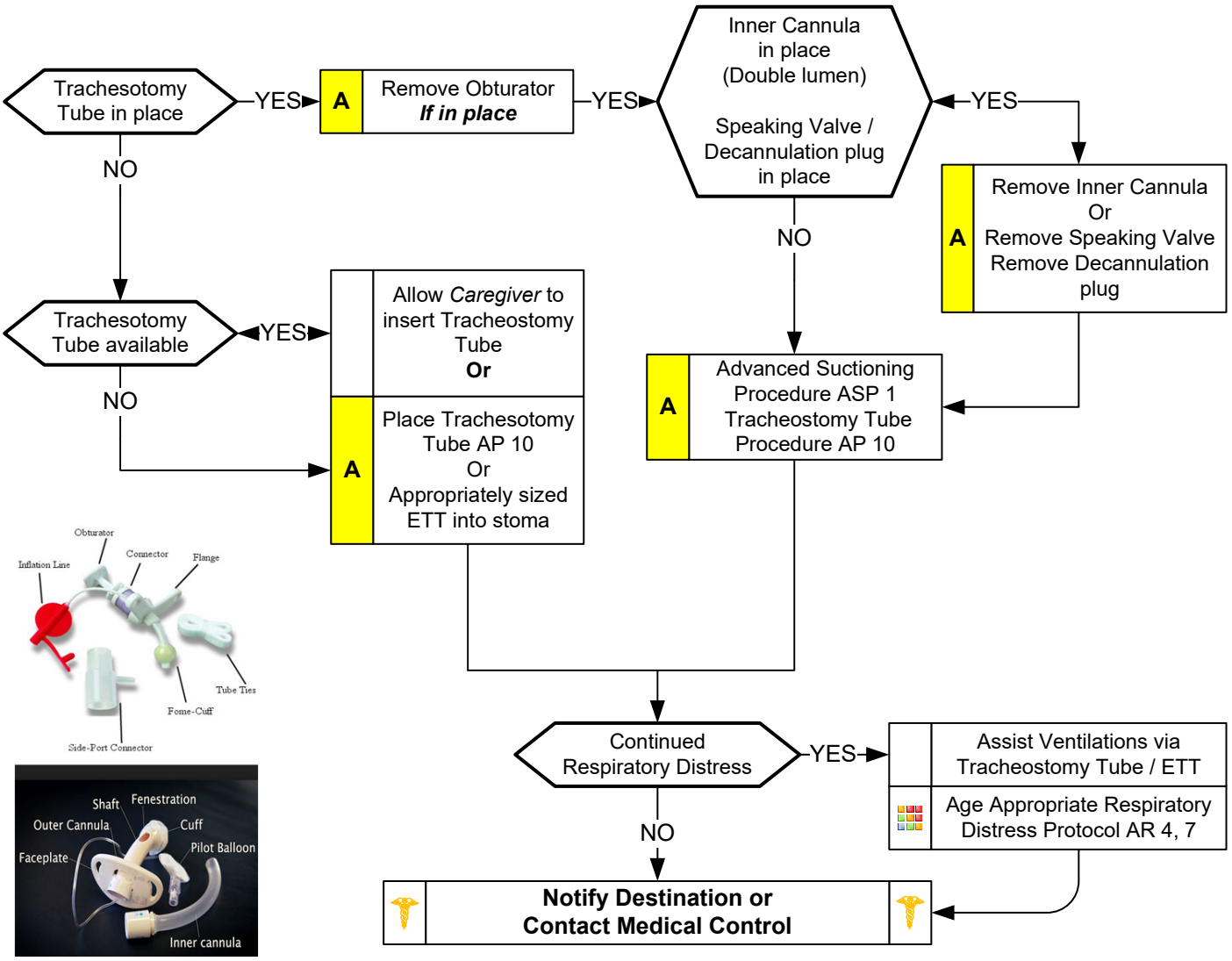
Pearls
- **Always talk to family / caregivers as they have specific knowledge and skills.**
- **If using the patient's ventilator bring caregiver knowledgeable in ventilator operation during transport.**
- **Take patient's ventilator to hospital even if not functioning properly.**
- Always use patient's equipment if available and functioning properly.
- Continuous pulse oximetry and end tidal CO2 monitoring must be utilized during assessment and transport.
- Unable to correct ventilator problem: Remove patient from ventilator and manually ventilate using BVM.
- 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.
- **DOPE: D**isplaced tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment failure.

Tracheostomy Tube Emergencies

History
- Birth defect (tracheal atresia, tracheomalacia, craniofacial abnormalities)
- Surgical complications (accidental damage to phrenic nerve)
- Trauma (post-traumatic brain or spinal cord injury)
- Medical condition (bronchial or pulmonary dysplasia, muscular dystrophy)

Signs and Symptoms
- Nasal flaring
- Chest wall retractions (with or without abnormal breath sounds)
- Attempts to cough
- Copious secretions noted coming out of the tube
- Faint breath sounds on both sides of chest despite significant respiratory effort
- AMS
- Cyanosis

Differential
- Allergic reaction
- Asthma
- Aspiration
- Septicemia
- Foreign body
- Infection
- Congenital heart disease
- Medication or toxin
- Trauma



Airway Respiratory Protocol Section

Pearls
- **Always talk to family / caregivers as they have specific knowledge and skills.**
- **Important to ask if patient has undergone laryngectomy. This does not allow mouth/nasal ventilation by covering stoma.**
- Use patients 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 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 tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment failure.

Asthma Management

Policy
The Community Paramedic (CP) will respond to a residence on order from the medical provider or patient/ parent of patient and follow guidelines outlined by the medical providers orders for the management of asthma.

Purpose:
- To assist the patient (family/ caregiver) by increasing awareness of the disease through education on pathology.
- To demonstrate and review technique of all devices used to treat asthma. To evaluate and identify home triggers of disease in an effort to lesson exacerbations.
- To communicate with the medical provider on the general well being of the patient as well as continuing medication reconciliation

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Educate patient in use of inspirometer.
2. Review pathophysiology with the patient
3. Record current patient history including frequency of symptoms at rest, activity and with sleep. Further history will include exacerbating factors including virus exposure, aeroallergen exposure, exercise, cold air, tobacco smoke, chemical irritants etc.
4. Observe home in an effort to possibly identify exacerbating factors.
5. Review devices used by the patient including short/long acting medications and MDI/continuous neb devices.
6. Review when to call health care provider.

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Asthma Management Section

Chronic Obstructive Pulmonary Disease Management

Policy
The CP will respond to a residence on request from the medical provider or case management referral.
The CP will follow guidelines as outlined by the medical provider's orders for the management of Chronic Obstructive Pulmonary Disease (COPD).

Purpose:
To assist the patient (family/caregiver) by increasing awareness of the disease through education on pathology.
To demonstrate and review technique of all devices used to treat COPD.
To evaluate and identify home triggers of disease in an effort to lessen exacerbations.
To communicate with the medical provider on the general well-being of the patient
Continuing medication reconcilliation

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Educate patient in use of inspirometer (if applicable).
2. Review pathophysiology with the patient
3. Record current patient history including frequency of symptoms at rest, activity and with sleep. Further history will include exacerbating factors including virus exposure, aeroallergen exposure, exercise, cold air, tobacco smoke, chemical irritants etc.
4. Observe home in an effort to possibly identify exacerbating factors.
5. Review devices used by the patient including short/long acting medications and MDI/continuous neb devices.
6. Review when to call health care provider.
7. Communicate all updated information to the medical provider.

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

COPD Management Section

CPAP/BiPAP/Sleep Apnea/Oxygen Sat Checks

Policy
The Community Paramedic will respond to a residence on request from the medical provider and/or patient and follow guidelines outlined by the medical provider's orders for follow up on recently diagnosed and discharged or chronic sufferers of sleep apnea.

Purpose:
To assist the medical provider in observing and documenting recently diagnosed/chronic sufferers of obstructive sleep apnea through written and /or verbal communication to ensure proper ventilation of the Patient during sleep for the purpose of avoidance of long term OSA pathologic outcomes.

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Patient must be closely observed for hemodynamic instability the first 8 hours after starting CPAP/ BiPAP
2. Conduct assessment
   - Necessary VS assessments including PO2 and ETCO2 and weight/BMI?
   - Sleep habits (work nights? Irregular work schedule)
   - Alcohol/recreational drug use? Prescription drug use? Compliant?
3. Quality of life - Noticeable changes after usage.
4. Communicate with medical providers' office.
5. Troubleshoot if necessary including ensuring proper fit of mask and use of machine as well as general condition of machine.
6. Connect patient with necessary resources (Oxygen supply company, etc.)

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Diabetic Education and Management

Policy
The Community Paramedic will respond to a residence on request from the medical provider or patient and follow guidelines outlined by the medical providers' orders to assist in wellbeing checks for the diabetic patient.

Purpose:
To ensure the proper maintenance of blood sugar and insulin levels in the diabetic.

This will be accomplished through blood glucose monitoring, appropriate prescription drug usage, recognition of desired drug effects, and further education/resources

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Review history and physical exam
2. Review pathology with patient including signs and symptoms of disorder and corrective actions.
3. Receive medical providers' orders including plan for diet, blood glucose levels, and insulin administration.
4. Observe patient's physical state/general wellbeing.
5. Obtain BGL and compare with home glucometer.
6. Note directions for insulin administration and record compliance.
7. Note diet.
8. Note and record any patient concerns about treatment (insulin levels, blood sugar levels). Communicate with doctor about request for prescription change.
9. Determine if follow up needed with medical provider and/or community paramedic.

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Follow Up / Post Discharge Management

Policy
The Community Paramedic will respond to a residence on order from the medical provider requesting community paramedic care and follow guidelines outlined by the medical provider's orders for proper follow-up from a medical provider, ER visit, and/or a hospital post discharge.

Purpose:
To assist the medical provider in observing and documenting the patients post discharge healing and/or adjustment to new medications, and/or therapy regimen.

This will allow for timely adjustment/healing as well as quick identification of unwanted results and alternative direction in care.

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Home Medications / Medication Reconcilliation

Policy
The Community Paramedic will respond to a residence on order from the medical provider requesting community paramedic care and follow guidelines outlined by the medical provider's orders for home medication checks.

Purpose:
1. To assist the patient in proper usage of home medications through information/education and vital sign checks.
2. To assist the medical provider in a thorough documentation of all prescription and non-prescription medications for the purpose of avoiding adverse drug reactions.
3. To ensure proper continuum of care during medical provider care provider transitions.

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Review patient's information with the patient, including medical and medication history, current medications the patient is receiving and taking, compliance, time of doses, medical provider who prescribed medications and sources of medications such as the pharmacy.
2. Ask the patient if there are any other medications or supplements they take that might be from another medical provider or over the counter.
3. Assess vital signs
4. Assist patient in sorting medications.
5. Stress importance of medication compliance.
6. Contact referring medical provider if paramedic or patient has concerns.

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Home Safety Assessment

Policy
The Community Paramedic will respond to a residence on order from the medical provider requesting community paramedic care and follow guidelines outlined by the medical provider's orders for a home safety assessment.

Purpose:
To ensure the home is in safe condition to meet the medical needs of the patient.

Can be used to conduct a pre-surgical assessment, post-operative assessment, or an evaluation of the safety of the home at any time.

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Follow the Home Safety Inspection checklist including the inspection of the following areas of the home:
   - ✱ Outside of the house
   - ✱ Living room Kitchen
   - ✱ Stairs
   - ✱ Bathroom
   - ✱ Bedroom
   - ✱ General Inspection
2. Complete the *Overall Tips* inspection
3. Complete comments on any sections marked "no" during the inspection
4. Complete recommendations for the resident and possible referrals
5. Discuss the findings with the patient and resources to remedy
6. Have the patient sign off the report with the understanding they understand the recommendations
7. Complete report and return a copy to the ordering medical provider.
8. ***If any*** life-threating issues are identified, notify the ordering provider immediately

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Home Safety Assessment

Lab Draw

Policy
The Community Paramedic will respond to a residence on order from the medical provider requesting community paramedic care and follow guidelines outlined by the medical provider's orders for the purpose of obtaining a lab specimen for testing.

Purpose:
To assist the medical provider in obtaining specimens for appropriate diagnostic and testing procedures. By performing the lab draws in the home, it prevents the patients from needing to go into a medical provider's office for a minor procedure that can be managed by the Community Paramedic.

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Perform lab draw
2. Tubes should be collected in the order of red, green, purple, pink, and blue.
3. Fill out the label for each of the tubes to include the patient's name, date of birth, provider's initials, and date and time of the lab draw.
4. Affix the label to the blood tubes
5. Complete the lab paperwork provided by the medical provider's office or hospital
6. Put samples in a biohazard bag
7. Deliver samples to the appropriate ordering medical provider's office or hospital

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Social Assessment

Policy
The Community Paramedic (CP) will respond to the home on the request of the provider to perform a social assessment.

Purpose:
To assess the social environment in which the patient lives.

This will enable the CP to determine if adequate support systems are in place and to offer any assistance in providing the patient with available resources that are wanted and/or needed.

This will also allow the paramedic to assess the basic financial needs of the home and be able to link the patient in with possible assistance programs.

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. The CP will complete the 'Social Evaluation Checklist' through an interview with the patient.
2. The CP will then fax a completed copy of the report to the referring provider within 24 hours of the visit.
3. The CP will notify the CP Coordinator of any potential unmet needs and the coordinator will then be responsible for following up with the appropriate resources and relaying this information back to both the provider and the patient.

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Wound Check / Post-Op Dressing Change

Policy
The Community Paramedic will respond to a residence on order from the medical provider requesting community paramedic care and follow guidelines outlined by the medical provider's orders for the purpose of wound care and post-operative dressing changes.

Purpose:
To assist the medical provider in attending to soft tissue injuries for the purpose of restoration of function through repair of injured tissue while minimizing risk of infection and cosmetic deformity.

This will be accomplished through visual inspection, wound cleaning and dressing/bandage change, and patient education.

Review patient health history and medical provider's orders prior to appointment	
Follow Medical Provider's orders	
1	Reconcile medications
2	Complete History and Physical assessment
3	Complete vital signs

1. Obtain history of wound, medical illnesses (certain illnesses may delay wound healing and increase risk of Infection), current vaccinations (Tdap) and medical provider's orders.
2. Visually inspect dressings and wound.
   - ✱ Examine dressings for excess drainage.
   - ✱ Examine wounds for infection and delayed healing including increasing inflammation, purulent drainage, foul odor, persistent pain, and fever.
   - ✱ If needed, document wound with digital camera and send to medical provider with updated records.
3. If signs of infection, contact medical provider immediately for follow up.
4. If no signs of infection clean and dress wound per medical provider's orders, and educate patient on signs and symptoms of infection and risk management.
5. Make sure patient is up to date on vaccinations (Tetanus) and if needed offer vaccine on sight or connect to public health.

1	**Complete all documentation, to include scanning and attaching any associated paperwork**
2	**Schedule next appointment. If this is graduation appointment, complete survey.**

Communicate all updated information to the medical provider

Pediatric Asystole / PEA

History
- Events leading to arrest
- Estimated downtime
- SAMPLE
- Existence of terminal illness
- Airway obstruction
- Hypothermia
- Suspected abuse

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

Differential
- Respiratory failure
- Foreign body
- Infection (croup, epiglotitis)
- Congenital heart disease
- See Reversible Causes below

Pediatric Pulseless Arrest Protocol

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES →
Decomposition
Rigor mortis
Dependent lividity
Blunt force trauma
Injury incompatible with life
Extended downtime with asystole or Wide Complex PEA ≤ 40 bpm

Do not begin resuscitation

Follow Deceased Subjects Policy

NO ↓

Begin Continuous CPR Compressions
Push Hard (≥ 1/3 AP Diameter of Chest)
(1.5 inches Infant / 2 inches in Children)
Push Fast (100 - 120 / min)
Change Compressors every 2 minutes
(sooner if fatigued)
(Limit changes / pulse checks ≤ 10 seconds)

Ventilation rate:
1 breath every 6 seconds
15:2 Compression:Ventilation if no Advanced Airway

AED Procedure CSP 5
if available

P Cardiac Monitor

IV / IO Access Protocol UP 6

A **Epinephrine 1:10,000 (1 mg/10mL)**
0.01 mg/kg IV / IO Maximum Single Dose 1mg
Repeat every 3 – 5 Minutes

A **Normal Saline Bolus 20 mL/kg IV / IO**
May repeat as needed
Maximum 60 mL/kg

Search for Reversible Causes

Blood Glucose Analysis Procedure ASP 4
if applicable

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

Notify Destination or Contact Medical Control

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

Pediatric Cardiac Protocol Section

Pediatric Asystole / PEA

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Push-Dose Vasopressor Agent – Procedure

1. **Indications**
   a. Peri-intubation hypotension
   b. Post-arrest (post-ROSC) hypotension
   c. Hypotension requiring initiation of vasopressor drip – prior to drip setup
   d. Unstable bradycardia (as a supplement to other therapy)
2. **Instructions**
   a. Draw up 1mL of 1:10,000 epinephrine
   b. Waste 1mL of saline from a 10mL saline flush
   c. Add the 1mL of epinephrine to the remaining 9mL of saline
      i. This yields epinephrine in a concentration of 10mcg/mL
   d. Place a medication added label on this syringe to identify it as a vasopressor
   e. Administer 1mcg/kg (0.1mL/kg) every 2 minutes as needed to achieve desired blood pressure or heart rate and/or max 10mcg (1mL)

Norepinephrine (Levophed) Drip Rates

For the following chart, add **4mg** norepinephrine to **250mL** NS or D5W. Use **60 gtts/mL** IV Set

Desired Dose (mcg/min)	4 mcg/min	8 mcg/min	12 mcg/min	16 mcg/min	20 mcg/mi	24 mcg/min	28 mcg/min	30 mcg/min
Drip Rate (drops/min)	15 gtts/min	30 gtts/min	45 gtts/min	60 gtts/min	75 gtts/min	90 gtts/min	105 gtts/min	113 gtts/min

Pearls

- **DO NOT HYPERVENTILATE:**
  If advanced airway in place ventilate 1 breath every 6 seconds, uninterrupted compressions.
- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks.**
- **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.**
- **Majority of pediatric arrests stem from a respiratory insult or hypoxic event. Compressions should be coupled with ventilations.**
- **When advanced airway not in place perform 15 compressions with 2 ventilations.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric pads should be used in children < 10 kg.**
- **Airway is a more important intervention in pediatric arrests. This should be accomplished quickly with BVM or BIAD.**
- **Patient survival is often dependent on proper ventilation and oxygenation / airway Interventions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **High-Quality CPR:**
  Make sure chest compressions are being delivered at 100 – 120 / min.
  Make sure chest compressions are adequate depth for age and body habitus.
  Make sure you allow full chest recoil with each compression to provide maximum perfusion.
  Minimize all interruptions in chest compressions to < 10 seconds.
  Use AED or apply ECG monitor / defibrillator as soon as available.
- **End-tidal CO2 (EtCO2)**
  If EtCO2 is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
  If EtCO2 spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation**.
- **IV access is preferred route. Follow IV or IO Access Protocol UP 6.**
- **Special Considerations**
  Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. 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.
  Renal Dialysis / Renal Failure - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
  Opioid Overdose - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol UP 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
  Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.

Pediatric; Bradycardia With a Pulse

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

Bradycardia
Typically HR < 60/min
Hypotension / AMS / Poor Perfusion / Shock

Pediatric Airway Protocol(s) AR 5, 6
as indicated

P — Cardiac Monitor

IV / IO Access Protocol UP 6

Heart Rate < 60/min
Persists despite oxygenation and ventilation

YES → Exit to Pediatric Cardiac Arrest Protocol(s) PC 1, 4, 7

NO

Identify underlying cause
Search for reversible causes

Blood Glucose Analysis Procedure ASP 4

A — **Normal Saline Bolus**
20 mL/kg IV / IO
Repeat as needed x 3
Maximum 60 mL / kg

P — **Epinephrine 1:1,000,000**
0.1 – 1 mcg/kg/min IV / IO (max 10 mcg/min)
Titrate to SBP ≥ 70 + (2 x Age)

P — *Consider*
Push-Dose Epinephrine
1 mcg/kg IV / IO (max 10 mcg/dose)
May repeat every 2 minutes

P — **Atropine 0.02 mg / kg IV / IO**
May repeat x 1
Minimum single dose 0.1 mg
Maximum single dose 0.5 mg

P — **If no improvement**
Consider
Transcutaneous Pacing Procedure CSP 3

Notify Destination or Contact Medical Control

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

Suspected Beta-Blocker or Calcium Channel Blocker

Follow Pediatric Toxicology Protocol

Pediatric Cardiac Protocol Section

Pediatric; Bradycardia With a Pulse

Epinephrine Drip Rates

A mixture of 1mg of Epinephine in 1,000 mL = 1 mcg/mL

Rates based on MACRO drip set (10 gtts/mL)

Desired Dose (mcg/min)	1 mcg/min	2 mcg/min	3 mcg/min	4 mcg/min	5 mcg/min	6 mcg/min	7 mcg/min	8 mcg/min	9 mcg/min	10mcg/min
Drip Rate (Drops/min)	10 gtts/min	20 gtts/min	30 gtts/min	40 gtts/min	50 gtts/min	60 gtts/min	70 gtts/min	80 gtts/min	90 gtts/min	100 gtts/min

Epinephrine Infusion Preparation

1) Draw up **1 mg epinephrine, preferably 1:1,000 epinephrine (1 mg/mL)**
2) Add **1 mg of epinephrine to 1,000 mL bag of normal saline,** this yields **epinephrine 1 mcg/mL** solution
3) Connect and prime a **10 gtts/mL IV set** for medication administration
4) Using high contrast sticker, label IV bag with medication name, amount added, date/time added, resulting concentration and provider initials

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Bradycardia is often associated with hypoxia so insure patent airway, breathing, and circulation as needed.**
- **Begin CPR immediately with persistent bradycardia and poor perfusion despite adequate oxygenation and ventilation.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological treatment given only when symptomatic, otherwise monitor and reassess.**
- **Consider hyperkalemia with wide complex, bizarre appearance of QRS complex, and bradycardia.**
- **12-Lead ECG:**
  - **12 Lead ECG not necessary to diagnose and treat.**
  - **Obtain when patient is stable and/or following rhythm conversion.**
- **Unstable condition**
  - **Condition which acutely impairs vital organ function and cardiac arrest may be imminent.**
  - **If at any point patient becomes unstable move to unstable arm in algorithm**
- **Epinephrine is first drug choice for persistent, symptomatic bradycardia.**
- **Atropine:**
  - **Second choice, unless there is evidence of increased vagal tone or a primary AV conduction block, then give atropine first.**
  - **Ineffective and potentially harmful in cardiac transplantation. May cause paradoxical bradycardia.**
- **Symptomatic bradycardia causing shock or peri-arrest condition:**
  - **If no IV or IO access immediately available, start Transcutaneous Pacing, establish IV / IO access, and then administer epinephrine. Epinephrine should be administered followed Atropine if no response.**
  - **Epinephrine should be administered following Atropine if no response.**
- **Symptomatic condition**
  - **Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.**
  - **Symptomatic bradycardia usually occurs at rates < 50 beats per minute.**
  - **Search for underlying causes such as hypoxia or impending respiratory failure.**
- **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 CHF.**
- **Transcutaneous Pacing Procedure (TCP)**
  - **Indicated with unstable bradycardia unresponsive to medical therapy.**
  - **If time allows transport to specialty center because transcutaneous pacing is a temporizing measure.**
  - **Transvenous / permanent pacemaker will probably be needed.**
  - **Immediate TCP with high-degree AV block (2d or 3d degree) with no IV / IO access.**
- Most maternal medications pass through breast milk to the infant so maintain high-index of suspicion for OD-toxins.
- Hypoglycemia, severe dehydration and narcotic effects may produce bradycardia. Many other agents a child ingests can cause bradycardia, often is a single dose.

Pediatric Pulmonary Edema / CHF

History
- Congenital Heart Disease
- Chronic Lung Disease
- Congestive heart failure
- Past medical history

Signs/Symptoms
- Infant: Respiratory distress, poor feeding, lethargy, weight gain, +/- cyanosis
- Child/Adolescent: Respiratory distress, bilateral rales, apprehension, orthopnea, jugular vein distention (rare), pink, frothy sputum, peripheral edema, diaphoresis, chest pain
- Hypotension, shock

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

History / Signs / Symptoms consistent with respiratory distress with crackles / rales / known CHF

→ Airway Patent, Ventilations adequate, Oxygenation adequate

NO → Pediatric Airway Protocol(s) 5, 6, 7 ***as indicated***

YES

Allergic Reaction Anaphylaxis

YES → Pediatric Allergic Reaction Anaphylaxis Protocol PM 1

NO

	Pulse Oximetry Monitoring
B	12 Lead ECG Procedure CSP 1
	EtCO2 Monitoring
	IV / IO Access Protocol UP 6 ***if indicated***
P	Cardiac Monitor

Position child with head of bed in up-position (25-40°)
Flexing hips with support under knees so that they are bent 90°

Transport to a Pediatric Specialty Center ***if available***

Notify Destination or Contact Medical Control

Pediatric Cardiac Protocol Section

Pearls
- **Recommended exam: Mental status, Respiratory, Cardiac, Skin, Neuro**
- **Contact Medical Control early in the care of the pediatric cardiac patient.**
- **Most children with CHF have a congenital heart defect, obtain a precise past medical history.**
- **Congenital heart disease varies by age:**
  - < 1 month: Tetralogy of Fallot, Transposition of the great arteries, Coarctation of the aorta.
  - 2 – 6 months: Ventricular septal defects (VSD), Atrioseptal defects (ASD).
  - Any age: Myocarditis, Pericarditis, SVT, heart blocks.
- **Treatment of Congestive Heart Failure / Pulmonary edema may vary depending on the underlying cause and may include the following with consultation by Medical Control:**
  - **Morphine Sulfate: 0.1 mg/kg IV / IO. Max single dose 5mg/dose**
  - **Fentanyl: 1 mcg/kg IV / IO. Max single dose 50 mcg.**
  - **Nitroglycerin: Dose determined after consultation of Medical Control.**
  - **Furosemide (Lasix) 1 mg/kg IV / IO.**
  - **Norepinephrine 4 mcg – 30 mcg IV / IO**
- Do not assume all wheezing is pulmonary, especially in a cardiac child: avoid albuterol unless strong history of recurrent wheezing secondary to pulmonary etiology (discuss with Medical Control)

Pediatric Cardiac 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, K)
- Acidosis

Protocol Age Guidance:

Newborn – 3 days:
AO2 Newly Born

3- days to 15 years:
PC4 Pediatric Cardiac Arrest

≥ 16 years:
AC3 Cardiac Arrest; Adult

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES → Do not begin resuscitation
Follow Deceased Subjects Policy

NO

Begin Continuous CPR Compressions
Push Hard (≥ 1/3 AP Diameter of Chest)
(1.5 inches Infant / 2 inches in Children)
Push Fast (100 - 120 / min)
Change Compressors every 2 minutes
(sooner if fatigued)
(Limit changes / pulse checks ≤ 10 seconds)

Ventilation rate:
1 breath every 6 seconds
15:2 Compression:Ventilation if no Advanced Airway

ALS Available

NO → AED Procedure CSP 5 *if available*

YES → P Cardiac Monitor

AED Procedure CSP 5 *if available*

NO → **Shockable Rhythm**

YES → Defibrillation Automated

Defibrillation Automated

Continue CPR 2 Minutes
Repeat and reassess
Pediatric Airway Protocol(s) 5, 6

P Cardiac Monitor

NO → **Shockable Rhythm**

Pediatric Asystole / PEA Protocol PC 1
Pediatric Airway Protocol(s) 5, 6

YES → **Shockable Rhythm**

Pediatric VF / VT Protocol PC 6
Pediatric Tachycardia Protocol PC 5
Pediatric Airway Protocol(s) 5, 6

Continue CPR 2 Minutes
Repeat and reassess
Pediatric Airway Protocol(s) 5, 6

Pediatric Asystole / PEA Protocol PC 1
Pediatric Airway Protocol(s) 5, 6

Pediatric VF / VT Protocol PC 6
Pediatric Tachycardia Protocol PC 5
Pediatric Airway Protocol(s) 5, 6

Arrest secondary to Opioid OD?

YES → **Naloxone 0.4 – 2 mg IN / IMPeds: 0.1 mg/kg IN**
Maximum 4 mg

A **Naloxone 0.4 –2 mg**
Peds: 0.1 mg/kg
IV / IO / IM / IN / ETT
Maximum 4 mg

NO

Notify Destination or Contact Medical Control

Pediatric Cardiac Protocol Section

Pediatric Cardiac Arrest

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks.**
- **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.**
- **Majority of pediatric arrests stem from a respiratory insult or hypoxic event. Compressions should be coupled with ventilations.**
- **When advanced airway not in place perform 15 compressions with 2 ventilations.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **DO NOT HYPERVENTILATE:**
  If advanced airway in place ventilate at 1 breath every 6 seconds with continouous uninterrupted compressions
- **Patient survival is often dependent on proper ventilation and oxygenation / airway Interventions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **High-Quality CPR:**
  Make sure chest compressions are being delivered at 100 – 120 / min.
  Make sure chest compressions are adequate depth for age and body habitus.
  Make sure you allow full chest recoil with each compression to provide maximum perfusion.
  Minimize all interruptions in chest compressions to < 10 seconds.
  Use AED or apply ECG monitor / defibrillator as soon as available.
- **Defibrillation:**
  First defibrillation is 2 J/kg, second defibrillation is 4 J/kg, subsequent shocks ≥ 4 J/kg (Maximum 10 J/kg or adult dose)
  Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
  Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO2 (EtCO2)**
  If EtCO2 is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
  If EtCO2 spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation**.
- **IV access is preferred route. Follow IV or IO Access Protocol UP 6.**
- **Special Considerations**
  Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. 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.
  Renal Dialysis / Renal Failure - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
  Opioid Overdose - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol TE 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
  Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.

Pediatric Tachycardia
Narrow Complex (≤ 0.09 sec)

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

Assess tachycardia in context of clinical condition
Identify and treat underlying cause of tachycardia

Unstable / Serious Signs and Symptoms
AMS, shock, hypotension
HR Typically > 180 Child
HR Typically > 220 Infant

YES →

P
Cardiac Monitor
Cardioversion Procedure CSP 2
1 J / kg Repeat and increase to **2 J / kg** May increase to **4 J / kg** Or adult maximum
Consider sedation Do NOT delay cardioversion **Midazolam 0.2 mg / kg** **IV / IO / IN** May repeat every 5 minutes as needed **Maximum Single Dose 2 mg** **Maximum Total Dose 5 mg**

NO

B	12 Lead ECG Procedure CSP 1
P	Cardiac Monitor
	IV / IO Access Protocol UP 6

Single lead ECG able to diagnose and treat arrhythmia

12 Lead ECG not necessary to diagnose and treat, but preferred when patient is stable.

Regular Rhythm? NO → **Contact Medical Control**

YES

Probable Sinus Tachycardia

Identify and Treat Underlying Cause

Exit to Age Appropriate Protocol(s)

Probable SVT

P
Vagal Maneuvers
Adenosine 0.1 mg / kg IV / IO **Maximum 6 mg** May repeat **Adenosine 0.2 mg / kg IV / IO** **Maximum 12 mg**

Notify Destination or Contact Medical Control

AT ANY TIME

Pulseless

Go to Pediatric Pulseless Arrest Protocol

Pediatric Cardiac Protocol Section

Pediatric Tachycardia
Narrow Complex (≤ 0.09 sec)

Pearls

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Monomorphic QRS:**
  All QRS complexes in a single lead are similar in shape.
- **Polymorphic QRS:**
  QRS complexes in a single lead will change from complex to complex.
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological or electrical treatment given only when symptomatic, otherwise monitor and reassess.**
- **12-Lead ECG:**
  12-Lead ECG not necessary to diagnose and treat.
  Obtain when patient is stable and/or following rhythm conversion.
  When administering adenosine, obtaining a continuous 12-Lead can be helpful to physicians.
- **Unstable condition:**
  Condition which acutely impairs vital organ function and cardiac arrest may be imminent.
  If at any point patient becomes unstable move to unstable arm in algorithm
  If IV or IO access is in place, may administer adenosine and repeat, prior to synchronized cardioversion.
- **Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.**
- **Serious Signs and Symptoms:**
  Respiratory distress / failure.
  Signs of shock / poor perfusion with or without hypotension.
  AMS
  Sudden collapse with rapid, weak pulse
- **Narrow Complex Tachycardia (≤ 0.09 seconds):**
  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
- **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.
- Monitor for respiratory depression and hypotension associated with the administration of Benzodiazepines.
- Continuous pulse oximetry is required for all SVT Patients if available.

