Craven, Jones, Pamlico Counties
EMS PROTOCOLS

March 17, 2025

Version 2A

2025 NCCEP Treatment Protocols

Table of Contents

AR -6. Pediatric Failed Airway

AR -7. Pediatric Respiratory Distress

AR -8 Post Post-intubation / BIAD Management

AR -9. Ventilator Emergencies

AR -10. Tracheostomy Tube Emergencies

AR - 11 Mechanical Ventilation

Adult Cardiac Section AC (Dark Blue)

AC -1. Asystole / Pulseless Electrical Activity

AC -2. Bradycardia; Pulse Present

AC -3. Cardiac Arrest; Adult

AC -4. Chest Pain: Cardiac and STEMI

AC -5. CHF / Pulmonary Edema

AC -6. Adult Tachycardia Narrow Complex (≤ 0.11 sec)

AC -7. Adult Monomorphic Tachycardia Wide Complex (≥ 0.12 sec)

AC -8. Adult Polymorphic Tachycardia WIDE (≥ 0.12 sec) Torsades de pointes

AC -9. Ventricular Fibrillation Pulseless Ventricular Tachycardia

AC -10. Post Resuscitation

AC -11. Team Focused CPR (Highly Recommended)

AC -12. On-scene Resuscitation / Termination of CPR

AC -13. Target Temperature Management

AC -14. LVAD Emergency

AC -15. Total Mechanic Circulation - Artificial Heart

AC -16. Wearable Cardioverter Defibrillator Vest

Adult Medical Section AM (Olive Green)

AM -1. Allergic Reaction / Anaphylaxis

AM -2. Diabetic; Adult

AM -3. Dialysis / Renal Failure

AM -4. Hypertension

AM -5. Hypotension / Shock

AM -6. Stroke; Activase / t t-PA Transfer (Optional)

Trauma and Burn Section TB (Red)

TB -1. Blast Injury / Incident

TB -2. Chemical and Electrical Burn

TB -3. Crush Syndrome Trauma

TB -4. Extremity Trauma

TB -5. Head Trauma

TB -6. Multiple Trauma

TB -7. Radiation Incident

TB -8. Spinal Motion Restriction

TB -9. Thermal Burn

TB -10. Traumatic Arrest

Adult Obstetrical Section AO (Dark Purple)

AO -1. Childbirth / Labor

AO -2. Newly Born

AO -3. Obstetrical Emergency

Pediatric Cardiac Section PC (Light Purple)

PC -1. Pediatric Asystole / PEA

PC -2. Pediatric Bradycardia

PC -3. Pediatric CHF / Pulmonary Edema

PC -4. Pediatric Pulseless Arrest

PC -5. Pediatric Tachycardia Narrow Complex

PC -6. Pediatric Tachycardia Wide Complex

PC -7. Pediatric Ventricular Fibrillation / Pulseless VT

PC -8. Pediatric Post Resuscitation

Pediatric Medical Section PM (Grey Blue)

PM -1. Pediatric Allergic Reaction

PM -2. Pediatric Diabetic

PM -3. Pediatric Hypotension / Shock

Toxin-Environmental Section TE (Gold)

TE -1. Bites and Envenomations

TE -2. Carbon Monoxide / Cyanide

TE -3. Drowning

TE -4. Hyperthermia

TE -5. Hypothermia / Frostbite

TE -6. Marine Envenomation / Injury

TE -7. Overdose / Toxic Ingestion

TE -8. WMD – Nerve Agent Protocol

TE -9. AHF Skin Exposure

TE -10. AHF EYE Exposure

TE -11. AHF Inhalation

TE -12. AHF Ingestion

Special Circumstances Section SC (Black)

SC -1. Suspected Viral Hemorrhagic Fever – Ebola

SC -2. High Consequence Pathogens

SC -3. Hospice or Palliative Care Patient

SC -4. Vaccination/Immunization

SC -5. SARS CoV2 Monoclonal Antibody Infusion

SC – 6. Individual Patient Care Plans

Special Operations Section SO (Black)

SO -1. Fire Scene Rehabilitation

SO -2. Scene Rehabilitation - Responder

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

Pediatric Assessment Procedure

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 / 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

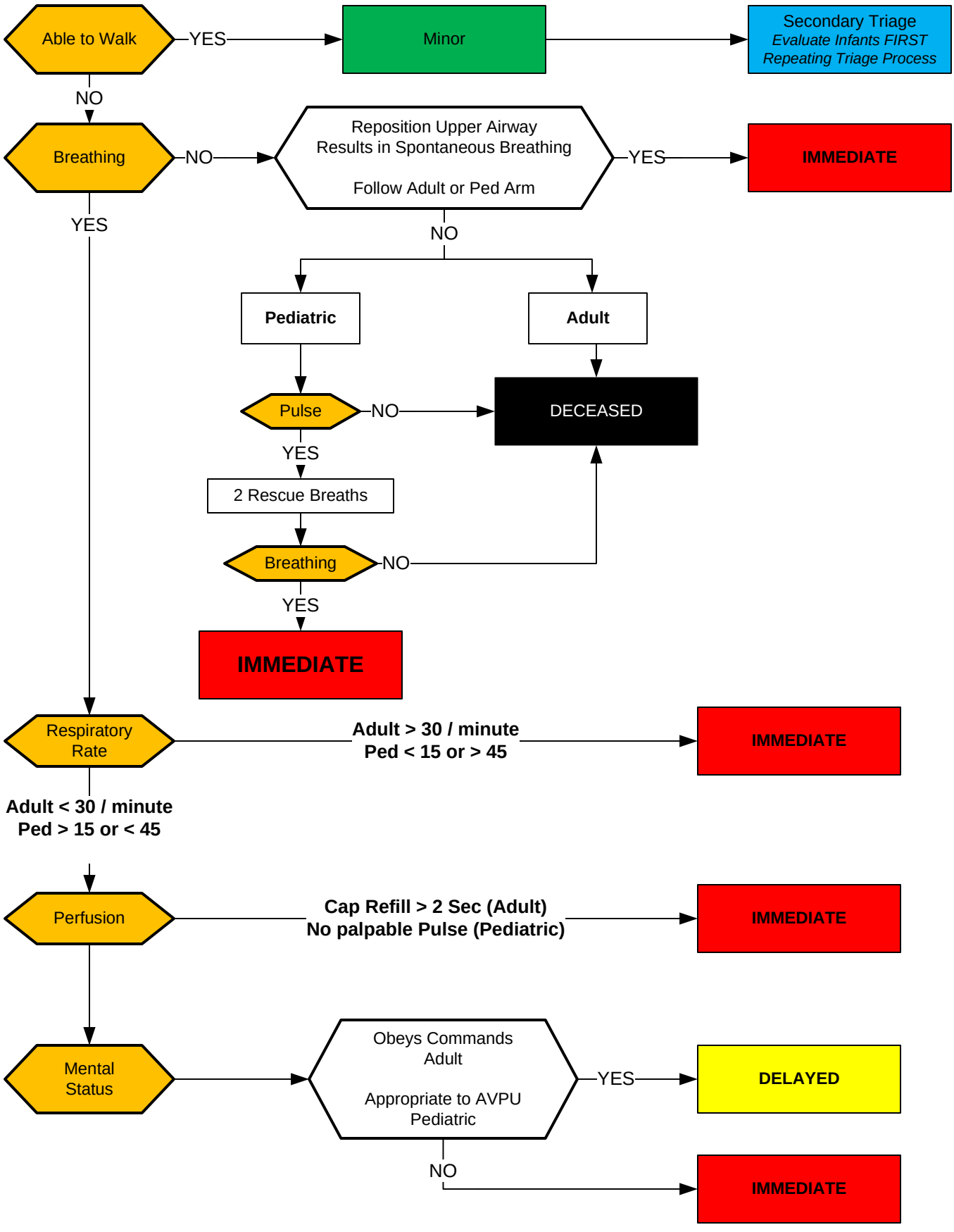
Notify Destination

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 agency 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

Triage

Pearls

- .**<u>When approaching a multiple casualty incident where resources are limited:</u>**
  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.
- **<u>Scene Size Up:</u>**
  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 is a continuous process in each section as resources allow.**
- **<u>Step 1: Global sorting:</u>**
  Call out to those involved in the incident to walk to a designated area and assess group last.
  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.
- **<u>Step 2: Individual assessments:</u>**
  Control major hemorrhage.
  Open airway and if child, give 2 rescue breaths.
  Perform Needle Chest Decompression Procedure if indicated.
  Administer injector antidotes if indicated.
- **<u>Assess the first patient you encounter using the three objective criteria which can be remembered by RPM.</u>**
  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.
- **<u>Treatment:</u>**
  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.
- **<u>Lightning strike (Reverse Triage):</u>**
  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
- CNS (increased pressure, headache, stroke, CNS lesions, trauma or hemorrhage, vestibular)
- Myocardial infarction
- Drugs (NSAID's, antibiotics, narcotics, chemotherapy)
- GI or Renal disorders
- Diabetic ketoacidosis
- OB-Gyn disease (ovarian cyst, PID, Pregnancy)
- Infections (pneumonia, influenza)
- Electrolyte abnormalities
- Food or toxin induced
- Medication or Substance abuse
- Psychological

	Consider Blood Glucose Analysis Procedure
B	12 Lead ECG Procedure
	IV or 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**
A	**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**
A	**Ondansetron 4 mg** **IV / IO / ODT / PO / IM Peds: 0.2 mg/kg** **Peds Maximum 4 mg** May repeat in 15 minutes If no response and vomiting **Compazine** **5 mg IV / IO / IM** May repeat x 1 as needed

Monitor and Reassess

Notify Destination

Universal Protocol Section

Abdominal Pain
Vomiting and Diarrhea

Prochlorperazine (Compazine)

Use with caution as it has a strong sedative effect.
Consider combined effects with narcotic co-administration.
Dilute in 10ml of saline- flush and administer slowly.
May be administered first line when PT is allergic to Zofran
Dystonic reactions:

- can occur with co-administration of psych meds.
- involuntary contractions of muscles in the extremities, face, neck, abdomen, pelvis, or larynx in either sustained or intermittent patterns that lead to abnormal movements or postures
- Treat with Benadryl 25-50mg IV/IM/IO

LR (Lactated Ringers), Normosol, Plasmalyte are acceptable substitutes for Normal Saline

Alternative Agents: To be used in times of drug shortage / Special Permission from Med Director

- Promethazine (Phenergan) 25mg IM x 1 - May only be given once IM (Not IV) Weight > 40kg

- Droperidol 1.25mg IV - May repeat x 1 - Very sedating / cause signifcant QT prolongation

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.**
- **Prochlorperazine (Compazine):**
  May cause sedative effects in pediatric patients and in ages ≥ 65, and the debilitated, etc.)

- 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 patholgy.

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
B	12 Lead ECG Procedure
	IV or 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**

Universal Protocol Section

Altered Mental Status

Pearls

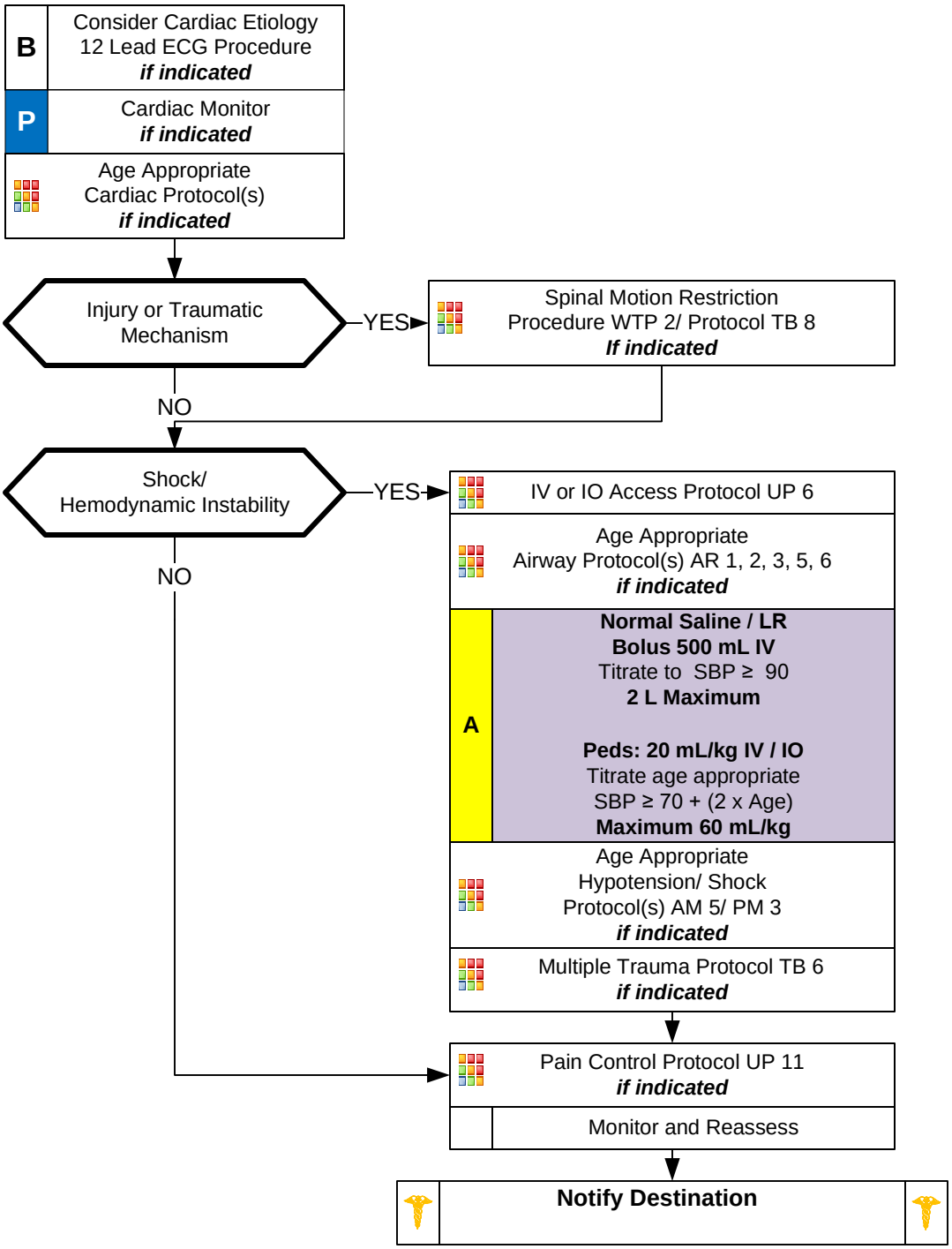
- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro.**
- **AMS may present as a sign of an environmental toxin or Haz-Mat exposure, protect personal safety.**
- **General:**
  - **The patient with AMS poses one of the most significant challenges.**
  - **A 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 medical 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



Universal Protocol Section

Back Pain

Consider Abdominal Aortic Aneurysm with severe back pain. Classic presentation is abdominal pain radiating to the back. A pulsatile mass may be felt on thin patients. Avoid Toradol in these patients

Consider Thoracic Aortic Dissection with severe upper back pain between the shoulder blades and chest pain.

Pearls

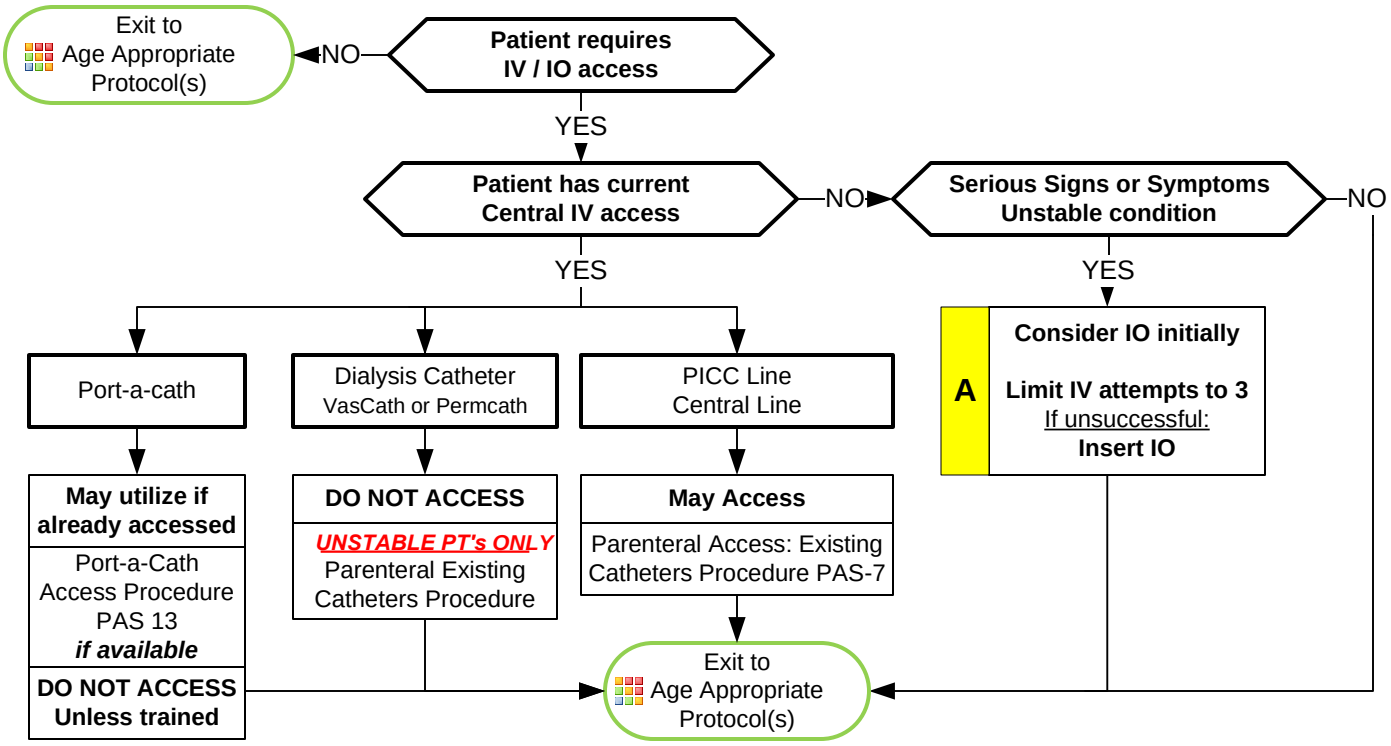
- **Recommended Exam: Mental Status, Heart, Lungs, Abdomen, Neuro, Lower extremity perfusion, Back**
- **Back pain is one of the most common complaints in medicine and affects more than 90% of adults at some point in their life. Back pain is also common in the pediatric population. Most often it is a 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 > 35, diabetics and/ or women especially with upper abdominal complaints.**
- **Red Flags which may signal a 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 (numbness between the genitalia and rectum)
  - 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 infection)
  - 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

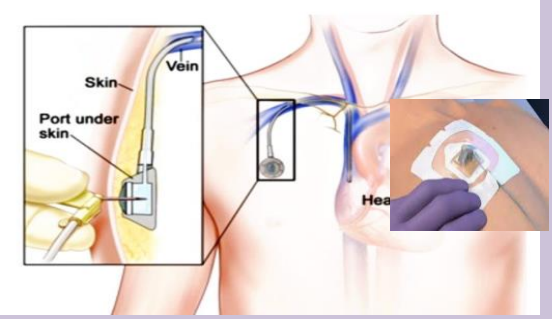
Pearls
- **Frequent encounter of patients with IV access devices and confusion as to which device can be accessed and used by EMS providers are common.**
- **If unclear about device use, always ask "Is this device used for dialysis?"**
- **When accessing central catheter, always ensure sterility of catheter 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:

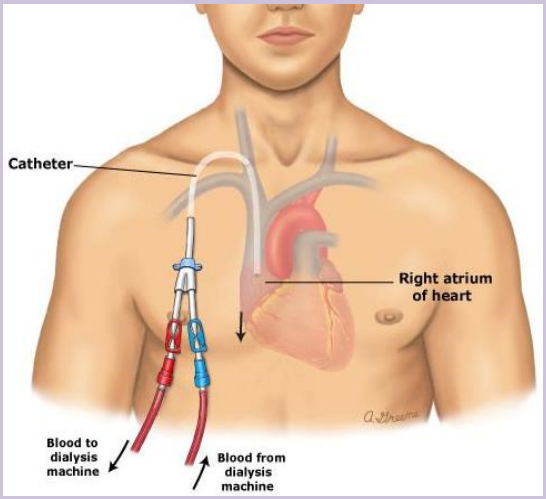
Port-a-Cath® :

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 may access this device with special training.
Paramedic may utilize if already accessed with needle/ extension.
Paramedic may access if trained on procedure with access to proper equipment / Huber Needle Only.



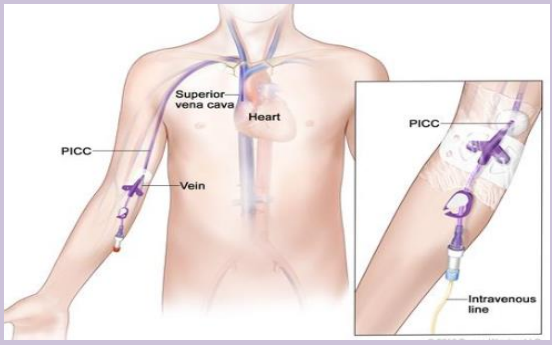
Dialysis Catheter:

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 MAY only access if PT UNSTABLE (Only if IV or IO access cannot be established.)



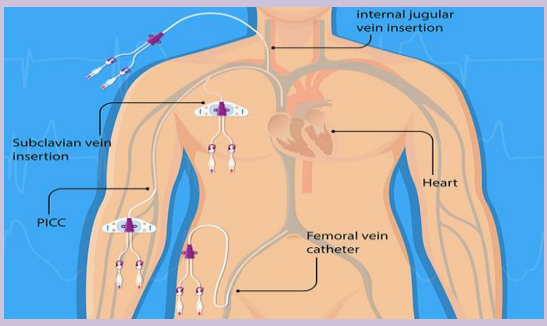
PICC (Peripherally Inserted Central Catheters):

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.



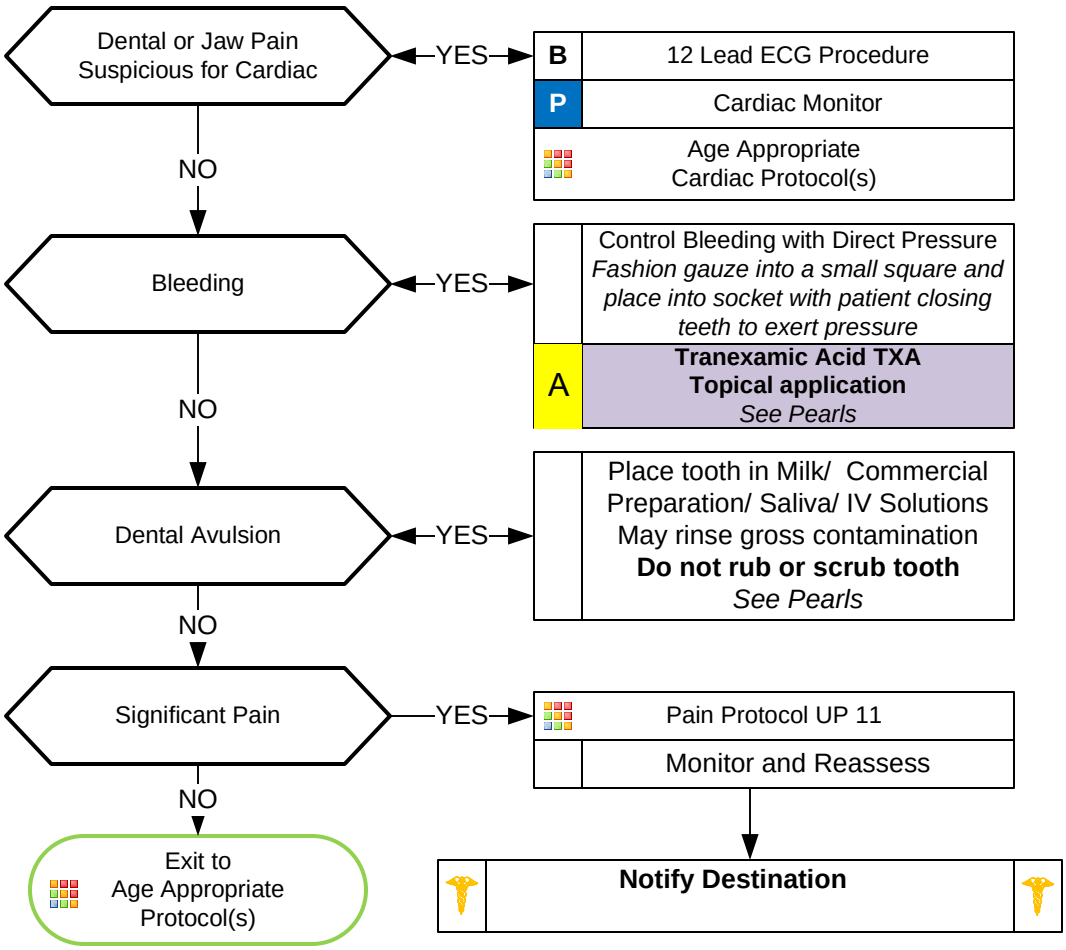
Universal Protocol Section

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, but unlikely when > 1 hour from time of injury.
- 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.
- **TXA Use in Dental Bleeding:**
  May be used topically.
  TXA offers modest benefit as TXA instilled gauze combined with direct pressure.
  ** May utilize TXA soaked gauze or nebulized for severe oral pharyngeal bleeding **

