

Annville Fire Department  
(Nueces County Emergency Services District # 1)



The attached Patient Care Field Protocols and Standing Orders are adopted as the official medical protocols for the Annville Fire Department as attested to by the signatures affixed below and shall be effective from October 1, 2023, until September 30, 2025.

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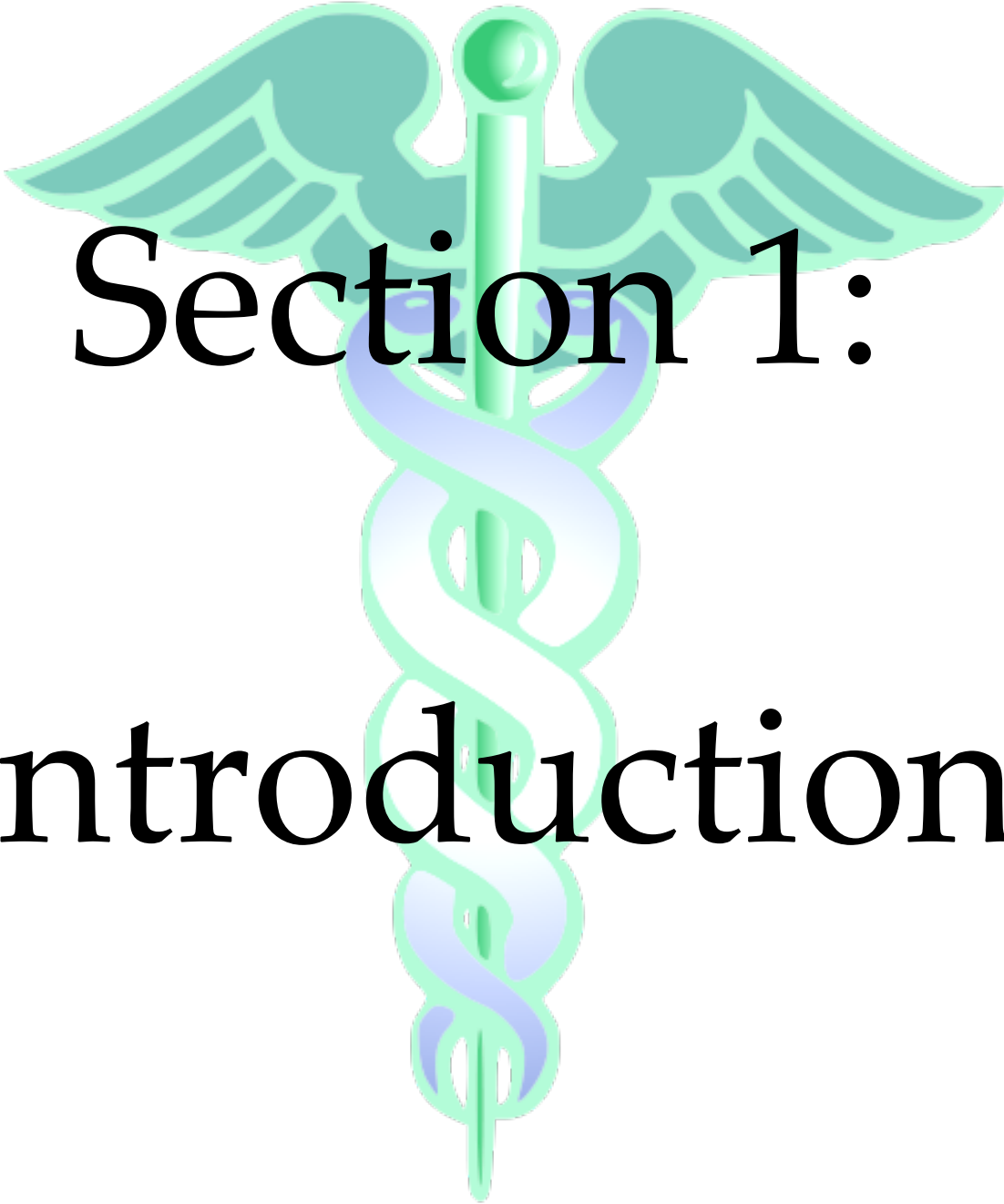
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# Section 1: Introduction

## Introduction to Patient Care Protocols and Standing Orders

The patient care field protocols and standing orders outlined in this manual are intended to serve as guidelines for all prehospital providers who practice under the medical license of the EMS Medical Director. Each treatment protocol begins with an introduction, a section on the basic life support (BLS) management of the given protocol, a section on the advanced life support management (ALS) of the same protocol, and finally pertinent notes regarding that protocol.

**It is imperative that all personnel using these protocols practice within their current level of state certification and that level recognized by the EMS Medical Director.** Thus, for each protocol, the BLS section will be directed for Emergency Medical Technicians-Basics (EMT-B's). The ALS section will continue on from the BLS section, and address the Emergency Medical Technicians-Paramedics (EMT-P's). Advanced EMT's (A-EMT's) will be allowed to perform only those ALS interventions that are designated by a ★ before the numbered protocol step.

This field protocol and standing order manual will supersede any and all prior patient care protocol manuals.