Pediatric Tachycardia
Wide Complex (> 0.09 sec)

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

Assess tachycardia in context of clinical condition
Identify and treat underlying cause of tachycardia

Unstable / Serious Signs and Symptoms
AMS, shock, hypotension
HR Typically > 180 Child
HR Typically > 220 Infant

YES →

P
Cardiac Monitor
Cardioversion Procedure CSP 2
1 J / kg Repeat and increase to **2 J / Kg** May increase to **4 J / Kg** Or adult maximum
Consider sedation Do NOT delay cardioversion **Midazolam 0.2 mg / kg** **IV / IO / IN** May repeat every 5 minutes as needed **Maximum Single Dose 2 mg** **Maximum Total Dose 5 mg**

NO ↓

B	12 Lead ECG Procedure CSP 1
P	Cardiac Monitor
	IV / IO Access Protocol UP 6

Single lead ECG able to diagnose and treat arrhythmia

12 Lead ECG not necessary to diagnose and treat, but preferred when patient is stable.

Regular Rhythm?

NO → **Contact Medical Control**

YES ↓

Probable Ventricular Tachycardia

P
If QRS Regular and Monomorphic **Adenosine 0.1 mg / kg IV / IO** **Maximum 6 mg** May repeat **Adenosine 0.2 mg / kg IV / IO** **Maximum 12 mg**
Expert consultation recommended for further medication management and/ or cardioversion procedure

Notify Destination or Contact Medical Control

AT ANY TIME

Pulseless

Go to Pediatric Pulseless Arrest Protocol

Pediatric Cardiac Protocol Section

Pediatric Tachycardia
Wide Complex (> 0.09 sec)

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Pearls

- **Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention**
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Neuro**
- **Monomorphic QRS:**
  All QRS complexes in a single lead are similar in shape.
- **Polymorphic QRS:**
  QRS complexes in a single lead will change from complex to complex.
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological or electrical treatment given only when symptomatic, otherwise monitor and reassess.**
- **12-Lead ECG:**
  12-Lead ECG is not necessary to diagnose and treat arrhythmia. A single lead ECG is often all that is needed.
  Obtain 12-Lead when patient is stable and/ or following a rhythm conversion.
  When administering adenosine, obtaining a continuous 12-Lead can be helpful later to physicians.
- **Unstable condition:**
  Condition which acutely impairs vital organ function and cardiac arrest may be imminent.
  If at any point patient becomes unstable move to unstable arm in algorithm
- **Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.**
- **Serious Signs and Symptoms:**
  Respiratory distress/ failure.
  Signs of shock/ poor perfusion with or without hypotension.
  AMS
  Sudden collapse with rapid, weak pulse
- **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.
  Amiodarone 5 mg / kg over 20 – 60 minutes or Procainamide 15 mg / kg over 30 – 60 minutes IV / IO are recommended agents. They should not be administered together. Consultation with Medical Control is advised when these agents are considered.
- **Torsade's 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.
  Separating the child from the caregiver may worsen the child's clinical condition.
- Monitor for respiratory depression and hypotension associated if Diazepam, Lorazepam, or Midazolam is used.
- Continuous pulse oximetry is required for all SVT patients if available.

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

Pediatric Pulseless Arrest Protocol PC 4

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

Begin Continuous CPR Compressions
Push Hard (≥ 1/3 AP Diameter of Chest)
(1.5 inches Infant / 2 inches in Children)
Push Fast (100 - 120 / min)
Change Compressors every 2 minutes
(sooner if fatigued)
(Limit changes / pulse checks ≤ 10 seconds)

Ventilation rate:
1 breath every 6 seconds
15:2 Compression:Ventilation if no Advanced Airway

Automated Defibrillation Procedure CSP 5

P — Defibrillation Manual Procedure CSP 6
- First shock: 2 J / Kg
- Second shock: 4 J / Kg
- Subsequent shocks ≥ 4 J / kg

Maximum 10 J / kg or adult dose

IV / IO Access Protocol UP 6

A — **Epinephrine 1:10,000**
0.01 mg/kg IV / IO Maximum 1mg
Repeat every 3 – 5 minutes

P — **Amiodarone 5mg/kg IV / IO**
Maximum Single Dose 300mg
May repeat x 2 to a Max of 15mg/kg

Or

Lidocaine 1.0 mg/kg IV / IO
May repeat 0.5 mg/kg if refractory
Maximum 3 mg/kg

Consider
High Energy Defibrillation Procedure
if available and rhythm refractory

Persistent VF / VT
Or
Torsades de Points

Magnesium Sulfate
40 mg/kg IV / IO over 1 – 2 minutes
May repeat every 5 minutes
Maximum 2 g

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia
Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

If Rhythm Refractory to defibrillation
- **Continue CPR and give Agency specific Anti-arrhythmic(s) in a drug-shock-drug-shock pattern.**
- **Continue CPR up to point where you are ready to defibrillate with device charged.**

Repeat pattern during resuscitation.

Notify Destination or Contact Medical Control

Pediatric Cardiac Protocol Section

Pediatric Ventricular Fibrillation
Pulseless Ventricular Tachycardia

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks.**
- **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.**
- **Majority of pediatric arrests stem from a respiratory insult or hypoxic event. Compressions should be coupled with ventilations.**
- **When advanced airway not in place perform 15 compressions with 2 ventilations.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **DO NOT HYPERVENTILATE:**
  If advanced airway in place ventilate at 1 breath every 6 seconds with continuous, uninterrupted compressions
- **Patient survival is often dependent on proper ventilation and oxygenation / airway Interventions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **High-Quality CPR:**
  Make sure chest compressions are being delivered at 100 – 120 / min.
  Make sure chest compressions are adequate depth for age and body habitus.
  Make sure you allow full chest recoil with each compression to provide maximum perfusion.
  Minimize all interruptions in chest compressions to < 10 seconds.
  Use AED or apply ECG monitor / defibrillator as soon as available.
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation**.
- **IV access is preferred route. Follow IV or IO Access Protocol.**
- **Defibrillation:**
  Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
  Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO2 (EtCO2):**
  If EtCO2 is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
  If EtCO2 spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **Antiarrhythmic agents:**
  Amiodarone 5 mg / kg IV / IO (single dose Max 300 mg). May repeat x 2 to a Maximum of 15 mg / kg.
  Lidocaine 1 mg / kg IV / IO. Infusion 20 – 50 mcg / kg / min. If infusion is initiate > 15 minutes from first bolus, repeat 1 mg / kg bolus.
  Magnesium Sulfate 40 mg / kg IV / IO over 10 – 20 minutes. In Torsades de pointes give over 1 – 2 minutes. Max 2 g
- **Special Considerations**
  Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. 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.
  Renal Dialysis / Renal Failure - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
  Opioid Overdose - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol UP 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
  Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.

Pediatric Post Resuscitation

History
- Respiratory arrest
- Cardiac arrest

Signs/Symptoms
- Return of pulse

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

Transport Destination Decision

Post-resuscitation patient is medically complex.

Consider facility capabilities:
- Pediatric ICU service
- Pediatric Cardiology service
- Pediatric Neurology service
- Targeted Temperature Management

	Pediatric Airway Protocol(s) AR 5 - 7 ***as needed***
	Monitor Vital Signs / Reassess
	Blood Glucose Analysis Procedure ASP 4
	Optimize Ventilation and Oxygenation • Maintain SpO2 92% - 98% • Advanced airway if indicated • Respiratory Rate 12 – 20 **DO NOT HYPERVENTILATE**
B	12 Lead ECG Procedure CSP 1
	IV / IO Access Protocol UP 6
P	Cardiac Monitor
	Pediatric Diabetic Protocol PM 2 ***if indicated***
	Pediatric Hypotension / Shock Protocol PM 3 ***if indicated***
	Pediatric Bradycardia Protocol PC 2 ***if indicated***
	Pediatric Tachycardia Protocol PC 5, 6 ***as indicated***

Hypotension Age Based

0 – 31 Days
< 60 mmHg

1 Month to 1 Year
< 70 mmHg

> than 1 Year
< 70 + (2 x age) mmHg

Antiarrhythmic Medication Given During Arrest

YES

	Continue Antiarrhythmic Utilized Refer to Appropriate Pediatric Arrhythmia Protocol
P	**Amiodarone 5mg/kg IV / IO** **Maximum Single Dose 300mg** May repeat x 2 to a Max of 15mg/kg **Or** **Lidocaine 1.0 mg/kg IV / IO** **May repeat 0.5 mg/kg if refractory** **Maximum 3 mg/kg**

NO

Arrhythmias are common and usually self limiting after ROSC

If Arrhythmia Persists follow Rhythm Appropriate Protocol

Post-intubation / BIAD Management Protocol AR 8

Notify Destination or Contact Medical Control

Pediatric Cardiac Protocol Section

Pediatric Post Resuscitation

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Push-Dose Vasopressor Agent - Procedure

1. **Indications**
   a. Peri-intubation hypotension
   b. Post-arrest (post-ROSC) hypotension
   c. Hypotension requiring initiation of vasopressor drip – prior to drip setup
   d. Unstable bradycardia (as a supplement to other therapy)
2. **Instructions**
   a. Draw up 1mL of 1:10,000 epinephrine
   b. Waste 1mL of saline from a 10mL saline flush
   c. Add the 1mL of epinephrine to the remaining 9mL of saline
      i. This yields epinephrine in a concentration of 10mcg/mL
   d. Place a medication added label on this syringe to identify it as a vasopressor
   e. Administer 1mcg/kg (0.1mL/kg) every 2 minutes as needed to achieve desired blood pressure or heart rate and/or max 10mcg (1mL)

Pearls

- **Recommended Exam: Mental Status, Neck, Skin, Lungs, Heart, Abdomen, Extremities, Neuro**
- **Goals of care are to preserve neurologic function, prevent secondary organ damage, treat the underlying cause of illness, and optimize prehospital care. Frequent reassessment is necessary.**
- **Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the post resuscitation phase and must be avoided. Titrate FiO_2 to maintain SpO_2 of 92 - 98%.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **Pain/sedation:**
  Patients requiring advanced airways and ventilation commonly experience pain and anxiety.
  Unrelieved pain can lead to increased catecholamine release, ischemia, immunosuppression, and prolonged hospitalization.
  Ventilated patients cannot communicate pain / anxiety and providers are poor at recognizing pain / anxiety.
  Vital signs such has tachycardia and / or hypertension can provide clues to inadequate sedation, however they both are not always reliable indicators of patient's lack of adequate sedation.
  Pain must be addressed first, before anxiety. Opioids are typically the first line agents before benzodiazepines. Ketamine is also a reasonable first choice agent.
- **Ventilator / Ventilation strategies:**
  Tailored to individual patient presentations. Medical Control can indicate different strategies above.
  In general ventilation with BVM should cause chest rise. With mechanical ventilation a reasonable tidal volume should be about 6 mL/kg and peak pressures should be < 30 cmH20.
  Continuous pulse oximetry and capnography should be maintained during transport for monitoring.
  Head of bed should be maintained at least 10 – 20 degrees of elevation when possible to decrease aspiration risk.
- **EtCO2 Monitoring:**
  Initial End tidal CO2 may be elevated immediately post-resuscitation, but will usually normalize.
  Goal is 35 – 45 mmHg but DO NOT hyperventilation to achieve.
  EtCO2 should be continually monitored with advanced airway in place.
- **Administer resuscitation fluids and vasopressor agents to maintain SBP at targets listed on page 1. This table represents minimal SBP targets.**
- **Targeted Temperature Management is recommended in pediatrics, but prehospital use is not associated with improved outcomes. Transport to facility capable of intensive pediatric care.**
- **Consider transport to facility capable of managing the post-arrest patient including hypothermia therapy, cardiology / cardiac catheterization, intensive care service, and neurology services.**
- The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring. Appropriate post-resuscitation management may best be planned in consultation with Medical Control.

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
Skin Only

Diphenhydramine
1 mg/kg mg PO
Maximum 50 mg
See Pearls

IV or IO Access Protocol UP 6
If indicated

A

Diphenhydramine
1 mg/kg IV / IM / IO / PO
Maximum 50 mg

Famotidine
1 mg/kg PO or IV / IO
Maximum 20 mg
60gtt set over 5-10 minutes

B

Monitor and Reassess
Monitor for Worsening
Signs and Symptoms

MODERATE
2+ Body Systems

Epinephrine 1:1000
≥ 30 kg 0.3 - 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes PRN
Autoinjector preferred if available

Diphenhydramine 1 mg/kg PO
Maximum 50 mg
See Pearls

B

Albuterol Nebulizer 2.5 – 5 mg
Repeat as needed x 3
if indicated

IV / IO Access Protocol UP 6

A

Diphenhydramine
1 mg/kg IV / IM / IO
if not given PO (See Pearls)

Albuterol Nebulizer 2.5 – 5 mg
+/- Ipratropium 0.5 mg (DuoNeb)
Repeat as needed x 3
if indicated

Famotidine 1 mg/kg PO or IV / IO
Maximum 20 mg
60gtt set over 5-10 minutes

Normal Saline Bolus
20 mL/kg IV / IO
Repeat as needed
Maximum 60 mL/kg Liter(s)

P

Worsening despite IM Epinephrine
Push-Dose Epinephrine
1 mcg/kg IV / IO (max 10 mcg)
May repeat every 2 minutes
and/or
Epinephrine 1:1,000,000
1-10 mcg/min IV / IO

Methylprednisolone 2 mg/kg IV
Maximum 125 mg

SEVERE
2 + Body Systems + hypotension
Or Isolated Hypotension

Epinephrine 1:1000
≥ 30 kg 0.3 - 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes PRN
Autoinjector preferred if available

B

Albuterol Nebulizer 2.5 – 5 mg
Repeat as needed x 3
if indicated

Airway Pediatric Protocol(s)
if indicated

Pediatric Hypotension / Shock Protocol PM 3
if indicated

Notify Destination or
Contact Medical Control

Pediatric Medical Protocol Section

Pediatric Allergic Reaction

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs**
- **Anaphylaxis is an acute and potentially lethal multisystem allergic reaction.**
- **Epinephrine administration:**
  - **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.**
- **Diphenhydramine and steroid administration:**
  - **Diphenhydramine/steroids have no proven utility in Moderate/Severe anaphylaxis.**
  - **Diphenhydramine/steroids should NOT delay repeated Epinephrine administration.**
  - **In Moderate and Severe anaphylaxis Diphenhydramine may decrease mental status.**
  - **Diphenhydramine should NOT be given to a patient with decreased mental status and/or a hypotensive patient as this may cause nausea and / or vomiting.**
- **Anaphylaxis unresponsive to repeat doses of IM epinephrine may require IV epinephrine administration by IV push or epinephrine infusion. Contact Medical Control for appropriate dosing.**
- **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.**
- **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 blood pressure medications like Prinivil / Zestril (lisinopril)-typically end in **-il**.
- **Hereditary Angioedema** involves swelling of the face, lips, airway structures, extremities, and may cause moderate to severe abdominal pain. Some patients are prescribed specific medications to aid in reversal of swelling. **Paramedic may assist or administer this medication per patient/ package instructions.**
- **Fluids and Medication titrated to maintain a SBP >70 + (age in years x 2) mmHg.**
- **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.**
- **EMR/ EMT:**
  - **The use of Epinephrine IM is limited to the treatment of anaphylaxis and may be given only by autoinjector,** unless manual draw-up is approved by the Agency Medical Director and the NC office of EMS.
  - **Administration of diphenhydramine is limited to the oral route only**.
- **EMT administration of beta-agonist is limited to only patients currently prescribed the medication,** unless approved by the Agency Medical Director and the NC office of EMS.
- The shorter the onset from exposure to symptoms the more severe the reaction.

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.

A — ***Blood glucose ≤ 69 mg/dl Symptomatic with NO IV / IO Access:*** Awake, alert and able to tolerate oral agent: Give **oral glucose solution**. If unable to tolerate oral: **Glucagon 0.1 mg/kg IM (Maximum 1 mg)** Repeat every 15 minutes as needed to keep Blood glucose > 60 mg / dl.

- Blood Glucose Analysis Procedure ASP 4
- **B** — 12 Lead ECG Procedure CSP 1 ***if indicated***
- IV / IO Access Protocol UP 6
- **P** — Cardiac Monitor
- Altered Mental Status Protocol UP 4 ***if indicated***
- Hypotension / Shock Protocol AM 5 ***if indicated***
- Seizure Protocol UP 13 ***if indicated***

Blood Sugar ≤ 69 mg / dl

- **Oral Glucose ½ to 1 Tube** If age appropriate
- **Consider Oral Solution (Juices / Food)**
- **A** — **Dextrose Infusion** Use D10W PreMixed 250mL Bag

  For patients under 50 kg **D10W 5 mL/kg IV / IO**, Repeat as needed, titrate to patient condition and effect

  For patients 50 kg or greater **D10W PreMixed 250mL** Bag, Titrate to patient condition and response

Blood Sugar 70 – 249 mg / dl

- Blood Glucose Analysis Procedure ***if condition changes***

Exit to Appropriate Protocol(s)

Blood Sugar ≥ 250 mg / dl

- **A** — **Normal Saline Bolus 20 mL/kg IV / IO** Repeat as needed to effect age appropriate SBP **Maximum 60 mL/kg**

Monitor and Reassess Every 5 minutes Until Blood Glucose ≥ 80 mg / dl

Notify Destination or Contact Medical Control

Pediatric Medical Protocol Section

Pediatric Diabetic

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Patients with prolonged hypoglycemia my not respond to glucagon.**
- **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.**
- **Patient's refusing transport to medical facility after treatment of hypoglycemia:**
  Adult caregiver must be present with pediatric patient.
  Blood sugar must be ≥ 80, patient has ability to eat and availability of food with responders on scene.
  Patient must have known history of diabetes and not taking any oral diabetic agents.
  Patient returns to normal mental status and has a normal neurological exam with no new neurological deficits.
  Must demonstrate capacity to make informed health care decisions. See Universal Patient Care Protocol UP-1.
  Otherwise contact medical control.
- **Hypoglycemia with 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. Not all oral agents have prolonged action so Contact Medical Control for advice. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- **Hypoglycemia with 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. Not all insulins have prolonged action so Contact Medical Control for advice. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.

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

Blood Glucose Analysis Procedure ASP 4

IV / IO Access Protocol UP 6

P — Cardiac Monitor

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

Diabetic Protocol PM 2 ***if indicated***

Age Specific Blood Pressure indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

All ages Shock Index: HR > SBP

History and Exam Suggest Type of Shock

Cardiogenic

Chest Pain: Cardiac and STEMI Protocol AC 4

Appropriate Pediatric Arrhythmia Protocol(s) ***if indicated***

A — **Normal Saline Bolus 5 – 10 mL / kg IV / IO** Titrate to age appropriate SBP ≥ 70 + (2 x Age) **Maximum 10 mL / kg**

Hypovolemic / **Distributive**

Pediatric Allergy Protocol PM 1 ***if indicated***

Suspected Sepsis Protocol UP 15 ***if indicated***

Multiple Trauma Protocol TB 6 ***if indicated***

A — **Normal Saline Bolus 20 mL/kg IV / IO** Titrate to age appropriate SBP ≥ 70 + (2 x Age) **Maximum 60 mL / kg**

Obstructive

P — Chest Decompression-Needle Procedure WTP 1 ***if indicated***

P — *Consider* **Push-Dose Vasopressor Agent** See Physician Notes

Norepinephrine 0.1 – 2.0 mcg/kg/min IV / IO Titrate to age appropriate SBP ≥ 70 + (2 x Age)

Notify Destination or Contact Medical Control

Pediatric Medical Protocol Section

Pediatric; Hypotension / Shock

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Push-Dose Vasopressor Agent - Procedure

1. **Indications**
   a. Peri-intubation hypotension
   b. Post-arrest (post-ROSC) hypotension
   c. Hypotension requiring initiation of vasopressor drip – prior to drip setup
   d. Unstable bradycardia (as a supplement to other therapy)
2. **Instructions**
   a. Draw up 1mL of 1:10,000 epinephrine
   b. Waste 1mL of saline from a 10mL saline flush
   c. Add the 1mL of epinephrine to the remaining 9mL of saline
      i. This yields epinephrine in a concentration of 10mcg/mL
   d. Place a medication added label on this syringe to identify it as a vasopressor
   e. Administer 1mcg/kg (0.1mL/kg) every 2 minutes as needed to achieve desired blood pressure or heart rate and/or max 10mcg (1mL)

Norepinephrine (Levophed) Drip Rates

For the following chart, add **4mg** norepinephrine to **250mL** NS or D5W. Use **60 gtts/mL** IV Set

Desired Dose (mcg/min)	4 mcg/min	8 mcg/min	12 mcg/min	16 mcg/min	20 mcg/mi	24 mcg/min	28 mcg/min	30 mcg/min
Drip Rate (drops/min)	15 gtts/min	30 gtts/min	45 gtts/min	60 gtts/min	75 gtts/min	90 gtts/min	105 gtts/min	113 gtts/min

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Consider all possible causes of shock and treat per appropriate protocol. 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 protocol.**
- **Hypovolemic Shock:**
  Hemorrhage, trauma, GI bleeding, or pregnancy-related bleeding.
  Tranexamic Acid (TXA):
  Agencies utilizing TXA must submit letters from the their receiving trauma centers for approval by the OEMS Medical Director.
  Receiving trauma centers must agree to continue TXA therapy with repeat dosing.
  TXA is NOT indicated and should NOT be administered where trauma occurred > 3 hours prior to EMS arrival.
- **Cardiogenic Shock:**
  Heart failure: MI, Cardiomyopathy, Myocardial contusion, Ruptured ventricle/ septum/ valve/ toxins.
- **Distributive Shock:**
  Septic/ Anaphylactic/ Neurogenic/ Toxic
  Hallmark is warm, dry, pink skin with normal capillary refill time and typically alert.
- **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.
- **Acute Adrenal Insufficiency or Congenital Adrenal Hyperplasia:**
  Body cannot produce enough steroids (glucocorticoids/ mineralocorticoids.)
  May have primary or secondary adrenal disease, congenital adrenal hyperplasia, or more commonly have stopped a steroid like prednisone. Injury or illness may precipitate.
  Usually hypotensive with nausea, vomiting, dehydration and/ or abdominal pain.
  If suspected, Paramedic should give Methylprednisolone 125 mg IM / IV / IO or Dexamethasone 10 mg IM / IV / IO. Use steroid agent specific to your drug list.
  May administer prescribed steroid carried by patient IM / IV / IO. Patient may have Hydrocortisone (Cortef or Solu-Cortef). Dose: < 1y.o. give 25 mg, 1-12 y.o. give 50 mg, and > 12 y.o. give 100 mg or dose specified by patient's physician.

Suspected Viral Hemorrhagic Fever
Ebola

EMS Dispatch Center

1. Use Emerging Infectious Disease (EID) Surveillance Tool with the following chief complaints:
   - **Typical Flu-Like Symptoms**
     and/or
   - **Unexpected Bleeding**
     (not trauma or isolated nose bleed related)

2. Use EID Card (or equivalent) with the following protocols (or equivalent)
   - EMD 6 Breathing Problem
   - EMD 10 Chest Pain
   - EMD 18 Headache
   - EMD 21 Hemorrhage (medical)
   - EMD 26 Sick Person

3. Ask the following:
   In the past 21 days have you been to Africa or been exposed to someone who has?
   If YES:
   Do you have a fever?

Evolving Protocol:
Protocol subject to change at any time dependent on changing outbreak locations.

Monitor for protocol updates.

Viral Hemorrhagic Fevers:
Ebola is one of many.

YES → **DO NOT DISPATCH FIRST RESPONDERS**

Dispatch EMS Unit only
Discretely notify EMS Supervisor or command staff

NO

EMS

Do not rely solely on EMD personnel to identify a potential viral hemorrhagic fever patient – constrained by time and caller information

Obtain a travel history / exposure history and assess for clinical signs and symptoms

EMS Immediate Concern

1. Traveler from area with known VHR (Ebola) with or without symptoms
2. Traveler from a Country, with active Ebola outbreak, within past 21 days

AND

Fever, Headache	Joint and Muscle aches	Weakness, Fatigue
Vomiting and/or Diarrhea	Abdominal Pain	Anorexia
Bleeding		

NO → Exit to Appropriate Protocol(s)

YES

EMS Personal Protective Equipment ↔ Refer to page 2
Place surgical mask on patient
Use Non-rebreather mask if Oxygen Needed
Donning and Doffing Guidelines

NO Routine Aerosol Generating Procedures ↔ Avoid aerosol generating procedures unless medically necessary
NIPPV / Nebulizer therapy / Intubation / BIAD / Suctioning

No Routine IV or IO Lines ↔ Avoid routine IV or IO access unless medically necessary
If IV / IO necessary:
Stop vehicle to lessen exposure risk

EMS Personnel / Equipment / Transport Unit Requires Decontamination ↔ Refer to Page 3

Notify Destination as soon and as discretely as possible
DO NOT ENTER facility with patient until instructed
Follow entry directions from hospital staff

Special Circumstances Section

Suspected Viral Hemorrhagic Fever
Ebola

PARTICULAR ATTENTION MUST BE PAID TO PROTECTING MUCOUS MEMBRANES OF THE EYES, NOSE, and MOUTH FROM SPLASHES OF INFECTIOUS MATERIAL OR SELF INOCULATION FROM SOILED PPE / GLOVES.
THERE SHOULD BE NO EXPOSED SKIN

DONNING PPE: BEFORE you enter the patient area.

Recommended PPE

PAPR: A PAPR with a full face shield, helmet, or headpiece. Any reusable helmet or headpiece must be covered with a single-use (disposable) hood that extends to the shoulders and fully covers the neck and is compatible with the selected PAPR.

N95 Respirator: Single-use (disposable) N95 respirator in combination with single-use (disposable) surgical hood extending to shoulders and single-use (disposable) full face shield. If N95 respirators are used instead of PAPRs, careful observation is required to ensure healthcare workers are not inadvertently touching their faces under the face shield during patient care.

Single-use (disposable) fluid-resistant or impermeable gown that extends to at least mid-calf or coverall without integrated hood. Coveralls with or without integrated socks are acceptable.

Single-use (disposable) nitrile examination gloves with extended cuffs. Two pairs of gloves should be worn. At a minimum, outer gloves should have extended cuffs.

Single-use (disposable), fluid-resistant or impermeable boot covers that extend to at least mid-calf or single-use (disposable) shoe covers. Boot and shoe covers should allow for ease of movement and not present a slip hazard to the worker.

Single-use (disposable) fluid-resistant or impermeable shoe covers are acceptable only if they will be used in combination with a coverall with integrated socks.

Single-use (disposable), fluid-resistant or impermeable apron that covers the torso to the level of the mid-calf should be used if Ebola patients have vomiting or diarrhea. An apron provides additional protection against exposure of the front of the body to body fluids or excrement. If a PAPR will be worn, consider selecting an apron that ties behind the neck to facilitate easier removal during the doffing procedure

DOFFING PPE: OUTSIDE OF PPE IS CONTAMINATED! DO NOT TOUCH

1) PPE must be carefully removed without contaminating one's eyes, mucous membranes, or clothing with potentially infectious materials.

Use great care while doffing your PPE so as not to contaminate yourself (e.g. Do not remove your N-95 facemask or eye protection BEFORE you remove your gown). There should be a dedicated monitor to observe donning and doffing of PPE. It is very easy for personnel to contaminate themselves when doffing. A dedicated monitor should observe doffing to insure it is done correctly. Follow CDC guidance on doffing.

2) PPE must be double bagged and placed into a regulated medical waste container and disposed of in an appropriate location.
3) Appropriate PPE must be worn while decontaminating / disinfecting EMS equipment or unit.
3) Re-useable PPE should be cleaned and disinfected according to the manufacturer's reprocessing instructions.

Hand Hygiene should be performed by washing with soap and water with hand friction for a minimum of 20 seconds. Alcohol-based hand rubs may be used if soap and water are not available.

EVEN IF AN ALCOHOL-BASED HAND RUB IS USED, WASH HANDS WITH SOAP AND WATER AS SOON AS FEASIBLE.

THE USE OF GLOVES IS NOT A SUBSTITUTE FOR HAND WASHING WITH SOAP & WATER

For any provider exposure or contamination contact occupational health.

If the patient is being transported via stretcher then a disposable sheet can be placed over them.

Special Circumstances Section

Pearls

- **Transmission to another individual is the greatest after a patient develops fever. Once there is fever, the viral load in the bodily fluids appears to be very high and thus a heightened level of PPE is required.**
- **Patient contact precautions are the most important consideration.**
- **Incubation period 2-21 days**
- **Ebola must be taken seriously; however using your training, protocols, procedures and proper Personal Protective Equipment (PPE), patients can be cared for safely.**
- When an infection does occur in humans, the virus can be spread in several ways to others. The virus is spread through direct contact (through broken skin or mucous membranes) with a sick person's blood or body fluids (urine, saliva, feces, vomit, and semen) objects (such as needles) that have been contaminated with infected body fluids.
- Limit the use of needles and other sharps as much as possible. All needles and sharps should be handled with extreme care and disposed in puncture-proof, sealed containers. Safety devices must be employed immediately after use.
- **Ebola Information: For a complete review of Ebola go to:**
  http://www.cdc.gov/vhf/ebola/index.html
  http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-emergency-medical-services-systems-911-public-safety-answering- points-management-patients-known-suspected-united-states.html

Suspected Viral Hemorrhagic Fever
Ebola

EMS Personal
Requires Decontamination

If EMS personnel are exposured to blood, bodily fluids, secretions, or excretions from a patient with suspected or confirmed Ebola should immediately:

1) Stop working and wash the affected skin surfaces with soap and water.
2) Mucous membranes (e.g., conjunctiva) should be irrigated with a large amount of water or eyewash solution;

EMS Equipment / Transport Unit
Requires Decontamination

1) EMS personnel performing decontamination / disinfection should wear recommended PPE
   When performing Decontamination EMS Personnel MUST wear appropriate PPE, which includes:
   - •Gloves (Double glove)
   - •Fluid resistant (impervious) Tyvek Like Full length (Coveralls)
   - •Eye protection (Goggles)
   - •N-95 face mask
   - •Fluid resistant (impervious)-Head covers
   - •Fluid resistant (impervious)-Shoe / Boot covers
2) Face protection (N-95 facemask with goggles) should be worn since tasks such as liquid waste disposal can generate splashes.
3) Patient-care surfaces (including stretchers, railings, medical equipment control panels, and adjacent flooring, walls and work surfaces) are likely to become contaminated and should be decontaminated and disinfected after transport.
4) A blood spill or spill of other body fluid or substance (e.g., feces or vomit) should be managed through removal of bulk spill matter, cleaning the site, and then disinfecting the site. For large spills, a chemical disinfectant with sufficient potency is needed to overcome the tendency of proteins in blood and other body substances to neutralize the disinfectant's active ingredient. An EPA-registered hospital disinfectant with label claims for viruses that share some technical similarities to Ebola (such as, norovirus, rotavirus, adenovirus, poliovirus) and instructions for cleaning and decontaminating surfaces or objects soiled with blood or body fluids should be used according to those instructions.
   (Alternatively, a 1:10 dilution of household bleach (final working concentration of 500 parts per million or 0. 5% hypochlorite solution) that is prepared fresh daily (i.e., within 12 hours) can be used to treat the spill before covering with absorbent material and wiping up. After the bulk waste is wiped up, the surface should be disinfected as described in the section above).
5) Contaminated reusable patient care equipment should be placed in biohazard bags (double-bagged) and labeled for decontamination and disinfection.
6) Reusable equipment should be cleaned and disinfected according to manufacturer's instructions by appropriately trained personnel wearing correct PPE.
7) Avoid contamination of reusable porous surfaces that cannot be made single use. Use only a mattress and pillow with plastic or other covering that fluids cannot get through.
8) To reduce exposure, all potentially contaminated textiles (cloth products) should be discarded. This includes non-fluid-impermeable pillows or mattresses. They should be considered regulated medical waste and placed in biohazard red bags. They must be double-bagged prior to being placed into regulated medical waste containers.