Emergencies Involving Indwelling Central Lines

History

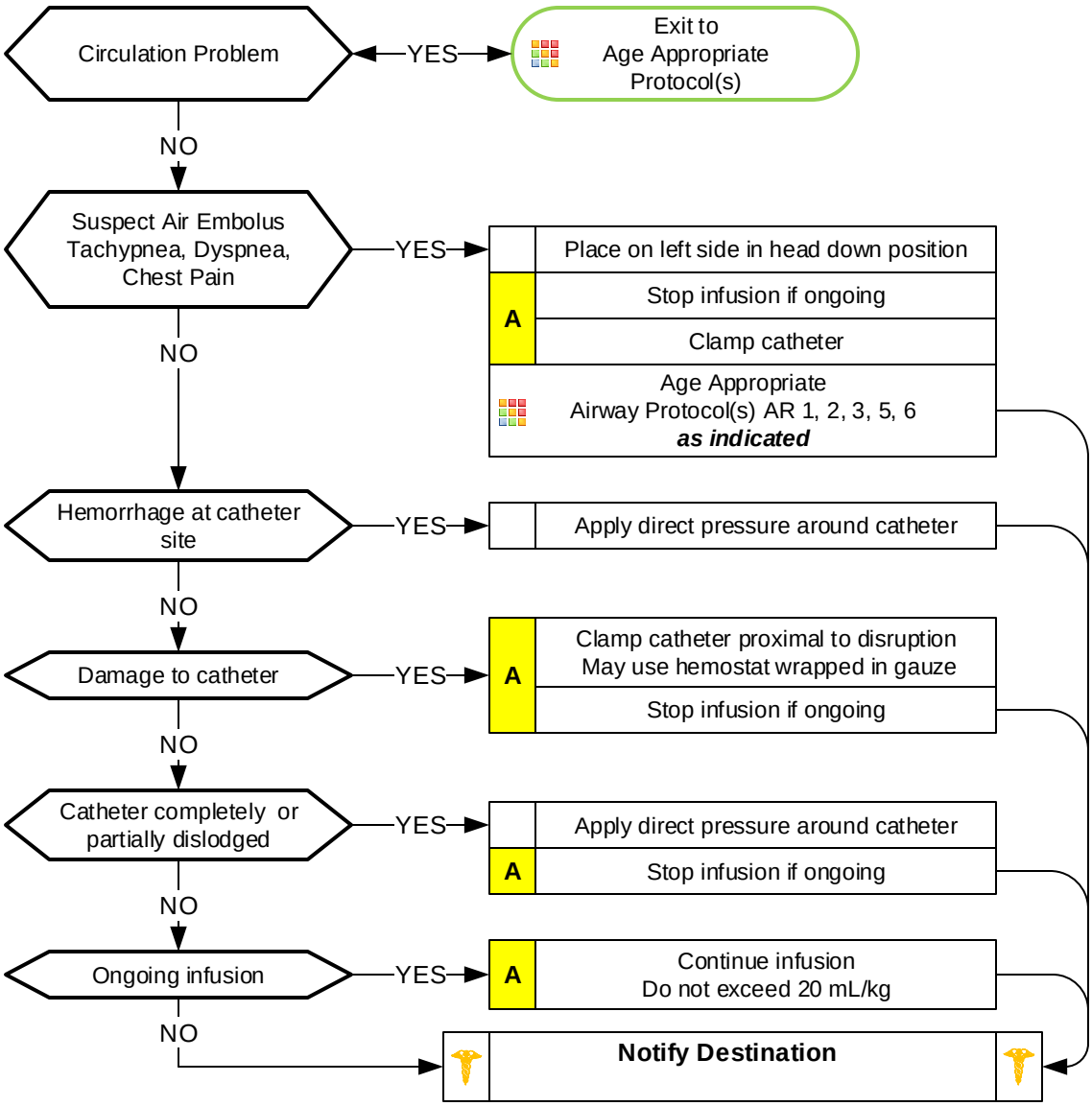
- Central Venous Catheter Type
  - Tunneled Catheter (Broviac / Hickman)
  - PICC (peripherally inserted central catheter
  - Implanted catheter (Mediport / Hickman)
- Occlusion of line
- Complete or partial dislodge
- Complete or partial disruption

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



Universal Protocol Section

Pearls

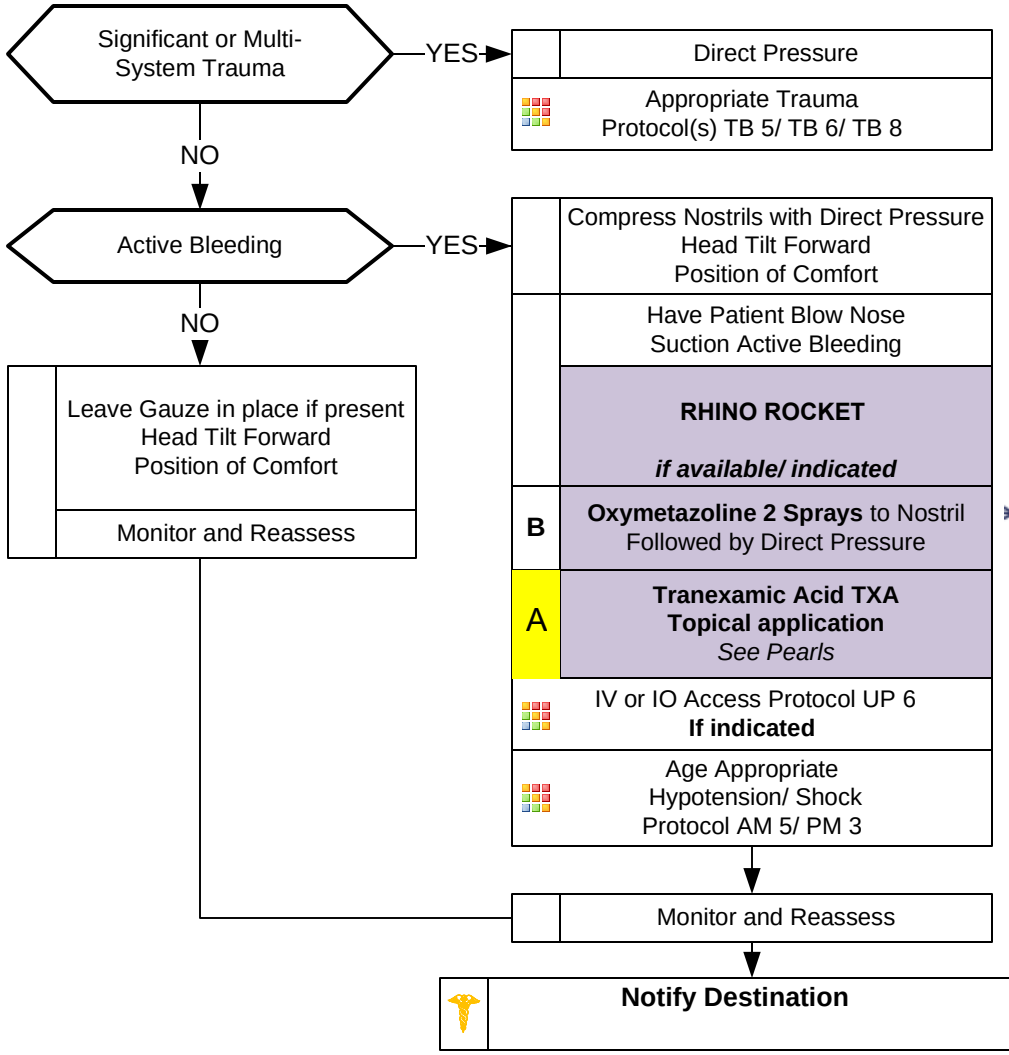
- **Always talk to family / caregivers as they have specific knowledge and skills.**
- **Use strict sterile technique when accessing / manipulating an indwelling catheter.**
- **Cardiac arrest: May access central catheter and utilize if functioning properly.**
- Do not attempt to force catheter open 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

A **May soak Rhino Rocket in TXA Before insertion**

A **Consider Nebulizing TXA 1 gram for severe bleeding**

** Reserve hemostatic devices for severe bleeds not stopped by traditional means **

Universal Protocol Section

Pearls
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Neuro**
- **TXA Use in Epistaxis:**
  May be used topically with or without rhino rocket. Have patient blow nose then apply with MAD device and resume compression of nostrils - May soak Merocel Nasal Packing with TXA after placement
  No clear evidence that TXA provides benefit over conventional vasoconstrictors and sustained direct pressure.
- 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

	Contact, Droplet, and Airborne Precautions See Pearls
B	Temperature Measurement Procedure ***if available***
	IV or IO Access Protocol UP 6 ***If indicated***

Temperature ≥ 100.4° F (38° C)

NO → Exit to Age Appropriate Protocol(s) ***as indicated***

YES →

B	**Ibuprofen 10 mg / kg PO** (if age > 6 months) **Adult Ibuprofen 400 – 600 mg PO** And / Or **Acetaminophen 15 mg / kg PO** **Adult Acetaminophen 325 – 1000 mg PO**
A	**Acetaminophen 1g/100mL IV over 15 min (Peds - 15mg/Kg IV over 15 min)**

Exit to Age Appropriate Protocol(s) ***as indicated***

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.
- Agency Medical Director may require contact of medical control prior to EMT/ EMR administering any medication.

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

B

Ibuprofen 10 mg/kg PO
(400 – 600 mg typical adult)
Maximum 800 mg
Or
Acetaminophen 15 mg/kg PO
(325 – 1000 mg typical adult)
Maximum 1000 mg
Or
Aspirin 324 to 650 mg PO
(≥ 16 only)

If no improvement
Consider
IV or IO Access Protocol UP 6
if indicated

Monitor and Reassess Pain
Every 10 minutes

Moderate to Severe

B **Nitrous Oxide 70:30 to 50:50 Mix NO/O_2**

IV or IO Access Protocol UP 6

A

Ketorolac 15 mg IV / IO -- 30 mg IM
Peds: 0.5 mg/kg IV / IO / IM - Max 30mg
Acetaminophen 1000mg /100mL IV over 15 min
Peds: 15 mg/kg IV over 15 minutes

P

Fentanyl 50 – 100 mcg IV / IO / IM / IN
Repeat every 5 minutes
Maximum 3 mcg/kg
Peds: 1 mcg/kg IV / IO / IM / IN
May repeat 0.5 mcg/kg every 5 minutes
Maximum 2 mcg/kg
Or
Morphine 4 mg IV / IO / IM
Repeat **2 mg** every 5 minutes as needed
Peds: 0.1 mg/kg IV / IO / IM
May repeat every 5 minutes
Maximum 10 mg

Ketamine 0.3 mg/kg IV / IO
Infuse or IV push over 10 minutes

May repeat every 20 minutes
Maximum 30 mg single dose

Maximum 3 total doses
Or
Ketamine 1 mg/kg IN
Maximum 1 total dose

Notify Destination

Universal Protocol Section

Pain Control

Acceptable Alternative Medications

- Dilaudid 0.5mg to 1mg IV / IO / IM - May repeat in 5 minutes - Max Dose 4mg
- Be very cautious Dilaudid (Hydromorphone) is approx 10x the strength of Morphine

Nitrous Oxide is a Schedule C controlled substance. Nonparamedic services wishing to utilize NO will need a controlled substance plan and a DEA License before implementation.

Pearls

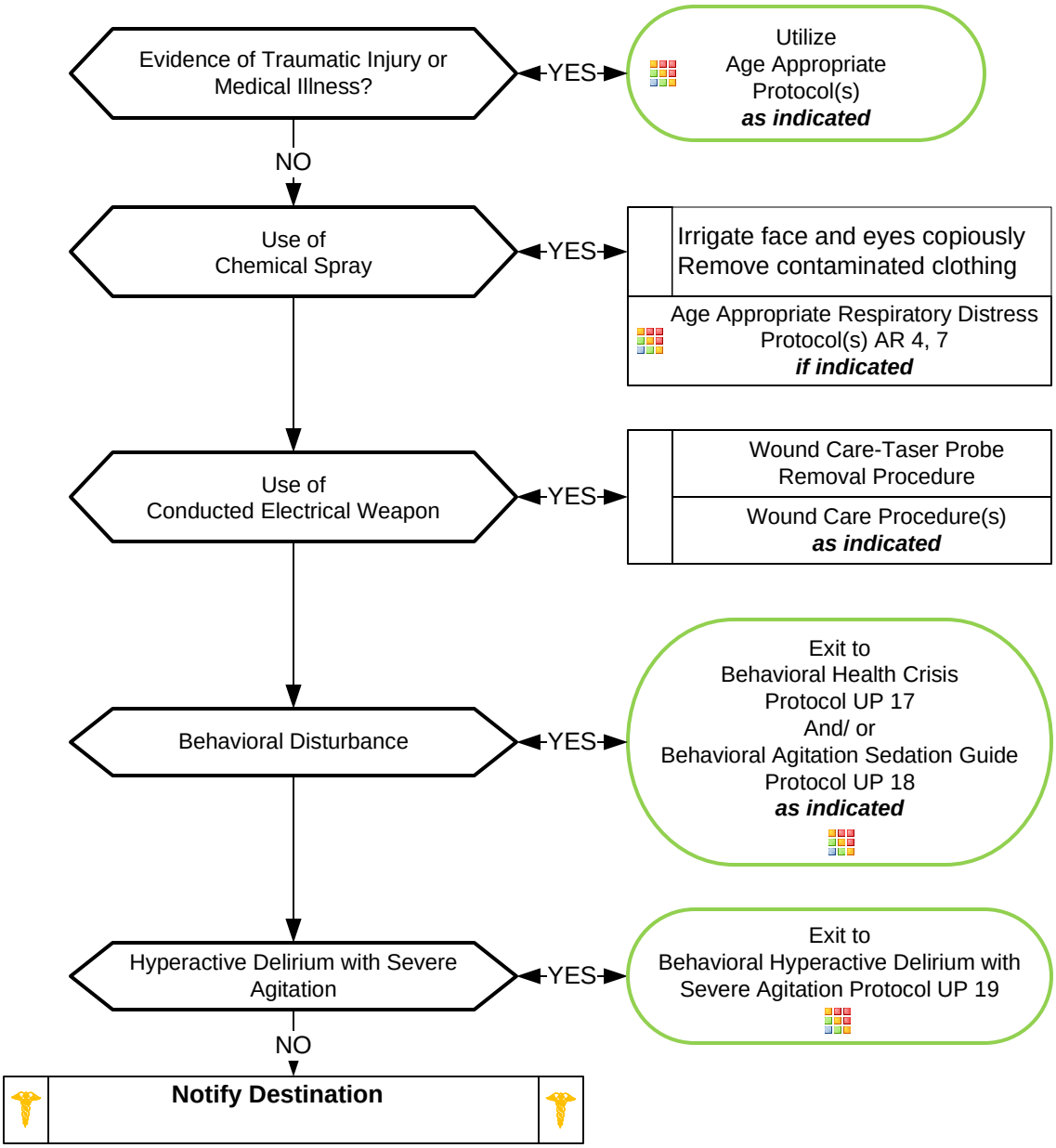
- **Recommended Exam: Mental Status, Area of Pain, Neuro**
- **Pain severity (0-10) is a vital sign to be recorded before and after PO, IV, IO or IM medication delivery and at patient hand off. Monitor BP closely as sedative and pain control agents may cause hypotension.**
- **Ketamine:**
  Ketamine 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 depressed respiratory drive.
- **Both arms of the treatment protocol 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 ASP 2)
  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.
- 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

Pearls

- **Patient does not have to be in police custody or under arrest to utilize this protocol.**
- **Local EMS agencies should formulate a policy with local law enforcement agencies concerning patients requiring EMS and Law Enforcement services simultaneously.**
- **Agencies should work together to formulate a disposition in the best interest of the patient.**
- **Patients restrained by law enforcement devices must be transported and accompanied by a law enforcement officer in the patient compartment who is capable of removing the devices. However, when rescuers have utilized restraints in accordance with Restraint Procedure, the law enforcement agent may follow the ambulance during transport.**
- **All patients who receive either physical and chemical restraint must be continuously observed by ALS personnel on scene or immediately upon their arrival.**
- 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 irritant/ 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 or Droperidol 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.**
- **<u>Hyperactive Delirium with Severe Agitation:</u>**
  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.
- Do not position or transport any restrained patient is such a way that could impact the patients respiratory or circulatory status.
- 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, 18, 19 ***if indicated***

Loosen any constrictive clothing
Protect patient

Active Seizure Activity → YES → IV / IO Access → YES

P **Midazolam 2 – 2.5 mg IV / IO**
May repeat every 3 to 5 minutes
Maximum 10 mg

Peds: Midazolam 0.2 mg/kg IV / IO
Maximum single dose 2.5 mg
May repeat every 3 to 5 minutes as needed
Maximum 10 mg

NO

NO

P **≥ 49 kg**
Midazolam 5-10 mg IM / IN
May repeat in 5 minutes if needed
Maximum 20 mg

< 49 kg
Midazolam 0.2 mg/kg IM / IN
Maximum single dose 5 mg

May repeat in 5 minutes if needed
Maximum 10 mg

P For seizures refractory to Benzo's:
Minimum: Two Benzo Doses

Ketamine 1mg/kg IV/IO

or

Levetiracetam (Keppra)
1 gram in 500cc NS
over 15 minutes IV/IO
Peds: 15 mg/kg of mixture
over 15 minutes
Max 1 gram

Blood Glucose Analysis Procedure

IV or IO Access Protocol UP 6 ***if indicated***

P Cardiac Monitor ***if indicated***

Monitor and Reassess

Notify Destination

Universal Protocol Section

Seizure

Alternative Seizure Medications

- Lorazepam 1-2 mg IV only (due to long onset)
- May repeat in 3-5 minutes Max Dose 4mg total

- Diazepam 5mg IV / IO Adults, Peds 0.1 - 0.3 mg/kg, Ped Rectal 0.5 mg/kg

- Ketamine 1mg/kg IV / IO x 1 -- use only if allergic to Benzodiazepines OR active seizures greater than 5 minutes refractory to Benzodiazepines

Active seizure in known or suspected pregnancy greater than 20 weeks,administer Magnesium Sulfate 2g IV/IO over 2-3 minutes, may repeat dose x1.

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 drugs 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 diazepam or midazolam is used.
- For any seizure in a pregnant patient, follow the AO 3 Obstetrical Emergencies Protocol.
- Midazolam (Versed) is shown to be as effective with IM route as Lorazepam (Ativan) is via the IV or IO route.
- Lorazepam (Ativan) is not as effective when administered IM. IV or IO route is preferred.
- Diazepam (Valium) is not effective when administered IM. Give IV or Rectally.
- **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

EMS Stroke Screen Assessment

Blood Glucose Analysis Procedure

Consistent with Acute Stroke

NO → Exit to Appropriate Protocol(s) ***as indicated***

YES

Determine:
1. Last Known Well Time
2. Time of Symptom Discovery

Time of Onset or Time Last Seen Normal < 24 Hours

YES → **Stroke Severity Screen Assessment**

NO

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

B 12 Lead ECG Procedure

IV or 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**

Transport based on:
STROKE
EMS Triage and Destination Plan

Keep Scene Time to ≤ 15 Minutes
Provide Early Notification of Destination Facility
Suspected Stroke Alert

Reperfusion Checklist Procedure ***if time allows completion***

B Cardiac Monitor

IV or IO Access Protocol UP 6
Preferably 2 Sites
See Pearls

A Venous Access Blood Draw Procedure ***if applicable***

P Cardiac Monitor

Persistent Hypertension:
If SBP ≥ 185 or DBP ≥ 110 mmHg
After 3 readings, 5 minutes apart

Contact Receiving Facility for guidance on hypertension treatment

Notify Destination

Universal Protocol Section

Suspected Stroke

All Stroke patients with LKWT < 24 hours are a CODE STROKE / STROKE ALERT
- All Patients in window, transport to - Vidant or CarolinaEast

Utilize Pulsara to activate CODE STROKE AT CarolinaEast
- Otherwise call EMS Line and clearly call CODE STROKE

Patients LKWT is 4.5 hrs - 24 hours with NEW SEVERE UNILATERAL DEFICITS May be flown or ground transported to Vidant due to suspicion of Large Vessel Occlusion.

Pearls

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, 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 may be changed at any time depending on the capabilities and resources of your regional hospital(s).**
- **Refer to your Stroke: EMS Triage and Destination Plan which should be updated when community resources change.**
- **Time of Onset or Last Seen Normal:**
  - **One of the most important items the pre-hospital provider can obtain, of which all treatment decisions are based.**
  - **Be very precise in gathering data to establish the time of onset and report as an actual time (i.e. 13:47 NOT "about 45 minutes ago.")**
  - **Without this information patient may not be able to receive thrombolytics at facility.**
  - **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, bystanders, witnesses, or family/ caregivers.**
- **Sources of information pertaining to Last Known Well Time or Symptoms Onset:**
  - **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 patient care.**
  - **Obtain contact information (phone number and name) of best witnesses and give to hospital 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 stroke centers utilize EMS venous blood samples. Follow your local policy and procedures.**
- The differential listed in the UP 4 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 EMS Stroke Screen, Stroke Severity Score, and Stroke Alert notification time in the ePCR or 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 ***if available***

Fever/ Infection Control Protocol UP 10 ***if needed***

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

B 12 Lead ECG Procedure

IV or 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 CEMC via Pulsara 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)

SBP + 2(DBP)
3
Monitor usually calculates this value on screen

Venous Access Blood Draw ***if applicable***

A **Normal Saline / LR**
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

A **Draw Blood Cultures - if equipped**
Rocephin 1g IV / IO

If age < 18 years
50 mg /kg up to
1 gram
over 10 minutes
see page 2

Age Appropriate Hypotension/ Shock Protocol AM 5/ PM 3

Notify Destination

Universal Protocol Section

Suspected Sepsis

Rocephin may be used for patients with mild allergy to penicillin. Avoid in severe allergies and anaphylaxis - Avoid when allergic to Cephalsporins - Keflex, Omnicef, Cefdinir, Cefuroxime

If less than age 18 - Rocephin dosage 50mg/kg - Max 1g over 10 minutes

Organizations may utilitize Zosyn 3.375g or 4.5g IV for Sepsis also

As of May 2025, One antibiotic is required.

Blood Cultures using Steripath is highly recommended but not required for nonhospital agencies.

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 distal 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 with 2 or more SIRS criteria (or qSOFA) along with organ dysfunction, such as AMS, hypotension, or hypoxia.**
- **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 ≥ 92%.**
- **EKG should be obtained with suspected sepsis, but should not delay care in order to obtain.**
- **Abnormally low temperatures increase mortality and are 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**).
- Allergies to NSAIDs (non-steroidal anti-inflammatory medications) are a contraindication to Ibuprofen.
- Agency Medical Director may require contact of medical control prior to EMT / MR administering any medication.
- **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
B	12 Lead ECG Procedure
	IV or 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***

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 → **A**

IV or IO Access Protocol UP 6
Consider 2 Large Bore sites

Normal Saline / LR
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)

NO

Notify Destination

Universal Protocol Section

Syncope

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Syncope is both loss of consciousness and loss of postural/ muscle tone with collapse. 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**

- **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, typically increases as dehydration becomes more severe.**
- Syncope with no preceding symptoms or event may be associated with an 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.
- In general 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 Health Crisis

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

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

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

Call for help
Call for additional resources
Stage prior to arrival
or
Wthdraw from scene until safe

Screen patient for weapons
Screen for scene safety

Assess for underlying medical or traumatic condition causing behavioral disturbance

Age Appropriate Protocol(s)

Establish rapport
- Genuine respect for feelings/ circumstances
- Active listening
- Eye contact and at meet at eye level

Create a quiet and safe environment
- Only 1 provider talks to patient to limit stimuli
- Decrease unnecessary stimuli

Identify major problem or crisis
- "What happened to upset you?"
- "How are you feeling right now?"

Assess for suicidal and/or homicidal thoughts

Identify major problem or crisis
- "What happened to upset you?"
- "How are you feeling right now?"

Exit to
Behavioral
Agitation/ Sedation Guide
UP 18
Hyperactive Delirium with Severe Agitation
UP 19
Age Appropriate Protocol(s)

Assess and score: BARS
Behavioral Activity Rating Scale

BARS

1 – Difficult or unable to wake

2 – Asleep, but responds normally to verbal or physical stimuli

3 – Drowsy, appears sedated

4 – Quiet and awake (normal activity)

5 – Overt activity (physical or verbal) Agitated but not disruptive

6 – Extremely or continuously active, Agitated, disruptive, but not violent

7 – Violent, requires restraint Agitated and violent

P
Evaluation and Screening
Mental Health and Substance Use Protocol
CIT Paramedic Only
if available
Page 3

Triage and Alternative Destination
Mental Health / Substance Abuse
if available
Page 3

Notify Destination

Universal Protocol Section

Behavioral Health Crisis

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Neurologic status**
- **Crew/ responders safety is the main priority. Call for assistance, stage, or withdraw from scene if necessary.**
- **Law Enforcement:**
  - **Any patient who is handcuffed or restrained by Law Enforcement and transported by EMS, must be accompanied by law enforcement during transport.**
  - **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 USP 6 Restraints: Therapeutic Take-down 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.**
- **General communications techniques**
  - **Ask Open-ended questions (questions that cannot be answered with a yes/no)**
    "Tell me how we can help you?" "What caused you to call 911 today?"
  - **Active listening (stay engaged, be able to summarize patient's story, use your body language to convey listening)**
    Eye contact, nodding your head, periodically repeating back part of patient's story
  - **Encouraging (remain positive, convey interest in patient's crisis)**
    "Tell me more about that…"
  - **Clarifying questions (ask patient to rephrase or repeat if you don't understand)**
    "I'm not sure I understand, can you…?"
  - **Emotional labeling (naming emotions patient is demonstrating, validating emotions**
    "You look upset." "You seem angry."
  - **Conversational pause (okay to allow a period of silence for patient to process information)**
- **Behavioral health disturbance incidents are increasing and commonly involve the following:**
  - **Substance misuse**
  - **Depression/ Anxiety/ Stress Reactions / Bipolar**
  - **Psychosis**
  - **Schizophrenia or schizophrenia-like illness**
- **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. Do not transport in prone position!**
- Maintain high-index of suspicion for medical, trauma, abuse, or neglect causes:
  Hypoglycemia, hyperglycemia, overdose, substance abuse, hypoxia, head injury, shock, sepsis, stroke, etc.
  Domestic violence, child or geriatric abuse/ neglect.
- **Extrapyramidal reactions:**
  Condition causing involuntary muscle movements or spasms typically of the face, neck and upper extremities. May present with contorted neck and trunk with difficult motor movements. Typically an adverse reaction to antipsychotic drugs like Haloperidol and may occur with your administration. When recognized, give **Diphenhydramine 50 mg IV / IO / IM / PO** in adults or **1 mg/kg IV / IO / IM / PO** in pediatrics, **Maximum 50 mg**.
- **May add page 3 to protocol for specific for local mental health and / or substance misuse resources or destinations.**

Behavioral CIT Paramedic (Optional - Not available)

Complete EMS CIT Behavioral Health Data Sheet

Complete EMS CIT Behavioral Assessment Form

This is a continuation of the Evaluation and Screening for Mental Health and Substance Abuse Procedure

Alternative Destinations other than Hospital ED
Call Access Line for all referrals:
Contact Number

If appropriate, contact Mobile Crisis:
Contact Number

- ☐ Blood/Vomit/Difficulty Breathing/Acute Medical Issue
- ☐ Blood Glucose <70 or >250 & symptomatic
- ☐ Head Trauma or fall in past 7 days
- ☐ In and out of consciousness
- ☐ Seizure activity in past 24 hours
- ☐ Unable to speak or walk
- ☐ On IVC or Emergency Custody
- ☐ Violent or Aggressive
- ☐ Provider can't see within 2 hours at alternative site
- ☐ Acute Withdrawal
- ☐ Hospital transport requested by patient
- ☐ BP ≥210/130 or ≥180/110 and symptomatic
- ☐ BAC > .35
- ☐ Oxygen Dependent

YES → **Transport to Emergency Department** → **Notify Destination**

NO

- ☐ Suicidal (with plan and/or intent)
- ☐ Homicidal Ideation
- ☐ Psychosis (auditory/visual hallucinations or delusions)
- ☐ Request for Detox
- ☐ Med Request during 8:00 am and 3:00pm and client can not wait until next day for meds

YES → **Contact Provider** → **Triage and Alternative Destination Mental Health / Substance Abuse**

NO

- ☐ No current suicidal ideation
- ☐ Anxiety/Panic
- ☐ Tearful crying with no suicidal plan or intent
- ☐ Med request in which EMS/Mobile Crisis able to triage and client is "ok" to go M-F for meds.