While these patient care protocols and standing orders cannot specifically address every possible variation of disease or injury, they do provide a foundation of prehospital care. Given the many unusual patient presentations that may be encountered in the prehospital arena, these protocols will serve as **guidelines** for the purpose of performing conscientious, standardized prehospital care. They are not meant to substitute for sound paramedic judgment based on education and experience. It is important that all prehospital care providers operating under these protocols recognize and consider them as guidelines. **In most instances, strict adherence should be maintained;** however, it is recognized that avoidable deviations may occur depending on particular circumstances. This stated, it is mandatory that any deviation from these protocols is included and well documented in the EMS patient care report and brought to the attention of the EMS Chief / Director as soon as possible. When the word "consider" is seen in this manual regarding a medication or procedure, the prehospital provider has the option to institute this treatment at his/her discretion, based on their training, experience, judgment, and the patient's condition.

These protocols closely reflect the current Advanced Cardiac Life Support (ACLS), Pediatric Advanced Life Support (PALS), and International Trauma Life Support (ITLS) / Prehospital Trauma Life Support (PHTLS) guidelines. Some protocols will require **contact with on-line medical control**, and these will be clearly identified in the applicable protocol with **bold print**. **Contact with medical control** as used in this manual refers to communication with the base station hospital (CHRISTUS Spohn Shoreline). Important points in these protocols that are stressed are also written in **bold print**. Throughout this manual, all comments and drug dosages regarding *pediatric patients* will be in *italics*. As these field protocols often contain many standing orders, it is very important that all therapies and interventions be administered in the sequence described.

These written patient care field protocols and standing orders define the standard of care that will be expected by the EMS Medical Director of everyone in this EMS system. They were written to ensure

consistent, high quality, and efficient prehospital patient care. In the rare event of loss of radio contact between the ambulance and base station hospital, these protocols must be followed exactly.

It is mandatory that all prehospital personnel using these protocols are very familiar with them. The base-station physician (on-line medical control) should be contacted immediately for consultation, advice, guidance, and authorization of treatments that may not be specifically addressed in this manual. The protocols are considered to be a dynamic process, and it is anticipated that they will be revised in the future as scientific advances are discovered, state and national guidelines change, and continuous quality improvement (CQI) items are uncovered.

Always treat patients and their families / friends as if they are a loved member of your own family. Provide the care you would want provided for your family if you were not there. Provide a compassionate and caring demeanor while employing a reassuring tone, words, and actions. Keep in mind that you provide a respected public service. Often the greatest asset provided to the citizens you serve is your reassurance and caring.

#### Geographical Area:

These patient care field protocols and standing orders will be for all personnel on duty. These protocols shall only be utilized under the medical direction of the EMS Medical Director in your local service area, mutual aid areas, when operating in regional deployments, and when on transfers that may occur outside the local geographic area. For off-duty coverage guidelines, please refer to Off-Duty Patient Care appendix, p. 164.

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## Definitions

For the purposes of consistency, the following definitions and parameters will be utilized throughout this manual:

### Vital Signs (Adult):

Hypertensive- systolic blood pressure > **220** mmHg (and/or) diastolic blood pressure > **110** mmHg.

Hypotensive- systolic blood pressure < 100 mmHg.

Tachycardia (adult)- heart rate > 100 beats per minute.

Bradycardia (adult)- heart rate < 60 beats per minute

Tachypnea (adult)- respiratory rate > 24 breaths per minute.

Hemodynamically Stable- patient does **not** have hypotension, tachycardia, or evidence of impaired generalized perfusion (delayed capillary refill, etc.).

Hemodynamically Unstable- patient has hypotension, tachycardia, or evidence of impaired generalized perfusion (delayed capillary refill, etc.).

### Age Definitions:

Neonate / Newborn: < 28 days old.

Infant: ≥ 28 days old and < 1 year old.

Child: ≥ 1 year old and < 8 y/o.

Pediatric: Age ≤ 16 y/o (or weight < 40kg).

Adult: Age > 16 y/o (or weight ≥ 40kg).



## Levels of Care / Skills Allowed

The levels of care and skills allowed in this protocol manual are established by the Texas Department of State Health Services (DSHS) and the EMS Medical Director. It is imperative that all personnel stay within their certification level as established by Texas DSHS. **No provider may perform a skill or treatment beyond his or her certification level.**

These protocols are for state certified EMS personnel only; however, an exemption to this will be students in an approved EMS-training program that are functioning under the direct supervision of certified EMS personnel. Personnel that are **not** EMS-certified by Texas DSHS should not be performing any patient care duties (including vital signs). These non-certified individuals will function only on a basic first aid level (e.g. CPR, assisting with patient packaging, direct-pressure hemorrhage control, etc.). Allied health personnel (including respiratory therapists and nurses) that do not have current Texas DSHS EMS certification **must** have written approval from the EMS Medical Director prior to using these protocols. This approval **must** be in the form of a letter sent to the Texas DSHS Region 11 office in Harlingen.