Pearls

* **Ebola Information:** **For a complete review of Ebola EMS Vehicle Disinfection go to:**
  http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-emergency-medical-services-systems-911-public-safety-answering-points-management-patients-known-suspected-united-states.html

Suspected Viral Hemorrhagic Fever
Ebola

Decedent Known or suspected carrier of HVF / Ebola Requires Transportation

Only personnel trained in handling infected human remains, and wearing full PPE, should touch, or move any Ebola-infected remains.
Handling human remains should be kept to a minimum.

Donning / Doffing PPE

PPE should be in place **BEFORE** contact with the body

1) Prior to contact with body, postmortem care personnel must wear PPE consisting of: surgical scrub suit, surgical cap, impervious Tyvex-Coveralls, eye protection (e.g., face shield, goggles), facemask, shoe covers, and double surgical gloves.

2) Additional PPE (leg coverings,) might be required in certain situations (e.g., copious amounts of blood, vomit, feces, or other body fluids that can contaminate the environment).

PPE should be removed immediately after and discarded as regulated medical waste.

1) Use caution when removing PPE as to avoid contaminating the wearer.

2) Hand hygiene (washing your hands thoroughly with soap and water or an alcohol based hand rub) should be performed immediately following the removal of PPE. If hands are visibly soiled, use soap and water.

Preparation of Body Prior to Transport

1) At the site of death, the body should be wrapped in a plastic shroud. Wrapping of the body should be done in a way that prevents contamination of the outside of the shroud.
2) Change your gown or gloves if they become heavily contaminated with blood or body fluids.
3) Leave any intravenous lines or endotracheal tubes that may be present in place.
4) Avoid washing or cleaning the body.
5) After wrapping, the body should be immediately placed in a leak-proof plastic bag not less than 150 µm thick and zippered closed The bagged body should then be placed in another leak-proof plastic bag not less than 150 µm thick and zippered closed before being transported to the morgue.

Surface Decontamination

1) Prior to transport to the morgue, perform surface decontamination of the corpse-containing body bags by removing visible soil on outer bag surfaces with EPA-registered disinfectants which can kill a wide range of viruses.
2) Follow the product's label instructions. Once the visible soil has been removed, reapply the disinfectant to the entire bag surface and allow to air dry.
3) Following the removal of the body, the patient room should be cleaned and disinfected.
4) Reusable equipment should be cleaned and disinfected according to standard procedures.

Transportation of VHV / Ebola Remains

PPE is required for individuals driving or riding in a vehicle carrying human remains. DO NOT handle the remains of a suspected / confirmed case of Ebola The remains must be safely contained in a body bag where the outer surface of the body bag has been disinfected prior to the transport.

Special Circumstances Section

Pearls

- **Ebola Information: For a complete review of Handling Remains of Ebola Infected Patients go to:**
  http://www.cdc.gov/vhf/ebola/hcp/guidance-safe-handling-human-remains-ebola-patients-us-hospitals-mortuaries.html

High Consequence Pathogens
(Respiratory Diseases, SARS, MERS-CoV, COVID-19)

EMD Dispatch Center Screening

1. All calls requiring response from EMS system:
   Ask: Do you have FEVER AND/OR RESPIRATORY SYMPTOMS?
   (cough, breathing difficulty, or other respiratory symptoms?)

EMD Systems:
PDS – Card 36 Pandemic Flu
APCO – COVID-19 Pandemic Vital Points Card
PowerPhone – Pandemic Influenza Card

Evolving Protocol:
Protocol subject to change at any time dependent on changing outbreak locations.

Monitor for protocol updates.

EMD Screen Positive

Notify All Responding Agencies:
- Positive screening (agency specific code)
- First Responder Response: Stage Until Advised by EMS

EMD Screen Negative

First Responders and EMS Screening

Do not rely solely on EMD personnel to identify a potential exposure patient:
- EMD may be constrained by time and caller information.
- **First arriving provider (FR or EMS):**
  - If call nature allows, send 1 provider only into scene to complete a quick screen.
  - Stand at a distance of ≥ 6 feet and perform screening question.
  - Patients with Fever and/or Cough *(or other respiratory symptoms are at risk of Influenza and/or COVID-19).*
  - Chills, muscle aches, sore throat, or sudden loss of taste or smell.
  - If patient screens **positive:**
    - Place facemask or covering over patient's mouth and nose and provider dons appropriate PPE based on clinical situation.
- First Responders should stage and limit number of providers entering scene only necessary for care to limit potential exposures and use of PPE.
- Request additional resources as needed. See Page 4.

Negative FR or EMS Screening

Exit to Appropriate Protocol(s)

Positive FR or EMS Screening

EMS PPE

Patient:
- Use non-rebreather mask if oxygen needed
- If unable to tolerate mask, have patient cover mouth and nose when coughing

Providers utilize:
- **Follow PPE precautions listed below:**
  - Exam gloves and eye protection
  - Facemask minimum
- **Aerosol generating procedure:**
  - Respirator (N95, PAPR, or equivalent)
  - Goggles, gown (disposable gown, coveralls, or equivalent)
  - Create negative pressure in care compartment (See Pearls)
- **Personnel in ambulance cab utilize:**
  - Facemask for driver and passenger

PPE Supply Chain Disruptions:
- Prioritize respirators (N95 or equivalent) to aerosol-generating procedures until supply chain restored.
- Prioritize gowns to aerosol-generating procedures.
- It is reasonable for providers to wear a facemask during their duty-shift and change only when soiled or damaged. Adjust use based on supply chain.

EMS General Treatment Considerations

- **Aerosol generating procedures:**
  - NIPPV / Nebulizer therapy / Intubation / BIAD / Suctioning / CPR
- **Use all PPE devices and strategies listed above**
  - **Notify receiving facility of infection control requirements prior to arrival.**

Exit to Appropriate Protocol(s)

Special Circumstance Section

High Consequence Pathogens
(Respiratory Diseases, SARS, MERS-CoV, COVID-19)

Pearls

- **First Responders: Because community spread is now present, every patient contact should be considered to have potential for infection with COVID-19. Limit number of FR when caring for patients to limit exposures and PPE use.**
- **Place facemask on any patient complaining of respiratory problems with or without a fever.**
- **Dispatch Screening:**
  - **If caller interrogation results in positive screen first responders are assigned based on local agency direction.**
  - **This screening process will result in many False Positive screens in order to be very sensitive.**
- **First Responder and EMS Screening:**
  - **Limit distance initially to ≥ 6 feet and conduct a quick screening using the EMD specific question. If this results in a positive screen, immediately place a facemask on the source patient and all providers don appropriate PPE and limit provider number to that which necessary for patient care.**
- **Close Contact and Duration Definition:**
  - **Healthcare provider exposure is defined as being within 6 feet for ≥ 15 minutes in a patient with suspected illness.**
  - **Unprotected (no or incorrect PPE) with direct contact with body fluids, including respiratory generated body fluids.**
- **Transport:**
  - **Occupants in cab of vehicle all should wear facemasks. Riders should be discouraged in order to limit PPE use.**
  - **Limit number of providers in vehicle required to provide patient care in order to limit exposures.**
  - **Ensure use of correct PPE for crew and passengers when aerosol-producing procedures utilized.**
- **Recommend facemask and gloves with every patient contact. It is reasonable to wear eye protection on every patient contact.**
- **Reasonable to wear simple/surgical mask during entire duty-shift when not able to maintain social distance of ≥ 6 feet among fellow providers when not engaged in patient care.**
- **Negative Pressure in care compartment:**
  - **Door or window available to separate driver's and care compartment space:**
    - **Close door/window between driver's and care compartment and operate rear exhaust fan on full.**
  - **No door or window available to separate driver's and care compartment space:**
    - **Open outside air vent in driver's compartment and set rear exhaust fan to full.**
  - **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 gown or coveralls, change of gloves after every patient contact, and strict hand washing precautions. This level is utilized with Aspergillus, SARS/MERS/COVID-19, Tuberculosis, Measles (rubeola) Chickenpox (varicella-zoster), Smallpox, Influenza, disseminated herpes zoster, or Adenovirus/Rhinovirus.
- **Contact precautions:**
  - Standard PPE with utilization of a gown or coveralls, change of gloves after every patient contact, and strict hand washing precautions. This level is utilized with GI complaints, blood or body fluids, C diff, scabies, wound and skin infections, MRSA. Clostridium difficile (C diff) is not inactivated by alcohol-based cleaners and washing with soap and water is indicated.
- **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, 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).
- **COVID-19 (Novel Coronavirus): For most current criteria to guide evaluations of patients under investigation:** https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html

High Consequence Pathogens
(Respiratory Diseases, SARS, MERS-CoV, COVID-19)

Decontamination Recommendations

EMS Personnel Requires Decontamination

Driver:

- Should wear full PPE as described when caring for patient.
- Remove all PPE, except respiratory (N95, PAPR, or equivalent) and perform hand hygiene prior to entering cab to prevent contamination of driver's compartment. **Cab occupants only need to wear facemasks if respirator not already used.**

Wash hands:

- Thoroughly after transferring patient care and/or cleaning ambulance

Maintain records:

- All prehospital providers exposed to patient at the scene and during ambulance 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.
- List all prehospital provider names (students, observers, supervisors, first response etc.) in the Patient Care Report.

EMS Equipment / Transport Unit Requires Decontamination

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 respirator should not be needed) during the clean-up process; the PPE should be discarded after use.
- All surfaces that may have come in contact with the patient or materials contaminated during patient care (e.g., stretcher, rails, control panels, floors, walls, work surfaces) should be thoroughly cleaned and disinfected using an **EPA-registered disinfectant** appropriate for SARS, MERS-CoV, or coronavirus in healthcare settings in accordance with manufacturer's recommendations. **Keep doors open to patient care compartment while cleaning to allow air exchanges.**

EMS Provider Exposure Risk and Monitoring Recommendations

Close Contact
Less than 6 feet for ≥ 15 minutes
Source patient **NOT WEARING A MASK**

PPE Utilized	Exposure Risk	Monitoring	Work Restrictions
NONE	HIGH	Self-monitor Supervision	**If symptomatic:** Fever and Respiratory symptoms (cough, difficulty breathing or other respiratory symptoms) ***THEN*** **Exclude from work:** • At least 72 hours after fever resolution with no use of fever reducing medications. AND • At least 10 days since symptom onset.
No facemask N95 or PAPR	HIGH		
No Eye Protection	MEDIUM		
No Gown/ Coveralls or Gloves	LOW		
All recommended PPE Except facemask instead of N95 or PAPR	LOW		

Close Contact
Less than 6 feet for ≥ 15 minutes
Source patient **WEARING A MASK**

PPE Utilized	Exposure Risk	Monitoring	Work Restrictions
NONE	MEDIUM	Self-monitor Supervision	**If symptomatic:** Fever and Respiratory symptoms (cough, difficulty breathing or other respiratory symptoms) ***THEN*** **Exclude from work:** * At least 72 hours after fever resolution with no use of fever reducing medications. AND * At least 10 days since symptom onset.
No facemask N95 or PAPR	MEDIUM		
No Eye Protection	LOW		
No Gown/ Coveralls or Gloves	LOW		
All recommended PPE Except facemask instead of N95 or PAPR	LOW		

Placing a simple/surgical mask on the patient within 15 minutes of contact decreases exposure risk.

Return to Work Practice and Work Restrictions (if excluded from work OR exposure to suspected or known COVID-19 patient):

- Prior to duty shift, measure temperature and assess for illness symptoms either by provider, infection control officer, or occupational or public health.
- Self-monitoring with oversight by agency's infection control officer, occupation or public health department per agency policy.
- Wear mask at all times and restrict care of immunocompromised patients (Cancer, Transplant, Steroid use) until all symptoms have resolved or 14 days after onset of illness, whichever is longest.
- Social distance: Employee should maintain 6 feet of separation as work duties permit in the workspace.
- Remove from work if employee becomes symptomatic.

- https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-for-ems.html
- https://www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/hcp-return-work.html
- https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2-covid-19

High Consequence Pathogens
(Respiratory Diseases, SARS, MERS-CoV, COVID-19)

First Responder Guidance

COVID-19 Declared Pandemic with both State and Federal Emergencies Declared

- Many systems are heavily dependent on First Responder agencies to supplement critical prehospital medical care services.
- Community spread is now evident both in NC and in the US.
- Every patient, regardless of medical or injury complaint, is at risk of COVID-19 and all should undergo routine screening questions.
- While EMD is a first step, all providers must screen every patient contact and don appropriate PPE based on clinical situation and COVID-19 screening.
- The citizens we serve continue to have a variety of illness and injury unrelated to COVID-19.
- Limiting PPE use:

  First Responders should consider staging with all incidents and sending 1 provider (or more dependent on situation) into the scene to assess for fever and respiratory complaints.

  Request staged resources as needed only to provide necessary medical care.

  Where patients do not require immediate intervention, first responders may stay in contact with patient, but remain beyond 6 feet until EMS providers arrive to begin assessment and further care.

  Consider calling patient on mobile phones to maintain contact and provide reassurance and explain current situation.

PPE Crisis or Alternative Srategies

N95 Respirators

- Use only for aerosol generating procedures (Nebulizer, NIPPV, Suctioning, BVM, BIAD, Intubation).
- Use facemasks in all other scenarios.
- Use respirators (N95 or equivalent) beyond the manufacturing expiration date when not soiled, ripped, torn, or otherwise damaged. Securing straps should also be in good repair and operational:
  - Visually inspect straps, nose bridge/foam, and mask in general.
  - Perform seal check: https://www.youtube.com/watch?v=pGXiUyAoEd8
- Models tested by CDC and are believed to function properly beyond expiration date:

  3M: 1860, 1860s, 1870, 8210, 9010, 8000
  Gerson 1730
  Medline/Alpha Protech NON27501
  Moldex: 1512, 2201
- Minimize providers caring for patient to the extent possible to conserve.
- Use Self-Contained Breathing Apparatus (SCBA) if needed.
- Re-use respiratory (N95 or equivalent) masks and place in paper bag between use. Do not touch inside of mask. Wash hands thoroughly before removing mask.
- When to discard a respirator (N95 or equivalent):
  - After using during an aerosol producing procedure.
  - Contamination with blood, body fluids or secretions, following close contact with known COVID-19 patient.

Gowns:

- Use only for aerosol generating procedures (Nebulizer, NIPPV, Suctioning, BVM, BIAD, Intubation).
- Use only for close patient contact, lifting, moving, or transferring where provider contacts patients body.
- May use removable and washable coveralls.

https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/index.html

Hospice or Palliative Care Patient

Terminal Illness?
Life-altering Chronic Illness?

NO → Exit to Appropriate Adult or Pediatric Protocol(s)

YES

Request Community Paramedic To Scene
If available

Established Hospice Patient?
Active Hospice Care?

NO → Hospice Referral → Exit to Appropriate Adult or Pediatric Protocol(s)

YES

Hospice Service or RN Notified of EMS Response

NO → Contact Hospice Service and Ensure Hospice Response to scene

YES

Patient Requires or Desires Medical Transport

YES → Involve Hospice Service in transport decision and/or make aware of transport and destination → Exit to Appropriate Adult or Pediatric Protocol(s)

- IV or IO Access Protocol UP 6
- Parenteral Access Existing Catheters Procedure PAS 7 ***If available***
- Port-A-Cath Access Procedure PAS 13 ***If available***

NO

Patient Expectant Actively Dying

NO → P Administer Medications from **eKit** Follow instructions in **eKit** or Equivalent Medications from EMS Suppy *See Pearls*

YES

Patient Suffering Pain / Uncomfortable Air hunger?

NO

YES

P Administer Medications from **eKit** Follow instructions in **eKit** or Equivalent Medications from EMS Suppy *See Pearls*

Exit to Appropriate Adult or Pediatric Protocol(s)
Consider Treatment in place with Treat/ No transport
In consultation with Hospice Nurse or Provider

Special Circumstances Section

Hospice or Palliative Care Patient

Acute Pain / Air Hunger:

Severity	Medication		
	Morphine (IV/IM/SQ)	Dilaudid (IV/IM/SQ)	Fentanyl (IV/IM/SQ)
Mild	2 mg	0.5 mg	25 mcg
Moderate	4 mg	1 mg	50 mcg
Severe	8 mg	2 mg	100 mcg
Titration	2 mg q 15 minutes IV	0.5 mg q 15 minutes IV	25 mcg q 15 minutes IV

Due to pain associated with IM injection, IM administration should only be used if alternative medications or routes of administration are not available. PICC lines may be accessed for use by EMS with sterile techniques. May access port-a-cath if appropriate equipment is available and provider is trained.

If using IM or SQ injections, delay repeat dosing by 30 minutes to prevent dose stacking.

Consider using moderate / severe dose in opiate tolerant patients:

Opiate tolerant patients have typical daily dose of narcotic is equivalent to ≥ 60 mg of oral Morphine per day (60 OME (Oral Morphine Equivalents).

Examples of opiate dosages equivalent to 60 mg of oral Morphine:

40 mg/day of Oxycodone
25 mcg/hr Fentanyl Transdermal
200 mg/day of Tapentadol
Suboxone
60 mg/day Hydrocodone
15 mg/day of Methadone
16 mg/day of Oxymorphone

Consider total use of multiple types of opiates. If in doubt about the patient's level of opiate tolerance, or amount of total daily opiate use, treat with a lower initial dose of opiate.

Anxiety / Agitation:

Severity	Medication			
	Ativan (IV/IM/SQ)	Versed (IV/IM/SQ)	Valium (IV/IM/SQ)	Haldol (IV/IM/SQ)
Mild / Moderate	0.5 mg	1 mg	2 mg	2 mg
Severe	1 mg	2 mg	5 mg	4 mg

May repeat dose in 15 minutes for IV administration, or 30 minutes for IM or SQ injections.

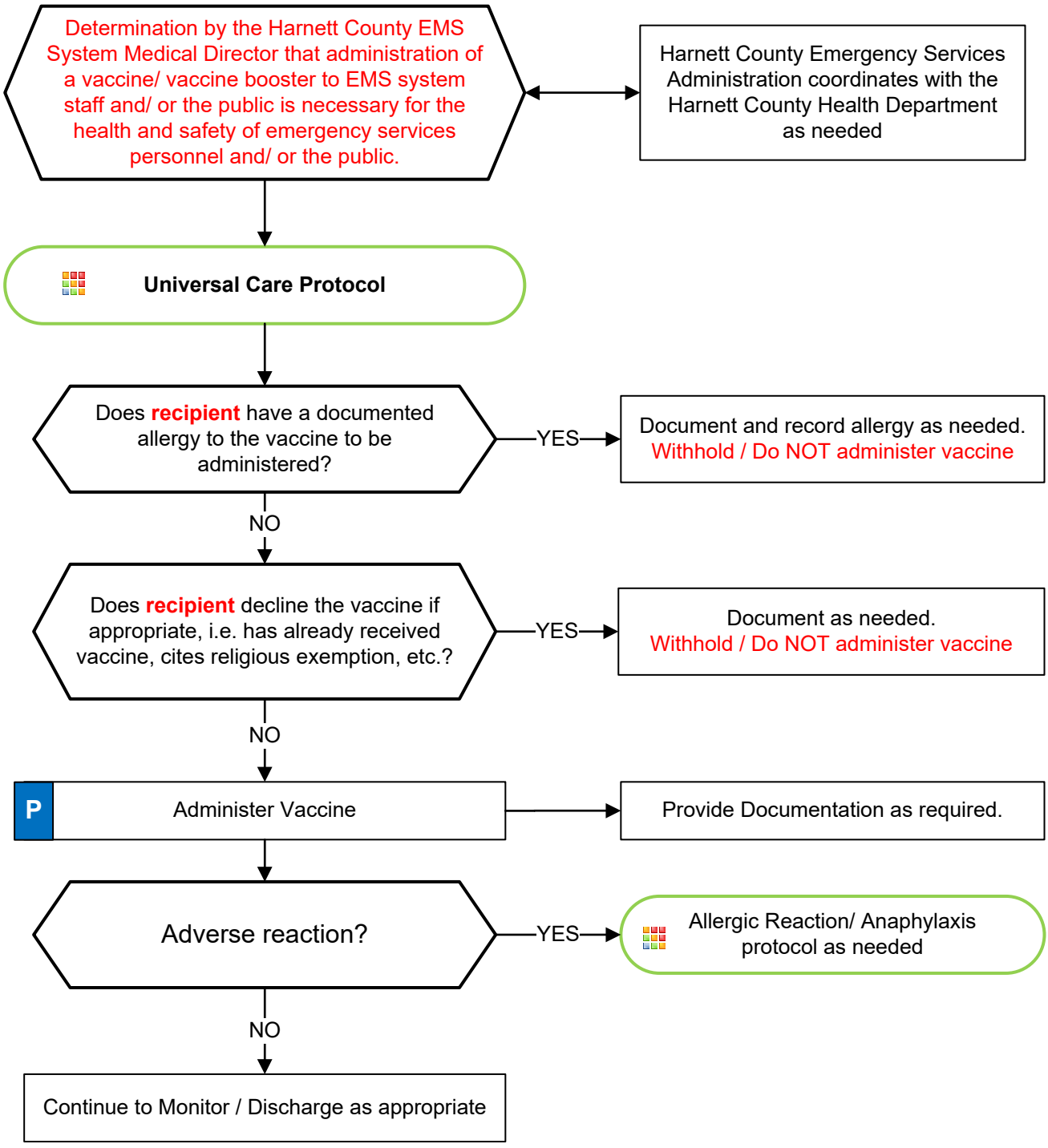
Nausea / Vomiting:

Zofran IV / IM	Phenergan IV / IM	Haldol IV / IM / SQ	Ativan IV / IM / SQ
4 mg	25 mg	2 mg	0.5 mg

Pearls

- **MOST form Section A and DNR forms are equivalent – if valid, Do Not Resuscitate.**
- **MOST form and DNR forms may be revoked by Health Care Power of Attorney or other appropriate surrogate decision-makers.**
- **Palliative care is specialized care for patients with a chronic and/ or terminal illness which focuses on managing symptoms exacerbation and the stress of illness.**
- **Hospice care is specialized care (similar to palliative care) for patients within the last 6 months of life.**
- **Hospice patient may not have a DNR or MOST form completed and still be enrolled in Hospice care.**
- **Emergency Kits (eKit):**
  May be given to patient by Hospice to use at home for acute symptom exacerbation.
  Each eKit is individualized and will be different for each patient, but typically addresses pain, nausea/ vomiting, anxiety, and/ or secretions. *(EMS is able to administer if within provider's scope of practice.)*
- **Interaction on-scene with Hospice personnel:**
  Hospice nurses are valuable resources in helping patients/ families make care/ transport decisions.
  EMS should discuss care/ transport decision with Hospice nurse.
  After medication administration, if no transport occurs, care may be transferred to Hospice nurse.

Mass Vaccination/Immunization Medication Distribution



Pearls

- This protocol covers the administration of necessary vaccines to all Harnett County EMS System providers and the public.
- Vaccination(s) as determined necessary are provided to all EMS system staff and the public as needed.
- The Harnett County EMS System Medical Director will coordinate with the Harnett County Health Department Director, and any other health officials as needed, a letter of agreement for EMS System paramedics to perform this task.
- It is not necessary to complete a PCR for each vaccination, rather, a log will be kept of all recipients.

Monoclonal Antibody Administration

Policy

* The paramedic will respond to a residence on order from the physician and follow guidelines outlined by the physician's orders for the administration of Monoclonal Antibody (Bamlanivimab,or Casirivimab/ Imdevimab)

* The administration of Monoclonal Antibodies may be performed at alternative locations other than the patients residence at the discretion of the Medical Director/ EMS Chief

Purpose

* To assist the patient (family/ caregiver) by increasing awareness of the disease through education on pathology.

* To administer medication for the treatment of COVID-19 related illness in a monitored environment.

	Review patient health history and physician's orders prior to appointment
	Follow Physician's Orders
P	Administer Medication As Listed Below (see exclusion criteria on next page)

1. Obtain Medication form Betsy Johnson Pharmacy. Medication will be prepared on day of infusion for scheduled patients. Paramedic can park at Employee entrance of hospital, call pharmacy at 910-892-1000, ext. 4095 and someone will deliver. Pharmacy will also supply the 0.2 micron filter tubing needed to administer the medication.
2. Prior to patient contact; you must ensure you properly donned your personal protective equipment.
3. Assess patient to ensure patient is a candidate for receiving medication (see exclusion criteria on next page)
4. Obtain initial set of vital signs.
5. Provide patient the Frequently Asked Questions document about the medication.
6. Establish IV access and ensure patency.
7. At patient side, attach the 0.2 micron filter tubing infusion set to the IV bag and prime the infusion set.
8. Administer as an IV infusion via pump or gravity over 60 minutes. The prepared solution should ***not*** be administered with any other medication simultaneously as compatibility is not known.
9. Patient should be monitored throughout the infusion with vital signs documented every 15 minutes.
10. After infusion is complete, flush with 0.9% Sodium Chloride injection.
11. Discard unused product.
12. Monitor patients during administration and observe patients for at least 1 hour after infusion is complete. For any signs of allergic reaction, follow **"Protocol 9 - Allergic Reaction / Anaphylaxis"** and request the closest 911 transport unit respond to the scene. Notify online medical control physician as soon as possible.
13. Properly doff your personal protective equipment, wash hands and decontaminate all equipment

Complete all documentation, to include scanning and attaching any associated paperwork

Communicate all patient follow-up information to the ordering physician

Special Circumstance Section

Monoclonal Antibody Administration

These medications are indicated under an FDA emergency use authorization for the treatment of COVID-19-related illness. You will be working with patients known to have COVID-19 and should exercise caution while in this environment. Appropriate use of personal protective equipment (PPE), including appropriate donning, doffing and decontamination, is important to minimize risk of transmission.

Exclusion criteria: These medications are not indicated in patients requiring oxygen therapy *or* in patients that require an increase in their baseline level of supplemental oxygen. For any patient with an SPO2 less than 92%, unless this is their baseline, approval should be obtained by the medical control physician before administering the medication. As these medications can cause hypotension, approval should also be obtained before administering the medication in patients with hypotension noted during their vital sign assessment.

Anaphylaxis Management – although rare in clinical trials, allergic reactions can occur. Follow **"Protocol 9 - Allergic Reaction / Anaphylaxis."** Request the closest 911 transport unit to respond to the scene and notify online medical control physician as soon as possible.

Possible side effects – monitor for the following: fever, headache, chills, nausea, headache, shortness of breath, low blood pressure, wheezing, swelling of lips/face/or throat, rash including hives, itching, muscle aches and dizziness. This list is not inclusive as the medications are still being studied so it is possible that not all adverse reactions are known.

For any questions or concerns during medication administration or monitoring, contact the online medical control physician immediately.

Scene Rehabilitation: General

Injury / Illness / Complaint should be treated using appropriate treatment protocol beyond need for oral or IV hydration.

Initial Process
1. Personnel logged into General Rehabilitation Section
2. VS Assessed / Recorded (If HR > 110 then obtain Temp)
   Carbon Monoxide monitoring if indicated
3. Personnel assessed for signs / symptoms
4. Remove PPE, Body Armor, Haz-Mat Suits, Turnout Gear, Other equipment as indicated

Significant Injury
Cardiac Complaint: Signs / Symptoms
Respiratory Complaint: Serious Signs / Symptoms
Respiratory Rate < 8 or > 40
Systolic Blood Pressure ≤ 80

YES → Exit to Scene Rehabilitation Responder Protocol

NO

Heat or Cold stress

YES → **HEAT STRESS**

Active Cooling Measures
Forearm immersion, cool shirts, cool mist fans etc.
Rest 10 – 20 Minutes

Rehydration Techniques
12 – 32 oz Oral Fluid over 20 minutes
Oral Rehydration may occur along with Active Cooling Measures
Firefighters should consume 8 ounces of fluid between SCBA change-out

YES → **COLD STRESS**

Active Warming Measures
Dry responder, place in warm area
Hot packs to axilla and / or groin
Rest 10 – 20 minutes

Rehydration Techniques
12 – 32 oz Oral Fluid over 20 minutes
Oral Rehydration may occur along with Active Warming Measures
Firefighters should consume 8 ounces of fluid between SCBA change-out

NO

Reassess responder after 20 Minutes in General Rehabilitation Section
Reassess VS

HR ≥ 110 — YES → Temp ≥ 100.6 — YES → Responder Cannot Wear Protective Gear
Extend Rehabilitation Time Until VS Improve

NO

Temp ≥ 100.6 — YES → HR ≥ 110 — YES → Extend Rehabilitation Time Until VS Improve

NO

Discharge Responder from General Rehabilitation Section

Reports for Reassignment

VITAL SIGN CAVEATS

Blood Pressure:
Prone to inaccuracy on scenes. Must be interpreted in context.

Firefighters have elevated blood pressure due to physical exertion and is not typically pathologic.

Firefighters with Systolic BP ≥ 160 or Diastolic BP ≥ 100 may need extended rehabilitation. However this does not necessarily prevent them from returning to duty.

Temperature:
Firefighters may have increased temperature during rehabilitation.

Special Operations Section

Scene Rehabilitation: General

Pearls

- **Rehabilitation officer has full authority in deciding when responders may return to duty and may adjust rest / rehabilitation time frames depending on existing conditions.**
- **Rehabilitation goals:**
  - **Relief from climatic conditions.**
  - **Rest, recovery, and hydration prior to incident, during, and following incident.**
  - **Active and / or passive cooling or warming as needed for incident type and climate conditions.**
- **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.**

General indications for rehabilitation:

20-minute rehabilitation following use of a second 30-minute SCBA, 45-minute SCBA or single 60-minute SCBA cylinder.
20-minute rehabilitation following 40 minutes of intense work without SCBA.

- **General work-rest cycles:**
  10-minute self-rehabilitation following use of one 30-minute SCBA cylinder or performing 20 minutes of intense work without SCBA.
- **Serious signs / symptoms:**
  Chest pain, dizziness, dyspnea, weakness, nausea, or headache.
  Symptoms of heat stress (cramps) or cold stress.
  Changes in gait, speech, or behavior.
  Altered Mental Status.
  Abnormal Vital Signs per agency SOP or Policy / Procedure.
- **Rehabilitation Section:**
  Integral function within the Incident Management System.
  Establish section such that it provides shelter / shade, privacy and freedom from smoke or other hazards
  Large enough to accommodate expected number of personnel.
  Separate area to remove PPE.
  Accessible to EMS transport units and water supply.
  Away from media agencies and spectators / bystanders.

