RANDOLPH COUNTY
Emergency Medical Services System

Pre-Hospital Care Manual

Protocols, Procedures, and Policies
Version 2023

Randolph County Emergency Medical Services System
Pre-Hospital Care Manual

Foreword

This Pre-hospital Care Manual has become the focal point for patient care in the pre-hospital setting for the Randolph County EMS System providers. The intent of this manual is to create a *team* approach to pre-hospital care, resulting in optimum patient care that is effective and efficient. The focus of this manual is on providing safe, well-planned care for the patients who enter the RCEMS System and maintaining a safe environment for the pre-hospital provider. This manual is also to serve as a helpful reference and study guide for re-certification examinations. All information contained herein is intended for use within the Randolph County EMS System. No other System's protocols, policies or procedures shall supersede the guidelines set forth in this manual, or be utilized in place of this manual, by a provider in the Randolph County EMS System.

The following protocols, policies and scope of practice procedures for the Randolph County Emergency Medical Service System are written for the guidance of Randolph County Emergency Medical Service System providers to facilitate the rapid administration of acceptable measures to stabilize the ill or injured and insure their safe treatment and/or delivery to the most appropriate medical facility. While no fixed set of rules can span the variety of situations, which may be encountered by EMS personnel, the protocols, policies and scope of practice procedures herein contained are a comprehensive volume covering most situations that are routinely encountered.

The primary purpose of the Pre-hospital Care Manual is to serve as guidelines for out-of-hospital (pre-hospital and inter-hospital) care. Quality out-of-hospital care is the direct result of comprehensive education, accurate patient assessment, good judgment, and continuous quality improvement. All EMS personnel are expected to know the protocols and understand the reason for their use. EMS personnel should not perform any step or steps in a standing order or protocol if they have not been trained to perform the procedure or treatment in question. All EMS providers shall maintain a current Patient Care Manual. Periodic updates will be required as directed.

It is the philosophy of the Randolph County Emergency Medical Service System that the well-being of the patient is our primary concern. This is accomplished by practicing the highest standard of care as defined by current medical science, standing orders and protocols, federal, state and local laws. The standard of care is dynamic, changing and improving regularly. It is not possible to produce a written document that addresses every clinical situation or that is perpetually up to date. It is therefore necessary for Randolph County EMS System personnel to continuously update their own knowledge and at times to rely upon clinical judgment not discussed in written policy. Compassion for the patient tempered by intellectual honesty should direct Randolph County EMS System personnel when applying these protocols to patient care.

All levels of care are shown on the same page for each protocol. This is to allow for a more unified approach to caring for a patient, especially when pre-hospital providers of differing levels are involved with treating that patient. The levels of care are "stacked" according to the level of the pre-hospital provider. The order of the steps in these protocols should generally be followed in sequence; the order of the steps is a recommendation, not an absolute. Every step in the protocol may not have to be completed; if the patient responds adequately to the earlier therapies in the protocol and is stable, further treatment listed later in the protocol may not be needed. Medications or procedures that require Medical Control authorization follow the phrase "Contact Medical Control". All others are standing orders. If not specified in the protocol, contact Medical Control to advise of the patient's status when you are en-route to the hospital.

Scope of Practice for Pre-Hospital Providers

A. Emergency Medical Responder (EMR)

An Emergency Medical Responder trainee or Certified Emergency Medical Responder, while caring for patients in a hospital as part of their training or continuing education, under the direct supervision of a physician, or while at the scene of a medical emergency or during transport, or during inter-facility transfer when medical direction is available by the transferring facility physician according to the policies and procedures of the Randolph County EMS System, may perform any activity or administer any medication listed below according to local BLS Treatment Guidelines:

Approved Skills

- Foreign Body Obstruction
- Airway Bag Valve Ventilation
- Airway Carboxy/Methemoglobin
- Airway Suctioning Basic
- Airway Oxygen Administration
- Assessment Adult
- Assessment Pain
- Assessment Pediatric
- Blood Glucose Analysis
- Cardiopulmonary Resuscitation
- Childbirth
- Decontamination
- Defibrillation Automated
- Medication Administration Oral
- Medication Administration Auto-Injector
- Medication Administration Intramuscular
- Orthostatic Blood Pressure
- Pulse Oximetry

- Reperfusion Checklist
- Spinal Motion Restriction
- Splinting
- Stroke Screen LA Pre-Hospital
- Temperature Measurement
- Wound Care-General
- Wound Care-Hemostatic Agent
- Wound Care-Taser Probe Removal
- Wound Care-Tourniquet

Approved Medications

- Pre-measured epinephrine devices or IM after approved training
- Oxygen
- Oral Glucose
- Topical hemostatic (bleeding control) agents

Note: Prior to performing a new skill, technique, medication, or procedure, it shall be documented by the service medical director, or approved EMS training institution that the EMS provider has been appropriately trained to perform those new skills, techniques, medications, or procedures.

B. Emergency Medical Technician (EMT)

I. An EMT may perform any activity identified in the scope of practice of an Emergency Medical Responder.

II. An EMT trainee or Certified EMT, while caring for patients in a hospital as part of their training or continuing education, under the direct supervision of a physician, or while at the scene of a medical emergency or during transport, or during inter-facility transfer when medical direction is available by the transferring facility physician according to the policies and procedures of the Randolph County EMS System, may perform any activity or administer any medication listed below according to local BLS Treatment Guidelines:

Approved Skills

- 12 Lead ECG
- Airway Carboxy/Methemoglobin
- Airway Combitube
- Airway BIAD King
- Foreign Body Obstruction
- Airway Intubation Confirmation CO2 Detector
- Airway Intubation Confirmation Esophageal Bulb
- Airway Bag Valve Ventilation
- Airway Nebulizer Inhalation

- Airway Suctioning Basic
- Airway Oxygen Administration
- Assessment Adult
- Assessment Pain
- Assessment Pediatric
- Blood Glucose Analysis
- Capnography
- Cardiopulmonary Resuscitation
- Childbirth
- Decontamination
- Defibrillation Automated
- Medication Administration Intranasal
- Medication Administration Oral
- Medication Administration Sublingual
- Medication Administration Auto-Injector
- Medication Administration Intramuscular
- Orthostatic Blood Pressure
- Pulse Oximetry
- Reperfusion Checklist
- Restraints Physical
- Spinal Motion Restriction
- Splinting
- Stroke Screen LA Pre-Hospital
- Temperature Measurement
- Wound Care-General
- Wound Care-Hemostatic Agent
- Wound Care-Taser Probe Removal
- Wound Care-Tourniquet

Emergency Medical Technicians may only administer medication in accordance with protocols in a system that provides medical oversight and control.

Approved Medications

- Pre-measured epinephrine devices or IM after approved training
- Oxygen
- Oral Glucose
- Topical hemostatic (bleeding control) agents
- *Pre-measure inhalation devices
- *Aspirin
- *Pre-measured NTG SL spray or SL NGT Tablets
- *Oxymetazoline Spray
- Narcan Intranasal after approved training
- **Ibuprofen
- **Acetaminophen
- **Benadryl

Note: **Ash-Rand, PTAR, RCEMS and NC Zoo EMTs may carry and administer Albuterol via nebulizer to those patients who have a prescription for Albuterol. EMTs may carry and administer Narcan via intranasal after receiving approved training. Ash-Rand, PTAR, RCEMS and NC Zoo EMTs may carry and administer Ibuprofen PO, Acetaminophen PO and Benadryl PO. Ash-Rand, PTAR, RCEMS and NC Zoo EMTs may carry and administer Oxymetazoline.

*EMTs with County Fire Departments may administer Albuterol via nebulizer if the patient has their own Albuterol and home nebulizer. Aspirin may be administered if available. NTG SL may be administered if the patient has their own medication.

Note: Prior to performing a new skill, technique, medication, or procedure, it shall be documented by the service medical director, or approved EMS training institution that the EMS provider has been appropriately trained to perform those new skills, techniques, medications, or procedures.

C. Advanced Emergency Medical Technician (AEMT)

I. An AEMT may perform any activity identified in the scope of practice of an Emergency Medical Responder and EMT.

II. An AEMT trainee or Certified AEMT, while caring for patients in a hospital as part of their training or continuing education, under the direct supervision of a physician, or while at the scene of a medical emergency or during transport, or during inter-facility transfer when medical direction is available by the transferring facility physician according to the policies and procedures of the Randolph County EMS System, may perform any activity or administer any medication listed below according to local ALS Treatment Guidelines:

Approved Skills

- 12 Lead ECG
- Airway Combitube Tube
- Airway King
- Airway Carboxy/Methemoglobin
- Airway NIPPV
- Airway Intubation Endotracheal Tube Introducer
- Airway Intubation
- Foreign Body Obstruction
- Airway Intubation Confirmation CO2 Detector
- Airway Bag Valve Ventilation
- Airway Intubation Nasal
- Airway Intubation Oral Tracheal
- Airway Nebulizer Inhalation
- Airway Suctioning Advanced

- Airway Suctioning Basic
- Airway Ventilator Operation
- Airway Oxygen Administration
- Assessment Adult
- Assessment Pain
- Assessment Pediatric
- Blood Glucose Analysis
- Capnography
- Cardiopulmonary Resuscitation
- Childbirth
- Decontamination
- Defibrillation Automated
- Medication Administration Injection SQ IM
- Medication Administration Intranasal
- Medication Administration Intravenous and Intraosseous
- Medication Administration Oral
- Medication Administration Sublingual
- Medication Administration Transdermal
- Medication Administration Auto-Injector
- Medication Administration ETT
- Orthostatic Blood Pressure
- Pulse Oximetry
- Reperfusion Checklist
- Restraints Physical
- Spinal Motion Restriction
- Splinting
- Stroke Screen LA Pre-Hospital
- Temperature Measurement
- Venous Access Blood Draw
- Venous Access External Jugular Access
- Venous Access Extremity
- Venous Access Intraosseous
- Wound Care-General
- Wound Care-Hemostatic Agent
- Wound Care-Taser Probe Removal
- Wound Care-Tourniquet

Approved Medications

- 10%, 25% and 50% Dextrose
- Acetaminophen
- Afrin
- Albulterol
- Aspirin
- Crystalloid Solutions (NS, D5W, LR) IVs with no medications
- Diphenhydramine Hydrochloride

- Epinephrine
- Glucagon
- Ibuprofen
- Ipratropium
- Naloxone Hydrochloride
- Nitroglycerine SL and Paste
- Oral Glucose

Medications Allowed for Monitoring by AEMT During Inter-Facility Transports

Monitor intravenous infusions during inter-facility transports utilizing the hospitals infusion devices.

1. Non-Medicated IV Fluids only (NS, D5W, LR) No additives

Skills Approved for Monitoring by AEMT during inter-facility transports

1. Utilize an AED
2. Monitor urinary catheters
3. Monitor patients with nasogastric tubes
4. Monitor heparin/saline locks/PIC lines
5. Monitor PEG tubes
6. Use of infusion pumps
7. Monitor patients with Patient Assist Devices (ie IV Pumps with Pain Medications that the patient controls).

Note: Prior to performing a new skill, technique, medication, or procedure, it shall be documented by the service medical director, or approved EMS training institution that the EMS provider has been appropriately trained to perform those new skills, techniques, medications, or procedures.

D. Paramedic

I. A Paramedic may perform any activity identified in the scope of practice of an Emergency Medical Responder, EMT, and AEMT.

II. A Paramedic trainee or Certified Paramedic, while caring for patients in a hospital as part of their training or continuing education, under the direct supervision of a physician, or while at the scene of a medical emergency or during transport, or during inter-facility transfer when medical direction is available by the transferring facility physician according to the policies and procedures of the Randolph County EMS System, may perform any activity or administer any medication listed below according to local ALS Treatment Guidelines:

Approved Skills

- 12 Lead ECG
- Airway Combitube
- Airway King
- Airway Carboxy/Methemoglobin
- Airway NIPPV
- Airway Cricothyrotomy Surgical
- **Airway Drug Assisted Airway
- Airway Intubation Endotracheal Tube Introducer
- Airway Foreign Body Obstruction
- Airway Intubation Confirmation CO2 Detector
- Airway Bag Valve Ventilation
- Airway Intubation Nasal
- Airway Intubation Oral Tracheal
- Airway Nebulizer Inhalation
- Airway Suctioning Advanced
- Airway Suctioning Basic
- Airway Tracheostomy Tube Change
- Airway Ventilator Operation
- Airway: Video Laryngoscopy
- Airway Oxygen Administration
- Assessment Adult
- Assessment Pain
- Assessment Pediatric
- Blood Glucose Analysis
- Capnography
- Cardiac External Pacing
- Cardiopulmonary Resuscitation
- Cardioversion
- Chest Decompression
- Childbirth
- Decontamination
- Defibrillation Automated
- Defibrillation Manual
- Gastric Tube Insertion
- Medication Administration Injection SQ IM
- Medication Administration Intranasal
- Medication Administration Intravenous and Intraosseous
- Medication Administration Oral
- Medication Administration Rectal
- Medication Administration Sublingual
- Medication Administration Transdermal
- Medication Administration Auto-Injector
- Medication Administration ETT
- Orthostatic Blood Pressure

- Pulse Oximetry
- Reperfusion Checklist
- Restraints Physical
- Spinal Motion Restriction
- Splinting
- Stroke Screen LA Pre-Hospital
- Temperature Measurement
- Parenteral Access: Arterial Line Maintenance
- Parenteral Access Blood Draw
- Parenteral Access Central Line Maintenance
- Parenteral Access Existing Catheters
- Parenteral Access External Jugular
- Parenteral Access Extremity
- Parenteral Access Intraosseous
- Wound Care-General
- Wound Care-Hemostatic Agent
- Wound Care-Conducted Electrical Weapon Removal
- Wound Care-Tourniquet

Note: **Only paramedics approved by the EMS System Medical Director can perform drug assisted intubation procedures (this includes the use of Ketamine for any procedure).

Approved Medications

- Acetaminophen
- Adenosine
- Albulterol
- Aspirin
- Atropine Sulfate
- Calcium Chloride
- Calcium Gluconate (Supplemental Medication)
- Cefazolin
- Dexamethasone (Supplemental Medication)
- Dextrose 10%, 25% and 50%
- Dextrose, Oral
- Diltiazem
- Diphenhydramine Hydrochloride
- Epinephrine 1:1,000
- Epinephrine 1:10,000
- Epinephrine: Pre-measured Injection Device
- Etomidate
- Glucagon
- Fentenyl
- Haldoperidol
- Ibuprofen

- Ipratropium
- Ketamine
- Labetalol
- Lidocaine Hydrochloride
- Levophed
- Magnesium Sulfate
- Methylprednisolone
- Midazolam
- Morphine Sulfate
- Naloxone Hydrochloride
- Nitroglycerine Prepartions
- Ondansetron
- Oxygen
- Oxymetazoline
- Phenylephine
- Pralidoxine Chloride(If Available)
- Rocuronium
- Sodium Bicarbonate
- Succinycholine
- Tranexamic Acid (TXA)
- Vasopressin (Supplemental Medication)
- Vecuronium

Medications Allowed for Monitoring by Paramedics During Inter-Facility Transports:

Monitor intravenous infusions during inter-facility transports utilizing the hospitals infusion devices.

- Aminophylline***
- Amiodarone***
- Antibiotics
- Bretylium***
- Digoxin***
- Dobutamine***
- Dopamine***
- Epinephrine***
- Histamine 2 Blocker
- Heparin***
- Insulin***
- Lidocaine Hydrochloride***
- Magnesium Sulfate***
- Mannitol***
- Methylprednisolone***

- Nitroglycerin***
- Norepinephrine***
- Oxytocin***
- Phenytoin***
- Phenobarbital***
- Platelet GPIIb/IIIa inhibitors***
- Potassium Chloride***
- Procainamide***
- Steroid Preparations***
- Terbutaline***
- Thrombolytic Agents (e.g., tPA)***
- Total Parenteral Nutrition (TPN)***
- Whole Blood and Blood Components
- Ranitidine

Skills Approved for Monitoring by Paramedics in Transport.

- Monitor thoracotomy tubes
- Urinary Catheters
- Intraosseous Adult
- Use of infusion pumps

Note: Prior to performing a new skill, technique, medication, or procedure, it shall be documented by the service medical director, or approved EMS training institution that the EMS provider has been appropriately trained to perform those new skills, techniques, medications, or procedures.

*** Requires an Infusion Pump, When Given by Continuous Infusion

CONCLUSION

These protocols, policies and scope of practice procedures have been established to facilitate and, hopefully, standardize out-of-hospital treatment modalities in the Randolph County EMS System. As new treatment and patient management modalities are developed, they will be reviewed and updated in the Patient Care Manual. Remember that these protocols are only a guideline and are not to be followed blindly without regard for the patient's condition or response to therapies. Use common sense. NEVER HESITATE TO CONTACT MEDICAL CONTROL FOR ANY PROBLEM, QUESTION, OR FOR ADDITIONAL INFORMATION.

IN THE ABSENCE OF SPECIFIC INSTRUCTIONS, OPTIMUM PATIENT CARE, COMMON SENSE AND GOOD JUDGEMENT MUST BE THE OVER-RIDING PRINCIPLE.

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Introduction

The following medical treatment protocols are developed for North Carolina EMS agencies. The process has evolved since 2007 and continues with input from Medical Directors, EMS Administration, North Carolina Chapter of Emergency Physicians Protocol Committee, North Carolina Office of EMS, EMS field personnel and the public at large through on-line surveys, public meetings across North Carolina and direct communication with stakeholders. The 2017 update expands on the 2012 and 2009 version and continues to incorporate evidence-based guidelines, expert opinion and historically proven practices meant to ensure that citizens and visitors of North Carolina will continue to be provided the highest quality pre-hospital patient care available. The North Carolina Chapter of Emergency Physicians develops and provides final approval.

The purpose of the protocol section is to provide treatment protocols outlining permissible and appropriate assessment, delivery of care, reassessment and procedures which may be rendered by pre-hospital providers. The protocols also outline which medical situations require direct voice communication with medical control. In general treatment protocols are specific orders which may and should be initiated prior to contact with Medical Control.

Please note the medical protocols are divided into three (3) to four (4) sections. The upper section includes three (3) boxes (History, Signs and Symptoms and Differential) which serves as a guide to assist in obtaining pertinent patient information and exam findings as well as considering multiple potential causes of the patients complaint. It is not expected that every historical element or sign / symptom be recorded for every patient. It is expected that those elements pertinent to your patient encounter will be included in the patient evaluation.

The algorithm section describes the essentials of patient care. Virtually every patient should receive the care outlined in this section, usually in the order described. However each medical emergency must be dealt with individually and appropriate care determined accordingly. Professional judgment is mandatory in determining treatment modalities within the parameters of these protocols. Circumstances will arise where treatment may move ahead in the algorithm, move outside to another protocol and then re-enter later. While protocols are written based on body systems and primary complaints the patient should be treated as a whole and therefore the protocols should be considered as a whole in providing care.

Professional judgment hierarchy:

The pre-hospital provider may determine that no specific treatment is needed;
Or
The pre-hospital provider may follow the appropriate treatment protocols and then consult Medical Control;
Or
The pre-hospital provider may consult Medical Control before initiating any specific treatment.

Some protocols will encompass two (2) pages. Protocols which exist in a single page format may have page 2 added by the local medical director. The PEARLS section will either be located at the bottom of page 1 (single page protocol) or page 2 (double page protocol). The PEARLS section provides points regarding the main protocol based on evidence to date, common medical knowledge and expert medical opinion.

Information boxes highlighted in purple. These areas are editable at the local level. They will mainly involve specific medications and dosages utilized by the local EMS agency. Page 2 will have a large section highlighted in purple where the local Medical Director may edit as they see fit to provide expanded points and treatment not otherwise specified in the algorithm. If the box is not to be utilized – add "***This Space Left Blank Intentionally***."

Finally these medical treatment protocols are established to ensure safe, efficient and effective interventions to relieve pain and suffering and improve patient outcomes without inflicting harm. They also serve to ensure a structure of accountability for Medical Directors, EMS agencies, pre-hospital providers and facilities to provide continual performance improvement. A recent report of the Institute of Medicine calls for the development of standardized, evidence-based pre-hospital care protocols for the triage, treatment and transport of patients. These protocols establish expectations of pre-hospital care in North Carolina.

Key to Protocol Utilization

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

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

Differential
- A list of other disease or injury which should be considered

Black Box

Hightlights Important Information

Universal Patient Care Protocol
Assumed all protocols utilize and will not appear on individual protocols

Red Box

Highlights Critical Information

May direct to another protocol

Signals protocol within a protocol

Indicates Entry / Exit from / to to another protocol(s)

Information box

Decision Point
Darker outline to highlight

Highlights medication after Contact Medical Control
May be added by Local Medical Director

Purple Shading of Information Box
Indicates items changeable at local agency level, including medications / dosages on NCMB formulary
Local Medical Director may add / change at his / her discretion
Local medical director may add page 2 to any protocol where none exists for additional comments

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

Pearls
- Important information specific to each protocol will appear here.
- Will usually appear on page.
- Important exam items listed here specific to protocol.

Key to Protocol Utilization

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

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- Important Signs and Symptoms specific to each protocol

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- Will usually appear on page.
- Important exam items listed here specific to protocol.

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 or Contact Medical Control

Universal Protocol Section

Universal Patient Care

Scene Safety Evaluation
Identify potential hazards to rescuers, patient and public.Identify number of patients and utilize SMART protocol if indicated.Observe patient position and surroundings.

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

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

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

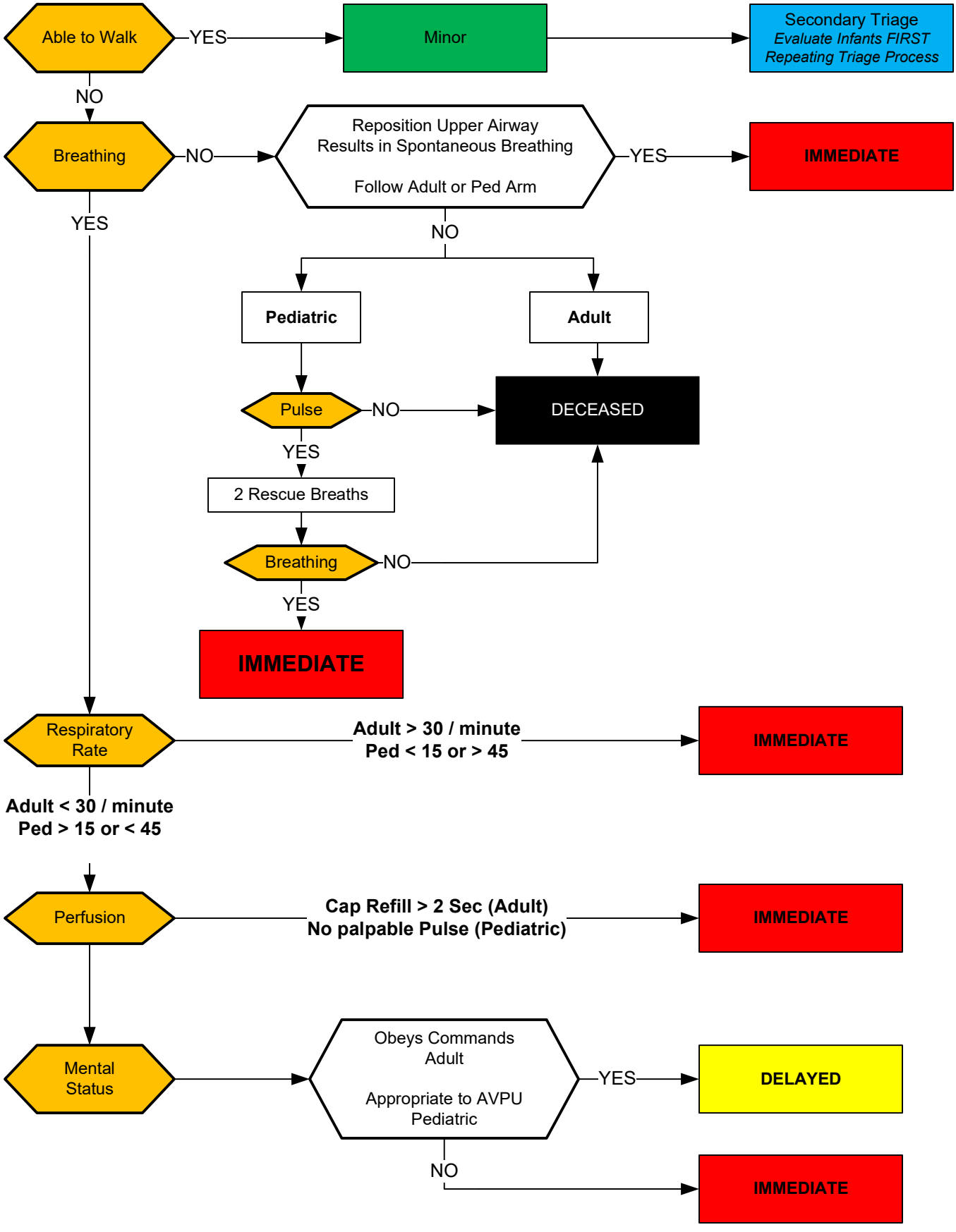
Pediatric Patient:
Where a refusal of care or transport is involved please call the on-call medical director to discuss when ≤12 months of age.
Exception: Pediatric patient involved in an MVC who is properly restrained with no injury found after thorough assessment, has normal behavior, normal V/S, had no loss of consciousness, and is not vomiting.

Special note on oxygen administration and utilization
Oxygen is probably over used in prehospital patient care. Oxygen is a drug with indications, contraindications, as well as untoward side effects.
Recent research demonstrates a link with increased mortality when given liberally (hyperoxia / hyperventilation) in cardiac arrest.
Utilize oxygen when indicated and not because it is available. A reasonable target oxygen saturation in all treatment protocols is ≥94 % regardless of delivery device.

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


Able to Walk
YES
Minor
Secondary Triage
Evaluate Infants FIRST
Repeating Triage Process
NO
Breathing
NO
Reposition Upper Airway
Results in Spontaneous Breathing
Follow Adult or Ped Arm
YES
IMMEDIATE
YES
NO
Pediatric
Adult
Pulse
NO
DECEASED
YES
2 Rescue Breaths
Breathing
NO
YES
IMMEDIATE
Respiratory Rate
Adult > 30 / minute
Ped < 15 or > 45
IMMEDIATE
Adult < 30 / minute
Ped > 15 or < 45
Perfusion
Cap Refill > 2 Sec (Adult)
No palpable Pulse (Pediatric)
IMMEDIATE
Mental Status
Obeys Commands
Adult
Appropriate to AVPU
Pediatric
YES
DELAYED
NO
IMMEDIATE

Triage

Triage is used to bring control to a seemingly overwhelming situation. Incidents which produce multiple casualties are rare but do occur and planning is paramount. A multiple casualty incident is defined as any incident where more casualties are present than initial response can reasonably handle. More response is needed for triage, treatment & transport than can arrive in a timely fashion.

Responders are also tasked with assuring / maintaining scene safety as well as dealing with injury and illness. First arriving responders can become overwhelmed with patients presenting with or without a wide variety of injury and illness.

This protocol incorporates pediatric patient multiple casualty triage tool. It provides an objective structure to help assure responders triage children with their **heads and not their hearts** which can lead to over triage and diversion of precious resources from other patients who may need them more. Under triage is addressed as well by recognizing key differences between adult and pediatric physiology. ***This should only be used with true multiple casualty incidents and disasters where resources for care are limited and should not be used for routine pre-hospital triage***.

Sorting / Triage:
Sort patients based on objective criteria in how they present. The severity of injury and therefore treatment / transport priority is color coded. Triage tags contain these colors so treatment and transport crews easily can see which patients have been triaged and to which level.
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 or treat uncontrolled bleeding before moving to next patient.

Pearls

- **When approaching a multiple casualty incident where resources are limited:**
  Triage decisions must be made rapidly with less time to gather information
  Emphasis shifts from ensuring the best possible outcome for an individual patient to ensuring the best possible outcome for the greatest number of patients.
- **Scene Size Up:**
  1. **Conduct a scene size up. Assure well being of responders. Determine or ensure scene safety before entering. If there are several patients with the same complaints consider HazMat, WMC or CO poisoning.**
  2. **Take Triage system kit.**
  3. **Determine number of patients. Communicate the number of patients and nature of the incident and establish incident command.**
  4. **Direct incoming resources. Identify ingress and egress path. Establish a staging area. Assign a medical officer, triage officer, transportation officer, and staging officer as personal become available.**
- **Triage is a continual process and is a continuous process in each section as resources allow.**
- **Step 1: Global sorting:**
  Call out to those involved in the incident to walk to a designated area and assess 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.
- **Step 2: Individual assessments:**
  Control major hemorrhage.
  Open airway and if child, give 2 rescue breaths.
  Perform Needle Chest Decompression Procedure if indicated.
  Administer injector antidotes if indicated.
- **Assess the first patient you encounter using the three objective criteria which can be remembered by RPM.**
  R: Respiratory *(Respiratory rates are difficult to measure quickly, use work of breathing and respiratory distress)*
  P: Perfusion *(Capillary refill can be altered by many factors including skin temperature – use age appropriate heart rates)*
  M: Mental Status *(Motor component of GCS score is important indicator – ability to follow commands)*
- If your patient falls into the RED TAG category, stop, place RED TAG and move on to next patient. Attempt only to correct airway problems, treat uncontrolled bleeding, or administer an antidote before moving to next patient.
- **Treatment:**
  Once casualties are triaged, a focus on treatment can begin. You may need to move patients to treatment areas.
  RED TAGs are moved/ treated first, followed by YELLOW TAGs. BLACK TAGs should remain in place.
  You may also indicate deceased patients by pulling their shirt/ clothing over their head.
  As more help arrives, then the triage/ treatment process may proceed simultaneously.
- **Lightning strike (Reverse Triage):**
  Lightning strike victims are amenable to airway, breathing, cardiac compressions as well as early defibrillation.
  Use concept of reverse triage with multiple casualties. Resuscitate lightning strikes as the priority.
  Lightning strike victims found alive do not often deteriorate quickly.
- **SMART triage tag system is utilized in NC.**

Abdominal Pain Vomiting and Diarrhea

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

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

Associated symptoms:
Fever, headache, blurred vision, weakness, malaise, myalgias, cough, headache, dysuria, mental status changes, rash

Differential
- 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**
P	**Ondansetron 4 mg** **IV / IO / ODT / PO / IM** **Peds: 0.2 mg/kg** **Peds Maximum 4 mg** May repeat in 15 minutes
	Age Appropriate Hypotension/ Shock Protocol AM 5/ PM 3 ***if indicated***

NO

A	**Normal Saline IV TKO Or Saline Lock**
P	**Ondansetron 4 mg** **IV / IO / ODT / PO / IM** **Peds: 0.2 mg/kg** **Peds Maximum 4 mg** May repeat in 15 minutes If no response **Promethazine** **12.5 mg IM** May repeat x 1 as needed

Monitor and Reassess

Notify Destination or Contact Medical Control

Universal Protocol Section

Abdominal Pain
Vomiting and Diarrhea

Abdominal pain is a common complaint encountered by EMS. Abdominal pain may arise from many organ systems including cardiac, pulmonary, endocrine, genitourinary and renal systems. Often 40 –60 % of abdominal complaints have no diagnosis after extensive testing once in the emergency department so a diagnosis is very difficult in the pre-hospital setting.

IV Fluid Volume: Once you reach initial bolus maximum doses (i.e. 2 L or 60 mL/Kg), if blood pressure not responding or ≥target SBP, initiate vasopressor and continue fluid resuscitation with SBP or MAP target goal.

Four patient populations which deserve special focus:

1. Elderly
   - May signal significant morbidity and mortality in patients > 50 years of age.
   - Disease significance may be out of proportion to exam findings and presentation.
   - Vascular problems are seen more often.
   - Consider cardiac etiology and obtain ECG if warranted.

2. Immunocompromised
   - HIV, Diabetes, Renal Failure, Transplant patients, Patients taking chronic steroids.

3. Women of childbearing age Consider ectopic pregnancy until proven otherwise.

4. Pediatric
   - Consider Blood Glucose Analysis as abdominal pain and N/V can be an initial sign of diabetes or DKA

Stable versus unstable patient:
Very important as the stable patient with undifferentiated abdominal pain may require only supportive care, anti-emetics and possibly pain medications. The unstable patient needs more directed therapy which is typically driven by presentation and vital signs.

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 years old, 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.**
- **Promethazine (Phenergan):**
  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 pathology.

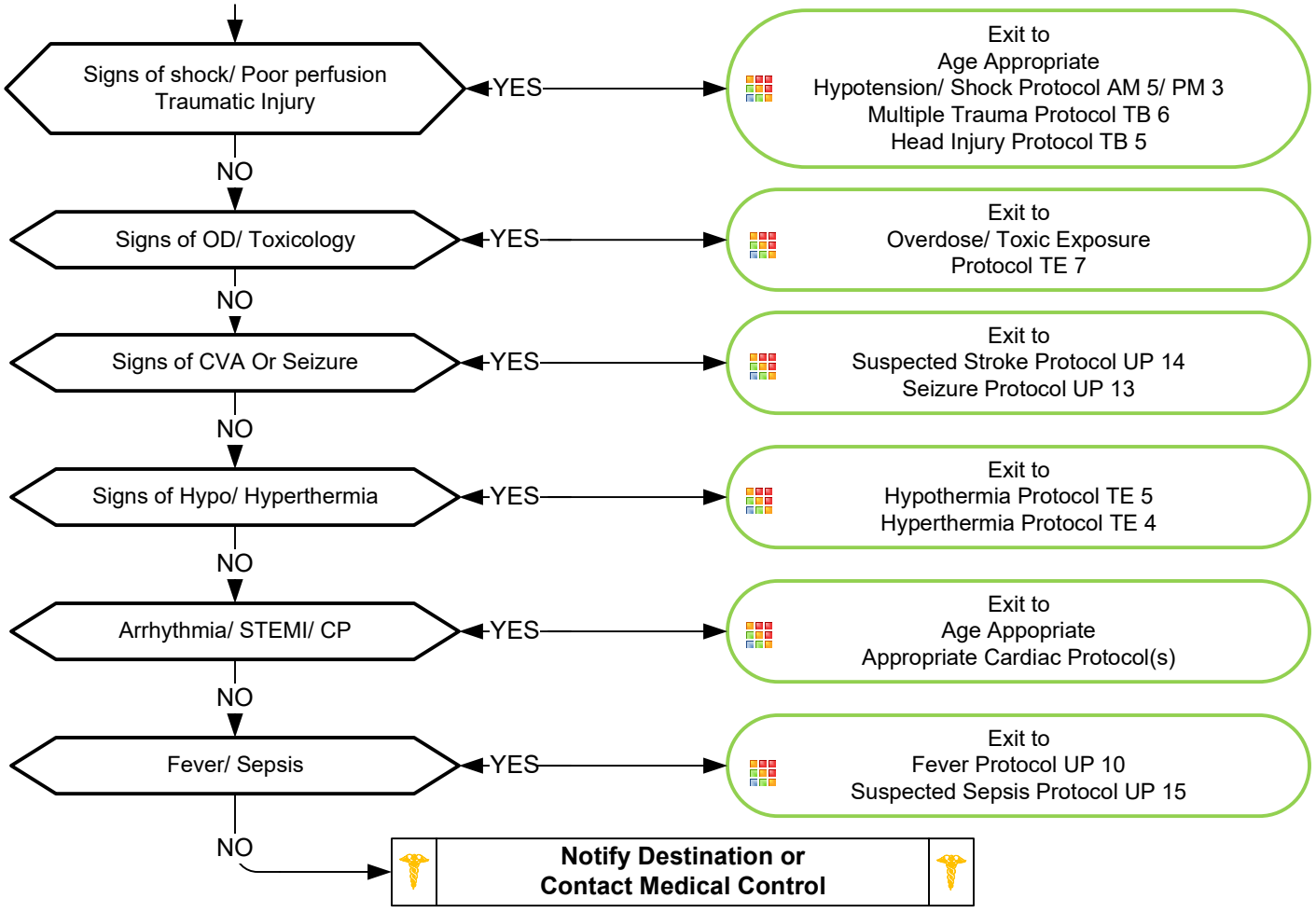
Altered Mental Status

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

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

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

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
	Blood Glucose Analysis Procedure
B	12 Lead ECG Procedure
	IV or IO Access Protocol UP 6
	Age Appropriate Diabetic Protocol(s) AM 2/ PM 2 ***if indicated***



Universal Protocol Section

Altered Mental Status

General:
The patient with AMS poses one of the most significant challenges to you as a provider. 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.

The algorithm is written in a step wise fashion but circumstances may dictate moving within the protocol. The stepwise fashion should serve as a reminder of the importance of a methodical approach to the patient with AMS. An example is the 12 lead ECG procedure and interpretation of the rhythm. As you work as a team one provider may be assessing the finger stick glucose while another provider interprets the ECG rhythm.

12-Lead ECG Acquisition:
AMS, especially in the elderly, can be a sign of a cardiac etiology. Patients with AMS need a 12-Lead ECG assessment. Patients who have underlying dementia or cognitive disturbance at baseline, but a caregiver believes them to have worsening AMS, obtain a 12-Lead ECG.

Spinal Motion Restriction / Trauma:
Only utilize spinal immobilization if the situation warrants. The patient with AMS may worsen in some instances when immobilized therefore only use when necessary.

In AMS with evidence of trauma -you should move immediately to the Adult Head Trauma Protocol in conjunction with the Altered Mental Status Protocol.

Pearls

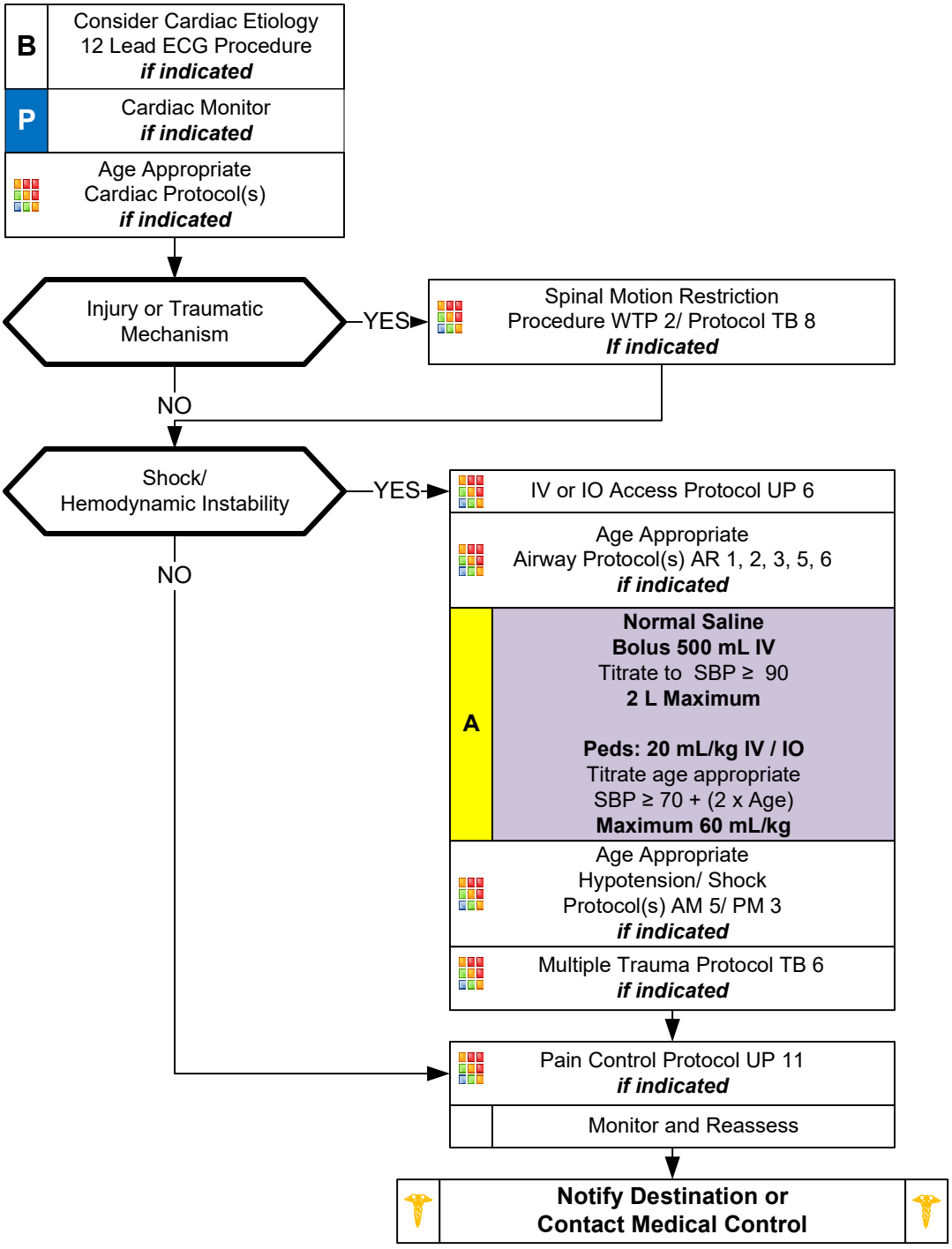
- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro.**
- **AMS may present as a sign of an environmental toxin or Haz-Mat exposure, protect personal safety.**
- **General:**
  - **The patient with AMS poses one of the most significant challenges.**
  - **A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

Back pain is one of the most common complaints in medicine and effects more than 90 % of adults at some point in their life. Most often it is a benign process but in some circumstances can be life or limb threatening.