Non-EMS certified or licensed medical personnel who provide patient care in the provider's EMS vehicles (Critical Care Transport Team members, etc.) will do so under the medical direction of their own respective medical director. Specific orders pertaining to patient care provided by the respiratory therapist, nurse, and other non-EMS certified allied health personnel will be through physician oversight via **medical control** on a case-by-case basis. In addition, these personnel will supply their own medications and equipment necessary to perform their patient care duties.

The current levels of care and skills allowed include:

### **Basic Life Support (BLS)**

Emergency Medical Technician - Basic (EMT-B)- skills allowed include:

- Spinal motion restriction.
- Bandaging / splinting / dressing.
- Cardiopulmonary resuscitation (adult, child, infant).
- Oropharyngeal / nasopharyngeal airway (nasal trumpets).
- Oral suctioning.
- Oxygen administration (including bag-valve-mask).
- Automatic External Defibrillator (AED) application and operation.
- Blood glucose assessment.
- Pulse oximetry.
- Emergency childbirth.
- Traction splints.
- Albuterol nebulizers
- Intramuscular (IM) 1:1,000 epinephrine.
- Oral glucose.
- i-gel<sup>®</sup> airway device\* (*\*Annaville FD Only*).
- Peripheral Intravenous Access\* (*\*Annaville FD Only*).

**Advanced Life Support (ALS)**

**Advanced Emergency Medical Technician Basic (AEMT)**- skills allowed include all of the skills in BLS above **plus**:

- Acetaminophen (Tylenol®)
- Aspirin
- Calcium gluconate gel 2.5% topical
- Dextrose 10% (D<sub>10</sub>)
- Diphenhydramine (Benadryl®)
- Naloxone (Narcan®)
- Methylprednisolone (Solu-Medrol®)
- Ondansetron (Zofran®)

**Emergency Medical Technician- Paramedic (EMT-P)**- skills allowed include all of the skills in BLS and AEMT above **plus**:

- Orotracheal intubation.
- End-tidal CO<sub>2</sub> monitoring.
- All medications authorized in this protocol manual.
- Pleural decompression (needle thoracostomy).
- Transthoracic (external) cardiac pacing.
- External jugular venous cannulation.
- Intraosseous (IO) access.
- 4-lead cardiac (EKG) rhythm interpretation (cardiac monitoring).
- Manual defibrillation / synchronized cardioversion.
- 12-lead cardiac monitoring / interpretation.
- CPAP.
- Intranasal Mucosal Atomization Device (MAD Nasal™).
- Peripheral IV access\* (*\*approved skill in credentialed EMT-Bs in Annville FD*).

**Notes:**

- The Texas DSHS defines the minimum Advanced Life Support (ALS) ambulance as including all BLS equipment **plus** IV equipment / IV fluids, intubation equipment, and Dextrose 10% (D<sub>10</sub>).
- The Texas DSHS defines the minimum Mobile Intensive Care Unit (MICU) ambulance as including all ALS supplies / equipment, **plus** cardiac monitor / defibrillator, and medications as approved by the EMS Medical Director.
- For the purposes of this Patient Care Field Protocol and Standing Order manual, MICU and ALS will be referred to collectively as ALS.
- EMT-Basics in the Annville FD may perform peripheral intravenous cannulation in accordance with this protocol manual provided they pass a yearly IV class, and have their skills credentialed by the Annville EMS Assistant Chief or his / her designee.

## Receiving Hospitals / Diversion

All patients with an emergent (*i.e.* life-threatening) condition as deemed by paramedic assessment should be transported to the **closest appropriate** hospital. This includes, but is not limited to, patients who are in cardiac arrest, severe shortness of breath, unconscious, significant hypotension, airway compromise or respiratory distress requiring emergent intubation, and evidence of significant hemodynamic instability. Special patient needs may dictate transport to a hospital that may not be the closest, but is the most appropriate facility for that patient's medical care needs (*i.e.* major trauma, acute stroke, STEMI).

In the cases of significant multi-system trauma (*i.e.* meet Trauma Criteria, see p. 13), the patient should be transported to CHRISTUS Spohn Hospital- Shoreline or Driscoll Children's Hospital depending on the pre-established guidelines.

All questions regarding specific hospital destinations should be addressed with on-line medical control at CHRISTUS Spohn Hospital- Shoreline. If the patient is stable based on paramedic assessment and the system status is able to support a unit with an extended transport time, **every effort** should be made to transport the patient's hospital request within reason and if medically appropriate. This does **not** apply to patients with life-threatening conditions unless it has been approved through on-line medical control.

In the event of a mass casualty incident, the incident commander (or his / her designee) should contact the local receiving hospitals as soon as possible to ascertain their current availability regarding the numbers and types of patients they can receive.

At this time, no patients will be transported by EMS to any of the free-standing emergency rooms.

### Hospital Diversions

Effective July 1, 2011, all receiving hospitals in Corpus Christi have agreed to do away with diversion status as adopted through the Coastal Bend Regional Advisory Council (CBRAC).

However, it is recognized that an internal hospital disaster {power outage, water loss, bomb threat, equipment (*e.g.* CT scan out-of-service, etc.)) may cause a hospital to activate diversion status. In order for a hospital to go on divert for an internal disaster, the following should occur:

- A hospital should provide the local EMS system dispatch (MetroCom) of diversion activation and the anticipated length of time the diversion period will last.
- A hospital on diversion must notify the local EMS system dispatch (MetroCom) with deactivation of the diversion status.