Scene Rehabilitation: Responder

Remove:
PPE
Body Armor
Chemical Suits
SCBA
Turnout Gear
Other equipment as indicated

Continue:
Heat and Cold Stress treatment techniques from General Rehab Section

Injury / Illness / Complaint should be treated using appropriate treatment protocol beyond need for oral or IV hydration.

NFPA Age Predicted 85 % Maximum Heart Rate

Age	Max HR
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

Responders should report to Scene Rehab for any of the following:

- 30 Minutes of Work
- 1 SCBA Bottle Used
- Chest Pain
- Shortness of Breath
- Syncope / Confusion
- Nausea / Vomiting
- Request for any Reason

Initial Process
1. Personnel logged into Responder Rehabilitation Section
2. VS Assessed and Recorded / Orthostatic Vital Signs
3. Pulse oximetry and SPCO (if available)
4. Personnel assessed for signs / symptoms

Use in conjunction with General Rehabilitation Protocol

20 Minute Rest Period

Pulse Rate > 85 % NFPA Age Predicted Maximum — YES → **A**

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

Discharge Responder from General Rehabilitation Section

Reports for Reassignment

A
Normal Saline Bolus
500 mL IV / IO
Maximum 2 L
Titrate to HR ≤ 100
An
SBP ≥ 100 mmHg

No improvement after 30 minutes of additional rehabilitation

Mandatory Rest Period
Rehydration is Most Important
Re-evaluate in 10 minutes

Notify Destination or Contact Medical Control

Special Operations Section

Pearls
- **Rehabilitation officer has full authority in deciding when responders may return to duty.**
- **Utilized when responder is not appropriate for General 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.

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
- Hearing loss (TM rupture)
- Ocular burns/vision changes
- Multiple trauma/penetrating trauma
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/ wheezing
- Pneumo/hemothorax
- Traumatic amputation (tourniquet)

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

Call for help/ additional resources
Stage until scene safe

Accidental / Intentional Explosions
(See Pearls)

- Triage Protocol UP 2 ***as indicated***
- Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***as indicated***
- Multiple Trauma Protocol TB 6 ***if indicated***
- IV / IO Access Protocol UP 6 ***if indicated***
- P — Cardiac Monitor ***if indicated***
- Thermal Burn Protocol TB 9 / Chemical and Electrical Burn Protocol TB 2 ***if indicated***
- Crush Injury Protocol TB 3 ***if indicated***
- Radiation Incident Protocol TB 7 ***if indicated***
- Decontamination Procedure USP 2 ***if indicated***
- Pain Control Protocol UP 11 ***if indicated***

Blast Lung Injury — YES → Age Appropriate Airway Protocol(s) AR 4, 7 ***as indicated***

NO

Rapid Transport to appropriate destination using Trauma and Burn: EMS Triage and Destination Plan

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Blast Injury / Incident

Pearls

- **Types of Blast Injury:**
  - Primary Blast Injury: From the blast pressure (air) 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 should be triaged using the Thermal Burn/ Chemical and Electrical Burn Protocol Guidelines for Critical/ Serious/ Minor Trauma and Burns and the Trauma and Burn: EMS Triage and Destination Plan.
  - Patients may be hard of hearing due to tympanic membrane rupture.
- **Care of Blast Injury Patients:**
  - Patients may suffer multi-system injuries including blunt and penetrating trauma, shrapnel, barotrauma, burns, and toxic chemical exposure.
  - Consider airway burns, which should prompt early and aggressive airway management as indicated.
  - Cover open chest wounds with semi-occlusive dressing or commercial chest seal product.
  - Use Lactated Ringers (if available) for all Critical or Serious Burns.
  - Minimize IV fluids resuscitation in patients with no signs of shock or poor perfusion.
- **Blast Lung Injury:**
  - Blast Lung Injury is characterized by respiratory difficulty and hypoxia. Can occur (rarely) in patients without external thoracic trauma. More likely to occur in an 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.
  - Air embolism should be considered and patient transported in left-lateral decubitus position.
  - Blast Lung Injury patients may require early intubation but positive pressure ventilation may worsen the injury, avoid hyperventilation, which can cause further injury.
  - Air transport may worsen lung injury, monitor oxygenation and ventilation closely. Tension pneumothorax may occur requiring chest decompression. Be judicious with fluids as volume overload may worsen lung injury.
- **Accidental Explosions or Intentional Explosions:**
  - **All explosions or blasts should be considered intentional until determined otherwise.**
  - **Greatest concern is potential threat for a secondary device.**
  - Attempt to determine the source of the blast to include any potential threat for aerosolization of hazardous materials.
  - Evaluate scene safety including the source of the blast, which may continue to spill explosive liquids or gases.
  - Consider structural collapse, environmental hazard, and fire.
  - Conditions that led to the initial explosion may reoccur and lead to a second explosion.
  - Patients who physically able, typically will attempt to move as far away from the explosive source.
  - Evaluate surroundings for suspicious items; unattended back packs or packages, or unattended vehicles.
  - **If patient(s) is unconscious or there is fatalities and you are evaluating patient(s) for signs of life:**
    - **Before moving, note if there are wires coming from the patient(s), or if it appears the patient(s) is lying on a package/ pack, or bulky item. If so, do not move the patient(s), quickly back away and immediately notify a law enforcement officer.**
  - If there are no indications the patient is connected to a triggering mechanism for a secondary device, expeditiously remove the patient(s) from the scene and begin transport to the hospital.
  - Protect the airway and cervical spine, however beyond the primary survey, care and a more detailed assessment should be deferred until rapid transport begins.
  - 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.

Chemical and Electrical Burn

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
- Ocular burns/vision changes
- Loss of consciousness
- Hypotension/shock
- Compartment syndrome
- Airway compromise/distress could be indicated by hoarseness/wheezing
- Electrical may be misleading with small contact/external burn and major internal injury – burn/trauma center recommended

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

Assure Chemical Source is NOT Hazardous to Responders.
Assure Electrical Source is NO longer in contact with patient before touching patient.

Assess Burn / Concomitant Injury Severity

< 5% TBSA 2nd/3rd Degree Burn	**5-15% TBSA 2nd/3rd Degree Burn**	**>15% TBSA 2nd/3rd Degree Burn**
No inhalation injury, Not Intubated, Normotensive GCS 14 or Greater Minor Burn	Suspected inhalation injury or requiring intubation for airway stabilization Hypotension or GCS 13 or Less (When reasonably accessible, transport to a Burn Center) Serious Burn	Burns with Multiple Trauma Burns with definitive airway compromise (When reasonably accessible, transport to a Burn Center) Critical Burn

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 4, 5, 6, 7 ***if indicated***
	IV or IO Access Protocol UP 6 Consider 2 IV sites if ≥ 15 % TBSA
	Thermal Burn Protocol TB 9
	Pain Control Protocol UP 11 ***if indicated***
	Identify Contact Points
	Eye Involvement Irrigate Involved Eye(s) with Normal Saline for 30 minutes Continue irrigation during transport
	Chemical Exposure / Burn Flush Contact Area with Normal Saline for 15 minutes Continue irrigation during transport
	Decontamination Procedure USP 2 ***if indicated***
	Age Appropriate Cardiac Protocol(s) ***if indicated***

Rapid Transport to appropriate destination using
Trauma and Burn:
EMS Triage and Destination Plan

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Chemical and Electrical Burn

Pearls

- ✱ **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro**
- ✱ **Green, Yellow and Red In burn severity do not apply to Triage systems.**
- ✱ **Refer to Rule of Nines.**
- ✱ **Transport and Destination:**
  - **In general, chemical and electrical burns should be transported to a burn center.**
  - **Burn center should be initial destination choice unless EMS system access is limited by time and/ or distance.**
  - **When EMS transport to burn center is limited, transport to and stabilization at local center is appropriate. ✱**

Chemical Burns:

- Refer to Decontamination Procedure.
- With dry powders/ substances, gently brush or wipe off prior to irrigation. Do not aerosolize by brushing too vigorously.
- Normal Saline or Sterile Water is preferred, however if not available, do not delay irrigation and use tap water. Other water sources may be used based on availability.
- Flush the area as soon as possible with the cleanest, most readily available water or saline solution and use copious amounts of fluids.
- Flush contact area for a minimum of 15 minutes and continue until arrival at receiving facility.
- Hydrofluoric acid burns:
  - Monitor ECG for peaked T waves, which can be sign of hypocalcemia.
- Eye involvement:
  - Irrigation is recommended for a minimum of 30 minutes and continue until arrival at receiving facility.

✱ **Electrical Burns:**

- **Remember the extent of the obvious external burn from an electrical source does not always reflect more extensive internal damage. Small external injury may have large internal injury.**
- **Do not refer to wounds as an entry and exit wound**.
- **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 (3rd).
- 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 or DC), the amount of voltage, and the amperage the patient may have been exposed to during the electrical shock.

Lightning strike:

- Lightning strike victims are amenable to airway, breathing, cardiac compressions, as well as early defibrillation.
- **Use concept of reverse triage with multiple casualties. Resuscitate lightning strikes as the priority.**
- Lightning strike victims found alive do not often deteriorate quickly.

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
- Vascular injury with perfusion deficit
- Compartment syndrome
- Altered mental status

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 4, 5, 6, 7 ***as indicated***
B	12 Lead ECG Procedure CSP 1
	IV / IO Access Protocol UP 6
P	Cardiac Monitor
	Multiple Trauma Protocol TB 6 ***if indicated***
	Thermal Burn Protocol TB 9 Chemical and Electrical Burn Protocol TB 2 ***if indicated***
	Pain Control Protocol UP 11 ***as indicated***

Age Specific Blood Pressure
indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 100

All ages:
Shock Index HR > SBP

P — Consider
Midazolam 2.5 mg IV / IO / IN
5 mg IM
Age ≥ 65: 1mg IV / IO / IN
2.5 mg IM
Pediatric: 0.2 mg / kg IV / IO / IN
Max 2.5 mg IV / IO / IN
Max 5 mg IM
Over 2 – 3 minutes as needed

Entrapped < 2 hours

A — **Normal Saline Infusion**
1 Liter per hour IV / IO
Pediatric:
3 x maintenance fluid rate

Entrapped > 2 hours

A — **Decrease Normal Saline Infusion**
500 mL per hour IV / IO
Pediatric:
Maintenance fluid rate

Abnormal ECG
Peaked T Waves
QRS ≥ 0.12 seconds
QT ≥ 0.46 seconds
Loss of P wave
Or
Hemodynamically Unstable
Or
Asystole / PEA / VF / VT

P — **Calcium Chloride 1 g IV / IO**
or
(Calcium Gluconate 2 g IV / IO)
Pediatric: 20 mg/kg IV / IO
Over 2- 3 minutes

P — **Albuterol Nebulizer**
2.5 – 5 mg
May repeat x 3

Sodium Bicarbonate
50 mEq IV / IO
Pediatric: 1 mEq/kg IV / IO

Exit to
Age Appropriate
Cardiac Arrest
Protocol AC 3 / PC 4
Arrhythmia Protocol(s)
if indicated

Rapid Transport to appropriate destination using
Trauma and Burn:
EMS Triage and Destination Plan

Notify Destination or
Contact Medical Control

Trauma and Burn Protocol Section

Crush Syndrome Trauma

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Pearls

- **Recommended exam: Mental Status, Musculoskeletal, Neuro**
- **Scene safety is of paramount importance as typical scenes may pose hazards to rescuers. Call for appropriate resources.**
- **Crush Injury is a localized crush injury with systemic signs and symptoms causing muscle breakdown and release of potentially toxic muscle cell components and electrolytes into the circulation.**
- **Crush syndrome typically manifests after 1 – 4 hours of crush injury.**
- **Fluid resuscitation strategy:**
  - **If possible, administer IV / IO fluids prior to release of crushed body part, especially with crush > 1 hour.**
  - **If access to patient and initiation of IV / IO fluids occurs after 2 hours, give 2 liters of IV fluids in adults and 20 mL/kg of IV fluids in pediatrics, and then begin > 2 hour dosing regimen.**
  - **If not able to perform IV / IO fluid resuscitation immediately, place tourniquet on crushed limb until IV / IO fluids can be initiated (even if tourniquet is not being used for hemorrhage control).**
- **Pediatric IV Fluid maintenance rate:**
  - **4 mL for the first 10 kg of weight +**
  - **2 mL for the second 10 kg of weight +**
  - **1 mL for every additional kg in weight after 20 kg**

Example: 28 kg pediatric	
First 10 kg:	4 mL/kg/hr = 40 mL/hr
Second 10 kg:	2 mL/kg/hr = 20 mL/hr
Final 8 Kg:	1 mL/kg//hr = 8 mL/hr
	Total: 68 mL/hr rate

- **Consider all possible causes of shock and treat per appropriate protocol.**
- **Majority of decompensation in pediatrics is airway or respiratory related.**
- **Decreasing heart rate and hypotension occur late in children and are signs of impending cardiac arrest.**
- **Shock may be present with a normal blood pressure initially or even elevated.**
- **Shock often is present with normal vital signs and may develop insidiously. Tachycardia may be the only sign.**
- **Patients may become hypothermic even in warm environments. Maintain warmth.**
- Hyperkalemia from crush syndrome can produce ECG changes described in protocol, but may also be a bizarre, wide complex rhythm. Wide complex rhythms should also be treated using the VF/ Pulseless VT Protocol if indicated (AC 9 VF Pulseless VT Protocol and/ or PC 7 Pediatric VF Pulseless VT Protocol).

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

Wound care
Control Hemorrhage with Direct Pressure
Splinting as indicated

Consider
Topical Hemostatic Dressing (see pearls)
Apply Gauze to Wound

Wound Care WTP 4
Tourniquet Procedure WTP 7
if indicated

IV / IO Access Protocol UP 6
if indicated

Age Appropriate
Airway Protocol(s) AR 1, 2, 3, 4, 5, 6, 7
if indicated

Multiple Trauma Protocol TB 6
if indicated

Age Appropriate Hypotension / Shock
Protocol AM 5 / PM 3
if indicated

Pain Protocol UP 11
if indicated

Crush Syndrome Protocol TB 3
as indicated

Amputation and / or Open Fracture

YES
- Clean amputated part
- Wrap part in sterile dressing soaked in normal saline or lactated ringers
- Place part/ dressing in air tight container.
- Place container on ice if available.

NO

Monitor and Reassess

P
Cefazolin (Ancef) 2g IV / IO
Reconstitute 3cc & administer IVP or IOP
Unless known Anaphylactic PCN Allergy

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Pearls
- Can use commercial hemostatic dressing or 1g TXA poured onto gauze
- Recommended Exam: Mental Status, Extremity, Neuro
- Peripheral neurovascular status is important
- In amputations, time is critical. Transport and notify medical control immediately, so that the appropriate destination can be determined.
- Hip dislocations and knee and elbow fracture / dislocations have a high incidence of vascular compromise.
- Urgently transport any injury with vascular compromise.
- Blood loss may be concealed or not apparent with extremity injuries.
- Lacerations must be evaluated for repair within 6 hours from the time of injury.
- **Multiple casualty incident: Tourniquet Procedure may be considered first instead of direct pressure.**

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

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
	Obtain and Record GCS
	Supplemental oxygen Airway adjuncts as needed Preferably ≥ 92 - 98% Prevent Oxygen desaturation events < 90%
	Blood Glucose Analysis Procedure ASP 4
	IV / IO Access Protocol UP 6 ***if indicated***
P	Cardiac Monitor
	Altered Mental Status Protocol UP 4 ***if indicated***
	Multiple Trauma Protocol TB 6 ***if indicated***
	Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***
	Seizure Protocol UP 13 ***if indicated***
	Spinal Motion Restriction Protocol TB 8 Procedure WTP 2 ***if indicated***
	Pain Control Protocol UP 11 ***if indicated***
	Monitor and Reassess

Rapid Transport to appropriate destination using
Trauma and Burn: EMS Triage and Destination Plan

Notify Destination or Contact Medical Control

Age Specific Blood Pressure indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

All ages Shock Index: HR > SBP

Hyperventilation:
Hyperventilation is NOT recommended in patients who require BVM, BIAD, or ETT.

Maintain ventilation rate to target EtCO2 of 35 – 45 mmHg
See Pearls

Maintain oxygenation to target SpO2 of 92 – 98%
(Near 100% if possible)

Trauma and Burn Protocol Section

Head Trauma

Pearls

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Back, Neuro**
- **Hypoxia:**
  - **Single episode of hypoxia can worsen head injury and double mortality.**
  - **Maintain SpO_2 preferrable between 92 – 98%, but 100% if possible.**
- **Hyperventilation in head injury requiring advanced airway:**
  - **Hyperventilation lowers CO2 and causes vasoconstriction leading to increased intracranial pressure (ICP).**
  - **Hyperventilation is not recommended and can worsen the brain injury.**
  - **In patients requiring BVM, BIAD, or endotracheal tube, titrate ventilation rate to $EtCO_2$ between 35 - 45 mmHg.**
  - **Recommended ventilation rates with advanced airways:**
    - **Infant/ Toddler: 25 breaths / minute**
    - **Children: 20 Breaths / minute**
    - **Adolescents/ Adults: 10 – 12 Breaths / minute**
- **Hypotension:**
  - **Episodes of hypotension can worsen head injury and increase mortality:**
    - **In adults, target SBP is at least 90 - 100 mmHg.**
    - **In pediatrics, target SBP is at least > 70 + (2 x the age in years).**
  - **Usually indicates shock unrelated to the head injury and should be aggressively treated, otherwise limit fluid administration.**
- **GCS**
  - **Key performance measure used in the EMS Acute Trauma Care Toolkit.**
  - **Serial assessments of GCG with ongoing assessments should be performed.**

Eye Opening Response	Verbal Response	Motor Response
4 = Spontaneous	5 = Oriented	6 = Obeys commands
3 = To verbal stimuli	4 = Confused	5 = Localizes pain
2 = To pain	3 = Inappropriate words	4 = Withdraws from pain
1 = None	2 = Incoherent	3 = Flexion to pain or decorticate
	1 = None	2 = Extension to pain or decerebrate
		1 = None

- **Do not place in Trendelenburg position as this may increase ICP and worsen blood pressure.**
- **Poorly fitted cervical collars may also increase ICP when applied too tightly.**
- **In areas with short transport times, Drug Assisted Airway protocol is not recommended for patients who are spontaneously breathing and who have oxygen saturations of ≥ 90% with supplemental oxygen including BIAD/ BVM.**
- **Increased intracranial pressure (ICP) may cause hypertension and bradycardia (Cushing's Response).**
- Consider Restraints if necessary for patient's and/ or personnel's protection per the Restraints: Physical Procedure USP 5.
- **Concussions:**
  - Traumatic brain injuries involving any of a number of symptoms including confusion, loss of consciousness, 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.
  - **EMS Providers should not make return-to-play decisions when evaluating an athlete with suspected concussion. This is outside the scope of practice.**

Multiple Trauma

History
- Time and mechanism of injury
- Damage to structure or vehicle
- Location in structure or vehicle
- Others 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

Age Specific Blood Pressure
indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

All ages Shock Index:
HR > SBP

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
	Control External Hemorrhage Consider Pelvic Binding Splint Suspected Fractures
P	Chest Decompression WTP 1 ***if indicated***
	Obtain and Record GCS
	IV o/ IO Access Protocol UP 6
P	Cardiac Monitor
	Head Injury Protocol TB 5 ***if indicated***
	Altered Mental Status Protocol UP 4 ***if indicated***
	Spinal Motion Restriction Procedure / Protocol TB 8 ***if indicated***
	Pain Control Protocol UP 11 ***if indicated***

VS / Perfusion / GCS

Normal

	Repeat Assessment Adult Procedure
	Monitor and Reassess

Abnormal

	Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***
P	**TXA 1 gm in 250cc D5W IV / IO** **Infuse over 10 minutes** *if indicated, see pearls*
	Monitor and Reassess

Rapid Transport to appropriate destination using
Trauma and Burn:
EMS Triage and Destination Plan
Limit Scene Time ≤ 10 minutes
Provide Early Notification

Notify Destination or
Contact Medical Control

Trauma and Burn Protocol Section

Multiple Trauma

** LIMIT SCENE TIME TO ≤ 10 MINUTES **

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lung, Abdomen, Extremities, Back, Neuro**
- **Items in Red Text are key performance measures used in the EMS Acute Trauma Care Toolkit**
- **BVM is an acceptable method of managing the airway if pulse oximetry can be maintained ≥ 90%**
- **Transport Destination is chosen based on the EMS System Trauma Plan with EMS pre-arrival notification.**
- **Scene time should not be delayed for procedures, they should be performed during transport when possible.**
- **Rapid transport of the unstable trauma patient to the appropriate facility is the goal.**
- **Control external hemorrhage and prevent hypothermia by keeping patient warm.**
- **Decompress chest with signs of shock and injury to torso as well as with signs of tension pneumothorax.**
- **Trauma Triad of Death:**
  - **Metabolic acidosis / Coagulopathy / Hypothermia**
  - **Appropriate resuscitation measures and keeping patient warm regardless of ambient temperature helps to mitigate metabolic acidosis, coagulopathy, and hypothermia.**
- **Tranexamic Acid (TXA):**
  - TXA administration has been approved by the Capital Regional Trauma Advisory Committee (CapRAC)
  - Indications for IV Transexamic Acid Use:
    - Patient Age ≥ 16 years old
    - Hemorrhage that can not be controlled with tourniquet or direct pressure
    - Elapsed time since injury ≤ 3 hours
    - Systolic blood pressure less than 90 mmHg or heart rate > 110
- **Trauma in Pregnancy:**
  - Providing optimal care for the mother = optimal care for the fetus.
  - After 20 weeks gestation (fundus at or above umbilicus) transport patient on left side with 10 – 20° of elevation.
- **Geriatric Trauma:**
  - **Age ≥ 65: SBP < 110 mmHg or HR > SBP may indicate shock.**
  - Evaluate with a high index of suspicion for occult injury.
  - Injuries not obvious are difficult to recognize and cause decompensation unexpectedly with no warning.
  - Risk of death with trauma increases after age 55.
  - SBP < 110 may represent shock/ poor perfusion in patients over age 65.
  - Low impact mechanisms, such as ground level falls, might result in severe injury, especially in age over 65.
- **Refer to your Regional Trauma Guidelines when declaring Trauma Activation.**
- Severe bleeding from an extremity, not rapidly controlled with direct pressure, needs application of a tourniquet.
- Maintain high-index of suspicion for domestic violence or abuse, pediatric non-accidental trauma, or geriatric abuse.

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

Scene Safety / Quantify and Triage Patients / Load and Go with Assessment / Treatment Enroute

Assess Burn / Concomitant Injury Severity

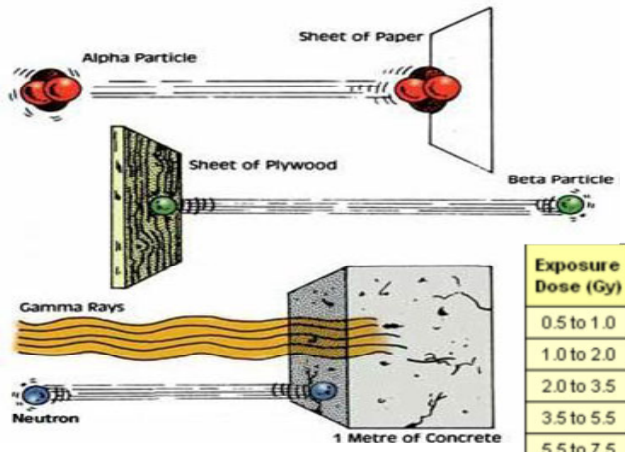
Minor Burn	Serious Burn	Critical Burn
< 5% TBSA 2nd/3rd Degree Burn No inhalation injury, Not Intubated, Normotensive GCS 14 or Greater	**5-15% TBSA 2nd/3rd Degree Burn** Suspected inhalation injury or requiring intubation for airway stabilization Hypotension or GCS 13 or Less *(When reasonably accessible, transport to a Burn Center)*	**>15% TBSA 2nd/3rd Degree Burn** Burns with Multiple Trauma Burns with definitive airway compromise *(When reasonably accessible, transport to a Burn Center)*

- Age Appropriate Airway Protocol(s) AR 1, 2, 3, 4, 5, 6, 7 ***if indicated***
- Eye Involvement
  Irrigate Involved Eye(s) with Normal Saline for 15 – 30 minutes
  May repeat as needed
- Flush Contact Area with Normal Saline for 15 minutes
- Decontamination Procedure USP 2 ***if indicated***
- IV and IO Access Protocol UP 6 ***if indicated***
- Age Appropriate Cardiac Protocol(s) ***as indicated***
- Thermal Burn Protocol TB 9 ***if indicated***
- **Rapid Transport** to appropriate destination using **Trauma and Burn: EMS Triage and Destination Plan**
- **Notify Destination or Contact Medical Control**

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 Protocol Section

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

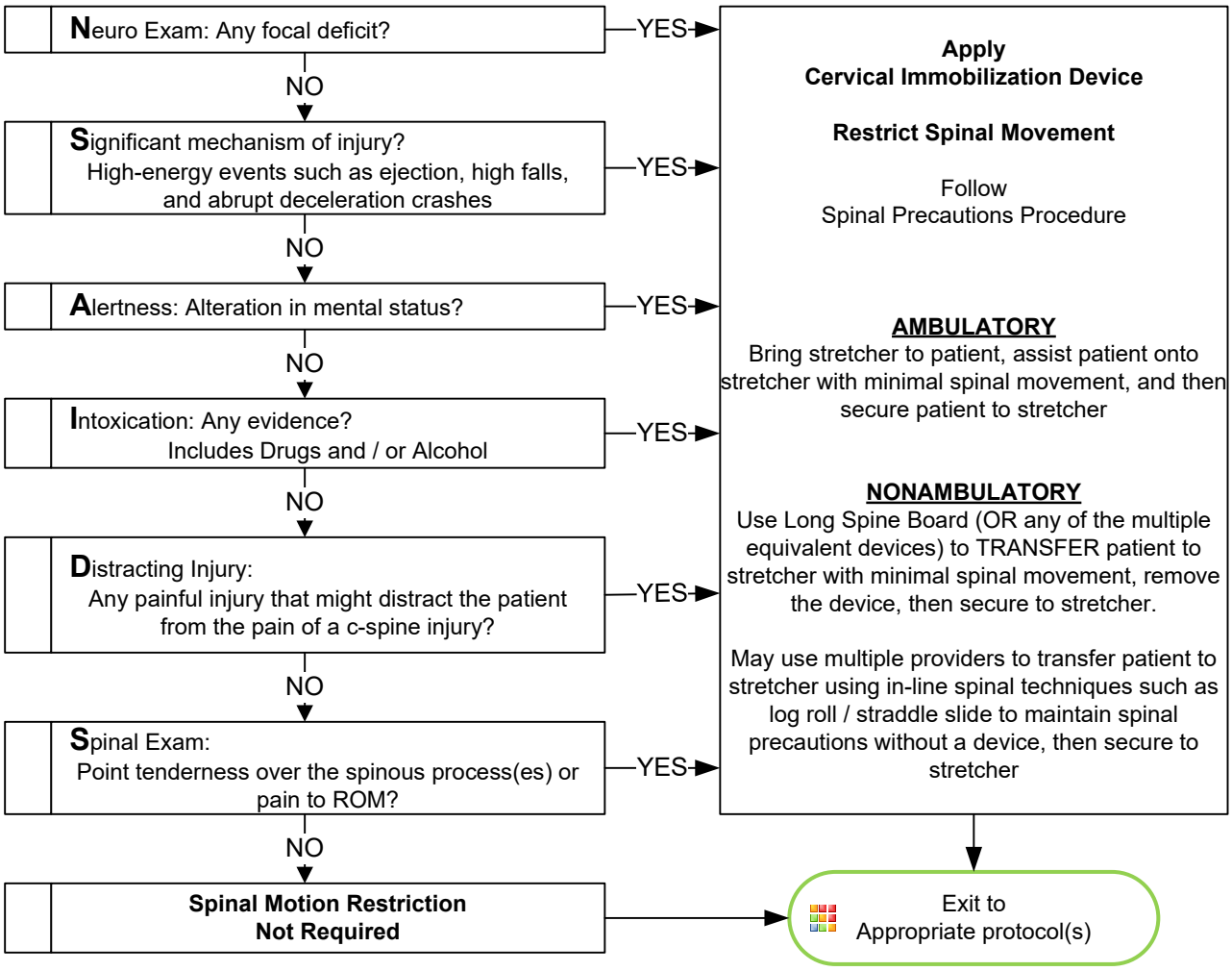
* Hypotension
** Also cardiovascular collapse, fever, shock

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

- **The three primary methods of protection from radiation sources:**
  - **Limiting time of exposure**
  - **Distance from**
  - **Shielding from the source**
- 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. Refer to the Decontamination Procedure USP 2 for more information.
- 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, most 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. When 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 is 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.
- Dirty bomb ingredients generally include previously used radioactive material and are usually combined with a conventional explosive device to spread and distribute the contaminated material.
- Refer to Decontamination Procedure USP 2/ WMD and Nerve Agent Protocol TE 8 for 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.
- This event may require an activation of the National Radiation Injury Treatment Network (RITN). UNC Hospitals, Atrium Health Wake Forest Baptist and Duke are the RITN hospitals, with burns managed at UNC and Wake Forest.

Selective Spinal Motion Restriction



Trauma and Burn Protocol Section

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 require 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.**
- **True spinal immobilization is not possible. Spine protection and spinal motion restriction do not equal long spine board.**
- **Spinal motion restriction is always utilized in at-risk patients. These include 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, 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 (shoulder to shoulder) 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**
- **<u>Immobilization on a long spine board is not necessary where</u>:**
  Penetrating trauma to the head, neck or torso with no signs / 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
  MVC ≥ 30 mph, rollover, and/or ejection
  Motorcycle, bicycle, other mobile device, or pedestrian-vehicle crash
  Diving or axial load to spine
  Electric shock

Thermal Burn

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

Assess Burn / Concomitant Injury Severity

< 5% TBSA 2nd/3rd Degree Burn
No inhalation injury, Not Intubated, Normotensive
GCS 14 or Greater
Minor Burn

5-15% TBSA 2nd/3rd Degree Burn
Suspected inhalation injury or requiring intubation for airway stabilization
Hypotension or GCS 13 or Less
(When reasonably accessible, transport to a Burn Center)
Serious Burn

>15% TBSA 2nd/3rd Degree Burn
Burns with Multiple Trauma
Burns with definitive airway compromise
(When reasonably accessible, transport to a Burn Center)
Critical Burn

- Airway Protocol(s) AR 1, 2, 3, 5, 6 ***as indicated***
- Multiple Trauma Protocol TB 6 ***if indicated***
- Remove Rings, Bracelets, Constricting Items
- Dry Clean Sheet or Dressings
- IV / IO Access Protocol UP 6
  Consider 2 IV sites if ≥ 15 % TBSA

TBSA estimate at ≥ 20%

NO

A **Normal Saline**
Or
Lactated Ringers
(if available)
0.25 mL/kg x (%TBSA) / hr
for up to the first 8 hours.
(More info below*)

YES

A **Normal Saline**
Or
Lactated Ringers
(if available)
Age: ≤ 5 = 125 mL/hr
Age: 6–14 = 250 mL/hr
Age: ≥ 15 = 500 mL/hr

Formula example:
70 kg patient with 15% TBSA

0.25 *x* 70 kg = 17.5
17.5 *x* 15 = 263 mL/hr

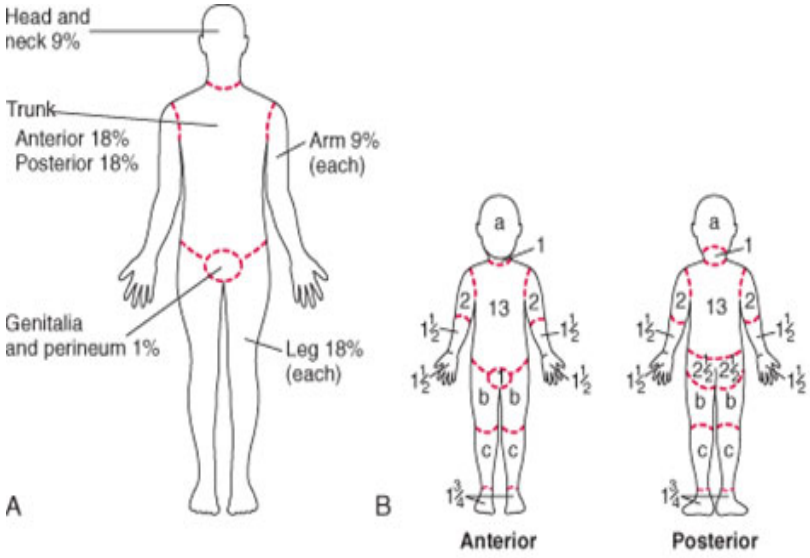
- Pain Control Protocol UP 11 ***if indicated***
- Carbon Monoxide / Cyanide Protocol TE 2 ***if indicated***
- Monitor and Reassess
- **Rapid Transport** to appropriate destination using Trauma and Burn: EMS Triage and Destination Plan

Notify Destination or Contact Medical Control

Lactated Ringers preferred over Normal Saline. Use if available, if not change over once available.