Associated "RED FLAG" signs/symptoms:
Fever, chills and night sweats.
Symptoms outside the musculoskeletal system like urinary, gastrointestinal or pulmonary.
Progressive neurological symptoms described below.
Abnormal vital signs.

"Red Flag" Symptoms in Back Pain = TUNA FISH
T = Trauma
U = Unexplained Weight Loss
N = Neurologic Symptoms
A = Age > 50
F = Fever
I = IVDU
S = Steroid Use
H = History of Cancer (Prostate, Renal, Breast, Lung)

Non-traumatic back pain:.
Back pain in patients with known malignancy -Should always be evaluated by physician.

Cauda equina syndrome:
Terminal nerves of spinal cord being compressed.
Saddle anesthesia
Recent onset of bladder and bowel dysfunction –likely retention with overflow urinary incontinence.
Severe or progressive neurological deficit in the lower extremity.
Motor weakness of thigh muscles or foot drop

Traumatic back pain-Red flags for spinal fracture:
Major trauma
Minor trauma / strenuous lifting in older adults (> 50yrs) or those with know osteoporosis or other bone diseases or diseaseslike renal failure which affects bone metabolism.

Universal Protocol Section

Pearls

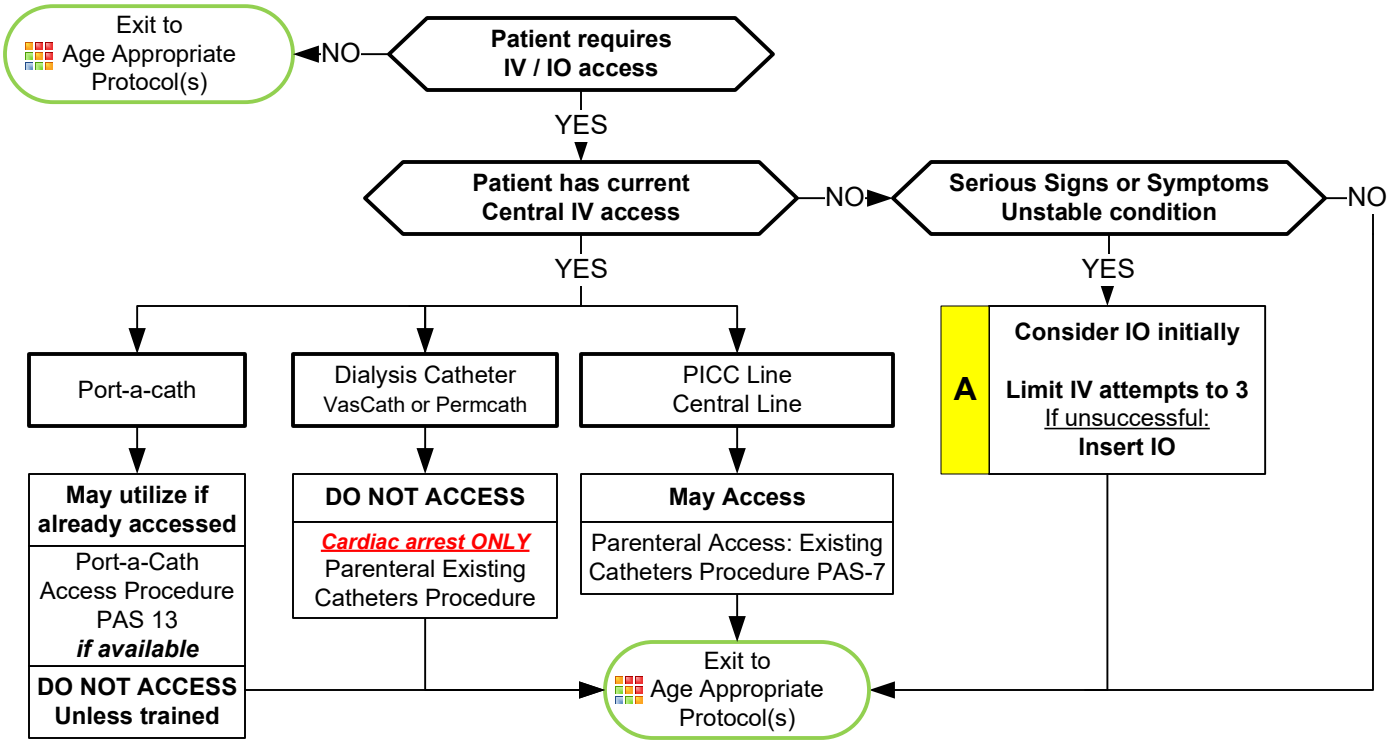
- **Recommended Exam: Mental Status, Heart, Lungs, Abdomen, Neuro, Lower extremity perfusion, Back**
- **Back pain is one of the most common complaints in medicine and affects more than 90% of adults at some point in their life. Back pain is also common in the pediatric population. Most often it is a 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 years old, 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

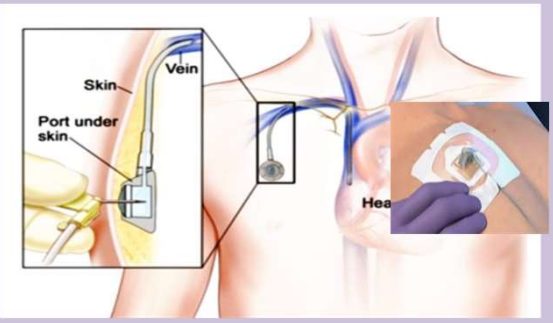
Pearls
- **Frequent encounter of patients with IV access devices and confusion as to which device can be accessed and used by EMS providers are common.**
- **If unclear about device use, always ask "Is this device used for dialysis?"**
- **When accessing central catheter, always ensure sterility of catheter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

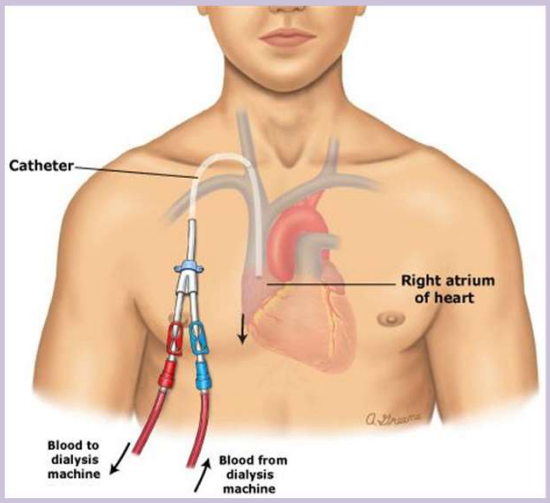
Port-a-Cath® :

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 does NOT routinely access this device.
Paramedic may utilize if already accessed with needle/ extension.
Paramedic may access if trained on procedure with access to proper equipment.



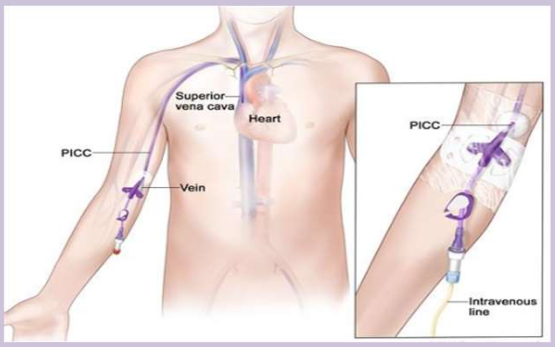
Dialysis Catheter:

Surgically implanted device used to access the vasculature for hemodialysis.
May be tunneled under the skin with access on outside of skin surface or may be non-tunneled with greater portion of catheter on outside of skin surface.
Catheter has a RED port indicating use for dialysis:
Most catheters have a RED port and a BLUE port.
Some catheters have a RED port and a WHITE port.
Dialysis catheters may be used for both short and long-term dialysis and should not accessed or used for delivery of fluids, medications, antibiotics, or blood products as it increases risk of infection, which then requires removal and subsequent loss of dialysis access.
Paramedic and AEMT do NOT routinely access this device.
Paramedic and AEMT MAY access during cardiac arrest only (Only if IV or IO access cannot be established.)



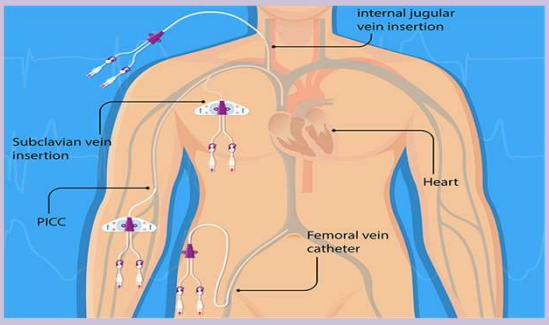
PICC (Peripherally Inserted Central Catheters):

Long catheter inserted into a vein in arm or leg (less common) with the tip of the catheter positioned into the central circulation.
Used for long-term IV fluids, medication administration, blood administration or blood draws.
May have 1 or 2 ports (possibly more, but less common.)
Port ends usually white, blue, or purple. (May be red, less common and is not used for dialysis.)
Paramedic and AEMT may access and utilize following clean technique.



Central Lines:

Catheter placed in large vein in the neck, under the clavicle, or in the groin.
Used for long-term IV fluids, medication administration, blood administration or blood draws.
May have 1 - 4 ports (possibly more, but less common.)
Port ends usually white, blue, or purple. (May be red, less common and is not used for dialysis.)
Paramedic and AEMT may access and utilize following sterile technique.

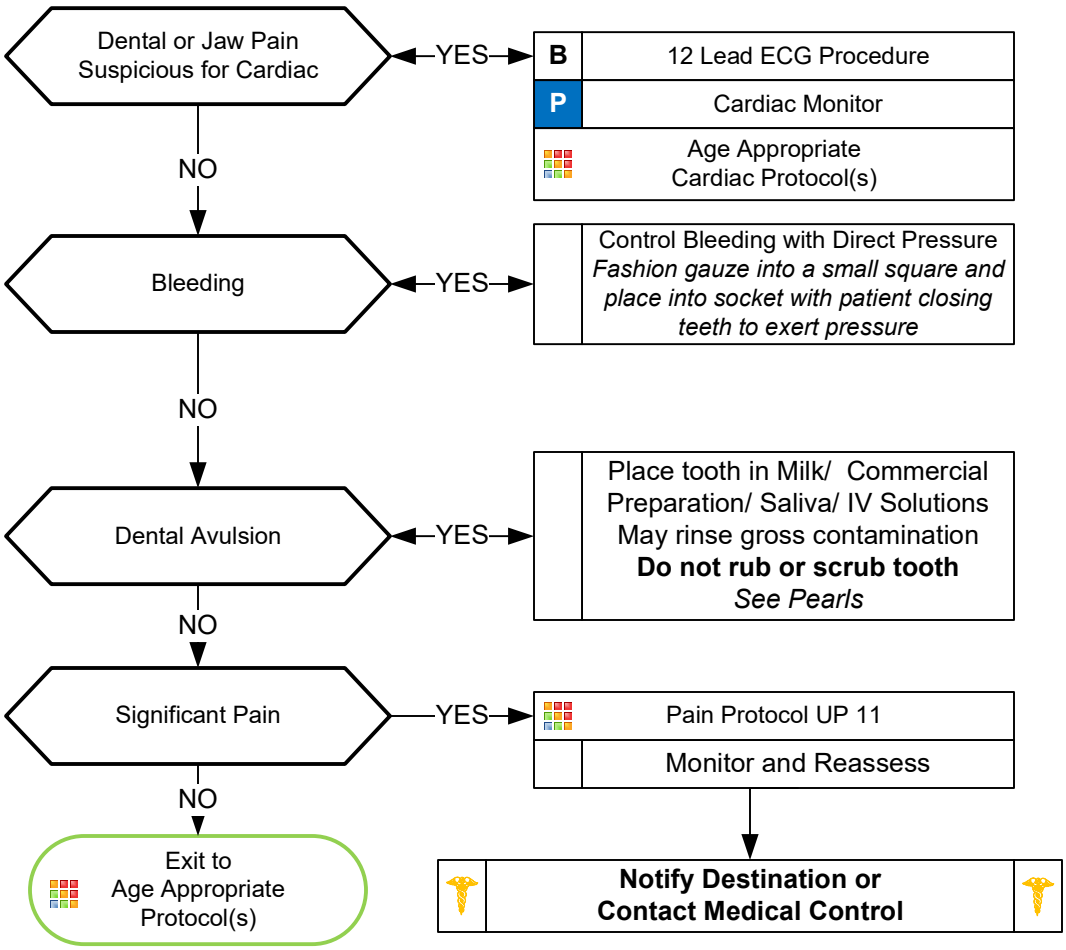


Dental Problems

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.

Emergencies Involving Indwelling Central Lines

History

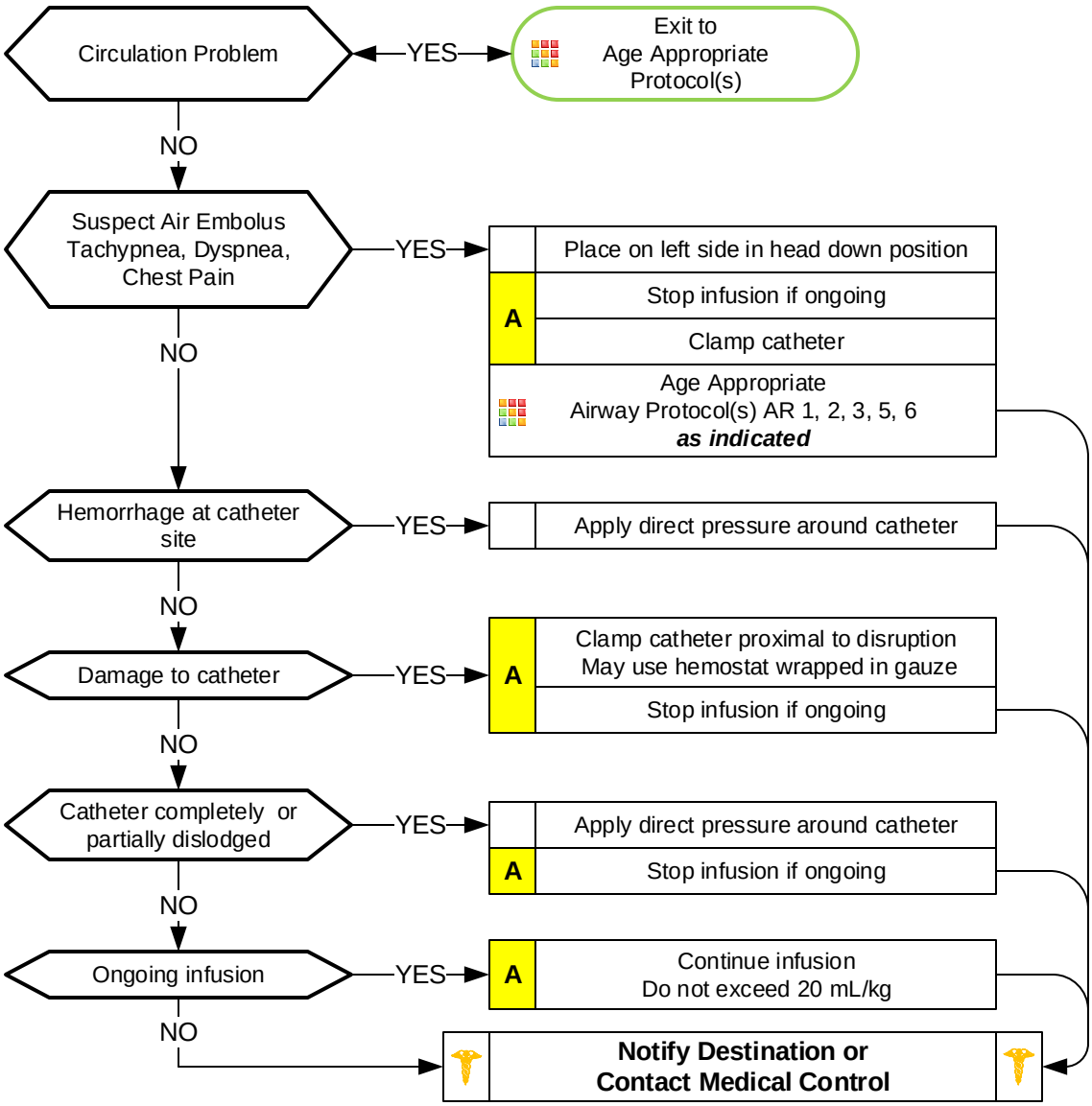
- Central Venous Catheter Type
  - Tunneled Catheter (Broviac / Hickman)
  - PICC (peripherally inserted central catheter
  - Implanted catheter (Mediport / Hickman)
- Occlusion of line
- Complete or partial dislodge
- Complete or partial disruption

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



Pearls

- **Always talk to family / caregivers as they may 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.

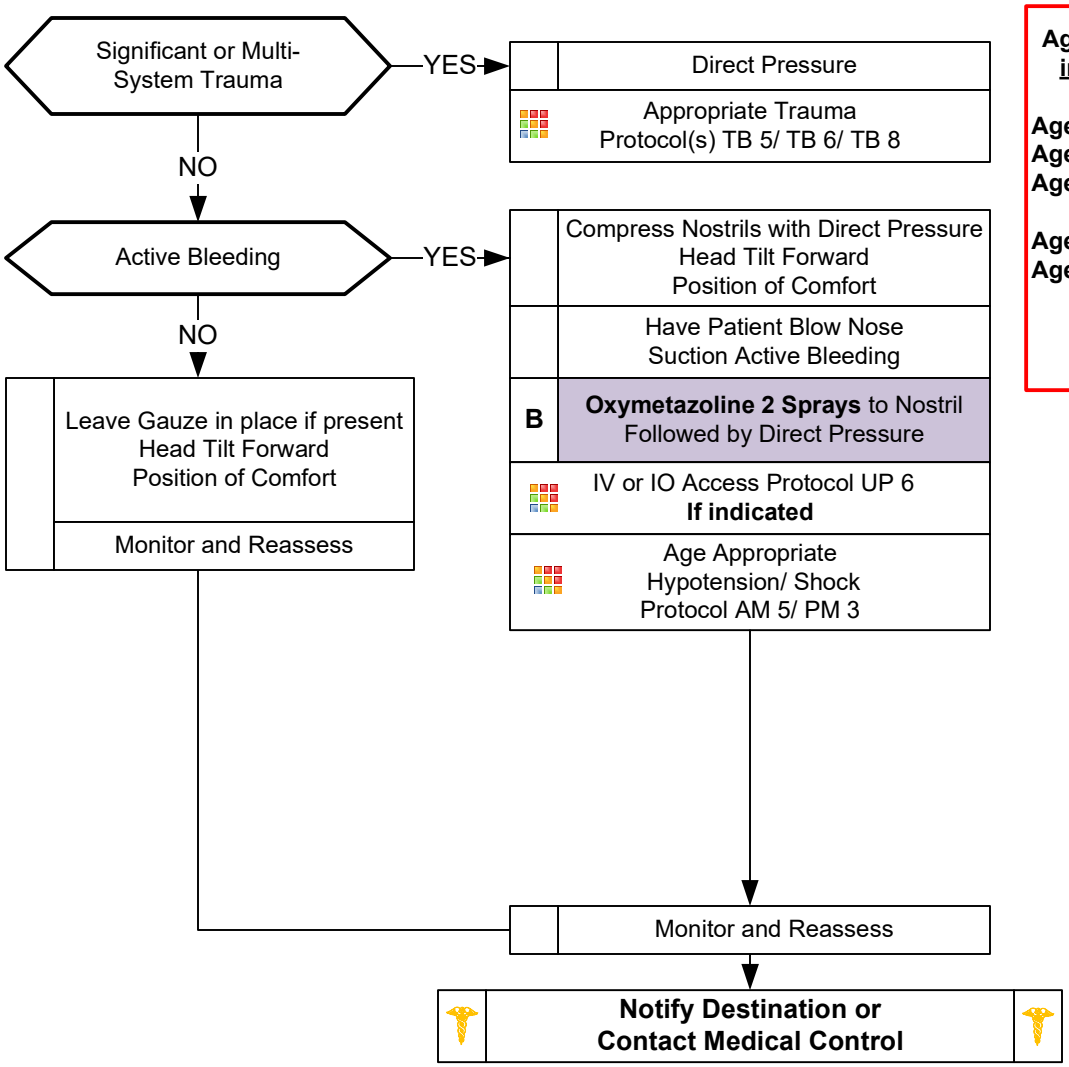
Universal Protocol Section

Epistaxis

History
- Age
- Past medical history
- Medications (HTN, anticoagulants, aspirin, NSAIDs)
- Previous episodes of epistaxis
- Trauma
- Duration of bleeding
- Quantity of bleeding

Signs and Symptoms
- Bleeding from nasal passage
- Pain
- Nausea
- Vomiting

Differential
- Trauma
- Infection (viral URI or Sinusitis)
- Allergic rhinitis
- Lesions (polyps, ulcers)
- Hypertension



Age Specific Blood Pressure indicating possible shock

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

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

All ages Shock Index:
HR > SBP

Universal Protocol Section

Pearls
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Neuro**
- It is very difficult to quantify the amount of blood loss with epistaxis.
- Bleeding may also be occurring posteriorly. Evaluate for posterior blood loss by examining the posterior pharnyx.
- Anticoagulants include warfarin (Coumadin), Apixaban (Elequis), heparin, enoxaparin (Lovenox), dabigatran (Pradaxa), rivaroxaban (Xarelto), and many over the counter headache relief powders.
- Anti-platelet agents like aspirin, clopidogrel (Plavix), aspirin/ dipyridamole (Aggrenox), and ticlopidine (Ticlid) can contribute to bleeding.

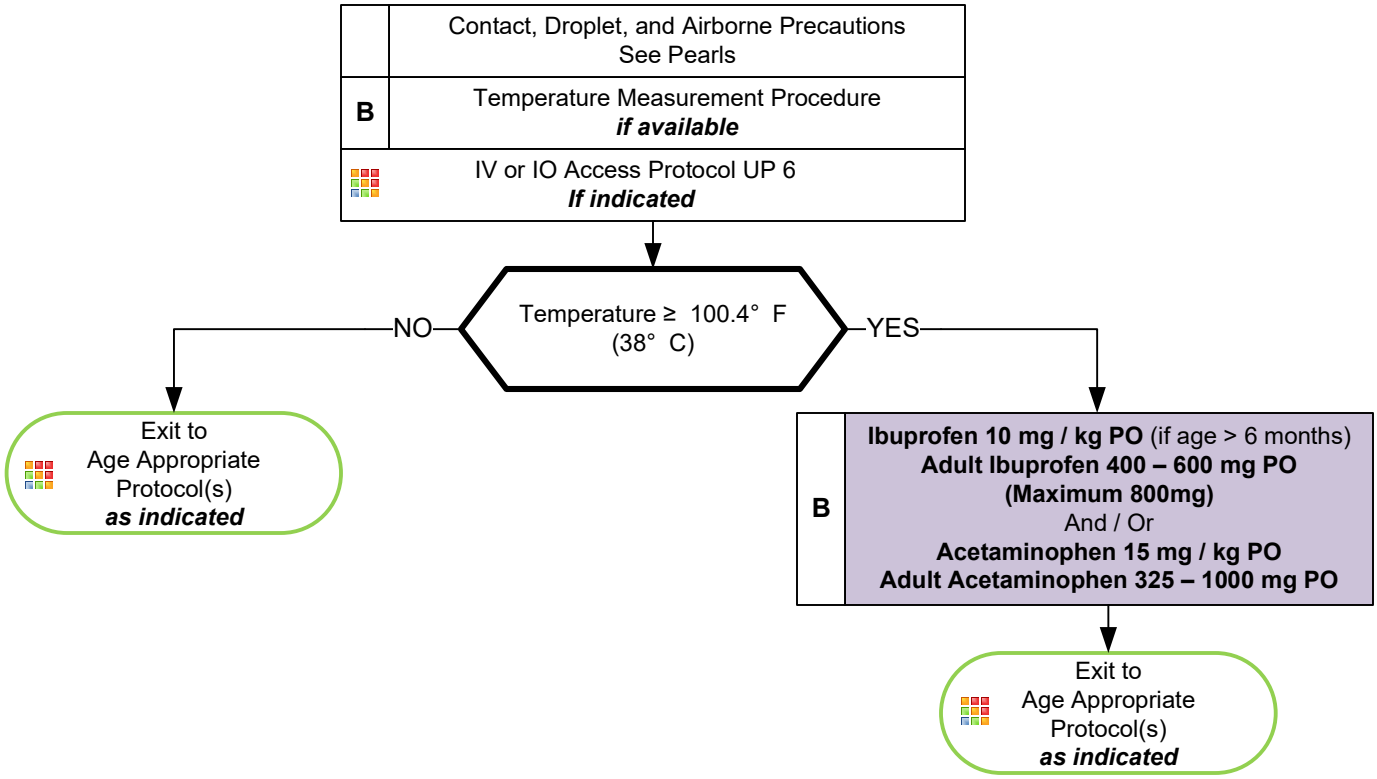
Fever/ Infection Control

History
- Age
- Duration of fever
- Severity of fever
- Past medical history
- Medications
- Immunocompromised (transplant, HIV, diabetes, cancer)
- Environmental exposure
- Last acetaminophen or ibuprofen

Signs and Symptoms
- Warm
- Flushed
- Sweaty
- Chills/Rigors

Associated Symptoms (Helpful to localize source)
- Myalgias, cough, chest pain, headache, dysuria, abdominal pain, mental status changes, rash

Differential
- Infections / Sepsis
- Cancer / Tumors / Lymphomas
- Medication or drug reaction
- Connective tissue disease
  - Arthritis
  - Vasculitis
- Hyperthyroidism
- Heat Stroke
- Meningitis



Universal Protocol Section

Pearls
- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- Febrile seizures are more likely in children with a history of febrile seizures and with a rapid elevation in temperature.
- Patients with a history of liver failure should not receive acetaminophen.
- **Droplet precautions** include standard PPE plus a standard surgical mask for providers who accompany patients in the back of the ambulance and a surgical mask or NRB O2 mask for the patient. This level of precaution should be utilized when influenza, meningitis, mumps, streptococcal pharyngitis, and other illnesses spread via large particle droplets are suspected. A patient with a potentially infectious rash should be treated with droplet precautions.
- **Airborne precautions** include standard PPE plus utilization of a gown, change of gloves after every patient contact, and strict hand washing precautions. This level of precaution is utilized when multi-drug resistant organisms (e.g. MRSA), scabies, or zoster (shingles), or other illnesses spread by contact are suspected.
- **All-hazards precautions** include standard PPE plus airborne precautions plus contact precautions. This level of precaution is utilized during the initial phases of an outbreak when the etiology of the infection is unknown or when the causative agent is found to be highly contagious (e.g. **SARS, SARS-CoV-2, COVID-19, MERS, Monkeypox**).
- Rehydration with fluids increases the patient's ability to sweat and improves heat loss.
- Allergies to NSAIDs (non-steroidal anti-inflammatory medications) are a contraindication to Ibuprofen. Do not give to patients who have renal disease or renal transplant.
- NSAIDs should not be used in the setting of environmental heat emergencies.
- **Do not** give aspirin to a child, age ≤ 15 years.
- 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
(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

Moderate to Severe

IV or IO Access Protocol UP 6

Cardiac Monitor

P

Fentanyl 50 mcg IV / IO / IM
Repeat every 5 minutes
Maximum 300 mcg
Peds: 1 mcg/kg IV / IO / IM / IN
May repeat 0.5 mcg/kg every 5 minutes Maximum 2 mcg/kg
or
Morphine 2mg IV/IO/IM
Repeat every 5 min as needed
Peds: 0.1mg/kg IV/IO/IM
Maximum 10mg

Ketamine 0.3 mg/kg IV / IO

Mix in 50-250 mL NS and Infuse over 10 minutes

May repeat every 20 minutes
Maximum 30 mg single dose

Maximum 3 total doses -Or-
Ketamine 90 mg

Monitor and Reassess
Every 10 minutes following sedative

Notify Destination or Contact Medical Control

Universal Protocol Section

Pain Control

The relief of pain is a key aspect in emergency medicine care:

1. Pain is the most common complaint EMS encounters. 50 –75 % of all patients are experiencing pain.
2. An essential mission of EMS providers is the relief of pain.
3. We are often judged in how effective we are in relieving pain.
4. Often procedures we perform cause pain.
5. Unrelieved pain is associated with many untoward effects: Increased sympathetic response, Increase in peripheral vascular resistance, Increase in myocardial oxygen consumption, Increase in carbon dioxide production, Increase in clotting potentials, Decrease in gastric motility, Decrease in immune function.
6. It is important to measure, document and treat pain.

Do not administer any PO meds for patients who may need surgical intervention (i.e. fracture, abd pain)

Measurement of pain:

Use the verbal pain scale of 0 –10. Explain to the patient how the system works, zero is no pain and 10 is the worst pain you can imagine. An example may be hitting your hand with a sledge hammer. If the patient uses a number like 11 or 20 then the patient does not understand the scale and / or you have not explained the score clearly. The worst pain you can imagine is 10, 20 does not exist. If a person cannot speak, but hears and understands or reads lips then you can draw the pain scale on paper from 0 –10 and ask the patient to point the their pain number. Unfortunately the only device we have to truly measure pain is the patient and this totally relies on their perception. While you can use demeanor, facial expression and other body language to help assess the degree of pain they are not reliable alone.

Approach to pain management:

1. Abdominal pain/orthopedic injuries: In a patient who is not actively vomiting you may use PO medications even if you believe they may require surgery.
2. Opioids: Fentanyl is a better choice than morphine as it does not promote histamine release and therefore avoids common adverse affects of morphine (hypotension, rash, etc). IV, IO route is preferred as it is better titrated. IM use has variable and unpredictable onset of action.
3. Ketamine is an excellent alternative to opioids in those you would like to avoid opioids in (hypotensive, unstable patients) or for opioid-tolerant (i.e. chronic pain, buprenorphine) patients. Also a great alternative for patients who would like to avoid opioids. Pain dosing (0.2-0.3mg/kg) is "sub-dissociative" therefore patients should not dissociate or have a change in their awareness. Also avoids respiratory depression, but may occur in geriatric population.

Ketamine Dissociation syndrome: with rapid push may cause hallucinations or agitation. Treat with benzo and decrease ambient stimulation.

Pearls

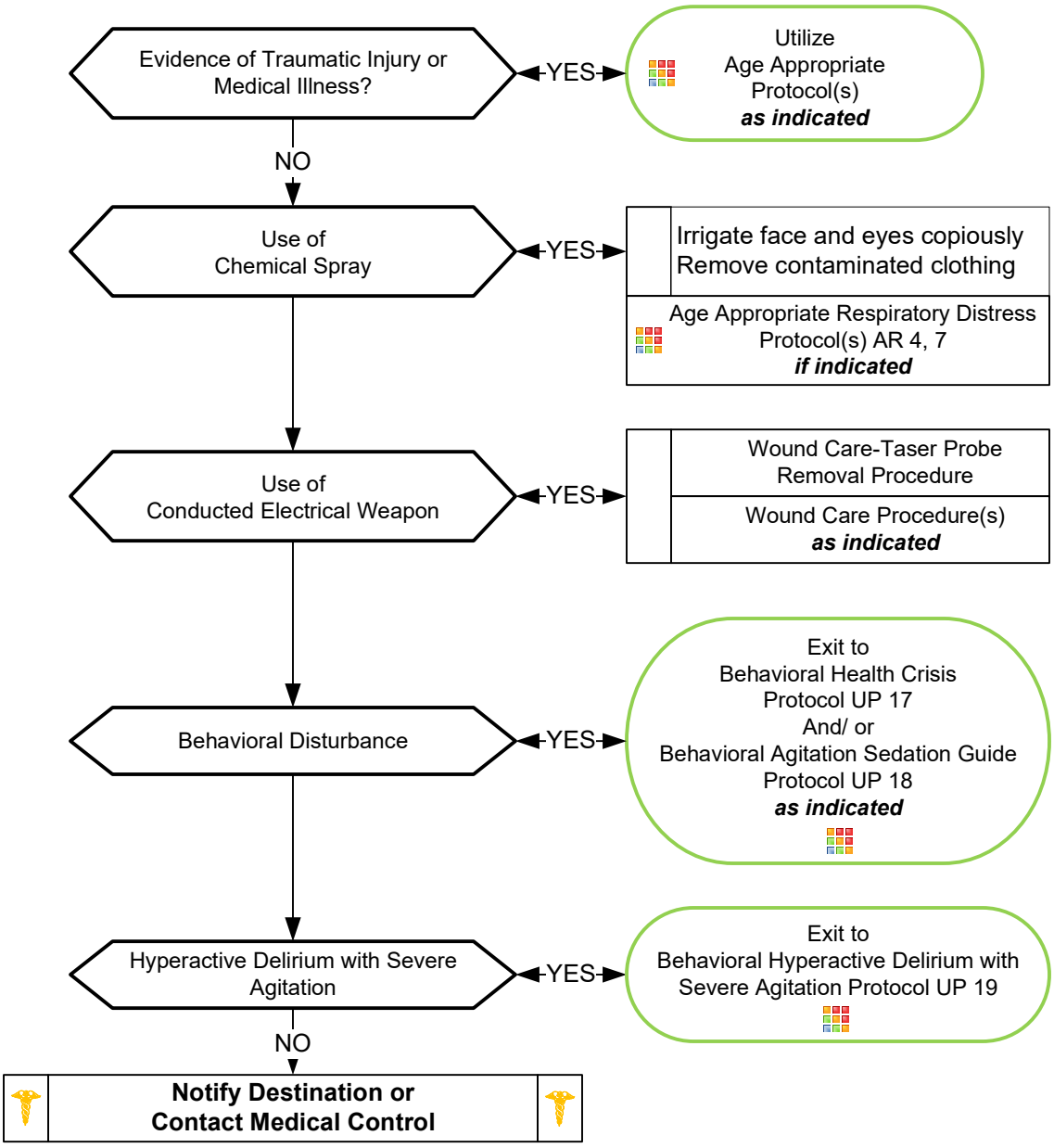
- **Recommended Exam: Mental Status, Area of Pain, Neuro**
- **Pain severity (0-10) is a vital sign to be recorded before and after PO, IV, IO or IM medication delivery and at patient hand off. Monitor BP closely as sedative and pain control agents may cause hypotension.**
- **Ketamine:**
  Ketamine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

Please refer to : Sheriff's Department and Emergency Medical Services Mental Health Client Policy

BOTH ORGANIZATIONS WILL WORK TOGETHER TO ASSURE THAT THE MENTAL HEALTH CLIENT IS EVALUATED BY THE APPROPRIATE CLINICIAN.

Transport Decisions

Sheriff Department will transport the following:
Mental health clients that have NO medical needs
Involuntary commitments.
Emergency commitments
Will have direct communication with EMS and/or Medical Control if there is a potential need for medical treatment.
Will contact EMS for a change in condition of patient deemed to be medical in nature.

EMS will transport the following:
Altered level of consciousness
Gun shot wounds
Significant injury with significant or potential substantial blood loss
Ingestion of narcotics, drugs, or other potentially life threatening substances
Carbon monoxide poisoning
Any client or their family/significant others request transport in an ambulance.
Emergency and involuntary commitments that require medical intervention. SCSD will be in the ambulance during transport to a medical facility.

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.**
- **Hyperactive Delirium with Severe Agitation:**
  Medical emergency: Combination of delirium, psychomotor agitation, anxiety, hallucinations, speech disturbances, disorientation, violent/ bizarre behavior, insensitivity to pain, hyperthermia and increased strength.
  Potentially life-threatening and associated with use of physical control measures, including physical restraints and Tasers.
  Most commonly seen in male subjects with a history of serious mental illness and/or acute or chronic drug abuse, particularly stimulant drugs such as cocaine, crack cocaine, methamphetamine, amphetamines or similar agents. Alcohol withdrawal or head trauma may also contribute to the condition.
  If patient suspected of Hyperactive Delirium with Severe Agitation suffers cardiac arrest, consider a fluid bolus, administration of calcium gluconate (or chloride), 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 2.5 mg IV / IO**
May repeat every 3 to 5 minutes as needed
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:
≥ 50 kg
Midazolam 5 mg IM

< 50 kg
Midazolam 2.5 mg

May repeat in 5 minutes if needed
Maximum 10 mg

Blood Glucose Analysis Procedure

A: IV / IO Procedure ***if indicated***

P: Cardiac Monitor ***if indicated***

Monitor and Reassess

Notify Destination or Contact Medical Control

Universal Protocol Section

Seizure

Signs and Symptoms:
LOC or AMS / behavioral changes such as bizarre behavior that often times has a repetitive or robotic-type movements.
Head deviation or fixed eye gazes with AMS.
Convulsions or tremors.
Incontinence.
Subjective changes in perception such as taste, smell or fear.

Classification:
Generalized:
1. Tonic-Clonic
2. Absence
3. Myoclonic
   - Neuronal discharges occur bilaterally in the brain with LOC noted.
   - Tonic movements: Flexion / extension of head / trunk / extremities.
   - Clonic movements: Rhythmic motor jerking of extremities or neck.

Partial:
1. Simple partial
   - Begin in focal area of brain. Patient may remain conscious.
   - May have aura which is a perception of flashing lights, noises or visual disturbances.
2. Complex partial
   - Remain awake but has an alteration in consciousness. May not recall the event.
   - Lip smacking, mumbling or continued rhythmic movements of hands are noted.
   - Typically are post-ictal.
3. Secondarily generalized
   - Loss of consciousness with generalized tonic-clonic movements

Partial-complex:
- Begin in focal area of brain. Patient may remain conscious.
- May have aura which is a perception of flashing lights, noises or visual disturbances.