YES → **Treatment No Transport** → Contact Mobile Crisis

Contact Number
If needed

Alternative Destinations / Crisis Providers For Centerpoint

County		
Resource Agency	Resource Agency	Resource Agency
Hours of Operation	Hours of Operation	Hours of Operation

Universal Protocol Section

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

PO / ODT Medication
**** Optional ****
Haloperidol 5mg PO x 1
Lorazepam 1mg PO x 1
Benadryl 50mg PO x 1

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
Or Geodon 20mg IM
Age ≥ 65
2.5 mg IM
May repeat every 5 as needed
Maximum 10 mg
And
Midazolam 2.5 mg IV / IO / IN
5 mg IM
Age ≥ 65
1 – 2.5 mg IV / IO / IN
2.5 mg IM
Peds: 0.1 – 0.2 mg/kg
IV / IO / IM / IN
Repeat every 2-3 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

NO

Call for help
Call for additional resources
Stage prior to arrival
or
Withdraw from scene until safe

Behavioral Activity Rating Scale (BARS)

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 + Haldol 5mg IM

Age ≥ 65
Midazolam 5 mg IM

Pediatrics:
Midazolam 0.1 – 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 / LR 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

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

Alternative Medications

- Lorazepam 2 mg IV only (due to long onset) - May repeat in 3-5 minutes
Max Dose 4mg total

Haldol + Midazolam have synergistic properties and

it is recommended they are used together.

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 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.

Sickle Cell Crisis

History
- Past medical history
- Medications
- Recent illness
- Prior pain crisis location
- Pain regimen at home

Signs and Symptoms
- Pain
- One sided paralysis / weakness
- Difficulty walking / speaking
- Sudden vision changes
- Unexplained numbness
- Severe headache
- Fever
- SOB
- Chest Pain
- Abdominal Pain
- Pallor

Differential
- Sickle Celle Pain Crisis
- Aplastic Crisis
- Acute Chest Syndrome
- Alcohol / drug use
- Toxic ingestion
- Seizure
- Stroke
- Altered baseline mental status
- Sepsis
- Pneumonia

Apply Hot Packs to affected areas: especially joints and areas of increased pain

Provide emotional support Calm and continual reassurance

- **B** Blood Glucose Analysis as needed
  Assess Pain Severity
  12 Lead ECG Procedure
- IV or IO Access Protocol UP 6
- **P** Cardiac Monitor
- Altered Mental Status Protocol UP 4 ***if indicated***
- Manage Airway as appropriate Protocol AR 1 & AR 5 ***if indicated***
- Suspected Stroke Protocol UP 14 ***if indicated***
- Suspected Seizure Protocol UP 13 ***if indicated***
- Hypotension/ Shock Protocol AM 5 & PM 3 ***if indicated***

Fluids indicated if signs of shock or hypotensive

Sickle Cell Crisis
- Acute Chest Syndrome
- Abdominal Crisis
- Joint Crisis

YES

Pain Control Protocol UP 11

Notify Destination or Contact Medical Control

Universal Protocol Section

Sickle Cell Crisis

PEARLS

Patterns of an acute sickle cell crisis are now recognizable. They are based on the part of the body where the crisis occurs.
Is this their typical pain crisis? If not, what is different about it?
Any fever, SOB, pleuritic chest pain?

Acute chest syndrome:

Sudden acute chest pain with coughing up of blood can occur. Low-grade fevers can be present. The person is usually short of breath. If a cough is present, it often is nonproductive. Acute chest syndrome is common in a young person with sickle cell disease.
Chronic (long-term) sickle cell lung disease develops over time because the acute and subacute lung crisis leads to scarred lungs as well as other problems.

Abdominal crisis:

The pain associated with the abdominal crisis of sickle cell disease is constant and sudden. It becomes unrelenting. The pain may or may not be localized to any one area of the abdomen. Nausea, vomiting, and diarrhea may or may not occur.

Joint crisis:

Acute and painful joint crisis may develop without a significant traumatic history. Its focus is either in a single joint or in multiple joints. Often the connecting bony parts of the joint are painful. Range of motion is often restricted because of the pain. Avascular necrosis of the hips can occur, causing permanent damage.

Stroke:

Many sickle cell patients can present with strokes at a younger age than average. Ensure hospital pre-notification indicating it is a sickle cell patient as the standard of care for a Sickle Cell Stroke can involve exchange therapy as opposed to other treatments such as tPA.

AIRWAY - AR
Section

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
- A: Direct Laryngoscopy ***Optional***
- P: Airway Cricothyrotomy Surgical Procedure ***if indicated***

NO

Breathing/ Oxygenation
Support needed?

YES →
- Supplemental Oxygen
  BVM
  Maintain
  Oxygen Saturation ≥ 92 %
- B: Consider Airway NIPPV Procedure
- B: Airway BIAD Procedure ***if indicated***
- A: Oral/ Nasotracheal Intubation Procedure ***Optional***
- P: Chest Decompression Procedure ***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
Adult Failed Airway Protocol
AR 2

Notify Destination

Airway Respiratory Protocol Section

Adult Airway

Pearls

- **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 ≥ 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.
- Gastric tube placement should be considered in all intubated patients if available or time allows.
- 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 NPA/ OPA
Maintains
Oxygen Saturation ≥ 92 %

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

NO

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

Notify Destination

Airway Respiratory Protocol Section

Adult, Failed Airway

Pearls

- **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.
- Gastric tube placement should be considered in all intubated patients if available or time allows.
- 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, 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.

Preoxygenate 100% O2

IV or IO Access Protocol UP 6
2 points of access

P — Assemble Airway Equipment
Suction equipment
Alternative Airway Device

Hypoxic Or
Hypotensive Or
Dangerously Combative?

YES — DSI

P — **Ketamine 2 mg/kg IV / IO**

No IV or IO Access:
Ketamine 4 mg/kg IM
Maximum 400 mg

Pediatric: *See Pearls*
2 mg/kg IM
Maximum 400 mg

Correct Hypoxia and/ or Hypotension

Age Appropriate Airway Protocol(s) AR 1, 2, 5, 6, ***as indicated***

Hypotension/ Shock Protocol AM 5/ PM 3 ***as indicated***

Hypoxia corrected
Hypotension corrected
Dangerously Combative condition corrected

Patient still requires intubation

YES

NO

NO

P — **Etomidate 0.3 mg/kg IV / IO**
Or
Ketamine 2 mg/kg IV / IO
May repeat x 1

P — **Succinylcholine 2 mg/kg IV / IO**
Or
Rocuronium 1 mg/kg IV / IO
(if Succinylcholine contraindicated)
May repeat x 1

Intubate trachea

Placement Verified
Continuous Waveform Capnography

Consider Restraints Physical Procedure

P — Consider Gastric Tube Insertion Procedure

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
Key performance indicators used to evaluate protocol compliance.

A NCOEMS Airway Evaluation Form must be completed for every patient who receives Drug Assisted Airway.

Airway Respiratory Protocol Section

Airway, Drug Assisted

Adult DAI/RSI may be utilized if child longer than the Broslow tape

Ketamine may be utilized with Pediatrics with Medical Control authorization
- Paralytic use in pediatrics can only be approved by the Medical Director

Pearls

- **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 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.**
  - **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 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.
- 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.

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

IV or IO Access Protocol UP 6

P — Cardiac Monitor

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

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

A — Consider **Epinephrine 1:1000 0.3 – 0.5 mg IM** OR → A — Terbutaline 0.25 mg IM/SQ Every 15-30 minute

A — **Methylprednisolone 125 mg IV / IO / IM**

A — **Magnesium Sulfate 2g IV / IO** Infuse over 10 – 20 minutes

Notify Destination

Airway Respiratory Protocol Section

Adult COPD/ Asthma Respiratory Distress

Terbutaline 0.25 mg IM/SQ every 15-30 minutes - Max 0.5 mg

Manual Draw Up of Epi has been approved by Dr Koontz and OEMS

Pearls

- **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, COPD, Asthma, Reactive Airway Disease, or bronchospasm.**
- **Patients may also have wheezing and respiratory distress with viral upper respiratory tract infections and pneumonia.**
- **Pulse oximetry should be monitored continuously and consider End-tidal CO_2 monitoring 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 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, and/ or CHF.**
  - **Consider early in treatment course.**
  - **Consider removal if SBP remains < 100 mmHg and not responding to other treatments.**
- 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 and may be given by autoinjector / Manual** Manual Epi draw-up has been approved by Dr Koontz and the NC office of EMS.
  - **Administration of diphenhydramine is limited to the oral route only**.
- **EMT administration of beta-agonist (Albuterol) DOES NOT REQUIRE MEDICAL CONTROL. Albuterol may be Patient's prescription or from EMS Supply.**

Pediatric 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
-Bag-valve mask (BVM) +/- PEEP

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
- A: Direct Laryngoscopy ***Optional***
- P: Airway Cricothyrotomy Needle Procedure **See Pearls Section**

NO

Breathing / Oxygenation Support needed → YES

- Supplemental Oxygen
  BVM
  Maintain
  Oxygen Saturation ≥ 92 %
- B: Airway BIAD Device Procedure ***if indicated***
- A: Oral / Tracheal Intubation Procedure ***Optional***
- P: Chest Decompression Procedure ***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

Airway Respiratory Protocol Section

Pediatric Airway

Pearls

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 ≥ 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.
- **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 only.

  Agencies using Ketamine in the pediatric population must also be using in their adult population.
- **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.
  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.
  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: D**isplaced tracheostomy tube/ ETT, **O**bstructed tracheostomy tube/ ETT, **P**neumothorax and **E**quipment failure.

Pediatric 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

Call for additional resources if available

Failed Aiway

BVM
Adjunctive Airway NP/ OP
Maintains
Oxygen Saturation ≥ 92%

YES → Continue BVM
Supplemental Oxygen

Exit to
Appropriate
Protocol(s)

NO

A Airway Video Laryngoscopy Device Procedure ***if available*** ***Optional***

B Attempt
Airway Blind Insertion Airway Device Procedure

P Airway Cricothyrotomy Needle Procedure **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%

Notify Destination

Airway Respiratory Protocol Section

Pediatric Failed Airway

Pearls

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 ≥ 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.**
- **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 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.**
  - **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.**
  - **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: D**isplaced 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 / Distractability
- Cyanosis
- Poor feeding
- JVD / Frothy Sputum
- Hypotension

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

Pediatric Airway Protocol(s) 3, 5 - 7 ***as indicated***

Pediatric Allergic Reaction/ Anaphylaxis Protocol PM 1 ***as indicated***

B — 12 Lead ECG Procedure

IV or 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

Consider
Epinephrine 1:1000
0.01 mg / kg IM OR
Maximum 0.3 mg

A — **Terbutaline 0.25 mg IM/SQ Every 15-30 minute**

A — **Methylprednisolone 2 mg / kg**
IV / IO / IM
Maximum 125 mg

A — **Magnesium Sulfate 40 mg/kg IV / IO**
Infuse over 10 – 20 minutes
Maximum 2 gm

Notify Destination

Airway Respiratory Protocol Section

Pediatric Asthma
Respiratory Distress

Terbutaline 0.25 mg IM/SQ every 15-30 minutes - Max 0.5mg

Pearls

- **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 should be monitored continuously and consider End-tidal CO2 monitoring 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 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 permitted from EMS Supply - No Medical Control Required**

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%
Ventilate Age Appropriate breaths/ minute
See Pearls

B
- Maintain EtCO2 35 – 45
- 12 Lead ECG Procedure ***as indicated***

- IV or IO Access Protocol UP 6 (preferably 2 sites)

P
- Cardiac Monitor
- Transport Ventilator Procedure ***If available***

- Mechanical Ventilation Adult Protocol AR 11 ***If available***

Is Sedation Needed?
(Awakening or Moving after Intubation / BIAD Placement Evidence of Anxiety / Agitation)

NO → **Propofol** Interfacility Transfer Protocol / Policy ***If available*** *See Pearls*

YES

P

Ketamine 1.5 – 2.0 mg / kg IV / IO

Fentanyl 50 - 75 mcg IV / IO
Repeat every 5 minutes as needed
Maximum 300 mcg
Pediatric: 1 mcg / kg IV / IO / IN
May repeat **0.5 mcg / kg** every 5 minutes as needed
Maximum 2 mcg / kg

Or

Morphine 4 mg IV / IO
Repeat **2 mg** every 5 minutes as needed
Maximum 10 mg
Pediatric: 0.1 mg / kg IV / IO
May repeat **0.1 mg / kg** every 5 minutes as needed
Maximum single dose 5 mg
Maximum 10 mg

Midazolam 2 - 2.5 mg IV / IO
Repeat every 3 – 5 minutes as needed
Maximum 10 mg
Pediatric: 0.1 – 0.2 mg / kg IV / IO / IN

Consider paralytic If needed for patient movement.
Vecuronium 10 mg (0.1 mg/kg) IV / IO

Or

Rocuronium 0.6 – 1.2 mg/kg IV / IO x1
Not indicated in Pediatrics

Seizure Like Activity or Significant Head Injury - Consider Keppra 1gm IV over 15 minutes

Notify Destination or Contact Medical Control

Post-intubation/ BIAD Management

Rocuronium 1mg/kg IV/IO is an acceptable substitute for Vecuronium

If seizure like activity and/or head injury consider Levetiracetam (Keppra) 1000mg IV over 15 minutes for seizure prevention.

Pearls

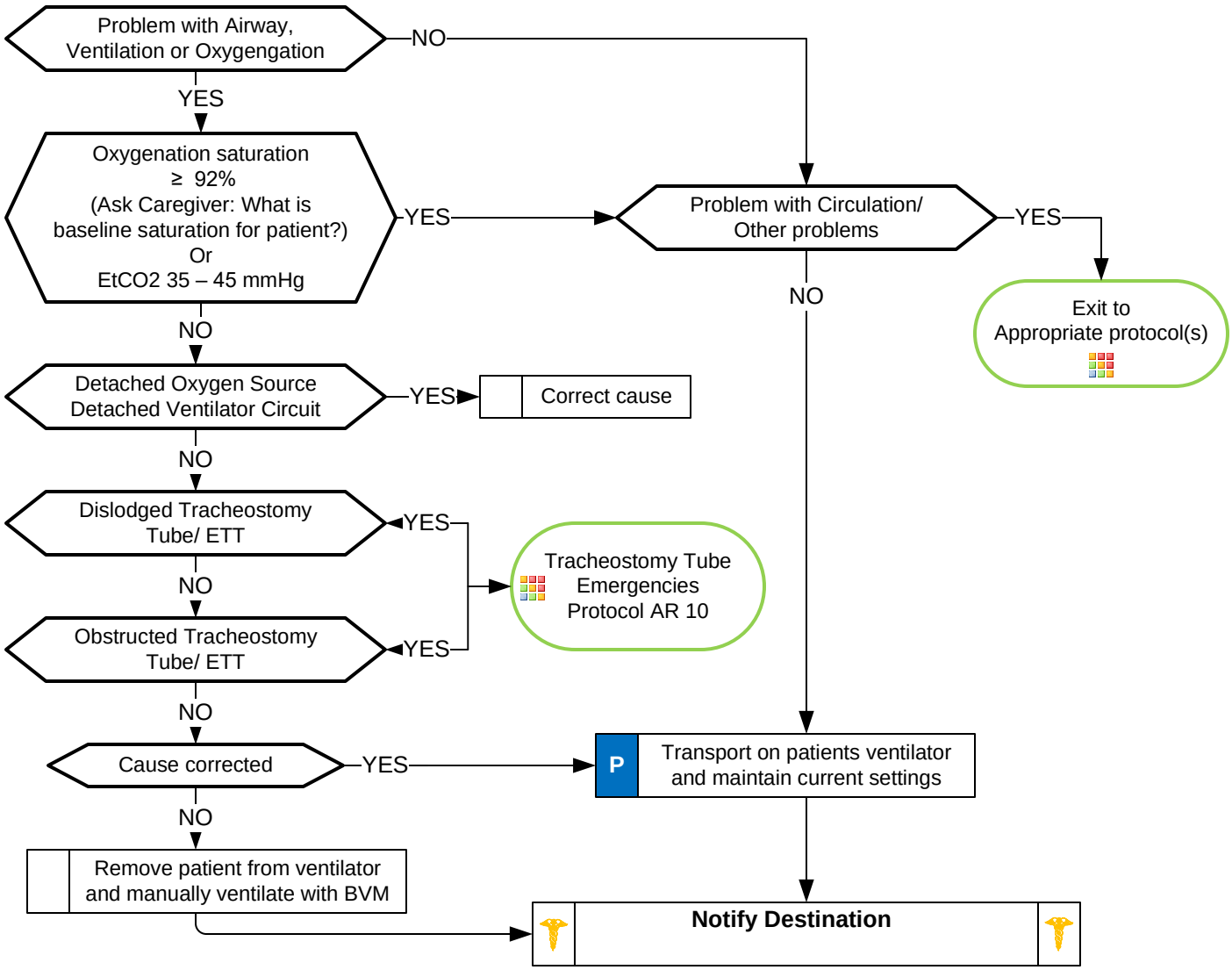
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Neuro**
- **Patients requiring advanced airways and ventilation commonly experience pain and anxiety.**
- **Unrelieved pain can lead to increased catecholamine release, ischemia, immunosuppression, and prolonged hospitalization.**
- **Ventilated patients cannot communicate pain/ anxiety and providers are poor at recognizing pain/ anxiety.**
- **Vital signs such as 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 opioids, 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.**
- **Propofol:**
  - Use restricted to agencies approved by the OEMS State Medical Director.
  - Agencies must submit a use policy and education plan to the OEMS.
  - Infusion must be supplied and initiated by a medical facility and may be used only during interfacility transfer.
  - Paramedic may titrate infusion to maintain appropriate sedation but cannot initiate or bolus the medication.
- 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

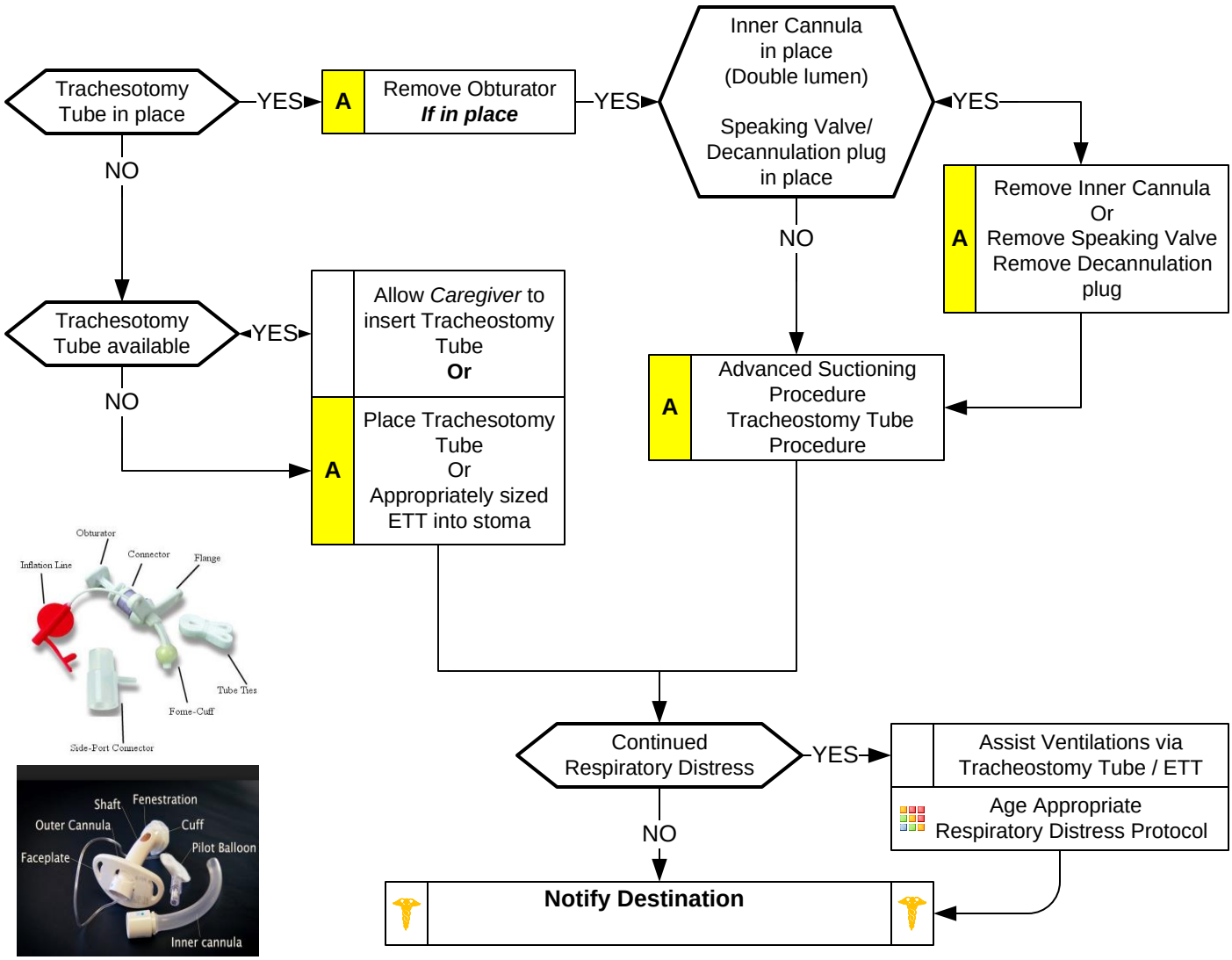
Pearls
- **Always talk to family/ caregivers as they have specific knowledge and skills.**
- **If using the patient's ventilator bring caregiver knowledgeable in ventilator operation during transport.**
- **Take patient's ventilator to hospital even if not functioning properly.**
- Always use patient's equipment if available and functioning properly.
- Continuous pulse oximetry and End Tidal CO_2 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.

Mechanical Ventilation; Adult

History
- Multiple etiologies leading to need for advanced airway control
- Requires ventilation support
- Height and underlying lung conditions

Signs and Symptoms
- Loss of consciousness or AMS with inability to protect airway
- Difficult oxygenation and/or ventilation
-

Differential
- ROSC
- Trauma
- Stroke
- Seizure
- Shock (see Shock Protocol)
- Toxicological

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

Post-intubation/BIAD Management Protocol AR 8 ***if indicated***

History of COPD or Asthma?

NO

P

MODE: Volume – Assist Control

FiO_2: 100%

PEEP: 5 cmH_2O

TIDAL VOLUME (V_t): 8 mL/kg
Follow PBW and V_t on page 3

BPM: RESPIRATORY RATE: 18 BPM

FLOW RATE: 60 mL/min *(preset)*

Check Plateau Pressure
Press Manual Breath
P Pressure button
Goal Pressure < 30 cm/H_2O

Decrease Tidal Volume
1 mL/kg increments
Until ≤ 29 **cm/H_2O**
(DO NOT DECREASE < 4 mL/kg)

P

After 10 minutes
Decrease FiO_2 down to 50%
Then adjust PEEP and FiO_2
Goal SpO2 92 – 98%

Step 1: **PEEP =10 FiO_2 =50%**

Step 2: **PEEP =10 FiO_2 =60%**

Step 3: **PEEP =10 FiO_2 =70%**

Step 4: **PEEP =12 FiO_2 =70%**

Step 5: **PEEP =14 FiO_2 =70%**

Alarming Ventilator and unsure how to troubleshoot

- Immediately disconnect patient and use BVM.
- Once oxygenation and ventilation stabilized, restart ventilator set-up procedure.

Home Ventilator
Inter-facility Transfer with Ventilator

- Set initial parameters to home or facility settings
- Titrate to oxygenation, work of breathing, SpO_2, and $EtCO_2$.
- Use home ventilator if functioning properly.