### Definitions:

- Transfer: movement of a patient from one hospital to another based upon the patient's need (inter-facility transport).

- Bypass: intentional movement of a patient from the scene to a specific hospital (most appropriate facility), **not** necessarily the closest hospital, based upon the patient's medical need.
  
- Diversion: intentional movement of a patient from the scene to an alternate hospital capable of providing appropriate care at the request of the diverting hospital due to an internal disaster (lack of available resources or capabilities).
  
- Appropriate Facility: a hospital, **not** necessarily the closest hospital, with the resources capable of caring for a patient based upon the patient's medical needs.
  
- Regional EMS System: will include any EMS provider licensed within the Coastal Bend Regional Advisory Council in Trauma Service Area U.

## Trauma Criteria

In order to best serve the specialty needs of a severely injured trauma patient, the following trauma system plan is in place. Patients who meet the **Level I Trauma Code Activation and Level II Trauma Alert Activation** criteria below will be transported directly to CHRISTUS Spohn Shoreline Hospital (or Driscoll Children's Hospital for **non-penetrating** pediatric trauma patients < 14 y/o). Patients who do **not** meet any of the Trauma Code or Trauma Alert criteria can be transported to the closest appropriate facility or the patient's / guardian's hospital of choice.

The term **Trauma Code** defines patients who are in the category of "Major Trauma Patients". The purpose of the **Trauma Code** is for the efficient and effective care of the trauma patient who may require a multi-disciplinary approach to care. This patient may also need to be taken emergently to the operating room.

The term **Trauma Alert** defines patients who have sustained a transfer of force or injury sufficient to be a threat to limb or life, but does **not**, at the time of field triage, qualify as a **Trauma Code** patient. This patient requires field triage to a facility that can provide specialized care for the given injury.

When giving the medical control report to the emergency department, do **not** request one of the following activations- only give the patient report as you would for any patient.

Notify the receiving hospital **as soon as possible** so that the Trauma Team can be activated for both **Trauma Code** and **Trauma Alert** patients.

### Level I Trauma Code Activation Criteria

1. Traumatic arrests
2. Sufficient facial trauma as to compromise the airway
3. Signs of hemodynamic instability (age appropriate):
  - Respiratory rate < 10 or > 29
  - Systolic BP < 90 mmHg
  - Head injury and a GCS ≤ 13
  - Intubated trauma patients
4. Penetrating injuries to head, neck, torso, or to extremities with vascular insults (pulse deficits)
5. Any trauma patient who presents with acute limb paralysis
6. Two or more proximal long bone fractures
7. Amputation proximal to the wrist or ankle
8. Burns > 15% (2° and 3°) or with respiratory distress / inhalation injury
9. Transfer patients receiving blood to maintain vital signs
10. Pelvic instability with hypotension

### Level II Trauma Alert Activation Criteria

1. Pelvic instability (including acetabular fractures)
2. Flail chest
3. Open or depressed skull fracture
4. Ejection from the vehicle
5. Falls > 20 feet in adults and > 10 feet in children
6. Pregnant trauma patients > 20 weeks' gestation with injuries / pain

## Patient Assessment / Patient Transport

While enroute to a call and prior to arrival, the EMS personnel should organize their approach to patient care upon arrival. It should be predetermined which crewmember will perform the primary assessment and which will perform other duties. Upon arrival and depending on the nature of the incident, airway supplies and oxygen, the cardiac monitor / defibrillator (AED if BLS), medication box (ALS), and the stretcher should be **carried to the patient immediately upon leaving the ambulance.**

Obtain history (**SAMPLE**):

Signs and Symptoms

Allergies

Medications

Past medical / Past surgical history

Last oral intake / Last menstrual period (when indicated)

Events of accident (mechanism of injury)

**OPQRST**:

Onset of pain (what was the patient doing when pain began)

Provocation of pain / Palliation of pain

Quality of pain

Radiation of pain

Severity (1 to 10 scale)

Time duration of pain

### **Approach to Patient Management:**

#### **Primary Survey:**

1. Scene safety with initial scene evaluation. An initial scene evaluation is vital to request any additional resources (ambulances, manpower, equipment, etc.) required to properly manage the incident.
2. Proper protective equipment (exam gloves, eyewear, gowns, etc.) as indicated.
3. Introduce yourself and establish level of consciousness (using **AVPU** scale: **A**lert, responsive to **V**oice, responsive to **P**ain, **U**nresponsive).
4. Maintain in-line cervical spine stabilization if any possibility of spinal injury exists (see Spinal Motion Restriction appendix, p. 183).
5. **Airway**- evaluate patient's airway for patency. Ask "How is your breathing?" Use jaw-thrust as needed to open the airway. If patient has a decreased level of consciousness, place a nasopharyngeal airway (nasal trumpet) as long as the patient has **no** suspected nasal, basilar skull, or mid-face fractures, or oropharyngeal airway.
6. **Breathing**- apply oxygen [nasal cannula or high-flow (via a non-rebreather mask), bag-valve- mask, or intubate as needed (ALS)]. Using a stethoscope listen for bilateral breath sounds. The patient's breathing status must be continually reassessed.
7. **Circulation**- assess presence and quality of patient's pulse (weak vs. strong, fast vs. slow). If **no** palpable carotid pulse, begin chest compressions.