Active Seizure with no IV / IO access:
Midazolam is preferred agent, give IM.

Universal Protocol Section

Pearls

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Extremities, Neuro**
- **Items in Red Text are key performance measures used to evaluate protocol compliance and care.**
- **Brief seizure-like activity can be seen following ventricular fibrillation or ventricular tachycardia associated cardiac arrest.**
- **Status epilepticus is defined by seizure activity lasting > 5 minutes or multiple seizures without return to baseline.**
- **Most seizure activity is brief, lasting only 1 – 2 minutes, and is associated with transient hypoventilation.**
- **Be prepared for airway problems and continued seizures.**
- **Seizure activity may be a marker of closed head injury, especially in the very young, examine for trauma.**
- **Adult:**
  Midazolam 10 mg IM is effective in termination of seizures.
  Do not delay IM administration with difficult IV or IO access. IM Preferred over IO.
- **Pediatrics:**
  Midazolam 0.2 mg/kg (Maximum 5 mg) IM is effective in termination of seizures.
  Do not delay IM administration with difficult IV or IO access. IM Preferred over IO.
- **Do not delay administration of anti-epileptic 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 OB Emergencies Protocol.
- **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

Prehospital Stroke Screen

Consistent with Acute Stroke

YES → **Time of Onset Or Time Last Seen Normal < 24 Hours**

YES → **Transport based on:**
STROKE
EMS Triage and Destination Plan
Keep Scene Time to ≤ 10 Minutes
Immediate Notification of Facility

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

NO →

- Blood Glucose Analysis Procedure
- Altered Mental Status Protocol UP 4 ***if indicated***
- Reperfusion Checklist Procedure
- **B** — 12 Lead ECG Procedure
- **A** — IV / IO Procedure Preferably 2 Sites
- **A** — Venous Access Blood Draw Procedure ***if applicable***
- **P** — Cardiac Monitor
- 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***

SBP ≥ 220
DBP ≥ 120
after 3 readings
at least 5 minutes apart

YES → Contact Receiving Facility Concerning Treatment of Hypertension

Notify Destination or Contact Medical Control

Universal Protocol Section

Suspected Stroke

TIME OF ONSET:

MUST obtain the Time of Onset or Time Last Seen Normal. Often stroke victims are discovered by someone (family, friends or caregivers) which begins the time of onset when they discovered the patient – inquire about the Time Last Seen Normal. You must ask directed questions to determine the last time the patient is known to be normal or at their baseline.

Wake-up Stroke: People often awaken with stroke symptoms – the time they were last seen normal and awake would be used in this case. **All treatment for stroke hinges on the Time of Onset.** This is important because it helps the physician determine eligibility for thrombolytics. When thrombolytics are given beyond 4.5 hours of symptom onset many of these patients have worse outcomes.

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 prevent an eligible patient from receiving thrombolytics. If the witness or family member cannot come with you then obtain their name and a contact number that hospital providers can contact for more information.

Patients that have neurologic deficit and chest pain need to have their blood pressures measured in both arms. A significant difference may indicate aortic dissection.

Blood Draw Kits:

The lab specimens should be obtained if at all possible as this will speed the assessment process upon arrival at the receiving facility. Label blood tube with patient's name, DOB, date and time drawn, and provider initials.

Hospital notification:

Receiving hospital should be given notification of suspected stroke patient at least 10 minutes prior to arrival, include Time of Onset, and include RACE or FAST-ED Stroke Score.
If possible place 2 IV sites during transport.

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 & resources of your hospital based on Stroke: Triage and Destination Plan.**
- **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.**
- **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 prevent an eligible patient from receiving thrombolytics.**
- **The Reperfusion Checklist should be completed for any suspected stroke patient. With a duration of symptoms of less than** 24 hours **, scene times should be limited to ≤ 10 minutes, early notification / activation of receiving facility should be performed and transport times should be minimized.**
- **If possible place 2 IV sites.**
- **Blood Draw:**
  - **Many systems utilize EMS venous blood samples. Follow your local policy and procedures.**
- The differential listed on the Altered Mental Status Protocol should also be considered.
- Be alert for airway problems (swallowing difficulty, vomiting/aspiration).
- Hypoglycemia can present as a localized neurologic deficit, especially in the elderly.
- Document the Stroke Screen results in the PCR.
- Agencies may use validated pre-hospital stroke screen of choice.
- **Pediatrics:**
  - Strokes do occur in children, they are slightly more common in ages < 2, in boys, and in African-Americans. Newborn and infant symptoms consist of seizures, extreme sleepiness, and using only one side of the body. Children and teenagers symptoms may consist of severe headaches, vomiting, sleepiness, dizziness, and/or loss of balance or coordination.

Suspected Sepsis

History
- Duration and severity of fever
- Past medical history
- Medications / Recent antibiotics
- Immunocompromised (transplant, HIV, diabetes, cancer)
- Indwelling medical device
- Last acetaminophen or ibuprofen
- Recent Hospital / healthcare facility
- Bedridden or immobile
- Elderly and very young – at risk
- Prosthetic device / indwelling device

Signs and Symptoms
- Warm
- Flushed
- Sweaty
- Chills / Rigors
- Delayed cap refill
- Mental status changes

Associated Symptoms (Helpful to localize source)
- myalgias, cough, chest pain, headache, dysuria, abdominal pain, rash

Differential
- Infections: UTI, Pneumonia, skin/ wound
- Cancer / Tumors / Lymphomas
- Medication or drug reaction
- Connective tissue disease: Arthritis, Vasculitis
- Hyperthyroidism
- Heat Stroke
- Meningitis
- Hypoglycemia/hypothermia
- MI / CVA

Consider: Contact, Droplet, and Airborne Precautions

Temperature Measurement Procedure ***if available***

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

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

B 12 Lead ECG Procedure

A IV / IO Procedure ***If indicated***

P Cardiac Monitor

Sepsis Screen Positive

NO → Exit to Age Appropriate Condition Appropriate Protocol(s)

YES → **SEPSIS ALERT**
Notify Receiving Facility Immediately

MAP (Mean Arterial Pressure)

SBP + 2(DBP) / 3

Monitor usually calculates this value on screen

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

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

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

A
Normal Saline 1000 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

P
Push Dose Vasopressor Regimen for Epinepherine
Give 5 cc (5 mcg) q 2 minutes to effect SBP >90
Use in patients with **SBP <90 and HR <120**
Push Dose Vasopressor Regimen for Neosynephrine
Give 5 cc (50 mcg) q 2 minutes to effect SBP >90
Use in patients with **SBP <90 and HR >120**

Levophed 5 mcg/min IV/IO
Titrate to effect SBP >90 (if available)

Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3

Notify Destination or Contact Medical Control

Universal Protocol Section

Suspected Sepsis

Universal Protocol Section

General approach:
Sepsis occurs when the body is fighting an infection. The response becomes overwhelming and can affect multiple organ systems and may cause organ damage. Early fluid resuscitation to maintain a SBP ≥ 90 mmHg or a MAP ≥ 65 mmHg can decrease morbidity and mortality.
When you recognize that a patient is potentially septic, notify the receiving facility as quickly as possible. Early notification allows the facility to set-up to receive the patient and ready antibiotics. Early antibiotic administration also decreases morbidity and mortality.
Establish 2 IV sites when sepsis is suspected.

Fluid resuscitation goals:
Administer 1L of Normal Saline bolus to patients suspected of sepsis. Repeat 1L of Normal Saline if transport time allows. IfBP remains ≤ 90 mmHg or MAP ≤ 65 mmHg give push-dose vasopressor. Maximum fluid volume should be 30 mL/kg.

Contraindications:
If patient develops dyspnea with pulmonary edema then decrease fluid infusion.
Use caution in patients with renal disease.

Levophed Drip:
If patient requires ≥ 2 push dose vasopressors or has suspected sepsis – consider Levophed drip.
Levophed 5 mcg/min IV / IO and titrate by **2 mcg/min every 2 minutes** to effect SBP ≥ 90mmHg and/or MAP ≥ 65 mmHg.

- **Pearls**
- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Recommended Exam Pediatrics: In childhood, physical assessment reveals important clues for sepsis. Look for mental status abnormalities such as anxiety, restlessness, agitation, irritability, confusion, or lethargy. Cardiovascular findings to look for include cool extremities, capillary refill >3 seconds, or mottled skin.**
- **Sepsis is a life threatening condition where the body's immune response to infection injures its own tissues and organs.**
- **Severe sepsis is a suspected infection and 2 or more SIRS criteria (or qSOFA) with organ dysfunction such as AMS or hypotension.**
- **Septic shock is severe sepsis and poor perfusion unimproved after fluid bolus.**
- **Agencies administering antibiotics should inquire about drug allergies specific to antibiotics or family of antibiotics.**
- **Following each fluid bolus, assess for pulmonary edema. Consider administration of agency specific vasopressor.**
- **Supplemental oxygen should be given and titrated to oxygenation saturation ≥ 94%.**
- **EKG should be obtained with suspected sepsis, but should not delay care in order to obtain.**
- **Abnormally low temperatures increase mortality and found often in geriatric patients.**
- Quantitative waveform capnography can be a reliable surrogate for lactate monitoring in detecting metabolic distress in sepsis patients. $EtCO_2$ < 25 mm Hg are associated with serum lactate levels > 4 mmol/L.
- Patients with a history of liver failure should not receive acetaminophen.
- **Droplet precautions:**
  - Include standard PPE plus a standard surgical mask for providers who accompany patients in the back of the ambulance and a surgical mask or NRB O2 mask for the patient.
  - This level of precaution should be utilized when influenza, meningitis, mumps, streptococcal pharyngitis, and other illnesses spread via large particle droplets are suspected.
  - A patient with a potentially infectious rash should be treated with droplet precautions.
- **Airborne precautions:**
  - Include standard PPE plus utilization of a gown, change of gloves after every patient contact, and strict hand washing precautions.
  - This level of precaution is utilized when multi-drug resistant organisms (e.g. MRSA), scabies, or zoster (shingles), or other illnesses spread by contact are suspected.
- **All-hazards precautions:**
  - Include standard PPE plus airborne precautions plus contact precautions.
  - This level of precaution is utilized during the initial phases of an outbreak when the etiology of the infection is unknown or when the causative agent is found to be highly contagious (e.g. SARS).
- All patients should have drug allergies documented prior to administering pain medications.
- Allergies to NSAIDs (non-steroidal anti-inflammatory medications) are a contraindication to Ibuprofen.
- 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
I	IV / IO Procedure
P	Cardiac Monitor
	Altered Mental Status Protocol UP 4 ***if indicated***
	Age Appropriate Cardiac Protocol(s) ***if indicated***
	Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***
	Multiple Trauma Protocol TB 6 Spinal Motion Restriction Procedure / Protocol TB 8 ***if indicated***

Serious Signs / Symptoms Hypotension, poor perfusion, shock

YES → **A**

A	
	IV / IO Procedure Consider 2 Large Bore sites
	Normal Saline 500 mL Bolus Repeat as needed Titrate SPB ≥ 90 mmHg **Maximum 2 L** **Peds: 20 mL/kg IV / IO** Repeat as needed Titrate to Age Appropriate SBP ≥ 70 + 2 x Age **Maximum 60 mL/kg**

→ Exit to Age Appropriate Condition Appropriate Protocol(s)

NO → **Notify Destination or Contact Medical Control**

Universal Protocol Section

Syncope

Universal Protocol Section

Syncope is a transient loss of consciousness which has a multitude of causes.

Two important tests with patients who experience syncope are an ECG and Blood Glucose Analysis.

It is NOT vasovagal syncope until everything else is ruled out in the hospital. You must assume the worst first (while hoping for the best).

High risk patients who experience syncope:
Age ≥ 60
Patients with abnormal ECG
Patients with history of CHF

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Syncope is both loss of consciousness and loss of postural tone. Symptoms preceding the event are important in determining etiology.**
- **Syncope often is due to a benign process but can be an indication of serious underlying disease in both the adult and pediatric patient.**
- **Often patients with syncope are found normal on EMS evaluation. In general patients experiencing syncope require cardiac monitoring and emergency department evaluation.**
- **Differential should remain wide and include:**

Cardiac arrhythmia	Neurological problem	Choking	Pulmonary embolism
Hemorrhage	Stroke	Respiratory	Hypo or Hyperglycemia
GI Hemorrhage	Seizure	Sepsis	

- **High-risk patients:**

Age ≥ 60	Syncope with exertion
History of CHF	Syncope with chest pain
Abnormal ECG	Syncope with dyspnea

- **Age specific blood pressure 0 – 28 days > 60 mmHg, 1 month - 1 year > 70 mmHg, 1 - 10 years > 70 + (2 x age) mmHg and 11 years and older > 90 mmHg.**
- **Abdominal / back pain in women of childbearing age should be treated as pregnancy related until proven otherwise.**
- **The diagnosis of abdominal aneurysm should be considered with abdominal pain, with or without back and / or lower extremity pain or diminished pulses, especially in patients over 50 and / or patients with shock/ poor perfusion. Notify receiving facility early with suspected abdominal aneurysm.**
- **Consider cardiac etiology in patients > 50, diabetics and / or women especially with upper abdominal complaints.**
- **Heart Rate: One of the first clinical signs of dehydration, almost always increased heart rate, tachycardia increases as dehydration becomes more severe, very unlikely to be significantly dehydrated if heart rate is close to normal.**
- Syncope with no preceding symptoms or event may be associated with arrhythmia.
- Assess for signs and symptoms of trauma if associated or questionable fall with syncope.
- Consider dysrhythmias, GI bleed, ectopic pregnancy, and seizure as possible causes of syncope.
- These patients should be transported. Patients who experience syncope associated with headache, neck pain, chest pain, abdominal pain, back pain, dyspnea, or dyspnea on exertion need prompt medical evaluation.
- More than 25% of geriatric syncope is cardiac dysrhythmia based.

Behavioral 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
Excited Delirium
Syndrome / Violent
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 or
Contact Medical Control

Universal Protocol Section

Behavioral Health Crisis

Universal Protocol Section

Scene safety: First priority is safety of on scene personnel. Protect yourself and others by requesting law enforcement. Do not approach patient if armed with any type weapon or reasonable suspicion of weapon. Retreat from scene to safe staging area if scene is or becomes unsafe at any point.
General: Behavioral emergencies may be precipitated by an underlying medical condition even with known psychiatric disease.Be vigilant in your assessment to make sure an underlying medical condition is not the cause, but assume medical condition is precipitating cause. Psychosis may include head trauma, hypoglycemia, acute intoxication, sepsis, CNS insult, hypoxia and ingestions. Psychosis and delirium may be very difficult to distinguish. **Search patient to ensure no weapons even if law enforcement has done so**.

Use SAFER model:

Stabilize the situation by containing and lowering the stimuli (remove unnecessary personnel, remove patient from stress, reassure, calm and establish rapport.) Position yourself between patient and an exit. Keep hands in front of your body (non-threatening posture.) Only one provider should communicate with patient. Outline the patient's choices and calmly set some boundaries of acceptable behavior.

Assess and acknowledge crisis

Facilitate resources (Friends, family, police, chaplain)

Encourage patient to use resources available and take actions in their best interest.

Recovery or referral: Patient in care of responsible person, professional or transport to medical facility.

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 take-down restraint procedure.**
- **Maintain high-index of suspicion for underlying medical or traumatic disorder causing or contributing to behavioral disturbance. Medical causes more likely in ages < 12 or > 40.**
- **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.**
- 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.
- **May add page 3 to protocol for specific for local mental health and / or substance misuse resources or destinations.**

Behavioral CIT Paramedic

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 or Contact Medical Control

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

Randolph County

336-633-7000 Daymark Recovery Services 110 W. Walker Ave. Asheboro, NC	**336-625-1500** Therapeutic Alternatives 962 S. Fayetteville St. Asheboro, NC	**336-495-2700** Therapeutic Alternatives 4270 Heath Dairy Rd. Randleman, NC
Open Access Hours Mon-Fri 8am-5pm	Open Access Hours 8am-5pm	**If Needed** Contact Crisis Response **1-877-626-1772**

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

Condition Improving?
NO → NO
YES → Exit to Age Appropriate Protocol(s)

Behavioral Activity Rating Scale
BARS scoring: 6

Agitated and disruptive
Not violent

YES →

Verbal De-escalation Procedure ASP 11

IV or IO Access Protocol UP 6
if indicated

P

Age ≥ 12
Haloperidol 2 - 5 mg
IM
Age ≥ 65
2.5 mg IM
May repeat every 5 as needed
Maximum 10 mg

> 50 kg
Midazolam 5 mg IM
10-50 kg 0r Age ≥ 65
Midazolam2.5 mg IM
<10 kg
Midazolam 1 mg IM
Repeat every 5 minutes as needed
Max 10 mg

Consider
Restraint Physical Procedure USP 5
Monitor per restraint procedure
if indicated

NO

Condition Improving?
NO → Exit to Hyperactive Delirium with Severe Agitation Protocol UP 19
YES → Exit to Age Appropriate Protocol(s)

Behavioral Activity Rating Scale
BARS scoring: 7

Agitated and violent

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

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

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 1 L Bolus
Then **150 – 200 mL / hr**
May repeat **500 mL** Bolus
as needed
Maximum 2 L

Peds: 20 – 60 mL/kg IV / IO
Maximum 60 mL/kg

Restraint Physical Procedure USP 5
Monitor per restraint procedure
if indicated

Restraint Therapeutic Take Down Procedure USP 6
if indicated

Hyperthermia Protocol

P Cardiac Monitor

Notify Destination or
Contact Medical Control

General Guidance

- **Use of protocol is indicated when a medical emergency requires a combination of both physical restraint and chemical restraint in order to prevent imminent injury to a patient and/ or providers.**
- **Use of this protocol requires medical judgement and consultation with Medical Control where indicated.**
- **Non-medical personnel requests or opinions should not be used as a factor when implementing this protocol.**

Universal Protocol Section

Behavioral
Hyperactive Delirium With Severe Agitation

BEHAVIORAL ACTIVITY RATING SCALE (BARS):

1. Difficult or unable to rouse
2. Asleep but responds normally to verbal or physical contact
3. Drowsy, appears sedated
4. Quiet and awake (normal level of activity)
5. Signs of overt (physical or verbal) activity, calms down with instructions
6. Extremely or continuously active, not requiring restraint
7. Violent, requires restraint

Restraints:

Patient must be out of control and posing a threat to themselves or others.
Use minimum necessary force required for patient control must be done in a way not to inflict harm upon the patient
Position of patient must not impede airway or breathing
This should be done supine or lateral with one arm raised above the head.

Team approach:

Need minimum of 6 providers
Team leader administers medication and acts as safety officer to ensure procedure is conducted to keep patient and providers safe
One provider controls and protects the head and another provider for each extremity –taking wrists/knees
Restraints must not impede circulation.
Do not restrain in prone position.
Contact Medical Control if patient continues to struggle against restraint.

Chemical Restraint:

Patient must be disruptive and violent, posing a threat to themselves and/or others
Necessary force required for patient control must be done in a way not to inflict harm upon the patient.
Position of patient must not impede airway or breathing.
This should be done supine or lateral with one arm raised above head.
Drug must be able to be given without imparting harm to rescuers or patient.
Use of **Haloperidol** is preferred agent for patients with psychosis (out of touch with reality) due to mental illness.
Use of **Midazolam** is preferred agent for patients with behavioral emergencies from substance (stimulant) use.
Use of **Ketamine** is reserved for patients that have evidence of excited delirium and are dangerously combative.

Pearls

- **Ketamine for sedation purposes:**
  Ketamine may be used in pediatric patients who fit within a Pediatric Medication/ Skill Resuscitation System product, ≤ 15 years of age, or ≤ 49 kg) with DIRECT ONLINE MEDICAL ORDER by the system MEDICAL DIRECTOR or ASSISTANT MEDICAL DIRECTOR only.
- **Hyperactive Delirium with Severe Agitation:**
  Medical emergency: Combination of delirium, psychomotor agitation, anxiety, hallucinations, speech disturbances, disorientation, violent/ bizarre behavior, insensitivity to pain, hyperthermia and increased strength.
  Potentially life-threatening and associated with use of physical control measures, including physical restraints.
  Most commonly seen in male subjects with a history of serious mental illness and/or acute or chronic drug abuse, particularly stimulant drugs such as cocaine, crack cocaine, methamphetamine, amphetamines or similar agents.
  Alcohol or substance withdrawal as well as head trauma may also contribute to the condition.
- **Restraint use:**
  Physical restraints are not contraindicated in agitated or excited delirium, but you must use caution.
  Once sedated, prevent patient from continued struggle, which can worsen metabolic condition.
  Prevent patient from assuming a prone position for prolonged period, move to supine position as quickly as possible.
  Team approach for sedation and Restraint Therapeutic Take Down Procedure USP-6:
    1 provider for each limb.
    1 provider to lead restraint, maintain airway and control head.
    1 Provider to administer medication.
  Do not position prone or prone with restraints, as this can impede respiration and ventilation.
- Hyperthermia: Assess for and treat hyperthermia.

Universal Protocol 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 or Contact Medical Control

Airway Respiratory Protocol Section

Adult Airway

Always weigh the risks and benefits of endotracheal intubation in the field against rapid transport. All pre-hospital endotracheal intubations are considered high risk. If ventilation / oxygenation is adequate then rapid transport may be the best option. The most important airway device and the most difficult to use correctly and effectively is the Bag Valve Mask (*not the laryngoscope*).Few pre-hospital airway emergencies cannot be temporized or managed with proper BVM techniques.
Please refer to Protocols AR2 and AR3 for additional information.

External Laryngeal ManipulationAKA Bi-manual laryngoscopy:
While holding the laryngoscope blade, the right hand should be actively manipulating the larynx to improve your glottic view.Patient should be positioned with face parallel to the ceiling and external auditory canal parallel with the sternal notch. Obese patients should be ramped into proper position. The stretcher may be a useful to allow the patient to be placed in optimal position for airway management.

Trauma:
Utilize in-line manual cervical stabilization during intubation, BIAD or BVM use. During intubation or BIAD the cervical collar front should be open or removed to facilitate translation of the mandible / mouth opening while another member of the team holds in-line stabilization

Nasotracheal intubation:
Orotracheal intubation is the preferred choice. Procedure requires patient to have spontaneous breathing. Contraindicated in combative patients, anatomically disrupted or distorted airways, increased intracranial pressure, severe facial trauma, basal skull fracture, head injury. Not a rapid procedure and exposes patient to risk of desaturation.

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): Radiation 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): Look 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): Radiation 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): Surgery scars**; M**ass or hematoma**, A**ccess or anatomical problems**; R**adiation treatment to face, neck, or chest; **T**umor.
- **Capnography Monitoring (EtCO2):**
  Continuous Waveform or Quantitative Capnography and Pulse Oximetry are required for intubation verification and ongoing patient monitoring (Not validated and may prove impossible in the neonatal population -verification by two (2) other means is recommended in this population.)
  Capnography verification and monitoring is required for BIAD verification and monitoring once available on scene.
- **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 or Contact Medical Control

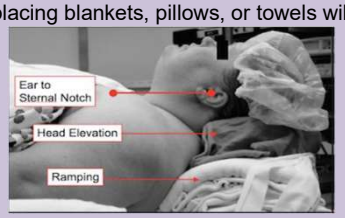
Airway Respiratory Protocol Section

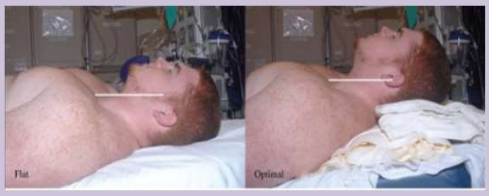
Adult, Failed Airway

A failed airway occurs when a provider begins a course of airway management by endotracheal intubation and identifies that intubation by that means will not succeed.

The most important way to avoid a failed airway is to identify patients with expected difficult airway, difficult BVM ventilation, difficult BIAD, difficult laryngoscopy and / or difficult cricothyrotomy. (See below)

Position of patient:
In the field setting improper position of the patient and rescuer are responsible for many failed and difficult intubations. Often this is dictated by uncontrolled conditions present at the scene and we must adapt. However many times the rescuer does not optimize patient and rescuer position. **Optimal position is aligning ear canal to sternal notch with face parallel to ceiling.** In the obese or late pregnant patient elevating the torso by placing blankets, pillows, or towels will optimize the position. This can also be facilitated by raising the head of the cot.





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

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

Cricothyrotomy / Surgical Airway Procedure:
Use in patients 12 years of age and greater only. Percutaneous transtracheal jet ventilation is used in younger (1-11yo) patients.

Relative contraindications include:
Pre-existing laryngeal or tracheal tumors, infections or abscess overlying the cricoid area.Hematoma or anatomical landmark destruction / injury.

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.**
- **<u>Anticipating the Difficult Airway and Airway Assessment</u>**
  - **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.**
- **<u>Nasotracheal intubation</u>:**
  - **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 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

A IV/ IO Procedure

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**
Repeat as needed x 3 ***if indicated***

Consider **Epinephrine 1:1000 0.3 – 0.5 mg IM Repeat x1 after 5 minutes if needed**

P Consider **Methylprednisolone 125 mg IV / IO / IM**

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

Notify Destination or Contact Medical Control

Airway Respiratory Protocol Section

Adult COPD / Asthma Respiratory Distress

COPD

Most patients who have COPD have other comorbidities which are often significant.
A COPD exacerbation is a change in the course of the disease marked by change in patient's baseline work of breathing, cough and / or sputum character which is different from their chronic symptoms.

Diseases that may mimic acute COPD exacerbations:

Decompensated CHF	Acute MI	Acute asthma	Pneumonia
Cardiac dysrhythmia	Pulmonary embolism (PE)	Pneumothorax	Pericardial or pleural effusion

Oxygen therapy in COPD Exacerbations:
Goal is oxygen saturation of ≥ 94 %. However saturations between 88 and 92 % are often acceptable and you should ask the patient what their typical saturations are in order to determine their normal range. Use side-stream capnography monitoring.

Treatment in COPD Exacerbations:
DuoNebs are important treatment mainstays. Use of steroids is also important. NonInvasive Positive Pressure Ventilation (NIPPV) should be utilized when necessary and is an important treatment modality in COPD.

ASTHMA

Asthma continues to increase in prevalence. Mortality is also increasing in the very young and elderly populations.
Asthma is really two diseases with a chronic inflammatory component and also an acute airflow obstruction component.
Treatment in Asthma Exacerbations:
Oxygen and Albuterol as well as ipratropium are mainstays in treatment. Steroids are also important. Epinephrine is an important adjunct in patients not responding to first line therapies. Magnesium sulfate may offer some benefit in the severe asthma attack but shows better efficacy in the pediatric population.

NIPPV should be considered in the severe asthmatic who does not respond to first line therapies. Intubation should be avoided in the asthma exacerbation patient unless severity dictates. Signs which may signal intubation need include: Worsening dyspnea despite therapy, decreasing pulse oximetry, increasing side-stream EtCO2, "shark-fin" capnography, declining mental status and progressive agitation. ***If the asthma patient requires intubation it is very important to match their ventilation rate after you control their airway. If they were breathing 40 times per minute you should attempt to ventilate them at or near that rate as they typically have profound respiratory acidosis by this point.*** This is important and different than in most patients who require ventilation at 8 – 10 breaths per minute.
Methylprednisolone:
Consider administration in patients who require two (2) or more breathing treatments only.

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.**
- **Combination nebulizers containing albuterol and ipratropium:**
  Patients may receive more than 3 nebulizer treatments, treatments should continue until improvement. Following 3 combination nebulizers, it is acceptable 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 impending respiratory failure and no improvement.**
- **Consider Magnesium Sulfate with impending respiratory failure and no improvement.**
- **Pulse oximetry should be monitored continuously and consider End-tidal CO2 monitoring if available.**
- **CPAP or Non-Invasive Positive Pressure Ventilation:**
- **May be used with COPD, Asthma, Allergic reactions, and CHF.**
- **Consider early in treatment course.**
- **Consider removal if SBP remains < 100 mmHg and not responding to other treatments.**
- A silent chest in respiratory distress is a pre-respiratory arrest sign.
- **EMT may administer Albuterol if patient already prescribed and may administer from EMS supply.** Agency Medical Director may require contact of medical control prior to EMT / EMR administering any medication.

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 or
Contact Medical Control

Airway Respiratory Protocol Section

Pediatric Airway

Airway management in the pediatric patient has many challenges, including drug dosing and equipment sizes along with the anxiety of managing a critically ill child. The principles of airway management in the pediatric patient are generally the same as in the adult.

1. Differences are most pronounced in the first 2 years of life after which the pediatric airway evolves into that of adult around age 8.
   The pediatric airway is more anterior especially in children 2 years and younger. The glottic opening is at C 1 in infancy and transitions to C 3 / C 4 by age 7 and then to C 5 / C 6 by age 8 which is similar to adults. Cricoid ring is the narrowest portion of airway.
   Large occiput which causes flexion of the airway and also causes tongue to obstruct against the posterior pharynx.
2. Must appreciate age and size related factors which evolve throughout development.
   The pediatric airway is prone to obstruction due to poor positioning, swelling, and large tongue
   Large tonsils and adenoids may bleed during procedures.

   Allow the pediatric patient to assume a position of comfort if able to maintain their own airway.

   Recommended Miller intubation blade.

3. Need for alternative airway techniques especially a mastery of the BVM with use of airway adjuncts.

Formula for estimating ETT size in children > 1 year of age:
(16 + age in years) / 4
Cuffed tubes can be used at any age. When used in children ≤8 subtract 0.5 mm from estimated ETT.
Use minimal ETT balloon occlusion pressure to effect a seal. Put just enough air in the ETT cuff to prevent leak.

Airway Needle Cricothyrotomy Procedure:
Absolute last resort when all other airway adjuncts have failed to ventilate & oxygenate. **Generally age ≥ 1 and ≤ 11.**
The cricothyroid membrane is small & difficult to detect in children under 3 –4 years of age.
Typical age group where most likely to be utilized is age 5 –10.

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 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 or Contact Medical Control

Pediatric Failed Airway

Risk Factors for Difficult Airways in Pediatrics:
Small airway size which is prone to obstruction from poor positioning and infection / edema.
Provider stress from managing age, anatomical variants and equipment sizes.
Low frequency number of encounters limit provider's experience.
While historically not well known in pediatrics, obesity may increase difficulty in airway management similar to adults.

Difficult Airway Management Secondary to Infections:
Epiglottitis (now more common in adults)
Croup
Retropharyngeal abscess
Infection leads to swelling which may compromise the already relatively small airway size. When stimulated, the child may cry which may also cause an airway to become obstructed. Allow child to assume position of comfort.

Difficult Airway Management Secondary to Non-infections:
Foreign Body
Burns / Trauma
Anaphylaxis / Airway edema

Difficult Airway Management Secondary to Congenital Anomalies:
Craniofacial abnormalities
Micrognathic mandible (small mandible / no-chin)

Airway Needle Cricothyrotomy Procedure:
Absolute last resort when all other airway adjuncts have failed with inability to ventilate / oxygenate. The cricothyroid membrane is small to virtually undetectable in children under 3 –4 years of age. Typical age group where most likely to be utilized is 5 –10 years of age.

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:**
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  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.
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- **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) 5 - 7
as indicated

Pediatric
Reaction / Anaphylaxis
Protocol PM 1
as indicated

B 12 Lead ECG Procedure

A IV / IO Procedure
if indicated

P Cardiac Monitor

Following Assessment

WHEEZING / Asthma

B **Albuterol Nebulizer**
1.25 - 2.5 mg

STRIDOR / Croup

B **Albuterol Nebulizer**
1.25 - 2.5 mg

A **Epinephrine Nebulizer**
1 mg (1:1000) in 2 mL NS
May repeat x 1

Pediatric Airway Protocol(s) 5 - 7
as indicated

A

No response: Consider
Epinephrine 1:1000
0.01 mg / kg IM
Maximum 0.3 mg

Albuterol Nebulizer 1.25 - 2.5 mg
+/- Ipratropium 0.5 mg
Repeat as needed x 3

P

Consider
Methylprednisolone 2 mg / kg
IV / IO / IM
Maximum 125 mg

Magnesium Sulfate 40 mg/kg IV / IO
Max 2G - Infuse over 10 – 20 minutes

Notify Destination or
Contact Medical Control

Airway Respiratory Protocol Section

Pediatric Asthma
Respiratory Distress

Respiratory Distress / Respiratory Failure

Respiratory distress is abnormal breathing in terms of rate and / or effort. Assess for respiratory distress by looking for changes in lung sounds and changes in skin color and mental status. Respiratory failure is a state of inadequate oxygenation and / or ventilation. The first priority in managing an ill child is assessment of airway and breathing. Respiratory conditions are a major cause of cardiac arrest in infants and children. Early detection and management of respiratory distress and / or failure means a better chance of favorable outcome in the ill child.

Respiratory distress / tachypnea with normal lung sounds and normal oxygenation may signal **hypoglycemia** in the young child / infant. Consider **CHF** in young child / infant with wheezing.

Signs of Respiratory Distress:

Tachypnea	Increased effort (nasal flaring, retractions)
Tachycardia	Poor respiratory effort (hypoventilation, bradypnea)
Pale, cool skin	Abnormal lung sounds (stridor, wheezing, grunting)
Mental status changes	

Signs of Respiratory Failure:

Early signs:	**Late Signs:**
Marked Tachypnea	Bradypnea
Increased effort	Decreased or no effort
Tachycardia	Bradycardia
Poor / absent air movement	Cyanosis
	Stupor or coma

Refer to Adult COPD / Asthma Protocol AR 4 Purple Section, Page 2

Methylprednisolone:

Administer to patients who require two (2) or more breathing treatments only.

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.**
- **Pulse oximetry should be monitored continuously in the patient with respiratory distress.**
- **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.**
- **Combination nebulizers containing albuterol and ipratropium:**
  Patients may receive more than 3 nebulizer treatments, treatments should continue until improvement. Following 3 combination nebulizers, it is acceptable 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 impending respiratory failure and no improvement.**
- **Consider Magnesium Sulfate with impending respiratory failure and no improvement.**
- **Albuterol dosing: ≤ 1 year of age 1.25 mg; 1 – 6 years 1.25 – 2.5 mg; 6 – 14 years 2.5 mg; ≥ 15 years 2.5 – 5 mg.**
- **Consider IV access when Pulse oximetry remains ≤ 92 % after first beta agonist treatment.**
- **Do not force a child into a position, allow them to assume position of comfort. They will protect their airway by their body 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 patients supply for repeat nebulizers or agency's supply.
- **EMT may administer Albuterol if patient already prescribed and may administer from EMS supply.** Agency medical director may require Contact of Medical Control prior to administration.

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
May require faster rate
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***

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 long term paralytic
Vecuronium 10 mg (0.1 mg/kg) IV / IO
If needed for patient movement.
Not indicated in Pediatrics

Notify Destination or Contact Medical Control

Post-intubation/ BIAD Management

Immediately following BIAD or ETT placement:
The patient may experience various levels of stress, agitation, or combativeness. The most important initial aspect of immediate post-intubation / BIAD management is to control pain. Agitation and combativeness is usually because of pain with a BIAD or ETT in the airway causing discomfort. Mechanical ventilation / BVM / positive pressure ventilation is painful. Immediately begin sedation with **Ketamine 2 mg/kg**or **Fentanyl 50 mcg or 1 –2 mcg/kg IV / IO**.

Ketamine and Fentanyl are equal choices for sedation and even if Ketamine is given to initially to facilitate airway management, it remains an appropriate sedation choice. **Ketamine 2 mg/kg over 1 –2 minutes. You may repeat 0.5 mg/kg doses every 5 minutes as needed**.

Remember benzodiazepines are associated with worse patient outcomes and prolonged ICU stays. Opioid and/or Ketamine is the best first choice.

Hypotension:
Persistent hypotension should not prevent you from providing appropriate sedation and pain control. Fluid resuscitation should be initiated. Push-dose vasopressors can be started simultaneously and pain medication can be given, such as **Fentanyl 50 mcg or 1 mcg/kg IV / IO.**

Ketamine is also appropriate to use with hypotension as a sedative which also has pain relieving properties and like **Fentanyl** does not provoke hypotension to the extent of other sedative medications.

Persistent inadequate sedation:
Midazolam may be given if repeat doses of opioids and / or **Ketamine**are ineffective or inadequate**.**

Rocuronium may be used only as a last resort. If utilized make every effort to ensure the patient has adequate pain control. A patient should never be paralyzed without adequate sedation and pain control.

Positioning: Proper patient positioning is paramount. Raise the head of the bead 10 to 30°depending on underlying condition. This helps prevent aspiration.