YES

P

MODE: Volume – Assist Control

FiO_2: 100%

PEEP: 5 cmH_2O

TIDAL VOLUME: 8 mL/kg
Follow PBW and V_t on page 3

BPM: RESPIRATORY RATE: 12 BPM

FLOW RATE: 60 mL/min *(preset)*

I:E Ratio
Increase to 1:4 or 1:5

Check Plateau Pressure
Press Manual Breath
P Pressure button
Goal Pressure < 30 cm/H_2O

Decrease Tidal Volume
1 mL/kg increments
Until ≤ 29 **cm/H_2O**
(DO NOT DECREASE < 4 mL/kg)

P

Check Peak Inspiratory Pressure (PIP)
Goal V_t is 8 mL/kg

ADJUST PIP Alarm Settings
- Up until full exhalation achieved on 8 mL/kg Tidal Volume

Notify Destination

Universal Protocol Section

Mechanical Ventilation; Adult

If home ventilator patient is being transported non-emergency, family may manage ventilator
Only a EMT-B (basic) crew is needed for the non-emergency transport
** Does not apply to emergency or critical care transport !! **

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Mechanical ventilation may be used in any patient ≥ 1 year old.**
- **MODE:**
  - **In all adult patients use Volume – Assist Control.**
  - **This mode requires adequate sedation as it can be uncomfortable in a patient who is awakening.**
- **TIDAL VOLUME:**
  - **Tidal volume is very important in preventing lung injury and calculated by height and predicted body weight, or ideal body weight, and NOT actual body weight.**
  - **Follow Tidal Volume by Height Table on page 3.**
  - **Follow Tidal Volume by Height Table on page 3 when adjusting Peak Inspiratory Pressure alarms to allow full exhalation.**
  - **High Tidal Volumes are well known to cause alveolar damage and lung injury.**
- **FLOW RATE:**
  - **A normal breath (non-mechanical ventilation) has highest flow and volume at the beginning and both decrease as inspiration comes to an end.**
  - **Setting Flow Rate at 60 L/minute allows patient to take full breath without air hunger toward end of inspiration. This is more comfortable for the patient.**
  - **If patient looks like they are trying to take in more volume initially, the Flow Rate can be increased by increments of 5 as needed to improve patient comfort.**
- **FiO_2 and PEEP Adjustments:**
  - **Seems intuitive that when SpO_2 is less than desired the FiO_2 should be increased.**
  - **When FiO_2 is ≥ 50% and SpO_2 remains low, this indicates a shunt, and PEEP must be used in conjunction with FiO_2 to correct the shunt and increase oxygenation.**
  - **Follow PEEP adjustment recommendations on page 1.**
- **$EtCO_2$:**
  - **EtCO_2 and arterial CO_2 do not always correlate well in patients with lung disease or during serious illness or injury.**
  - **Use caution in adjusting respiratory rate to reach a goal of 35 – 45 mmHg. Most intubated patients do not need tight control in this range.**
  - **Patients with suspected head injury do need EtCO2 with a target of 35 – 45 mmHg.**
  - **Allowing patients with COPD and asthma exacerbations to have higher EtCO2 outside the 35 – 45 mmHg range is acceptable. Lower ventilation rates allow more time for exhalation and prevents auto-PEEP and/ or air trapping.**
- **DOPE: D**isplaced tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment failure.

Mechanical Ventilation; Adult

TIDAL VOLUME INITIAL SETTINGS By HEIGHT

FEMALE
Height / Predicted body weight / Vt

HEIGHT	PBW	4 ml	5 ml	6 ml	7 ml	8 ml
4' 0" (48)	17.9	72	90	107	125	143
4' 1" (49)	20.2	81	101	121	141	162
4' 2" (50)	22.5	90	113	135	158	180
4' 3" (51)	24.8	99	124	149	174	198
4' 4" (52)	27.1	108	136	163	190	217
4' 5" (53)	29.4	118	147	176	206	235
4' 6" (54)	31.7	127	159	190	222	254
4' 7" (55)	34	136	170	204	238	272
4' 8" (56)	36.3	145	182	218	254	290
4' 9" (57)	38.6	154	193	232	270	309
4' 10" (58)	40.9	164	205	245	286	327
4' 11" (59)	43.2	173	216	259	302	346
5' 0" (60)	45.5	182	228	273	319	364
5' 1" (61)	47.8	191	239	287	335	382
5' 2" (62)	50.1	200	251	301	351	401
5' 3" (63)	52.4	210	262	314	367	419
5' 4" (64)	54.7	219	274	328	383	438
5' 5" (65)	57	228	285	342	399	456
5' 6" (66)	59.3	237	297	356	415	474
5' 7" (67)	61.6	246	308	370	431	493
5' 8" (68)	63.9	256	320	383	447	511
5' 9" (69)	66.2	265	331	397	463	530
5' 10" (70)	68.5	274	343	411	480	548
5' 11" (71)	70.8	283	354	425	496	566
6' 0" (72)	73.1	292	366	439	512	585
6' 1" (73)	75.4	302	377	452	528	603
6' 2" (74)	77.7	311	389	466	544	622
6' 3" (75)	80	320	400	480	560	640
6' 4" (76)	82.3	329	412	494	576	658
6' 5" (77)	84.6	338	423	508	592	677
6' 6" (78)	86.9	348	435	521	608	695
6' 7" (79)	89.2	357	446	535	624	714
6' 8" (80)	91.5	366	458	549	641	732
6' 9" (81)	93.8	375	469	563	657	750
6' 10" (82)	96.1	384	481	577	673	769
6' 11" (83)	98.4	394	492	590	689	787
7' 0" (84)	100.7	403	504	604	705	806

MALE
Height / Predicted body weight / Vt

HEIGHT	PBW	4 ml	5 ml	6 ml	7 ml	8 ml
4' 0" (48)	22.4	90	112	134	157	179
4' 1" (49)	24.7	99	124	148	173	198
4' 2" (50)	27	108	135	162	189	216
4' 3" (51)	29.3	117	147	176	205	234
4' 4" (52)	31.6	126	158	190	221	253
4' 5" (53)	33.9	136	170	203	237	271
4' 6" (54)	36.2	145	181	217	253	290
4' 7" (55)	38.5	154	193	231	270	308
4' 8" (56)	40.8	163	204	245	286	326
4' 9" (57)	43.1	172	216	259	302	345
4' 10" (58)	45.4	182	227	272	318	363
4' 11" (59)	47.7	191	239	286	334	382
5' 0" (60)	50	200	250	300	350	400
5' 1" (61)	52.3	209	262	314	366	418
5' 2" (62)	54.6	218	273	328	382	437
5' 3" (63)	56.9	228	285	341	398	455
5' 4" (64)	59.2	237	296	355	414	474
5' 5" (65)	61.5	246	308	369	431	492
5' 6" (66)	63.8	255	319	383	447	510
5' 7" (67)	66.1	264	331	397	463	529
5' 8" (68)	68.4	274	342	410	479	547
5' 9" (69)	70.7	283	354	424	495	566
5' 10" (70)	73	292	365	438	511	584
5' 11" (71)	75.3	301	377	452	527	602
6' 0" (72)	77.6	310	388	466	543	621
6' 1" (73)	79.9	320	400	479	559	639
6' 2" (74)	82.2	329	411	493	575	658
6' 3" (75)	84.5	338	423	507	592	676
6' 4" (76)	86.8	347	434	521	608	694
6' 5" (77)	89.1	356	446	535	624	713
6' 6" (78)	91.4	366	457	548	640	731
6' 7" (79)	93.7	375	469	562	656	750
6' 8" (80)	96	384	480	576	672	768
6' 9" (81)	98.3	393	492	590	688	786
6' 10" (82)	100.6	402	503	604	704	805
6' 11" (83)	102.9	412	515	617	720	823
7' 0" (84)	105.2	421	526	631	736	842

TROUBLESHOOTING Hypoxia or Deterioration DOPES	
D	Dislodged ETT or cuff leak
O	Obstruction of ETT or circuit
P	Pneumothorax, Pneumonia, Pulmonary embolism or edema, Plug (mucous)
E	Equipment problem
S	Stacked breaths, air trapping, or auto-PEEP

RESPONSE to Hypoxia or Deterioration DOTT	
D	Disconnect ventilator, squeeze chest if auto-PEEP, Decompress if pneumothorax
O	Oxygen 100% FiO2, BVM and check compliance
T	Tube position and function, check EtCO2
T	Tweak ventilator settings or equipment

Pressure Alarm Troubleshooting			Problem Location	Consider
High PIP	+	High Plateau > 30	Alveoli	Compliance problem: Pneumothorax, Pneumonia Pulmonary Edema or Embolism, CHF
High PIP	+	Normal Plateau < 30	Airway problem	Airway, ventilator, or circuit problem: DOPE, Right Main stem intubation, Air trapping or auto-PEEP, Mucous plug, Patient out of synchrony with ventilator

ADULT CARDIAC
AC SECTION

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

AED Procedure
if available

P — Cardiac Monitor

IV or IO Access Protocol UP 6

A — **Epinephrine (1:10,000) 1 mg IV / IO**
Repeat every 5 minutes - Max 3 doses

Normal Saline Bolus 500 mL IV / IO
May repeat as needed
Maximum 2 L

Search for Reversible Causes

Blood Glucose Analysis Procedure
if applicable

P — **Consider Bicarbonate 8.4 %**
50-100 mEq IV / IO

On Scene Resuscitation / Termination of Resuscitation Protocol(s) AC 12
as indicated

Notify Destination

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

Reversible Causes
Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

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

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

Adult Cardiac Protocol Section

Adult Asystole / Pulseless Electrical Activity

If Epinephrine is unavailable due to drug shortage - Substitute - Vasopressin 40 Units IV x 1

Epinephrine 1:10K IV/IO - 3 dose Limit (1mg q 5 minutes x 3)
- If Rosc may utilize Epi drip or push dose Epi for hypotension.

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional Team Focused CPR Protocol AC 11 or development of local agency protocol.**
- **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 optional in agencies practicing 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 Protocol 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***
- **B** Search for Reversible Causes
- **B** 12 Lead ECG Procedure
- IV / IO Protocol UP 6
- **P** Cardiac Monitor
- **A** **Normal Saline / Lactate Ringers 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 mmHg Or **Dopamine 2 – 20 mcg/kg/min IV / IO** Titrate to SBP ≥ 90 mmHg
- **P** **Levophed 2-12 mcg/min IV / IO**
- **P** **If No Improvement Transcutaneous Pacing Procedure** ***(Consider earlier in 2nd or 3rd AVB)***

P Consider Sedation
Midazolam 2 – 5 mg IV / IO / IM / IN
Maximum 10 mg

Notify Destination

Suspected Beta-Blocker or Calcium Channel Blocker
Follow Overdose/ Toxic Ingestion Protocol TE 7

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

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

Adult Cardiac Protocol Section

Bradycardia; Pulse Present

Levophed & Dopamine are Pre-Mixed

If Epi Drip not available Pre-Mix use below mixing instructions:

"Dirty" or "Easy" Epi Drip Mixing Instructions

Inject 1mg of Epi into 1000cc Bag of Normal Saline - Epi can Be 1:1000 or 1:10K - does really matter in big scheme

Concentration will be 1 mcg/ml

The maximum rate of infusion will vary with catheter size, IV bag height, and squeeze on the bag; however, with a wide-open 18-gauge IV, the patient will receive about 20-30 mL/min (or 20-30 mcg/min) of epinephrine, which is similar to the recommended push-dose epi (0.1 mg or 100 mcg over 5 minutes = 20 mcg per minute)

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

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 ***if available***

YES → **P** Cardiac Monitor

NO ← Shockable Rhythm → YES

NO → AED Procedure

Continue CPR
2 Minutes

Repeat and reassess

Airway
Protocol(s) AR 1, 2, 3

NO ← Shockable Rhythm → YES

Asystole / PEA
Protocol AC 1
as indicated

Airway
Protocol(s) AR 1, 2, 3

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 2-4mg IN / IM
Peds: 0.1 mg/kg IN / IM

Maximum 4 mg

A

Naloxone 2 - 4 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

Adult Cardiac Protocol Section

Cardiac Arrest; Adult

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assign responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **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 optional in agencies practicing 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 Protocol 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.
- **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.

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**
	Aspirin 81 mg x 4 PO (chewed) Or **325 mg PO**
	Nitroglycerin 0.3 / 0.4 mg Sublingual Repeat every 5 minutes x 3 ***if prescribed to patient and (BP ≥ 100)***
P	Cardiac Monitor

Acute MI / STEMI
See box to right

YES →

TRANSPORT ONLY TO PCI Center

VIDANT OR CEMC

EARLY NOTIFICATION

Use PULSARA for CEMC

B	*If transporting to Non PCI Center* **Reperfusion Checklist**
P	Heparin IV Bolus 50 units/kg IV x 1 Max 5,000 units

NO ↓

	IV / IO Protocol UP 6
A	**Nitroglycerin 0.3 / 0.4 mg SL** Repeat every 5 minutes as needed
	Not for Use in STEMI - CP only **Nitroglycerin Paste** **See Next Page for Dosing**
P	**Morphine 2 – 4 mg IV / IO** Repeat every 5 minutes as needed **Maximum 10 mg** **Or** **Fentanyl 50 – 100 mcg IV / IO** Repeat every 5 minutes as needed **Maximum 300 mcg**
	Hypotension / Shock Protocol AM 5 ***if indicated***
	CHF / Pulmonary Edema Protocol AC 5 ***if indicated***

*** IMPORTANT ***
Pulsara is the prefered notificaton method for STEMI - If not available, Text ekg to 252-474-2337 and call STEMI Hotline 1-866-980-7223 to activate

Acute MI / STEMI

STEMI Definition:
- **≥ 1 mm ST Segment elevation in ≥ 2 contiguous leads**
- **≥ 2 mm ST/J point elevation in V2-V3 for men**
- **≥ 1.5 mm ST/J point elevation in V2-V3 for women**
- **NO IMPOSTERS**
  LBBB, LVH, PACER
  USE
  Modified Sgarbossa's Criteria

***** Consider placing 2 IV sites in the left arm *****
Many PCI centers use the right radial artery for intervention.
Unless Prior Cabg then will use femoral approach - include this Hx in Pulsara

Notify Destination

Adult Cardiac Protocol Section

Chest Pain: Cardiac and STEMI

Indications for Nitroglycerin drips

- Not be used in STEMI Care unless transporting from Non PCI Center

- May use in Non-STEMI chest pain if transport time > 30 minutes

- May use in CHF / Pulmonary Edema

- May use for Blood pressure Control >180/110 in the setting of Chest Pain / CHF.

Transdermal Nitro Paste Dosing - Do not use with STEMI - CP Only

- Systolic Blood pressure >100 - apply 1" of paste
- Systolic Blood pressure >150 - apply 1.5" of paste
- Systolic Blood pressure >200 - apply 2" of paste

Estimated Dose Conversions:
1.0" of paste = 10 - 39 mcg/min IV infusion 1.5" of paste = 40 - 59 mcg/min IV infusion
2.0" of paste = 60 - 100 mcg/min IV infusion

Pearls

- **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 < 15 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 already prescribed medication. May give from EMS supply.**
- Agency medical director may require Contact of Medical Control prior to administration.

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

B — **Nitroglycerin 0.3 / 0.4 mg Sublingual**
Repeat every 5 minutes x 3
if prescribed to patient and (BP >100)

P — Cardiac Monitor

IV / IO Procedure

Assess Symptom Severity

MILD
Normal Heart Rate
Elevated or Normal BP

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

A — **Nitroglycerin Paste**

See Next Page for Dosing

Improving — NO → (B) **Airway NIPPV Procedure**

YES

MODERATE / SEVERE
Elevated Heart Rate
Elevated BP

B — **Airway NIPPV Procedure**

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

A — **Nitroglycerin Paste**

See Next Page for Dosing

****Optional ** Nitroglycerin Drip**
If transport > 30 minutes

Furosemide 40 mg IV
ONLY IF
Transport time > 30 minutes
Known CHF / Daily Lasix
Afebrile

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

Adult Cardiac Protocol Section

CHF / Pulmonary Edema

Nitroglycerin Drips for CHF / Pulmonary Edema - Optional - Must have pump

Nitroglycerin drip for CHF - start 20 mcg/min and titrate up 10 mcg/min every 3 minutes till improvement of symptoms.

Keep BP greater than 120 systolic. Decrease drip if blood pressure drops below 100 systolic

May titrate down by a factor of 20 mcg/min every 3 minutes or if below 100 systolic - may shut drip off.

**** Alternative High Dose - Rapid Titration for crashing CHF / Pulm Edema - Start 100 mcg/min and titrate up 50 mcg/min every 2 minutes till improvement of symptoms. Keep BP greater than 120 systolic. ****

Transdermal Nitro Paste Dosing

- Systolic Blood pressure >100 - apply 1" of paste
- Systolic Blood pressure >150 - apply 1.5" of paste
- Systolic Blood pressure >200 - apply 2" of paste

Estimated Dose Conversions:
1.0" of paste = 10 - 39 mcg/min IV infusion 1.5" of paste = 40 - 59 mcg/min IV infusion
2.0" of paste = 60 - 100 mcg/min IV infusion

**** Consider Anxiolytics with NIPPV to ease anxiety and increase compliance/tolerance ****

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**.
- Agency medical director may require Contact of Medical Control.

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

Consider
Only if regular/narrow complex
Adenosine 6 mg IV / IO
Rapid push with flush
May repeat **12 mg IV / IO**

Cardioversion Procedure

Consider Sedation
Midazolam 2 – 5 mg IV / IO / IN
May repeat as needed
Maximum 10 mg
Consider Ketamine 1mg/kg IV / IM

Syncronized
Narrow and Regular: 50 – 100J
Narrow and Irregular: 120 – 200J
May repeat and increase dose with subsequent cardioversion attempts

NO

B — 12 Lead ECG Procedure

P — Cardiac Monitor

IV or 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
Maximum 25 mg

If No Improvement in 15 minutes
Diltiazem 0.35 mg/kg IV / IO
Maximum 25 mg

Lopressor 5mg IV / IO

Last Line

Amiodarone 150 mg in 100 mL of NSS / D5W IV / IO

Monitor and Reassess

Notify Destination

Adult Cardiac Protocol Section

Adult Tachycardia
NARROW (≤ 0.11 sec)

No Cardizem drip for EMS use - May use for interfacility transport only

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. dysrrhythmia
- 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
P	Cardioversion Procedure
P	**Consider Sedation Prior to Cardioversion** **Midazolam 2 – 5 mg IV / IO** May repeat as needed **Maximum 10 mg**
P	**Wide: Regular and Irregular: 200 – 360J** • **Monomorphic QRS (Synchronized)** • **Polymorphic QRS (Not-Synchronized)** *May repeat and increase dose with subsequent cardioversion attempts*

NO

B	12 Lead ECG Procedure
P	Cardiac Monitor
	IV or IO Access Protocol UP 6
P	**Consider consultation with medical control**

Regular Rhythm?

YES →

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

NO

P	**Amiodarone 150 mg** **in 100 mL of D5W IV / IO** **Infuse over 10 minutes** May repeat if wide complex tachycardia recurs Or **Lidocaine 1.5 mg/kg IV / IO** **May repeat x1 - Max 3mg/kg**
	Monitor and Reassess
	Notify Destination

Monomorphic QRS:
- **All QRS complexes in a single lead are similar in shape.**

Adult Cardiac Protocol Section

Adult Monomorphic Tachycardia

Wide Complex (≥0.12 sec)

Amiodarone Drip / Continuous infusion will not be used by general EMS. Maybe utilized for Critical Care Transport

150mg Amiodarone over 10 minutes is not considered a continuous infusion requiring a pump.

Pearls

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Extremities, Neuro**
- **Most important goal is to differentiate the type of tachycardia and if STABLE or UNSTABLE and if SYMPTOMATIC.**
- **12-Lead ECG:**
  - **12-Lead ECG is not necessary to diagnose and treat arrhythmia. A single lead ECG is often all that is needed. Obtain12-Lead when patient is stable and/ or following a 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 impending. 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 impending.**
  - **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 to 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 (≥ 0.12 sec) Torsades de pointes

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
	Consider Sedation Prior to Defibrillation **Midazolam 2 – 5 mg IV / IO / IN** **OR** **Ketamine 1mg/kg IV / IO**
	Wide and Irregular: 200 – 360J **Polymorphic QRS (Not-Synchronized)** *May repeat and increase dose with subsequent cardioversion attempts*

NO

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

Pulse Present?

YES → **PROCEED**

NO → Exit to Cardiac Arrest Protocol AC 3

QT Interval < 500 msec

P	**Amiodarone 150 mg in 100 mL of D5W IV / IO** Infuse over 10 minutes May repeat if tachycardia recurs or persists Or **Lidocaine** **1.5 mg/kg IV / IO** May repeat if refractory **Lidocaine** **1.5 mg/kg IV / IO** **Maximum 3 mg/kg**
	Monitor and Reassess

QT Interval > 500 msec

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

Notify Destination

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

- **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 ***if available***
A	Defibrillation Procedure
	IV / IO Access Protocol UP 6
A	**Epinephrine (1:10,000) 1 mg IV / IO** Repeat every 3-5 minutes - Max 3 doses *If VF / VT refractory to defibrillation, delay Epinephrine administration until after 2d defibrillation*
	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	**Amiodarone 300 mg IV / IO** May repeat if refractory **Amiodarone 150 mg IV / IO** Or **Lidocaine 1.5 mg/kg IV / IO** May repeat if refractory **Lidocaine 1.5 mg/kg IV / IO** **Maximum 3 mg/kg** Refractory **<u>Magnesium 2 gm IV / IO</u>**
	Defibrillation Procedure *If VF / VT refractory after 3 shocks consider changing vector of defibrillation pads*

Notify Destination

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

<u>Reversible Causes</u>

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

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

Adult Cardiac Protocol Section

Ventricular Fibrillation
Pulseless Ventricular Tachycardia

Epinephrine 1:10K IV/IO - 3 dose Limit (1mg q 5 minutes x 3)
- If Rosc may utilize Epi drip or push dose Epi for hypotension.

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional Team Focused CPR Protocol AC 11 or development of local agency protocol.**
- **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 optional in agencies practicing 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 Protocol 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.
- **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

10 Min COOL DOWN
DO NOT TRANSPORT FOR 10 MIN UNLESS STEMI

Repeat Primary Assessment

	Optimize Ventilation and Oxygenation • Remove Impedance Threshold Device • Respiratory Rate 10 / minute • Maintain SpO2 92 – 98% • DO NOT HYPERVENTILATE
B	• ETCO2 ideally 35 – 45 mm Hg
	Airway Protocol(s) AR 1, 2, 3, 4 ***as indicated***
B	12 Lead ECG Procedure
	IV or 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***
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
	Targeted Temperature Management Protocol AC 13 ***if available***

Notify Destination

Transport Destination Decision

Post-resuscitation patient is medically complex.

Consider facility capabilities:

- 24-hour cardiac catheterization laboratory
- Medical ICU service
- Cardiology service
- Neurology service
- Pulmonologyservice
- 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

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

Adult Cardiac Protocol Section

Post Resuscitation

ROSC - 10 Minute Cool Down

*** Do Not transport for 10 minutes POST ROSC Unless CLEAR STEMI

1. Secure Airway - No RSI/DAI unless absolutely needed
2. Correct Hypotension
3. Correct Hypoxia
4. 12 Lead EKG
5. Full Vitals – Full Assessment

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.**
- Targeted Temperature Management (optional):
  - Maintain core temperature between 32 - 36°C.
  - Infusion of cold saline is NOT recommended in the prehospital setting.
  - No evidence suggests improved survival with prehospital cooling.
- 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
(Highly Recommended)

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

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

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

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 Protocol UP 6
Administer Appropriate Medications
Establish Airway with BIAD if not in place

P

Initiate Defibrillation Manual Procedure
Continuous Cardiac Monitoring
Establish IV / IO Protocol UP 6
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

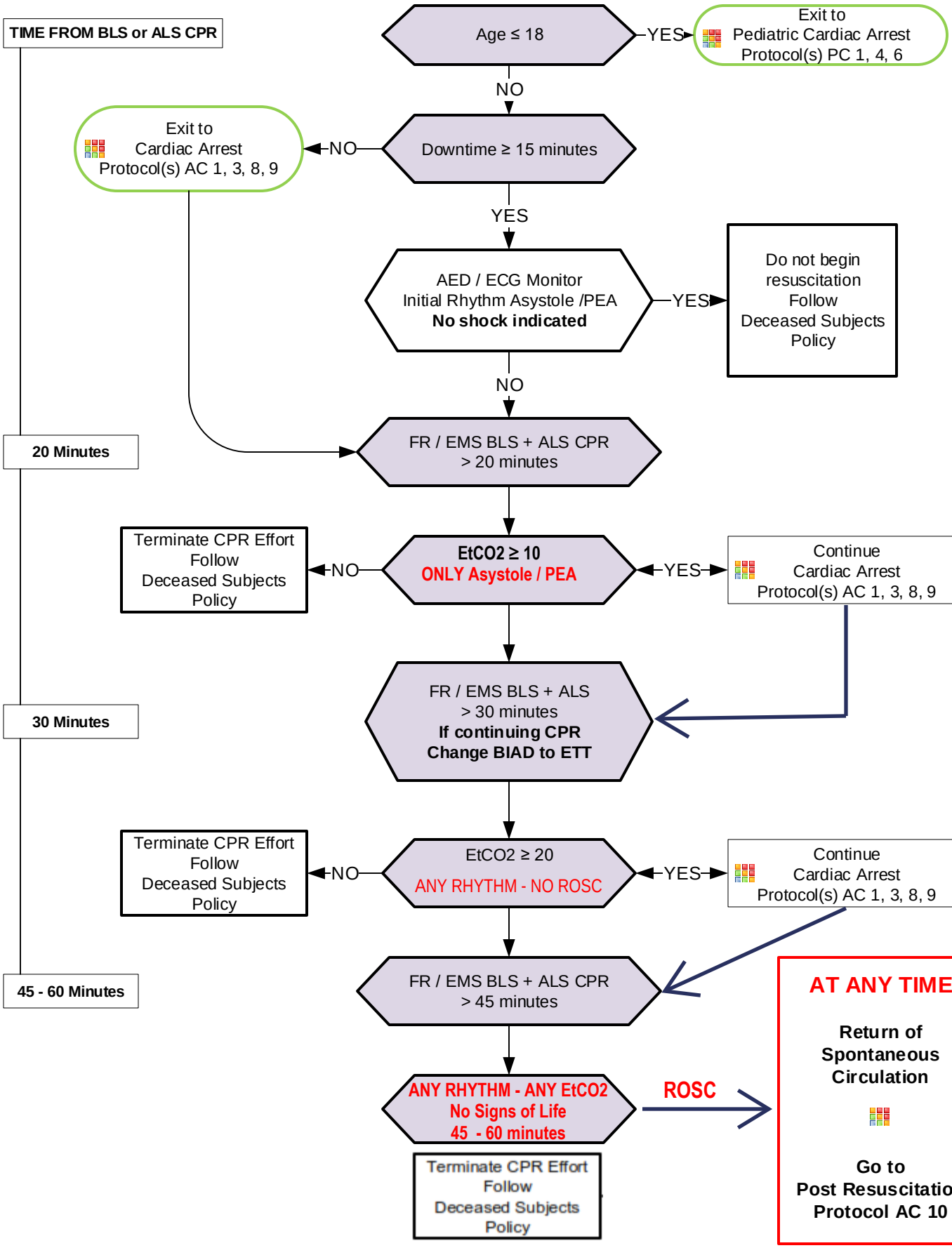
Adult Cardiac Protocol Section

Team Focused CPR

Pearls

- **This protocol is optional and given only as an example. Agencies may and are encouraged to develop their own.**
- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **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 optional in agencies practicing Team Focused Approach / Pit-Crew Approach.**
- Reassess and document BIAD and / or endotracheal tube placement and $EtCO_2$ 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 Protocol 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



Adult Cardiac Protocol Section

On Scene Resuscitation / Termination of CPR

ROSC ALWAYS RESETS THE CLOCK - ALL ROSC TRANSPORTED TO ER AFTER COOL DOWN

Strongly recommended to work entire code on scene unless unsafe to do so

Better chance of High Quality CPR while stationary on scene

Likely-hood of meaningful neurological recovery after 45 minutes in arrest is very low - Exceptions are hypothermic and pediatric arrest scenarios

Remember: End Tidal CO2 is affected by Bicarb administration.