8. Hemorrhage- rapidly assess for external bleeding and control gross hemorrhage with direct pressure. A tourniquet can be used in severe extremity hemorrhage situations.
9. Expose the patient's neck, chest, and abdomen for internal and external injuries.

### Secondary Survey:

10. Obtain vital signs [heart rate, respiratory rate, blood pressure, pulse ox (if available), temperature (if available)]. Avoid taking vital signs in an extremity containing a dialysis shunt.
11. Perform head-to-toe physical exam. Include pulse, motor function, and sensory in all four extremities.
12. Obtain **SAMPLE** History: **S**igns / **S**ymptoms, **A**llergies, **M**edications, **P**ast Medical / Surgical History, **L**ast oral intake / **L**ast menstrual period (if applicable), **E**vents leading to injury / illness.

### Notes:

- If deficiencies are noted in any aspect of the primary survey, attempts should be made to correct each before proceeding to the next assessment.
- Diaphoresis is an ominous sign! Any non-exerting patient in a cool environment who is sweating is significant. Diaphoresis signifies sympathetic nervous system response (catecholamine release).
- Avoid addressing patients by terms of endearment (such as "honey", "sweetie", "sugar", etc.). Despite their likely good intentions, these terms are often insulting to many people and should not be used.

### Standard of Care

The fundamental components to standard of care include the following concepts:

1. **The patient benefits from early medical interventions.** This applies especially to:
  - a. The early and aggressive application of oxygen therapy.
  - b. The early use of defibrillation for the patient in cardiac arrest, along with continuous uninterrupted chest compressions.
  - c. The early protection of in-line cervical spine stabilization.
  - d. The early initiation of definitive therapies.
2. **The patient defines the emergency.** The prehospital provider must be professional in his / her conduct, and always be a patient advocate.
3. **EMS is an extension of medical care into the field and not merely a mode of transportation to the hospital.** Prehospital personnel often provide definitive medical care in the field, and realize they are an integral part of the health care team. Prehospital providers must be dedicated in maintaining their skills and medical knowledge base.

### Patient Transport

Patients should be transported from the scene to the hospital based on your department's policies. In general, the following criteria should be used:

- Code 1:** Patient is non-urgent and has minimal potential for decompensation. The use of warning lights and sirens is **not** indicated.

**Code 3:** Patient is emergent and has an immediate life-threatening condition. The use of lights and sirens is indicated.

**Notes:**

- All patients (on a MICU ambulance) considered to be Code 3 (emergency) transports **must have** a paramedic in the back of the ambulance attending to the patient.
- Vital signs on urgent and emergent (ALS) “Code 3” patients are to be repeated and recorded a **minimum of every 5 minutes** until hospital arrival. Routine (non-emergent) “Code 1” patients should have vital signs recorded a minimum of every 15 minutes.
- In the event of a mass casualty incident (MCI), the above guidelines may change to better utilize available resources.
- The vehicle response code to the hospital will be at the discretion of the lead paramedic transporting the patient.

**Rapid Transport**

At times, prehospital personnel will encounter a patient whose injuries can only be treated definitely with surgery or early hospital intervention. When confronted with such a “LOAD & GO” patient, early interventions should be initiated with rapid transport to the **closest appropriate** hospital. The following interventions should be done prior to transporting (if possible):

- BLS, airway and ventilation procedures (oxygen administration, bag-valve-mask, etc.).
- Intubation if it can be accomplished rapidly.
- Defibrillation (including AED).
- Spinal motion restriction.
- Control of gross external hemorrhage with direct pressure.
- Occlusion of open chest wounds.
- 12 lead EKG on indicated chest pain patients.

Most other interventions should be performed **once enroute** to the hospital (including IVs on most patients).

The following list is representative of the patients in whom rapid transport is indicated:

- Adult and Pediatric Trauma Code patients.
- Suspected stroke with GCS < 10.
- Suspected aortic aneurysm.
- Suspected ectopic pregnancy, fetal distress, abruptio placenta, or uterine rupture.
- Patients with significant abdominal pain or GI bleeding **and** unstable vital signs.



# Section 2:

# Medical

Adult and  
Pediatric

Patient Care  
Field Protocols  
&

# Standing Orders

## Abdominal Pain (Non-Traumatic)

### **Introduction:**

- Abdominal pain may be caused by a wide spectrum of illnesses. Usually other symptoms will accompany the pain (nausea, vomiting, diarrhea, urinary symptoms, etc.).
- Life-threatening causes of abdominal pain are often surgical and should therefore be quickly treated in the field by initial stabilization and rapid transport to an appropriate facility.