Pearls

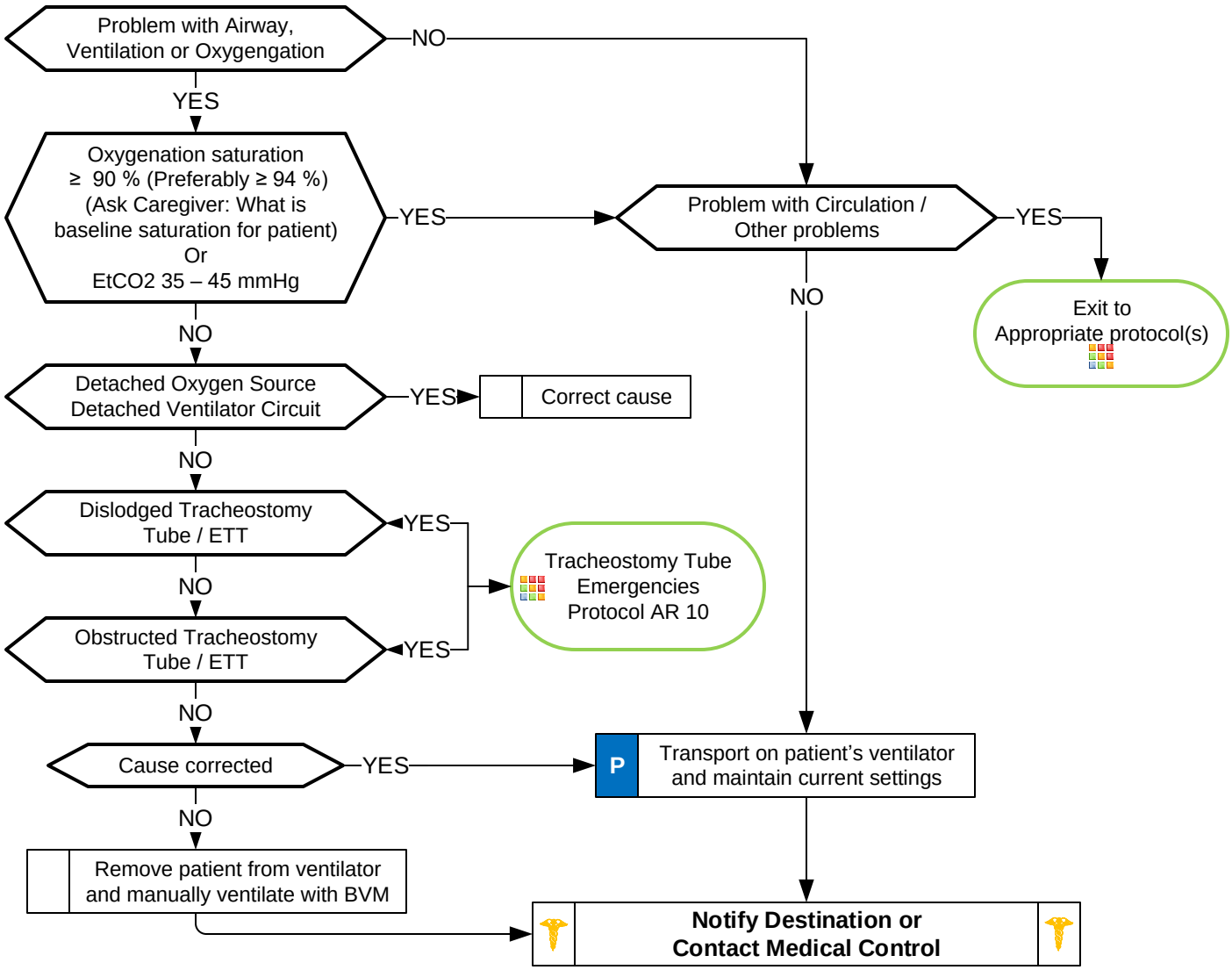
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Neuro**
- **Patients requiring advanced airways and ventilation commonly experience pain and anxiety.**
- **Unrelieved pain can lead to increased catecholamine release, ischemia, immunosuppression, and prolonged hospitalization.**
- **Ventilated patients cannot communicate pain/ anxiety and providers are poor at recognizing pain/ anxiety.**
- **Vital signs such has tachycardia and/ or hypertension can provide clues to inadequate sedation, however they are not always reliable indicators of a patient's lack of adequate sedation.**
- **Sedation strategy:**
  Pain is the primary reason patients experience agitation and must be addressed first.
  Opioids and/ or Ketamine are the first line agents, alone or in combination.
  Benzodiazepines may be utilized if patient is not responding to adequate opioid and/ or Ketamine doses.
  Paralysis is considered a last resort, only when patients are not responding to opioid, Ketamine, or benzodiazepines.
  Patients that have received paralytics may be experiencing pain with no obvious signs or symptoms.
  Consider sedation early after giving paralytics, especially in patients receiving Rocuronium.
- **Ventilation rate:**
  Guidelines: 30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 10 – 12 per minute.
  Maintain EtCO2 between 35 - 45 and avoid hyperventilation.
- **Ventilator/ Ventilation strategies will need to be tailored to individual patient presentations. Medical director can indicate different strategies above.**
- **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.**
- Always use patient's equipment if available and functioning properly.
- Continuous pulse oximetry and end tidal CO2 monitoring must be utilized during assessment and transport.
- Unable to correct ventilator problem: Remove patient from ventilator and manually ventilate using BVM. Take patient's ventilator to hospital even if not functioning properly.
- Typical alarms: Low Pressure / Apnea: Loose or disconnected circuit, leak in circuit or around tracheostomy site.
  Low Power: Internal battery depleted.
  High Pressure: Plugged / obstructed airway or circuit.
- **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

Trachesotomy Tube in place

YES

A Remove Obturator *If in place*

Inner Cannula in place (Double lumen)

Speaking Valve / Decannulation plug in place

YES

YES

A Remove Inner Cannula Or Remove Speaking Valve Remove Decannulation plug

NO

A Advanced Suctioning Procedure Tracheostomy Tube Procedure

NO

Trachesotomy Tube available

YES

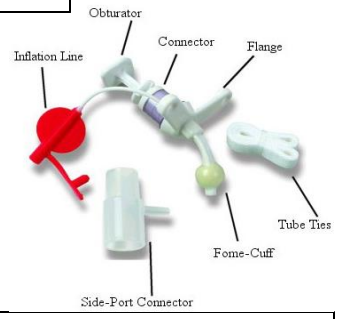
Allow *Caregiver* to insert Tracheostomy Tube

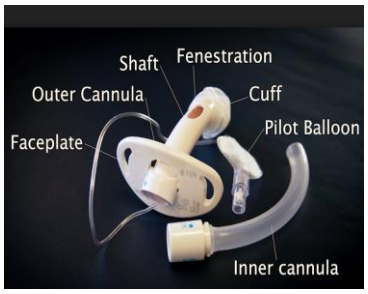
A Place Trachesotomy Tube

(Insert **bougie** first if needed to make sure you are in the trachea)

NO

A Appropriately sized ETT into stoma (Insert **bougie** first if needed to make sure you are in the trachea)





Continued Respiratory Distress

YES

Assist Ventilations via Tracheostomy Tube / ETT

Age Appropriate Respiratory Distress Protocol

NO

Notify Destination or Contact Medical Control

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 patient's equipment if available and functioning properly.
- Estimate suction catheter size by doubling the inner tracheostomy tube diameter and rounding down.
- Suction depth: Ask family / caregiver. No more than 3 to 6 cm 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:
16 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)

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

Step 1: **PEEP = 8 FiO_2 =40%**

Step 2: **PEEP = 8 FiO_2 =50%**

Step 3: **PEEP =10 FiO_2 =50%**

Step 4: **PEEP =10 FiO_2 =60%**

Step 5: **PEEP =10 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:
10 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)

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

After 10 minutes
Decrease FiO_2 down to 50%
Goal SpO2 92 – 98%

- Decrease FiO_2 in increments of 10% to goal of 50%.

Notify Destination or Contact Medical Control

Universal Protocol Section

Mechanical Ventilation; Adult

Universal Protocol Section

Choosing COPD/ Asthma Arm

- First decision point is deciding if underlying problem leading to the need for mechanical ventilation is directly related to COPD or Asthma.
- Typically these patients will have bronchospasm, which may be worsened by mechanical ventilation.
- In general we should maximize medical therapy, continuous DuoNebs, methylprednisolone, and oxygen therapy to prevent the need for mechanical ventilation.
- Initial FiO2 setting can be 40% and increase as needed after 10 minutes. Not all patients require 100%
- Maximum allowable PIP to use is 35 mmHg. Use preferably Less.
- **OTHER MODES: (Use as Trained)**
  Assist Control: Volume
  Assist Control: Pressure
  SIMV: Volume or Pressure
  NIPPV: CPAP / BiPAP

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.
- **$EtCO_2$:**
  Et**CO_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

Universal Protocol 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) use Metronome
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**
Single dose as early as possible

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

Search for Reversible Causes

Blood Glucose Analysis Procedure
if applicable

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

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

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Adult Asystole / Pulseless Electrical Activity

Primary focus is on high-quality, continuous and uninterrupted compressions at a rate of:

100-120 / minute, 2 inches depth of compression, allow complete recoil of chest on upstroke.
Do not interrupt compressions for more than 10 seconds maximum, 5 seconds if possible.

Compressor counts aloud q20th compression and next compressor moves in position at the 180th compression.
Ventilator provides ventilation breath every 20th compression via BVM, mouth-to-mask, BIAD, or ETT.
Paramedic should charge the defibrillator at the 180th compression.

When faced with either PEA or Asystole the most important aspect is finding a reversible cause.

Consider if this a cardiac event or a primary respiratory event, drug overdose, drowning, hanging, suffocation or trauma?

Medication Sequence:
SINGLE DOSE EPI: Give Epinephrine 1mg (1:10,000) IV/IO
Atropine not likely beneficial and no longer indicated with PEA or Asystole (can give at discretion of team leader to max of 3 mg.)

Hyperkalemia: Unknown in field setting. End stage renal dialysis patient is at risk and Sodium bicarbonate and Calcium chloride should be given. ECG findings may not reflect common findings such as peaked T waves. PEA with a bizarre or widened complex may indicate hyperkalemia.

Toxicology: Consider Calcium Channel Blocker (CCB) and Beta Blocker (BB) overdose with PEA and asystole. If suspected give Glucagon 2 mg IV. If you see ECG improvement you may repeat glucagon and then contact medical control for further orders. **Large doses of Glucagon may be needed**. Calcium Chloride or Ca gluconate may be beneficial in BB overdose. If suspected CCB overdose administer 1 amp of Calcium over 3 minutes. If you see ECG improvement you may repeat and then contact medical control for further orders.

Downtime: if >10 minutes without chest compressions – survival with good neurological outcome is VERY unlikely

Termination of Resuscitation: Follow On Scene Resuscitation / Termination of Resuscitation On Scene Protocol AC 12.

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 manufacturer'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
- 12 Lead ECG Procedure

IV / IO Protocol UP 6

P Cardiac Monitor

A
Normal Saline Fluid Bolus
500 mL – 2 L NS IV / IO
(Unless Acute CHF)
Maximum 2 L

P
Atropine 0.5 mg IV / IO
May repeat every 3 – 5 minutes
Maximum 3 mg

Epinephrine Push Dose 5 mcg IV / IO
Repeat every 2 min prn
Or
Epinephrine Drip 5 mcg/min IV/IO
Titrate to SBP ≥ 90 mmHg

If No Improvement
Transcutaneous Pacing Procedure
(Consider earlier in 2nd or 3rd AVB)

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

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

Suspected Beta-Blocker or Calcium Channel Blocker

Follow Overdose/ Toxic Ingestion Protocol TE 7

P Consider Sedation

Midazolam 2.5 mg
IV / IO
May repeat q5 minutes
Maximum 10 mg

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Bradycardia - Pulse Present

ECG and rhythm information should be interpreted in context of the entire patient assessment.
For example: a patient who is likely septic with fever & bradycardia - the cause of their overall instability is unlikely related to bradycardia and more likely related to overwhelming sepsis and potentially hypoxia. Hypoxemia commonly causes bradycardia. Their bradycardia should improve with treatment of hypoxia and sepsis.

Bradycardia is defined as heart rate < 60 but rarely causes symptoms unless < 50 in adults.
The most important decision point in care is whether the patient is stable or unstable

Unstable:
Refers to patient condition in which a vital organ function is acutely impaired or cardiac arrest is imminent.

Symptomatic, but Stable:
Symptomatic implies the arrhythmia is causing the presenting symptoms but the patient may be stable and not in immediate danger. This situation allows you more time to decide on the most appropriate intervention which may be supportive care only.

Heart Blocks:

1st degree AV block:
PR > 0.2 seconds. This is relatively common and typically benign.

2nd degree AV block:
Mobitz I: Block at AV node. Often transient and asymptomatic.
Mobitz II: Usually below the AV node in the His-Purkinje system. May progress to 3rd degree AV block.

3rd degree AV block:
May occur at the AV node, bundle of His or at the bundle branches. May be permanent or transient.

Push-Dose Epinephrine: Start here
Mix 1 Ampule (1 mg) of 1:1000 into 1000 mL of NS or LR.
Yields a concentration of 1 mcg/mL of Epinephrine.
Give 5 mcg every 5 minutes to effect SBP > 90 and/or MAP of 65 mmHg.
Use in patients with BP < 90 and best practice up to a Heart Rate < 120.

Epinephrine Drip: (If repeat doses are required)
Mix 1 Ampule (1 mg) of 1:1000 into 1000 mL of NS or LR.
Yields a concentration of 1 mcg/mL of Epinephrine.
Administer 5 mcg/minute. Titrate to effect: SPB > 90 and/or MAP of 65 mmHg.
Use a 10 drop set so 50 gtts / minute = 5 mcg/minute.

Epinephrine DRIP

1 mg of drug in 1000 mL NS or LR
(1 mcg / mL)
10 drop set

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

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) use Metronome
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

NO →
Asystole / PEA
Protocol AC 1
as indicated

Airway
Protocol(s) AR 1, 2, 3

YES →
VF / VT
Protocol AC 9
Tachycardia
Protocol(s) AC 6, 7
as indicated

Airway
Protocol(s) AR 1, 2, 3

CPR-Induced Consciousness

NO → **P** Consider ETI if no ROSC after 20 min of resuscitation

YES → **P** Ketamine 2mg/kg IV/IO

Termination on Scene
Protocol AC 12
as indicated

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Cardiac Arrest - Adult

Follow Cardiac Arrest; Protocol AC3 and Team Focused CPR Protocol AC 11 and Termination of Resuscitation On Scene Protocol AC 12.

Primary focus is on high-quality, continuous and uninterrupted compressions at a rate of:

100-120 / minute, 2 inches depth of compression, allow complete recoil of chest on upstroke.
Do not interrupt compressions for more than 10 seconds maximum, 5 seconds if possible.

Compressor counts aloud q20th compression and next compressor moves in position at the 180th compression.
Ventilator provides ventilation breath every 20th compression via BVM, mouth-to-mask, BIAD, or ETT.
Paramedic should charge the defibrillator at the 180th compression.

When faced with either PEA or Asystole the most important aspect is finding a reversible cause.

Consider if this a cardiac event or a primary respiratory event, drug overdose, drowning, hanging, suffocation or trauma?

Medication Sequence:

SINGLE DOSE EPI: Give Epinephrine 1mg (1:10,000) IV/IO

Atropine not likely beneficial and no longer indicated with PEA or Asystole (can give at discretion of team leader to max of 3 mg.)

Hyperkalemia: Unknown in field setting. End stage renal dialysis patient is at risk and Sodium bicarbonate and Calcium chloride should be given. ECG findings may not reflect common findings such as peaked T waves. PEA with a bizarre or widened complex may indicate hyperkalemia.

CPR-Induced Consciousness:

Can be seen in high-quality CPR, is poorly understood, may result from many factors, and is characterized by the following:
Eye opening, Movement, Purposeful Movement, Verbal and Nonverbal communication, Interference with CPR

While rare this can be disconcerting to providers and family, as well as bystanders. In the event patient awareness is felt to be problematic to the resuscitation you may administer **Ketamine 2 mg/kg IV / IO**.

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 & continuous chest compressions & 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.

Cardiac Arrest Checklist - Adult

_____Incident Number
_____Date
_____CPR Start Time
_____CPR Started by:

HYPOXIC ARREST

Drowning, Suffocation, Hanging, Lightning Strike

YES → **Give 2 – 5 Ventilations**

Begin Continuous CPR Compressions with Ventilations

NO ↓

Priority 1 *Time Event*		__ **Continuous, Uninterrupted Chest Compressions with METRONOME**
		__ **Team Focused CPR Positions in place** *Each compressors take one side of the patient*
		__ **Minimize Compression Interruptions < 5 seconds if possible** *Compress at 100-120 compressions per minute*
		__ **Compressor counts aloud every 20th compression** *On-deck compressor monitors CPR quality and gives feedback to compressor*
Priority 2 *Time Event*		__ **Place pads and position AED / Monitor for easy view / access** *Anterior Posterior position preferable*
		__ **Charge defibrillator at 180th compression (defib or dump as indicated)**
		__ **Compressor change every 200th compression – keep ≤ 5-10 seconds**
		__ **Rhythm / Pulse check at compressor change – keep ≤ 5-10 seconds** ***Once EtCO2 monitoring available: DO NOT check pulses unless spike in EtCO2 – Rhythm check at end of 200 compressions.***
Priority 3 *Time Event*		__ **Place BIAD and ventilate every 6 seconds**
		__ **Place EtCO2 monitor _____mmHg**
		__ **Pulse check now only with spike in EtCO2 (> 10 mmHg)**
Priority 4 *Time Event*		__ **IV / IO access – IV preferred**
		__ **Epinephrine 1 mg (Initial Epinephrine Dose)**
		__ **Lidocaine** / __ **Atropine** / __ **Dextrose** / __ **Sodium Bicarb** / __ **Calcium** — **Naloxone NOT INDICATED IN CARDIAC ARREST**

Search Correctable Causes						
Hypovolemia	**Hypoxia**	**Hyperkalemia**	**Tamponade**	**Tension PTX**	**Toxin / Tablet**
Hypoglycemia	**H+ Acidosis**	**Hypothermia**	**Thrombosis MI / PE**		**Trauma**

ROSC *Time Event*	
	__ **Obtain 12 Lead ECG / Transmit and notify hospital immediately if STEMI**
	__ **Perform neurological assessment**
	__ **Ensure airway is secure with BIAD or ETT**
	__ **Remain on scene 10 minutes anticipating re-arrest – get initial, 5 & 10 min VS**

_____Time of Cardiac Arrest	__ Cardiac __ Hypoxic __ Trauma	**AED**
__ Witness or __ Unwitnessed	Initial Rhythm_____	__ FR POV __ Bystander __ FR Apparatus

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 based on:
STEMI
EMS Triage and Destination Plan
Immediate Notification of Facility
Immediate Transmission of ECG
if capable
Keep Scene Time to ≤ 15 Minutes
BUT Shorter is better!!!!

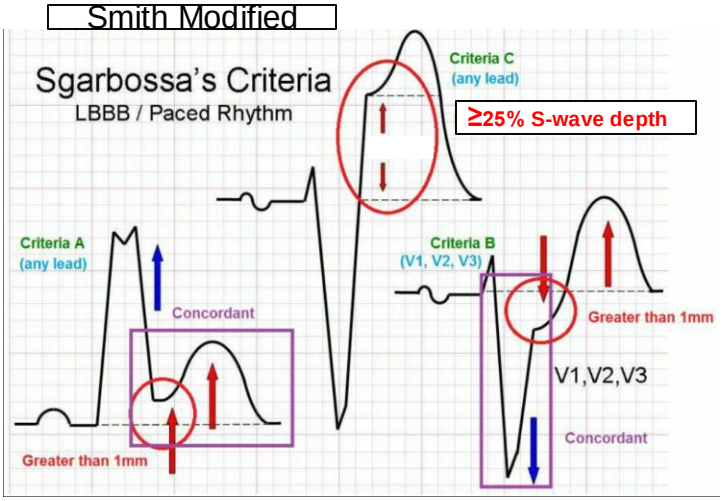
B	*If transporting to Non PCI Center* **Reperfusion Checklist**

NO

	IV / IO Protocol UP 6 Venous access blood draw
A	**Nitroglycerin 0.3 / 0.4 mg SL** Repeat every 5 minutes as needed
	Nitroglycerin Paste **SBP >100 mmHg 1 inch** **SBP >150 mmHg 1.5 inch** **SBP > 200 mmHg 2 inch**
P	**Fentanyl 50 mcg IV / IO** Repeat every 5 minutes as needed **Maximum 300 mcg** **or** **Morphine 2 mg IV / IO** Repeat every 5 minutes as needed **Maximum 10 mg**
	Hypotension / Shock Protocol AM 5 ***if indicated***
	CHF / Pulmonary Edema Protocol AC 5 ***if indicated***

STEMI Definition:
- **≥ 1 mm ST Segment elevation in ≥ 2 contiguous leads**
- **≥ 2 mm ST/J point elevation in chest lead**
- **ECG software diagnoses Acute MI & patient is symptomatic**

Smith Modified



Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Chest Pain: Cardiac and STEMI

Presume chest pain is of a cardiac etiology unless age, circumstances, history and exam clearly suggest a noncardiac cause.
Typical features such as chest and left arm pain associated with dyspnea, diaphoresis and nausea are often not present in the elderly, women and patients with diabetes. Their complaints may be very vague such as nausea and weakness or isolated dyspnea.

General:
Utilize oxygen to maintain oxygen saturation ≥ 94 %.
Aspirin therapy is very important and should be given when not contraindicated. If the patient has taken, for example a 81 mg baby aspirin, give three additional to equal 4, etc.
Nitroglycerin:
Use in patients who have already taken and had no relief. In patients who gain relief or who have ongoing chest pain, apply nitroglycerin paste when not contraindicated. Use cautiously in patients with systolic blood pressure approaching 100 and avoid until blood pressures are consistently above 100 mmHg. Use cautiously in patients with bradycardia < 50 or very rapid heart rates > 120 with serious signs / symptoms or heart failure.
Use cautiously in patients who have inferior wall MI or who have ST elevation in right sided ECGs in V3 or V4. Nitroglycerin may precipitate hypotension in these patients may require a fluid bolus to increase their preload.

STEMI:
Goal is to get from first provider contact, YOU, to first device deployment (cardiologist in cath-lab) of ≤ 90 minutes when transporting to a PCI-Center. Identify STEMI **(ECG < 10 minutes** from patient contact), transmit & **activate (<10 minutes**), expedite transport (**scene time <15 minutes**) to the receiving hospital immediately. **Please document these times.** The rate limiting step, especially after business hours, is having the cath-lab team arrive and prepare the lab for cardiac catheterization. It is of no value to arrive at the hospital quickly when the cath-lab was notified late.

- Establish 2 IV sites in left upper extremity
- EXPOSE your patient so the cath team doesn't have to waste time after arrival
- Report should include: 1. Active Chest Pain; 2. ECG meets STEMI criteria; 3. ETA

Modified Sgarbossa Criteria: 1. Concordant ST elevation ≥ 1 mm in ≥ 1 lead -or- 2. Concordant ST depression ≥ 1 mm in ≥ 1 lead of V1-V3 -or- 3. Proportionally excessive discordant STE in ≥ 1 lead anywhere with ≥ 1 mm STE, as defined by ≥ 25% of the depth of the preceding S-wave

STEMI Mimics: Early Repol, Hyperkalemia, LVH, pericarditis, LV aneurysm – Always err on the side of caution – Transmit, honest Report & Activate

ALL TRANSMITTED ECGs MUST HAVE NAME, AGE and GENDER as available. ECG is a medical record and must have appropriate identifier, especially a correctly spelled First and Last NAME. Patient's name and DOB help the ED staff retrieve an old ECG for comparison when needed.

AICD Firing: If patient has experienced 1 AICD firing and has no other symptoms no anti-arrhythmic is required. If AICD fires ≥ 2 then begin
Lidocaine 1 mg / kg IV / IO. If no improvement repeat **Lidocaine 1 mg/kg every 10 minutes to maximum of 3 mg/kg**.
Amiodarone may be used depending on availability.

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**
SPB >100 mmHg 1 inch
SPB >150 mmHg 1.5 inch
SPB > 200 mmHg 2 inch

Improving
NO
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**
SPB >100 mmHg 1 inch
SPB >150 mmHg 1.5 inch
SPB > 200 mmHg 2 inch

CARDIOGENIC SHOCK
Tachycardia followed by bradycardia
Hypertension followed by hypotension

B — Remove NIPPV
if in place

Adult Hypotension / Shock
Protocol AM 5
if indicated

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

CHF / Pulmonary Edema

Acute decompensated heart failure:
Patients either have heart failure with preserved ejection fraction or heart failure with reduced ejection fraction. Normal ejection fraction (the amount of blood the heart squeezes forward with each beat) is about 55%.

Ejection Fraction:
Patients who are known to have heart failure may know their ejection fraction – ask the patient if they know.
Heart failure with preserved ejection fraction typically have an ejection fraction of ≥ 41%.
Heart failure with reduced ejection fraction have an ejection fraction of ≤ 40 %.

Systolic compared to diastolic dysfunction:
Another (older) way to think about heart failure is systolic or diastolic dysfunction.
Systolic dysfunction is due to a weak and thin ventricular myocardium where diastolic dysfunction is due to thickened and stiff myocardium. The heart is unable to squeeze blood effectively with systolic dysfunction. In diastolic dysfunction the heart is not able to fill effectively because the myocardium does not relax and the myocardium is enlarged or thickened and decreases the volume of the heart. It will be difficult to know the patient's underlying pathophysiology because both circumstances produce similar signs and symptoms.

Main therapy considerations:
Airway, oxygenation, and ventilation are most important. NIPPV therapy should be initiated early.
12 Lead ECG is important to acquire early. If patient is experiencing a STEMI, follow the Triage and Destination Protocol for STEMI care.

Therapy related to Systolic Blood Pressure:
Normotensive to Hypertensive:
- Oxygen
- NIPPV (document time started and settings)
- **NTG SL every 5 minutes as needed. ALS may continue NTG with no limit if SBP ≥ 100 mmHg and patient's symptoms are improving. This effectively provides a NTG drip.**

Hypotensive:
- The patient with CHF / Pulmonary edema and hypotension is difficult to treat.
- When the SBP is ≤ 90 mmHg give 1 – 2 boluses of crystalloid at 250 mL each. If the patient responds, they are likely volume depleted from an intravascular perspective even though they may have peripheral edema and pulmonary edema.
  If responsive to fluid continue to give 250 mL boluses to maintain SBP ≥ 90 mmHg. Frequent reassessments of lung status is important to ensure you are not worsening the respiratory status.

If the SBP ≤ 90 mmHg after fluid boluses or initially responsive and now refractory to fluid boluses, add **pressor as directed in protocol AM5.**

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 — **Cardioversion Procedure**

Consider Sedation Prior to Cardioversion
Midazolam 2.5 mg IV / IO
May repeat as needed
Maximum 10 mg

Syncronized
Narrow and Regular: 100J
Narrow and Irregular: 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**

NO

P

Diltiazem 20 mg IV / IO
Over 2 – 3 minutes

If No Improvement
Diltiazem 5 – 15 mg/hr IV / IO

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

Age >60
Give half dose and the remainder in 5 min
If SBP >100 mmHg

Monitor and Reassess

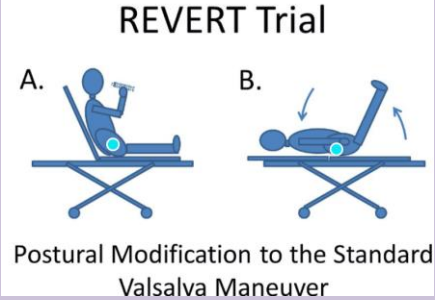
Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Adult Tachycardia
NARROW (≤ 0.11 sec)

ECG and rhythm information should be interpreted in context of the entire patient assessment:
Is the tachycardia causing the patients signs and symptoms OR is the patient's ROOT problem causing compensatory tachycardia? For example if you have a patient that probably has an infection with fever and tachycardia to 140 – 160s it is likely that their overall symptoms are NOT related to tachycardia and more likely related to overwhelming sepsis and potentially hypoxia.

Tachycardia is defined as heart rate > 100 but rarely causes symptoms unless > 150 in the adult.
Vagal maneuver should take the structure described in the REVERT trial.
The most important decision point in care is whether the patient is stable or unstable.



Rate controlled:
Heart rate is considered controlled when rate is ≤ 120 beats per minute.

Unstable:
Refers to patient condition in which a vital organ function is acutely impaired or cardiac arrest is ongoing or imminent.

Symptomatic:
Implies the arrhythmia is causing the presenting symptoms but the patient may be stable and not in imminent danger. This situation allows you more time to decide on the most appropriate intervention which often is supportive care only.

Diltiazem Dosing:
Classically the first dose is calculated as 0.25mg/kg (max 25mg), but usual practice is 10-20mg based on patient factors (ie body weight, systolic BP etc).

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
- 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
- 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 – 2.5 mg IV / IO** May repeat as needed **Maximum 10 mg**
P	**Wide: Regular : 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	**Lidocaine 1 mg/kg IV/IO** **Every 10 minutes as needed** **if No improvement** **(Max 3mg/kg)** **If still No improvement** **Initiate Lidocaine Infusion** **2 mg/min IV/IO**
	Monitor and Reassess
	Notify Destination or Contact Medical Control

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)

ECG and rhythm information should be interpreted in context of the entire patient assessment:
Tachycardia is defined as heart rate > 100 but rarely causes symptoms unless > 150 in the adult.
The most important decision point in care is whether the patient is stable or unstable.

Unstable: Refers to patient condition in which a vital organ function is acutely impaired or cardiac arrest is ongoing or imminent.

Symptomatic: Implies the arrhythmia is causing the presenting symptoms, but the patient may be stable and not in imminent danger. This situation allows you more time to decide on the most appropriate intervention which often is supportive care only.

Tachycardias are identified in several ways based on appearance of the QRS complex, heart rate and if regular or irregular.

Main objective is to recognize and differentiate between sinus tachycardia, narrow-complex supraventricular tachycardia and wide-complex tachycardia. Next you should identify the underlying cause of the tachycardia and whether it is the primary reason for the problem or secondary to a problem like anxiety, fever, shock or sepsis.

Wide-QRS-Complex Tachycardia (QRS ≥ 0.12 sec) in order of frequency:
Ventricular Tachycardia > Ventricular Fibrillation SVT with aberrancy > Wolff-Parkinson-White (WPW)

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 – 2.5 mg IV / IO
  May repeat as needed
  Maximum 10 mg
- **Wide, Regular 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 → P **Consider consultation with medical control**

NO → Exit to Cardiac Arrest Protocol AC 3

QT Interval < 500 msec

P
- **Lidocaine 1 mg/kg IV/IO**
  Every 10 minutes as needed
  if No improvement
  (Max 3mg/kg)
  If still No improvement
  Initiate Lidocaine Infusion
  2 mg/min IV/IO
- Monitor and Reassess

QT Interval > 500 msec

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

Notify Destination or Contact Medical Control

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

ECG and rhythm information should be interpreted in context of the entire patient assessment:
Tachycardia is defined as heart rate > 100 but rarely causes symptoms unless > 150 in the adult.
The most important decision point in care is whether the patient is stable or unstable.

Unstable: Refers to patient condition in which a vital organ function is acutely impaired or cardiac arrest is ongoing or imminent.

Symptomatic: Implies the arrhythmia is causing the presenting symptoms, but the patient may be stable and not in imminent danger. This situation allows you more time to decide on the most appropriate intervention which often is supportive care only.

Tachycardias are identified in several ways based on appearance of the QRS complex, heart rate and if regular or irregular.
Main objective is to recognize and differentiate between sinus tachycardia, narrow-complex supraventricular tachycardia and wide-complex tachycardia. Next you should identify the underlying cause of the tachycardia and whether it is the primary reason for the problem or secondary to a problem like anxiety, fever, shock or sepsis.

Wide-QRS-Complex Tachycardia (QRS ≥ 0.12 sec) in order of frequency:
Ventricular Tachycardia > SVT with aberrancy > Wolff-Parkinson-White (WPW)

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*)

At the end of each 2 minute cycle
Check AED/ECG monitor
If shockable rhythm deliver shock (360J) and
Immediately continue chest compressions

AED Procedure
if available

P Defibrillation Procedure

IV / IO Access Protocol UP 6

A **Epinephrine (1:10,000) 1 mg IV / IO**
Single dose as early as possible

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
Continue CPR up to point where you are ready to defibrillate with device charged.
Repeat pattern during resuscitation.

P

Lidocaine 1 mg/kg IV / IO

May repeat if refractory

Maximum 3 mg/kg

If Refractory
Magnesium 2 gm IV / IO

Administer medications in drug-shock-drug-shock pattern

(If Lidocaine contraindicated/unavailable)
Amiodarone 300mg IV/IO push
May push 150mg IV/IO as second dose

Refractory after 2 Defibrillation Attempts
Consider changing vector of defibrillation pads

Notify Destination or Contact Medical Control

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

Follow Cardiac Arrest; Protocol AC3 and Team Focused CPR Protocol AC 11 & Termination of Resuscitation On Scene Protocol AC 12.

Primary focus is on high-quality, continuous and uninterrupted compressions at a rate of:

100-120 / minute, ~2 inches depth of compression, allow complete recoil of chest on upstroke.
Do not interrupt compressions for more than 10 seconds maximum, 5 seconds if possible.

Compressor counts aloud q20th compression and next compressor moves in position at the 180th compression.
Ventilator provides ventilation breath every 20th compression via BVM, mouth-to-mask, BIAD, or ETT.
Paramedic should charge the defibrillator at the 180th compression.

When faced with either PEA or Asystole the most important aspect is finding a reversible cause.
Consider if this is a primary cardiac event or a primary respiratory event, drug overdose, drowning, hanging, suffocation or trauma?

Medication Sequence:
SINGLE DOSE EPI: Give Epinephrine 1mg (1:10,000) IV/IO

Deliver all defibrillations at 360J

Dialysis patients:
Refer to Dialysis / Renal Failure protocol early on in the resuscitation. Give sodium bicarbonate and calcium. They shouldnot be given in succession without 10 mL of NS flushing of catheter between each dose as they may cause a precipitate to form in the IV line. Given in separate IV lines if available.

REFRACTORY VF / Magnesium Sulfate:
Place 2nd set of defibrillator pads on patient after 2nd defibrillation is unsuccessful. Plug defib into second set of pads for 3rd attempt and shock through this different vector. Continue to defibrillate alternating between pad sets #1 and #2.
Give Mag where VF persists after Lidocaine administered. Give magnesium early-on in the resuscitation in patients with suspected low magnesium states or in Torsades de point. Chronic alcoholics or those who appear malnourished are most at risk. In suspected digitalis toxicity should give early as well. Any patient on digitalis who complains of weakness, nausea and / or vomiting or new confusion pre-arrest may have digitalis toxicity.

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

↓

Repeat Primary Assessment

Optimize Ventilation and Oxygenation
- 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

TEN MINUTE ROSC Evaluation period even if STEMI
Monitor Vital Signs q 5 minutes
Reassess ABCDE
Obtain PMH, Meds
Perform Secondary survey
Search for reversible causes

↓

Chest Pain and STEMI
Protocol AC 4
if indicated

Hypotension / Shock
Protocol AM 5
as indicated

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

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

Seizure Protocol UP 13
as indicated

Post Intubation BIAD Management
Protocol AR 8

↓

Notify Destination or Contact Medical Control

Transport Destination Decision

Post-resuscitation patient is medically complex.

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

Arrhythmias are common and usually self limiting after ROSC

If Arrhythmia Persists follow Rhythm Appropriate Protocol

Reversible Causes

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

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

P

If arrest was ventricular in nature:

Lidocaine 1 mg/kg IV/IO Bolus then Initiate Lidocaine Infusion 2 mg/min IV/IO

Adult Cardiac Protocol Section

Post Resuscitation

Immediate concerns following Return of Spontaneous Circulation

1. Optimize oxygenation and ventilation to maintain oxygen saturation at 94 % or greater.
   Hyperventilation must be avoided due to induced hypotension, decreased cardiac output and oxygen injury.
2. Optimize cardiopulmonary function and vital organ perfusion.
3. Search for and treat correctable / reversible causes:
   Hypovolemia, Hypoxia, Hydrogen ion (acidosis), Hypo / Hyperkalemia, Hypothermia, Hypoglycemia, Tension Pneumothorax, Tamponade; cardiac, Toxins / Ingestions, Thrombosis; pulmonary, Thrombosis; CORONARY
4. Identify and treat STEMI
5. Transport to facility capable of caring for post arrest patients.

Anti-arrhythmic medications:
Continue anti-arrhythmic given during cardiac arrest even if arrhythmia is not present as maintenance therapy. If no anti-arrhythmic has been given then no anti-arrythmic should be initiated after ROSC. If ROSC was achieved after anti-arrhythmic was given then you can continue that therapy.

Sedation / Paralysis /Shivering with BIAD / ETT in place:
In the post-resuscitative phase the patient may require sedation and paralysis.
The primary focus is to sedate the patient adequately with Fentanyl preferably, or Morphine, which addresses pain.
Pain is the primary cause of agitation in the intubated patient. Midazolam / Diazepam may also be used after two to three doses of an opioid, but opioid is the primary agent for sedation.
The patient should not be paralyzed unless they are sedated first as this causes tremendous psychological and physical stress.
Ketamine is also a strategy for sedation equal to opioids.

Airway:
Following ROSC the EMT-Paramedic may elect to exchange a BIAD to ETT. Consider discussion with medical control prior to this decision.
The post-cardiac arrest patient is typically hypotensive and acidotic which creates a high-risk situation for RSI and potentially will lead to re-arrest.
Ensure hypoxia and/or hypotension is corrected prior to intubation attempt.
Ketamine alone may be used to facilitate endotracheal intubation.

Rocuronium 1 mg/kg if no improvement.
Ensure patient is adequately sedated prior to use.
Note any focal activity or seizure-like activity and report to receiving facility.
Rocuronium and vecuronium will mask seizure activity.

Pearls

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

Team Focused CPR

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES

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

Do not begin resuscitation

Follow Deceased Subjects Policy

NO

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

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

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol AC 10

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

Second Arriving BLS / ALS Responder
Assume Compressions or
Initiate Defibrillation Automated / Manual Procedure
Place BIAD
DO NOT Interrupt Compressions
Ventilate 1 breath every 6 seconds

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

Team Focused CPR

Typical Tiered Response:

First Arriving BLS / MR:

Initiate Compression Hands-only CPR and call for help / notify communications of CPR.

Second Arriving BLS / MR:

Assume compressions if First Responder has compressed longer than 200 compressions otherwise will initiate Defibrillation Automated Procedure if available. Depending on time spent during compressions

First or Second Responder will place BIAD without interrupting compressions and ventilate every 20th compression.

If no BIAD then give 2 breaths with BVM or mouth-to-mask every 30th compressions.

Third or Fourth Arriving BLS / MR:

Allows establishment of Team Leader. Third Arriving may be Team Leader or take direction from Team Leader.

Team Leader:

Responsible for ensuring High Quality / Continuous / Uninterrupted Compressions, change in compressors every 200th compression and ensure the patient is not being hyperventilated. Responsible for talking with family and ensuring they are aware victim has no pulse and is not breathing so they are in effect DEAD. Inform them that everything that can be done is being performed now. Be respectful, direct and compassionate as well as honest. They have a very poor chance of survival, typically < 8 %.

Fire Department / Squad Officer:

In addition to Team Leader. CPR should be managed like any other Fire Scene. Personnel not immediately needed should be moved to a staging area and summoned when needed. This decreases confusion and noise on scene and limits the overwhelming environment the family is likely already experiencing.

ALS On Scene First:

ALS Team Leader is established. Begin compressions if downtime is < 15 minutes. If downtime is > 15 minutes apply ECG monitor / Quick Look and Defibrillation Manual Procedure is initiated if applicable. If asystole consider termination. IV / IO procedure performed and medications are administered per appropriate protocol. BIAD is placed if not previously done.

Location:

Resuscitation should be performed where the patient is found on-scene. A safe location with ample space should be sought, but patient movement should be limited as this interrupts compressions. If arrest occurs in a public place then effort will be made to maintain patient dignity. Move to unit only if necessary. Resuscitation should **not** be performed during transport as this degrades performance and places you and the public at risk of injury. If a family insists on transport then do so **non-emergency** to limit injury risk and maximize compression quality. 20 minutes of high-quality resuscitation should be attempted before transport to maximize patient's survivability.

Movement of patient if needed:

A coordinated effort will be employed when moving a patient undergoing CPR. The team leader should make sure everyone is prepared for the move and this should occur when a planned compressor cycle change is indicated. Brief movements of short distances should be interspersed with 4 minutes of compressions / 400 compressions. Moves optimally should not take more than 10 seconds each. Rapid return of continuous chest compressions should resume at the end of each move. Do not perform CPR during move, move quickly, stop and restart compressions.