AT 45-60 minutes with no ROSC - May terminate with ANY RHYTHM - ANY EtCO2

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.

Target Temperature Management (Optional)

History
- Non-traumatic cardiac arrests (drownings and hanging / asphyxiation are permissible in this protocol.)
- All presenting rhythms are permissible in this protocol
- Age 18 or greater

Signs and Symptoms
- Cardiac arrest
- Return of Spontaneous Circulation post-cardiac arrest

Differential
- Continue to address specific differentials associated with the arrhythmia

Return of Spontaneous Circulation ROSC

Criteria for Induced Hypothermia
Initial rectal temperature
≥ 93.2 F (34C)

YES

NO

Exit to Post Resuscitation Protocol AC 10

Agencies utilizing cerebral cooling devices are unlikely to see a change in rectal temperature during transport.

Continued temperature assessment not warranted with these devices. Document initial temperature

B	**Advanced Airway (includes BIAD) in place** with EtCO2 > 20 mmHg
	Airway Protocol(s) AR 1, 2, 3 ***as indicated***
	Post Resuscitation Protocol AC 910 ***as indicated***
	IV / IO Access Protocol UP 6
	Hypotension / Shock Protocol AM 5 ***as indicated***
	Perform Neurological Assessment
	Expose and apply ice packs to axilla and groin areas

Agency Specific Cooling Device

Reassess Rectal Temperature
Target: 89.6 – 96.8 °F
(Range 32 – 36C)

< 89.6° F *(32° C)*

Stop cooling measures
Until temperature increases

Reassess temperature every 10 minutes

Continue Post Resuscitation Care

≥ 89.6° F *(32° C)*

Continue Cooling

Exit to Post Resuscitation Protocol AC 9

Shivering noted

NO

YES

P

Fentanyl 50 – 75 mcg IV / IO
Repeat every 5 minutes as needed
Maximum 200 mg

Versed 2 – 2.5 mg IV / IO
Repeat every 5 minutes as needed
Maximum 10 mg

Vecuronium 10 mg IV / IO
If shivering uncontrolled following Opioid and Benzodiazepine Administration

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Target Temperature Management
(Optional)

Targeted Temperature Management (optional):
Maintain core temperature between 32 - 36°C.
Infusion of cold saline is NOT recommended in the prehospital setting.

No evidence suggests improved survival with prehospital cooling.

Pearls

- Criteria for Targeted Temperature Mangement:
  - Return of spontaneous circulation not related to blunt / penetrating trauma or hemorrhage with ventricular fibrillation / tachycardia and non-shockable arrhythmias.
  - Temperature greater than 93.2°F (34° C).
  - Advanced airway (including BIAD) in place with no purposeful response to verbal commands.
  - Infusion of cold saline is NOT recommended in the prehospital setting.
- 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.
- 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.
- Titrate fluid resuscitation and vasopressor administration to maintain SBP of > 90 mmHg or Mean Arterial Pressure (MAP) of 65 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.
- Utilization of this protocol mandates transport to facility capable of managing the post-arrest patient and continuation of induced hypothermia therapy.
- If no advanced airway in place obtained, cooling may only be initiated on order from medical control.
- No evidence suggests improved survival with prehospital cooling.
- 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.

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

NO

Place stethoscope over heart

Humming sound present?

YES ▶ **Go to Page 3** ◀ YES

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

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**

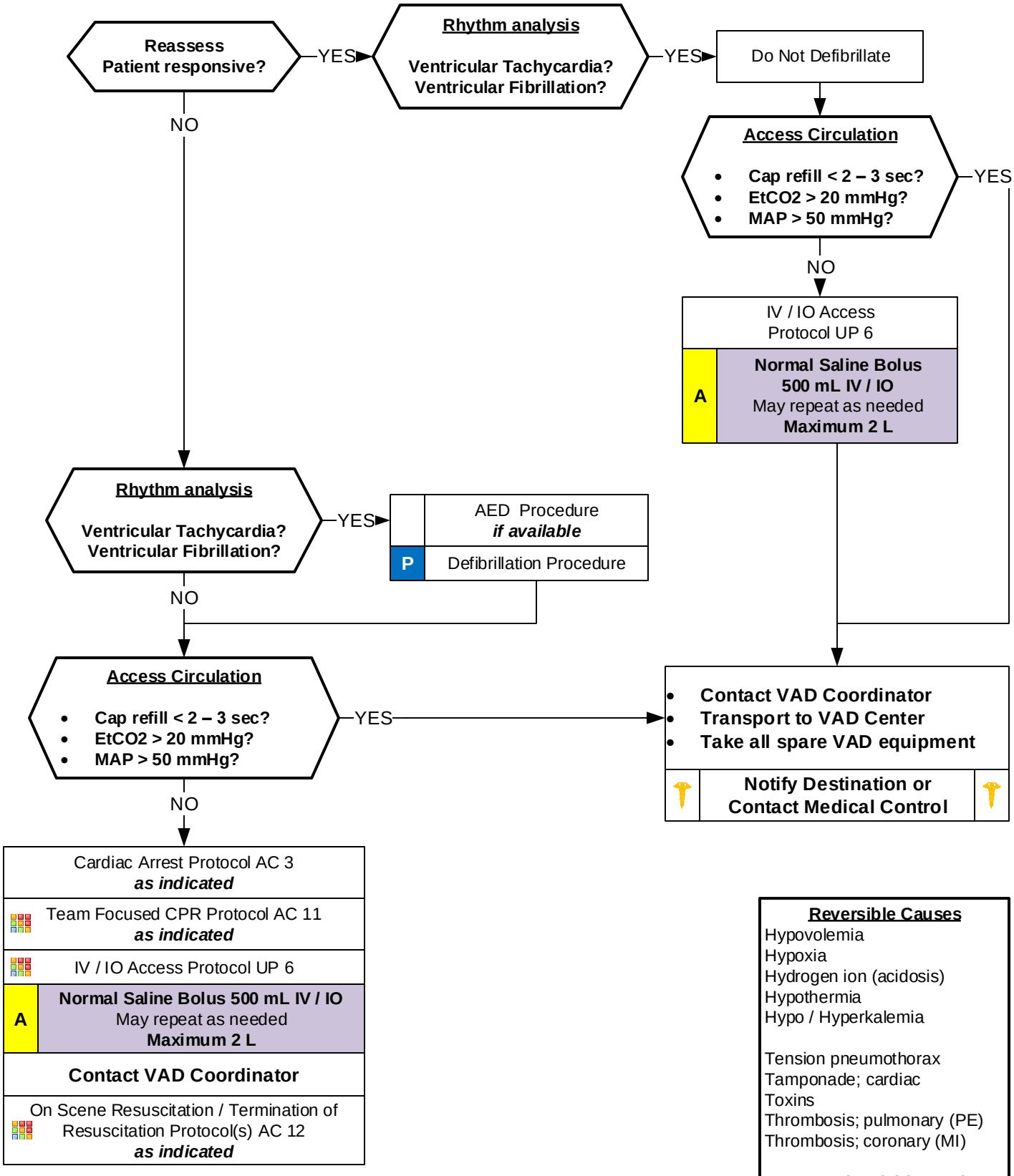
LVAD restarted? Humming sound over heart?

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



Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

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

TRANSPORT TO VAD / ARTIFICAL HEART CENTER - May UTILIZE AEROMEDICAL

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

TRANSPORT TO VAD / ARTIFICAL HEART CENTER - May UTILIZE AEROMEDICAL

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 produre 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 CO_2 ($EtCO_2$)
  - 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 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 ***if available***
- P: Cardioversion - Defibrillation Procedure(s)
- P: Cardiac Monitor

Notify Destination or Contact Medical Control

NO

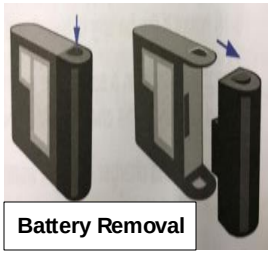
Leave Vest in Place and Operational

Exit to Age Appropriate Protocol(s)

Adult Cardiac Protocol Section

Wearable Cardioverter Defibrillator Vest

VERY COMMON AND USED LOCALLY


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.

ADULT MEDICAL
AM Section

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

- **Diphenhydramine 25 - 50 mg PO**
- IV or IO Access Protocol UP 6 ***if indicated***
- **A** — **Diphenhydramine 25 - 50 mg PO / IV / IM / IO**
- **A** — **Pepcid 40mg IV** *If available*
- **B** — Monitor and Reassess Monitor for Worsening Signs and Symptoms

MODERATE
2 + Body Systems

- **Epinephrine 1:1000 IM 0.3 – 0.5 mg** Repeat every 5 minutes if no improvement
- **Diphenhydramine 25 - 50 mg PO** *See Pearls*
- **B** — **Albuterol Nebulizer 2.5 – 5 mg** Repeat as needed x 3 ***if indicated***
- **A** — **Epinephrine 1:1000 0.3 – 0.5 mg IM** Repeat every 5 minutes if no improvement
- **A** — **Diphenhydramine 25 - 50 mg IV / IM / IO *if not given PO (See Pearls)***

SEVERE
2 + Body Systems + hypotension
Or Isolated Hypotension

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

- IV or IO Access Protocol UP 6
- **A** — **Albuterol Nebulizer 2.5 – 5 mg +/- Ipratropium 0.5 mg (DuoNeb)** Repeat as needed x 3 ***if indicated***
- **A** — *Pepcid 40 mg IV x 1* *If available*
- **Normal Saline Bolus 500 mL IV / IO** Repeat as needed **Maximum 2 Liters**
- **A** — **Methylprednisolone 125 mg IV/IM/IO or Decadron 10 mg IV/IM/IO**
- **P** — **If not responsive to IM Epi then Epinephrine 1:10K - 0.3 - 0.5 mg IV/IO May repeat every 3 - 5 minutes**
- **Notify Destination**

- **A** — **If severe Angioedema consider Tranexamic Acid 1g IV / IO**

Adult Medical Protocol Section

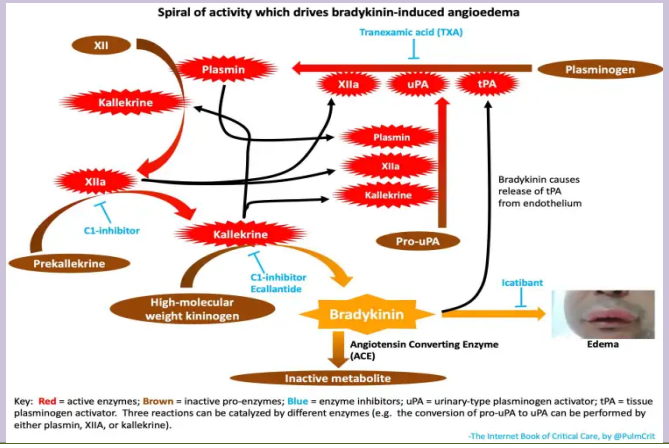
Allergic Reaction/ Anaphylaxis

Anaphylaxis usually has offending agents or known allergies/reactions. Hives / wheezing / itching

Angioedema may have no trigger / facial swelling with no hives / wheezing. May be due to ACE Inhibitor blood pressure medications -
- most common is Lisinopril or anything ending in **pril.

Hereditary angioedema brought on by stress or is spontaneous.

Facial swelling only - if moderate to severe symptoms give Antihistamines / Steroids - Epi, If not helpful. TXA only true treatment in the field.



Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdominal**
- **Anaphylaxis is an acute and potentially lethal multisystem allergic reaction.**
- **<u>Epinephrine and administration:</u>**
  - **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.**
- **<u>Diphenhydramine and steroid administration:</u>**
  - **Diphenhydramine/ steroids have no proven benefit in Moderate/ Severe anaphylaxis.**
  - **Diphenhydramine/ steroids should NOT delay initial or repeat 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, vomiting, and/ or worsening mental status.**
- **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.**
- **<u>Symptom Severity Classification:</u>**
  - **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.**
- **<u>EMR/ EMT:</u>**
  - **The use of Epinephrine IM is limited to the treatment of anaphylaxis and may be given autoinjector or draw up**
    Manual draw-up is approved by Dr Koontz and the NC office of EMS.
  - **Administration of diphenhydramine is limited to the oral route only**.
- **EMT administration of beta-agonist is not limited to only patients currently prescribed the medication,** approved by Dr Koontz and the NC office of EMS.
- Dr Koontz does not require contact of medical control prior to EMT/ EMR administering any medication(s).
- 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

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

IV or 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 AM 7 ***if indicated***

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

B — Blood Glucose ≤ 69 mg / dl and symptomatic
No venous access
Glucagon 1 – 2 mg IM
Repeat in 15 minutes if needed

Blood Sugar ≤ 69 mg / dl

Consider Oral Glucose Solution *if available*

Consider Oral Solution (Juices / Food)

A — If no improvement

D10 125 mL – 250 mL IV / IO
Or
D50 12.5 - 25 gm IV / IO
May repeat until Blood Glucose ≥ 80 mg/dL

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**
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

Adult Medical Protocol Section

Diabetic; Adult

Encourage patients to eat, assist in getting or preparing food for immediate consumption.

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 who 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 for advice if needed. 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 insulins have prolonged action so Contact Medical Control for advice if needed.
  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 patient has 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 Gluconate 2 gm IV / IO (Or Calcium Chloride 1 gm IV / IO)**
	Sodium Bicarbonate 100 mEq IV / IO

→ Exit to Appropriate Cardiac Protocol(s) ***as indicated***

NO ↓

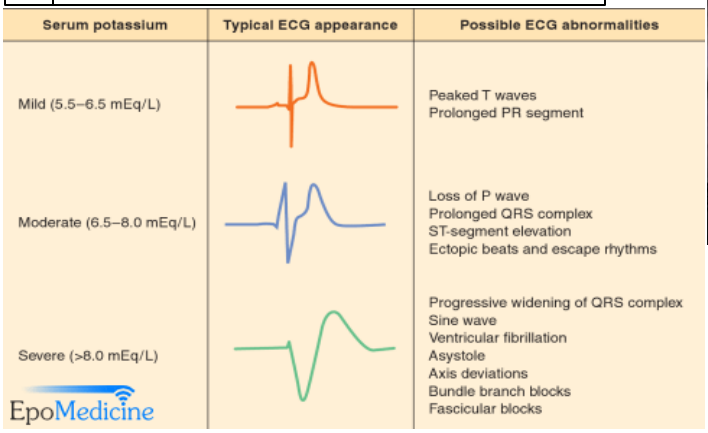
Shunt / Fistula Bleeding — YES →

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

Pin Point Finger Tip Pressure
DO NOT Compress
entire Fistula / Graft

NO ↓

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



NO ↓

Systolic Blood Pressure < 90 — 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 →

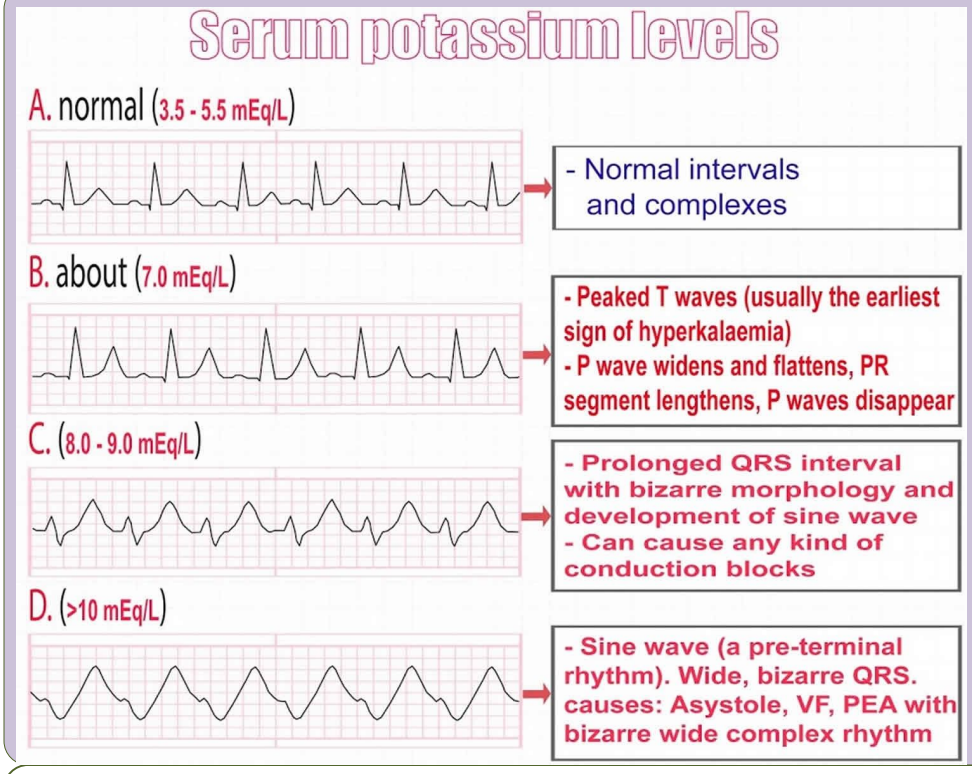
P	**Calcium Gluconate 2 gm IV / IO (Or Calcium Chloride 1 gm IV / IO)**
	Sodium Bicarbonate 100 mEq IV / IO

NO ↓

Notify Destination

Adult Medical Protocol Section

Dialysis/ Renal Failure



Emergent ER/ICU
Dialysis Capable Hospitals

1. CEMC - 24/7
2. ECU - 24/7

Other local hospitals have routine dialysis beds

- very limited availability
- No CVVH or emergent

If suspected High K with EKG changes then transport to CEMC or ECU

Pearls

- **Recommended exam: Mental status. Neurological. Lungs. Heart. Skin.**
- **Preferably transport to a medical facility capable of providing dialysis treatment.**
- **Do not take Blood Pressure or start IV / IO 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

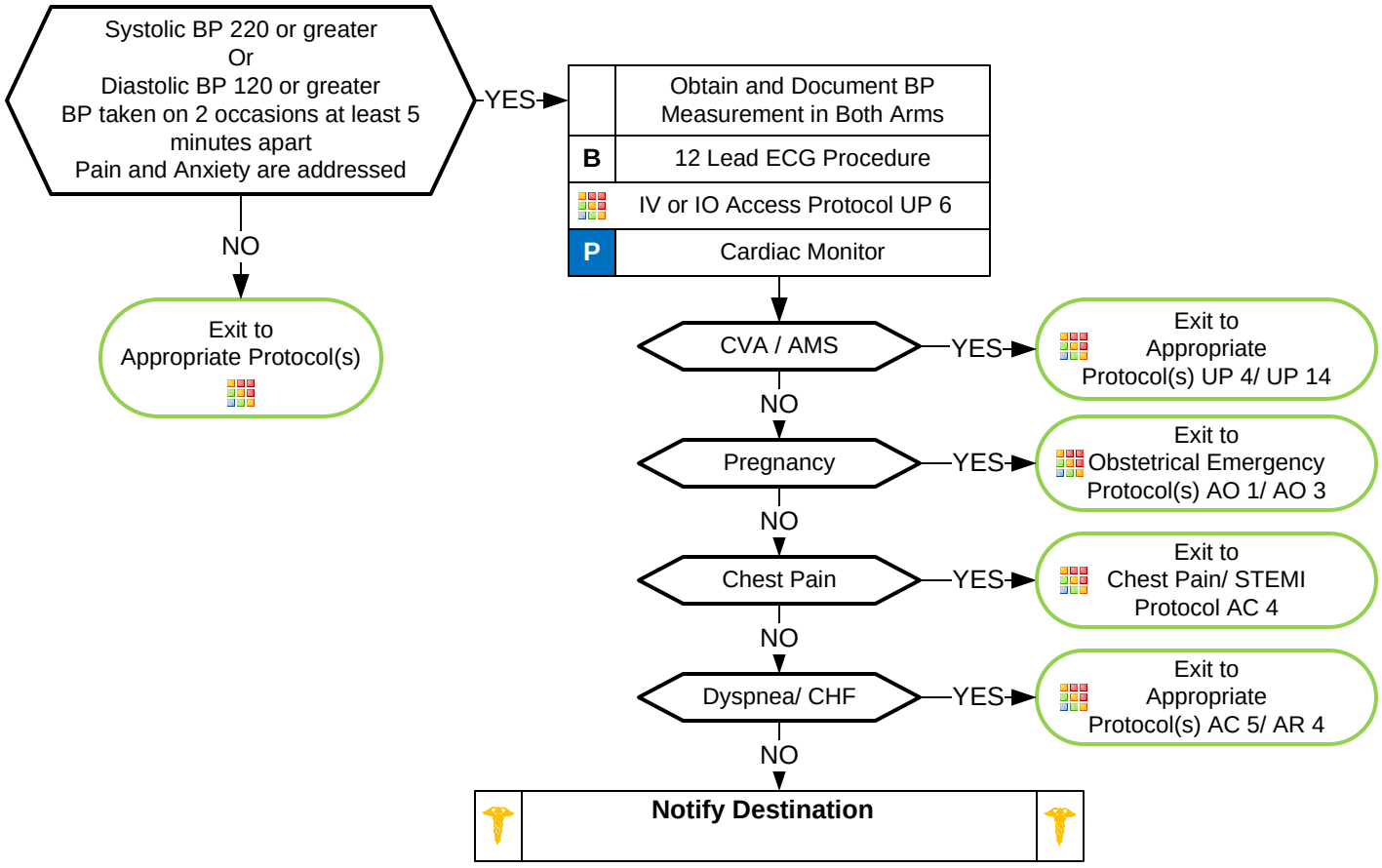
History
- Documented Hypertension
- Related diseases: Diabetes; CVA; Renal Failure; Cardiac Problems
- Medications for Hypertension
- Compliance with Hypertensive Medications
- Erectile Dysfunction medications
- Pregnancy

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

	Blood Glucose Analysis Procedure
B	12 Lead ECG Procedure
	IV or IO Access Protocol UP 6
P	Cardiac Monitor
	Airway Protocol(s) ***if indicated***
	Diabetic Protocol AM 2 ***if indicated***

History and Exam Suggest Type of Shock

Cardiogenic

Chest Pain: Cardiac and STEMI Protocol AC 4 Appropriate Cardiac Protocol(s) ***if indicated***

Hypovolemic / **Distributive**

Allergy Protocol AM 1 ***if indicated***

Suspected Sepsis Protocol UP 14 ***if indicated***

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

Obstructive

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

A — **Normal Saline / LR**
Bolus 500 - 1000 mL IV
Repeat to effect
SBP > 90
2 L Maximum

P — Push Dose Vasopressor - Epinephrine 1:100K

Give 1cc (10 mcg) q 2 – 3 minutes to effect SBP > 90

Use in patients with BP < 90 & Heart Rate < 140.

Levophed 2 - 20 mcg/min IV / IO

Titrate SBP > 90

Notify Destination

Norepinephrine: 4mg in 4mL mixed in NS 1000mL = 4mcg/mL

Infusion Rate	10 drops/mL Set	60 drops/mL Set
2 mcg/min	5 drops/min	30 drops/min
4 mcg/min	10 drops/min	60 drops/min
6 mcg/min	15 drops/min	90 drops/min
8 mcg/min	20 drops/min	120 drops/min
10 mcg/min	25 drops/min	150 drops/min
12 mcg/min	30 drops/min	180 drops/min
14 mcg/min	35 drops/min	210 drops/min
16 mcg/min	40 drops/min	240 drops/min
18 mcg/min	45 drops/min	270 drops/min
20 mcg/min	50 drops/min	300 drops/min

Hypotension/ Shock

Push-Dose Vasopressors:

Epinephrine 1:100K - How to mix

1. Take a 10 ml syringe with 9 ml of normal saline. Draw up 1 ml of epinephrine from a cardiac amp

   (Cardiac amp contains Epinephrine 100 mcg/ml (1:10K))

- Now you have 10 mls of Epinephrine 1:100K - 10 mcg/ml

Levophed Infusion

Adult Dosage: 4mg/4mL mixed in Normal Saline 1000 mL = 4mcg/mL

Levophed 2 – 20 mcg / min IV / IO and titrate by 2 mcg / min every 2 – 3 minutes to effect SBP > 90mmHg or/and MAP >65mmHg.

PUMP is preferred but may titrate to SBP > 90 for short transport time

Critical Care Transport - Must be on a pump

If patient requires ≥ 2 push dose vasopressors or has suspected sepsis - Levophed drip can be initiated.

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Hypotension is defined as a systolic blood pressure less than 90. This is not always reliable and should be interpreted in context and consider patient's 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):

  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 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.