Trauma and Burn Protocol Section

Thermal Burn



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

	Age				
Body Part	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

Rule of Nines

- Rarely 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 1st degree burn (superficial) 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 (2nd) and Full Thickness (3rd) burns. Report the observation of other superficial (1st degree) burns but do not include those burns in your TBSA estimate.
- Some texts will refer to 4th 5th and 6th degree burns. There is significant debate regarding the actual value of identifying a burn injury beyond that of the superficial, partial and full thickness burn at least at the

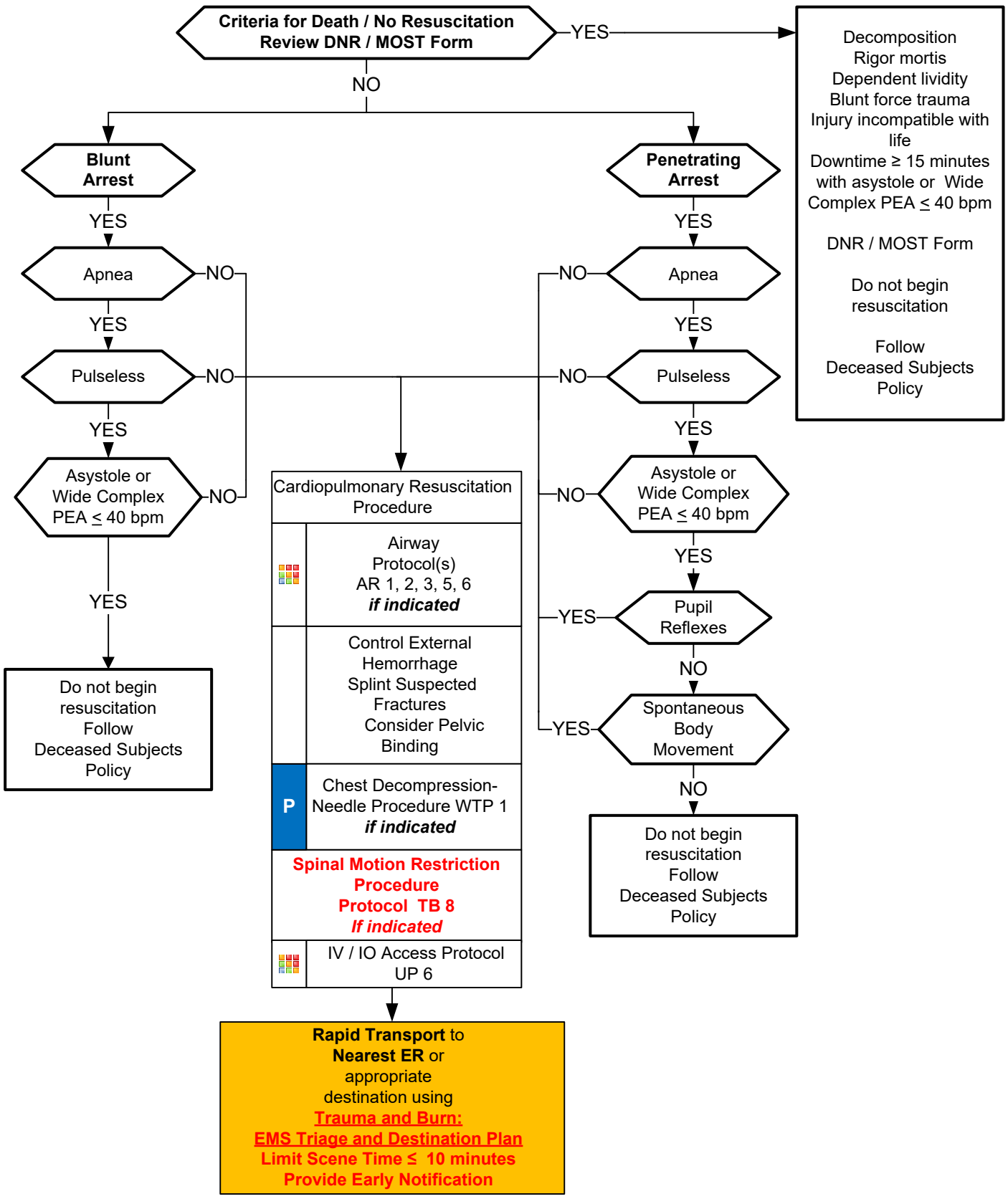
Estimate spotty areas of burn by using the size of the patient's palm as 1 %

Trauma and Burn Protocol Section

Pearls

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro**
- **Green, Yellow and Red In burn severity do not apply to the Start / JumpStart Triage System.**
- **Airway considerations:**
  - **Singed nasal hairs, facial burns, and/or carbonaceous sputum are not absolute indications for intubation in a burn patient.**
  - **Utilizing non-rebreather face mask as well as NIPPV procedure are acceptable as tolerated.**
- **Critical or Serious Burns:**
  - **> 5-15% total body surface area (TBSA) 2nd or 3rd degree burns**
  - **3rd (full thickness) degree burns > 5% TBSA for any age group**
  - **Circumferential burns of extremities**
  - **Electrical or lightning injuries**
  - **Suspicion of abuse or neglect**
  - **Inhalation injury**
  - **Chemical burns**
  - **Burns of face, hands, perineum, or feet**
  - **Require direct transport to a Burn Center. Local facility should be utilized only if distance to Burn Center is excessive or critical interventions such as airway management are not available in the field.**
- Burn patients are trauma patients, evaluate for multisystem trauma.
- Assure whatever has caused the burn is no longer contacting the injury. (Stop the burning process!)
- 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 geriatric abuse with burn injuries in the elderly.
- Do not administer IM pain injections to a burn patient. IM dosing is variable in burn patients and may result in over or under dose.

Traumatic Arrest



Trauma and Burn Protocol Section

Traumatic Arrest

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lung, Abdomen, Extremities, Back, Neuro**
- **Withholding resuscitative efforts with blunt and penetrating trauma victims who meet criteria is appropriate.**
- **If transport time to Trauma Center is < 15 minutes use of ECG monitor may delay resuscitation.**
- **Rhythm determination is more helpful in rural settings or where transport to nearest facility is > 15 minutes. Omit from algorithm where appropriate.**
- **Organized rhythms for the purposes of this protocol include Ventricular Tachycardia, Ventricular Fibrillation and PEA.**
- **Wide, bizarre rhythms such as Idioventricular and severely brachycardic rhythms < 40 BPM are not organized rhythms.**
- **First arriving EMS personnel should make the assessment concerning agonal respirations, pulselessness, asystole or PEA < 40, pupillary reflexes and spontaneous body movements.**
- **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: If no advanced airway (BIAD, ETT) compressions to ventilations are 30:2. If advanced airway in place ventilate 8 – 10 breaths per minute.**
- **ALS procedures should optimally be performed during rapid transport.**
- **<u>Time considerations:</u>**

  From the time cardiac arrest is identified, if CPR is performed ≥ 15 minutes with no ROSC consider termination of resuscitation.

  From the time cardiac arrest is identified, if transport time to closest Trauma Center is > 15 minutes consider termination of resuscitation.
- Lightning strike, drowning or in situations causing hypothermia resuscitation should be initiated.
- Where multiple lightning strike victims are found used Reverse Triage: Begin CPR where apneic / pulseless

Bites and Envenomations

History
- Type of bite / sting
- Description / photo 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 (venomous)
- Spider bite (venomous)
- Insect sting / bite (bee, wasp, ant, tick)
- Infection risk
- Rabies risk
- Tetanus risk

Call for help / additional resources
Stage until scene safe

Contact
Carolinas Poison Control
1-800-222-1222
As needed

- General Wound Care Procedure
- Immobilize Injury
- Remove any constricting clothing / bands / jewelry
- IV or IO Access Protocol UP 6 ***if indicated***
- Age Appropriate Trauma Protocol(s) TB 4, 5, 6 ***if indicated***
- Age Appropriate Allergic Reaction/ Anaphylaxis Protocol AM 1 / PM 1 ***if indicated***
- Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***
- Pain Control Protocol UP 11 ***if indicated***
- Extremity Trauma Protocol TB 4 ***if indicated***

Identification of Animal

Spider Bite / Bee or Wasp Sting
Venomous

- Keep bite at level of heart ***if able***
- Apply Ice Packs
- P: **<u>Muscle Spasm</u>**
  Midazolam 2.5 mg IV / IO / IN
  5 mg IM
  Age ≥ 65: 1 mg IV / IO / IN
  2.5 mg IM
  Peds: 0.2 mg/kg IV / IO / IN
  Max 2.5 mg IV / IO / IN
  Max 5 mg IM
  Repeat every 5 minutes as needed

Snake Bite
Venomous

- Keep bite at level of heart ***if able***
- Remove any constricting clothing / bands
- **DO NOT apply ICE**
- Mark Margin of Swelling / Redness and Time

Mammal Bite

Transport
- YES
- NO → Contact and Document contact with Animal Control Officer

Monitor and Reassess

Notify Destination or Contact Medical Control

Toxin-Environmental Protocol Section

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**
- **Immunocompromised patients are at an increased risk for infection: diabetes, chemotherapy, transplant patients.**
- **Consider contacting the North Carolina Poison Control Center for guidance (1-800-222-1222).**
- **Do not put responders in danger attempting to capture and animal or insect for identification purposes.**
- **Evidence of infection: swelling, redness, drainage, fever, red streaks proximal to wound.**
- **Human bites:**
  Human bites have higher infection rates than animal bites due to normal mouth bacteria.
  Hand and foot bites have highest rates of infection.
- **Dog / Cat / Carnivore bites:**
  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).
- **Snake bites:**
  Poisonous snakes in this area are generally of the pit viper family: rattlesnake and copperhead.
  Coral snake bites are rare: Very little pain but very toxic. "Red on yellow - kill a fellow, red on black - venom lack."
  Amount of envenomation is variable, generally worse with larger snakes and early in spring.
  Snake bites are treated based on signs and symptoms and progression.
  It is not important to attempt to identify the type of snake and attempts may endanger providers.
  Do not bring a snake to the facility for identification as accidental bites to providers may occur.
- **Spider 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).
- **Animal bite(s) in subjects declining transport to a medical facility for evaluation:**
  NCGS 130A-196 requires that all animal bites be reported to the local health department even if the bite is by the owner's animal, and even if accidental.
  Reporting requirements can be satisfied by reporting to local animal control official.

Carbon Monoxide / Cyanide

History
- Smoke inhalation
- Ingestion of 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

	Immediately Remove from Exposure
	Appropriate Airway Protocol(s) ***as indicated***
	High Flow Oxygen
	Blood Glucose Analysis Procedure ASP 4
B	12 Lead ECG Procedure CSP 1
	IV/ IO Access Protocol UP 6
P	Cardiac Monitor / CO Monitor

Contact
Carolinas Poison Control
1-800-222-1222
As needed

High Suspicion of Carbon Monoxide

YES → **Measure COHb % (SpCO)** *If available*

NO

SpCO 0% to 5%

SpCO > 5%

Reassess SpCO as needed
Monitor for any signs/ symptoms of CO Exposure and/or Hypoxia

NO ← Signs or Symptoms of CO Exposure and/or Hypoxia

YES

Continue Monitoring - Exit to Appropriate Scene Rehabilitation Protocol

100% High Flow Oxygen Non-Rebreather or BVM
Consider Transport to Duke University Hospital ED for Hypobaric Chamber due to serious exposure and/or pregnant

If Cardiac/Respiratory/Neurological Symptoms are also present, Exit to appropriate protocol

High Suspicion of Cyanide

NO

Continue Care Continue High Flow Oxygen
Monitor and Reasses

Yes

P	High Flow O2 & Rapid Transport

Notify Destination or Contact Medical Control

Pearls
- **Recommended exam: Neuro, Skin, Heart, Lungs, Abdomen, Extremities**
- **Scene safety is priority. Ensure the fire department clears the structure for any additional patients.**
- Consider CO and Cyanide with any product of combustion
- Normal environmental CO level does not exclude CO poisoning.
- Symptoms present with lower CO levels in pregnancy, children and the elderly.
- Continue high flow oxygen regardless of pulse ox readings.

Drowning

History
- Submersion in water regardless of depth
- Possible history of trauma
  - Slammed into shore wave break
- Duration of submersion / immersion
- Temperature of water or possibility of hypothermia

Signs and Symptoms
- Unresponsive
- Mental status changes
- Decreased or absent vital signs
- Foaming / Vomiting
- Coughing, Wheezing, Rales, Rhonchi, Stridor
- Apnea

Differential
- Trauma
- Pre-existing medical problem
  - Hypoglycemia
  - Cardiac Dysrhythmia
- Pressure injury (SCUBA diving)
  - Barotrauma
  - Decompression sickness
- Post-immersion syndrome

Awake and Alert

- Supplemental Oxygen ***as tolerated***
- Spinal Motions Restriction Procedure WTP 2/Protocol TB 8 ***if indicated***
- Remove wet clothing Dry / Warm Patient
- Monitor and Reassess
- **Encourage transport and evaluation even if asymptomatic or with minimal symptoms** *Asymptomatic drowning patients (refusing transport) should be instructed to seek medical care/ call 911 if they develop any symptoms within 6 hours*
- IV / IO Access Protocol UP 6 ***if indicated***
- P Cardiac Monitor ***as indicated***

Awake but with AMS

- 5 Breaths via BVM ***as tolerated***
- Supplemental Oxygen ***as tolerated***
- Age Appropriate Airway Protocol(s) 1-7 ***as indicated***
- Spinal Motion Restriction Procedure WTP 2/ Protocol TB 8 ***if indicated***
- Altered Mental Status Protocol UP 4 ***as indicated***
- Remove wet clothing Dry / Warm Patient
- IV / IO Access Protocol UP 6
- P Cardiac Monitor

→ Age Appropriate Airway Protocol(s) AR 1 - 7 ***as indicated***

Unresponsive

- 5 Breaths via BVM ***as tolerated***

Pulse
- YES → Age Appropriate Airway Protocol(s) 1-7 ***as indicated***
- NO → Exit to Age Appropriate Cardiac Arrest Protocol(s) AC 3 / PC 4 Airway Protocol(s) AR 1 - 7 Spinal Motion Restriction Protocol TB 8 ***as indicated***

Dive Accident / Barotrauma
Divers Alert Network
1-919-684-9111

Hyperbaric Chamber located at Duke University Trauma Center

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

Pearls
- **Recommended Exam: Respiratory, Mental status, Trauma Survey, Skin, Neuro**
- **Drowning is the process of experiencing respiratory impairment (any respiratory symptom) from submersion / immersion in a liquid.**
- **Begin with BVM ventilations, if patient does not tolerate then apply appropriate mode of supplemental oxygen.**
- **Ensure scene safety. Drowning is a leading cause of death among would-be rescuers.**
- **When feasible, only appropriately trained and certified rescuers should remove patients from areas of danger.**
- **Regardless of water temperature – resuscitate all patients with known submersion time of ≤ 25 minutes.**
- **Regardless of water temperature – If submersion time ≥ 1 hour consider moving to recovery phase instead of rescue.**
- **Foam is usually present in airway and may be copious, DO NOT waste time attempting to suction. Ventilate with BVM through foam (suction water and vomit only when present.)**
- **Cardiac arrest in drowning is caused by hypoxia, airway and ventilation are equally important to high-quality CPR.**
- **Encourage transport of all symptomatic patients (cough, foam, dyspnea, abnormal lung sounds, hypoxia) due to potential worsening over the next 6 hours.**
- Predicting prognosis in prehospital setting is difficult and does not correlate with mental status. Unless obvious death, transport.
- Hypothermia is often associated with drowning and submersion injuries even with warm ambient conditions.
- Drowning patient typically has <1 – 3 mL/kg of water in lungs (does not require suction) Primary treatment is reversal of hypoxia.
- Spinal motion restriction is usually unnecessary. When indicated it should not interrupt ventilation, oxygenation and / or CPR.

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 (Thyroid Storm)
- Delirium tremens (DT's)
- Heat cramps, exhaustion, stroke
- CNS lesions or tumors

Temperature Measurement Procedure ***if available***

Temperature Measurement should NOT delay treatment of hyperthermia

- Remove from heat source to cool environment
- Cooling measures
- Remove tight clothing
- Blood Glucose Analysis Procedure ASP 4
- Age Appropriate Diabetic Protocol AM 2 / PM 2 ***as indicated***

Heat Stroke

Classic Heat Stroke
- Not common type
- Hot and Dry
- Altered Mental Status

Exertional Heat Stroke
- **Most common type**
- Wet with prior sweating
- Altered Mental Status

Assess Symptom Severity

HEAT CRAMPS
Normal to elevated body temperature
Warm, moist skin
Weakness, Muscle cramping

- PO Fluids as tolerated
- Monitor and Reassess

HEAT EXHAUSTION
Elevated body temperature
Cool, moist skin
Weakness, Anxious, Tachypnea

HEAT STROKE
Fever, usually > 104°F (40°C)
Hot, dry skin
Hypotension, AMS / Coma

- Age Appropriate Airway Protocol(s) AR 1 - 7 ***as indicated***
- Altered Mental Status Protocol UP 4 ***as indicated***
- Active cooling measures Target Temp < 102.5° F (39°C)
- B: 12 Lead ECG Procedure CSP 1
- IV / IO Access Protocol UP 6
- P: Cardiac Monitor
- A: **Normal Saline Bolus 500 mL IV / IO** Repeat to effect SBP > 90 **Maximum 2 L** **PED: Bolus 20 mL/kg IV / IO** Repeat to effect Age appropriate SBP ≥ 70 + (2 *x* Age) **Maximum 60 mL/kg**
- Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***as indicated***
- Monitor and Reassess

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

Hyperthermia

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Neuro**
- **Extremes of age are more prone to heat emergencies (i.e. young and old).**
- **Temperature measurement:**
  - **Obtain and document patient temperature if able.**
  - **Many thermometers and routes of measurement are available.**
  - **Order of preference for route of measurement: Rectal > oral > temporal > axillary.**
- Heat illness is predisposed by use of: tricyclic antidepressants, phenothiazines, anticholinergic medications, and alcohol.
- Cocaine, Amphetamines, and Salicylates may elevate body temperatures.
- Intense shivering may occur as patient is cooled.
- **Heat Cramps:**
  - Consists of benign muscle cramping secondary 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.
  - Sweating generally disappears as body temperature rises above 104°F (40°C).
  - The young and elderly are more prone to be dry with no sweating.
  - **Exertional Heat Stroke:**
  - **In exertional heat stroke (athletes, hard labor), the patient may have sweated profusely and be wet on exam.**
  - **Rapid cooling takes precedence over transport as early cooling decreases morbidity and mortality.**
  - **If available, immerse in an ice water bath for 5 – 10 minutes. Monitor rectal temperature and remove patient when temperature reaches 102.5°F (39°C). Your goal is to decrease rectal temperature below 104°F (40°C) with target of 102.5°F (39°C) within 30 minutes. Stirring the water aids in cooling.**
  - **Nearly 66% of all exertional heat strokes occur in high school athletes during the month of August.**
  - **In NC, it is mandatory that all high school field houses have a dunk tank and available ice and water.**
  - **Other methods include cold wet towels below and above the body or spraying cold water over body continuously.**
- **Neuroleptic Malignant Syndrome (NMS):**
  - Neuroleptic Malignant Syndrome is a hyperthermic emergency which is not related to heat exposure.
  - It occurs after taking neuroleptic antipsychotic medications.
  - This is a rare but often lethal syndrome characterized by muscular rigidity, AMS, tachycardia and hyperthermia.
  - **Drugs Associated with Neuroleptic Malignant Syndrome:**
  - Prochlorperazine (Compazine), promethazine (Phenergan), clozapine (Clozaril), and risperidone (Risperdal) metoclopramide (Reglan), amoxapine (Ascendin), and lithium.
  - **Management of NMS:**
  - Supportive care with attention to hypotension and volume depletion.
  - Use benzodiazepines such as diazepam or midazolam for seizures and / or muscular rigidity.

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, Barbiturates
- 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
- Hypothyroidism
- Hypoglycemia
- CNS dysfunction
  - Stroke
  - Head injury
  - Spinal cord injury

Temperature Measurement Procedure ***if available***

Temperature Measurement should NOT delay treatment of hypothermia

Remove wet clothing
Dry / Warm Patient

Passive warming measures

Blood Glucose Analysis Procedure ASP 4

Age Appropriate Diabetic Protocol AM 2 / PM 2 ***as indicated***

Hypothermia / Frost Bite

Systemic Hypothermia

Localized Cold Injury

Awake with / without AMS

Unresponsive

Pulse

YES

NO

Exit to Age Appropriate Cardiac Protocol(s) ***See Pearls***

General Wound Care

DO NOT Rub Skin to warm
DO NOT Massage
Skin to warm

DO NOT allow refreezing

Age Appropriate Airway Protocol(s) AR 1 - 7 ***as indicated***

Altered Mental Status Protocol UP 4 ***as indicated***

Active warming measures

B — 12 Lead ECG Procedure CSP 1

IV / IO Access Protocol UP 6

A — **Normal Saline Bolus**
500 mL IV / IO
Repeat to titrate SBP > 90 mmHg
Maximum 2 L
Pediatric: 20 mL / kg IV / IO
Repeat to titrate Age Appropriate SBP ≥ 70 + 2 x Age
Maximum 60 mL / kg

P — Cardiac Monitor

Age Appropriate Hypotension/ Shock Protocol AM 5 / PM 3
Multiple Trauma Protocol TB 6 ***as indicated***

Monitor and Reassess

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

Hypothermia / Frostbite

Pearls

- **Recommended Exam: Mental Status, Heart, Lungs, Abdomen, Extremities, Neuro**
- **NO PATIENT IS DECLARED DECEASED UNTIL WARMED TO NEAR NORMAL BODY TEMPERATURES (Body temperature ≥ 93.2° F, 32° C.)**
- **Temperature measurement:**
  - **Obtain and document patient temperature if able.**
  - **Many thermometers and routes of measurement are available.**
  - **Order of preference for route of measurement: Rectal > oral > temporal > axillary.**
  - **Many thermometers do not register temperature below 93.2° F**
- **Hypothermia categories:**
  - Mild 90 – 95° F (32 – 35° C)
  - Moderate 82 – 90° F (28 – 32° C)
  - Severe < 82° F (< 28° 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 and rough handling of the patient theoretically can cause ventricular fibrillation. This has not been demonstrated or confirmed by current evidence. Intubation and CPR techniques should not be with-held due to this concern.**
  - **Intubation can cause ventricular fibrillation, so it should be done gently by the most experienced provider(s).**
  - **Below 86°F (30° C) antiarrhythmics may not work and if given, should be given at increased time intervals. Contact medical control for direction. Epinephrine can be administered.**
  - **Below 86° F (30°C) pacing should not utilized.**
  - **Consider withholding CPR if patient has organized rhythm or has other signs of life. Contact Medical Control.**
  - **If the patient is below 86° F (30° C) then defibrillate 1 time if defibrillation is required. Deferring further attempts until more warming occurs is controversial. Contact medical control for direction.**
  - **Hypothermia may produce severe bradycardia so take at least 60 seconds to palpate a pulse.**
- **Active Warming:**
  - Remove from cold environment and to warm environment protected from wind and wet conditions.
  - Remove wet clothing and provide warm blankets / warming blankets.
  - 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.

Marine Envenomations / Injury

History
- Type of bite / sting
- Identification of organism
- Previous reaction to marine organism
- Immunocompromised
- Household pet

Signs and Symptoms
- Intense localized pain
- Increased oral secretions
- Nausea / vomiting
- Abdominal cramping
- Allergic reaction / anaphylaxis

Differential
- Jellyfish sting
- Sea Urchin sting
- Sting ray barb
- Coral sting
- Swimmers itch
- Cone Shell sting
- Fish bite
- Lion Fish sting

Call for help/ additional resources
Stage until scene safe

If Needed
Carolinas Poison Control
1-800-222-1222

- Wound Care Procedure WTP 4
- IV / IO Access Protocol UP 6 ***if indicated***
- P — Cardiac Monitor ***if indicated***
- Drowning Protocol TE 3 ***if indicated***
- Age Appropriate Allergy / Anaphylaxis Protocol AM 1 / PM 1 ***if indicated***
- Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***
- Pain Control Protocol UP 11 ***if indicated***

Identification of Sea Creature

Jelly Fish Anemone Man-O-War
- Immobilize injury
- Lift away tentacles Do Not brush or rub
- Apply Vinegar Rinse ***If available*** Otherwise wash with clean seawater DO NOT use fresh water or ice

Sting Ray Lion Fish Urchin / Starfish
- Immobilize injury
- Remove Barb or Spine If large Barb in thorax or abdomen stabilize object
- Immerse in Hot Water 110 – 114°F (43 - 46°C) ***if available***

Large Organism
- Immobilize injury
- Multiple Trauma Protocol TB 6 ***if indicated***
- Extremity Trauma Protocol TB 4 ***if indicated***

Monitor and Reassess

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

Marine Envenomations / Injury

Pearls

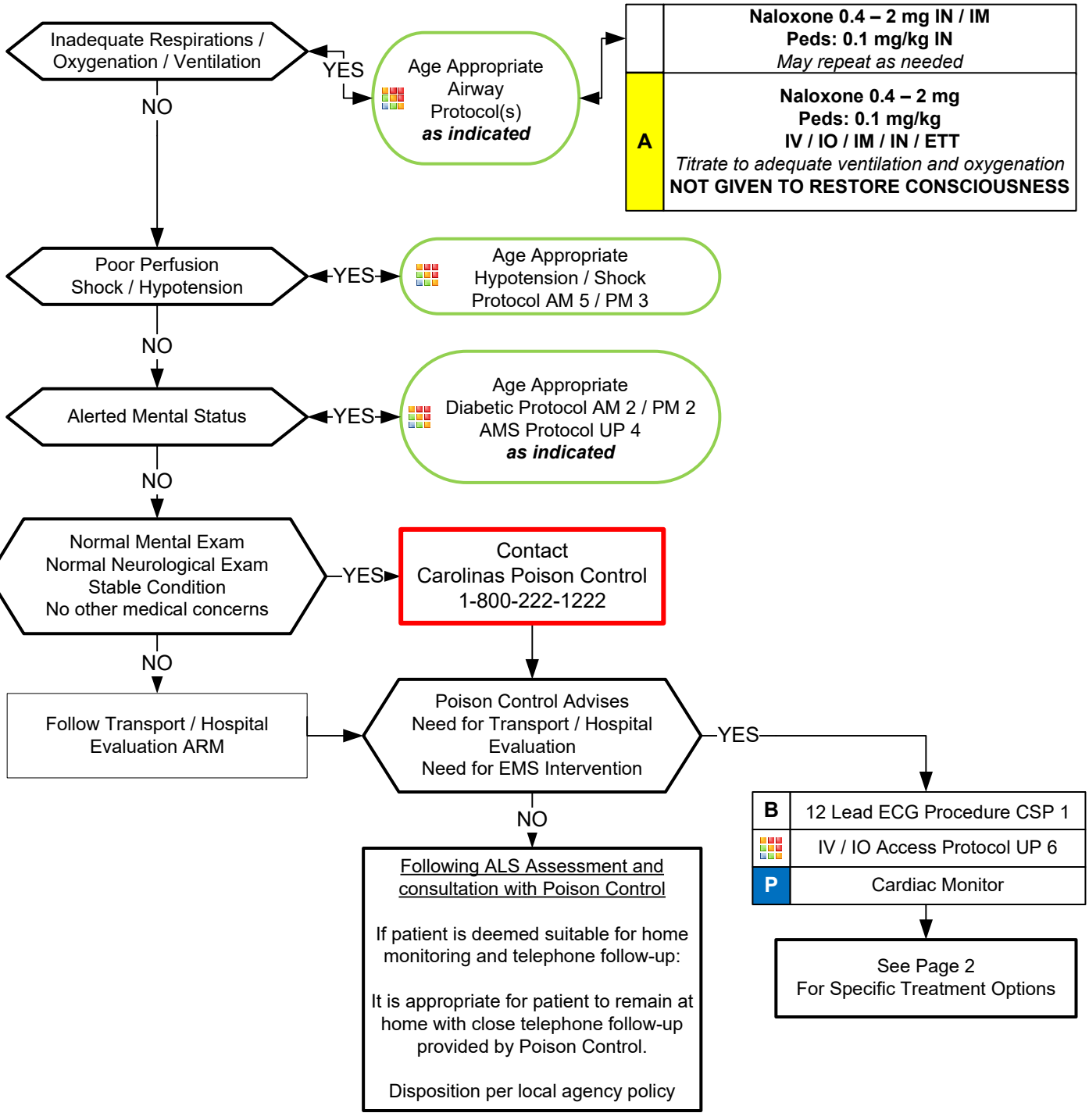
- **Ensure your safety: Avoid the organism or fragments of the organism as they may impart further sting / injury.**
- **Priority is removal of the patient from the water to prevent drowning.**
- **Coral:**
  - Coral is covered by various living organisms which are easily dislodged from the structure.
  - Victim may swim into coral causing small cuts and abrasions and the coral may enter to cuts causing little if any symptoms initially.
  - The next 24 – 48 hours may reveal an inflammatory reaction with swelling, redness, itching, tenderness and ulceration.
  - Treatment is flushing with large amounts of fresh water or soapy water then repeating
- **Jelly Fish / Anemone / Man-O-War:**
  - Wash the area with fresh seawater to remove tentacles and nematocysts.
  - Do not apply fresh water or ice as this will cause nematocysts firing as well.
  - Recent evidence does not demonstrate a clear choice of any solution that neutralizes nematocysts.
  - Vinegar (immersion for 30 seconds), 50:50 mixture of Baking Soda and Seawater, and even meat tenderizer may have similar effects.
  - Immersion in warm water for 20 minutes, 110 – 114°F (43 - 46°C), has recently been shown to be effective in pain control.
  - Shaving cream may be useful in removing the tentacles and nematocysts with a sharp edge (card).
  - Stimulation of the nematocysts by pressure or rubbing cause the nematocyst to fire even if detached from the jellyfish.
  - Lift away tentacles as scrapping or rubbing will cause nematocysts firing.
  - Typically symptoms are immediate stinging sensation on contact, intensity increases over 10 minutes.
  - Redness and itching usually occur.
  - Papules, vesicles and pustules may be noted and ulcers may form on the skin.
  - Increased oral secretions and gastrointestinal cramping, nausea, pain or vomiting may occur.
  - Muscle spasm, respiratory and cardiovascular collapse may follow.
- **Lionfish:**
  - In North Carolina this would typically occur in the home as they are often kept as pets in saltwater aquariums.
  - Remove any obvious protruding spines and irrigate area with copious amounts of saline.
  - The venom is heat labile so immersion in hot water, 110 – 114 degrees for 30 to 90 minutes is the treatment of choice but do not delay transport if indicated.
- **Stingrays:**
  - Typical injury is swimmer stepping on ray and muscular tail drives 1 – 4 barbs into victim.
  - Poison is released when barb is broken.
  - Typical symptoms are immediate pain which increases over 1 – 2 hours. Bleeding may be profuse due to deep puncture wound.
  - Nausea, vomiting, diarrhea, muscle cramping and increased urination and salivation may occur.
  - Seizures, hypotension and respiratory or cardiovascular collapse may occur.
  - Irrigate wound with saline. Extract the spine or barb unless in the abdomen or thorax, contact medical control for advise.
  - Immersion in hot water if available for 30 to 90 minutes but do not delay transport.
- Patients can suffer cardiovascular collapse from both the venom and / or anaphylaxis even in seemingly minor envenomation's.
- Sea creature stings and bites impart moderate to severe pain.
- Stop the envenomation by inactivation of the venom as appropriate.
- Ensure good wound care, immobilization and pain control.