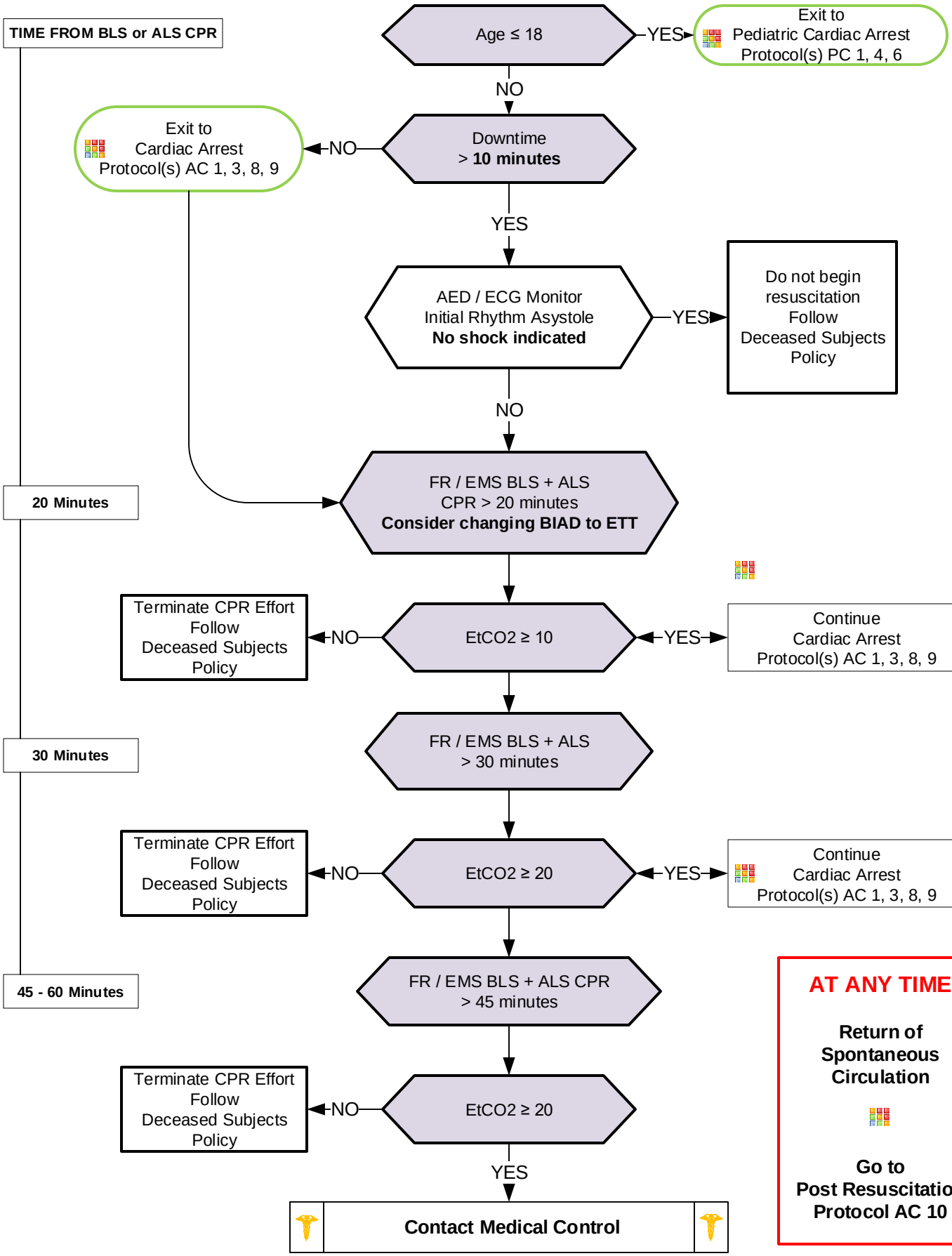
EXTREMELY Important Aspect - Talking with Family:

People will not remember your great intubation or EJ but they will always remember how you interacted with them. Be honest and straightforward; do not be technical. Begin to gather the information they know and start your explanation from that point. Be very clear the patient is not breathing and their heart is not beating which means they are "dead." Explain what is being done and allow the family to be present for the resuscitation if they desire. Share that all that can be done is being done right now and that transporting will actually worsen their loved ones chance of survival. Let them know that after 30 minutes if we have no response then we should stop as the chance of survival now is less than 1 %. Our goal is to talk / update the family on four (4) separate occasions during the resuscitation.

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 & document BIAD and/or endotracheal tube placement & 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.
  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

General Approach

Obtain an urgent history only after or while others or performing appropriate medical treatment. Resuscitation measures should not be interrupted while an urgent history is being obtained.
Determine the most legitimate person to elicit the history. Typically spouse, child, or sibling or Durable Health Care Power of Attorney.

Determine the following:

1. Is a terminal illness involved (i.e. COPD, CHF, Cancer, Hospice Care)?
2. Is there an advanced directive such as DNR / MOST?
3. Did patient express to your historian any desires regarding resuscitation and if so what?
4. A living will does not necessarily mean a DNR.

DNR / MOST

Patient assessment should occur promptly and without delay. Never withhold or delay patient assessment to read a document. EMS providers should not attempt to decide if a DNR or MOST is valid. If present and contains a healthcare providers signature it should be considered valid unless an immediate family member or guardian revokes the DNR / MOST. DNR / MOST situations should be dealt with on an individual basis with appropriate care and decision-making determined accordingly.

Withholding of Resuscitation Efforts

The primary goal of EMS is to render aid and comfort to the suffering and the application of this protocol does not diminish this responsibility. It is however appropriate to withhold resuscitation in these specific settings: 1. Decomposition; 2. Rigor mortis; 3. Dependent lividity; 4. Blunt force trauma; 5. Injury incompatible with life; 6. Downtime > 10 minutes and asystole.

Downtime

Downtime before start of compressions is a nebulous concept fraught with inaccuracy. Every effort should be utilized to determine when the estimated time of death occurred. This will likely come from bystanders and / or family members. Time last seen alive is an important piece of information. However **when unsure the default is always to initiate resuscitation**.

Downtime ≥ 10 Minutes with Asystole or AED indicating NO SHOCK

Current studies show that patients presenting in asystole have almost zero chance of walk out of the hospital survival even if ROSC occurs. When downtime is confirmed ≥ 10 minutes and the presenting rhythm is asystole it is appropriate to withhold resuscitation.

End Tidal CO2 Monitoring (EtCO2)

EtCO2 monitoring determines when to assess for ROSC and should be utilized instead of pulse checks. If the EtCO2 is < 10 mmHg after 20 minutes of high-quality CPR resuscitation should be terminated as the chance of survival is essentially zero. If after 30 minutes of high-quality CPR the EtCO2 is < 20 mmHg resuscitation should be terminated. If after 45 minutes the EtCO2 is > 20 contact medical director to discuss continued resuscitation.

ROSC

Patients undergoing resuscitation may have transient ROSC several times during the resuscitation. Transient ROSC does not equate with survivability. When ROSC is achieved the Post Resuscitation Protocol is then utilized. Remain on scene at least 10 minutes before any patient movement to assess if prolonged ROSC will continue. When the resuscitation effort has reached 30 minutes and ROSC occurs but then is lost, CPR should continue 10 minutes beyond last ROSC before Termination of CPR is performed. Contact Medical Control for guidance as needed.

Talking with Family

Refer to Team Focused CPR Protocol AC 11, page 2.

Pearls

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

Mechanical Circulatory Support
LVAD, RVAD, and Bi-VAD

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

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

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

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

Rapid assessment
Check for signs of life
Assess for adequate perfusion

Criteria for Death / No Resuscitation
Review DNR / MOST Form

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

Do not begin resuscitation

Follow Deceased Subjects Policy

NO

Unresponsive and Not breathing normally

Responsive or Unresponsive and Breathing normally

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

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

Assess LVAD function
Look and listen for alarms
LVAD Alarming?

YES ▶ **Go to Page 2** ◀ YES

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
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- Unconsciousness
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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**

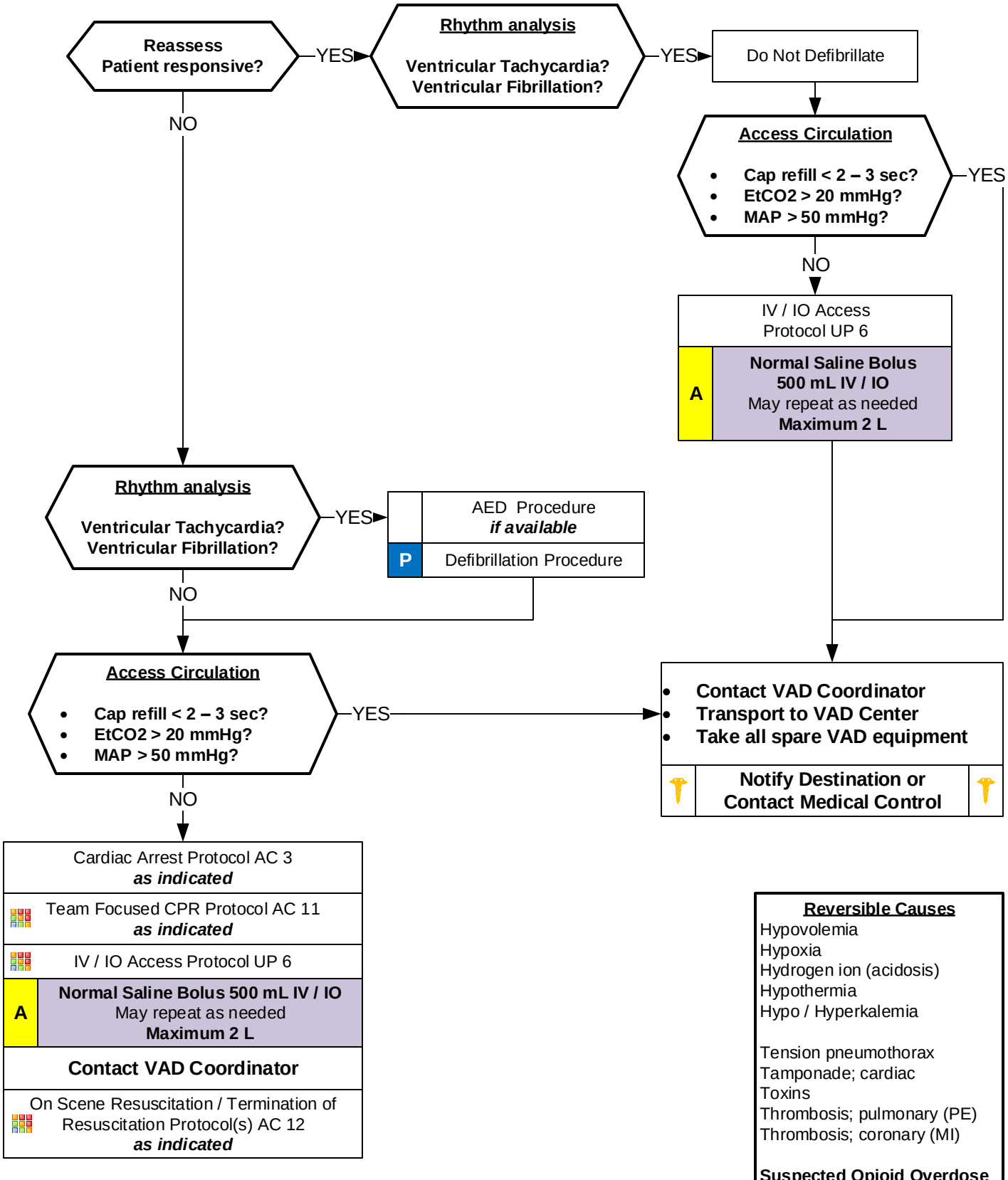
LVAD restarted? Humming sound over heart?

YES → **Go to Page 3**

NO

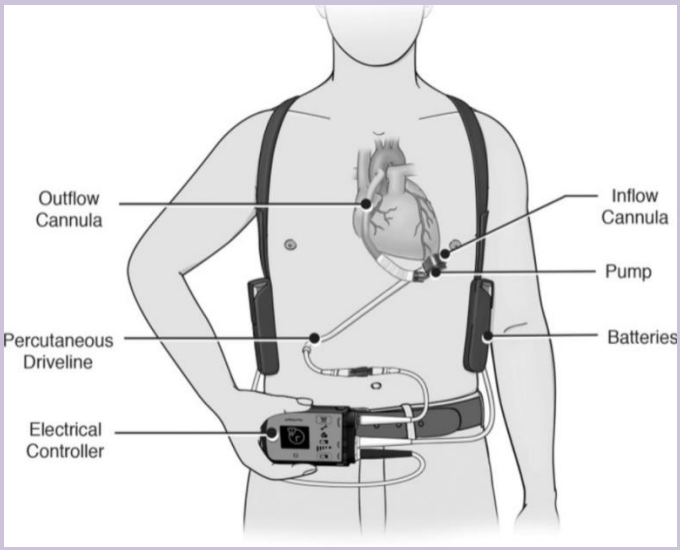
Possible driveline cable fracture:
- **Quickly, but gently manipulate cable trying to restore break**
- **If successful, tape driveline in place where functioning restored**

Mechanical Circulatory Support
LVAD, RVAD, and Bi-VAD



Left Ventricular Assist Device LVAD Unresponsive or AMS

VAD Coordinator Contact
Atrium Main – office and after hours line – 704-355-8092
Atrium Health Wake Forest Baptist Heart Line - 336-716-7370
Moses Cone VAD pager – 336-319-0137
Duke University Operator – 919-684-8111
UNC 24/7 on call pager – 919-216-2095



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 CO_2 ($EtCO_2$)
  - If $EtCO_2$ is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
  - If $EtCO_2$ 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

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 50 mg PO**
- IV or IO Access Protocol UP 6 ***if indicated***
- **A** — **Diphenhydramine 50 mg PO / IV / IM / IO**
- **A** — **Histamine (H2) Blocker** *If available*
- **B** — Monitor and Reassess Monitor for Worsening Signs and Symptoms

MODERATE
2 + Body Systems

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

SEVERE
2 + Body Systems + hypotension
Or Isolated Hypotension

- **Epinephrine 1:1000 IM 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 0.5 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** — **Histamine (H2) Blocker** *If available*
- **A** — **Normal Saline Bolus 500 mL IV / IO** Repeat as needed **Maximum 2 Liters**
- **P** — <u>No improvement with IM Epinephrine</u> **Epinephrine IV / IO** See Pearls for dosing regimen
- **P** — **Methylprednisolone 125 mg IV/ IO/ IM**
- **Notify Destination or Contact Medical Control**

Adult Medical Protocol Section

Allergic Reaction/ Anaphylaxis

Allergic reactions occur when a patient is exposed to an allergen (pollen, insect, medication, food, etc.) causing the body to respond by releasing specific immunoglobulins and mediators such as histamine which cause hives, itching and capillary leaking leading to edema. Most allergic reactions are mild and involve only the skin (erythema, hives and / or **itching**) and are usually resolved with an anti-histamine like diphenhydramine.

Anaphylaxisis a severe form of an allergic reaction and recent studies show it is under-recognized and under-treated.
Anaphylaxis is likely present when any 1 of the 2 criteria below are present:

1. Acute onset of illness (minutes to hours) with skin involvement: Hives, erythema, itching and/or angioedema.
PLUS
---Dyspnea, wheezing, stridor, hypoxemia
OR
---Nausea, vomiting and / or abdominal pain / cramping
OR
---Hypotension, poor perfusion, shock, incontinence, syncope.

2. Acute onset of illness (minutes to hours) with hypotension, poor perfusion, syncope, incontinence after exposure to known allergen.

The main point is that anaphylaxis does not mean the patient must be in shock. It is possible for a patient to have anaphylaxis without skin findings such as rash or erythema, but this is rare.

Epinephrine IV in Severe Allergy unresponsive to IM Epinephrine after 2 doses:
In severe anaphylaxis not responsive to IM Epinephrine, IV / IO Epinephrine should be administered.
Mix Epinephrine 1:1000 (1mg in 1mL) into 1000 mL of NS or LR = a concentration of 1 mcg/mL of Epinephrine.
Give**5 mL (5 mcg)**IV/IO push and repeat every 2 minutes to effect SBP > 70+ 2(Age) mmHg (90mmHg after age 10yrs) and/or MAP ≥65 mmHg.

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdominal**
- **Anaphylaxis is an acute and potentially lethal multisystem allergic reaction.**
- **Epinephrine and 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/ poor perfusion or isolated hypotension.
- **Allergic reactions may occur with only respiratory and gastrointestinal symptoms and have no rash/ skin involvement.**
- **Angioedema** is seen in moderate to severe reactions and is swelling involving the face, lips or airway structures. This can also be seen in patients taking blood pressure medications like Prinivil / Zestril (lisinopril)-typically end in **-il.**
- **Hereditary Angioedema** involves swelling of the face, lips, airway structures, extremities, and may cause moderate to severe abdominal pain. Some patients are prescribed specific medications to aid in reversal of swelling.
  Paramedic may assist or administer this medication per patient/ package instructions.
- **Patients with moderate and severe reactions should receive a 12 lead ECG and should be continually monitored, but this should NOT delay administration of epinephrine.**
- **EMR/ EMT:**
  The use of Epinephrine IM is limited to the treatment of anaphylaxis and may be given only by autoinjector, unless manual draw-up is approved by the Agency Medical Director and the NC office of EMS.
  Administration of diphenhydramine is limited to the oral route only.
- **EMT administration of beta-agonist is limited to only patients currently prescribed the medication,** unless approved by the Agency Medical Director and the NC office of EMS.
- Agency Medical Director may 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 / IO Protocol UP 6

P — Cardiac Monitor

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

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

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

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

A

Blood Glucose ≤ 69 mg / dl and symptomatic
No venous access
Glucagon 1 – 2 mg IM
Repeat in 15 minutes if needed (while transporting)

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 ≥ 70 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 ≥ 70 mg / dl

Notify Destination or Contact Medical Control

Adult Medical Protocol Section

Diabetic - Adult

Hypoglycemia:
D10 is preferred even in adults, however if volume overload is suspected give D50 if available.
Dextrose 50 % will raise blood sugar but rebound hypoglycemia is common.
Suspect hypoglycemia in any patient with altered mental status and perform finger stick glucose procedure.
If Blood Glucose Analysis is not available or not functional give **D5**, **D10, D12.5, or D50 12.5 to 25 Grams IV / IO**, or Glucagon with altered mental status.

Glucagon: Only when unable to obtain venous access
IV / IO access obtained after glucagon administration & patient remains symptomatic, give dextrose as per treatment branches.

Hyperglycemia:
Diabetic ketoacidosis (DKA) is a complication of diabetes and cannot be diagnosed in the field but can be suspected.
DKA is a condition where the body cannot properly utilize insulin to effect glucose metabolism. The body compensates by breaking down fats and proteins leading to a metabolic acidosis. The body also begins to dump excess glucose by excessive urination. Patients typically appear dehydrated, ill and usually have tachypnea. Patients can have marked hyperglycemia without being in DKA. DKA can occur at any level of hyperglycemia typically above 250 mg/dl. Often precipitated by illness or injury.

Insulin Pump:
If patient is hypoglycemic **turn off** the patient's insulin pump. Elicit help from the patient/family, when able who may be well versed in it's operation.

Oral Diabetic and Long Acting Insulin Agents / Patient Refusal:
Patients taking oral agents and/or long acting insulin who experience hypoglycemia should be encouraged to seek care in the emergency department via EMS. If patient refuses transport attempt to contact the patient's Primary Care Provider to arrange quick follow up that business day or the next. Instruct patient to remain with a responsible person for the next 36 hours in order for help to be summoned if patient becomes incapacitated. Contact medical control for advice concerning oral agents if needed.
Glucophage / Metformin: Patients who ONLY take this medication (orally is only route) do not fit into the category of oral diabetic agents. This medication does not induce hypoglycemia.

Pearls

- **Recommended exam: Mental Status, Skin, Respirations and effort, Neuro.**
- **Patients with prolonged hypoglycemia my not respond to glucagon.**
- **Do not administer oral glucose to patients that are not able to swallow or protect their airway.**
- **Quality control checks should be maintained per manufacturers recommendation for all glucometers.**
- **Patient's refusing transport to medical facility after treatment of hypoglycemia:**
  - Blood sugar must be ≥ 70, 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.
  - Patient's who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- **Hypoglycemia with Insulin Agents:**
  - Many forms of insulin now exist. Longer acting insulin places the patient at risk of recurrent hypoglycemia even after a normal blood glucose is established.
  - Not all insulin have prolonged action so Contact Medical Control for advice.
  - Patient's who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- **Congestive Heart Failure patients who have Blood Glucose > 250;**
  - Limit fluid boluses unless they have signs of volume depletion, 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 50 mEq IV / IO** → Exit to Appropriate Cardiac Protocol(s) ***as indicated***

NO

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

NO

- Blood Glucose Analysis Procedure
- Diabetic Protocol AM 2 ***as indicated***
- B: 12 Lead ECG Procedure
- A: IV / IO Procedure
- 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

Evidence of Hyperkalemia: Peaked T Waves or Loss of P wave or QRS ≥ 0.12 seconds — YES →
- P: **Sodium Bicarbonate 50 mEq IV / IO Pediatric: 1 mEq / kg IV / IO**
- P: **Calcium Gluconate 2 g IV / IO Or (Calcium Chloride 1 g IV / IO) Pediatric: 20 mg / kg IV / IO** Over 2- 3 minutes
- P: **Albuterol Nebulizer 2.5 mg** May repeat x 3

NO

Notify Destination or Contact Medical Control

Adult Medical Protocol Section

Dialysis / Renal Failure

Peritoneal dialysis:
Patient will have a catheter placed inside the abdomen called a Tenckhoff Catheter. The patient will typically infuse the abdomen full of dialysate at night and will remove in the morning which is called a dwell or more frequently in the day lasting for a few hours. The metabolic waste will be absorbed by the solution through the peritoneal membrane. In addition to the typical problems encountered by the dialysis patient infection, bleeding, occlusion and disruption of the Tenckhoff catheter may occur.

Hemodialysis:
Patient will have a long term catheter or shunt placed for this procedure. Catheters are typically placed in the upper chest region or groin. Shunts are typically placed in the arms or forearms. The shunt is created by connecting a vein and an artery together and you will feel a thrill over the shunt when palpated and hear a bruit when functioning properly. This typically occurs 3 times per week in 4 hour sessions. Some patients are now performing hemodialysis at home daily for 1 to 2 hours.

Shunt bleeding:
Bleeding after hemodialysis is not uncommon but typically is controlled at the center before leaving. Many dialysis patients receive heparin during their treatment. When faced with a bleeding shunt you should identify the site of bleeding. Typically this will occur in 1 to 4 tiny holes made by needles. A common response is to wrap in a bulky dressing. This will absorb the blood but will NOT control the bleeding.

Direct finger tip pressure should be performed. You may fold a small gauze into a half inch square and place over the bleeding area(s) but direct pressure is key. When the bleeding stops place tape over the gauze but do not remove the gauze to check your progress as this will usually cause more bleeding. Circumferential dressing should NOT be used as this can occlude the shunt and cause clotting of the shunt. The tape should envelope about 180 degrees of the extremity.

Indwelling catheter and shunt access:
In an emergency when vascular access by IV or IO procedure cannot be obtained the paramedic may access the long term vascular catheter for use. Access by this means should only be used in an emergency when no other means of vascular access are available. Use sterile technique as infection is a great risk in this procedure. IO is preferred if peripheral access cannot be obtained.

Pearls

- **Recommended exam: Mental status. Neurological. Lungs. Heart.**
- **Consider transport to medical facility capable of providing Dialysis treatment.**
- **Do not take Blood Pressure or start IV in extremity which has a shunt / fistula in place.**
- **Access of shunt indicated in the dead or near-dead patient only with no IV or IO access.**
- **If hemorrhage cannot be controlled with firm, uninterrupted direct pressure, application of tourniquet with uncontrolled dialysis fistula bleeding is indicated.**
- **Hemodialysis:**
  Process which removes waste from the blood stream and occurs about three times each week.
  Some patients do perform hemodialysis at home.
- **Peritoneal dialysis:**
  If patient complains of fever, abdominal pain, and / or back pain, bring the Peritoneal Dialysis fluid bag, which has drained from the abdomen, to the hospital.

Complications of Dialysis Treatment:

Hypotension: Typically responds to small fluid bolus of 250 mL Normal Saline. May result in angina, AMS, seizure or arrhythmia.
Filtration and decreased blood levels of some medications like some seizure medications
Disequilibrium syndrome: Shift of metabolic waste and electrolytes causing weakness, dizziness, nausea and / or vomiting and seizures.
Equipment malfunction:
- Air embolism.
- Bleeding.
- Electrolyte imbalance.
- Fever.

- **Fever:** Consider sepsis in a dialysis patient with any catheter extending outside the body.
- Always consider Hyperkalemia in all dialysis or renal failure patients.
- Sodium Bicarbonate and Calcium Chloride / Gluconate should not be mixed. **Ideally give in separate lines**.
- Renal dialysis patients have numerous medical problems typically. Hypertension and cardiac disease are prevalent.

Hypertension

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

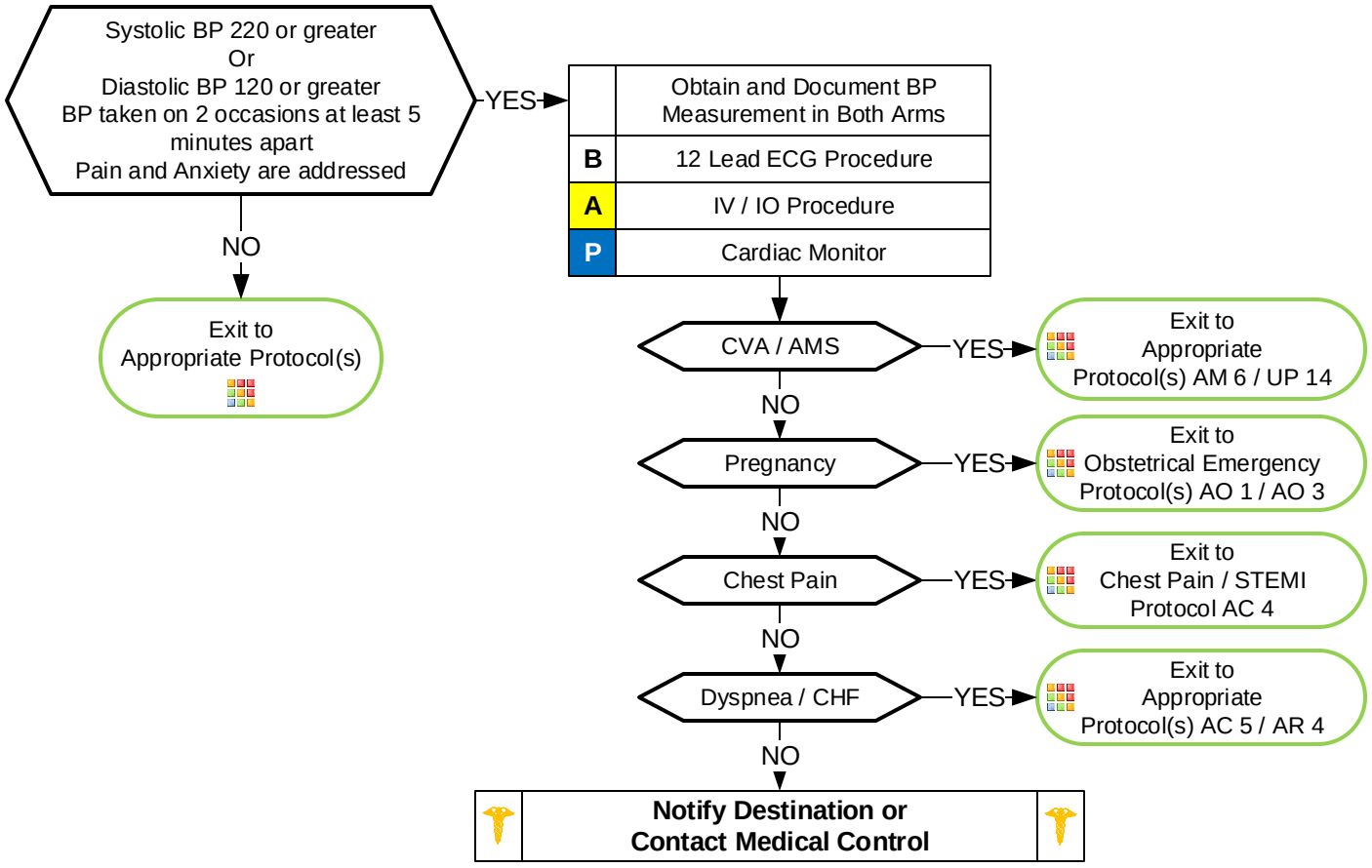
Signs and Symptoms

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

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

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

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



Adult Medical Protocol Section

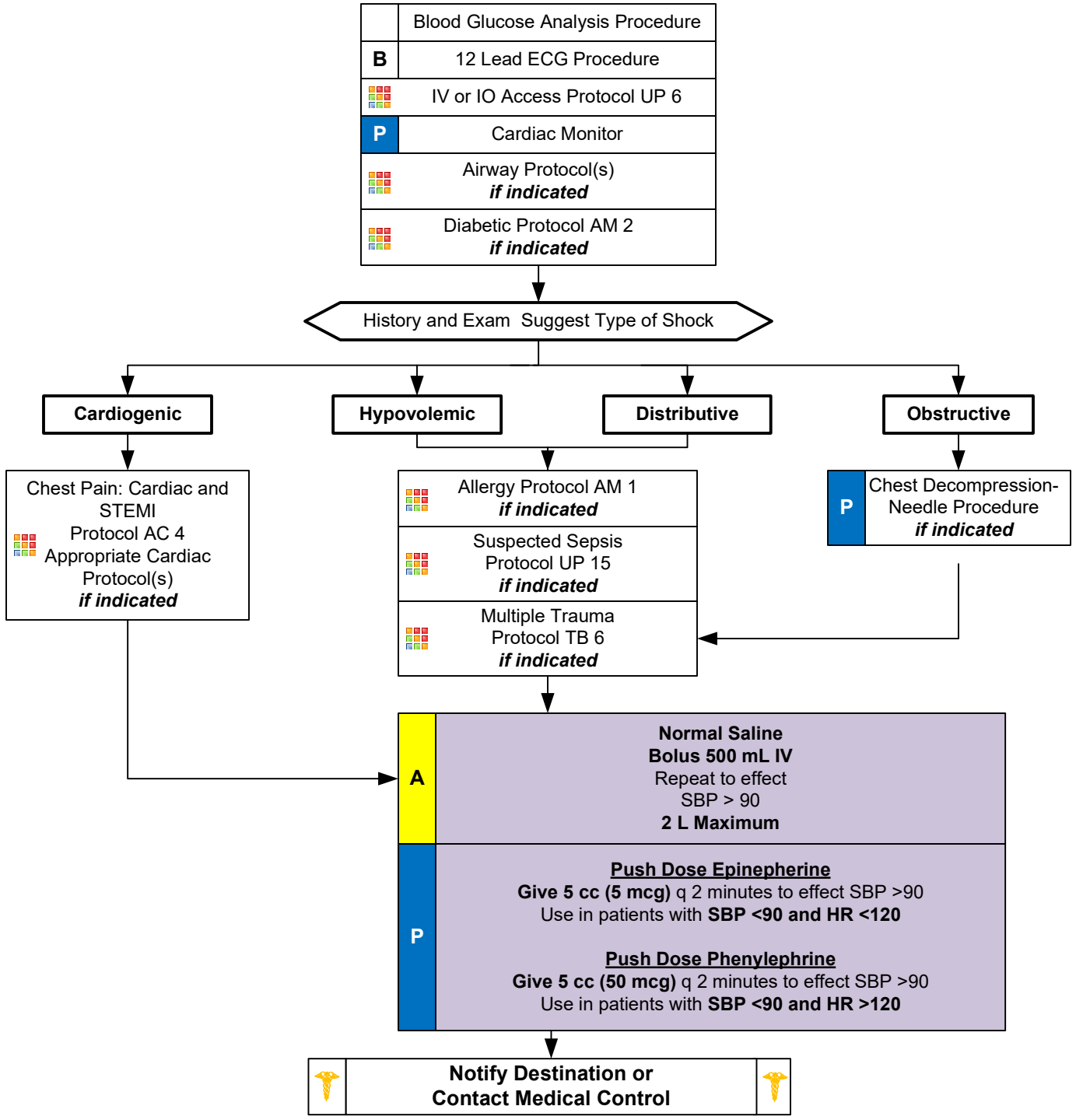
Pearls
- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- Elevated blood pressure is based on two to three sets of vital signs.
- Symptomatic hypertension is typically revealed through end organ dysfunction to the cardiac, CNS or renal systems.
- All symptomatic patients with hypertension should be transported with their head elevated at 30 degrees.
- Ensure appropriate size blood pressure cuff utilized for body habitus.

Hypotension/ Shock

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

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

Differential
- Ectopic pregnancy
- Dysrhythmias
- Pulmonary embolus
- Tension pneumothorax
- Medication effect / overdose
- Vasovagal
- Physiologic (pregnancy)
- Sepsis



Adult Medical Protocol Section

Hypotension/ Shock

Tranexamic Acid (TXA)
Indications: Trauma patients with symptoms of shock or early shock, expected to have internal bleeding, and potential need for blood transfusion. Vital Signs guidelines: SBP < 110 and/or HR > 110 and/or suspected internal hemorrhage, shock, or early shock.
Administer **1 gm over 10 minutes**
Infuse during transport only, unless patient entrapped and can be administered without slowing extrication.

Push-Dose Vasopressors:
Epinephrine: Mix 1:1000 (1mg in 1mL) into 1000 mL of NS or LR. Yields a concentration of 1 mcg/mL of Epinephrine .
Give 5 mcg every 2 minutes to effect SBP ≥90 for patients with HR <120.
Phenylephrine: Mix 10mg in 1000mL of NS. Yields concentration of 10mcg/mL.
Give 5cc (50mcg) every 2 minutes to effect a BP>90
Use if patients with SBP <90 and HR >120

Consider push-dose vasopressors when faced with hypotension prior to RSI.
Consider push-dose vasopressors with hypotension unresponsive to fluid resuscitation.
Consider push-dose vasopressor as you are setting up an Epinephrine or Levophed drip.

Epinephrine Drip:
Use in post-cardiac arrest and anaphylactic situations with hypotension unresponsive to fluid resuscitation that requires multiple doses of push dose epinephrine.

Epinephrine DRIP
1 mg of drug in 1000 mL NS or LR(1 mcg / mL)
10 drop set

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

- **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):
  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

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 ≥ 94 %

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 1 mg/min
every 15 minutes
Titrate SBP < 180 mmHg
DBP < 105 mmHg
Maximum 8 mg/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 or Contact Medical Control

Adult Medical Protocol Section

Suspected Stroke: Activase / t-PA

Hypertension During t-PA Infusion:
When SPB is ≥ 180 and DBP is ≥ 105 Labetalol 10 mg IV push may be administered. Medical Control or receiving Stroke Center (preferred) should be contacted for further orders concerning blood pressure management after this initial dose. This assumes anti-hypertensive medications are not infusing from transferring hospital.

Nicardipine (Cardene):
Common antihypertensive which may be initiated by transferring facility. Used for blood pressure management.
Calcium channel blocker.

Common reactions:	Adverse reactions:
Headache	AV Block
Peripheral edema	MI
Dizziness	Ventricular Tachycardia
Nausea / vomiting	Angina exacerbation
Tachycardia / palpitations	Allergic reactions

Target SBP and DBP during t-PA administration:
A SBP of 170 – 180 and a DBP of 95 – 105 is a reasonable target range. Main target is to keep SBP < 180 and DBP < 105 during and following tPA administration. While aggressive blood pressure control is warranted during t-PA administration, episodes of hypotension give rise to increased morbidity and mortality. Be cautious in titrating antihypertensive medications with the idea that slow and steady reduction is key. Wide and quick swings in blood pressure can worsen condition.

Hypotension: Hypotension should be aggressively treated as this can worsen cerebral perfusion pressure and outcomes.

Unless contraindicated keep Head of Bed elevated 20 to 30 degrees.

Pearls

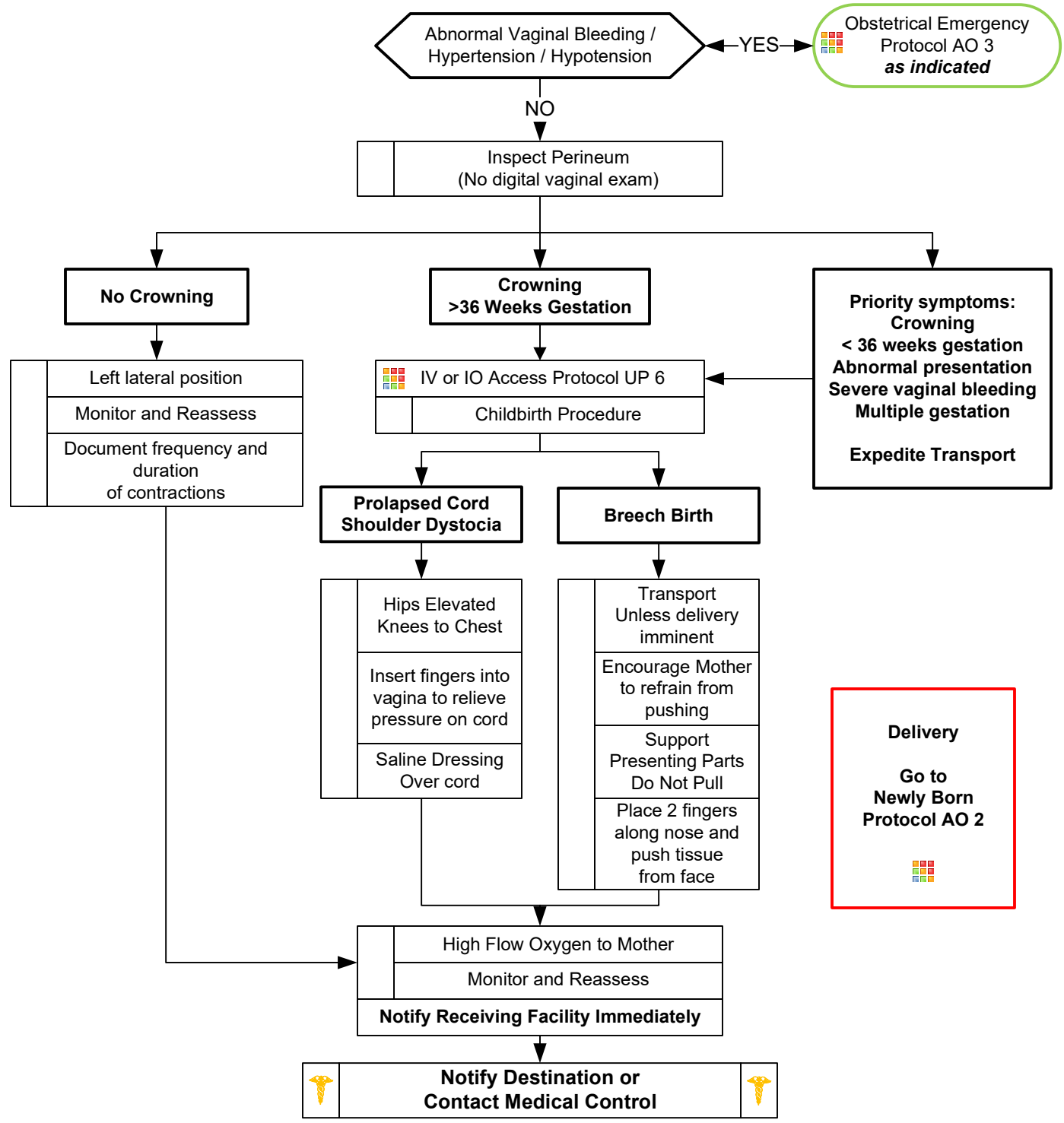
- **This protocol is optional and given only as an example. Agencies may and are encouraged to develop their own.**
- **This protocol is intended for interfacility transfer patients only. Medication must be started at initial treating hospital.**
- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Items in Red Text are key performance measures used in protocol compliance.**
- **The Reperfusion Checklist should be completed for any suspected stroke patient.**
- **Onset of symptoms** is defined as the last witnessed time the patient was symptom free (i.e. awakening with stroke symptoms would be defined as an onset time when the patient went to sleep or last time known to be symptom free.)
- 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.

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

Stages of Labor:

Stage 1: Dilatation stage.
Begins with the onset of true labor contractions and ends with the complete dilatation and effacement of the cervix. (8-10hrs for first pregnancy; 5-7hrs for multiparous)-Effacement of the cervix means it has become very thin and short. -Complete dilatation is 10 cm -Contractions are mild and last 15-20sec and recur q10-20min at first, but as labor progresses they become intense, lasting ~60sec& recur q2-3 min.