Suspected Stroke: Activase/ t-PA (Critical Care Transport Only)

Obtain/ Document VS prior to transport

SBP ≥ 185
DBP ≥ 110

YES → Patient must be stabilized BEFORE transport initiated
SBP < 185
DBP < 110

NO

Assess/ Document GCS/ Pupil exam

Nothing by mouth / NPO

Prehospital Stroke Screen

Maintain SaO2 ≥ 92 %

P
- Cardiac Monitor
- Verify **Activase / t-PA** bolus dose
  Verify total dose
- Document time infusion initiated
  Document estimated time of dose completion
- Reassess VS every 15 minutes
  Repeat neurological exam every 15 minutes
  Obtain BP readings in limb without infusion

Any of following:
Severe headache
Worsening of neurological exam
Nausea / Vomiting
Allergic reaction
Excessive bleeding

P
Stop
IV Activase / t-PA infusion

SBP ≥ 180 and/or DBP ≥ 105
And
NO antihypertensive medication infusion initiated by transferring hospital

YES →
P **Labetalol 10 mg IV / IO**
Contact Medical Control or Receiving Facility

NO

Antihypertensive medication infusion initiated by transferring hospital

YES →
P
Labetalol: Increase 2 mg/min
every 10 minutes
Titrate SBP < 180 mmHg
DBP < 105 mmHg
Maximum 8mg/min
Or
Nicardipine: Increase 2.5 mg/hr
every 5 minutes
Titrate SBP < 180 mmHg
DBP < 105 mmHg
Maximum 15 mg/hr

NO

SBP < 140 and/or DBP < 80

YES →
P
- Stop Anti-hypertensive agent
- Continue **Activase / t-PA** infusion

NO

P
Reassess VS every 15 minutes
Repeat neurological exam every 15 minutes
Obtain BP readings in limb without infusion

Notify Destination

Adult Medical Protocol Section

Suspected Stroke: Activase / t-PA (Critical Care Transport)

Pearls

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **This protocol is optional. Agencies may develop their own in conjunction with their regional stroke center(s) guidance.**
- **This protocol is intended for interfacility transfer patients only. Medication must be started at initial treating hospital.**
- **Items in Red Text are key performance measures used in protocol compliance.**
- **The Reperfusion Checklist should be completed for any suspected stroke patient.**
- **Time of Onset or Last Seen Normal:**
  - **One of the most important items the pre-hospital provider can obtain, of which all treatment decisions are based.**
  - **Be very precise in gathering data to establish the time of onset and report as an actual time (i.e. 13:47 NOT "about 45 minutes ago.")**
  - **Without this information patient may not be able to receive thrombolytics at facility.**
  - **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, bystanders, witnesses, or family/ caregivers.**
- 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.
- **Infusion Pump Alarm / No Flow:**
  - Remove drip chamber from Activase / t-PA bag.
  - Spike Activase/ t-PA drip chamber to NS bag.
  - Restart infusion to complete medication remaining in IV tubing.
- **Medication dosing safety:**
  - When IV **Activase/ t-PA** dose administration will continue en route, verify estimated time of completion.
  - Verify with sending hospital that excess **Activase/ t-PA** has been withdrawn from the bottle and wasted.
  - This ensures the bottle will be empty when the full dose is finished. *For example, if the total dose is 70 mg, then 30 cc should be withdrawn and wasted since a 100 mg bottle of **Activase/ t-PA** contains 100 mL of fluid when reconstituted.*
  - Sending hospital should apply a label to **Activase/ t-PA** bottle with the number of mL of fluid that should be in the bottle in case of pump failure during transit.
- **Allergy Anaphylaxis:**
  - **Activase/ t-PA**, is structurally identical to endogenous t-PA and therefore should not induce allergy, single cases of acute hypersensitivity reactions have been reported.
  - ***Angioedema:***
    - Rapid swelling (edema) of the dermis, subcutaneous tissue, mucosa and submucosal tissues. Typically involves the face, lips, tongue and neck.
    - Almost always self limiting but may progress to interfere with airway / breathing so close monitoring is warranted.
  - Utilize the Allergy / Anaphylaxis Protocol as indicated and also for angioedema. Infusion should be stopped.
  - Give all medications related to the Allergy/ Anaphylaxis Protocol by IV route only as patient should remain NPO.

Trauma / Burn
TB Section

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

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 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 ***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

Trauma and Burn Protocol Section

Blast Injury / Incident

Pearls

- **Types of Blast Injury:**
  - Primary Blast Injury: From pressure wave.
  - Secondary Blast Injury: Impaled objects. Debris which becomes missiles / shrapnel.
  - Tertiary Blast Injury: Patient falling or being thrown / pinned by debris.
  - Most Common Cause of Death: Secondary Blast Injuries.
- **Triage of Blast Injury patients:**
  - Blast Injury Patients with Burn Injuries Must be Triaged using the Thermal / Chemical / Electrical Burn Destination Guidelines for Critical / Serious / Minor Trauma and Burns
  - 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.
  - Cover open chest wounds with semi-occlusive dressing.
  - Use Lactated Ringers (if available) for all Critical or Serious Burns.
  - Minimize IV fluids resuscitation in patients with no sign 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 in enclosed space or in close proximity to explosion.
  - Symptoms: Dyspnea, hemoptysis, cough, chest pain, wheezing and hemodynamic instability.
  - Signs: Apnea, tachypnea, hypopnea, hypoxia, cyanosis and diminished breath sounds.
  - 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 exacerbate the injury, avoid hyperventilation.
  - Air transport may worsen lung injury as well and close observation is mandated. Tension pneumothorax may occur requiring chest decompression. Be judicious with fluids as volume overload may worsen lung injury.
- **Accidental Explosions or Intentional Explosions:**
  - **All explosions or blasts should be considered intentional until determined otherwise.**
  - Attempt to determine source of the blast to include any potential threat for aerosolization of hazardous materials.
  - Evaluate scene safety to include the source of the blast that may continue to spill explosive liquids or gases.
  - Consider structural collapse / Environmental hazards / Fire.
  - Conditions that led to the initial explosion may be returning and lead to a second explosion.
  - Greatest concern is potential threat for a secondary device.
  - Patients who can, typically will attempt to move as far away from the explosive source as they safely can.
  - Evaluate surroundings for suspicious items; unattended back packs or packages, or unattended vehicles.
  - **If patient is unconscious or there is(are) fatality(fatalities) and you are evaluating patient(s) for signs of life:**
    - **Before moving note if there are wires coming from the patient(s), or it appears the patient(s) is(are) lying on a package/pack, or bulky item, 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 the patient is in the ambulance.
  - If there are signs the patient was carrying the source of the blast, notify law enforcement immediately and most likely, a law enforcement officer will accompany your patient to the hospital.

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***
- 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 ***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

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 readily available water or saline solution using copious amounts of fluids.
  - Flush contact area for 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 not seen. Small external injury may have large internal injury.**
  - **Do not refer to as entry and exit sites or wounds**.
  - 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 / 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 - 7 ***as indicated***

B 12 Lead ECG Procedure

IV or 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 0.5 – 2 mg IV / IO
Midazolam 1 – 2 mg IN
Maximum 5 mg
Pediatric: 0.1 – 0.2 mg / kg
IV / IO / IN
Pediatric Maximum 2 mg
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 Gluconate 2 g IV / IO
Or
(Calcium Chloride 1 g IV / IO)
Pediatric: 20 mg / kg IV / IO
Over 2- 3 minutes

Albuterol Nebulizer
2.5 – 5 mg
May repeat x 3

Sodium Bicarbonate
100 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

Trauma and Burn Protocol Section

Crush Syndrome Trauma

Crush injuries may release large amount of potassium, myoglobin, and lactic acid into the blood. Therefore, did not use Lactated Ringers in this situation.

Albuterol is not limited to Paramedics in Crush syndrome however since the purpose of this block of medications is to treat and prevent ekg changes associated with Crush syndrome, a paramedic will need to monitor the rhythm strip carefully for dynamic changes.

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.**
- **<u>Fluid resuscitation strategy:</u>**
  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).**

- **<u>Pediatric IV Fluid maintenance rate:</u>**
  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

<u>Example: 28 kg pediatric</u>	
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

Topical &/or Wound Packing with Hemostatic Agent / Dressing
If available

Wound Care - Tourniquet Procedure
if indicated

A — IV / IO Procedure
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 and place in air tight container.

Place container on ice if available.

A — **Rocephin 1g IV/IO or Zosyn 3.375/4.5g IV/IO**
**** One is Required ****

** OPEN FRACTURES **

NO

Monitor and Reassess

Notify Destination

Trauma and Burn Protocol Section

Pearls
- **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)
- Epidural hematoma
- Subdural hematoma
- Subarachnoid hemorrhage
- Spinal injury
- Abuse

Prevent hypoxia, hypotension, and hyperventilation

A single episode of hypoxia, hypotension, and hyperventilation increases mortality

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
	Obtain and Record GCS
	All patients Titrate **target SpO2 100%** Monitor HR, BP and O2 every 3-5 minutes
	Blood Glucose Analysis Procedure
B	Maintain EtCO2 35 – 45 mmHg
A	IV or IO Access - UP 6 ***if indicated***
P	Cardiac Monitor
	Altered Mental Status - UP 4 ***if indicated***
	Multiple Trauma - TB 6 ***if indicated***
	Age Appropriate Hypotension/ Shock - AM 5/ PM 3 ***if indicated***
	Seizure - UP 13 ***if indicated***
	Spinal Motion Restriction Protocol TB 8 Procedure WTP 2 ***if indicated***
	Pain Control - UP 11 ***if indicated***
	Monitor and Reassess

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

Notify Destination

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

Signs of Impending Herniation:

GCS 8 or less
Unilateral or Dilated/Fixed Pupils
And / Or

Posturing
And / Or

Cushing's Triad
(widened pulse pressure, bradycardia, and irregular respirations)

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:
SI = HR ÷ SBP

Use Shock Index, Pediatric Adjusted (SIPA)for children <12 (see pearls)

P

3% Hypertonic Saline Infusion

Adult: 250 mL IV / IO
Over 20 minutes

Pediatric: 5 mL / kg IV / IO
Over 20 minutes

Trauma and Burn Protocol Section

Head Trauma

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

Hypertonic Saline 3% reserved for severe head injuries only GCS <8 with signs of Increased Intracranial Pressure including posturing, unequal or fixed unresponsive pupils, signs of Cushing Triad (Slow HR + High Systolic BP+Cheyne Stokes Respirations)

Do Not Forget to check a blood sugar - can mimic severe head injuries.

Pearls

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Back, Neuro**
- **Hypoxia:**
  - **Single episode of hypoxia can worsen head injury and double mortality.**
  - **Titrate SpO_2 as close to 100% as 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, minimal SBP is at least 90 - 100 mmHg.**
    - **In pediatrics, minimal 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 GCS with ongoing assessments should be performed.**
- **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)
- Uncontrolled hemorrhage
- Airway obstruction/ deformity
- Chest:
- Tension pneumothorax
  Flail chest/ Open chest wound
  Pericardial tamponade/ Hemothorax
- Head Trauma Protocol TB 5
- Intra-abdominal bleeding
- Pelvis/ Femur/ Extremity fracture
- Spine fracture/ Cord injury
- Hypothermia

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

P — Chest Decompression Procedure WTP 1
if indicated

Control External Hemorrhage
Procedure(s) WTP 4, 5, 7
Consider Pelvic Binding
Splint Fractures Procedure WTP 3

IV or IO Access Protocol UP 6

Spinal Motion Restriction Procedure WTP 2
Spinal Motion Restriction Protocol TB 8
if indicated

Obtain and Record GCS

VS / Perfusion Abnormal / Shock?

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

A — **TXA 1 - 2 g over 1 minute IV / IO**
Peds: Age 1 and above only
15 mg/kg IV - Max 1 gram

P — **Blood Products**
if indicated

NO

Head Injury Protocol TB 5
if indicated

Altered Mental Status
Protocol UP 4
if indicated

Pain Control Protocol UP 11
if indicated

Extremity Trauma Protocol TB 4
if indicated

Crush Syndrome Protocol TB 3
if indicated

Repeat Assessment Adult Procedure

Monitor and Reassess

Rapid Transport to appropriate destination using
Trauma and Burn:
EMS Triage and Destination Plan
Limit Scene Time ≤ 15 minutes
Provide Early Notification

Notify Destination

TXA/ Blood Product Indicators:
V/S parameters
for blunt or penetrating trauma:

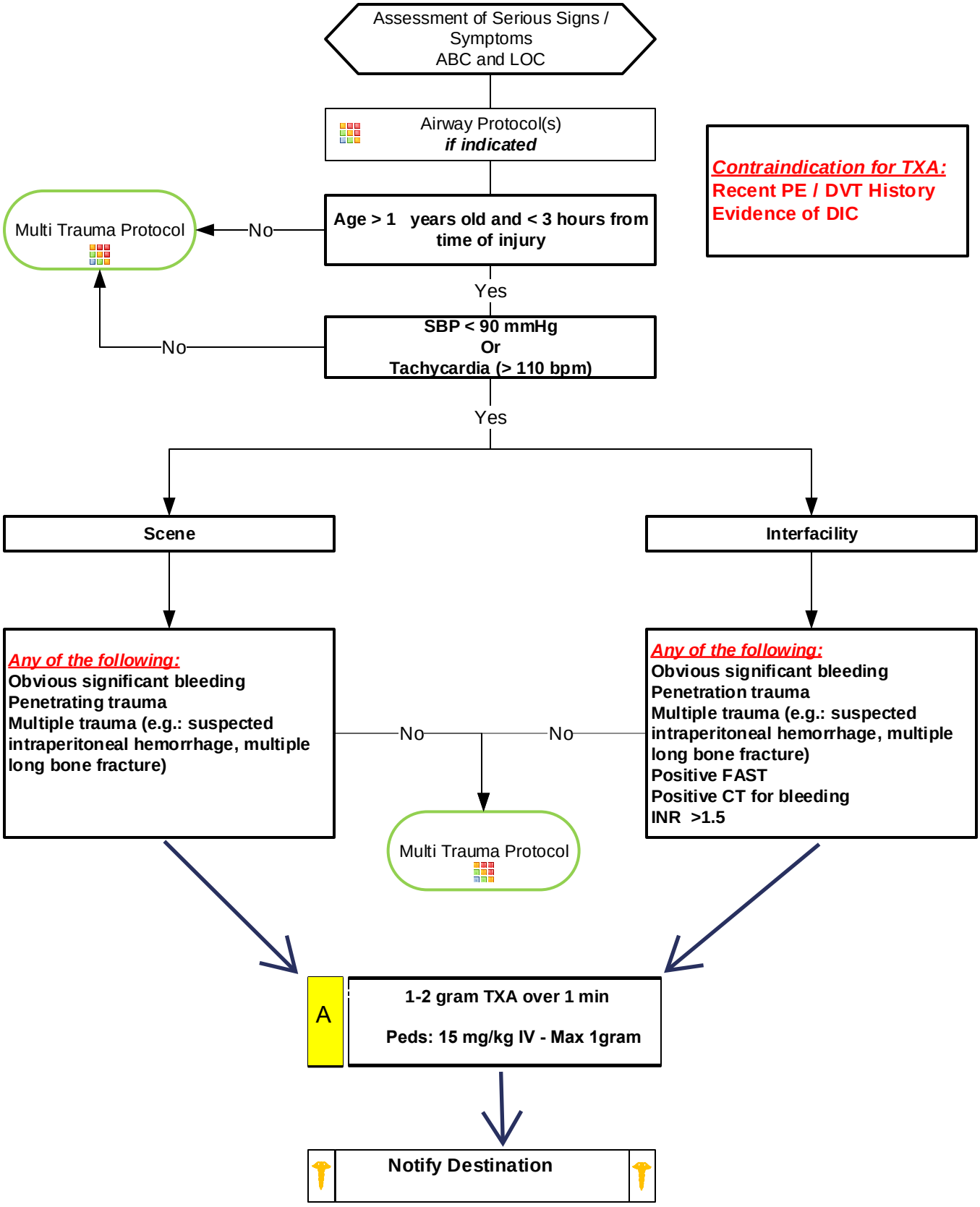
Adult:
- **SBP ≤ 70 mmHg**
  or
- **SBP ≤ 90 mmHg + HR ≥ 110**

- **Age ≥ 65**
  SBP < 100 mmHg + HR > 100

Peds:
- **SBP < {70 + 2(Age)}**

Trauma and Burn Protocol Section

Tranexamic Acid (TXA)



Adult Trauma and Burn Section Protocols

Multiple Trauma

TXA (Tranexamic Acid):

1) Indicated for ages 1 or greater in trauma patients with signs/symptoms of suspicion of internal hemorrhage and anticipation of blood transfusion.

2) Indication includes BP <100 systolic, HR > 110, altered LOC, pale, diaphoretic.

3) Contraindications include time greater than 3 hours from onset of injury, shock with other measures (tourniquet, direct pressure, and minimal fluid loss), nontraumatic shock, and non-hemorrhage shock. Additional contraindications evidence / hx of intravascular clotting (DVT, PE, stroke).

4) Patient must be transported to a trauma center if possible - pending weather conditions.

5) Loading dose TXA -Peds 15 mg/kg IV - Max 1 gram - Adults 1-2 grams slow push over 1 min

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**
- **Scene time should not be delayed for procedures and all should be performed during rapid transport of unstable patients.**
- **Ask all patients if they are taking any anticoagulants and report during facility transition of care.**
- **Airway:**
  - **BVM and BIAD are acceptable for airway management to maintain SpO_2 of 92 – 98%.**
  - **Endotracheal intubation, if performed, should be completed during transport and should not delay scene time.**
- **Breathing:**
  - **Consider Chest Decompression with signs of shock and/ or injury to torso with evidence of tension pneumothorax.**
- **Circulation:**
  - **Control external hemorrhage and prevent hypothermia by keeping patient warm.**
  - **IV or IO access should be established during rapid transport of unstable patients.**
- **Head Injury with multiple trauma (Refer to Head Trauma Protocol TB 5):**
  - **Higher SBP targets are needed to maintain cerebral perfusion pressure.**
  - **Single episodes of Hypotension and/ or hypoxia are associated with worse outcomes in head injured patients.**
  - **Adult SBP target is ≥ 100 mmHg.**
  - **Pediatric SPB target is ≥ 70 + 2(Age) mmHg.**
- **Trauma Triad of Death:**
  - **Metabolic acidosis/ Coagulopathy/ Hypothermia**
  - **Address by appropriate resuscitation measures and keeping patient warm, regardless of ambient temperature, which helps to treat metabolic acidosis, coagulopathy, and hypothermia.**
- **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.**
- **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, occult injuries difficult to recognize and with unexpected patient decompensation.
  - Risk of death with trauma increases after age 55.
  - Low impact mechanisms, such as ground level falls might result in severe injury especially in age over 65.
- See Regional Trauma Guidelines when declaring Trauma Activation.
- Maintain high-index of suspicion for domestic violence or abuse, pediatric non-accidental trauma, or geriatric abuse.
- **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** → **< 5% TBSA 2nd/3rd Degree Burn**
  No inhalation injury, Not Intubated, Normotensive
  GCS 14 or Greater
- **Serious 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)
- **Critical Burn** → **>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
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

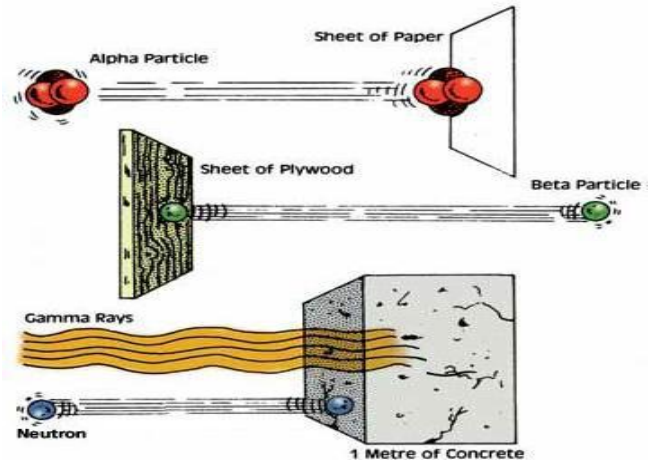
Collateral Injury: Most all injuries immediately seen will be a result of collateral injury, such as heat from the blast, trauma from concussion, treat collateral injury based on typical care for the type of injury displayed.·

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

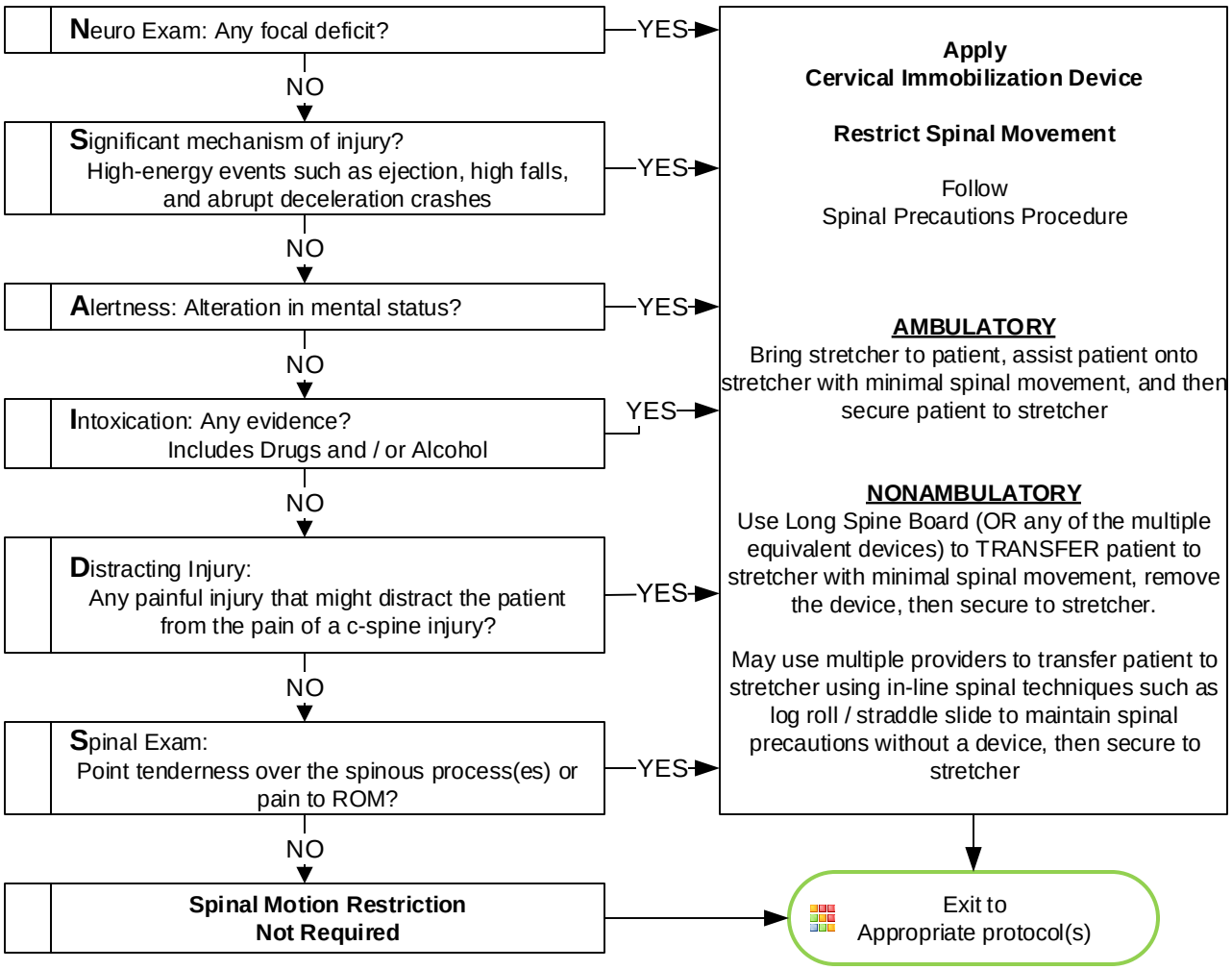
* Hypotension
** Also cardiovascular collapse, fever, shock

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

- 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 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 readily available water or saline solution using copious amounts of fluids.
- **Three methods of exposure:**
  - External irradiation
  - External contamination
  - Internal contamination
- **Two classes of radiation:**
  - Ionizing radiation (greater energy) is the most dangerous and is generally in one of three states: Alpha Particles, Beta Particles and Gamma Rays.
  - Non-ionizing (lower energy) examples include microwaves, radios, lasers and visible light.
- Radiation burns with early presentation are unlikely, it is more likely this is a combination event with either thermal or chemical burn being presented as well as a radiation exposure. Where the burn is from a radiation source, it indicates the patient has been exposed to a significant source, (> 250 rem).
- Patients experiencing radiation poisoning are not contagious. Cross contamination is only a threat with external and internal contamination.
- Typical ionizing radiation sources in the civilian setting include soil density probes used with roadway builders and medical uses such as x-ray sources as well as radiation therapy. Sources used in the production of nuclear energy and spent fuel are rarely exposure threats as 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.
- **The three primary methods of protection from radiation sources:**
  - Limiting time of exposure
  - Distance from
  - Shielding from the source
- Dirty bombs ingredients generally include previously used radioactive material and combined with a conventional explosive device to spread and distribute the contaminated material.
- Refer to Decontamination Procedure / WMD / Nerve Agent Protocol for dirty contamination events.
- If there is a time lag between the time of exposure and the encounter with EMS, key clinical symptom evaluation includes: Nausea/ Vomiting, hypothermia/hyperthermia, diarrhea, neurological/cognitive deficits, headache and hypotension.
- This event may require an activation of the National Radiation Injury Treatment Network, RITN. UNC Hospitals, Wake Forest-Baptist and Duke are the NC 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.
- **EMR may participate in spinal motion restriction** per Agency Medical Director
- **Immobilization on a long spine board is not necessary where:**
  - **Penetrating trauma to the head, neck or torso with no signs / symptoms of spinal injury.**
- **Concerning mechanisms that may result in spinal column injury:**
  - **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/ 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 or 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 or IO Access Protocol UP 6
  Consider 2 IV sites if ≥ 15 % TBSA

TBSA estimate at ≥ 20%

NO → **A** **Lactated Ringers or Normal Saline**
0.25 mL/kg *X* (TBSA%)/hr

YES → **A** **Lactated Ringers or Normal Saline**
Age: ≤ 5 = 125 mL/hr
Age: 6–14 = 250 mL/hr
Age: ≥ 15 = 500 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

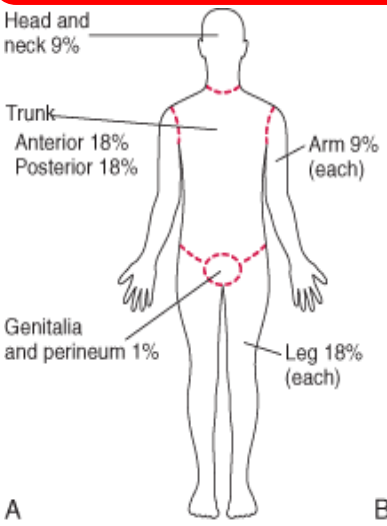
Formula example:
70 kg patient with 15% TBSA

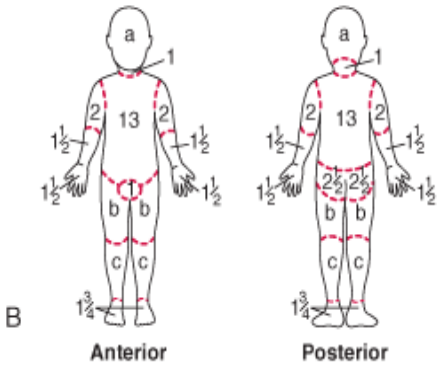
0.25 *x* 70 kg = 17.5
17.5 *x* 15 = 263 mL/hr