**History:** previous trauma, any toxic/drug ingestions, medications, previous abdominal conditions, previous abdominal surgeries, and pain using “**OPQRST**” method:

**O**nset of pain (what was the patient doing when pain began)

**P**rovocation of pain / **P**alliation of pain

**Q**uality of pain

**R**adiation of pain

**S**everity (1 to 10 scale)

**T**ime duration of pain

**Symptoms:** nausea, vomiting (type, amount, bloody or coffee-ground), pain (location / migration), diarrhea, constipation, melena (black, tarry stools), urinary symptoms, fever, and menstrual history.

**Physical Exam:** abdominal bruising, tenderness, guarding, rigidity, distention, bowel sounds, equality of femoral pulses (can be unequal in abdominal aortic aneurysm patients).

### **Basic Life Support:**

1. Airway, breathing, circulation. Have suction ready if patient is nauseated or is vomiting.
2. Apply oxygen (if indicated).
3. Obtain vital signs.
4. Place in position of comfort (shock position if patient is hypotensive).
5. Keep patient NPO (nothing by mouth).
6. Check blood glucose (if indicated).
7. Pulse oximetry (if indicated).

### **Advanced Life Support:**

1. Establish IV access if indicated.
2. Administer IV fluids. Administer 250mL - 1000mL (20 mL/kg child) IV normal saline bolus if patient is hypotensive (systolic BP < 100mmHg) or signs / symptoms of hypoperfusion (HR > 120, poor capillary refill, etc.). Repeat blood pressure measurement after each bolus. Maintain systolic BP > 100mmHg. A saline lock (or IV fluids at 60 mL/hour) is acceptable in a hemodynamically stable patient.
3. Monitor EKG rhythm. If patient has age > 50 y/o, cardiac history (angina, myocardial infarction, CHF), cardiac risk factors (hypertension, diabetes mellitus, high cholesterol, etc.), or physical

findings suggestive of possible ischemic heart disease, obtain a 12-lead EKG (if available and time allows).

- ★4. In patients with active vomiting, administer ondansetron (Zofran®) 4mg (*2mg child*) IV or IM (adult).

**Notes:**

- Always rule out abdominal trauma.
- Always consider pregnancy (intrauterine or ectopic) in a woman of childbearing age.
- Always consider an acute abdominal aneurysm (AAA) in a patient with severe abdominal pain and age > 50 y/o.
- Ischemic heart disease can be manifested as abdominal pain. Maintain a high index of suspicion if patient complains of epigastric pain that is “tight” or “squeezing” in nature and has any cardiac risk factors.
- Patients with acute, undiagnosed abdominal pain should **not** routinely receive narcotic analgesia in the prehospital setting. One exception is suspected renal calculi (kidney stones) which can be extremely painful. If the adult patient has suspected kidney stones (flank pain and/or blood in the urine, inability to get comfortable), consider morphine sulfate 2mg - 10mg IV or IM (or fentanyl 50µg – 100µg).
- Signs of peritonitis (decreased bowel sounds, preference to lay still, rigid abdomen) usually indicate a surgical abdomen.
- Bilious (green-colored) vomiting in an infant is an emergency.
- Abdominal pain may be the first sign of catastrophic internal bleeding (ruptured abdominal aortic aneurysm, liver/spleen laceration, ectopic pregnancy, etc.) and signs of volume depletion (increased heart rate, decreased blood pressure) must be recognized and treated early.
- Appendicitis patients may present with vague, periumbilical pain that migrates to the right lower quadrant over time. They also often have a loss of appetite (anorexia).

## Airway Obstruction / Choking / Stridor / Laryngospasm

### **Introduction:**

**History:** possible history suggesting choking episode, foreign body, or food aspiration (was patient eating?), history of stroke with impaired swallowing, allergic reactions, prior throat surgeries, recent upper respiratory infections, fever.

**Symptoms:** dyspnea, dysphagia (difficulty swallowing), dysphasia (difficulty speaking), oropharyngeal swelling, shortness of breath.

**Physical Exam:** stridor, wheezing (new onset), inability to speak (or hoarseness), drooling, oropharyngeal edema, fever, tachypnea, use of accessory muscles or chest wall retractions, minimal or absent air movement with decreased breath sounds on auscultation, may be sitting up and leaning forward, level of consciousness, color, adequacy of air movement, skin color.

**Differential Diagnosis:** foreign body aspiration, epiglottitis, retropharyngeal or peritonsillar abscess, croup, CHF, asthma, inhalation injury, near drowning, allergic reaction, and angioedema.