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.
- 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)



Toxin-Environmental Protocol Section

Overdose / Toxic Ingestion

Acetaminophen
Tylenol®
APAP Containing Product

YES

NO

Aspirin
Salicylate Containing Product

YES

NO

Beta Blocker or
Calcium Channel Blocker

YES

A	**Glucagon 2 - 4 mg IV / IO / IM** **Peds: 0.1 mg/kg IV / IO / IM** May repeat in 15 minutes as needed
P	**Calcium Chloride 1 g IV / IO** **Or** **(Calcium Gluconate 2 g IV / IO)** **Pediatric: 20 mg / kg IV / IO** Over 2- 3 minutes
P	Consider Cardiac External Pacing Procedure for Severe Cases
	Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***

NO

Cyanide /
Carbon Monoxide

YES → Exit to
Carbon Monoxide / Cyanide
Protocol TE 2

NO

Organophosphate
WMD / Nerve Agent Exposure

YES → Exit to
WMD / Nerve Agent
Protocol TE 8

NO

Tricyclic
Antidepressant

YES → P

<u>QRS ≥ 0.12 sec or Peds: 0.09 sec</u>
Sodium Bicarbonate
50 mEq IV / IO
Peds: 1 mEq/kg IV / IO
Repeat in 10 minutes as needed

Symptomatic Care
as needed

Monitor and Reassess

Notify Destination or
Contact Medical Control

Toxin-Environmental Protocol Section

Overdose / Toxic Ingestion

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Opioids and opiates may require higher doses of Naloxone to improve respiration, in certain circumstances up to 10 mg.**
- **Time of Ingestion:**
  1. Most important aspect is the **TIME OF INGESTION** and the substance and amount ingested and any co-ingestants.
  2. Every effort should be made to elicit this information before leaving the scene.

- **Charcoal Administration:**
  The American Academy of Clinical Toxicology DOES NOT recommend the routine use of charcoal in poisonings.
  1. **Consider Charcoal within the FIRST HOUR after ingestion. If a potentially life threatening substance is ingested or extended release agent(s) are involved and ≥ one hour from ingestion, Contact Medical Control or NC Poison Control Center for direction.**
  2. **If NG would be necessary to administer Charcoal, then DO NOT administer unless known to be adsorbed, airway secured by intubation, and ingestion is less than ONE HOUR confirmed and potentially lethal.**
  3. **Charcoal in general, should only be given to a patient who is alert and awake such that they can self-administer the medication.**
- **Do not rely on patient history of ingestion, especially in suicide attempts. Make sure patient is still not carrying hiding other medications or has any weapons.**
- **Pediatric:**
  Age specific blood pressure 0 – 28 days > 60 mmHg, 1 month - 1 year > 70 mmHg, 1 - 10 years > 70 + (2 x age)mmHg and > 10 years > 90 mmHg.
  Pediatric IV Fluid maintenance rate:
  4 mL for the first 10 kg of weight +
  2 mL for the second 10 kg of weight +
  1 mL for every additional kg in weight after 20 kg
- **Bring bottles, contents, emesis to ED.**
- **S.L.U.D.G.E: Salivation, Lacrimation, Urination, Defecation, GI distress, Emesis.**
- **D.U.M.B.B.E.L.S: Diarrhea, Urination, Miosis, Bradycardia, Bronchorrhea, Emesis, Lacrimation, Salivation.**
- **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.
- **Nerve Agent Antidote kits** contain 2 mg of Atropine and 600 mg of pralidoxime in an autoinjector for self administration or patient care. These kits may be available as part of the domestic preparedness for Weapons of Mass Destruction.
- **EMR and EMT may administer naloxone by IN / IM route only and may administer from EMS supply. Agency medical director may require Contact of Medical Control prior to administration and may restrict locally.**
- **When appropriate contact the North Carolina Poison Control Center for guidance, reference Policy 18.**
- Consider restraints if necessary for patient's and/or personnel's protection per the Restraint Procedure.

WMD-Nerve Agent Protocol

History
- Exposure to chemical, biologic, radiologic, or nuclear hazard
- Potential exposure to unknown substance/hazard

Signs and Symptoms
- **S**alivation
- **L**acrimation
- **U**rination; increased, loss of control
- **D**efecation / Diarrhea
- **G**I 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.)

Call for help/ additional resources
Stage until scene safe

Obtain history of exposure
Observe for specific toxidromes
Initiate triage and/or decontamination as indicated.

Contact
Carolinas Poison Control
1-800-222-1222
Or
Agency Specific Number

Symptom Severity

Asymptomatic

Monitor and Reassess
Every 15 minutes for symptoms
Initiate Treatment per Appropriate Arm

Minor Symptoms:
Respiratory Distress + SLUDGEM

IV or IO Access Protocol UP 6

Nerve Agent Kit IM
2 Doses Rapidly
if available

Major Symptoms:
Altered Mental Status, Seizures, Respiratory Distress, Respiratory Arrest

IV or IO Access Protocol UP 6

Nerve Agent Kit IM
3 Doses Rapidly
if available

P

Atropine 2 mg IV / IO / IM
Pediatric: See Pearls
IV / IO / IM
Repeat every 3 to 5 minutes until symptoms resolve

Pralidoxime (2PAM)
600 mg IV / IO / IM
Pediatric: 15 – 25 mg / kg
IV / IO / IM
Over 30 minutes

Seizure Protocol UP 13

CDC/ ASPR
CHEMPACK Program
NC -57 EMS containers
-43 locations

Almost all citizens within 50 miles of CHEMPACK
See Page 2 and Pearls

Multiple Patients — YES

Consider
Activation and deployment of CHEMPACK
CHEMPACK ACTIVATION:
(insert local number)

Healthcare Coalition Activation
(insert local number)

NO

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

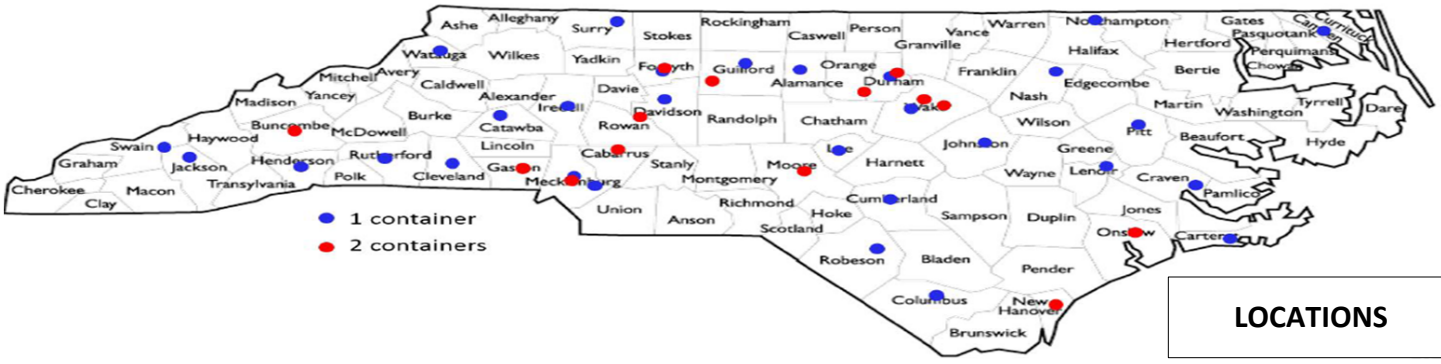
WMD-Nerve Agent Protocol

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Gastrointestinal, Neuro**
- **Follow local HAZMAT protocols for decontamination and use of personal protective equipment.**
- **Adult/ Pediatric Atropine Dosing Guides:**
  - **Confirmed attack: Begin with 1 Nerve Agent Kit for patients less than 7 years of age, 2 Nerve Agent Kits from 8 to 14 years of age, and 3 Nerve Agent Kits for patients 15 years of age and over.**
  - **If Triage/ MCI issues exhaust supply of Nerve Agent Kits, use pediatric atropines (if available).**
  - **Usual pediatric doses: 0.5 mg ≤ 40 pounds (18 kg), 1 mg dose if patient weighs between 40 to 90 pounds (18 to 40 kg), and 2 mg dose ≥ 90 pounds (≥ 40 kg).**
- **Each Nerve Agent Kit contains 600 mg of Pralidoxime (2-PAM) and 2 mg of Atropine.**
- **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 do not have exposure to other agent(s) (e.g., narcotics, vesicants, etc.)
- The main symptom that the atropine addresses is excessive secretions, so atropine should be given until secretions improve/ dry.
- EMS personnel, public safety officers and EMR/ EMT may carry, self-administer, or administer atropine/ pralidoxime to others by protocol. Agency medical director may require Contact of Medical Control prior to administration.
- **CHEMPACK Program:**
  - For multiple patients, call for **CHEMPACK** deployment per local emergency management and healthcare coalition plans.
  - **1 EMS CHEMPACK supports 454 patients.**
  - Medication in CHEMPACK may be used regardless of expiration date.

EMS Type CHEMPACK Container
454 Person Treatment Capacity

Product	Cases	Units per case	Total Units
Mark 1 Auto-injector	5	240	1,200
-OR			
ATNAA Auto-injector	6	200	1,200
-OR-			
Atropen 2mg Auto-injector	9	136	1,224
Pralidoxime 300mg Auto-injector	5	240	1,200
-AND-			
Diazepam 10mg Auto-injector	2	300	600
Seizalam (Midazolam) 5mg/ml vial 10ml	1	100	100
Atropen 0.5mg Auto-injector	1	225	225
Atropen 1mg Auto-injector	1	225	225
Atropine Sulfate 0.4mg/ml vial 20ml	1	100	100
Pralidoxime 1gm inj. 20ml	1	276	276
Sterile Water 20ml vials	1	150	150



LOCATIONS

Environmental: Overdose
Narcan for Law Enforcement

History
- Previous Drug History
- Paraphernalia
- Known Access to Narcotics

Signs and Symptoms

Must have one or more of the following:
- Altered Mental Status
- Unconscious
- Depressed Breathing
- Pin Point Pupils
- Blue/Cyanotic Lips
- Pale Skin Color
- Evidence of Previous IV Drug Use/ Track Marks

Possible Mimics
- Trauma/Assault
- Mixed Overdose
- Alcohol Intoxication
- Obvious Death
- Hypoglycemia
- Benzodiazepine Overdose
- Other Substance Use / Abuse / Ingestion

Activate EMS

Signs of Severe Distress include:
Turning Color / Blue or Pale Skin
Cool Skin Temperature
Not Breathing
Not Moving, Completely Flaccid

Is Subject Awake or Able to be Awakened?

YES → STOP **Do Not Administer Naloxone (Narcan)**

NO → Is the subject showing any signs of life?

YES → History or Signs and Symptons of Overdose?

NO → 1. Begin CPR
2. Call for Additional Resources
3. Connect the AED (if available)

History or Signs and Symptons of Overdose?

NO → STOP **Do Not Administer Naloxone (Narcan)**

YES → Administer 1 – 4 mg Intranasal Naloxone or IM Auto-Injector Naloxone (Narcan)

Is the subject showing any signs of life?

NO → Continue CPR
Administer Additional 1 - 4 mg Intranasal Naloxone or IM Auto-Injector Naloxone (Narcan). **Max Dose of 4 mg total**

YES → Place subject in the recovery position and monitor

Special Adult Medical Section Protocols

Environmental: Overdose
Narcan for Law Enforcement

Procedure for Intranasal Naloxone Administration:

1. Activate EMS.
2. Begin CPR if the patient has no signs of life.
3. Confirm the correct medication and dosage. Naloxone (Narcan) is typically packaged in 2mg / 2 ml prefilled syringe, 4mg / 0.1ml prefilled applicator, or 0.4mg auto-injector (Evzio).
4. For the device in FIGURES 1 A&B:
   - 4a. Attach the MAD (Mucosal Atomizer Device) nasal atomizer to the syringe. (FIGURE 1B)
   - 4b. Insert the atomizer in the nostril until you have a snug fit. Make sure the syringe is pointing straight towards the back of the patients head (NOT pointing up towards the top of the head or top of the nose) AND compress the other nostril closed.
   - 4c. Rapidly compress the syringe to administer ½ of the medication (1mL). If not administered rapidly, the medication does not aerosolize and is much less effective. Remove device from nose.
5. For the device in FIGURE 2:
   - 5a. Insert the tip of the device into one nostril, ensuring that it is pointing towards the back of the patient's head (NOT pointing up towards the top of the head or the top of the nose). Compress the other nostril closed.
   - 5b. Rapidly compress the device, then remove from nose.
6. After administration, squeeze the nostrils together gently (do NOT compress) and massage in the medication for 5-10 seconds.
7. For the device in FIGURE 1 A&B, may repeat the same dose in 2 minutes if no improvement (max is 2 doses). There is no repeat dose the device in FIGURE 2.
8. Volumes greater than 1ml are too large to be absorbed and will lead to failure.
9. If no signs of life return despite Narcan, CPR, and/or AED use, continue CPR until relieved by Fire Department and/or EMS.
10. If the patient begins to breath and show signs of life, roll the subject into the recovery position (FIGURE 3). Be aware that the patient may vomit.

FIGURE 1a: Naloxone (Narcan) as it appears from the package

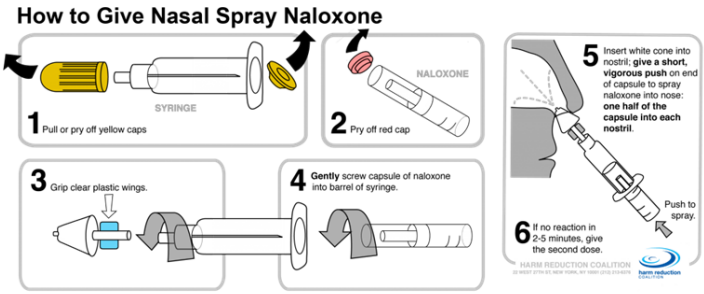


FIGURE 1b: Naloxone (Narcan) Assembly

FIGURE 2: 4mg Narcan Atomizer

FIGURE 3: Recovery Position

Pearls:

- Subjects treated with Naloxone must be transported for medical evaluation.
- Subjects may become combative after Naloxone (Narcan) administration.
- Subjects may vomit after Naloxone (Narcan) administration, be quick to roll them into the recovery position.
- Make sure subject is not carrying any other medication, illegal substance, or any weapon.
- The nostril can absorb 1 ml of fluid at a time.
- Factors that may negatively affect mucosal absorption of medication may include recent use of vasoconstrictors, i.e. cocaine or Afrin, nosebleeds, nasal congestion and/or discharge.
- Initial Training on Naloxone indication and intranasal administration must be conducted prior to naloxone administration.
- All naloxone administrators should attend annual refresher training for the administration of naloxone.

Universal Patient Care

Scene Safe

YES

- Bring all necessary equipment to patient
- Demonstrate professionalism and courtesy
- Consider WMD in mass assemblies

Utilize appropriate PPE

Consider Airborne, Contact, or Droplet Isolation ***if indicated***

Initial assessment
BLS maneuvers
Initiate oxygen ***if indicated***

Adult Assessment Procedure ASP 1

Pediatric Assessment Procedure ASP 3

Conduct Screening for Weapons

NO

Call for help / additional resources
Stage until scene safe

Required VS:
Blood pressure
Palpated pulse rate
Respiratory rate
Pulse ox if available

If Indicated:
Glucose
12 Lead ECG
Temperature
Pain scale
CO Monitoring
EtCO2 Monitoring

Medical or Trauma

Trauma Patient

Evaluate MOI

Significant MOI

Primary and Secondary trauma assessment

No Significant MOI

Primary and Secondary trauma assessment

Focused assessment on specific injury

Medical Patient

Mental Status Exam

Unresponsive

Primary and secondary assessment

Obtain history of present illness from available sources / scene survey

Responsive

Obtain Chief Complaint

Primary and Secondary assessment
Focused assessment on specific complaint

Spinal Motion Restriction
Procedure WTP 2 / Protocol TB 8
as indicated

Obtain VS

Obtain SAMPLE

Repeat assessment while preparing for transport

Exit to
Age Appropriate Protocol(s)
as indicated

Continue on-going assessment
Repeat initial VS
Evaluate interventions / procedures

Transfer
Patient hand-off includes patient information, personal property and summary of care and response to care

Patient does not fit specific protocol

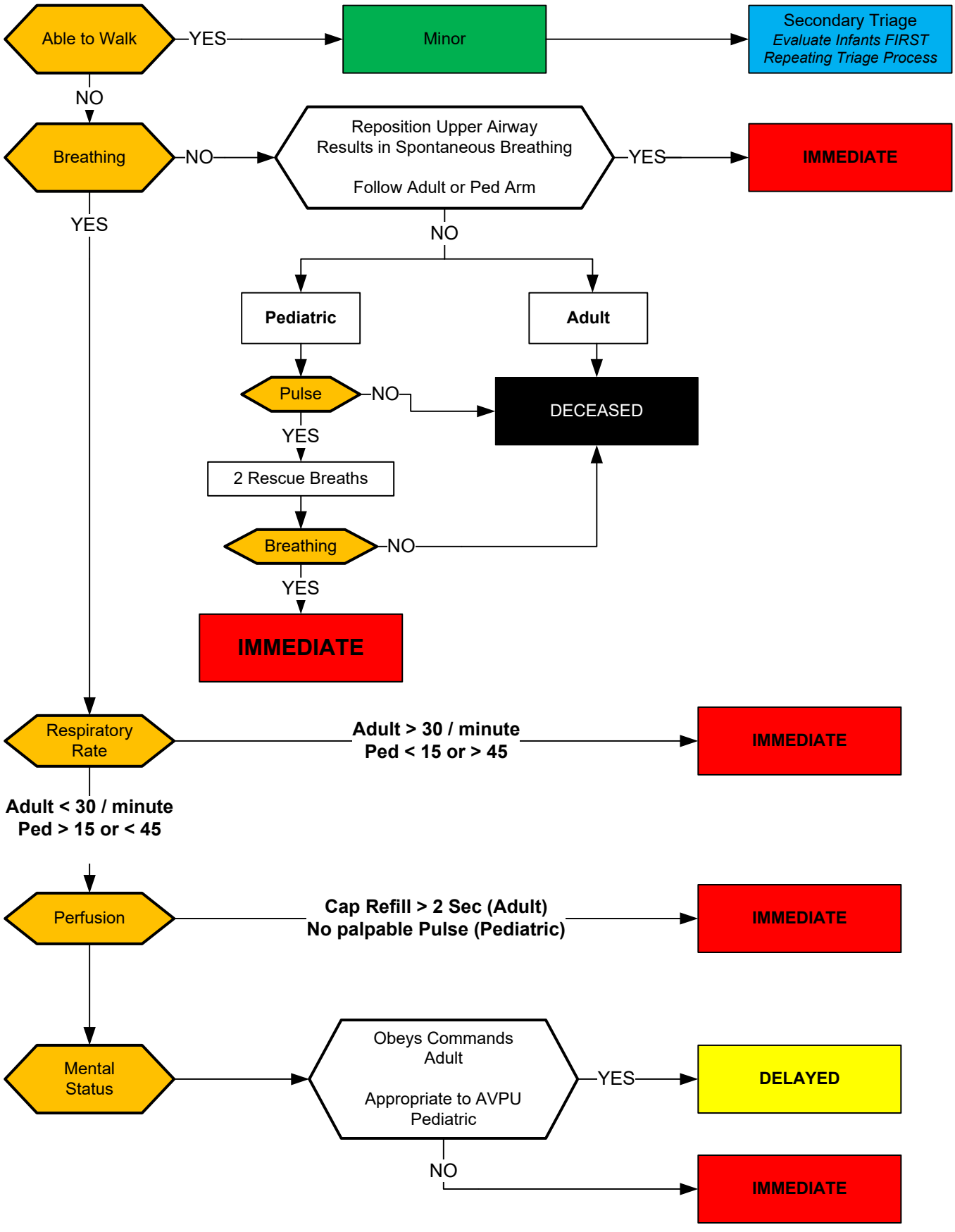
Notify Destination or Contact Medical Control

Universal Protocol Section

Pearls

- **Recommended Exam: Minimal exam if not noted on the specific protocol is vital signs, mental status with GCS, and location of injury or complaint.**
- **Any patient contact, which does not result in an EMS transport, must have a completed Patient Care Report.**
- **Vital signs should be obtained before, 10 minutes after, and at patient hand off with all pain medications.**
- **Two complete vital sign acquisitions should occur at a minimum with any patient encounter.**
- **Patient Refusal (Declining Treatment and/or Transport):**
  - Patient refusal is a high risk situation. Encourage 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:**
  - **C**:***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.
  - **R**: ***Relevant information is understood:*** Patient should be able to voice a factual understanding of the illness/ injury, the options, and the risks and benefits of recommended treatment or transport.
  - **A**: ***Appreciation of the situation:*** Ability to communicate an understanding of the facts of the situation. The patient should be able to recognize the significance of the outcome potentially from their decision.
  - **M**: ***Manipulation of information in a rational manner:*** Demonstrate a rational process to come to a decision. Should be able to describe the logic they are using to come to the decision, though you may not agree with decision.
- **Pediatric Patient General Considerations:**
  - **A pediatric patient is defined by fitting with a Pediatric Medication/ Skill Resuscitation System, Age ≤ 15, weight ≤ 49 kg.**
  - Special needs children may require continued use of Pediatric based protocols regardless of age and weight.
  - Initial assessment should utilize the **Pediatric Assessment Triangle** which encompasses Appearance, Work of Breathing and Circulation to skin.
  - The order of assessment may require alteration dependent 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.
- Timing of transport should be based on patient's clinical condition and the transport policy.
- Consider consultation with Medical Control for patient(s) refusing treatment/ transport.
- 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 to illness / injury

Triage



Universal Protocol Section

Harnett County EMS System MCI Levels

MCI Level 1: An MCI Incident resulting in 5 to 10 surviving patients.
MCI Level 2: An MCI Incident resulting in 11 to 20 surviving patients.
MCI Level 3: An MCI Incident resulting in 21 to 50 surviving patients.
MCI Level 4: Mass casualty incident resulting in more than 50 surviving patients.

Pearls

- **When approaching a multiple casualty incident where resources are limited:**
  - Triage decisions must be made rapidly with less time to gather information
  - Emphasis shifts from ensuring the best possible outcome for an individual patient to ensuring the best possible outcome for the greatest number of patients.
- **Scene Size Up:**
  1. **Conduct a scene size up. Assure well being of responders. Determine or ensure scene safety before entering. If there are several patients with the same complaints consider HazMat, WMC or CO poisoning.**
  2. **Take Triage system kit.**
  3. **Determine number of patients. Communicate the number of patients and nature of the incident and establish incident command.**
  4. **Direct incoming resources. Identify ingress and egress path. Establish a staging area. Assign a medical officer, triage officer, transportation officer, and staging officer as personal become available.**
- **Triage is a continual process and should recur in each section as resources allow.**
- **Step 1: Global sorting:**
  - **Call out to those involved in the incident to walk to a designated area and assess third.**
  - **For those who cannot walk, have them wave / indicate a purposeful movement and assess them second.**
  - **Those involved who are not moving or have an obvious life threat, assess first.**
- **Step 2: Individual assessments:**
  - **Control major hemorrhage**
  - **Open airway and if child, give 2 rescue breaths**
  - **Perform Needle Chest Decompression Procedure if indicated.**
  - **Administer injector antidotes if indicated**
- **Assess the first patient you encounter using the three objective criteria which can be remembered by RPM.**
  - **R: Respiratory** *(Respiratory rates are difficult to measure quickly, use work of breathing and respiratory distress)*
  - **P: Perfusion** *(Capillary refill can be altered by many factors including skin temperature – use age appropriate heart rates)*
  - **M: Mental Status** *(Motor component of GCS score is important indicator – ability to follow commands)*
- If your patient falls into the RED TAG category, stop, place RED TAG and move on to next patient. Attempt only to correct airway problems, treat uncontrolled bleeding, or administer an antidote before moving to next patient.
- **Treatment:**
  - Once casualties are triaged, a focus on treatment can begin. You may need to move patients to treatment areas.
  - RED TAGs are moved/ treated first, followed by YELLOW TAGs. BLACK TAGs should remain in place.
  - You may also indicate deceased patients by pulling their shirt/ clothing over their head.
  - As more help arrives, then the triage/ treatment process may proceed simultaneously
- **Lightning strike (Reverse Triage):**
  - Lightning strike victims are amenable to airway, breathing, cardiac compressions as well as early defibrillation.
  - Use concept of reverse triage with multiple casualties. Resuscitate lightning strikes as the priority.
  - Lightning strike victims found alive do not often deteriorate quickly.
- **SMART triage tag system is utilized in NC.**

Abdominal Pain
Vomiting and Diarrhea

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
- Pain
- Character of pain (constant, intermittent, sharp, dull, etc.)
- Distention
- Constipation
- Diarrhea
- Anorexia
- Radiation

Associated symptoms:
- Fever, headache, blurred vision, weakness, malaise, myalgias, cough, headache, dysuria, mental status changes, rash

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

	Consider Blood Glucose Analysis Procedure ASP 4
B	12 Lead ECG Procedure CSP 1
	IV / IO Access Protocol UP 6
P	Cardiac Montior
	Age Appropriate Diabetic Protocol AM 2/ PM 2 ***if indicated***
	Pain Control Protocol UP 11 ***if indicated***
	Age Appropriate Cardiac Protocol(s) ***if indicated***

Age Specific Blood Pressure indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

All ages Shock Index: HR > SBP

Serious Signs/ Symptoms Hypotension, poor perfusion, shock

YES

	IV or IO Access Protocol UP 6 Consider 2 Large Bore sites
A	**Normal Saline 500 mL Bolus** Repeat as needed Titrate SPB ≥ 90 mmHg **Maximum 2 L** **Peds: 20 mL/kg IV / IO** Repeat as needed Titrate to Age Appropriate SBP ≥ 70 + (2 x Age) **Maximum 60 mL/kg**
P	**Ondansetron 4 mg** **IV / IO / ODT / PO / IM** **Peds: 0.2 mg/kg** **Peds Maximum 4 mg** May repeat in 15 minutes
	Age Appropriate Hypotension/ Shock Protocol AM 5/ PM 3 ***if indicated***

NO

A	**Normal Saline IV TKO** **Or Saline Lock**
P	**Ondansetron 4 mg** **IV / IO / ODT / PO / IM** **Peds: 0.2 mg/kg** **Peds Maximum 4 mg** May repeat in 15 minutes or **Promethazine** **12.5 mg IV / IO / IM / PO** May repeat x 1 as needed May use both if no response

Monitor and Reassess

Notify Destination or Contact Medical Control

Universal Protocol Section

Abdominal Pain
Vomiting and Diarrhea

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Abdominal/ back 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, with or without back and/ or lower extremity pain or diminished pulses, especially in patients over 50 and/ or patients with shock/ poor perfusion. Notify receiving facility early with suspected abdominal aneurysm.**
- **Consider cardiac etiology in patients > 35, diabetics and/ or women, especially with upper abdominal complaints.**
- **Heart Rate: Tachycardia is one of the first clinical signs of dehydration and volume depletion and typically increases as dehydration becomes more severe.**
- **Nausea without vomiting should be treated like vomiting. Patient will benefit from symptom control with antiemetic even if not actively vomiting.**
- **<u>Promethazine (Phenergan):</u>**
  May cause sedative effects in pediatric patients and in ages ≥ 65, and the debilitated, etc.)
  When giving promethazine IV, dilute with 10 mL of normal saline and administer slowly as it can also harm the veins.
- Isolated vomiting in children is common but can be a sign of more serious pathology. Pyloric stenosis, bowel obstruction, and CNS processes (bleeding, tumors, or increased CSF pressures) all often present with vomiting.
- Vomiting and diarrhea are common symptoms, but can be the symptoms of uncommon and serious pathology such as stroke, CO poisoning, acute MI, new onset diabetes, diabetic ketoacidosis (DKA), and organophosphate poisoning. Maintain a high index of suspicion for serious pathology.

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

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
	Blood Glucose Analysis Procedure ASP 4
B	12 Lead ECG Procedure CSP 1
	IV / IO Access Protocol UP 6
	Age Appropriate Diabetic Protocol(s) AM 2 / PM 2 ***if indicated***

Signs of shock / Poor perfusion Traumatic Injury
- YES → Exit to Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3, Multiple Trauma Protocol TB 6, Head Injury Protocol TB 5
- NO ↓

Signs of OD / Toxicology
- YES → Exit to Overdose / Toxic Exposure Protocol TE 7
- NO ↓

Signs of CVA Or Seizure
- YES → Exit to Suspected Stroke Protocol UP 14, Seizure Protocol UP 13
- NO ↓

Signs of Hypo / Hyperthermia
- YES → Exit to Hypothermia Protocol TE 5, Hyperthermia Protocol TE 4
- NO ↓

Arrhythmia / STEMI / CP
- YES → Exit to Age Appopriate Appropriate Cardiac Protocol(s)
- NO ↓

Fever / Sepsis
- YES → Exit to Fever Protocol UP 10, Suspected Sepsis Protocol UP 15
- NO ↓

Notify Destination or Contact Medical Control

Universal Protocol Section

Altered Mental Status

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro.**
- **AMS may present as a sign of an environmental toxin or Haz-Mat exposure - protect personal safety.**
- **General:**
  - **The patient with AMS poses one of the most significant challenges.**
  - **A careful assessment of the patient, the scene, and the circumstances should be undertaken.**
  - **Assume the patient has a life threatening cause of their AMS until proven otherwise.**
  - **Pay careful attention to the head exam for signs of bruising or other injury.**
  - **Information found at the scene must be communicated to the receiving facility.**
  - **Patients not able to communicate with you coherently require a complete secondary survey (head-to-toe) exam to assess for trauma, infection, or signs of maltreatment/ abuse, or neglect.**
  - **Acute Stroke should be considered in all patients with acute AMS when < 24 hours from onset.**
- **Substance misuse:**
  - Patients ingesting substances can pose a great challenge.
  - DO NOT assume recreational drug use and / or alcohol are the sole reasons for AMS.
  - Misuse of alcohol/ recreational drugs may lead to hypoglycemia or occult trauma.
  - More serious underlying medical and trauma conditions may be the cause.
- **Behavioral health:**
  - The behavioral health patient may present a great challenge in forming a differential.
  - DO NOT assume AMS is the result solely of an underlying psychiatric etiology.
  - Often an underlying medial or trauma condition precipitates a deterioration of a patients underlying disease.
- **Spinal Motion Restriction / Trauma:**
  - Only utilize spinal immobilization if the situation warrants.
  - The patient with AMS may worsen with increased agitation when immobilized.
- **It is safer to assume hypoglycemia than hyperglycemia if doubt exists. Recheck blood glucose after Dextrose or Glucagon**
- Consider Restraints if necessary for patient's and/ or personnel's protection per USP 5 Restraints: Physical procedure..