1. 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

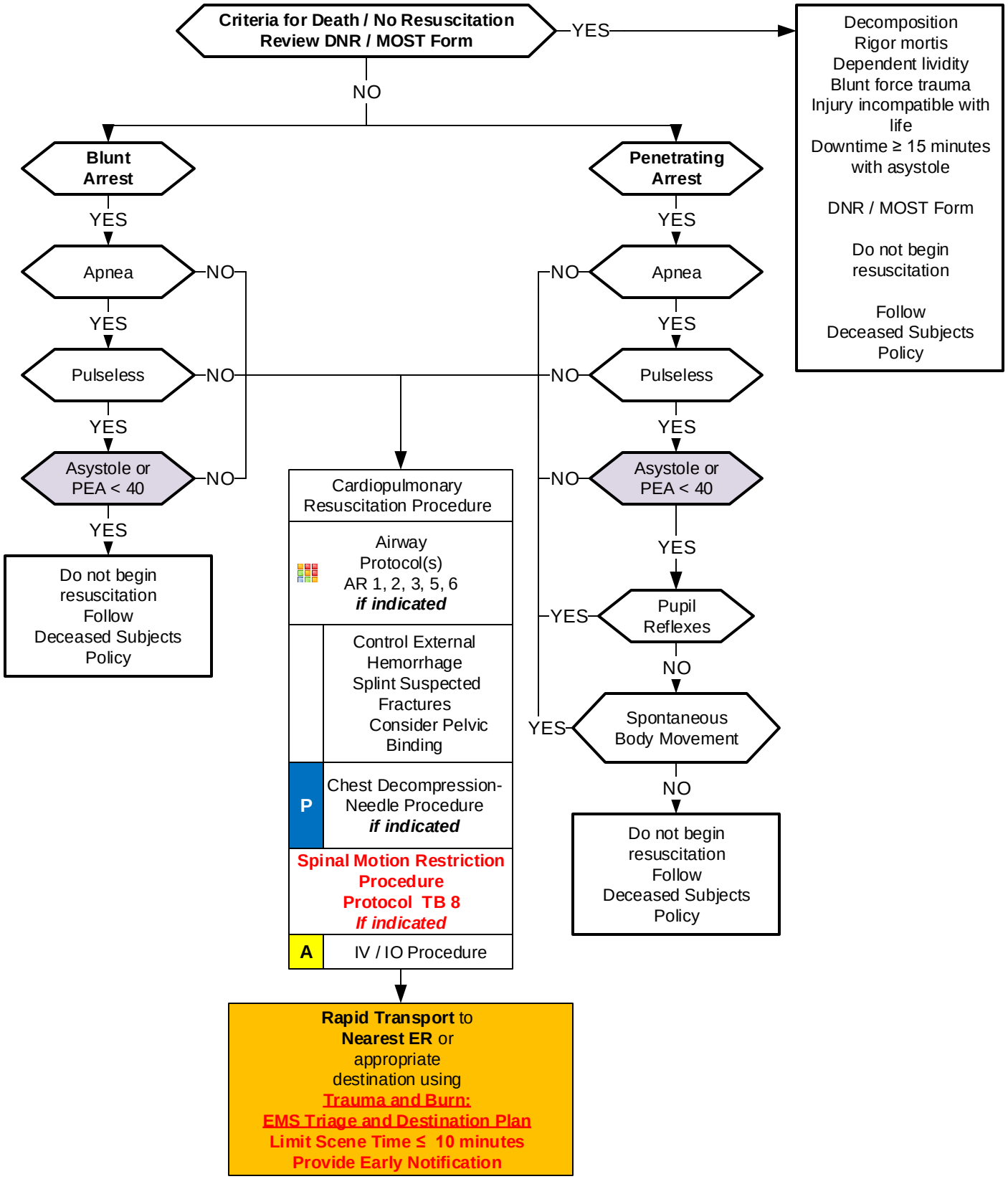
- Rarely find a complete isolated body part that is injured as described in the Rule of Nines.
- More likely, it will be portions of one area, portions of another, and an approximation will be needed.
- For the purpose of determining the extent of serious injury, differentiate the area with minimal or 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 level of emergent and primary care. For our work, all are included in Full Thickness burns

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

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:**
  - **For systems performing RSI, Rocuronium is preferred agent (succinylcholine can be used in the first 24-hours)**
  - **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



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.**
- **Time considerations:**

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

  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
- Agencies utilizing Targeted Temperature Management Protocol should not cool the trauma patient, but rather make every effort to maintain warmth.

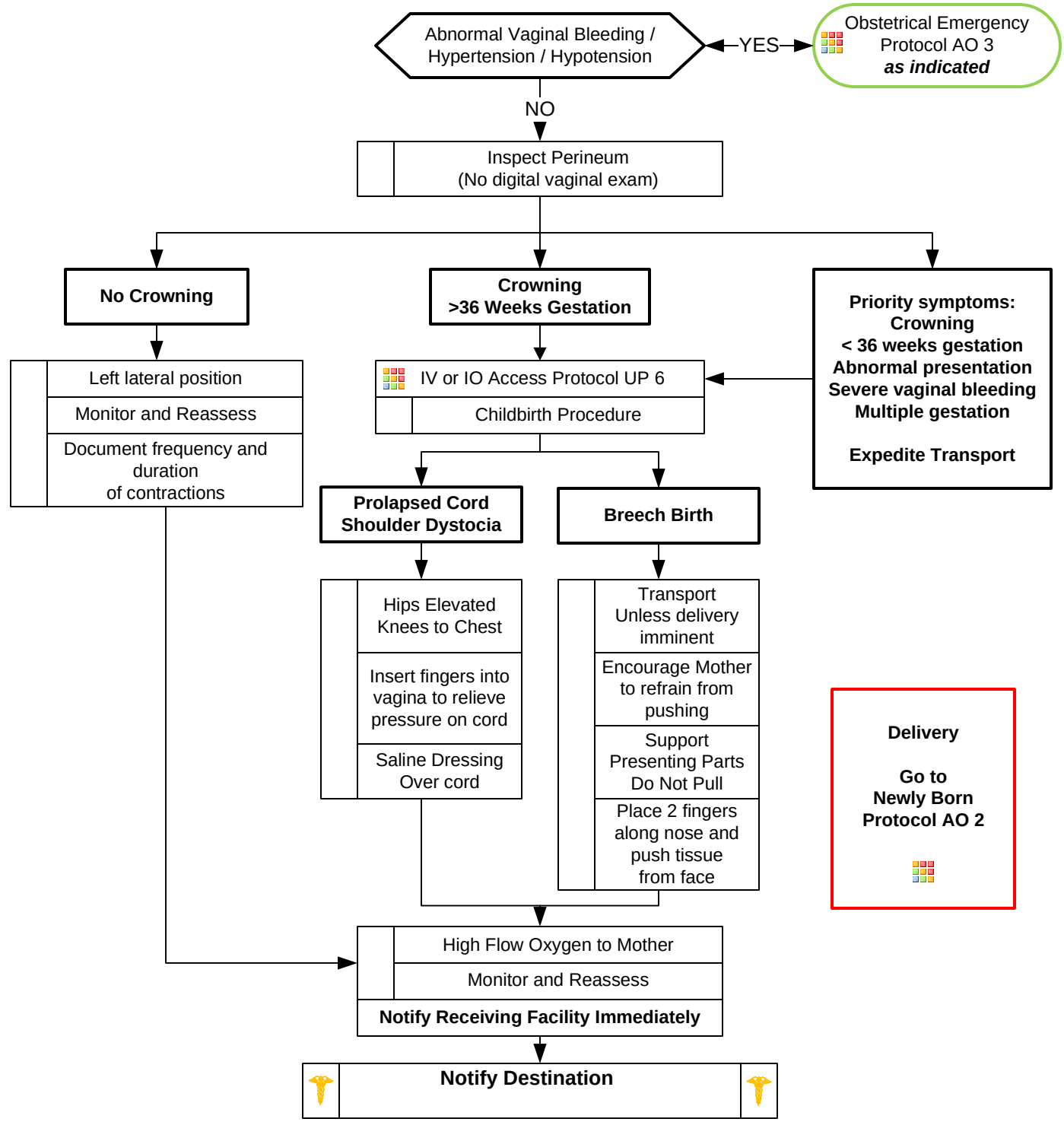
Adult Obstetrics
AO Section

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
- **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

Adult Obstetrical Protocol Section

Newly Born

Immediate Post child birth, newborns may have a blood sugar less then 40 mg/dl

Active warming and stimulation will often rapidly increase blood sugar after birth.

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
- IV or 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

A: **TXA 1 – 2 gm IV / IO**
See Pearls

NO

Seizure Activity

YES

P:
Midazolam 2.5 mg IV / IO
May repeat
every 3 to 5 minutes as needed

Midazolam 5 mg IM

Midazolam 2 mg IN

Maximum 10 mg

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

NO

- Childbirth / Labor Protocol AO 1 **if indicated**
- Monitor and Reassess

Notify Destination

Adult Obstetric Protocol Section

Obstetrical Emergency

Please Note: Midazolam dosage is less than traditional seizures. This is because respiratory depression and hypotension are far more dangerous to the mother and baby.

Unless prior epilepsy history, the etiology of eclamptic seizures are more appropriately treated with lower dose benzodiazepines and repeat doses of Magnesium.

Clarification: 1st Dose Med in Suspected Eclamptic Seizures is Midazolam every 3-5 minutes if seizures persist. Magnesium is immediately given after the Midazolam.

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.

Pediatric Cardiac PC Section

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

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 2 seconds when age < 1
1 breathe every 3 seconds when age ≥ 1
15:2 Compression:Ventilation if no Advanced Airway

AED Procedure
if available

P Cardiac Monitor

IV or IO Access Protocol UP 6

A
Epinephrine1:10,000
0.01 mg/kg IV / IO Maximum Single Dose 1mg
Or
Epinephrine 1:1000 0.1 mg / kg ETT Maximum 2.5 mg
Repeat every 3 – 5 minutes

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

Search for Reversible Causes

Blood Glucose Analysis Procedure
if applicable

↓

Notify Destination

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

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

Pediatric Cardiac Protocol Section

Pediatric Asystole / PEA

No limit to pediatric epi doses at this time.

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks.**
- **Refer to optional protocol AC 11 or development of local agency protocol.**
- **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:
  Age < 1 year: 1 breath every 2 seconds with continuous, uninterrupted compressions.
  Age ≥ 1 year: 1 breath every 3 seconds with continuous, uninterrupted compressions.
- **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.
- **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)
- **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. Transport / Fly to Trauma Cemter if ROSC Obtained
- 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

Identify underlying cause
Search for reversible causes

P — Cardiac Monitor

IV or IO 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

IV or IO Protocol UP 6

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

P — **Epinephrine1:10,000**
0.01 mg/kg IV / IO Maximum Single Dose 1mg
Or
Epinephrine 1:1000 0.1 mg / kg ETT Maximum 2.5 mg
Repeat every 5 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

Notify Destination

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 Poor Perfusion

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.
- 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
- **B**: EtCO2 Monitoring
- IV or IO 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

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.**
  - **Lasix 1 mg/kg IV / IO.**
  - **Agency specific vasopressor.**
- 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 2 seconds when age < 1
1 breathe every 3 seconds when age ≥ 1
15:2 Compression:Ventilation if no Advanced Airway

ALS Available

NO → AED Procedure ***if available***

YES → **P** Cardiac Monitor

Shockable Rhythm

NO → Continue CPR 2 Minutes
Repeat and reassess
Pediatric Airway Protocol(s) 5, 6

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

Shockable Rhythm

NO → Pediatric Asystole / PEA Protocol PC 1
Pediatric Airway Protocol(s) 5, 6

YES → 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 / IM
Peds: 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

Pediatric Cardiac Protocol Section

Pediatric Cardiac Arrest

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **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:
  Age < 1 year: 1 breath every 2 seconds with continuous, uninterrupted compressions.
  Age ≥ 1 year: 1 breath every 3 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.
- **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.
- **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 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
	0.5 – 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 0.1 – 0.2 mg / kg IV / IO / IN** May repeat if needed **Maximum Single Dose 2 mg** **Maximum Total Dose 5 mg**

NO

B	12 Lead ECG Procedure
P	Cardiac Monitor
	IV or 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 if Diazepam, Lorazepam, or Midazolam is used.
- 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)
- Hypothermia/ 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
	0.5 – 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 0.1 – 0.2 mg / kg IV / IO / IN** May repeat if needed **Maximum Single Dose 2 mg** **Maximum Total Dose 5 mg**

NO ↓

B	12 Lead ECG Procedure
P	Cardiac Monitor
	IV or 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)

If Fever 101F or above - likely Sepsis -- treat underlying problem not tachycardia !

Pearls

- **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
- **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

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 2 seconds when age < 1
1 breathe every 3 seconds when age ≥ 1
15:2 Compression:Ventilation if no Advanced Airway

Automated Defibrillation Procedure

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

Maximum 10 J / kg or adult dose

IV / IO Protocol UP 6

A
Epinephrine1:10,000
0.01 mg/kg IV / IO Maximum 1mg
Or
Epinephrine 1:1000 0.1 mg / kg ETT
Maximum 2.5 mg
Repeat every 3 – 5 minutes

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.

P
Amiodarone IO/IV
5 mg/kg bolus during cardiac arrest.
May repeat up to 2 times for refractory VF/pulseless VT

Notify Destination

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

Reversible Causes

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

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

Pediatric Cardiac Protocol Section

Pediatric Ventricular Fibrillation
Pulseless Ventricular Tachycardia

No limit to pediatric epi doses at this time.

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **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:
  Age < 1 year: 1 breath every 2 seconds with continuous, uninterrupted compressions.
  Age ≥ 1 year: 1 breath every 3 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.
- **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.
- **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 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

Optimize Ventilation and Oxygenation
- Maintain SpO2 ≥ 92 – 98%
- Advanced airway if indicated
- Age Appropriate Respiratory Rate
- Remove Impedence Threshold Device

DO NOT HYPERVENTILATE

ETCO2 ideally 35 – 45 mm Hg

B — 12 Lead ECG Procedure

IV or IO 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 IO/IV dose:
5 mg/kg bolus during cardiac arrest.
May repeat up to 2 times for refractory VF/pulseless VT

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

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 Medical
PM Section

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 Protocol UP 6
If indicated

A
Diphenhydramine
1 mg/kg IV / IM / IO / PO

Pepcid 0.25 mg/kg IV/IO
If available

B
Monitor and Reassess
Monitor for Worsening
Signs and Symptoms

MODERATE
2+ Body Systems

Epinephrine 1:1000 IM
≥ 30 kg 0.3 – 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes
if no improvement

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

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

A
Epinephrine 1:1000 IM
≥ 30 kg 0.3 – 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes
if no improvement

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

SEVERE
2 + Body Systems + hypotension
Or Isolated Hypotension

Epinephrine 1:1000 IM
≥ 30 kg 0.3 – 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes
if no improvement

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

A
Epinephrine 1:1000 IM
≥ 30 kg 0.3 – 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes
if no improvement

Airway Pediatric Protocol(s)
if indicated

Pediatric Hypotension/ Shock
Protocol PM 3
if indicated

IV or IO Access Protocol UP 6

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

Pepcid 0.25 mg/kg IV/IO
If available

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

P
No improvement with IM Epinephrine
Epinephrine 1:10K IV / IO
If <30Kg - 0.15mg >30Kg - 0.3-0.5 mg

A
Methylprednisolone
2 mg/kg IV
Maximum 125 mg

Notify Destination

Pediatric Medical Protocol Section

Pediatric Allergic Reaction

Decadron 0.2 mg/kg IV / IO / IM - Maximum 10mg

- May be substituted for Methylprednisolone

IV Epi is only to be used in Anaphylactic Shock / Life Threatening Reactions

IV Epi form is 1:10K - NOT 1:1K !!

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen**
- **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 benefit in Moderate/ Severe anaphylaxis.**
  - **Diphenhydramine/ steroids should NOT delay initial or repeat 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, vomiting, and/ or worsening mental status.**
- **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 not limited in our system.**

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.

	Blood Glucose Analysis Procedure
B	12 Lead ECG Procedure ***if indicated***
	IV or 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***

B	***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 Sugar ≤ 69 mg / dl

	Oral Glucose ½ to 1 Tube If age appropriate
	Consider Oral Solution (Juices / Food)
A	<u>< 1 Year of Age:</u> **D10: 5 mL/kg IV / IO** Repeat as needed <u>1 to 2 Years:</u> **D25: 2 mL/kg IV / IO** Repeat as needed <u>> 2 Years:</u> **D50: 1 mL/kg IV / IO** **Maximum 25 g per dose** Repeat as needed

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 10 - 20 mL/kg IV / IO** **Maximum 20 mL/kg**

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

Notify Destination

Pediatric Medical Protocol Section

Pediatric Diabetic

Immediate Post child birth, newborns may have a blood sugar less then 40 mg/dl

Active warming and stimulation will often rapidly increase blood sugar after birth.

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Respirations and effort, Abdomen, Neuro.**
- **Patients with prolonged hypoglycemia or those who are malnourished 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.**
- **D10/ D25 Preparation:**
  - **D10: Remove 10 mL of D50 from a D50 vial. Add 40 mL of NS with the 10 mL of D50 with a total volume of 50 mL.**
  - **D10: Alternative, Discard 40 mL from the D50 vial and draw up 40 mL of NS with a total volume of 50 mL.**
  - **D25: Remove 25 mL of D50 and draw up 25 mL of NS with a total volume of 50 mL.**
- **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
  - 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.
  - should be instructed to contact their physician immediately and consume a meal.
- In extreme circumstances with no IV and no response to glucagon, Dextrose 50 % can be administered rectally.

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

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

Blood Glucose Analysis Procedure

IV or IO Access Protocol UP 6

P Cardiac Monitor

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

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

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 ***if indicated***

Push Dose Vasopressor - Epinephrine 1:100K
Give 1cc (10 mcg) q 2 – 3 minutes to effect SBP > 90 Use in patients with BP < 80 & Heart Rate < 200.

Levophed 2 – 20 mcg / min IV / IO

Titrate to age appropriate
SBP ≥ 70 + 2 x Age

Notify Destination

Pediatric Medical Protocol Section

Hypotension/ Shock

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 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 first and only sign.**
- **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.

Toxins & Envenomations

TE Section

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 (poisonous)
- Spider bite (poisonous)
- 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
Or
Agency Specific Number

- 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 – 2.5 mg IV / IO
Over 2 to 3 minutes
Midazolam 5mg IN
Maximum 10 mg
Pediatrics:
Midazolam 0.1 – 0.2 mg / kg
IV / IO / IM / IN
Over 2 to 3 minutes
Maximum 5 mg IM

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

Monitor and Reassess

Notify Destination

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 an 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) 1 - 7 ***as indicated***
	High Flow Oxygen
	Blood Glucose Analysis Procedure
B	12 Lead ECG Procedure
	IV or IO Access Protocol UP 6
P	Cardiac Monitor/ CO Monitor
	Altered Mental Status Protocol UP 4 ***if indicated***
	Age Appropriate Diabetic Protocol AM 2/ PM 2 ***if indicated***
	Age Appropriate Multiple Trauma Protocol TB 6 Head Injury TB 5 ***if indicated***
	Age Appropriate Hypotension/ Shock Protocol AM 5/ PM 3 ***if indicated***

Contact
Carolinas Poison Control
1-800-222-1222

ppm	%COHb[6]	Effects on the body
≤5	≤1	Normal
10	1.8	Normal
25	3.5	Maximum allowed in the workplace
30-60	5-10	Maximum safe level
60-150	10-20	Headache, breathless
150-300	20-30	Add dizziness, nausea, impaired dexterity
300-650	30-50	Add vomiting, confusion and loss of consciousness
700-1000	50-65	Organ impairment, coma, fatal if not treated
>1000	>65	Fatal

Note: In smokers, %COHb may vary between 1.5 percent and 14 percent.

High Suspicion of Cyanide

YES → P **Hydroxocobalamin 70 mg / kg IV / IO Maximum 5 g** ***If available***

NO

	Continue Care Continue High Flow Oxygen
	Monitor and Reasses

Notify Destination

Pearls
- **Recommended exam: Neuro, Skin, Heart, Lungs, Abdomen, Extremities**
- **Scene safety is priority.**
- 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/ 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 or IO Access Protocol UP 6 ***if indicated***
- P Cardiac Monitor ***as indicated***

Awake but with AMS

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

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

Notify Destination

Unresponsive

- **5 Breaths via BVM**/ mouth-to-mouth ***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
Or
Agency specific hyperbaric information

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
- 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
- IV or 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. very young and very 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 20 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 15 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), 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, barbituates
- Infections/ Sepsis
- Length of exposure/ Wetness/ Wind chill

Signs and Symptoms
- Altered mental status/ coma
- Cold, clammy
- Shivering
- Extremity pain or sensory abnormality
- Bradycardia
- Hypotension or shock

Differential
- Sepsis
- Environmental exposure
- 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

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

IV or IO Access Protocol UP 6

A
Normal Saline / LR 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

Toxic-Environmental Protocol Section

Hypothermia/ Frostbite

Pearls

- **Recommended Exam: Mental Status, Heart, Lungs, Abdomen, Extremities, Neuro**
- **NO PATIENT IS DEAD UNTIL WARM AND DEAD (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 into 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 Envenomation/ 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

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

- General Wound Care Procedure
- IV or 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
- Immerse in Hot Water
  110 – 114°F (43 - 46°C)
  if available
- 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

Toxic-Environmental Protocol Section

Marine Envenomation/ Injury

Pearls

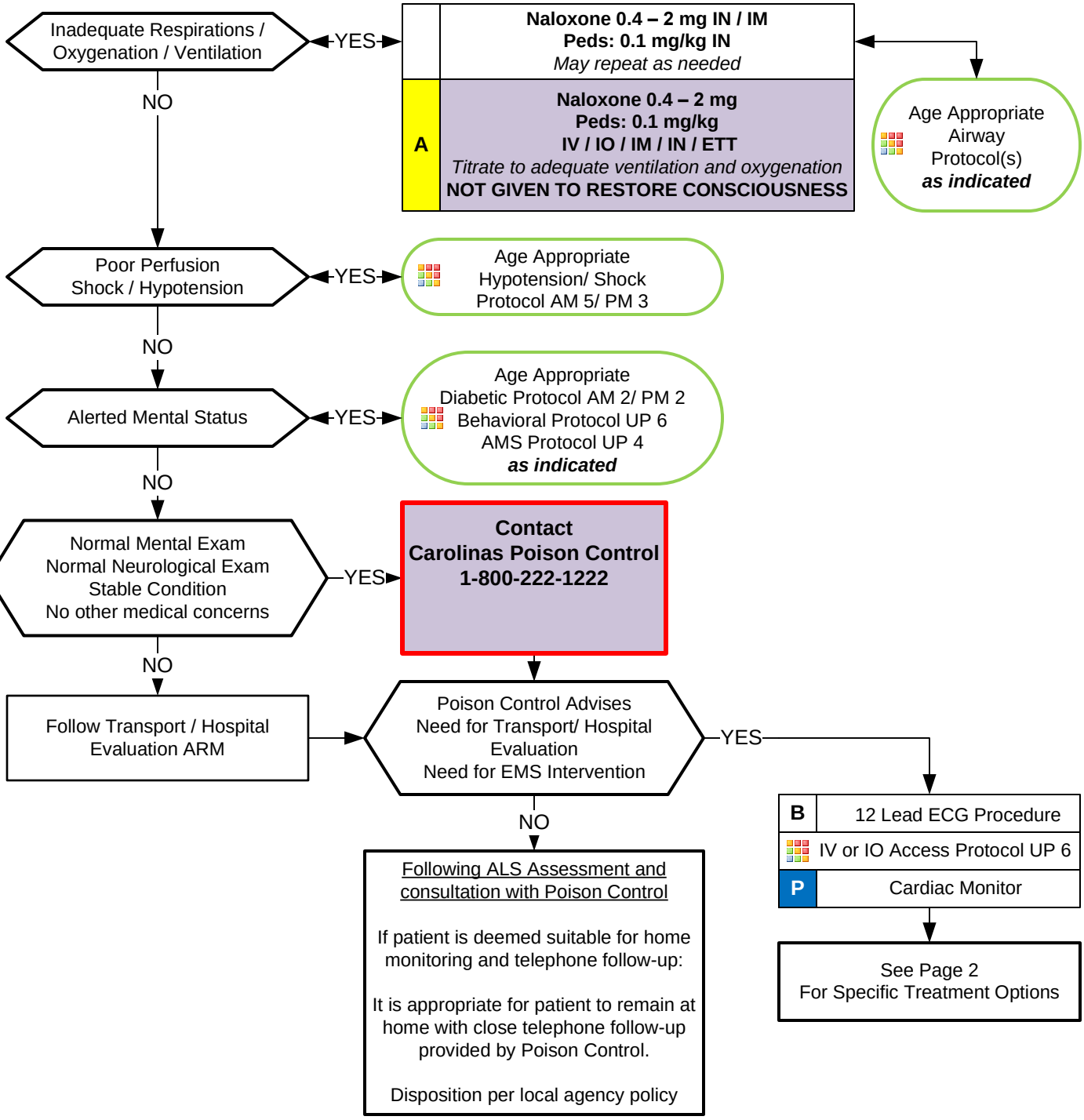
- **Ensure your safety: Avoid the organism or fragments of the organism as they may impart further sting or injury.**
- **Priority is removal of the patient from the water to prevent drowning.**
- **Coral:**
  - Coral is covered by various living organisms which are easily dislodged from the structure.
  - Victim may swim into coral causing small cuts and abrasions and the coral may enter into cuts, causing little if any symptoms initially, but later causing inflammation, pain and/ or infection.
  - 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), is 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 a residence/ business as lionfish 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°F 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.
  - Venom 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 advice.
  - 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.
- Sea creature stings and bites impart moderate to severe pain.
- Arrest 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 → **B**
If Time of Ingestion ≤ 1 Hour
Activated Charcoal 1 gm/kg PO
Maximum 50 gm
If available

NO

Aspirin
Salicylate Containing Product

YES → **B**
If Time of Ingestion ≤ 1 Hour
Activated Charcoal 1 gm/kg PO
Maximum 50 gm
If available

NO

Beta Blocker or
Calcium Channel Blocker

YES → **B**
If Time of Ingestion ≤ 1 Hour
Activated Charcoal 1 gm/kg PO
Maximum 50 gm
If available

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

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 → **B**
If Time of Ingestion ≤ 1 Hour
Activated Charcoal 1 gm/kg PO
Maximum 50 gm
if available

P
QRS ≥ 0.12 sec or Peds: 0.09 sec
Sodium Bicarbonate
100 mEq IV / IO
Peds: 1 mEq/kg IV / IO
Repeat in 10 minutes as needed

Sodium Bicarbonate Infusion
Critical Care Transport Only

Symptomatic Care
as needed

Monitor and Reassess

Notify Destination

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, the substance(s), 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**

Example: 34 kg pediatric	
First 10 kg:	4 mL/kg/hr = 40 mL/hr
Second 10 kg:	2 mL/kg/hr = 20 mL/hr
Final 14 Kg:	1 mL/kg//hr = 14 mL/hr
	Total: 74 mL/hr rate

- **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 does not 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:

Request thru Dispatch Center

Incident Command

NO

Notify Destination

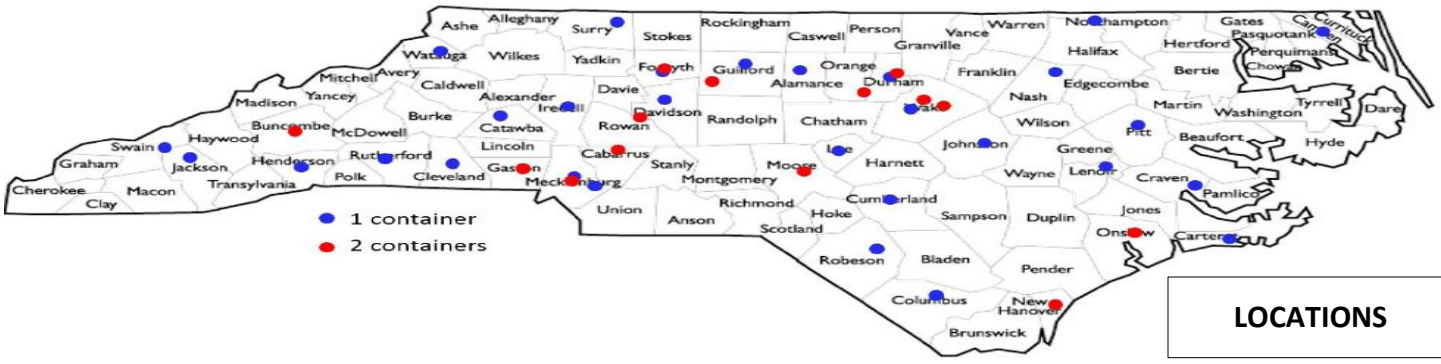
Toxic-Environmental Protocol Section

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

Toxic Exposure AHF Skin

History

- Known skin contacted by HF, vapor, or aqueous solution.
- Concentration of AHF
- Time of exposure

Signs and Symptoms

- Rapidly produces an erythematous area.
- White or gray color at the surface.
- Extreme pain.