Stage 2: Expulsive stage.
Begins when the cervix is dilated to 10 cm. Typically lasts 30-60min -Contractions are intense, last 60-80 sec & recur q2 min. -The membranes usually rupture in this stage-Back pain and the urge to push are prominent. -Crowning: head or presenting part is visible in the vaginal opening.

Stage 3: Placental stage.
Begins when the infant is delivered and ends when the placenta delivers. (5-30 min). Often a rush of blood will be seen, lower abdominal shape change (due to uterine contractions) and the umbilical cord may lengthen to signal that placenta delivery is imminent.

PREVENT Hypothermia:
Immediately following delivery place infant onto mother's abdomen skin-to-skin and wrap to maintain warmth.

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 or Contact Medical Control

Adult Obstetrical Protocol Section

Newly Born

Hypoglycemia:
Routine blood glucose checks are not warranted however with any child failing to or slow to respond to normal resuscitative efforts should have a blood glucose analysis performed. Controversy exists about what constitutes hypoglycemia in the newborn but for our assessment any symptomatic infant with a blood glucose < 50 should receive D10.

Guidelines for withholding resuscitation:
Gestational age < 23 weeks
Gross deformity incompatible with life.
Anencephaly
Parents desire DNR

EMS PROVIDER SHOULD NOT CARRY INFANT. INFANT SHOULD BE HELD BY MOTHER WITH SKIN-TO-SKIN CONTACT.
Carrying a newborn infant is difficult and could result in loss of control with subsequent injury. Provider may sit in a wheelchair and carry infant after arriving at the receiving facility.

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

P — **TXA 2 gm over 10 minutes IV / IO** *See Pearls*

NO

Seizure Activity

YES

P
- **Midazolam 2.5 mg IV / IO** May repeat every 5 minutes as needed
- **Midazolam 5 mg IM** May repeat every 5 minutes as needed
- **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 or Contact Medical Control

Adult Obstetric Protocol Section

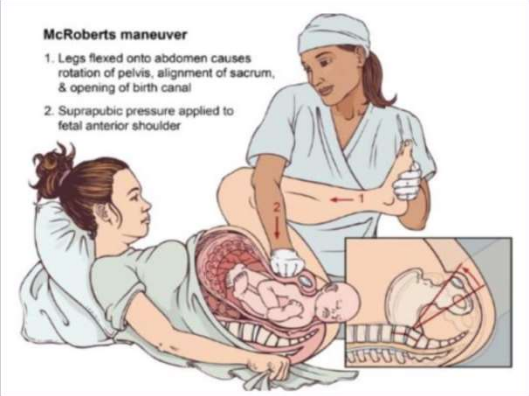
Obstetrical Emergency

Abruptio Placentae:
Abruptio Placentae is the premature separation of the placenta from the uterus. During second half of pregnancy < 5 % of patients will have vaginal bleeding. About 30% of vaginal bleeding during this period may result from Abruptio Placentae. Bleeding during this period may result in fetal distress and is considered an emergency.
Trauma, preeclampsia or maternal hypertension typically precipitate Abruptio Placentae. Other risk factors are women < 20 years of age, advanced maternal age (>35), smoking, prior Abruptio Placentae, multiparity or cocaine use.Patients with vaginal bleeding, contractions, uterine / abdominal tenderness and decreased or no fetal movement are clinical indicators that should make you consider Abruptio Placentae.

Placenta Previa:
Placenta Previa occurs when the placenta implants over the cervical os (opening.) This is a leading cause of vaginal bleedingin the second half of pregnancy. Bleeding is usually bright and painless though about 20 % will have some uterine irritability.
Advanced maternal age (>35), multiparity, smoking and prior C-section are risk factors for this condition.

Uterine Rupture:
Rare condition, but more commonly after trauma.
Can also occur with onset of labor.
This is usually signaled with severe abdominal pain and shock.

Active Seizure with no IV access:
Midazolam given IM is preferred agent.
It is very important to administer Magnesium Sulfate as the patient most likely has eclampsia, **but give Midazolam IM first** while you are trying to establish IV access.



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.

Blast Injury / Incident

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

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

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

Nature of Device: Agent / Amount. Industrial Explosion. Terrorist Incident. Improvised Explosive Device.
Method of Delivery: Incendiary / Explosive
Nature of Environment: Open / Closed.
Distance from Device: Intervening protective barrier. Other environmental hazards,
Evaluate for: Blunt Trauma / Crush Injury / Compartment Syndrome / Traumatic Brain Injury / Concussion / Tympanic Membrane Rupture / Abdominal hemorrhage or Evisceration, Blast Lung Injury and Penetrating Trauma.

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

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***
- A: IV / IO Procedure ***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***

Blast Lung Injury — YES → Age Appropriate Airway Protocol(s) AR 1-9 ***as indicated***

NO

- Decontamination Procedure ***if indicated***
- Pain Control Protocol UP 11 ***if indicated***
- **Rapid Transport** to appropriate destination using Trauma and Burn: EMS Triage and Destination Plan

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Blast Injury / Incident

Bombs and explosions cause unique patterns of injuries seldom seen outside of combat.
BOTH blunt and penetrating injuries can occur.
Blast lung injury is a major cause of Morbidity & Mortality for blast victims both at the scene and among initial survivors. It is a characterized by respiratory distress, hemoptysis, chest pain & hypoxia without obvious external chest injury. Wheezing & decreased breath sounds may progress to apnea, cyanosis and hemodynamic instability. Provide oxygenation and rapid transport to trauma cntr. Watch for S/S of tension pneumothorax.
Explosions in confined spaces or those associated with structural collapse are associated with greater morbidity and mortality.
Historically, ~50% of victims leave the area and seek treatment directly at a medical facility.

High-order explosives:	**Low-order explosives:**
Supersonic over-pressurized shock wave	Subsonic explosion
TNT, C-4, Ammonium Nitrate	Pipe bombs, Gunpowder

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 prone and in slight 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
- 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

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

Minor

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

Serious

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

Critical

>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

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

Identify Contact Points

Eye Involvement
Irrigate Involved Eye(s) with Normal Saline
for 15 – 30 minutes
May repeat as needed

Chemical Exposure / Burn
Flush Contact Area with Normal Saline for 15 minutes

Decontamination Procedure
if indicated

Age Appropriate Cardiac Protocol(s)
if indicated

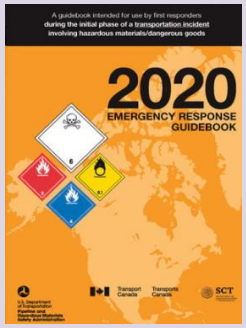
Thermal Burn Protocol TB 9

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

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Chemical and Electrical Burn



Main considerations when encountering a chemical burn:
-Use the Emergency Response Guidebook.
-What is the risk of exposure to you and other providers?

Triage:
-Scene size-up and assessment to determine threat to you and other providers

Assessment:
-Main focus is to limit ongoing injury and determine extent of exposure.
-Remove clothing, flush the area, and then cover with dry sterile dressings.
-Gross decontamination consisting of removing clothing typically removes the majority of any chemicals.
-Identify the type and nature of the chemical.

Caustics:
-Remove powder by brushing then irrigate and flush copiously.

Acids:
-WATER Irrigation up to 30 minutes is warranted.

Alkali:
-Alkali agents feel slick or soapy.
-May require prolonged irrigation.

Main considerations when encountering an electrical burn:
-Identify electrical source and determine if patient remains in contact with source.
-Electrical source must be disconnected before provider can perform assessment and care.

Potential threats:
-Downed power lines, assume they are energized.

Lightning strikes:
-***Reverse triage***: Lightning strike victims respond well to basic measures. With more than one victim, institute reverse triage and go to those who appear dead first and deliver rescue breaths and chest compressions unless an injury incompatible with life is determined
-Victims who are awake and breathing following a lightning strike do not typically worsen acutely.

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: Remember the extent of the obvious external burn from an electrical source does not always reflect more extensive internal damage not seen.**
- **Chemical Burns:**
  Refer to Decontamination Procedure.
  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.
- **Electrical Burns:**
  DO NOT contact patient until you are certain the source of the electrical shock is disconnected.
  Attempt to locate contact points (generally there will be two or more.) A point where the patient contacted the source and a point(s) where the patient is grounded.
  Sites will generally be full thickness.
  Do not refer to as entry and exit sites or wounds.
  Cardiac Monitor: Anticipate ventricular or atrial irregularity including VT, VF, atrial fibrillation and / or heart blocks.
  Attempt to identify the nature of the electrical source (AC / DC), the amount of voltage and the amperage the patient may have been exposed to during the electrical shock.

Crush Syndrome Trauma

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

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

Differential
- Entrapment without crush syndrome
- Vascular injury with perfusion deficit
- Compartment syndrome
- Altered mental status

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

B 12 Lead ECG Procedure

A IV / IO Procedure

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

P
Consider
Midazolam 2.5 mg IV / IO
Pediatric: 0.2 mg / kg (Max 2.5 mg) IV / IO
May repeat q5 minutes as needed

Maximum 10 mg

A
Normal Saline Infusion
1 Liter per hour IV / IO
Pediatric:
3 x maintenance fluid rate
First 2 hours

A
Decrease Normal Saline Infusion
500 mL per hour IV / IO
After 2 hours
Pediatric:
Maintenance fluid rate

High risk for Hyperkalemia after crush release
Or
Abnormal ECG
Peaked T Waves or Loss of P wave
QRS ≥ 0.12 seconds
QT ≥ 0.46 seconds
Or
Hemodynamically Unstable

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

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 mg
May repeat x 3

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

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

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Crush Syndrome Trauma

Crush Syndrome

-Crush injury is a compression of the extremities or trunk that causes muscle swelling and / or neurological symptoms in the affected anatomical locations. This most commonly effects the lower extremities. Crush injuries often occur in the settings of bombings, structural collapse and natural disasters.

-Crush syndrome is localized crush injury with systemic signs and symptoms. The systemic manifestations are caused by traumatic rhabdomyolosis (literally the breakdown of your muscle) and release of toxic muscle cell enzymes, proteins and electrolytes into the circulation. Crush syndrome may cause organ dysfunction and metabolic problems such as acidosis, hyperkalemia and hypocalcemia. Fluid retention in extremities (third spacing) may result in hypotension. Metabolic problems may cause cardiac arrhythmias. Acute renal failure may also occur.

Reperfusion Syndrome

Sudden release of a crushed anatomical part may result in acute hypotension / hypervolemia and metabolic problems which can lead to fatal cardiac arrhythmias and sudden death.

Management of Crush Syndrome

Crush syndrome should be considered in any patient where entrapped or obvious crush noted for ≥ 2 hours. Where an anatomical part is entrapped / crushed and abnormal neurological exam or vascular exam is noted this may also signal crush syndrome. Numbness, weakness, heaviness or paresthesias (burning, prickly-type pain) or diminished or absent pulses are signs and symptoms of potential crush syndrome. Consider administration of Calcium, Bicarb and albuterol before release of crushed body part.

Vascular compromise can be remembered by the **5 P's**: Pain, Pallor, Paresthesias, Pain with Passive movement and Pulselessness.

Hydration:

When crush syndrome is suspected the patient should receive 1 – 2 liters of NS before releasing the crush object when possible. If this is not possible apply a tourniquet to the crushed part if able and maintain until fluids can be delivered. Contract Medical Control before releasing tourniquet.

Cardiac Arrhythmias:

Calcium Gluconate at **2 g IV / IO** is preferred. Pediatric dose is **40 mg/kg IV / IO**.

If not available give Calcium Chloride **1 g IV / IO** in the adult and **20 mg/kg IV / IO** in the pediatric patient.

Treat sudden cardiac arrest with sodium bicarbonate and calcium if occurs in the setting of crush syndrome.

Pearls

- **Recommended exam: Mental Status, Musculoskeletal, Neuro**
- **Scene safety is of paramount importance as typical scenes pose hazards to rescuers. Call for appropriate resources.**
- **Lowest blood pressure by age: < 31 days: > 60 mmHg. 31 days to 1 year: > 70 mmHg. Greater than 1 year: 70 + 2 x age in years.**
- **Pediatric IV Fluid maintenance rate: 4 mL per first 10 kg of weight + 2 mL per second 10 kg of weight + 1 mL for every additional kg in weight.**
- **Crush syndrome typically manifests after 2 – 4 hours of crush injury, but may present in < 1 hour.**
- **Fluid resuscitation:**
  If access to patient and initiation of IV 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.
- **Consider all possible causes of shock and treat per appropriate protocol. Majority of decompensation in pediatrics is airway related.**
- **Decreasing heart rate and hypotension occur late in children and are signs of imminent cardiac arrest.**
- **Shock may be present with a normal blood pressure initially.**
- **Shock often is present with normal vital signs and may develop insidiously. Tachycardia may be the only manifestation.**
- **Consider all possible causes of shock and treat per appropriate protocol.**
- **Patients may become hypothermic even in warm environments.**
- 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.

Extremity Trauma

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

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

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

Wound care
Control Hemorrhage with Direct Pressure
Splinting as indicated

Consider
Topical Hemostatic 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.

P **Cefazolin Adult 2G IV / IO**
Pediatric: 20 mg/kg IV / IO
Over 10 min
if available

NO → Monitor and Reassess

Notify Destination or Contact Medical Control

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 or Laceration)
- Epidural hematoma
- Subdural hematoma
- Subarachnoid hemorrhage
- Spinal injury
- Abuse

	Age Appropriate Airway Protocol(s) AR 1, 2, 3, 5, 6 ***if indicated***
	Obtain and Record GCS
	Supplemental oxygen Maintain SpO2 ≥ 90% Preferably ≥ 94% Prevent Oxygen desaturation events < 90%
	Blood Glucose Analysis Procedure
B	Maintain EtCO2 35 – 45 mmHg
A	IV / IO Procedure ***if indicated***
P	Cardiac Monitor
	Altered Mental Status Protocol UP 4 ***if indicated***
	Multiple Trauma Protocol TB 6 ***if indicated***
	Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 ***if indicated***
	Seizure Protocol UP 13 ***if indicated***
	Spinal Motion Restriction Procedure / Protocol TB 8 ***if indicated***
	Pain Control Protocol UP 11 ***if indicated***
	Monitor and Reassess

DO NOT ROUTINELY HYPERVENTILATE

Evidence of Brain Herniation:
Unilateral or Bilateral Dilation of Pupils / Posturing

Hyperventilate to maintain EtCO2 30 – 35 mmHg
See Pearls

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

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Head Trauma

Assessment of neurological status:
The Glasgow Coma Score is an important tool to use for assessment and recording that can later be reevaluated and compared by subsequent providers.
However a more simple way to communicate a patient's level of consciousness is the AVPU mnemonic
A - Alert
V – Responds to verbal stimuli
P – Responds to painful stimuli
U – Unresponsive

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

Guide to Assessing the Student Athlete for Concussion Symptoms: (Any of the following signs indicate a concussion has occurred)
1. PROBLEMS IN BRAIN FUNCTION:
a. Confused state – dazed look, vacant stare or confusion about what happened or is happening.
b. Memory problems – can't remember assignment on play, opponent, score of game, or period of the game; can't remember how or with whom he or she traveled to the game, what he or she was wearing, what was eaten for breakfast, etc.
c. Symptoms reported by athlete – Headache, nausea or vomiting; blurred or double vision; oversensitivity to sound, light or touch; ringing in ears; feeling foggy or groggy; dizziness.
d. Lack of sustained attention – difficulty sustaining focus adequately to complete a task, a coherent thought or a conversation.
2. SPEED OF BRAIN FUNCTION: Slow response to questions, slow slurred speech, incoherent speech, slow body movements and slow reaction time.
3. UNUSUAL BEHAVIORS: Behaving in a combative, aggressive or very silly manner; atypical behavior for the individual; repeatedly asking the same question over and over; restless and irritable behavior with constant motion and attempts to return to play; reactions that seem out of proportion and inappropriate; and having trouble resting or "finding a comfortable position."
4. PROBLEMS WITH BALANCE AND COORDINATION:
Dizziness, slow clumsy movements, inability to walk a straight line or balance on one foot with eyes closed.

Pearls

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Back, Neuro**
- **GCS is a key performance measure used in the EMS Acute Trauma Care Toolkit.**
- **A single episode of hypoxia and / or hypotension can significantly increase morbidity and mortality with head injury.**
- **Hyperventilation in head injury:**
  - **Hyperventilation lowers CO_2 and causes vasoconstriction leading to increased intracranial pressure (ICP) and should not be done routinely.**
  - **Use in patient with evidence of herniation (blown pupil, decorticate / decerebrate posturing, bradycardia, decreasing GCS).**
  - **If hyperventilation is needed, ventilate at 14 – 18 / minute to maintain $EtCO_2$ between 30 - 35 mmHg.**
  - **Short term option only used for severe head injury typically GCS ≤ 8 or unresponsive.**
- **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.**
- **Hypotension:**
  - Limit IV fluids unless patient is hypotensive.
  - Increased intracranial pressure (ICP) may cause hypertension and bradycardia (Cushing's Response).
  - Usually indicates injury or shock unrelated to the head injury and should be aggressively treated.
  - Fluid resuscitation should be titrated to maintain at least a systolic BP of > 70 + 2 x the age in years.
  - **Lowest blood pressure by age: < 31 days: > 60 mmHg. 31 days to 1 year: > 70 mmHg. Greater than 1 year: 70 + 2 x age in years.**
- An important item to monitor and document is a change in the level of consciousness by serial examination.
- Consider Restraints if necessary for patient's and/or personnel's protection per the Restraint Procedure.
- **Concussions:**
  - Traumatic brain injuries involving any of a number of symptoms including confusion, LOC, vomiting, or headache.
  - Any prolonged confusion or mental status abnormality which does not return to normal within 15 minutes or any documented loss of consciousness should be evaluated by a physician ASAP.
  - **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***

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

P **TXA 2 g over 10 minutes IV / IO**
Peds: (Per local trauma guidelines) over 10 minutes IV / IO

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)}**

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

Notify Destination or Contact Medical Control

Trauma and Burn Protocol Section

Multiple Trauma

One of the major issues in trauma care is how to best balance the need for rapid transport with pre-hospital critical and time-sensitive interventions.

In general procedures and treatment should be administered during rapid transport.·

Vascular Access and Fluid Resuscitation:

Aggressive fluid resuscitation is unclear with current science. IV or IO access should be initiated during transport. NS or LR should be infused if hypotensive or demonstrating poor perfusion. Normalizing of the blood pressure is NOT the goal. ·

Open Fracture and/or Amputation:

Cefazolin 2 gm over 10 minutes IV / IO. Peds: 20 mg/kg (maximum 2 gm) over 10 minutes IV / IO.

Tranexamic Acid (TXA)-Within 3 hours of injury

Indication –poor perfusion (soft SBP, tachycardia, pale etc) in patient that has evidence of hemorrhage. Infuse during transport only, unless patient entrapped and can be administered without slowing extrication. Transport patient who receives TXA to Trauma Center, unless diverting to local facility for further stabilization.

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

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

Serious

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

>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 or Contact Medical Control

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

Qualify: Determine exposure type; external irradiation, external contamination with radioactive material, internal contamination with radioactive material.·

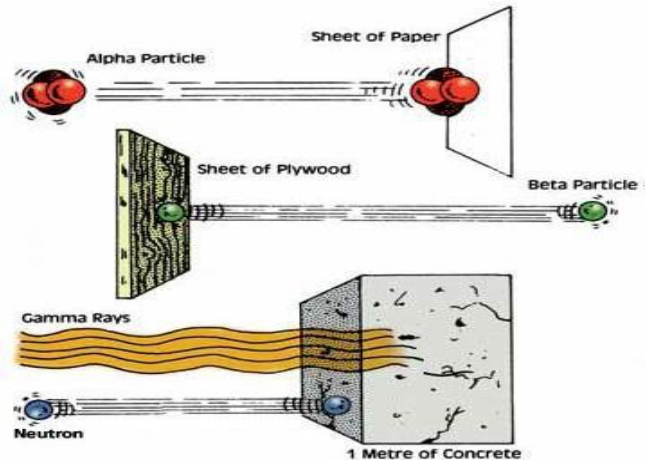
Quantify: Determine exposure (generally measured in Grays/Gy). *Information may be available from those on site who have monitoring equipment, do not delay transport to acquire this information.*

Trauma and Burn Protocol Section

Radiation Incident

General concepts in responding to a radiation incident:

Avoid touching suspected radioactive items
Perform only life saving / critical care tasks near a potential radioactive source
Avoid smoke within 100 meters of a fire or explosion involving potentially radioactive sources
Keep hands away from your mouth
Do not eat or drink until your hands and face are washed
Change clothes and shower as soon as possible



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

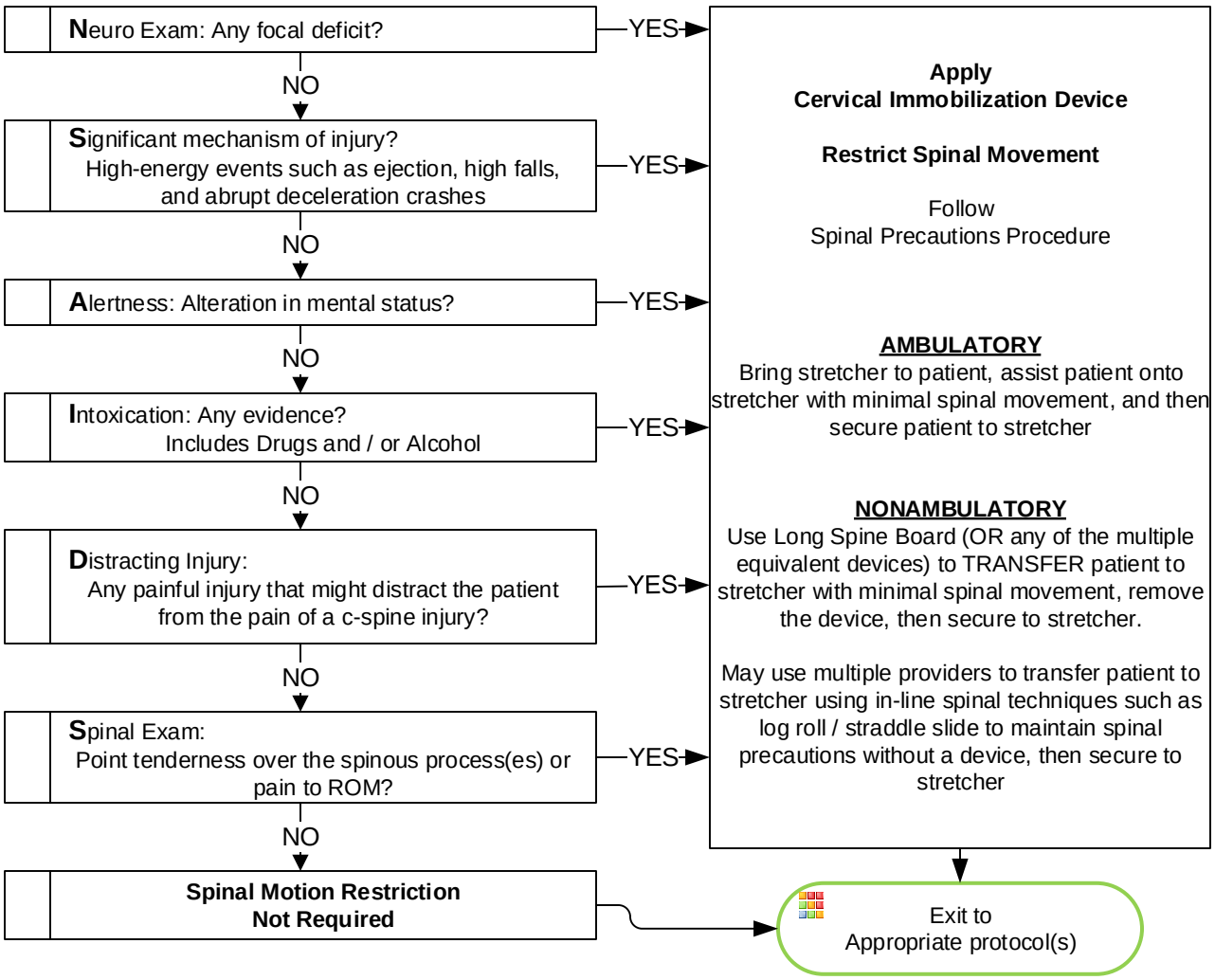
* Hypotension
** Also cardiovascular collapse, fever, shock

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 patients 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 or Contact Medical Control

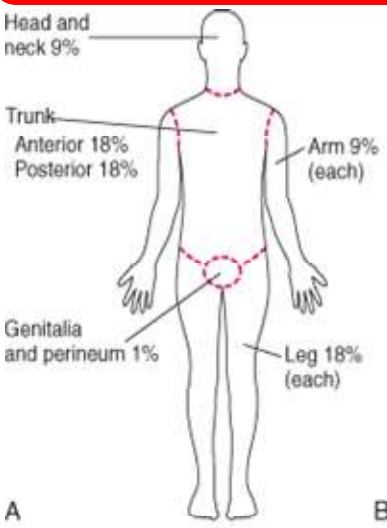
Formula example:
70 kg patient with 15% TBSA

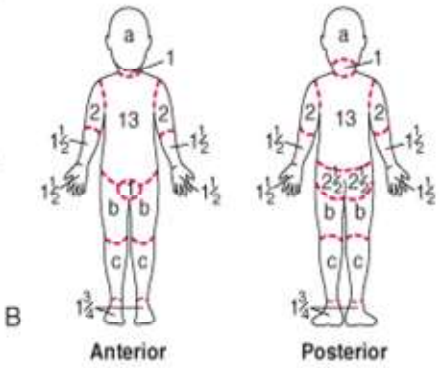
0.25 *x* 70 kg = 17.5
17.5 *x* 15 = 263 mL/hr

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

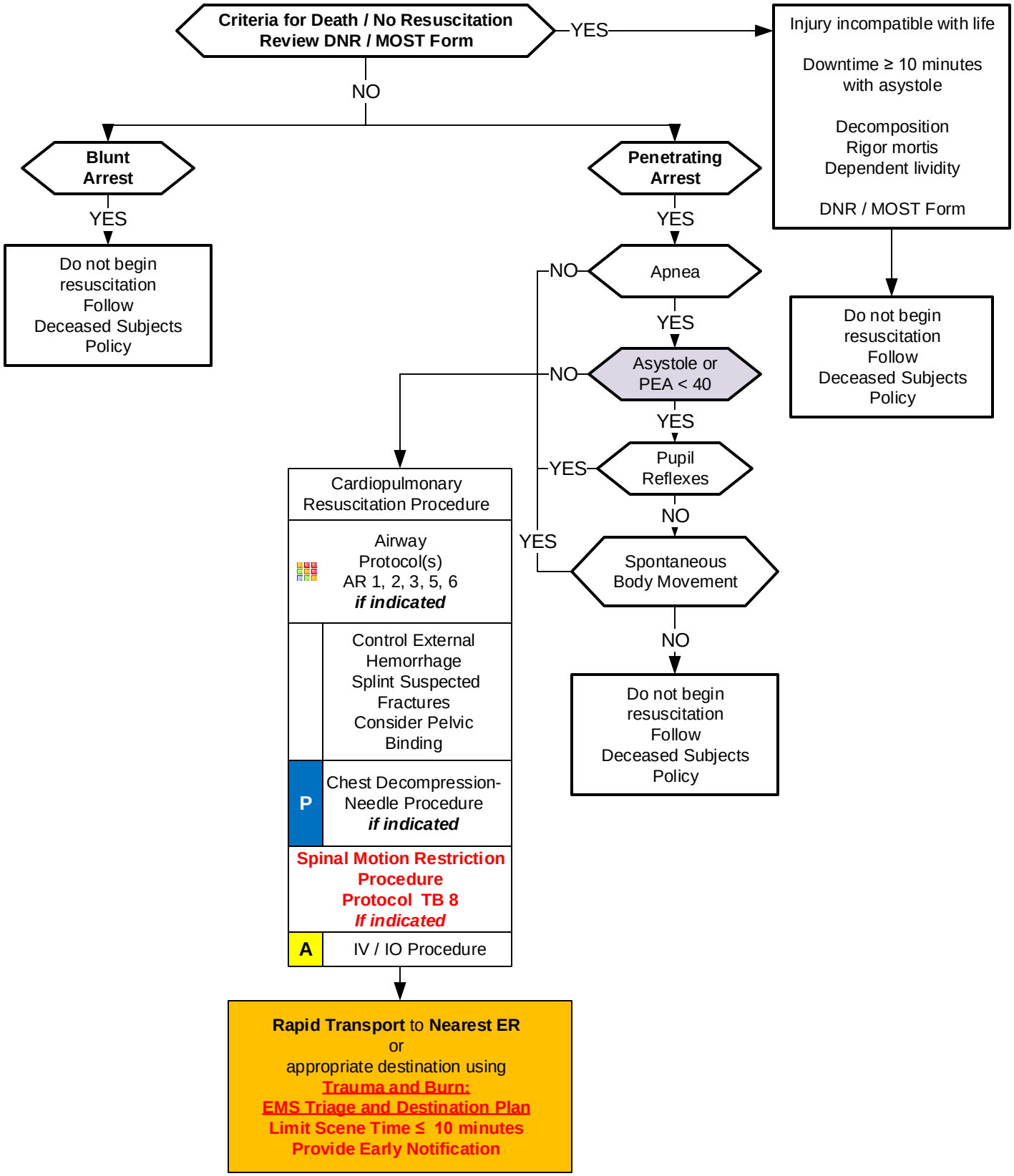
Estimate spotty areas of burn by using the size of the patient's palm as 1 %

IV / IO Infusion Rates:
Lactated Ringer is preferred IV solution. Normal Saline may be used if LR unavailable.
Rule of Nine:
First-degree burns do not count in the calculation of TBSA burns.

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



Trauma and Burn Protocol Section

Traumatic Arrest

General Approach

When a decision is made to perform cardiopulmonary resuscitation on the trauma victim follow protocol AC 11 Team Focused.
Transportation should be initiated to the nearest emergency department or trauma center. All procedures including IV or IO placement and advanced airway placement should be undertaken during transport.
Effort should be made to control bleeding with tourniquet preferred where appropriate.
Needle decompression of the thorax should be employed with suspected pneumothorax.
Fluid resuscitation should be utilized with a goal SBP of 80 – 90 mmHg.
Unlike a medical arrest the airway is of vital importance and decompression if indicated.
Hypothermia leads to worse outcomes in trauma so ensure warmth of the patient.

Where lightning strike, drowning or situations causing hypothermia are noted resuscitation should be initiated in most cases. In the event of ROSC follow protocol AC 9 / PC 7 Post-Resuscitation. With blunt or penetrating trauma every effort made to maintain warmth of the trauma victim.

If the mechanism of injury does not correlate with the clinical condition and a non-traumatic etiology is suspected standard resuscitation efforts should be initiated.

If the situation poses a danger to the crew and pronouncing death at the scene is predicted to exacerbated conditions, begin cardiopulmonary resuscitation and transport to nearest ER.

DNR / MOST

Patient assessment should occur promptly and without delay. Never withhold or delay patient assessment to read a document.
EMS providers should not attempt to decide if a DNR or MOST is valid. If present and contains a healthcare providers signature it should be considered valid unless an immediate family member or guardian revokes the DNR / MOST.
DNR / MOST situations should be dealt with on an individual basis with appropriate care and decision-making determined accordingly.

Withholding of Resuscitation Efforts

The primary goal of EMS is to render aid and comfort to the suffering and the application of this protocol does not diminish this responsibility. It is however appropriate to withhold resuscitation in specific settings:
1. Decomposition 2. Rigor mortis 3. Dependent lividity 4. Injury incompatible with life 5. Downtime >10 minutes with asystole (no shock indicated) 6. Blunt 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.**
- **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.
  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.

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 high-quality uninterrupted CPR****
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 rhythm / pulse checks ≤ 5 seconds)

Ventilation rate:
1 breath every 2 seconds when age < 1
1 breath 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

Epinephrine 1:10,000
0.01 mg/kg IV / IO (up to Max of 1mg/dose)
Repeat every 3 – 5 minutes

Normal Saline Bolus 20 mL/kg IV / IO
May repeat up to **Maximum 60 mL/kg**

Search for Reversible Causes

Blood Glucose Analysis Procedure
if applicable

Notify Destination or Contact Medical Control

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

Reversible Causes

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

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

Pediatric Cardiac Protocol Section

Pediatric Asystole / PEA

When faced with either PEA or Asystole the most important aspect is finding a reversible cause (HYPOXIA).

Consider is this a primary cardiac event or a primary respiratory event, drug overdose, drowning, hanging, suffocation or trauma?

Primary focus is on high-quality, uninterrupted CPR with compressions at a rate of:

120 / minute, = 1.5 - 2 inches depth of compression, allow complete recoil of chest on upstroke.
-Do not interrupt compressions for more than 5 seconds maximum for rhythm/pulse checks.
-Paramedic should charge the defibrillator at the 180th compression.
"1 breath every 2 seconds when age < 1yr & 1 breath every 3 seconds when age ≥ 1yr" is the recommended rate from AHA, but be sure not to overventilate your patient
15:2 Compression:Ventilation if no Advanced Airway

Pediatric EPINEPHRINE Dosing
Give Epinephrine (1:10,000) 0.01 mg/kg IV / I O every 3-5 minutes. FOUR minute intervals make the most sense because we do 2 minute rounds of CPR. Maximum of 1mg/dose even if your patient is >100kg.

Atropine not likely beneficial and no longer indicated with PEA or Asystole unless treating a Cholinergic (parasympathetic) toxin overdose (0.03-0.05mg/kg every 5 minutes until signs of atropinization [tachycardia, warm, dry, flushed skin, mydriasis])

Hyperkalemia: Unknown in field setting. End stage renal failure/dialysis dependent patients are at risk and **Sodium bicarbonate 1 mEq/kg IV / IO and Calcium gluconate 40 mg/kg IV / IO** should be given. ECG findings may not reflect common teaching such as peaked T waves. PEA with a bizarre or widened complex may indeed be hyperkalemia.

Toxicology: Consider Calcium Channel Blocker (CCB) and Beta Blocker (BB) overdose with PEA and asystole. If suspected BB overdose give **Glucagon 0.1 mg/kg IV / IO**. If you see ECG improvement you may repeat and then contact medical control. Large doses of Glucagon may be needed. Calcium Chloride (or Ca gluconate - preferred) may be beneficial in BB overdose. If suspected CCB overdose administer **Calcium gluconate 40 mg/kg** over 3 minutes. If you see ECG improvement you may repeat and then contact medical control.

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:**
  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**
  Renal Failure / Dialysis - 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 – Hypoxia associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.

Pediatric Bradycardia With Poor Perfusion

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

YES → 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

NO

Heart Rate < 60/min
Persists despite oxygenation and ventilation

NO →
- P: Cardiac Monitor
- 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: **Epinephrine push dose**
  2 mL (2 mcg) IV/IO push
  Repeat every 2 minutes to effect
  SBP > 70+ 2(Age) mmHg
  OR MAP ≥ 65
- P: **Atropine 0.02 mg / kg IV / IO**
  May repeat x 1
  Minimum single dose 0.1 mg
  Maximum single dose 0.5 mg
- **If no improvement**
  Consider
  Transcutaneous Pacing Procedure

Notify Destination or Contact Medical Control

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

Reversible Causes

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

Toxins
Tension pneumothorax
Tamponade; cardiac
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

ECG and rhythm information should be interpreted in context of the entire patient assessment.
For example if you have a patient which is ill with a likely infection and fever and is bradycardic their overall symptoms are unlikely related to bradycardia and more likely related to overwhelming sepsis and potentially hypoxia.

Bradycardia is defined as heart rate < 60 but rarely causes symptoms unless < 50 in the pediatric patient.
The most important decision point in care is whether the patient is Stable or Unstable (vital organ function is acutely impaired or cardiac arrest is ongoing or imminent.)
Hypoxemia is a common cause of bradycardia.

Symptomatic:
Symptomatic implies the arrhythmia is causing the presenting symptoms but the patient may be stable and not in imminent danger.
This situation allows you more time to decide on the most appropriate intervention which often is supportive care only.

Push-Dose Epinephrine:
Mix 1:1000 (1mg in 1mL) into 1000 mL of NS.
Yields a concentration of 1 mcg/mL of Epinephrine.
Give 2 mcg every 2 minutes to titrate SBP > 70 + 2(Age).

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 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.**
- 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
	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 or Contact Medical Control

Pediatric Cardiac Protocol Section

Pearls
- **Recommended exam: Mental status, Respiratory, Cardiac, Skin, Neuro**
- **Contact Medical Control early in the care of the pediatric cardiac patient.**
- **Most children with CHF have a congenital heart defect, obtain a precise past medical history from caregivers.**
- **Obtain the child's PCP & hospital where they are normally treated. Use caregivers as a valuable resource.**
- **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:**
  - **Fentanyl: 1 mcg/kg IV / IO. Max single dose 50 mcg -or- Morphine: 0.1 mg/kg IV / IO. Max single dose 5mg/dose**
  - **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
(Ages 31 days to 15 years)

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

Criteria for Death / No Resuscitation
Review DNR / MOST Form

YES → Do not begin resuscitation
Follow
Deceased Subjects
Policy

NO

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

****Begin high-quality uninterrupted CPR****
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 rhythm / pulse checks ≤ 5 seconds)

Ventilation rate:
1 breath every 2 seconds when age < 1
1 breath 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

AED Procedure ***if available*** → Shockable Rhythm
- NO → Continue CPR 2 Minutes → Repeat and reassess → Pediatric Airway Protocol(s) AR 5 & 6
- YES → Defibrillation Automated → Continue CPR 2 Minutes → Repeat and reassess → Pediatric Airway Protocol(s) AR 5 & 6

Cardiac Monitor → Shockable Rhythm
- NO → Pediatric Asystole / PEA Protocol PC 1; Pediatric Airway Protocol(s) AR 5 & 6
- YES → Pediatric VF / VT Protocol PC 7; Pediatric Tachycardia Protocol PC 5 & 6; Pediatric Airway Protocol(s) AR 5 & 6

Notify Destination or Contact Medical Control

Pediatric Cardiac Protocol Section

Pediatric Cardiac Arrest
(Ages 31 days to 15 years)

When faced with either PEA or Asystole the most important aspect is finding a reversible cause (HYPOXIA).
Consider is this a primary cardiac event or a primary respiratory event, drug overdose, drowning, hanging, suffocation or trauma?

Primary focus is on high-quality, uninterrupted CPR with compressions at a rate of:

120 / minute, = 1.5 - 2 inches depth of compression, allow complete recoil of chest on upstroke.
-Do not interrupt compressions for more than 5 seconds maximum for rhythm/pulse checks.
-Paramedic should charge the defibrillator at the 180th compression.
"1 breath every 2 seconds when age < 1yr & 1 breath every 3 seconds when age ≥ 1yr" is the recommended rate from AHA, but be sure not to overventilate your patient
15:2 Compression:Ventilation if no Advanced Airway

Pediatric EPINEPHRINE Dosing
Give Epinephrine (1:10,000) 0.01 mg/kg IV / I O every 3-5 minutes. FOUR minute intervals make the most sense because we do 2 minute rounds of CPR. Maximum of 1mg/dose even if your patient is >100kg.