### **Basic Life Support:**

1. Maintain airway. Use jaw thrust as needed to open the airway.
2. Apply oxygen (high flow via non-rebreather mask). Use bag-valve-mask as needed.
3. If a **partial** airway obstruction is suspected (patient is conscious and is still able to talk), leave patient in a position of comfort (often sitting and leaning forward). Encourage patient to cough deeply.
4. When a **complete** airway obstruction is present (patient is unconscious or cannot talk), check the oral cavity for a foreign body. If a foreign body **can be visualized**, a finger sweep can be done in an adult. If unable to ventilate, reposition the airway. If still unable to ventilate, institute five back blows (if patient position allows) alternating with five subdiaphragmatic abdominal thrusts (Heimlich maneuver) with the standard technique. Chest thrusts may be used instead of abdominal thrusts if the patient is obese or in the third trimester of pregnancy. *In an infant, deliver 5 back blows, followed by 5 chest thrusts.* Open airway and repeat the finger sweep if a foreign body can be visualized - **do not attempt any blind finger sweeps** (in an adult or child). Blind finger sweeps may push the obstructing object further into the airway. Reattempt to ventilate.
5. If the above **complete** airway obstruction steps have been followed without success, the LifeVac airway clearance device can be used. The LifeVac consists of a facemask that fits over the nose and mouth attached to a plunger with a one-way valve (refer to LifeVac, p. 197). Place the properly sized mask over the patient's nose and mouth to create a seal. Push the handle all the way down. Pull up on the handle swiftly to create a suction that can hopefully remove lodged food or object. Simple instructions are "Place, Push, and Pull." This LifeVac step may be repeated if needed.
6. Repeat the above steps 4 and 5 until the obstruction is relieved.
7. Obtain vital signs.
8. Pulse oximetry.

9. Continually reassess level of consciousness, airway, breathing status, and circulation. If the unconscious patient loses their pulse, start CPR (chest compressions).

### **Advanced Life Support:**

1. In the unconscious patient, the paramedic should attempt to ventilate and intubate the patient in the standard way. If the intubation is unsuccessful and the obstruction is unrelieved by the methods outlined above:
  - Use a laryngoscope to visualize the larynx. Attempt removal of any observed foreign body with suction or the Magill forceps.
  - If the airway is clear without any spontaneous respirations, perform orotracheal intubation.
2. Monitor EKG rhythm.
3. Establish IV access of normal saline at 60 mL/hr (or saline lock).
4. If patient is hypotensive or displaying poor hemoperfusion, administer IV fluids of normal saline at 250mL - 1000mL (*20 mL/kg child*) IV bolus.
5. Consider albuterol 5mg via nebulizer (*2.5mg child*) if patient is wheezing.
6. Consider epinephrine 1:1,000 IM 0.3mg (*0.01 mg/kg child*) if the patient has severe stridor, no history of coronary artery disease, age < 50 y/o, is not pregnant, and no foreign body is suspected.
- ★7. Consider diphenhydramine (Benadryl®) 25mg - 50mg (*0.75 mg/kg child*) IV or IM if the patient is suspected to have an allergic component to their airway obstruction.
8. Frequent reassessment with close monitoring of the airway.

### **Notes:**

- The above protocol is mainly directed for a suspected foreign body. If no foreign body is suspected and the still conscious patient has evidence of an airway obstruction (epiglottitis, mass, etc.) it may be detrimental to place the patient supine to look with a laryngoscope. In these cases, leave the patient in a sitting position.
- If patient has a tracheostomy with a suspected mucous plug, attempt to suction the patient. If unable to clear the secretions easily, instill 5mL of normal saline into the tracheostomy while the patient inhales. Repeat suctioning. If the mucous plug persists, consider removing the inner cannula (if present) to clear the obstruction. In rare cases, it may be necessary to remove the entire tracheostomy (Shiley™) tube and replace it with a cuffed endotracheal tube. Exercise excellent judgment before removing a tracheostomy tube which has recently been performed (within one month of surgery) as it may **not** have a well healed tract to the trachea, and a replacement tube can be inadvertently placed in the pre-tracheal tissue plane, anterior to the trachea.
- If upper airway obstruction is suspected to be the result of an anaphylactic reaction, refer to the Allergic Reaction / Anaphylaxis protocol, p. 23) for guidance.
- Cardiac and/or respiratory arrest in infants and children is usually the result of airway obstruction and should be considered as such until proven otherwise.
- Always consider a foreign body (peanuts, hot dogs, marbles, toys, etc.) in a pediatric patient with a sudden-onset of wheezing, especially if there is no history of upper respiratory symptoms.

Foreign body aspiration is the most common cause of sudden respiratory distress or cardiac arrest in a previously healthy child.

- Epiglottitis:

- Historically, a life-threatening bacterial infection in a child (2 y/o - 6 y/o) which usually starts suddenly. The febrile child will usually appear toxic, sitting-up and leaning forward (“tripod position”), have inspiratory stridor and may be drooling. Never try to place the patient supine.
- Notify the receiving hospital as soon as possible when a case of pediatric epiglottitis is suspected so that an anesthesiologist can be standing by in the ED for possible fiberoptic intubation. In many cases, it may be better to withhold an IV attempt in a suspected pediatric epiglottitis patient. Any agitation of the patient may worsen stridor and result in complete airway obstruction. It is always best to **not** agitate a pediatric patient with potential airway compromise. It may be best to have the guardian (parent) ride in the back of the ambulance with the child to minimize the child’s distress.
- Recently, epiglottitis in children has become very uncommon since the advent of the *H. influenza* type B vaccine, and nowadays most cases of epiglottitis occur in adults. Epiglottitis is typically less severe in an adult given their larger airway size.

- Croup:

- A viral infection of the subglottic tissue in a child (6 months - 4 y/o) which usually has a more gradual onset than epiglottitis. Croup is often worse at night.
- The child will have inspiratory stridor, hoarseness, and a “barking cough.” Some will describe this cough as a “seal-like” cough. It is treated with humidified oxygen, IM epinephrine, and corticosteroids (*e.g.* methylprednisolone) as needed.