Scene Safety / Quantify and Triage Patients / Begin Decontamination

Triage Protocol UP2 as indicated

Flush 5 minutes with copious amounts of water. Remove all clothing.

Age Appropriate Airway Protocol(s) 1, 2, 3, 4, 5, 6

A IV or IO Procedure UP 6 if indicated

P Cardiac Monitor if indicated

Rubber / Acid Resistant gloves MUST be worn when touching patient

B Apply calcium gluconate 2.5% gel on exposed area.
If pain significantly decreases or resolves within 20-30 minutes stop and observe.
OR
Immersion or compress with iced zephiran solution (0.13% benzalkonium chloride).

Exposure Level

Pain is Being Controlled

B If burn is responding to standard treatments (calcium gluconate gel or zephiran soaks) continue until pain subsides.

P Monitor cardiac rhythm closely.

Pain Is Not Controlled

P Inject Calcium Gluconate solution 2.5-5% into, around, and under all injuries.
Do not inject digits, nose flaps, or ear lobes. This will cause necrosis.
Do not use anesthetics which may hide pain perception, which is used to determine the amount of calcium gluconate to inject.
Treat injuries after injection as you would any other open wounds.

If QT interval increase by 50% of become >.50 consider Calcium Gluconate IV.

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

Notify Destination

Toxin-Environmental Protocol Section

Toxic Exposure AHF Skin

Contact Local Haz-Mat Team / Fire Dept for decontamination.

Patient's exposed to AHF are best served at a Burn Trauma Center

Pearls

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro**
- **RESPONDERS MUST WEAR RUBBER (NEOPRENE OR POLYVINYL CHLORIDE (PVC)) GLOVES WHEN TREATING AHF BURNS.**
- Green, Yellow, and Red In burn severity do not apply to Triage systems.
- Refer to Rule of Nines: Determine the purity of the AHF is possible.
- Do not flush more than 5 minutes the begin Calcium Gluconate Cream treatment. Remove all clothing during decontamination process to avoid residual exposure.
- Treat additional traumatic injuries per appropriate protocol.

Toxic Exposure AHF Eye

History
- Known eye contacted by HF, vapor, or aqueous solution.
- Concentration of AHF.
- Time of exposure.

Signs and Symptoms
- Severe irritation, chemical burns to eyelids and peri-ocular skin.
- Corneal opacities, pitting or ulceration, possible vision loss.
- Extreme pain.

Differential
- Sulfuric acid exposure.
- Phosphoric acid exposure.
- Other caustic exposure.

Scene Safety / Quantify and Triage Patients / Begin Decontamination

Consider Inhalation Injury. facial/head skin exposure

Triage Protocol UP2 as indicated

Flush 5 minutes with copious amounts of water. Remove all clothing.

Age Appropriate Airway Protocol(s) 1, 2, 3, 4, 5, 6

A IV or IO Procedure UP 6 if indicated

P Cardiac Monitor

Morgan Lens Available

No

P
- Irrigate each eye with 1000cc of a 1% calcium gluconate solution (no higher than 1%) for a minimum period of 15 minutes.
- Use standard IV tubing fixed to the forehead if one eye is exposed. For both eyes use a nasal cannula (designed for oxygen delivery) mounted on the nose
- Always obtain specialized medical evaluation & treatment.

Yes

P
- Place two drops of tetracaine in each eye if available. This will simplify the use of the "Morgan lens."
- Insure calcium gluconate solution is flowing before inserting Morgan lens and until removed.
- Irrigate each eye with 1000cc of a 1% calcium gluconate solution (no higher than 1%) for a minimum period of 15 minutes. **If tetracaine is used continue irrigation until evaluated by doctor.**
- Treat only effected eye(s)
- Always obtain specialized medical evaluation & treatment.

During transportation to a medical facility or while waiting for a physician to see the victim, it is extremely important to continue the calcium gluconate irrigation.

P Monitor cardiac rhythm closely.

If QT interval increase by 50% of become >.50 consider Calcium Gluconate IV.

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

Notify Destination

Toxin-Environmental Protocol Section

Toxic Exposure AHF Eye

Pearls

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro.**
- **RESPONDERS MUST WEAR RUBBER (NEOPRENE OR POLYVINYL CHLORIDE (PVC)) GLOVES WHEN TREATING AHF BURNS.**
- Green, Yellow, and Red In burn severity do not apply to Triage systems.
- Refer to Rule of Nines: Determine the purity of the AHF is possible.
- If Eye exposure exist consider Skin, Inhalation, and Ingestion and treat as needed.

Toxic Exposure AHF Inhalation

History

- Known or suspected inhalation of HF vapor.
- Concentration of AHF
- Time of exposure

Signs and Symptoms

- Coughing
- Shortness of breath
- Mucosal bleeding
- Pulmonary edema
- Labored breathing
- Bronchial spasm
- Upper airway edema
- Cardiac arrhythmia
- Erythema (reddening), swelling of the mouth, nose, and throat

Scene Safety / Quantify and Triage Patients / Begin Decontamination

Rubber / Acid Resistant gloves MUST be worn when touching patient

Triage Protocol UP2 as indicated

No decontamination possible. Exposure to HF vapors, consider skin and eye exposure. Refer to appropriate protocol.

Age Appropriate Airway Protocol(s) 1, 2, 3, 4, 5, 6

A IV or IO Procedure UP 6 if indicated

P Cardiac Monitor if indicated

Exposure Level

Minimal or no systemic effects expected

B
- Administer oxygen by nonrebreather mask at 15 liters per minute.

P
- **Calcium Gluconate Nebulizer 2.5%** in normal saline for 15 to 20 minutes minimum.

Respiratory, skin, eyes, and systemic effects

B
- Administer oxygen by nonrebreather mask @ 15 liters per minute.
- **Albuterol Nebulizer 2.5 - 5 mg** (do not pause calcium gluconate to give)

A
- Consider CPAP.
  Methylprednisolone 125 mg IV / IO

P
- **Calcium Gluconate Nebulizer 2.5%** in normal saline continuously until medically evaluated.

P Should QT interval increase by 50% of become >.50 consider Calcium Gluconate IV.

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

Notify Destination

Toxin-Environmental Protocol Section

Toxic Exposure AHF Inhalation

- Administer oxygen by nonrebreather mask @ 15 liters per minute.
- **Calcium Gluconate Nebulizer 2.5%** in normal saline continuously until medically evaluated.
- **Albuterol Nebulizer 2.5 - 5 mg** (do not pause calcium gluconate to give)

Consider CPAP.

- **Methylprednisolone 125 mg IV / IO**

Pearls

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro.**
- **RESPONDERS MUST WEAR RUBBER (NEOPRENE OR POLYVINYL CHLORIDE (PVC)) GLOVES WHEN TREATING AHF BURNS.**
- Green, Yellow, and Red In burn severity do not apply to Triage systems.
- Refer to Rule of Nines: Determine the purity of the AHF is possible.
- If Inhalation injury has occurred consider Skin, Eye, and Ingestion and treat as needed.

Toxic Exposure AHF Ingestion

History

- Known or suspected HF ingestion.
- Concentration of AHF
- Time of exposure

Signs and Symptom

- Reddening or bleeding of the mouth
- Difficulty swallowing
- Bronchial or pulmonary injury if aspiration if vomiting occurs.
- Systemic toxicity should be expected.
- Cardiac arrhythmia. • Death.

Scene Safety / Quantify and Triage Patients / Begin Decontamination

Triage Protocol UP2 as indicated	
Surrounding areas. Flush 5 minutes with copious amounts of water. Remove all clothing.	
Age Appropriate Airway Protocol(s) 1, 2, 3, 4, 5, 6	
A	IV or IO Procedure UP 6 if indicated
P	Cardiac Monitor if indicated

DO NOT INDUCE VOMITING!
If patient is able to swallow, give oral calcium solutions or calcium based antacids, milk or water.

P

Consider Gastric Tube Insertion Procedure

Gastric lavage with calcium solutions or antacids.

Monitor cardiac rhythm closely.

P Should QT interval increase by 50% of become >.50 consider Calcium Gluconate IV.

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

Notify Destination

Toxin-Environmental Protocol Section

Toxic Exposure AHF Ingestion

- **Pearls**
- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro.**
- **RESPONDERS MUST WEAR RUBBER (NEOPRENE OR POLYVINYL CHLORIDE (PVC)) GLOVES WHEN TREATING AHF BURNS.**
- Green, Yellow, and Red In burn severity do not apply to Triage systems.
- Refer to Rule of Nines: Determine the purity of the AHF is possible.
- If Ingestion exist consider Skin, Inhalation, and Eye exposure and treat as needed.

Special Circumstances

SC Section

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 VHF (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
  https://www.cdc.gov/vhf/ebola/clinicians/emergency-services/ems-systems.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:**
  https://www.cdc.gov/vhf/ebola/clinicians/emergency-services/ems-systems.html

Suspected Viral Hemorrhagic Fever
Ebola

Special Circumstances Section

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.

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:
  Follow local system guidance

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 Circumstances Section

High Consequence Pathogens

(Respiratory Diseases, SARS, MERS-CoV, COVID-19)

Special Circumstances Section

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):

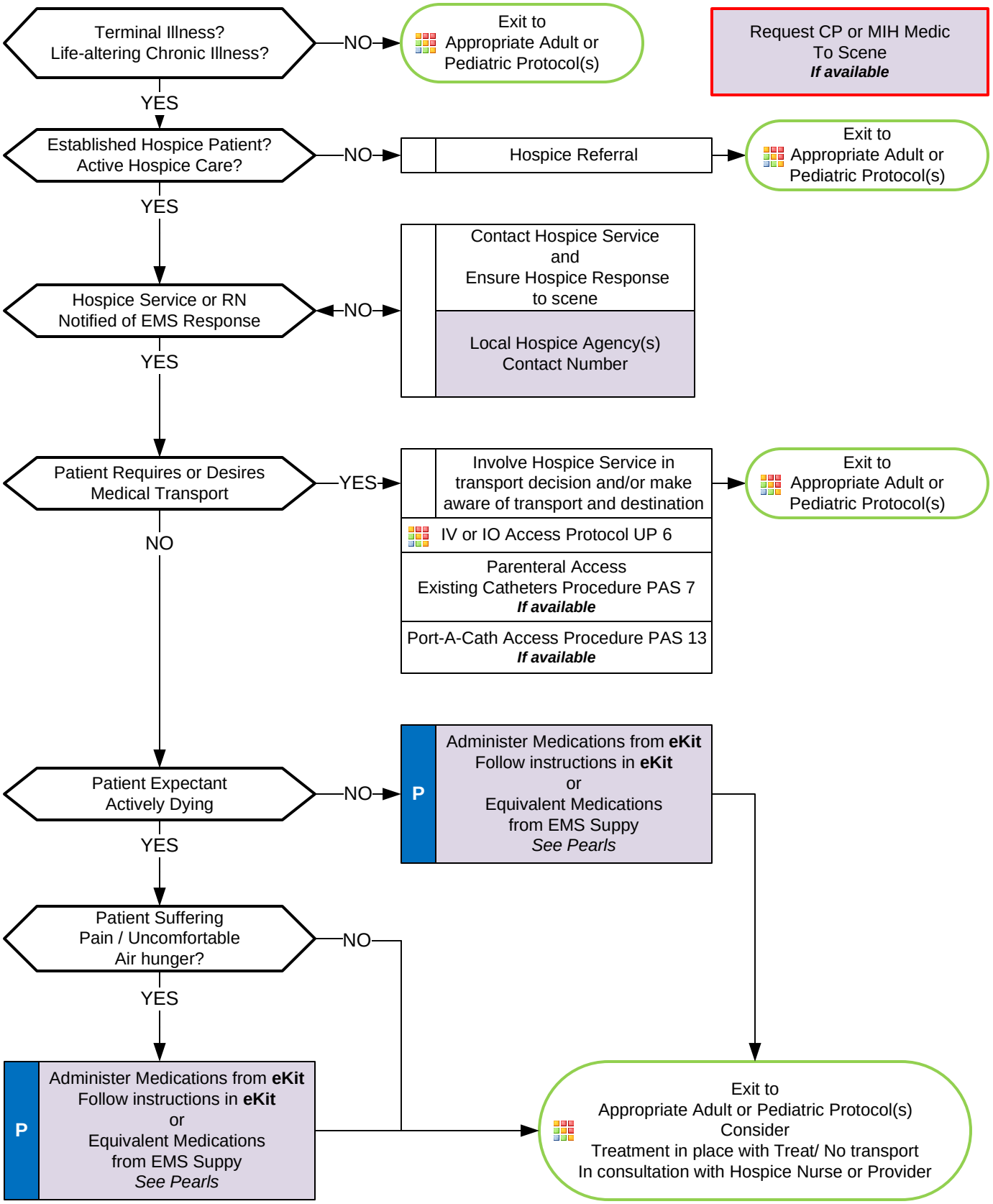
  After using during an aerosol producing procedure.
  Contamination with blood, body fluids or secretions, following close contact with known COVID-19 patient.

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



Medicate to control symptoms till hospice provider arrives - Hospice or Family can sign treat no transport. Goal is to make patient comfortable / alleviate severe symptoms of the dying process and keep patient at home.

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

Special Circumstances Section

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

History

- Follow local public health department criteria for specific immunization or medication administered.
- Patient receiving medication or vaccination must be without evidence of active infection.
- AEMT and Paramedic providers may participate
- EMT may participate when DHHS/NCMB allows special provision during local or state emergency.

Situation

- Local implementation of this protocol must be done as a component of the EMS system's local public health department community immunization or medication distribution program.
- May initiate protocol when a community has limited public health department resources or when local or state health emergency is declared.

A

Review immunization/vaccination or medication guide provided by the local public health department:

- Patient selection criteria per local public health department (may vary)
- Vaccine/immunization or medication indications
- Vaccine/immunization or medication contraindications
- Vaccine/immunization or medication distribution procedure

B

- EMT may provide vaccinations when DHHS/NCMB allows special provision during local or state emergency.

Confirm patient eligibility for the vaccination or medication including:

- Age
- Medical history
- Contraindications
- Allergies

Eligibility confirmed?

YES

NO

Do not administer:

- Refer to local public health department providers/ officials for further care and instructions.

A

Administer vaccination or medication:

- Dose dependent on local public health department
- Route dependent on local public health department (PO, IN, IM, IV, SQ)

B

Administer Over-the-Counter medication and/or vaccination *(if applicable)*:

- Undergo specific "just-in-time" training
- Dose dependent on local public health department
- Route dependent on local public health department (PO, IN, IM). SQ when specified by NCOEMS.
- Complete required local public health department documentation
- Provide post immunization or medication written instructions and monitoring

Allergic Reaction or Complications

- Exit to age appropriate Protocol(s)
- Notify appropriate local public health department provider/ official

Special Circumstances Section

Pearls

- **Purpose:**
  Provide protocol driven process for EMS providers to assist with public health immunization or medication distribution initiatives.
- **Documentation of the immunization or medication:**
  Complete using local public health department approved record system.
  Creation of an EMS patient care report is not required and is not required to submit to NCOEMS.
  Must create a log of all patient contacts associated with the immunization or mediation distribution program maintained by the EMS system.
  If local public health department is maintaining a log of all patients, EMS may use the public health log and keep copies in the EMS system.
- Injection site:
  Most common injection site for subcutaneous is tissue of an upper arm; follow procedure USP-4 otherwise.
  Injection volume is limited to 1 - 2 mL per site unless specific guidance is given per local public health department.
  Most common sites for intramuscular injections are upper arm, buttocks, and thighs, follow procedure USP-4.
  Injection volume is limited to 1 mL in the upper arm, unless specific guidance is given per local public health department; follow procedure USP-4 otherwise.
  Injection volume is limited to 2 mL (1 mL in pediatrics) in buttocks an thighs, unless specific guidance is given per local public health department; follow procedure USP-4 otherwise.

SARS CoV2
Monoclonal Antibody Administration

History

- FDA has issued an Emergency Use Authorization permitting the administration of REGEN-COV (casirivimab and imdevimab) for the treatment of mild to moderate COVID-19.
- Monoclonal antibodies are used to neutralize and prevent progression of the SARS CoV2 virus.

Situation

- Local implementation of this protocol must be done as a component of the EMS system's local public health department community immunization or medication distribution program.
- May initiate protocol when a community has limited public health department resources or when local or state health emergency is declared.

P

Review monoclonal antibody eligibility criteria:

- https://www.ems.gov/pdf/EMS_Template_Protocol_for_COVID-19_Monoclonal_Antibody_Administration_August_2021.pdf
- See page 2.

- Determine medication route for either intravenous or subcutaneous administration

Allergic Reaction or Complications

- Exit to age appropriate Protocol(s)
- Notify appropriate local public health department provider/ official

Confirm patient eligibility for monoclonal antibody including:

- Age
- Medical history
- Contraindications
- Allergies

Eligibility confirmed? — NO →

Do not administer:

- Refer to local public health department providers/ officials for further care and instructions.

YES

P

Intravenous Administration:

Mix

Casirivimab 600 mg and Imdevimab 600 mg
In 100 mL NS

Infuse IV piggyback in a NS line at KVO over 21 minutes (310 mL/hr)

Infuse through NS primed micron filter 0.20 or 0.22 size

P

Subcutaneous Administration:

Draw up

Casirivimab 600 mg (2.5 mL) in 2 separate syringes and
Imdevimab 600 mg (2.5 mL) in 2 separate syringes

Administer 4 SQ injections in separate muscle areas

Avoid the waistline and 5 cm periumbilically

Injections: Subcutaneous and Intramuscular Procedure USP - 4

Special Circumstances Section

Pearls

- **Purpose:**
  Provide protocol driven process for EMS providers to assist with public health medication distribution initiatives.
- **Documentation of the medication:.**
  Creation of an EMS patient care report is required and is required to submit to NCOEMS.
  Must create a log of all patient contacts associated with the mediation distribution program maintained by the EMS system.
  If local public health department is maintaining a log of all patients, EMS may use the public health log and keep copies in the EMS system.
- Injection site:
  Most common injection site for subcutaneous is tissue of an upper arm; follow procedure USP-4 otherwise.
  Injection volume is limited to 1 - 2 mL per site unless specific guidance is given per local public health department.
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  Injection volume is limited to 1 mL in the upper arm, unless specific guidance is given per local public health department; follow procedure USP-4 otherwise.
  Injection volume is limited to 2 mL (1 mL in pediatrics) in buttocks an thighs, unless specific guidance is given per local public health department; follow procedure USP-4 otherwise.

SARS CoV2
Monoclonal Antibody Administration

Eligibility criteria:

- Age > 12 and weight ≥ 40 kg.
- Not requiring hospitalization
- Not requiring oxygen therapy
- High risk for disease progression
  - Age ≥ 65
  - Obesity
  - Pregnancy
  - Chronic kidney disease
  - Dementia
  - Diabetes
  - Immunocompromised or immunosuppressive treatments
  - Cardiovascular disease (MI, CVA, CHF, hypertension, hyperlipidemia, diabetes)
  - Chronic lung disease (COPD, asthma, interstitial lung disease)
  - Cancer
  - Sickle cell disease
  - Liver disease
  - Neurodevelopmental disorders, metabolic syndromes, or congenital abnormalities
  - Medical technology dependent, tracheostomy, gastrostomy, or NIPPV/ventilator

- Post-Exposure Prophylaxis (PEP)
  - Not fully vaccinated and immunocompromised or taking immunosuppressive medications
    Only 1 of 2 doses and/or less than 2 weeks from 2d dose in 2 dose series or less than 2 weeks from 1st does in vaccine only requiring 1 dose.
  - **OR:** Individuals at high risk of exposure to a SARS-CoV-2 infected individual
    (Nursing home or prison resident)

- High risk of death
  - Age ≥ 80
  - Male sex
  - Black and South Asian descent

Special Circumstances Section

EMS CARE PLANS

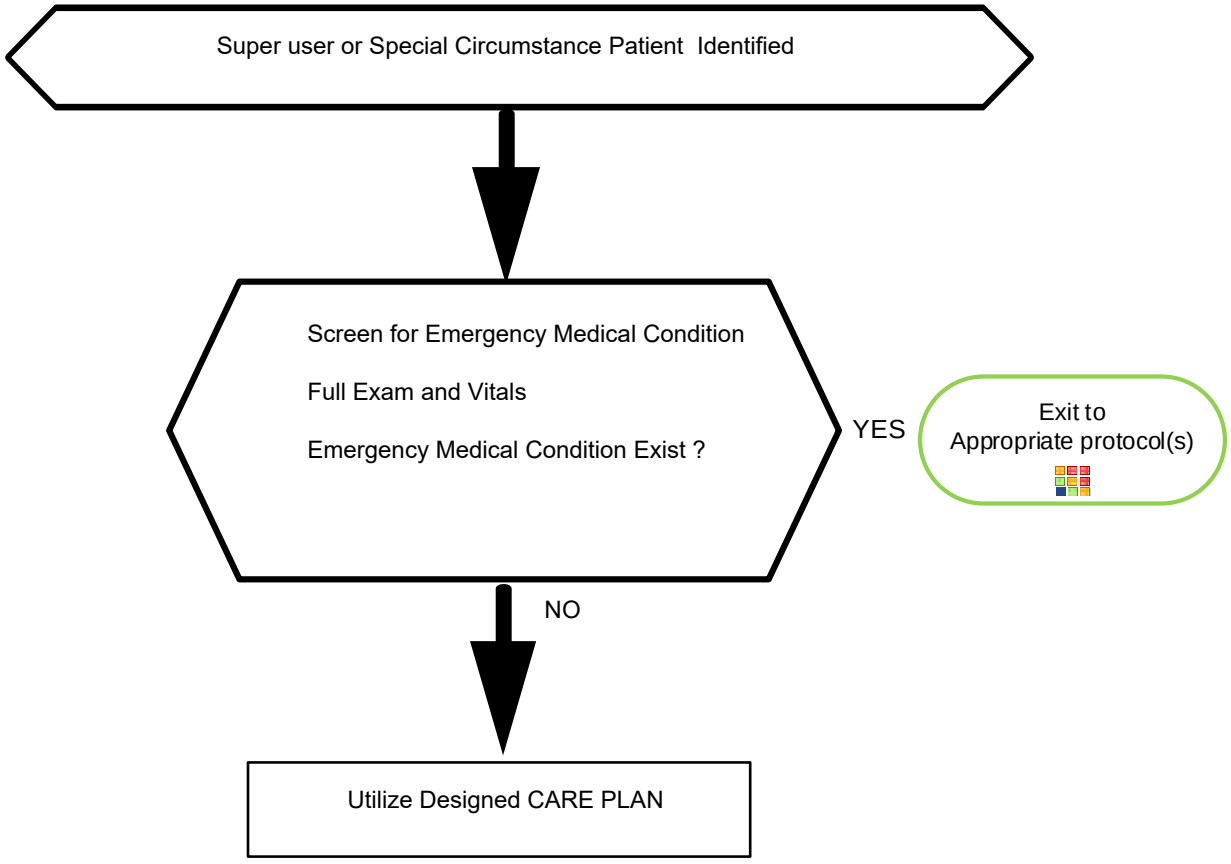
Care Plans are developed in response to Special Circumstances / Situations. Patient or group specific.

- Special Medical Conditions (Organ Transplant, LVAD, Experimental Treatments, Etc...)

- Super Users / Abuse of 911 System

Once, a Special Circumstance is identified. Care Plans will be developed by the Medical Director with consultation from appropriate agencies which may include Primary, Specialized Care, and/or Police, Fire, and/or Social Services.

The Care Plans will be shared with the involved parties - Care Plans are usually patient and service specifics and will not be shared broadly due to privacy concerns. A Master Copy of the Care Plan will be kept by the Medical Director and the Office of Emergency Services.



Special Operations

SO Section

Scene Rehabilitation: General (Highly Recommened)

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
Highly Recommended

Pearls

- **This protocol is optional and given only as an example. Agencies may and are encouraged to develop their own.**
- **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 (Highly Recommended)

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	
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

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**

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

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

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

- **This protocol is optional and given only as an example. Agencies may and are encouraged to develop their own.**
- **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.