Atropine not likely beneficial and no longer indicated with PEA or Asystole unless treating a Cholinergic (parasympathetic) toxin overdose (0.03-0.05mg/kg every 5 minutes until signs of atropinization [tachycardia, warm, dry, flushed skin, mydriasis])

Hyperkalemia: Unknown in field setting. End stage renal failure/dialysis dependent patients are at risk and **Sodium bicarbonate 1 mEq/kg IV / IO and Calcium gluconate 40 mg/kg IV / IO** should be given. ECG findings may not reflect common teaching such as peaked T waves. PEA with a bizarre or widened complex may indeed be hyperkalemia.
Toxicology: Consider Calcium Channel Blocker (CCB) and Beta Blocker (BB) overdose with PEA and asystole. If suspected BB overdose give **Glucagon 0.1 mg/kg IV / IO**. If you see ECG improvement you may repeat and then contact medical control. Large doses of Glucagon may be needed. Calcium Chloride (or Ca gluconate - preferred) may be beneficial in BB overdose. If suspected CCB overdose administer **Calcium gluconate 40 mg/kg** over 3 minutes. If you see ECG improvement you may repeat and then contact medical control.

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 rhythm/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**
  Renal Failure / Dialysis - 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 – Hypoxia 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
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
	1 J / kg Repeat and increase to **2 J / Kg** May increase to **4 J / Kg** Or adult maximum
	Consider sedation Do NOT delay cardioversion **Midazolam 0.2 mg / kg IV / IO / IN** May repeat if needed **Maximum Single Dose 2.5 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)

Ventricular Tachycardia:
Wide-Complex (> 0.09 sec) tachyarrhythmia which arises from the ventricle is uncommon in children.
The ventricular rate may vary from near normal (120 beats per minute) to > 200 beats per minute.
Most children who develop VT have underlying heart disease / previous heart surgery / long QT syndrome / cardiomyopathy / myocarditis.
Other causes may include electrolyte abnormalities and drug toxicity.
Contact medical control early for additional guidance.

Polymorphic VT / Torsades de Pointes:
QRS complexes vary in appearance.
Torsades de Pointes is a specific polymorphic VT characterized by twisting along the baseline or turning on a point.

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
- **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 high-quality uninterrupted CPR****
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 rhythm / pulse checks ≤ 5 seconds)

Ventilation rate:
1 breath every 2 seconds when age < 1
1 breath 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: 8 J / Kg

IV / IO Protocol UP 6

A **Epinephrine 1:10,000**
0.01 mg/kg IV / IO (up to Max of 1mg/dose)
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 **Lidocaine 1 mg / kg IV / IO**
Repeat every 5 minutes as needed
Maximum single dose 100mg
Maximum 3 mg / kg
-or-
Amiodarone 5 mg / kg IV / IO q5min prn
Max single dose 300 mg; Max total 15mg/kg

Notify Destination or Contact Medical Control

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

Reversible Causes

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

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

Persistent VF/ VT
Or
Torsades de Points

Magnesium Sulfate
40 mg / kg IV/IO
over 2 minutes
May repeat in 5 minutes x 1
if no change

Pediatric Cardiac Protocol Section

Pediatric Ventricular Fibrillation
Pulseless Ventricular Tachycardia

Defibrillation / Multiple Defibrillation:
Immediately after defibrillation resume chest compressions: Do not check for a pulse following defibrillation. Defibrillation dosing in pediatrics is not completely known. First defibrillation is at 2 J/kg followed by 4 J/kg. If more shocks are needed increase to 8 J/kg. If persistent VF or VT continues you may increase dose up to a maximum of 10 J/kg or 360 J after discussion with medical control.

Ventricular Tachycardia:
Wide-Complex (> 0.09 sec) tachyarrhythmia which arises from the ventricle is uncommon in children.
The ventricular rate may vary from near normal (120 beats per minute) to > 200 beats per minute.
Most children who develop VT have underlying heart disease / previous heart surgery / long QT syndrome / cardiomyopathy / myocarditis.
Other causes may include electrolyte abnormalities and drug toxicity.

Polymorphic VT / Torsades de Pointes:
QRS complexes vary in appearance.
Torsades de Pointes is a specific polymorphic VT characterized by twisting along the baseline or turning on a point.

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 < 5 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**
  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

Pediatric Airway Protocol(s) AR 5 - 7
as needed

Monitor Vital Signs / Reassess

Blood Glucose Analysis Procedure

Optimize Ventilation and Oxygenation
- Maintain SpO2 94 – 98%
- Advanced airway if indicated
- Age Appropriate Respiratory Rate

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

Lidocaine 1 mg / kg IV / IO
Repeat every 10 minutes as needed
Maximum single dose 100mg
Maximum 3 mg / kg
-or-
Amiodarone 5 mg / kg IV / IO q5min prn
Max single dose 300 mg; Max total 15mg/kg

NO

Arrhythmias are common and usually self limiting after ROSC

If Arrhythmia Persists follow Rhythm Appropriate Protocol

Post-intubation / BIAD Management Protocol AR 8

Notify Destination or Contact Medical Control

Pediatric Cardiac Protocol Section

Pediatric Post Resuscitation

Immediate concerns following Return of Spontaneous Circulation

1. Optimize oxygenation and ventilation to maintain oxygen saturation at ≥ 94%. Hyperventilation must be avoided due to induced hypotension, decreased cardiac output and oxygen injury.
2. Optimize cardiopulmonary function and vital organ perfusion.
3. Search for and treat correctable / reversible causes:
   Hypovolemia, Hypoxia, Hydrogen ion, Hypo / Hyperkalemia, Hypothermia, Hypoglycemia
   Tension Pneumothorax, Tamponade; cardiac, Toxins / Ingestions, Thrombosis; pulmonary, Thrombosis; coronary
4. Transport to facility capable of caring for post arrest patients.

Sedation / Paralysis with BIAD / ETT in place:

- In the post-resuscitative phase the patient may require sedation.
- The patient may experience various levels of stress, agitation, or combativeness.
- Pain is the primary cause of agitation in the intubated patient and the most important initial aspect of immediate post-intubation / BIAD management is to control pain.
- A BIAD or ETT in the airway causes discomfort and mechanical ventilation / BVM / positive pressure ventilation is painful.
- Immediately begin sedation with **Fentanyl 1 mcg/kg IV / IO or Ketamine 2 mg/kg.**
- The primary focus is to sedate the patient adequately with Fentanyl preferably, Morphine, or Ketamine, which addresses pain.

Remember benzodiazepines are associated with worse patient outcomes and prolonged ICU stays. Opioid and/or Ketamine is the best first choice.

- Midazolam may be given if repeat doses of opioids and / or Ketamine are ineffective or inadequate.
- Midazolam may be used after two to three doses of an opioid and/or Ketamine but midazolam should not be used as a primary agent in post-resuscitation sedation or post BIAD/ETT insertion sedation.

Airway:

The post-cardiac arrest patient is typically hypotensive and acidotic which creates a high-risk situation for RSI and potentially will lead to re-arrest.

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

Pediatric Allergic Reaction

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

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

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

Assess Symptom Severity

MILD
Skin Only

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

IV or IO Protocol UP 6
If indicated

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

Histamine (H2) Blocker
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

Histamine (H2) Blocker
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 IV / IO
Per Agency Medical Director

Methylprednisolone
2 mg/kg IV
Maximum 125 mg

Notify Destination or Contact Medical Control

Pediatric Medical Protocol Section

Pediatric Allergic Reaction

Allergic reactions occur when a patient is exposed to an allergen (pollen, insect, medication, food, etc.) causing the body to respond by releasing specific immunoglobulins and mediators such as histamine which cause hives, itching and capillary leaking leading to edema. Most allergic reactions are mild and involve only the skin (erythema, hives and / or **itching**) and are usually resolved with an anti-histamine like diphenhydramine.

Anaphylaxisis a severe form of an allergic reaction and recent studies show it is under-recognized and under-treated.
Anaphylaxis is likely present when any 1 of the 3 criteria below are present:

1. Acute onset of illness (minutes to hours) with skin involvement: Hives, erythema, itching and / or angioedema.

PLUS

---Dyspnea, wheezing, stridor or hypoxemia.

OR

---Hypotension, poor perfusion, shock, incontinence, syncope.

2. Acute onset of illness (minutes to hours) with 2 or more of the following are present:

a. Hives, erythema, itching and / or angioedema.
b. Dyspnea, wheezing, stridor or hypoxemia.
c. Hypotension, poor perfusion, shock, incontinence
d. Nausea, vomiting and / or abdominal pain / cramping.

3. Acute onset of illness (minutes to hours) with hypotension, poor perfusion, syncope, incontinence after exposure to known allergen.
The main point is that anaphylaxis does not mean the patient must be in shock. Patients who demonstrate skin involvement plus a respiratory complaint have anaphylaxis. Patients who have skin involvement and GI symptoms such as nausea or abdominal cramping have anaphylaxis. And finally a patient may have anaphylaxis and have no skin findings such as rash or erythema.

Epinephrine IV in Severe Allergy unresponsive to IM Epinephrine after 2 doses:
In severe anaphylaxis not responsive to IM Epinephrine, IV / IO Epinephrine should be administered. Mix Epinephrine 1:1000 (1mg in 1mL) into 1000 mL of NS or LR = a concentration of 1 mcg/mL of Epinephrine. Give**2 mL (2 mcg)**IV/IO push and repeat every 2 minutes to effect SBP > 70+ 2(Age) mmHg and/or MAP ≥65 mmHg.

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 limited to only patients currently prescribed the medication,** unless approved by the Agency Medical Director and the NC office of EMS.
- Agency Medical Director may require contact of medical control prior to EMT/ EMR administering any medication(s). Medical Director may require contact of medical control prior to EMT/ EMR administering any medication.
- 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***
A	IV / IO Procedure
P	Cardiac Monitor
	Altered Mental Status Protocol UP 4 ***if indicated***
	Hypotension / Shock Protocol PM 3 ***if indicated***
	Seizure Protocol UP 13 ***if indicated***

Blood Sugar ≤ 69 mg / dl

	Symptomatic awake, alert & able to take oral agent: **Oral Glucose ½ to 1 Tube** Or **Consider Oral Solution (Juices / Food)** If age appropriate
A	If unable to tolerate oral: **D10: 5 mL/kg IV / IO** **(Or if no IV/IO access Glucagon 0.1 mg/kg IM (Maximum 1 mg))** Repeat q15 min prn to keep Blood glucose > 70 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 10 mL/kg IV / IO** **Maximum 20 mL/kg**

	Monitor and Reassess Every 5 minutes

Notify Destination or Contact Medical Control

Pediatric Medical Protocol Section

Pediatric Diabetic

Dextrose Dosing Regimen: Rule of 50

Newborn to 1 year: D10 - 5 mL/kg IV / IO	(D10 x 5 mL/kg = 50)
1 year to 2 years: D25 – 2 mL/kg IV / IO	(D25 x 2 mL/kg = 50)
≥ 2 years: D50 – 1 mL/kg IV / IO	(D50 x 1 mL/kg = 50)

Hypoglycemia:

D10 is preferred agent and may be used in all age ranges. If patient demonstrates evidence of volume overload and if available, more concentrated formulations should be used based on the Rule of 50.
Due to continued drug shortages we may utilize D5 solutions and use the D10 dosing regimen.

Hyperglycemia:

Diabetic ketoacidosis (DKA) is a complication of diabetes and cannot be diagnosed in the field but can be suspected.
DKA is a condition where the body cannot properly utilize insulin to effect glucose metabolism. The body compensates by breaking down fats and proteins leading to metabolic acidosis. The body also begins to dump excess glucose by excessive urination.
Patients typically appear dehydrated, ill and usually have tachypnea and tachycardia.

Patients can have marked hyperglycemia without being in DKA. DKA can occur at any level of hyperglycemia typically above 200 mg / dl.

Glucagon:

If IV / IO access is obtained after glucagon administration and the patient remains symptomatic then give D10 as per appropriate treatment arm.

Insulin Pump:

If patient is hypoglycemic turn off/disconnect the patient's insulin pump. Elicit help from the patient, when able, and / or the family who typically are well versed in it's operation.

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Patients with prolonged hypoglycemia my not respond to glucagon.**
- **Do not administer oral glucose to patients that are not able to swallow or protect their airway.**
- **Quality control checks should be maintained per manufacturers recommendation for all glucometers.**
- **D10 / D25 Preparation:**
  - **D10: Remove 10 mL of D50 from a D50 vial. Add 40 mL of NS with the 10 mL of D50 – total volume 50 mL.**
  - **D10: Alternative, Discard 40 mL from the D50 vial and draw up 40 mL of NS – total volume 50 mL.**
  - **D25: Remove 25 mL of D50 and draw up 25 mL of NS – total volume 50 mL.**
- In extreme circumstances with no IV and no response to glucagon Dextrose 50 % can be administered rectally. Contact medical control for advice.
- **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.
  - Adult caregiver must demonstrate capacity to make informed health care decisions. See Protocol UP-1.
  - Otherwise contact medical control.
- **Hypoglycemia with Oral Agents:**
  - Patients taking oral diabetic medications should be strongly encouraged to allow transportation to a medical facility. They are at risk of recurrent hypoglycemia that can be delayed for hours and require close monitoring even after normal blood glucose is established. Not all oral agents have prolonged action so Contact Medical Control for advice. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- **Hypoglycemia with Insulin Agents:**
  - Many forms of insulin now exist. Longer acting insulin places the patient at risk of recurrent hypoglycemia even after a normal blood glucose is established. Not all insulins have prolonged action so Contact Medical Control for advice. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.

Pediatric Hypotension / Shock

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

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

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

Blood Glucose Analysis Procedure

A IV / IO Procedure

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 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***

P **Epinephrine push dose**
2 mL (2 mcg) IV/IO push

Repeat every 2 minutes to effect
SBP > 70+ 2(Age) mmHg
OR MAP ≥ 65

Notify Destination or Contact Medical Control

Pediatric Medical Protocol Section

Hypotension / Shock

Shock:

Shock results from inadequate tissue delivery of oxygen and nutrients to meet tissue demand. Shock is often characterized by inadequate peripheral and end-organ perfusion. Being in a shock state is not dependent entirely dependent on Blood Pressure. Early recognition and initiation of treatment of compensated shock is key to improving outcomes.

Compensated Shock:

Pediatric patients can often compensate for shock state for a prolonged period by increasing heart rate, increasing systemic vascular resistance, increasing cardiac contractility and increase in venous smooth muscle tone. Early recognition and early treatment is directed at preventing compensated shock from progressing to hypotensive shock and then cardiac arrest as compensatory mechanisms fail.

Fluid Resuscitation:

IV / IO NS or LR 20 mL/kg Bolus
Give rapid boluses and repeat every 5 minutes as needed
After 60 mL/kg of IV / IO fluids then start vasopressors
Pediatric patients are typically very responsive to fluid resuscitation

Push Dose Epi:

Mix Epinephrine 1:1000 (1mg in 1mL) into 1000 mL of NS or LR = a concentration of 1 mcg/mL of Epinephrine. Give **2 mL (2 mcg)** IV/IO push and repeat every 2 minutes to effect SBP > 70+ 2(Age) mmHg and/or MAP ≥ 65 mmHg.

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Lowest blood pressure by age: < 31 days: > 60 mmHg. 31 days to 1 year: > 70 mmHg. Greater than 1 year: 70 + 2 x age in years.**
- **Consider all possible causes of shock and treat per appropriate protocol. Majority of decompensation in pediatrics is airway related.**
- **Decreasing heart rate and hypotension occur late in children and are signs of imminent cardiac arrest.**
- **Shock may be present with a normal blood pressure initially.**
- **Shock often is present with normal vital signs and may develop insidiously. Tachycardia may be the only manifestation.**
- **Consider all possible causes of shock and treat per appropriate protocol.**
- **Hypovolemic Shock;**
  Hemorrhage, trauma, GI bleeding, ruptured aortic aneurysm or pregnancy-related bleeding.
- **Cardiogenic Shock:**
  Heart failure: MI, Cardiomyopathy, Myocardial contusion, Ruptured ventrical / septum / valve / toxins.
- **Distributive Shock:**
  Septic
  Anaphylactic
  Neurogenic: Hallmark is warm, dry, pink skin with normal capillary refill time and typically alert.
  Toxic
- **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 2mg/kg up to 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.**

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

Muscle Spasm
Midazolam 2 – 2.5 mg IV / IO
Over 2 to 3 minutes
Midazolam IN See Page 2
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 or Contact Medical Control

Toxin-Environmental Protocol Section

Bites and Envenomations

Snake bites:
Treatment is based on symptoms of envenomation not the identity. Attempt to identify, transport to hospital is not recommended. Dead snakes can bite as a reflex hours after death. Take pictures with a cell phone if available. Include head, tail and any distinctive markings.

Immobilize injury, keep at level heart if able, remove all constrictive clothing, any bands or tourniquets and jewelry, watches or rings on affected extremity. **DO NOT** apply ice as it is damaging to envenomated tissue.

Document TIME OF BITE
In case of exotic snakes, zoo animals or pet contact Carolinas Poison Control and Medical Control.
Local symptoms include: Pain and swelling, numbness and tingling and bruising and ecchymosis.
Systemic symptoms include: Metallic or peculiar taste in mouth, hypotension, AMS, bleeding, allergic reaction and shock.

Contact NC Poison Control Center 1-800-222-1222
If you are instructed that the patient may remain at home per the Poison Center, and the only complaint is related to toxicology, the patient may decide to remain at home. Poison Center provides follow up and recheck via telephone. You must still complete a refusal.

Bee / Wasp stings:
Remove stinger by scraping with a straight edge, like the edge of tongue blade. Do not squeeze or attempt to pick stinger from skin as this will express more venom from the venom sack.

Spider bite:
Identify spider. If easily captured, bring it to the hospital.

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
A	IV/ IO Procedure
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***

High Suspicion of Cyanide

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

NO

	Supportive Care Continue High Flow Oxygen
	Monitor and Reasses

Notify Destination or Contact Medical Control

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 Motion 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**

  Instruct asymptomatic drowning patients refusing transport to seek medical care / call 911 if they develop ANY symptoms w/i 6 hrs
- A: IV / IO Procedure ***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
- A: IV / IO Procedure
- P: Cardiac Monitor

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

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

Notify Destination or Contact Medical Control

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

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 attempt to suction! Ventilate with BVM through foam (suction water and vomit only when present.)**
- Drowning patient typically has <1 – 3 mL/kg of water in lungs (does not require suction) Primary treatment is reversal of hypoxia.
- **Cardiac arrest in drowning is caused by hypoxia; airway and ventilation are equally important to compressions.**
- **Encourage transport of ALL patients, especially those with symptoms (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.
- 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

Heat Illness
Set of disorders which occur after the body is exposed to heat for an extended period of time. May be triggered by vigorous exercise or work and lack of oral hydration. The very young, old and obese are most at risk.

Heat Cramps:
Common heat-related illness. Typically working in a hot environment and develop cramps while at rest. Symptoms of cramping usually involve the lower extremities and abdomen.

Heat Exhaustion:
Heat exhaustion is caused by volume depletion during excessive sweating in a hot environment.

Heat Stroke: Syndrome where the body loses the ability to regulate temperature.

Signs and Symptoms of Heat Stroke:
AMS / Neurological deficit
Headache
Seizures
Core body temperature > 104 degrees F (40 degrees C)
Tachycardia
Hyperventilation
Loss of sweating
Hypotension
Pulmonary edema CHF (High-output heart failure with tachycardia, hypotension and pulmonary edema)

Exertional Heat Stroke:
Typically young, healthy patients (often athletes) who train in hot environments and may maintain sweating until they decompensate.

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 5 – 10 minutes. Monitor rectal temperature and remove patient when temperature reaches 102.5°F (39°C). Your goal is to decrease rectal temperature below 104°F (40°C) with target of 102.5°F (39°C) within 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), and risperidone (Risperdal) metoclopramide (Reglan), amoxapine (Ascendin), and lithium.
  - **Management of NMS:**
  - Supportive care with attention to hypotension and volume depletion.
  - Use benzodiazepines such as diazepam or midazolam for seizures and/ or muscular rigidity.

Hypothermia / Frostbite

History
- Age, very young and old
- Exposure to decreased temperatures but may occur in normal temperatures
- Past medical history / Medications
- Drug use: Alcohol, 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

General Wound Care

DO NOT Rub or Massage Skin to warm

DO NOT allow refreezing

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

YES — Pulse

NO

Exit to Age Appropriate Cardiac Protocol(s)
See Pearls

Altered Mental Status
Protocol UP 4
as indicated

Active warming measures

B — 12 Lead ECG Procedure

IV / IO Procedure

A

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

P — Cardiac Monitor

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

Monitor and Reassess

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

Hypothermia / Frostbite

Passive rewarming – move patients to warm, dry environment and provide adequate insulation (ie blankets).

Frostbite

Frostbite is the formation of ice crystals within local tissues usually where skin is exposed. Commonly occurs in distal extremities.

Risk Factors: Prolonged exposure to cold temperatures (usually below freezing), exposure to wind, wearing wet clothing, inactivity / immobility, alcohol ingestion and diseases which cause peripheral vascular disease (atherosclerosis / diabetes).

Superficial Frostbite Signs and Symptoms: Numbness, Paresthesias, Poor fine motor control, Pruritus (itching), Edema (usually after rewarming), Coldness.

Deep Frostbite Signs and Symptoms: Hemorrhagic blisters, Diminished range of motion, Necrosis, gangrene, Cold, mottled, gray area (usually after rewarming), Immobile tissue (lost elasticity)

Systemic Hypothermia

Core body temp < 95° F (35° C). Caused by heat loss, decreased heat production or a combination of the two.

Risk Factors: Prolonged exposure to cold temperatures, exposure to wind, wearing wet clothing, inactivity / immobility, alcohol ingestion and diseases which cause peripheral vascular disease (atherosclerosis / diabetes). Hypothermia can be present when temperatures are well above freezing.

Mild Hypothermia Signs and Symptoms: Shivering, Dizziness. Nausea, Weakness, Hyperventilation, Tachypnea, Tachycardia.

Moderate Hypothermia Signs and Symptoms: AMS, Poor judgment/difficulty thinking, Atrial fibrillation, Bradycardia, Bradypnea, Diuresis, Shivering stops.

Severe Hypothermia Signs and Symptoms: Hypotension, Ventricular arrhythmias, J wave on ECG, AMS / Coma, Fixed / Dilated pupils, May have lividity, Bradycardia (severe)

Toxic-Environmental Protocol Section

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.)**
- **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 most experienced person.**
  - **Below 86°F (30° C) antiarrhythmics may not work and if given should be given at increased intervals. Contact medical control for direction. Epinephrine / Vasopressin 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 required. Deferring further attempts until more warming occurs is controversial. Contact medical control for direction.**
  - **Hypothermia may produce severe bradycardia so take at least 60 seconds to palpate a pulse.**
- **Active Warming:**
  - Remove from cold environment and to warm environment protected from wind and wet conditions.
  - Remove wet clothing and provide warm blankets / warming blankets.
  - Hot packs can be activated and placed in the armpit and groin area if available. Care should be taken not to place the packs directly against the patient's skin.

Marine Envenomations / Injury

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

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

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

General Wound Care Procedure

A — IV / IO Procedure ***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***

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

Identification of Sea Creature

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

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

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

Monitor and Reassess

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

Marine Envenomations / Injury

Contact NC Poison Control Center 1-800-222-1222
If you are instructed that the patient may remain at home per the Poison Center, and the only complaint is related to toxicology, the patient may decide to remain at home. Poison Center provides follow up and recheck via telephone. You must still complete a refusal.

Barbs/Spines that are in the torso (chest or abd) should NOT be removed. Rather they should be stabilized and strong consideration should be made to transport the patient to a trauma center.

Pearls

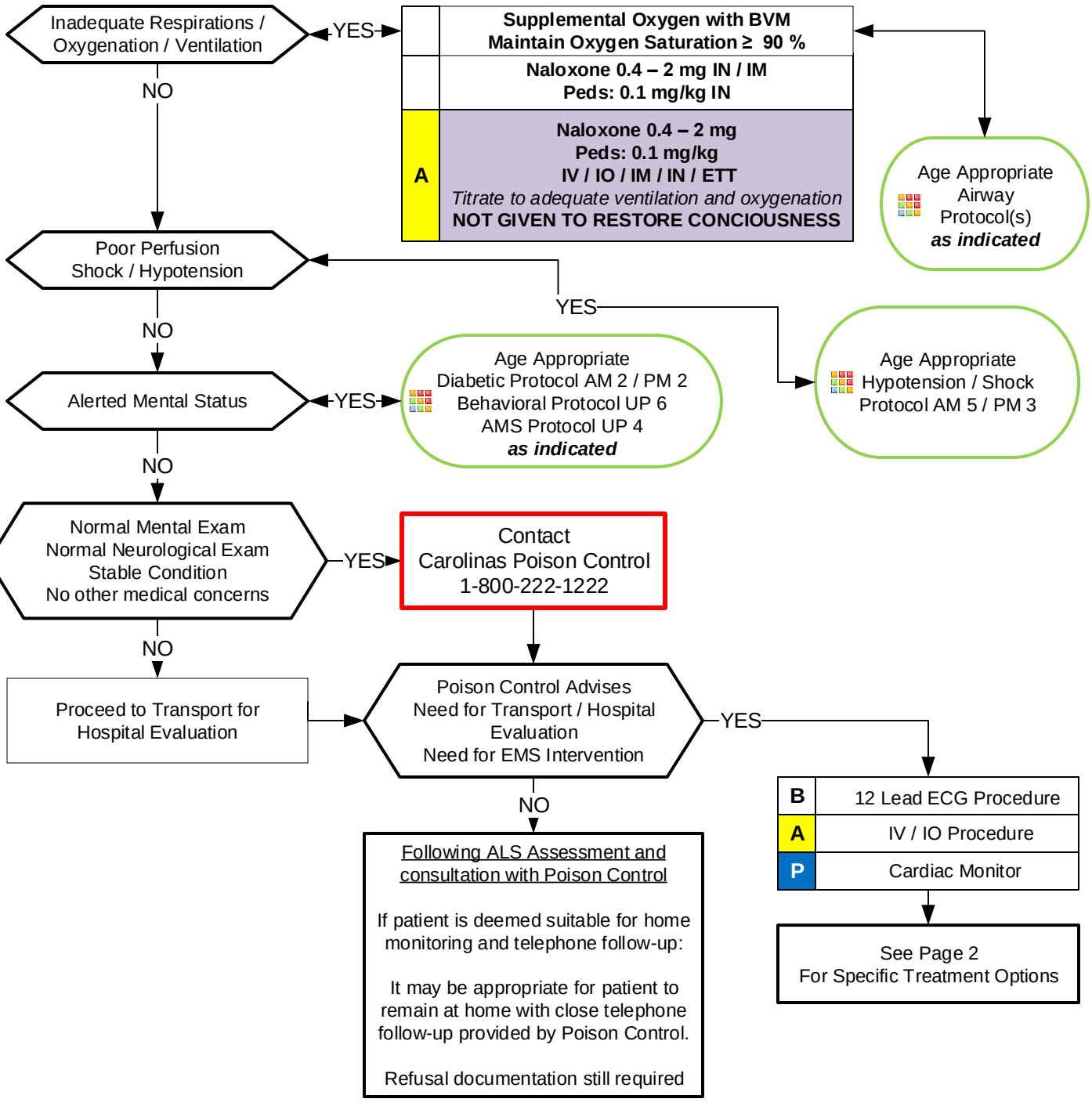
- **Ensure your safety: Avoid the organism or fragments of the organism as they may impart further sting / injury.**
- **Priority is removal of the patient from the water to prevent drowning.**
- **Coral:**
  - Coral is covered by various living organisms which are easily dislodged from the structure.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

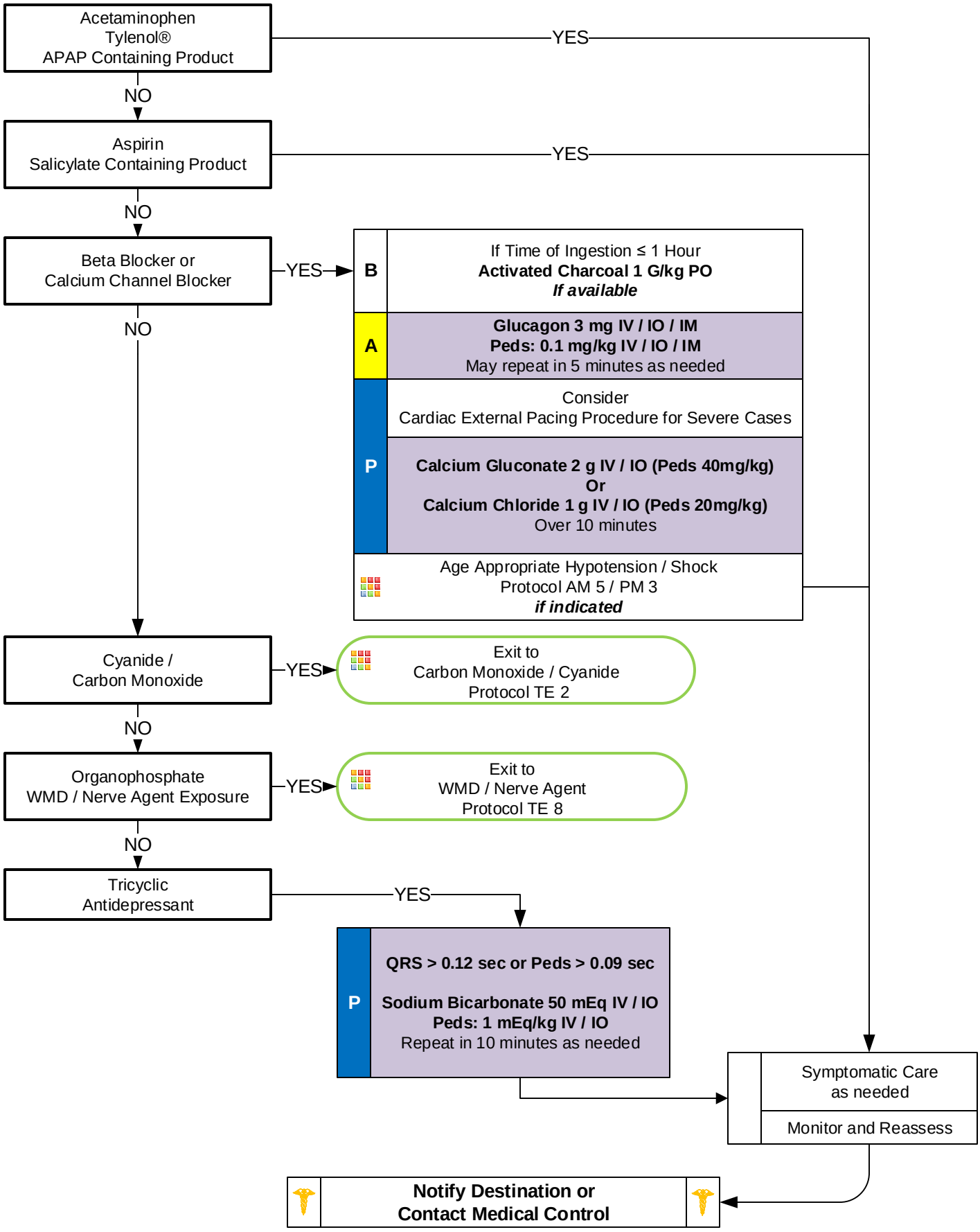
Signs and Symptoms
- Mental status changes
- Hypotension / hypertension
- Decreased respiratory rate
- Tachycardia, dysrhythmias
- Seizures
- S.L.U.D.G.E.
- D.U.M.B.B.E.L.S

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



Overdose / Toxic Ingestion

Narcotic overdose: It is extremely important to provide your patient with breaths via BVM while you are preparing to give Naloxone.

Beta Blockers and Calcium Channel Blockers:
Often OD may have only mild symptoms of dizziness and slow heart rate. Blood pressure may be marginally low. If relatively asymptomatic no treatment is necessary, just monitor and reassess. Glucagon IM can be used with no IV / IO access.

Common Beta Blockers: Atenolol Coreg Nadolol, Labetalol, Propranolol, Tenormin, Inderal, Metoprolol
Common Calcium Channel Blockers: Amlodipine, Cardene, Calan ,Nicardipine, Norvasc, Isoptin, Adalat, Diltiazem.

Tricyclic Antidepressants:
ECG changes are varied and many. Typically you will see tachycardia though bradycardia can present. Treatment is driven by width of QRS, ventricular arrhythmia, new RBBB and any evident heart blocks. You may note prolonged PR and QT intervals as well as a tall terminal R wave in aVR.
Common Tricyclics: Amitriptyline. Imipramine, Clomipramine, Doxepin and Nortriptyline.

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Opioids and opiates may require higher doses of Naloxone to improve respiration, in certain circumstances up to 10 mg.**
- **Time of Ingestion:**
  1. Most important aspect is the **TIME OF INGESTION** and the substance and amount ingested and any co-ingestants.
  2. Every effort should be made to elicit this information before leaving the scene.
- **Charcoal Administration:**
  The American Academy of Clinical Toxicology DOES NOT recommend the routine use of charcoal in poisonings.
  1. Consider Charcoal within the FIRST HOUR after ingestion. If a potentially life threatening substance is ingested or extended release agent(s) are involved and ≥ one hour from ingestion contact medical control or Poison Center for direction.
  2. If NG is necessary to administer Charcoal then DO NOT administer unless known to be adsorbed, and 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 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 11 years and older > 90 mmHg.**
- **Maintenance IV Rate: By weight of child: First 10 kg = 4 mL, Second 10 kg = 2 mL, Additional kg = 1 mL. (Example: 36 kg child: First 10 kg = 40 mL, Second 10 kg = 20 mL, 16 kg remaining at 1 mL each. Total is 76 mL / hour)**
- **Bring bottles, contents, emesis to ED.**
- **S.L.U.D.G.E: Salivation, Lacrimation, Urination, Defecation, GI distress, Emesis**
- **D.U.M.B.B.E.L.S: Diarrhea, Urination, Miosis, Bradycardia, Bronchorrhea, Emesis, Lacrimation, Salivation.**
- **Tricyclic:** 4 major areas of toxicity: seizures, dysrhythmias, hypotension, decreased mental status or coma; rapid progression from alert mental status to death.
- **Acetaminophen:** initially normal or nausea/vomiting. If not detected and treated, causes irreversible liver failure
- **Aspirin**: Early signs consist of abdominal pain and vomiting. Tachypnea and altered mental status may occur later. Renal dysfunction, liver failure, and or cerebral edema among other things can take place later.
- **Depressants:** decreased HR, decreased BP, decreased temperature, decreased respirations, non-specific pupils
- **Stimulants:** increased HR, increased BP, increased temperature, dilated pupils, seizures
- **Anticholinergic:** increased HR, increased temperature, dilated pupils, mental status changes
- **Cardiac Medications:** dysrhythmias and mental status changes
- **Solvents:** nausea, coughing, vomiting, and mental status changes
- **Insecticides:** increased or decreased HR, increased secretions, nausea, vomiting, diarrhea, pinpoint pupils
- **Nerve Agent Antidote kits** contain 2 mg of Atropine and 600 mg of pralidoxime in an autoinjector for self administration or patient care. These kits may be available as part of the domestic preparedness for Weapons of Mass Destruction.
- **EMR and EMT may administer naloxone by IN / IM route only and may administer from EMS supply. Agency medical director may require Contact of Medical Control prior to administration and may restrict locally.**
- **When appropriate contact the North Carolina Poison Control Center for guidance, Toxic Environmental Policy 1.**
- Consider restraints if necessary for patient's and/or personnel's protection per the Restraint Procedure.

WMD-Nerve Agent Protocol

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

Signs and Symptoms
- **S**alivation
- **L**acrimation
- **U**rination; increased, loss of control
- **D**efecation / Diarrhea
- **G**I Upset; Abdominal pain / cramping
- **E**mesis
- **M**uscle Twitching
- Seizure Activity
- Respiratory Arrest

Differential
- Nerve agent exposure (e.g., VX, Sarin, Soman, etc.)
- Organophosphate exposure (pesticide)
- Vesicant exposure (e.g., Mustard Gas, etc.)
- Respiratory Irritant Exposure (e.g., Hydrogen Sulfide, Ammonia, Chlorine, etc.)

Call for help/ additional resources
Stage until scene safe

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

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

Symptom Severity

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

Minor Symptoms:
Respiratory Distress + SLUDGEM

IV or IO Access Protocol UP 6

Nerve Agent Kit IM
2 Doses Rapidly
if available

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

IV or IO Access Protocol UP 6

Nerve Agent Kit IM
3 Doses Rapidly
if available

P

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

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

Seizure Protocol UP 13

CDC/ ASPR
CHEMPACK Program
NC -57 EMS containers
-43 locations

Almost all citizens within 50 miles of CHEMPACK
See Page 2 and Pearls

Multiple Patients — YES

Consider
Activation and deployment of CHEMPACK
CHEMPACK ACTIVATION:
(insert local number)

Healthcare Coalition Activation
(insert local number)

NO

Notify Destination or Contact Medical Control

Toxic-Environmental Protocol Section

WMD-Nerve Agent Protocol

Poison Control:
Poison control is a valuable resource, have a low threshold to engage them with any medication or chemical exposure.
Poison control can aid with chemical or medication identification and treatment.
Poison control can prevent unnecessary emergency department visits and EMS transports:
They may instruct the patient to remain at home based on the type and nature of the ingestion or exposure.
They can follow the patient at home with repeated phone calls and reassessments.

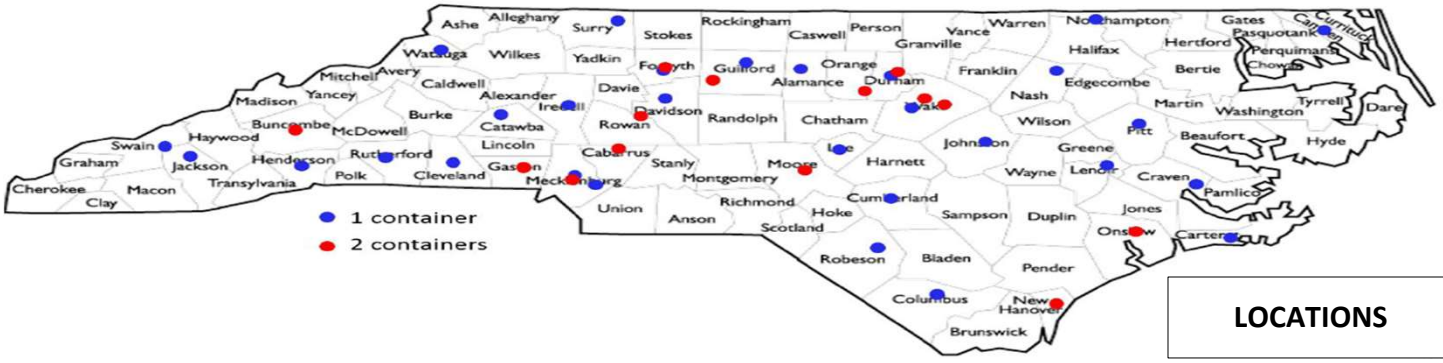
Poison control centers are connected nationwide. When you call 1-800-222-1222, you will most often be connected with Carolinas Poison Control, however if the NC center is busy, you may be directed to any poison center in the US.

When calling 1-800-222-1222, choose option #2 at the first voice prompt, and choose option #2 at the second voice prompt.