Back Pain

History
- Age
- Past medical history
- Past surgical history
- Medications
- Onset of pain / injury
- Previous back injury
- Traumatic mechanism
- Location of pain
- Fever
- Improvement or worsening with activity

Signs and Symptoms
- Pain (paraspinous, spinous process)
- Swelling
- Pain with range of motion
- Extremity weakness
- Extremity numbness
- Shooting pain into an extremity
- Bowel / bladder dysfunction

Differential
- Muscle spasm / strain
- Herniated disc with nerve compression
- Sciatica
- Spine fracture
- Kidney stone
- Pyelonephritis
- Aneurysm
- Pneumonia
- Spinal Epidural Abscess
- Metastatic Cancer
- AAA

B	Consider Cardiac Etiology 12 Lead ECG Procedure CSP 1 ***if indicated***
P	Cardiac Monitor ***if indicated***
	Age Appropriate Cardiac Protocol(s) ***if indicated***

Injury or Traumatic Mechanism

YES → Spinal Motion Restriction
Procedure WTP 2 / Protocol TB 8
If indicated

NO

Shock
Hemodynamic Instability

YES

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
A	**Normal Saline** **Bolus 500 mL IV** Titrate to SBP ≥ 90 mmHg **2 L Maximum** **Peds: 20 mL/kg IV / IO** Titrate age appropriate SBP ≥ 70 + (2 x Age) **Maximum 60 mL/kg**
	Age Appropriate Hypotension / Shock Protocol(s) AM 5 / PM 3 ***if indicated***
	Multiple Trauma Protocol TB 6 ***if indicated***

NO

	Pain Control Protocol UP 11 ***if indicated***
	Monitor and Reassess

Notify Destination or Contact Medical Control

Universal Protocol Section

Back Pain

Universal Protocol Section

Pearls

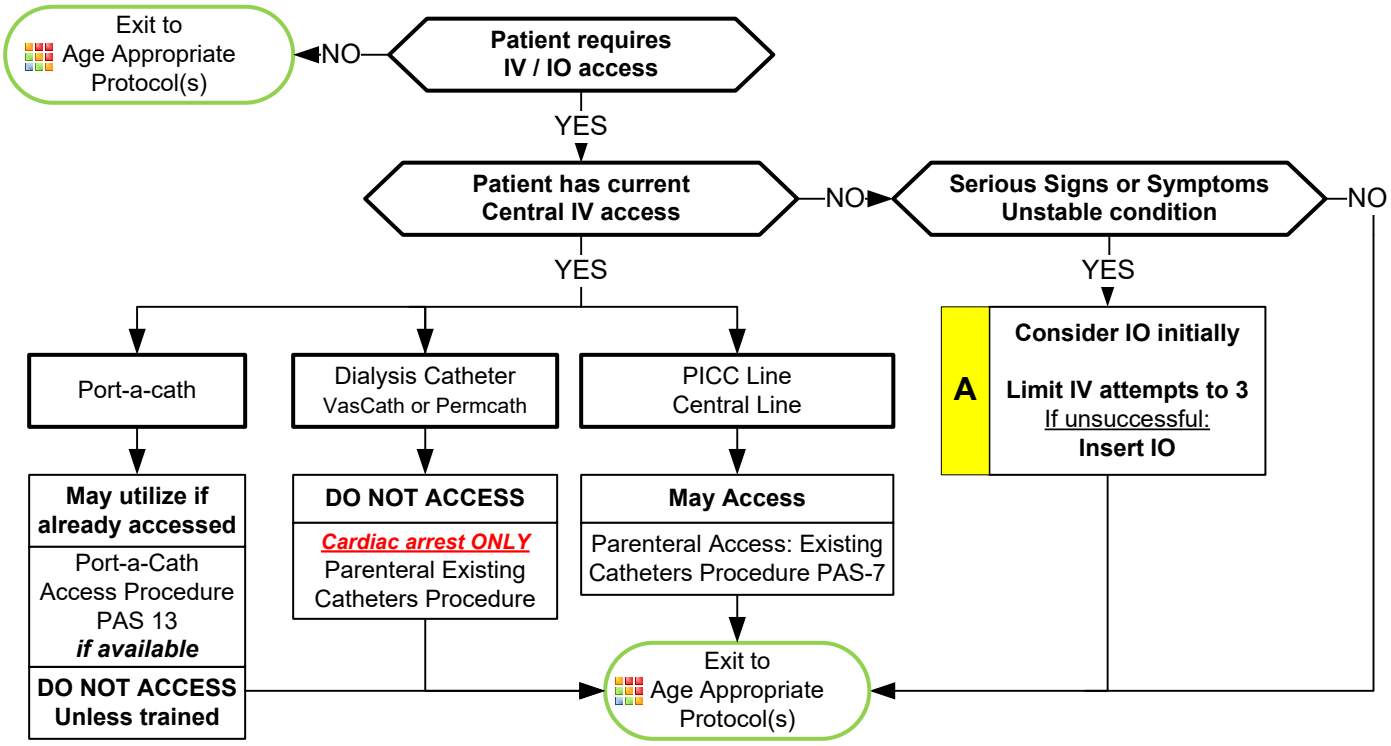
- **Recommended Exam: Mental Status, Heart, Lungs, Abdomen, Neuro, Lower extremity perfusion**
- **Back pain is one of the most common complaints in medicine and effects more than 90 % of adults at some point in their life. Back pain is also common in the pediatric population. Most often it is a benign process but in some circumstances can be life or limb threatening.**
- **Consider pregnancy or ectopic pregnancy with abdominal or back pain in women of childbearing age.**
- **Consider abdominal aortic aneurysm with abdominal pain especially in patients over 50 and/or patients with shock/ poor perfusion. Patients may have abdominal pain and / or lower extremity pain with diminished pulses. Notify receiving facility early with suspected abdominal aneurysm.**
- **Consider cardiac etiology in patients > 50, diabetics and / or women especially with upper abdominal complaints.**
- **Red Flags which may signal more serious process associated with back pain:**
  - Age > 50 or < 18
  - Neurological deficit (leg weakness, urinary retention, or bowel incontinence)
  - IV Drug use
  - Fever
  - History of cancer, either current or remote
  - Night time pain in pediatric patients
- **Cauda equina syndrome is where the terminal nerves of spinal cord are being compressed (Symptoms include):**
  - Saddle anesthesia
  - Recent onset of bladder and bowel dysfunction. (Urine retention and bowel incontinence)
  - Severe or progressive neurological deficit in the lower extremity.
  - Motor weakness of thigh muscles or foot drop
- **Back pain associated with infection:**
  - Fever / chills.
  - IV Drug user (consider spinal epidural abscess)
  - Recent bacterial infection like pneumonia.
  - Immune suppression such as HIV or patients on chronic steroids like prednisone.
  - Meningitis.
- **Spinal motion restriction in patients with underlying spinal deformity should be maintained in their functional position.**
- Kidney stones typically present with an acute onset of flank pain which radiates around to the groin area.

IV or IO Access

History
- Chronic medical conditions requiring recurrent need for IV access for medication, hydration, or blood sampling.
- Medical condition requiring administration of IV medications at home.
- End-stage renal disease requiring hemodialysis.
- Chronic medical condition requiring IV nutrition.

Signs and Symptoms
- Fever
- Bleeding
- Hypotension
- Redness, swelling, and/or pain at IV catheter site
- Shortness of breath
- Chest pain
- IV catheter patency

Differential
- Infection or sepsis
- Infection of catheter
- Clotted IV catheter
- Air embolism
- Pneumothorax
- Overdose of home medication
- Shock



Universal Protocol Section

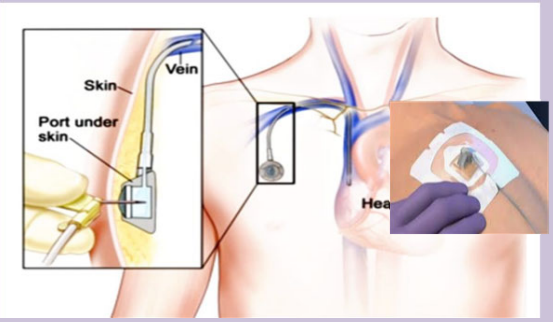
Pearls
- **Frequent encounter of patients with IV access devices and confusion as to which device can be accessed and used by EMS providers are common.**
- **If unclear about device use, always ask "Is this device used for dialysis?"**
- **When accessing central catheter, always ensure sterility of catheter 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

Types of IV catheters:

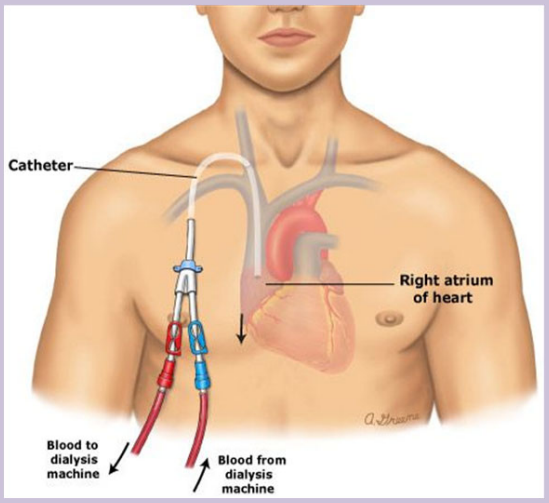
Port-a-Cath® :

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.



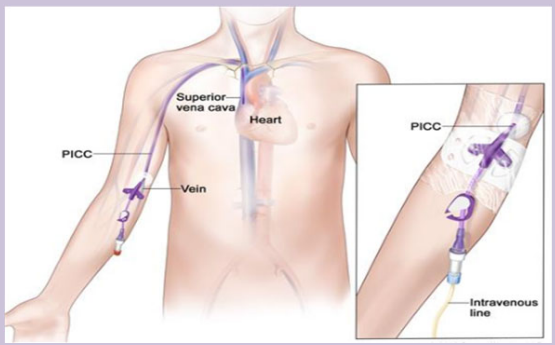
Dialysis Catheter:

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.
Paramedic and AEMT do NOT routinely access this device.
Paramedic and AEMT MAY access during cardiac arrest only (Only if IV or IO access cannot be established.)



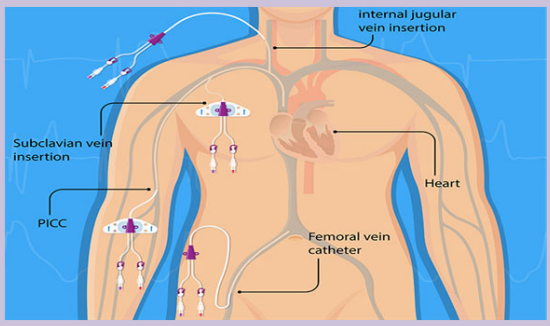
PICC (Peripherally Inserted Central Catheters):

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.)
Paramedic and AEMT 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.)
Paramedic and AEMT may access and utilize following sterile technique.



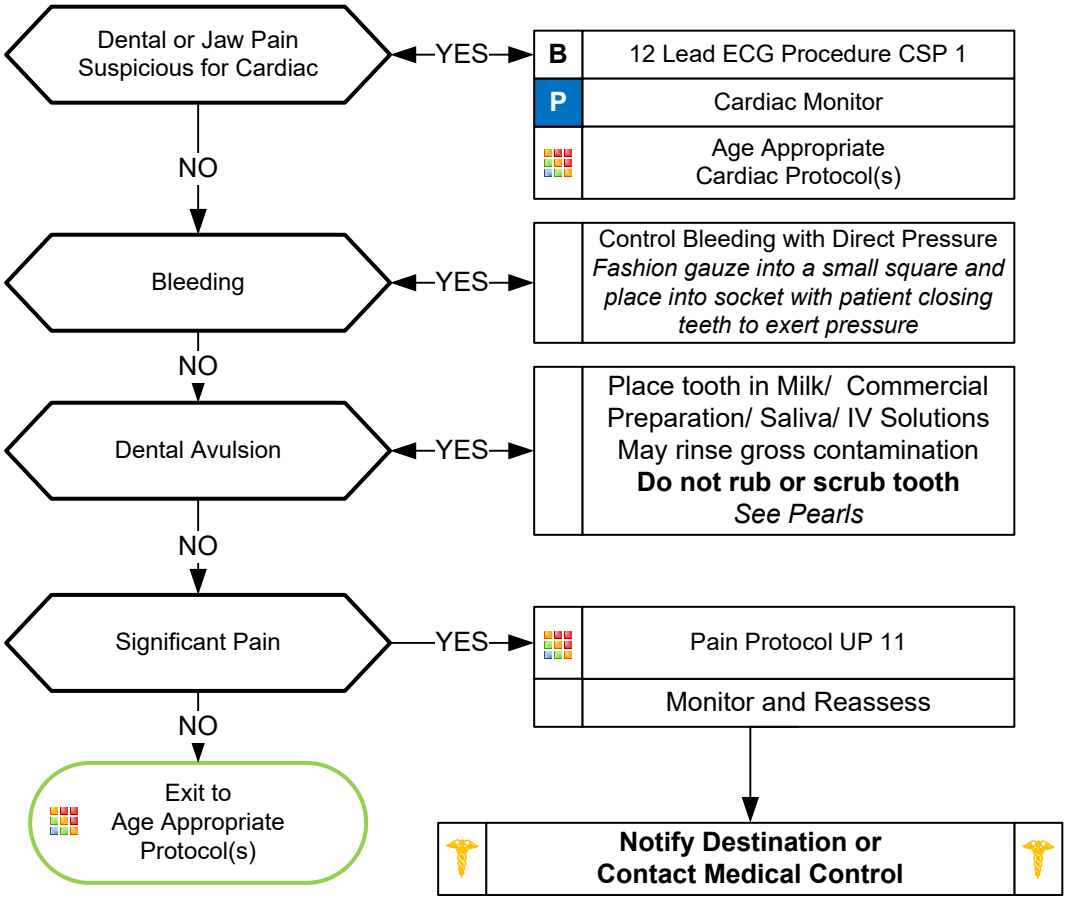
Universal Protocol Section

Dental Problems

History
- Age
- Past medical history
- Medications
- Onset of pain / injury
- Trauma with "knocked out" tooth
- Location of tooth
- Whole vs. partial tooth injury

Signs and Symptoms
- Bleeding
- Pain
- Fever
- Swelling
- Tooth missing or fractured

Differential
- Decay
- Infection
- Fracture
- Avulsion
- Abscess
- Facial cellulitis
- Impacted tooth (wisdom)
- TMJ syndrome
- Myocardial infarction



Universal Protocol Section

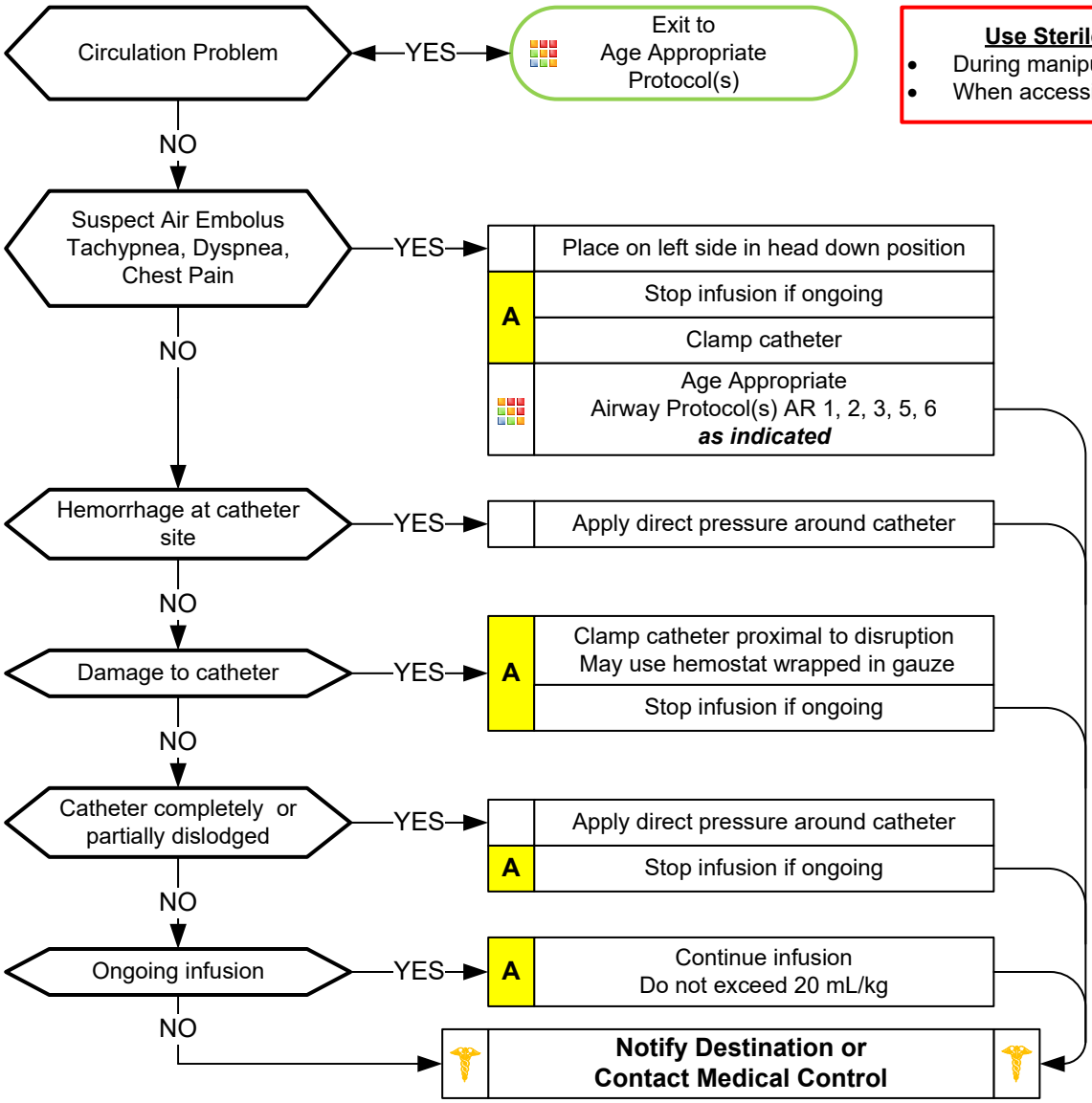
Pearls
- **Recommended Exam: Mental Status, HEENT, Neck, Chest, Lungs, Neuro**
- Significant soft tissue swelling to the face or oral cavity can represent a cellulitis or abscess.
- Scene and transport times should be minimized in complete tooth avulsions. Reimplantation is possible within 4 hours if the tooth is properly cared for.
- Cardiac chest pain may radiate to the jaw and teeth mimicking dental pain.
- **Avulsed tooth:**
  Handle tooth by the crown, do not touch the root.
  Rinse tooth if soiled but do not scrub, as this can damage the ligaments vital for possible reimplantation.
  Rinse with mild, commercial tooth solution, normal saline or lactated ringers, or the patient's own saliva if dry.
  Transport tooth in milk, commercial solution, patient's own saliva, or IV solution in a container to protect.

Emergencies Involving Indwelling Central Lines

History
- Central Venous Catheter Type
  - Tunneled Catheter (Broviac / Hickman)
  - PICC (peripherally inserted central catheter
  - Implanted catheter (Mediport / Hickman)
- Occlusion of line
- Complete or partial dislodge
- Complete or partial disruption

Signs and Symptoms
- External catheter dislodgement
- Complete catheter dislodgement
- Damaged catheter
- Bleeding at catheter site
- Internal bleeding
- Blood clot
- Air embolus
- Erythema, warmth or drainage about catheter site indicating infection

Differential
- Fever
- Hemorrhage
- Reactions from home nutrient or medication
- Respiratory distress
- Shock



Use Sterile Technique:
- During manipulation of central line
- When accessing central line

Universal Protocol Section

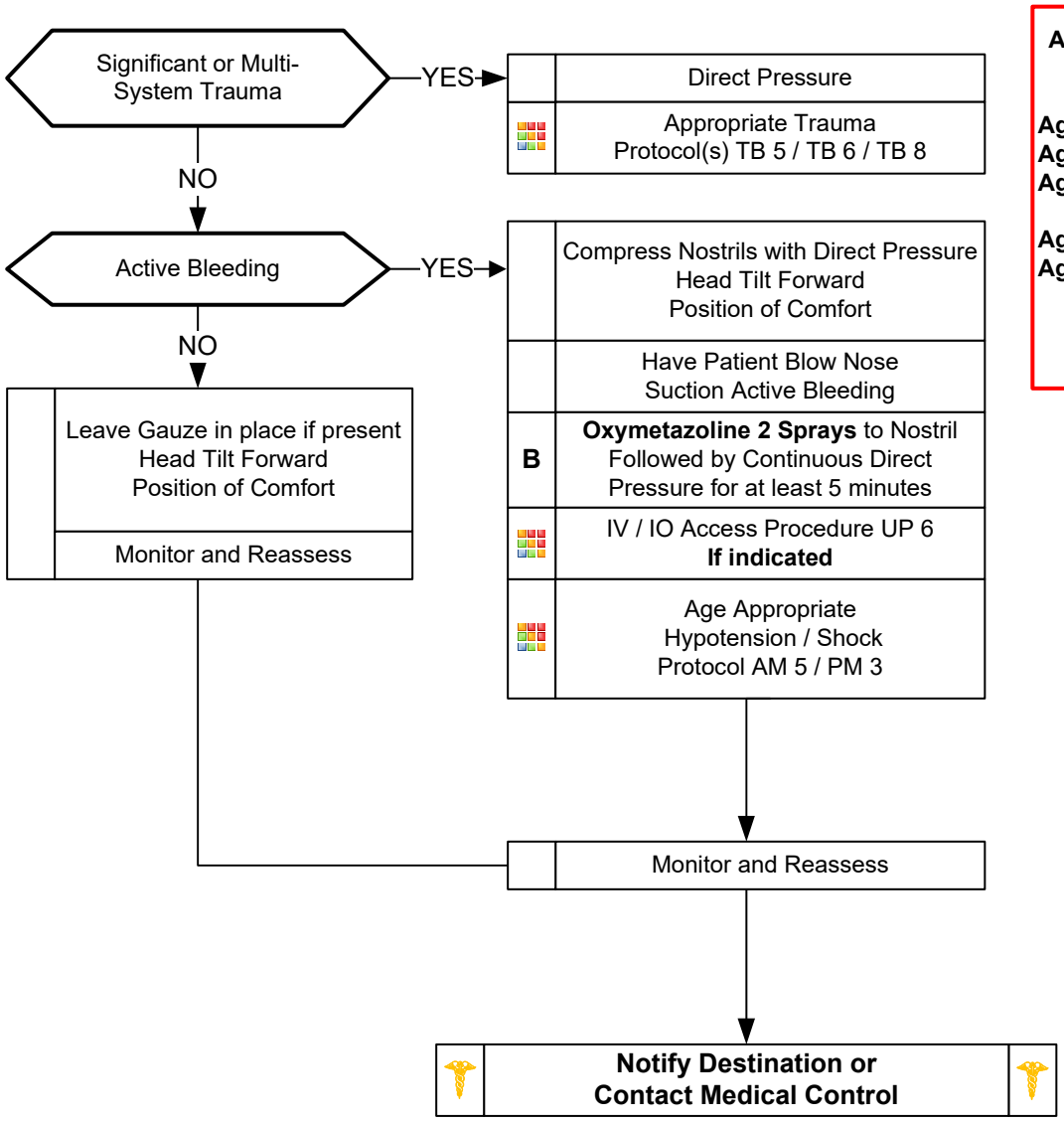
Pearls
- **Always involve family/ caregivers as they may have specific knowledge and skills related to catheter device.**
- **Use strict sterile technique when accessing / manipulating an indwelling catheter.**
- **Cardiac arrest: May access central catheter and utilize if functioning properly.**
- Do not attempt to force catheter open if occlusion evident.
- Some infusions may be detrimental to stop. Ask family or caregiver if it is appropriate to stop or change infusion.
- Hyperalimentation infusions (IV nutrition): If stopped for any reason monitor for hypoglycemia.

Epistaxis

History
- Age
- Past medical history
- Medications (HTN, anticoagulants, aspirin, NSAIDs)
- Previous episodes of epistaxis
- Trauma
- Duration of bleeding
- Quantity of bleeding

Signs and Symptoms
- Bleeding from nasal passage
- Pain
- Nausea
- Vomiting

Differential
- Trauma
- Infection (viral URI or Sinusitis)
- Allergic rhinitis
- Lesions (polyps, ulcers)
- Hypertension



Age Specific Blood Pressure indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

All ages Shock Index:
HR > SBP

Universal Protocol Section

Pearls
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Neuro**
- It is very difficult to quantify the amount of blood loss with epistaxis.
- Bleeding may also be occurring posteriorly. Evaluate for posterior blood loss by examining the posterior pharnyx.
- Anticoagulants include warfarin (Coumadin), Apixaban (Eliquis), heparin, enoxaparin (Lovenox), dabigatran (Pradaxa), rivaroxaban (Xarelto), and many over the counter headache relief powders.
- Anti-platelet agents like aspirin, clopidogrel (Plavix), aspirin/dipyridamole (Aggrenox), and ticlopidine (Ticlid) can contribute to bleeding.

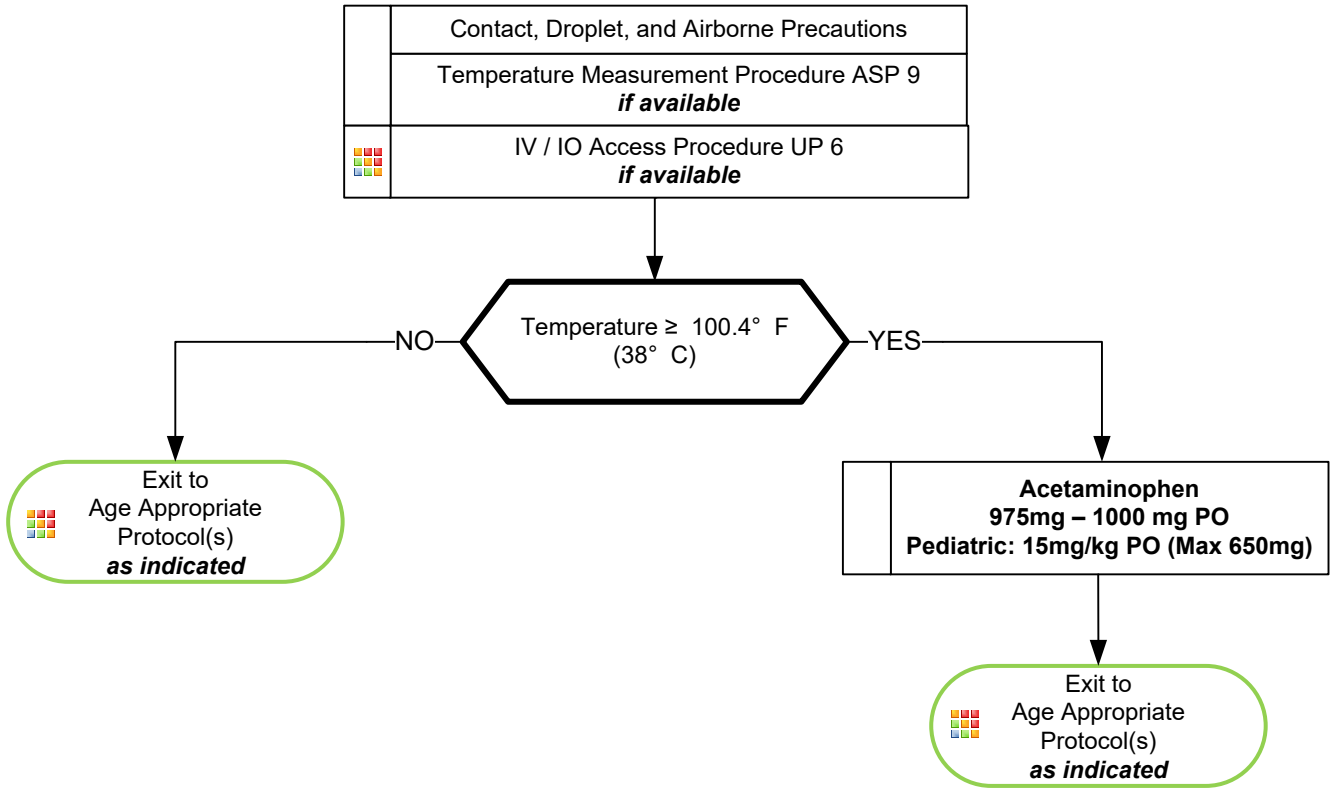
Fever / Infection Control

History
- Age
- Duration of fever
- Severity of fever
- Past medical history
- Medications
- Immunocompromised (transplant, HIV, diabetes, cancer)
- Environmental exposure
- Last acetaminophen or ibuprofen

Signs and Symptoms
- Warm
- Flushed
- Sweaty
- Chills/Rigors

Associated Symptoms (Helpful to localize source)
- myalgias, cough, chest pain, headache, dysuria, abdominal pain, mental status changes, rash

Differential
- Infections / Sepsis
- Cancer / Tumors / Lymphomas
- Medication or drug reaction
- Connective tissue disease
  - Arthritis
  - Vasculitis
- Hyperthyroidism
- Heat Stroke
- Meningitis



Universal Protocol Section

Pearls
- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- Febrile seizures are more likely in children with a history of febrile seizures and with a rapid elevation in temperature.
- Patients with a history of liver failure should not receive acetaminophen.
- **Droplet precautions** include standard PPE plus a standard surgical mask for providers who accompany patients in the back of the ambulance and a surgical mask or NRB O2 mask for the patient. This level of precaution should be utilized when influenza, meningitis, mumps, streptococcal pharyngitis, and other illnesses spread via large particle droplets are suspected. A patient with a potentially infectious rash should be treated with droplet precautions.
- **Airborne precautions** include standard PPE plus utilization of a gown, change of gloves after every patient contact, and strict hand washing precautions. This level of precaution is utilized when multi-drug resistant organisms (e.g. MRSA), scabies, or zoster (shingles), or other illnesses spread by contact are suspected.
- **All-hazards precautions** include standard PPE plus airborne precautions plus contact precautions. This level of precaution 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, SARS-CoV-2, COVID-19, MERS, Monkeypox**).
- Rehydration with fluids increases the patient's ability to sweat and improves heat loss.
- Allergies to NSAIDs (non-steroidal anti-inflammatory medications) are a contraindication to Ibuprofen. Do not give to patients who have renal disease or renal transplant.
- NSAIDs should not be used in the setting of environmental heat emergencies.
- **Do not** give aspirin to a child, age ≤ 15 years.