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

Medicated Assisted Treatment Bridge (MAT)

History
- Ingestion or suspected ingestion of an opioid
- 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
- Decreased respiratory rate
- Nausea / Vomiting
- Sweating
- Joint Aches
- Agitation
- Tremor
- Insomnia

Exclusion Criteria
- Buprenorphine allergy or hypersensitivity
- Currently on MAT medication
- Methadone, MAOI, or UDS and Methadone
- Severe respiratory insufficiency
- Severe hepatic insufficiency
- Acute alcoholism or delirium tremens
- Acute mental health problems
- Untreated psychiatric comorbidity and/or condition required hospitalization
- Recent head injury / loss of consciousness
- Breast Feeding or Children < 18 years of age
- Prolong QT (EKG Screening required)
- Pregnancy
- Chronic pain and on prescription opioids

Patient presents with opioid withdrawal Symptoms

→ Nausea / Vomiting Protocol ***if indicated***

P Medical & Psychiatric Clearance

- Well person Check Protocol UP20
- **Assess Withdraw Severity**
- **Objective signs and Clinical Opiate Withdrawal Scale (COWS)**

If Appropriate & GCS 15
Offer MAT
(COWS Score greater than 8)

NO → Leave Naloxone Kit With family/Associate
- Crisis Brochure
- Harm Reduction Info
- Support Foundations

→ P Buprenorphine not Indicated *May contact DEAX waivered Medical Director for orders if thought to be indicated

YES → Patient Signs Release of Information

NO → Leave Naloxone Kit With family/Associate
- Crisis Brochure
- Harm Reduction Info
- Support Foundations

YES → Patient Signs a Consent for Buprenorphine Administration

NO → Leave Naloxone Kit With family/Associate
- Crisis Brochure
- Harm Reduction Info
- Support Foundations

YES → P Contact approved Medical Director for the initial dose of Buprenorphine

YES → P 8 mg of Buprenorphine SL

Reassesses after 45-60 minutes
Clinical signs of withdrawal present?

NO → P Daily Administration will be the **total amount required initially of buprenorphine** and will be administered once daily by the community paramedic for up to 6 additional days or until patient care is transferred to the appropriate OBOT for treatment. **After the initial dose has been administered The Receiving Physician or the EMS Medical Director must be informed In person or via phone prior to subsequent doses**

YES → P Administer Additional 8 mg of Buprenorphine SL

Toxin-Environmental Protocol Section

Medicated Assisted Treatment Bridge (MAT)

Suboxone (buprenorphine /w naloxone) helps stabilize and maintain many people in recovery from opioid use disorders.

Suboxone (buprenorphine /w naloxone) is unique from other treatment drugs such as methadone (and buprenorphine monotherapy) in that it is formulated in combination with naloxone, which is an opioid antagonist. As an antagonist, the naloxone binds to and inhibits the activation of opioid receptors, which can prevent a person from experiencing the effects of an opioid drug. The combination is designed to discourage users from abusing Suboxone by methods such as dissolving the drug in solution for injection since they will not achieve a high from the drug.

Common minor side effects include:
Nausea and vomiting
Constipation
Muscle aches/cramps
Sleep disturbances

More serious side effects of buprenorphine may include:
Blurred vision
Confusion
Lightheadedness/dizziness
Drowsiness and unusual fatigue
Breathing difficulties such as slowed breathing

Once a patient has agreed to the treatment program, the Community Paramedic must contact an Iredell County EMS approved (approved list on file) physician for a verbal order to administer the first dose of buprenorphine.

There must be a discussion with the Receiving Physician or the EMS Medical Director after the first dose and prior to subsequent doses. An Iredell County EMS approved (approved list on file) physician will be primary contact for Program Participants for medical direction. This can be in person or via phone.

Patient referral to an approved Office Based Opioid Treatment (OBOT) program must be initiated within 24 hours of the initial buprenorphine dose, barring extenuating circumstances.

The PEER support specialist must be involved in the continuation of care for all overdose patient regardless if the qualify for buprenorphine treatment.

HIPAA and Release of Information forms must be completed prior to the Patient entering the MAT Bridge/ OBOT program.

Suboxone (buprenorphine /w naloxone) can ONLY be administered and carried by an approved Community Paramedic who has completed all required training.

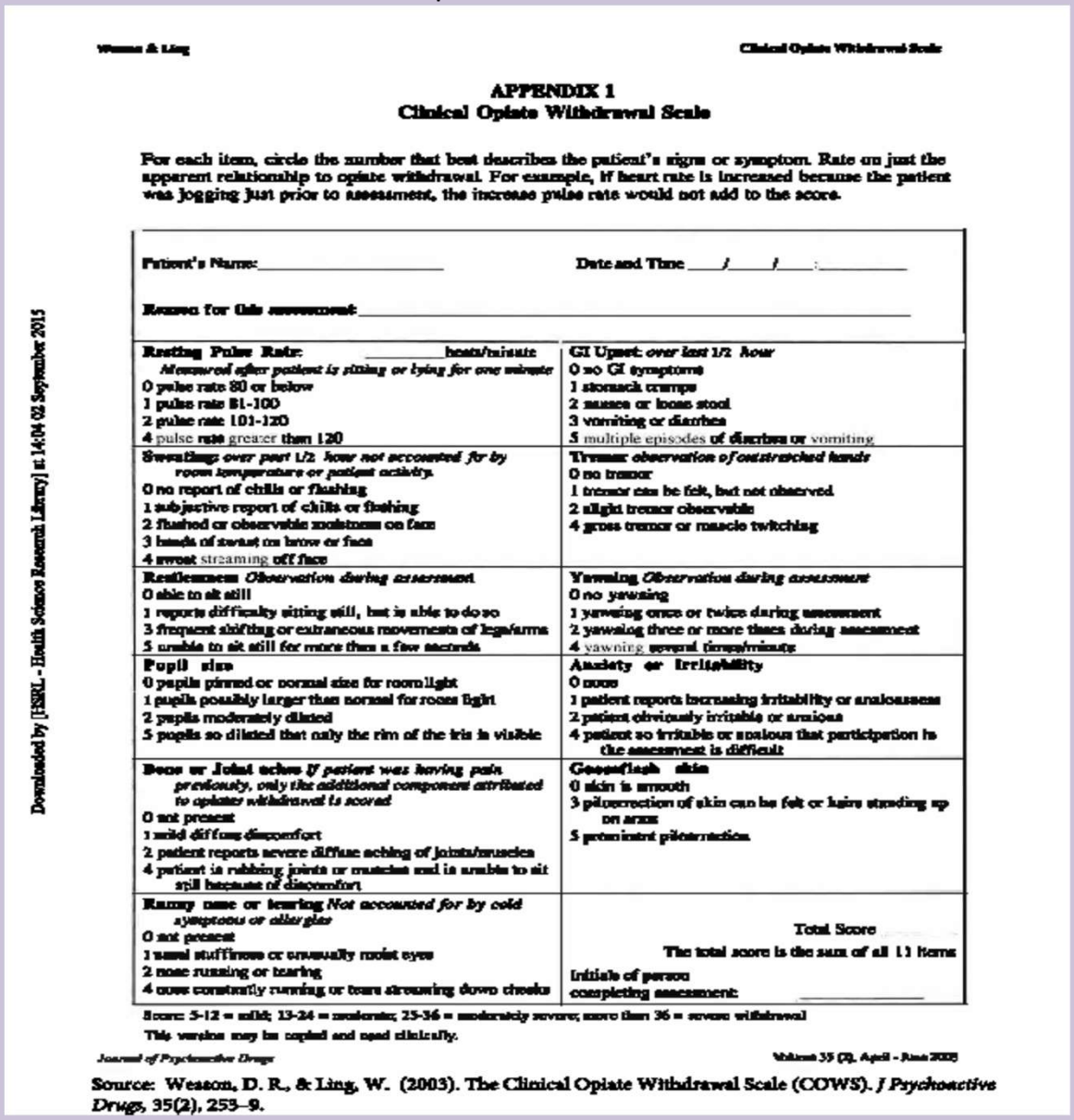
Toxin-Environmental Section

Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **North Carolina Opiate prescription database must be reviewed prior to initiating treatment with buprenorphine.**
- **Contact with the patient (if not immediate) should be within 24-72 hours, barring extenuating circumstances.**
- **PEER support specialist should be notified within 24 -72 hours, barring extenuating circumstances.**
- All components of the Behavioral Health Assessment must be completed along with a physical assessment.
- Ensure patient does not have a history of an adverse reaction to Buprenorphine and is on no other Medication Assisted Treatment medications.
- COWS: Clinical Opiate Withdrawal Scale (COWS) must be completed prior to each dose of buprenorphine. The Clinical Opiate Withdrawal Scale (COWS) is designed to reproducibly rate common signs and symptoms of opiate withdrawal and monitor these symptoms over time. The score can be used to help clinicians determine the stage or severity of opiate withdrawal and assess the level of physical dependence on opioids.
- The goal of induction is to safely suppress opioid withdrawal as rapidly as possible with adequate doses of Buprenorphine. Failure to do so may cause patients to use opioids or other medications to alleviate opioid withdrawal symptoms or may lead to early treatment dropout.
- The induction begins by assessing last use of all opioids, short and long acting, objective and subjective symptoms and a COWS score calculation. If not in sufficient withdrawal (mild to moderate: COWS of 5 to 24), it is in the patient s best interest to wait unless an overdose was experienced.
- A daily log sheet must be completed each day a dose is given, with amount given, route, time, COWS score, who administered, and any side effects.
- Health care professionals should take actions and precautions and develop a treatment plan when buprenorphine is used in combination with benzodiazepines or other CNS depressants. These include: Educating patients about the serious risks of combined use, including overdose and death, that can occur with CNS depressants even when used as prescribed, as well as when used illicitly.
- Developing strategies to manage the use of prescribed or illicit benzodiazepines or other CNS depressants when starting MAT.
- Recognizing that patients may require MAT medications long term or indefinitely and that their use should continue for as long as patients are benefiting and their use contributes to the intended treatment goals.

Medicated Assisted Treatment Bridge (MAT)

SAMPLE Clinical Opioid Withdraw Scale Worksheet



Wesson & Ling — Clinical Opiate Withdrawal Scale

APPENDIX 1
Clinical Opiate Withdrawal Scale

For each item, circle the number that best describes the patient's signs or symptom. Rate on just the apparent relationship to opiate withdrawal. For example, if heart rate is increased because the patient was jogging just prior to assessment, the increase pulse rate would not add to the score.

Patient's Name:_____ Date and Time ___/___/___:_____

Reason for this assessment:_____

Resting Pulse Rate: _____beats/minute *Measured after patient is sitting or lying for one minute* 0 pulse rate 80 or below 1 pulse rate 81-100 2 pulse rate 101-120 4 pulse rate greater than 120	**GI Upset:** *over last 1/2 hour* 0 no GI symptoms 1 stomach cramps 2 nausea or loose stool 3 vomiting or diarrhea 5 multiple episodes of diarrhea or vomiting
Sweating: *over past 1/2 hour not accounted for by room temperature or patient activity.* 0 no report of chills or flushing 1 subjective report of chills or flushing 2 flushed or observable moistness on face 3 beads of sweat on brow or face 4 sweat streaming off face	**Tremor:** *observation of outstretched hands* 0 no tremor 1 tremor can be felt, but not observed 2 slight tremor observable 4 gross tremor or muscle twitching
Restlessness *Observation during assessment* 0 able to sit still 1 reports difficulty sitting still, but is able to do so 3 frequent shifting or extraneous movements of legs/arms 5 unable to sit still for more than a few seconds	**Yawning** *Observation during assessment* 0 no yawning 1 yawning once or twice during assessment 2 yawning three or more times during assessment 4 yawning several times/minute
Pupil size 0 pupils pinned or normal size for room light 1 pupils possibly larger than normal for room light 2 pupils moderately dilated 5 pupils so dilated that only the rim of the iris is visible	**Anxiety or Irritability** 0 none 1 patient reports increasing irritability or anxiousness 2 patient obviously irritable or anxious 4 patient so irritable or anxious that participation in the assessment is difficult
Bone or Joint aches *If patient was having pain previously, only the additional component attributed to opiate withdrawal is scored* 0 not present 1 mild diffuse discomfort 2 patient reports severe diffuse aching of joints/muscles 4 patient is rubbing joints or muscles and is unable to sit still because of discomfort	**Gooseflesh skin** 0 skin is smooth 3 piloerection of skin can be felt or hairs standing up on arms 5 prominent piloerection
Runny nose or tearing *Not accounted for by cold symptoms or allergies* 0 not present 1 nasal stuffiness or unusually moist eyes 2 nose running or tearing 4 nose constantly running or tears streaming down cheeks	Total Score _____ The total score is the sum of all 11 items Initials of person completing assessment: _____

Score: 5-12 = mild; 13-24 = moderate; 25-36 = moderately severe; more than 36 = severe withdrawal

This version may be copied and used clinically.

Journal of Psychoactive Drugs — Volume 35 (2), April - June 2003

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Source: Wesson, D. R., & Ling, W. (2003). The Clinical Opiate Withdrawal Scale (COWS). *J Psychoactive Drugs*, 35(2), 253–9.

Adjunct Therapies:
For patients not wanting buprenorphine or if symptoms are still present after max dose of buprenorphine;

- Nausea: Zofran
- Body aches: Acetaminophen or Ibuprofen
- Anxiety/Irritability/Itching: Benadryl

Buprenorphine Drug Interactions;

- MOAI use w/n past 14 days
- HIV Medications
- Rifampin
- Azole Antifungals
- Antibiotics
- Benzos
- CYP3A4 interactions with Liver failure patients

Drugs That Increase BUP Levels;

- **HIV Meds, Azole Antifungals, Macrolides, Quinolones**

Dose these patients starting at LOWER end of dose range

Drugs That Decrease BUP Levels;

- **Rifampin, Phenytoin, Carbamazepine**

Consider Starting at HIGHER initial dose range

Toxin-Environmental Section

Addendum #1 Opioid Agonist and Duration of Action

Full Agonist		
Short Acting	Intermediate Acting	Long Acting
Fentanyl (Abstral, Actiq, Fentora, Lazanda, Onsolis, Subsys)	*Hydrocodone (Norco, Vicodin, Vicoprofen, Lorcet, Lortab, Hycet, Hycodan, Tussionex, Hydromet)	Morphine CR, ER (MS Contin, Oramorph SR, Kadian, Avinza, Arymo ER, Morphabond ER)
Remifentanil (Ultiva)	Oxycodone IR (Roxicodone, Percocet, Endocet)	Oxycodone CR, ER (OxyContin, Xtampza ER)
Sufentanil (Dsuvia)	Tapentadol IR (Nucynta)	Oxymorphone ER (Opana ER)
Alfentanil (Alfenta)	Opium (B&O Supprettes)	Hydromorphone ER (Exalgo ER)
	*Codeine (Tylenol with Codeine #3, #4; Phenergan VC; Guaifenesin AC; Fiorinal or Fioricet with Codeine; Cheratussin; Lortuss EX; Maxifed)	Fentanyl transdermal (Duragesic)
	Meperidine (Demerol)	Buprenorphine transdermal (BuTrans)
	Hydromorphone IR (Dilaudid)	Tapentadol ER (Nucynta ER)
	Morphine IR (Embeda)	Hydrocodone ER (Zohydro ER, Hysingla ER)
	Oxymorphone IR (Opana)	Tramadol ER (Ultram ER, ConZip)
		***Methadone (Dolophine) – Extremely Long Acting
Partial/Mixed Agonist		
	Tramadol (Ultram, Ultracet)	Buprenorphine (Sublocade, Probuphine)
	Pentazocine (Talwin NX)	
	Butorphanol (Stadol)	
	Buprenorphine (Subutex, Suboxone, Belbuca, Zubsolv, Bunavail)	
	Nalbuphine (Nubain)	
Illicit Substances		
Heroin	Kava (Kava Kava)	
	Kratom (Mitragynine)	
	Salvia divinorum (Salvinorin A)	
	U-47700	

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.
4) 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 COVID (FEVER AND/OR Dyspnea) 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 Potential:
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 pair 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 to only those necessary for care to limit potential exposures.
- 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.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 if limited supply:

  First Responders should consider staging with all incidents and sending 1 provider team (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 (Optional)

Terminal Illness?
Life-altering Chronic Illness?
NO → Exit to Appropriate Adult or Pediatric Protocol(s)
YES

Request CP or MIH Medic To Scene
If available

Established Hospice Patient?
Active Hospice Care?
NO → Hospice Referral → Exit to Appropriate Adult or Pediatric Protocol(s)
YES

Hospice Service or RN Notified of EMS Response
NO → Contact Hospice Service and Ensure Hospice Response to scene
Local Hospice Agency(s) Contact Number
YES

Patient Requires or Desires Medical Transport
YES → Involve Hospice Service in transport decision and/or make aware of transport and destination → Exit to Appropriate Adult or Pediatric Protocol(s)
- IV or IO Access Protocol UP 6
- Parenteral Access Existing Catheters Procedure PAS 7 ***If available***
- Port-A-Cath Access Procedure PAS 13 ***If available***

NO

Patient Expectant Actively Dying
NO → P Administer Medications from **eKit** Follow instructions in **eKit** or Equivalent Medications from EMS Suppy *See Pearls*
YES

Patient Suffering Pain / Uncomfortable Air hunger?
NO
YES

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

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

Special Circumstances Section

Hospice or Palliative Care Patient (Optional)

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

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

NO

Do not administer:

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

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 be submitted 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 or thighs, unless specific guidance is given per local public health department; follow procedure USP-4 otherwise.

Scene Rehabilitation: General

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

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

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

YES → Exit to Scene Rehabilitation Responder Protocol

NO

Heat or Cold stress

YES → **HEAT STRESS**

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

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

YES → **COLD STRESS**

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

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

NO

Reassess responder after 20 Minutes in General Rehabilitation Section
Reassess VS

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

HR ≥ 110 → NO → Temp ≥ 100.6 → YES → Extend Rehabilitation Time Until VS Improve

Temp ≥ 100.6 → 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

In addition to Pearls:

Criteria for Establishing Rehabilitation Section:

Any incident or activity that is large in size, long in duration and / or labor intensive will rapidly deplete the energy and strength of personnel and therefore merits consideration for rehabilitation section.
Each agency should develop a policy outlining when rehabilitation is warranted on initial notification of an incident.
Fire, EMS, First Responders and Law Enforcement should consider rehabilitation during initial stages of response.
Environment conditions indicating the need to establish rehabilitation are Heat Stress Index > 90 degrees / Wind-Chill Index < 10 degrees but this should not be the sole indicators.

Site Characteristics of a Rehabilitation Section:

Locate a site protected from environmental conditions where physical and mental rest can occur.
Ensure location allows prompt reentry into operations upon recuperation with entry and exits clearly identified.

Criteria for Rehabilitation of Responder:

Objective evaluation or self assessment of responder's fatigue level shall also determine mandatory rehabilitation.

Hydration:

Maintenance of hydration and electrolytes are critical in the prevention of heat injury.
Water must be replaced at incidents. During heat stress the responder should consume at least one (1) quart of water each hour.
OPTIMAL Re-hydration solution: 50 / 50 mixture of water and a commercially prepared activity beverage at 40 degrees.
Avoid carbonated or caffeinated beverages.
Re-hydration is important even during cold stress conditions especially where protective equipment is worn.

Nourishment:

Typically required where incidents extend more than three (3) hours.
Soup, broth or stew is recommended as this is digested easier than sandwiches / fast food products.
Fruits such as apples, oranges and bananas are also recommended.
Fatty / salty foods should be avoided.

Recovery:

Responders should maintain high level of re-hydration during recovery of at least 10 minutes or longer as needed.
Do not move responder from a hot environment to a cold environment such as air conditioning.
Air conditioning is acceptable after period of cool down at ambient temperature.

Special Operations Section

Pearls

- **Rehabilitation officer has full authority in deciding when responders may return to duty and may adjust rest / rehabilitation time frames depending on existing conditions.**
- **Rehabilitation goals:**
  - **Relief from climatic conditions.**
  - **Rest, recovery, and hydration prior to incident, during, and following incident.**
  - **Active and / or passive cooling or warming as needed for incident type and climate conditions.**
- **May be utilized with adult responders on fire, law enforcement, rescue, EMS and training scenes.**
- **Responders taking anti-histamines, blood pressure medication, diuretics or stimulants are at increased risk for cold and heat stress.**
- **General indications for rehabilitation:**
  - 20-minute rehabilitation following use of a second 30-minute SCBA, 45-minute SCBA or single 60-minute SCBA cylinder.
  - 20-minute rehabilitation following 40 minutes of intense work without SCBA.
- **General work-rest cycles:**
  - 10-minute self-rehabilitation following use of one 30-minute SCBA cylinder or performing 20 minutes of intense work without SCBA.
- **Serious signs / symptoms:**
  - Chest pain, dizziness, dyspnea, weakness, nausea, or headache.
  - Symptoms of heat stress (cramps) or cold stress.
  - Changes in gait, speech, or behavior.
  - Altered Mental Status.
  - Abnormal Vital Signs per agency SOP or Policy / Procedure.
- **Rehabilitation Section:**
  - Integral function within the Incident Management System.
  - Establish section such that it provides shelter / shade, privacy and freedom from smoke or other hazards
  - Large enough to accommodate expected number of personnel.
  - Separate area to remove PPE.
  - Accessible to EMS transport units and water supply.
  - Away from media agencies and spectators / bystanders.

Scene Rehabilitation: Responder

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

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

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

NFPA Age Predicted 85 % Maximum Heart Rate	
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
Oral Rehydration

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

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

- **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.

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Medication	Adult Dosing	Pediatric Dosing
Acetaminophen (Tylenol) **Protocol:** UP10 UP11 **Indications/Contraindications:** • Indicated for pain and fever control • Avoid in patients with severe liver disease	• 325-1000mg PO	• 15mg/kg PO
Activated Charcoal **Protocol:** TE7 **Indications/Contraindications:** • Used in overdose to reduce absorption of substance in GI tract • Avoid in patients who are altered and at risk of aspiration	• 1g/kg PO	**Not Applicable**
Adenosine (Adenocard) **Protocol:** AC6 AC7 PC5 PC6 **Indications/Contraindications:** • Treatment or diagnosis of Supraventricular Tachycardia	• 6mg RAPID IV push • If no response, repeat with 12mg RAPID IV push, x2 doses • Use stopcock and 20ml Normal Saline flush with each dose	• 0.1mg/kg RAPID IV push (Max 6mg) • If no response, repeat with 0.2mg/kg RAPID IV push (Max 12mg), x2 doses • Use stopcock and Normal Saline flush with each dose

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Albuterol **Protocol:** AM1 AR4 AR7 PM1 TB3 **Indications/Contraindications:** • Respiratory distress with bronchospasm	• 2.5-5.0mg (3cc) in nebulizer continuously x 3 doses. Anaphylaxis and hyperkalemia • 2.5mg (3cc) in nebulizer continuously x 3 doses.	• 1.25-2.5mg (3cc) in nebulizer continuously x 3 doses.
Amiodarone (Cordarone) **Protocol:** AC7 AC8 PC7 PC8 **Indications/Contraindications:** • Antiarrhythmic used in wide complex tachycardia and ventricular fibrillation. • Avoid in patients with heart block or profound bradycardia. • Contraindicated in patients with • iodine hypersensitivity	V-fib / pulseless V-tach • 300mg IV/IO push • Repeat dose of 150mg IV/IO push for recurrent episodes V-tach with a pulse • 150mg in 100cc D5W over 10 min, IV/IO • Drip: 450mg in 250cc D5W, 1mg/min (33cc/hr), IV/IO	V-fib / pulseless V-tach • 5mg/kg IV/IO push over 10 minutes • Repeat doses every 10 minutes PRN • May repeat up to 15mg/kg IV/IO • Max single dose 300mg
Aspirin **Protocol:** AC4 UP11 **Indications/Contraindications:** • Suspected ACS • Pain	ACS: • 81mg chewable (baby)-4 tablets OR • 325mg PO Pain: • 324-650mg PO	**Not Applicable**

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Medication	Adult Dosing	Pediatric Dosing
Atropine **Protocol:** AC2 PC2 TE8 **Indications/Contraindications:** • Bradycardia. • In Organophosphate toxicity, large doses may be required (>10 mg)	Bradycardia: • 0.5mg IV q3-5min • Max total dose: 3 mg Organophosphate: • 2mg IM/IO/IV, q3-5min or until symptoms resolve	Bradycardia: • 0.02mg/kg IV/IO • Min 0.1 mg per dose • Max 0.5 mg per dose • Max total dose 1mg IV • May repeat in 3 - 5 minutes one time Organophosphate/Nerve Agent: • <18kg- 0.5mg • 18-40kg- 1mg • >40kg- 2mg • q3-5min or until symptoms resolve
Atropine and Pralidoxime Auto-Injector Nerve Agent Kit **Protocol:** TE8 **Indications/Contraindications:** • Antidote for nerve agent poisoning	• Auto-injector- 3 doses rapidly	**Not Applicable**
Calcium Chloride **Protocol:** AM3 TB3 TE7 **Indications/Contraindications:** • Indicated for severe hyperkalemia • Indicated in calcium channel blocker overdose	• 1gm IV/IO over 10 minutes	• 10mg/kg IV/IO over 10 minutes Crush Syndrome: • 20mg/kg IV/IO over 10 minutes

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Medication	Adult Dosing	Pediatric Dosing
Calcium Gluconate **Protocol:** AM3 TB3 TE7 **Indications/Contraindications:** • Indicated for severe hyperkalemia • Indicated in calcium channel blocker overdose	• 2gm IV/IO over 10 minutes • Avoid use if pt is taking digoxin	• 30mg/kg IV/IO over 10 minutes
Cefazolin (Ancef) **Protocol:** TB4 **Indications/Contraindications:** • Antibiotic for open fractures • Close monitoring in patients with penicillin allergies	• 2g IV/IO over 10 minutes	• 20mg/kg IV/IO over 10 minutes
Dextrose 10%, 25%, 50% **Glucose solutions** **Protocol:** AM2 PM2 **Indications/Contraindications:** • Use in hypoglycemic states	• D50 12.5 - 25gm IV/IO • D10 125ml- 250ml IV/IO	• < 1 year: D10 5mL/kg IV/IO • 1-2 years: D25 2mL/kg IV/IO • > 2 year: D50 1mL/kg IV/IO

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Medication	Adult Dosing	Pediatric Dosing
Diltiazem (Cardizem) **Protocol:** AC6 **Indications/Contraindications:** • Calcium channel blocker used to treat narrow complex SVT • Contraindicated in patients with heart block, ventricular tachycardia, and/or acute MI	• 20mg IV/IO, over 2-3 minutes • **If rate not controlled repeat bolus in 15 minutes,** give 25mg IV/IO • Drip: 5-15mg/hr IV/IO • **If age ≥ 60 give 10 mg then** repeat **10 mg** in 5 minutes, if SBP >100mmHG • If rate not controlled repeat bolus give **15 mg** then repeat **10 mg** in 5 minutes	**Not Applicable**
Diphenhydramine (Benadryl) **Protocol:** AM1 PM1 **Indications/Contraindications:** • Indicated for allergic reactions	• 25-50mg IV/IO/IM/PO	• 1 mg/kg IV/IO/IM/PO • Do not give in infants < 3 mo
Epinephrine 1:1,000 **Protocol:** AM1 AR4 AR7 PM1 **Indications/Contraindications:** • Vasopressor used in anaphylaxis • Indicated in refractory asthma attacks • Indicated for stridor in nebulized form	Anaphylaxis/Asthma: • 0.3-0.5mg IM • q5min in anaphylaxis • x1 dose in Asthma Stridor: • 1 mg mixed with 2 ml of Normal Saline, repeat x1	Anaphylaxis: • >30kg, 0.3-0.5mg IM • <30kg 0.15mg IM • q5min Asthma: • 0.01mg/kg IM once • Max 0.3,g Stridor: • 1 mg mixed with 2 ml of Normal Saline

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Medication	Adult Dosing	Pediatric Dosing
Epinephrine 1:10,000 **Protocol:** AC1 AC9 AO2 PC1 PC7 **Indications/Contraindications:** • Vasopressor used in cardiac arrest.	• 1.0mg IV/IO, single dose	• 0.01mg/kg IV or IO • Repeat every 3 - 5 minutes • Max dose 1 mg
Epinephrine Push Dose/Drip **Protocol:** AC2 AM1 AM5 PC2 PM1 PM3 UP15 **Indications/Contraindications:** • Vasopressor used in anaphylaxis and hypotension • Do not use if HR >120	• Take Epinephrine 1:1,000 and put it into 1000ml of NS or LR • Titrate to SBP>90 • Push dose: 5mcg (5ml)/ IV/IO q2min PRN • Drip: 10 drop set, 50drips/min= 5mcg/min	• Take Epinephrine 1:1,000 and put it into 1000ml of NS or LR • Titrate to SBP=70+ (2xMAP) or MAP >65 • Push dose: 2mcg (5ml)/ IV/IO q2min PRN
Etomidate **Protocol:** AR3 **Indications/Contraindications:** • Sedative used in DAI	• 0.3mg/kg IV/IO • May repeat x1	**Not Applicable**

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Medication	Adult Dosing	Pediatric Dosing
Fentanyl (Sublimaze) **Protocol:** AC4 AR8 UP11 **Indications/Contraindications:** • Narcotic pain relief	• 50mcg IV/IO/IM bolus, q5min prn • Max dose 300mcg	• 1mcg/kg IV/IO/IN/IM • May repeat 0.5mcg/kg every 5 minutes • Maximum dose 2mcg/kg
Glucagon **Protocol:** AM2 PM2 TE7 **Indications/Contraindications:** • Indicated in hypoglycemia to release glucose into blood stream by glycogen breakdown • Indicated in BB or CCB overdose • Use in patients with no IV access	Hypoglycemia • 1-2mg IM • Repeat blood glucose measurement in 15 minutes, if ≤ 69 mg/dl repeat dose. BB/CCB Overdose • 3mg IV/IO/IM q5min	Hypoglycemia • 0.1 mg/kg IM, Maximum 1 mg • Repeat blood glucose measurement in 15 minutes, if ≤ 69 mg/dl repeat dose. BB/CCB Overdose • 0.1mg/kg IV/IO/IM q5min
Glucose Oral Glucose Solutions **Protocol:** AM2 PM2 **Indications/Contraindications:** • Use in conscious hypoglycemic states	• One tube or packet • Repeat BGL in 15 minutes and readminister if BGL <70	• 1/2-1 Tube or packet • Repeat BGL in 15 minutes and readminister if BGL <70 • Consider patient's ability to swallow and follow directions based on age

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Medication	Adult Dosing	Pediatric Dosing
Haloperidol (Haldol) **Protocol:** UP18 **Indications/Contraindications:** • Medication to assist with sedation of agitated patients	• >12 years old, 5mg IM • >65 years old, 2.5mg IM q5min • Max total dose: 10mg	**Not Applicable**
Hydroxocobalamin **Protocol:** TE2 **Indications/Contraindications:** • Antidote for cyanide poisoning	• 70mg/kg IV/IO • Max dose: 5g	**Not Applicable**
Ibuprofen (Motrin) **Protocol:** UP10 UP11 **Indications/Contraindications:** • A nonsteroidal anti-inflammatory drug (NSAID) used for pain and fever control. • Avoid NSAIDS in women who are pregnant or could be pregnant. • Not to be used in patients with history of GI Bleeding (ulcers) or renal insufficiency. • Not to be used in patients with allergies to aspirin or other NSAID drugs • Avoid in patients currently taking anticoagulants, such as coumadin.	• 400-600mg po • Max: 800mg	• 10 mg/kg po • Do not use in patients 6 months of age or younger

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Medication	Adult Dosing	Pediatric Dosing
Ipratropium (Atrovent) **Protocol:** AM1 AR4 AR7 PM1 **Indications/Contraindications:** • Medication used in addition to albuterol to assist in patients with asthma and COPD	• 0.5 mg per nebulizer treatment, x3 doses prn	• 0.5 mg per nebulizer treatment, x3 doses prn
Ketamine **Protocol:** AC3 AR8 UP11 **Indications/Contraindications:** • Sedative used in DAI and for extreme agitation • Lower doses used for pain control	DAI/CPR induced Consciousness: • 2mg/kg IV/IO Pain control: • 0.2mg/kg IV/IO • Place into 50-250ml NS and run over 10min • Repeat q20min • Max single dose 30mg • Max total dose 90mg Agitation: • 4mg/kg IM • Max 400mg	**Not Applicable**
Labetalol (Trandate; Normodyne) **Protocol:** AM6 **Indications/Contraindications:** • Hypertension • Not to be used in bronchial asthma, CHF, Bradycardia, Advanced heart block (2nd TII or 3rd), Cardiogenic shock	• 10 mg slow IV/IO Push over 2 minutes • Drip: Titrate by 1mg/min q15min to maintain SBP <180, DBP<105 • Max dose: 8mg/min	**Not Applicable**

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Lidocaine **Protocol:** AC7 AC8 AC9 AC10 PC7 PC8 **Indications/Contraindications:** • Antiarrhythmic used for control of ventricular dysrhythmias	• 1mg/kg IV/IO bolus q10min, x3 doses • 3mg/kg max bolus dose • Drip: 2mg/min IV/IO	• 1mg/kg IV/IO bolus, q10min • Maximum 100mg • Maximum total dose: 3 mg/kg
Magnesium Sulfate **Protocol:** AC8 AC9 AR4 AR7 AO3 PC7 **Indications/Contraindications:** • Electrolyte used to treat eclampsia • A smooth muscle relaxer used in refractory respiratory distress	**Respiratory Distress:** • 2g IV/IO over 10 minutes **Obstetrical Seizure:** • 2g IV/IO over 2-3 minutes • Dose may be repeated once **Torsades de Pointes/Refractory Vfib/Vtach:** • 2g IV/IO up to 4g	**Respiratory Distress:** • 40mg/kg IV/IO over 10 minutes (Max 2 gms) **Torsades de Pointes/Refractory Vfib/Vtach:** • 40mg/kg IV/IO over 2 minutes, repeat x1 dose in 5 min prn

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Medication	Adult Dosing	Pediatric Dosing
Methylprednisolone (Solu-medrol) **Protocol:** AM1 AR4 AR7 PM1 **Indications/Contraindications:** • Steroid used in respiratory distress for inflammatory and allergic reactions • Caution in brittle diabetics	• 125 mg IV/IO/IM	• 2 mg/kg IV/IO/IM • Max 125 mg
Midazolam (Versed) **Protocol:** AC2 AC6 AC7 AC8 AO3 PC5 PC6 TE1 TE3 UP13 UP18 UP19 **Indications/Contraindications:** • Benzodiazepine used to control seizures • Use with caution if BP < 100	Sedation/Muscle Spasm: • 2.5mg IV/IO/IM, q5min • Max total dose: 10mg total Agitation: • 10mg IM • 2.5mg IV/IO • >65 years old: 1mg IV/IO • >65 years old: 5mg IM Seizure: • >50kg 5mg IM • <50kg 2.5mg IM • q5min • 2.5mg IV/IO, q3-5min • Max total dose: 10mg	Sedation/Agitation: • 0.1-0.2mg/kg IV/IO/IM/IN • Max dose: 2.5mg • Max total dose: 5mg Muscle Spasm: • 0.2mg/kg IV/IO/IM q5min Seizure: • 0.2mg/kg IV/IO, q3-5min • Max dose: 2.5mg • Max total dose: 10mg

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Medication	Adult Dosing	Pediatric Dosing
Morphine Sulfate **Protocol:** AC4 AR8 UP11 **Indications/Contraindications:** • Narcotic pain relief • Possible beneficial effect in pulmonary edema • Avoid use if BP < 100	• 2mg IV/IO bolus, q5m prn • Max dose: 10mg Intubated/BIAD Pain Control: • 4mg IV/IO bolus, then 2mg q5min PRN • Max dose: 10mg	• 0.1 mg/kg IV / IO, q5 minutes • Maximum single dose: 4 mg • Maximum total dose: 10 mg
Naloxone (Narcan) **Protocol:** TE7 **Indications/Contraindications:** • Narcotic antagonist	• 0.4-2mg IV/IO/IM/IN/ETT bolus titrated to patient's respiratory response • Carfentanil and Etorphine exposures may require starting doses of 10 to 30 mgs.	• 0.1 mg/kg IV/IO/IN/IM/ETT
Nicardipine (Cardene) **Protocol:** AM6 **Indications/Contraindications:** • IV Calcium channel blocker used to lower BP in CVA	• Drip: Titrate by 2.5mg/hr, q5min • Maintain SBP<180, DBP <105 • Max 15mg/hr	**Not Applicable**

Nitroglycerin
 	
Protocol:
AC4
AC5
 	
Indications/Contraindications:
• Vasodilator used in ACS and CHF.
	• 0.3 / 0.4 mg SL every 5 minutes until pain-free
	
	• Paste:
	  • SBP>100 1 inch
	  • SBP>150 1.5 inch
	  • SBP>200 2 inch
		Not Applicable

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Norepinephrine (Levophed) **Protocol:** UP15 AM5 **Indications/Contraindications:** • Vasopressor used for hypotension	• 5mcg/min IV/IO • Titrate to SBP>90	**Not Applicable**
Ondansetron (Zofran) **Protocol:** UP3 **Indications/Contraindications:** • Anti-Emetic used to control Nausea and/or Vomiting	• 4 mg IV/IO/IM/ODT, q15min prn	• 0.2 mg/kg PO/ODT,q15min prn • Max dose: 4mg
Oxymetazoline (Afrin or Otrivin) **Protocol:** UP9 **Indications/Contraindications:** • Vasoconstrictor used for epistaxis • Relative Contraindication is significant hypertension	• 2 sprays in affected nostril • Usual concentration is 0.05% by volume	• 2 sprays in affected nostril • Usual concentration is 0.05% by volume
Phenylephrine (Neosynephrine) **Protocol:** AM5 UP15 **Indications/Contraindications:** Vasopressor used in hypotension	• Mix 10mg in 1000mL of NS-10mcg/mL concentration • 50mcg (5cc) IV/IO q2min • Titrate to SBP>90	**Not Applicable**

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Pralidoxime (2-PAM) **Protocol:** TE8 **Indications/Contraindications:** • Antidote for Nerve Agents or Organophosphate Overdose Administered with Atropine	• 600 mg IV/IO/IM over 30 minutes for minor symptoms	15-25 mg/kg IV/IM/IO over 30 minutes
Promethazine (Phenergan) **Protocol:** UP3 **Indications/Contraindications:** Used for nausea and vomiting	• 12.5mg IM, q15min prn	**Not Applicable**
Rocuronium **Protocol:** AR3 AR8 **Indications/Contraindications:** Paralytic for DAI	• 1mg/kg IV/IO • May repeat x1	**Not Applicable**
Sodium Bicarbonate **Protocol:** AM3 TB3 TE7 **Indications/Contraindications:** A buffer used in acidosis to increase the pH in Hyperkalemia or Tricyclic Overdose.	• 50 mEq IV/IO bolus, q10min prn	• 1mEq/kg IV/IO bolus, q10min prn Maximum 50 mEq

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Succinylcholine **Protocol:** AR3 **Indications/Contraindications:** • Paralytic for DAI • Caution in patients at risk for hyperkalemia and malignant hyperthermia	• 2mg/kg IV/IO • May repeat x1	**Not Applicable**
Tranexamic Acid (TXA) **Protocol:** TB12 **Indications/Contraindications:** • Indicated for patients ages 16 years and older in trauma with signs & symptoms of shock with suspicion of internal hemorrhage and anticipation of blood transfusion. • Indications include BP <90 systolic, HR >110, altered LOC, pallor and diaphoresis. • Contraindications include time greater than 3 hours from onset of injury, shock stabilized by other means (tourniquet, direct pressure, and cases of minimal fluid loss), non-traumatic shock, and non-hemorrhagic shock. • Additional contraindications include pregnancy or evidence or history of intravascular clotting disorder (DVT, PE, Stroke)	• 1 gram in 100ml of NS over 10 minutes IV / IO	**Not Applicable**