Pain Control

History
- Age
- Location
- Duration
- Severity (1 - 10)
- If child use Wong-Baker faces scale
- 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)

Specific Complaint Protocol

Assess Pain Severity

Combination of Pain Scale, MOI, circumstances, Injury or Illness severity

Mild

Acetaminophen
975mg – 1000mg PO
Pediatric: 15mg/kg PO (Max 650mg)
Or
Aspirin 324 mg PO
(≥ 16 only)

<u>If no improvement</u>
Consider
IV or IO Access Protocol UP 6
if indicated

Moderate to Severe

IV / IO Access Protocol UP 6

A

Ketorolac 15 mg IV / IO / IM
Peds: 0.5 mg/kg IV / IO / IM
Maximum 15 mg

P

Cardiac Monitor

Fentanyl 50-100 mcg IV / IO / IM / IN
Age ≥ 65: 25-50 mcg IV / IO / IM / IN
Repeat **25-100 mcg** every 5 minutes
Maximum 200 mcg
Peds: 1 mcg/kg IV / IO / IM / IN
May repeat 0.5 mcg/kg every 5 minutes
Maximum 2 mcg/kg
Or
Morphine 5 mg IV / IO / IM
Age ≥ 65: 2.5-5 mg IV / IO / IM
May repeat **2.5** every 5 minutes
Peds: 0.1 mg/kg up to Max 5mg
IV / IO / IM
May repeat every 5 minutes
Maximum of 10 mg

Ketamine 0.3 mg/kg IV / IO
Maximum 30mg
Mix in 250mL D5W and
Infuse with 10 drop set over 10 minutes
May repeat in 30 minutes as needed
Or
Ketamine 1 mg/kg IN
Maximum 1 dose

Monitor and Reassess
Every 10 minutes following sedative

Notify Destination or Contact Medical Control

Universal Protocol Section

Pain Control

Morphine is still considered the medication of choice for Cardiac related chest pain by the American Heart Association.

**** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown ****

The OPQRST mnemonic can assist with assessment of pain and discomfort:

O = Onset – The word "onset" should trigger questions regarding what the patient was doing just prior to and during the onset of the specific symptom(s) or chief complaint.
- What were you doing when the symptom(s) started?
- Was the onset sudden or gradual?

P = Provoke – The word "provoke" should trigger questions regarding what makes the symptoms better or worse.
- Does anything you do make the symptom(s) better or relieve them in any way?
- Does anything you do make the symptom(s) worse in any way?

Q = Quality – The word "quality" should trigger questions regarding the character of the symptom(s) and how they feel to the patient?
- Can you describe the symptom(s) (pain/discomfort) that you are having right now?
- What does it feel like?
- Is it sharp or dull?
- Is it steady or does it come and go?
- Has it changed since it began?

R = Region / Radiate – The words "region and radiate" should trigger questions regarding the exact location of the symptom(s).
- Can you point with one finger where it hurts the most?
- Does the pain radiate or move anywhere else?

S = Severity – The word "severity" should trigger questions relating to the severity of the symptom(s).
- On a scale of 1 to 10, how would you rate your level of discomfort *right now?*
- Using the same scale, how would you rate your discomfort when it *first began?*

T = Time – The word "time" should trigger questions relating to the when the symptom(s) began.
- When did the symptom(s) first begin?
- Have you ever experienced these symptom(s) before? If so, when?

Universal Protocol Section

Pearls

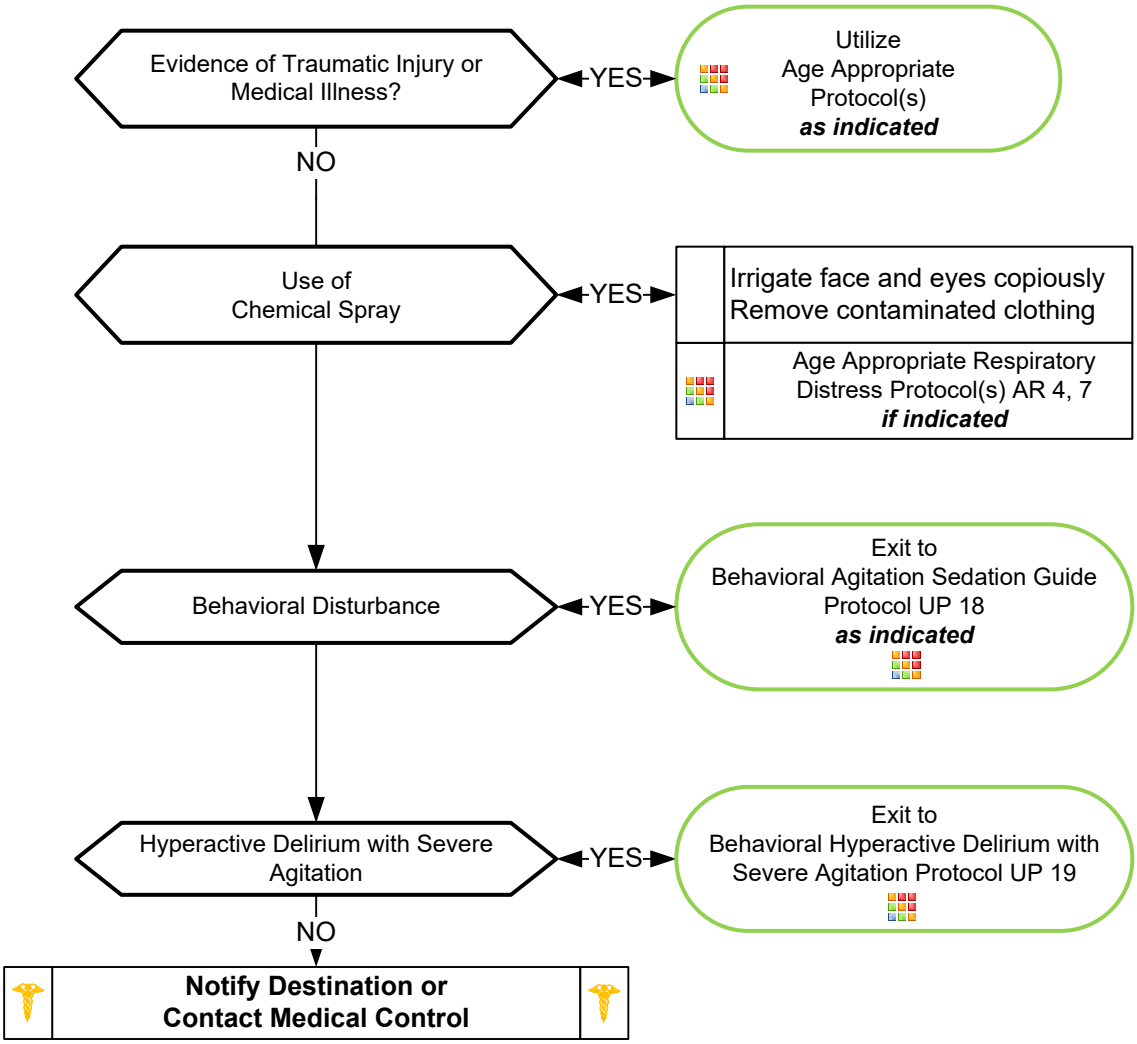
- **EtCO2 monitoring is MANDATORY after all opiate and/or ketamine administration**
- **Consider slower opiate redosing frequency for IM/IN administration due to slower rates of absorption**
- **Recommended Exam: Mental Status, Area of Pain, Neuro**
- **Pain severity (0-10) is a vital sign to be recorded before and after PO, IV, IO or IM medication delivery and at patient hand off. Monitor BP closely as sedative and pain control agents may cause hypotension.**
- **Ketamine:**
  Ketamine may be used in patients who are outside a Pediatric Medication/Skill Resuscitation System product.
  Ketamine may be used in patients who fit within a Pediatric Medication/ Skill Resuscitation System product only with DIRECT ONLINE MEDICAL ORDER, by the system MEDICAL DIRECTOR or ASSISTANT MEDICAL DIRECTOR.
- **Ketamine: appropriate indications for pain control:**
  Patients who have developed opioid-tolerance. Sickle cell crisis patients with opioid-tolerance.
  Patients who have obstructive sleep apnea.
  May use in combination with opioids to limit total amount of opioid administration.
- **Ketamine: caution when using for pain control:**
  Slow infusion or IV push over 10 minutes is associated with less side effects. Do not administer by rapid IV push.
  Avoid in patients who have cardiac disease or uncontrolled hypertension.
  Avoid in patients with increased intraocular pressure such as glaucoma.
  Avoid use in combination with benzodiazepines due to decreased respiratory effort.
- **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.**
- **Pediatrics:**
  For children use Wong-Baker faces scale or the FLACC score (see Assessment Pain Procedure)
  Use Numeric (> 9 yrs), Wong-Baker faces (4-16yrs) or FLACC scale (0-7 yrs) as needed to assess pain
- **Vital signs should be obtained before, 10 minutes after, and at patient hand off with all pain medications.**
- All patients who receive IM or IV medications must be observed 15 minutes for drug reaction in the event no transport occurs.
- Do not administer **Acetaminophen** to patients with a history of liver disease.
- NSAIDs such as Ketorolac (Toradol) should not be used in patients with known renal disease or renal transplant. Consider other agents in patients who are: pregnant, have other NSAID allergy, have active bleeding, patients who meet trauma criteria.
- Burn patients may required higher than usual opioid doses to titrate adequate pain control.
- Consider agency-specific anti-emetic(s) for nausea and/or vomiting.

Police Custody

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



Universal Protocol Section

Police Custody

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Neurologic status**
- **Patient does not have to be in police custody or under arrest to utilize this protocol.**
- **EMS agency should formulate a policy with local law enforcement agencies concerning patients requiring EMS and Law Enforcement involvement simultaneously.**
- **Agencies should work together to formulate a disposition in the best interest of the patient.**
- **Law Enforcement:**
  - **Any patient who is handcuffed or restrained by Law Enforcement and transported by EMS, must be accompanied by law enforcement during transport capable of removing the devices.**
  - **Patient should not be transported with upper extremities hand-cuffed behind back as this prevents proper assessment and could lead to injury.**
  - **Consider multidisciplinary coordination with law enforcement to approach verbal de-escalation, restraint, and/or take-down restraint procedure.**
- **Maintain high-index of suspicion for underlying medical or traumatic disorder causing or contributing to behavioral disturbance. Medical causes more likely in ages < 12 or > 40.**
- **Medications are not to be used solely to aid in placing an individual into police custody. Physical and/or chemical restraints are reserved for a medical emergency in order to prevent imminent injury to a patient and/or providers.**
- **Restraints:**
  - **All patients who receive either physical or chemical restraint must be continuously observed by ALS personnel on scene or immediately upon their arrival.**
  - **Do not position or transport any restrained patient is such a way that could impact the patients respiratory or circulatory status.**
  - **However, when EMS providers have utilized physical restraints in accordance with Restraint Procedure USP 5, the law enforcement agent may follow behind the ambulance during transport.**
- The responsibility for patient care rests with the highest authorized medical provider on scene per North Carolina law.
- 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 with decision-making capacity in police custody retain the right to participate in decision making regarding their care and may request care or refuse care of EMS.
- If extremity/ chemical/ law enforcement restraints are applied, follow USP 5 Restraints: Physical.
- **Consider Haldol for patients with history of psychosis or a benzodiazepine for patients with presumed substance misuse.**
- **Haldol is acceptable treatment in pediatric patients ≥ 12 years old. Safety and efficacy is not established in younger ages. Contact Medical Control for advice as needed.**
- **Hyperactive Delirium with Severe Agitation:**
  - 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.
  - **If patient suspected of EDS suffers cardiac arrest, consider a fluid bolus and sodium bicarbonate early.**
- Patients exposed to chemical spray, with or without history of respiratory disease, may develop respiratory complaints up to 20 minutes post exposure.

Seizure

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

Age Appropriate
Airway Protocol(s) AR 1, 2, 3, 5, 6
as indicated

Altered Mental Status
Protocol UP 4
if indicated

Childbirth/Labor Protocol AO 1
Obstetrical Emergency Protocol AO 3
if indicated

Behavioral Protocol UP 17
if indicated

Loosen any constrictive clothing
Protect patient

Active Seizure Activity → YES → IV / IO Access → YES

P

Midazolam 2.5 mg IV / IO
May repeat every5 minutes as needed
Maximum 10 mg

Peds: Midazolam 0.2 mg/kg IV / IO
Maximum single dose 2.5 mg
May repeat every 5 minutes as needed
Maximum 10 mg

Or

Diazepam 5 mg IV/IO
May repeat 2 mg every 5 minutes as needed
Maximum 10 mg

Active Seizure Activity → NO

IV / IO Access → NO

P

≥ 49 kg
Midazolam 10 mg IM
May repeat every 5 minutes as needed
Maximum 20 mg
< 49 kg
Midazolam 0.2 mg/kg IM
Maximum single dose 5 mg
May repeat every 5 minutes as needed
Maximum 10 mg
or
Diazepam 0.2 mg/kg per Rectum
Maximum 10 mg

Blood Glucose Analysis Procedure
ASP 4

IV or IO Access Protocol UP 6
if indicated

P Cardiac Monitor
if indicated

Monitor and Reassess

Notify Destination or Contact Medical Control

Universal Protocol Section

Seizure

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patient's weight is unknown **

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Extremities, Neuro**
- **Items in Red Text are key performance measures used to evaluate protocol compliance and care.**
- **Brief seizure-like activity can be seen following ventricular fibrillation or ventricular tachycardia associated cardiac arrest.**
- **Status epilepticus is defined by seizure activity lasting > 5 minutes or multiple seizures without return to baseline.**
- **Most seizure activity is brief, lasting only 1 – 2 minutes, and is associated with transient hypoventilation.**
- **Be prepared for airway problems and continued seizures.**
- **Seizure activity may be a marker of closed head injury, especially in the very young, examine for trauma.**
- **Adult:**
  Midazolam 10 mg IM is effective in termination of seizures.
  Do not delay IM administration with difficult IV or IO access. IM Preferred over IO.
- **Pediatrics:**
  Midazolam 0.2 mg/kg (Maximum 5 mg) IM is effective in termination of seizures.
  Do not delay IM administration with difficult IV or IO access. IM Preferred over IO.
- **Do not delay administration of anti-epileptic medications to check for blood glucose.**
- **Grand mal seizures (generalized)** are associated with loss of consciousness, incontinence, and tongue trauma.
- **Focal seizures** affect only a part of the body and are not usually associated with a loss of consciousness, but can propagate to generalized seizures with loss of consciousness.
- Be prepared to assist ventilations especially if midazolam is used.
- For any seizure in a pregnant patient, follow the AO 3 Obstetrical Emergencies Protocol.
- Midazolam is well absorbed when administered IM.
- **Optimal conditions for patients refusing transport following a seizure:**
  - Known history of seizures/epilepsy
  - Full recovery to baseline mental status
  - No injuries requiring treatment or evaluation
  - Adequate supervision
  - Seizure not associated with drugs or alcohol
  - Only 1 seizure episode in the past hour
  - Seizure not associated with pregnancy

Suspected Stroke

History
- Previous CVA, TIA's
- Previous cardiac / vascular surgery
- Associated diseases: diabetes, hypertension, CAD
- Atrial fibrillation
- Medications (blood thinners)
- History of trauma
- Sickle Cell Disease
- Immune disorders
- Congenital heart defects
- Maternal infection / hypertension

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

LA Prehospital Stroke Screening

Blood Glucose Analysis Procedure ASP 4

Consistent with Acute Stroke

NO → Exit to Appropriate Protocol(s) ***as indicated***

YES

Determine
1. Last Known Well Time
2. Time of Symptom Discovery

Last Known Well (Time of Onset) Less Than 24 Hours

YES → **Transport based on:**
STROKE
EMS Triage and Destination Plan

Goal Scene Time ≤ 10 Minutes
Provide Early Notification of Destination Facility
Suspected Stroke Alert

NO

- Altered Mental Status Protocol UP 4 ***if indicated***
- **B** 12 Lead ECG Procedure CSP 1
- IV / IO Access Protocol UP 6
- Age Appropriate Cardiac Protocol(s) ***if indicated***
- Head Trauma Protocol TB 5 / Multiple Trauma Protocol TB 6 ***if indicated***
- Seizure Protocol UP 13 ***if indicated***

Transport Destination Facility based on:
Stroke
EMS Triage and Destination Plan

- **Refer to plan for Last Known Well Times and Stroke Severity Assessment Values**
- **Combination of factors will drive transport destination decision-making based on your local region**

- Reperfusion Checklist Procedure ***if time allows***
- **B** 12 Lead ECG Procedure CSP 1
- IV / IO Protocol UP 6 Preferably 2 Sites
- **A** Venous Access Blood Draw Procedure PAS 3 ***if applicable***
- **P** Cardiac Monitor
- **P** **Persistent Hypertension**
  If SBP ≥ 185 or DBP ≥ 110
  After 3 readings all 5 minutes apart
  Contact Receiving Facility Concerning Treatment of Hypertension

Notify Destination or Contact Medical Control

Universal Protocol Section

Suspected Stroke

Universal Protocol Section

Pearls

- **Recommended Exam: EMS Stroke Screen and Severity Assessment, Mental Status, Neuro**
- **Items in Red Text are key performance measures used in the EMS Acute Stroke Care Toolkit.**
- **Acute Stroke care is evolving rapidly. Time of onset / last seen normal or well may be changed at any time depending on the capabilities and resources of your regional hospitals based on Stroke: EMS Triage and Destination Plan.**
- **Time of Onset or Last Seen Normal or Well:**
  - **One of the most important items the pre-hospital provider can obtain, of which all treatment decisions are based.**
  - **Be 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 care may be delayed at facility.**
  - **Wake up stroke: Time starts when patient last awake or symptom free.**
- **Time of Symptom Discovery:**
  - **Time when symptoms of stroke are first noticed by patient or witness.**
- **Sources of information pertaining to Last Known Well time:**
  - **You are often in the best position to determine the actual Time of Onset while you have family, friends or caretakers available.**
  - **Often these sources of information may arrive well after you have delivered the patient to the hospital.**
  - **Delays in decisions due to lack of information may negatively impact care.**
  - **Obtain contact information (phone number and name) of witnesses and give to facility providers.**
- **The Reperfusion Checklist should be completed for any suspected stroke patient as time allows.**
- **If possible place 2 IV sites, preferably above the wrists, and if possible both in the left upper extremity.**
- **Blood Draw:**
  - **Many systems utilize EMS venous blood samples. Follow your local policy and procedures.**
- The differential listed on the Altered Mental Status Protocol should also be considered.
- Be alert for airway problems (swallowing difficulty, vomiting/aspiration).
- Hypoglycemia can present as a localized neurologic deficit, especially in the elderly.
- Document the Stroke Screen, Stroke Severity Score, and facility notifcation time in the PCR.
- Agencies may use validated pre-hospital stroke screen of choice.
- **Pediatrics:**
  - Strokes do occur in children, they are slightly more common in ages < 2, in boys, and in African-Americans.
  - Newborn and infant symptoms consist of seizures, extreme sleepiness, and using only one side of the body.
  - Children and teenagers symptoms may consist of severe headaches, vomiting, sleepiness, dizziness, and/or loss of balance or coordination.

Suspected Sepsis

History
- Duration and severity of fever
- Past medical history
- Medications / Recent antibiotics
- Immunocompromised (transplant, HIV, diabetes, cancer)
- Indwelling medical device
- Last acetaminophen or ibuprofen
- Recent Hospital / healthcare facility
- Bedridden or immobile
- Elderly and very young – at risk
- Prosthetic device / indwelling device

Signs and Symptoms
- Warm
- Flushed
- Sweaty
- Chills / Rigors
- Delayed cap refill
- Mental status changes

Associated Symptoms (Helpful to localize source)
- myalgias, cough, chest pain, headache, dysuria, abdominal pain, rash

Differential
- Infections: UTI, Pneumonia, skin/wound
- Cancer / Tumors / Lymphomas
- Medication or drug reaction
- Connective tissue disease: Arthritis, Vasculitis
- Hyperthyroidism
- Heat Stroke
- Meningitis
- Hypoglycemia/hypothermia
- MI / CVA

Consider: Contact, Droplet, and Airborne Precautions

Temperature Measurement Procedure ASP 9 ***if available***

Fever / Infection Control Protocol UP 10 ***if needed***

Altered Mental Status Protocol UP 4 ***if needed***

B 12 Lead ECG Procedure CSP 1

IV / IO Access Protocol UP 6 ***If indicated***

P Cardiac Monitor

Age Specific Blood Pressure indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

All ages Shock Index: HR > SBP

Sepsis Screen Positive

NO → Exit to Age Appropriate Condition Appropriate Protocol(s)

YES → **SEPSIS ALERT**
Notify Receiving Facility Immediately

Adult SIRS Criteria
Temperature
≥ 100.4° F (38° C)
Or
≤ 96.8° F (36° C)
AND
Any 1 of the following:
HR > 90
RR > 20
EtCO < 25 mmHg

Adult qSOFA Criteria
SBP ≤ 100 mmHG
RR ≥ 22
AMS or new mental status change

Pediatrics SIRS Criteria
Temperature
Same as adult

AND
Heart Rate
1 month – 1 year > 180
2 – 5 years > 140
6 – 12 years > 130
13 – 18 years > 120

MAP (Mean Arterial Pressure)

$$\frac{SBP + 2(DBP)}{3}$$

Monitor usually calculates this value on screen

A

Venous Access Blood Draw ***if applicable***

Normal Saline 500 mL Bolus
Repeat as needed
Titrate SPB ≥ 90 mmHg
MAP > 65 mmHg
Maximum 2 L

Peds: 20 mL/kg IV / IO
Repeat to titrate
Age Appropriate
SBP ≥ 70 + (2 x Age)
Maximum 60 mL/kg

Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3

Notify Destination or Contact Medical Control

Universal Protocol Section

Suspected Sepsis

** Refer to Length Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Recommended Exam Pediatrics: In childhood, physical assessment reveals important clues for sepsis. Look for mental status abnormalities such as anxiety, restlessness, agitation, irritability, confusion, or lethargy. Cardiovascular findings to look for include cool extremities, capillary refill >3 seconds, or mottled skin.**
- **Sepsis is a life threatening condition where the body's immune response to infection injures its own tissues and organs.**
- **Severe sepsis is a suspected infection and 2 or more SIRS criteria (or qSOFA) with organ dysfunction such as AMS or hypotension.**
- **Septic shock is severe sepsis and poor perfusion unimproved after fluid bolus.**
- **Agencies administering antibiotics should inquire about drug allergies specific to antibiotics or family of antibiotics.**
- **Following each fluid bolus, assess for pulmonary edema. Consider administration of agency specific vasopressor.**
- **Supplemental oxygen should be given and titrated to oxygenation saturation ≥ 94%.**
- **EKG should be obtained with suspected sepsis, but should not delay care in order to obtain.**
- **Abnormally low temperatures increase mortality and found often in geriatric patients.**
- Quantitative waveform capnography can be a reliable surrogate for lactate monitoring in detecting metabolic distress in sepsis patients. $EtCO_2$ < 25 mm Hg are associated with serum lactate levels > 4 mmol/L.
- Patients with a history of liver failure should not receive acetaminophen.
- **Droplet precautions** include standard PPE plus a standard surgical mask for providers who accompany patients in the back of the ambulance and a surgical mask or NRB O2 mask for the patient. This level of precaution should be utilized when influenza, meningitis, mumps, streptococcal pharyngitis, and other illnesses spread via large particle droplets are suspected. A patient with a potentially infectious rash should be treated with droplet precautions.
- **Airborne precautions** include standard PPE plus utilization of a gown, change of gloves after every patient contact, and strict hand washing precautions. This level of precaution is utilized when multi-drug resistant organisms (e.g. MRSA), scabies, or zoster (shingles), or other illnesses spread by contact are suspected.
- **All-hazards precautions** include standard PPE plus airborne precautions plus contact precautions. This level of precaution 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, SARS-CoV-2, COVID-19, MERS, Monkeypox**).
- All patients should have drug allergies documented prior to administering pain medications.
- Allergies to NSAIDs (non-steroidal anti-inflammatory medications) are a contraindication to Ibuprofen.
- **Sepsis Screen:**

  Agencies may use Adult / Pediatric Systemic Inflammatory Response Syndrome (SIRS) criteria or quickSOFA (qSOFA) criteria.

  Receiving facility should be involved in determining Sepsis Screen utilized by EMS.

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

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
	Blood Glucose Analysis Procedure ASP 4
B	12 Lead ECG Procedure CSP 1
	IV / IO Access Protocol UP 6
P	Cardiac Monitor
	Altered Mental Status Protocol UP 4 ***if indicated***
	Age Appropriate Cardiac Protocol(s) ***if indicated***
	Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***
	Multiple Trauma Protocol TB 6 Spinal Motion Restriction Procedure / Protocol TB 8 ***if indicated***

Serious Signs / Symptoms Hypotension, poor perfusion, shock

YES

NO

	IV / IO Procedure Consider 2 Large Bore sites
A	**Normal Saline 500 mL Bolus** Repeat as needed Titrate SPB ≥ 90 mmHg **Maximum 2 L** **Peds: 20 mL/kg IV / IO** Repeat as needed Titrate to Age Appropriate SBP ≥ 70 + (2 x Age) **Maximum 60 mL/kg**

Exit to Age Appropriate Condition Appropriate Protocol(s)

Notify Destination or Contact Medical Control

Universal Protocol Section

Syncope

** Refer to Length-Based Medication Tape for Medication Doses IF pediatric patients weight is unknown **

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Syncope is both loss of consciousness and loss of postural tone. Symptoms preceding the event are important in determining etiology.**
- **Syncope often is due to a benign process but can be an indication of serious underlying disease in both the adult and pediatric patient.**
- **Often patients with syncope are found normal on EMS evaluation. In general patients experiencing syncope require cardiac monitoring and emergency department evaluation.**
- **Differential should remain wide and include:**

Cardiac arrhythmia	Neurological problem	Choking	Pulmonary embolism
Hemorrhage	Stroke	Respiratory	Hypo or Hyperglycemia
GI Hemorrhage	Seizure	Sepsis	

- **High-risk patients:**

Age ≥ 60	Syncope with exertion
History of CHF	Syncope with chest pain
Abnormal ECG	Syncope with dyspnea

- **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.**
- **Abdominal / back 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, with or without back and / or lower extremity pain or diminished pulses, especially in patients over 50 and / or patients with shock/ poor perfusion. Notify receiving facility early with suspected abdominal aneurysm.**
- **Consider cardiac etiology in patients > 50, diabetics and / or women especially with upper abdominal complaints.**
- **Heart Rate: Tachycardia is one of the first clinical signs of dehydration, typically increases as dehydration becomes more severe.**
- Syncope with no preceding symptoms or event may be associated with arrhythmia.
- Assess for signs and symptoms of trauma if associated or questionable fall with syncope.
- Consider dysrhythmias, GI bleed, ectopic pregnancy, and seizure as possible causes of syncope.
- These patients should be transported. Patients who experience syncope associated with headache, neck pain, chest pain, abdominal pain, back pain, dyspnea, or dyspnea on exertion need prompt medical evaluation.
- More than 25% of geriatric syncope is cardiac dysrhythmia based.

Behavioral Agitation/ Sedation Guide

Behavioral Activity Rating Scale (BARS)

Behavioral Activity Rating Scale
BARS scoring: 1 - 4

YES → No sedation required → Exit to Age Appropriate Protocol(s)

NO

Behavioral Activity Rating Scale
BARS scoring: 5
Agitated but not disruptive
Able to calm and redirect

YES →
- Verbal De-escalation Procedure ASP 11
- P: Age ≥ 12, Haloperidol 5 mg PO

NO

Condition Improving?
- NO
- YES → Exit to Age Appropriate Protocol(s)

Behavioral Activity Rating Scale
BARS scoring: 6

Agitated and disruptive
Not violent

- Verbal De-escalation Procedure ASP 11
- IV or IO Access Protocol UP 6 ***if indicated***
- P:
  - **Offer PO / ODT Medication for BARS 5**
  - **Or**
  - Age ≥ 12
  - **Haloperidol 5 mg**
  - **IM**
  - Age ≥ 65
  - **2.5 mg IM**
  - May repeat every 5 minutes as needed
  - **Maximum 10 mg**
  - And/Or
  - **Midazolam 2.5 mg IV / IO / IN**
  - **5 mg IM**
  - Age ≥ 65
  - **1 mg IV / IO / IN**
  - **2.5 mg IM**
  - **Peds: 0.2 mg/kg**
  - **IV / IO / IM / IN**
  - May repeat every 5 minutes as needed
- Consider Restraint Physical Procedure USP 5
  Monitor per restraint procedure
  if indicated

NO

Condition Improving?
- NO
- YES → Exit to Age Appropriate Protocol(s)

Behavioral Activity Rating Scale
BARS scoring: 7

Agitated and violent

→ Exit to Hyperactive Delirium with Severe Agitation Protocol UP 19

Universal Protocol Section

Behavioral
Hyperactive Delirium With Severe Agitation

Scene Safe

YES → **Behavioral Activity Rating Scale (BARS)**

NO → **Call for help**
Call for additional resources
Stage prior to arrival
or
Withdraw from scene until safe

Behavioral Activity Rating Scale

BARS scoring: 7

P	**Ketamine 4 mg/kg IM** **Maximum 400 mg** *See Pearls* **Pediatrics: 2 mg/kg IM** **Maximum 400 mg** *See Pearls* Or **Midazolam 10 mg IM** Age ≥ 65 **Midazolam 5 mg IM** **Pediatrics: Midazolam 0.2 mg/kg IM** Repeat every 5 minutes as needed **Midazolam Maximum Dose 20 mg**
	IV or IO Access Protocol UP 6 Preferably 2 large bore
A	**Normal Saline 1 L Bolus** Then **150 – 200 mL / hr** May repeat **500 mL** Bolus as needed **Maximum 2 L** **Peds: 20 – 60 mL/kg IV / IO** **Maximum 60 mL/kg**
	Restraint Physical Procedure USP 5 Monitor per restraint procedure ***if indicated***
	Restraint Therapeutic Take Down Procedure USP 6 ***if indicated***
	Hyperthermia Protocol
P	Cardiac Monitor

Notify Destination or Contact Medical Control

General Guidance

- **Use of protocol is indicated when a medical emergency requires a combination of both physical restraint and chemical restraint in order to prevent imminent injury to a patient and/ or providers.**
- **Use of this protocol requires medical judgement and consultation with Medical Control where indicated.**
- **Non-medical personnel requests or opinions should not be used as a factor when implementing this protocol.**

Universal Protocol Section

Pearls

- **Ketamine for sedation purposes:**
  Ketamine may be used in pediatric patients who fit within a Pediatric Medication/ Skill Resuscitation System product, ≤ 15 years of age, or ≤ 49 kg) with DIRECT ONLINE MEDICAL ORDER by the system MEDICAL DIRECTOR or ASSISTANT MEDICAL DIRECTOR only.
- **Hyperactive Delirium with Severe Agitation:**
  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.
  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 or substance withdrawal as well as head trauma may also contribute to the condition.
- **Restraint use:**
  Physical restraints are not contraindicated in agitated or excited delirium, but you must use caution.
  Once sedated, prevent patient from continued struggle, which can worsen metabolic condition.
  Prevent patient from assuming a prone position for prolonged period, move to supine position as quickly as possible.
  Team approach for sedation and Restraint Therapeutic Take Down Procedure USP-6:
  1 provider for each limb.
  1 provider to lead restraint, maintain airway and control head.
  1 Provider to administer medication.
  Do not position prone or prone with restraints, as this can impede respiration and ventilation.
- Hyperthermia: Assess for and treat hyperthermia.