## Allergic Reaction / Anaphylaxis

### **Introduction:**

- Allergic reactions and anaphylaxis (anaphylactic shock) represent the ends of a spectrum of the same problem. Allergic reactions consist of hives (urticaria), nausea, mild wheezing, but can progress to anaphylaxis quickly. Anaphylaxis (anaphylactic shock) is the more severe form of an allergic reaction consisting of hypotension, stridor, and bronchospasm and is a life-threatening condition. Prompt treatment of anaphylaxis is essential.
- Typically, the shorter the onset from contact to symptoms, the more severe the reaction.

History: history of allergies or anaphylaxis in the past, history of angioedema, new foods (especially nuts, shellfish), new medications (especially antibiotics), new detergents, new cosmetics or soaps, chemical exposure, insect sting or bite, time of exposure (is it rapidly progressing).

Symptoms: pruritus (itching skin), difficulty breathing, wheezing, drooling, swelling of face / mouth, metallic taste in mouth, hoarseness, chest tightness, lightheadedness, nausea or vomiting.

Physical Exam: flushing of the skin, hives, swelling of face, tongue, or mouth. May have wheezing, hoarseness, stridor, or hypotension.

### **Basic Life Support:**

1. Scene safety. Rapidly and safely remove patient from source of exposure (chemicals, bees, wasps, fire ants, other insects, etc.) if necessary.
2. Airway, breathing, circulation.
3. Apply oxygen (high flow via non-rebreather if indicated). Assist ventilations with bag-valve-mask as needed.
4. Obtain vital signs.
5. Administer albuterol 5mg via nebulizer (*2.5mg child*) if indicated.
6. Consider epinephrine IM 1:1,000 0.3mg (*0.01 mg/kg child*) IM if indicated (patient is having severe respiratory distress and/or hypotension). Epinephrine should be administered with extreme caution to patients > 50 y/o, patients with a history of coronary artery disease, or pregnant patients. Always weigh the risks and benefits of epinephrine in these high-risk patients.
7. Pulse oximetry.
8. Gather home medications and send them to the hospital with the patient.
9. If insect sting is suspected, refer to Environmental Emergencies protocol, p. 39.
10. Apply ice to insect bites to decrease swelling. Ice is contraindicated in venomous snake bites as it can cause more tissue damage.
11. Remove constricting jewelry if indicated.

### **Advanced Life Support:**

1. Intubate patient if needed.
2. Establish IV access.

3. Administer normal saline IV fluids at 250mL - 1000mL (*20 mL/kg child*) IV bolus if patient is hypotensive. Maintain systolic BP > 100mmHg. If the patient is not hypotensive, establish a saline lock or keep fluids at 60 mL/hour.
4. Monitor EKG rhythm.
- ★5. Administer diphenhydramine (Benadryl®) 25mg - 50mg (*0.75 mg/kg child*) IV or IM if indicated (*e.g. hives, swelling, itching, or shortness of breath*).
6. Administer albuterol 5.0mg (*2.5mg child*) by hand-held nebulizer (or mask) if patient is wheezing. This may be repeated every 5 minutes as needed (persistent wheezing).
- ★7. Administer methylprednisolone (Solumedrol®) 125mg (*2 mg/kg child*) IV or IM for any patient with bronchospasm, shortness of breath, hypotension, or airway edema.
8. Administer epinephrine 1:1,000 IM 0.3mg (*0.01 mg/kg child*) if patient is in anaphylactic shock (hypotension, severe respiratory distress). Be very cautious administering epinephrine to patients > 50 y/o, patients with a history of coronary artery disease, or pregnant patients.
9. Consider **IV** epinephrine 1:10,000 0.5mg – 1mg (*0.01 mg/kg child*) IV over 2 minutes for severe life-threatening cases unresponsive to IM epinephrine. Norepinephrine 8 mcg/min – 12 mcg/min IV may also be administered for severe anaphylactic cases in adults (persistent hypotension). This is a very rare treatment and should be only reserved for patients with anticipated imminent cardiac arrest.

**Notes:**

- Epinephrine may precipitate cardiac ischemia in the elderly or coronary artery disease patients.
- If an insect stinger is present, remove it by scraping with the edge of a credit card or laminated ID badge. Do **not** use forceps to remove as they may inject further venom into the body if the stinger is pinched. It is best to remove the stinger(s) as soon as possible while enroute to the hospital to minimize the amount of envenomation from any residual stingers.
- Patients taking  $\beta$ -blockers may **not** show the usual tachycardia or anxiety often associated with anaphylaxis.
- Angioedema is swelling usually involving the lips, tongue, and oropharynx. It most commonly occurs after taking an ACE inhibitor medication. Airway compromise can occur quickly, and often prompt control of the airway is necessary.



## Altered Mental Status

### **Introduction:**

- There are many possible causes of altered mental status (decreased level of consciousness), both medical and traumatic.
- Altered mental status may be a manifestation of poor perfusion to all or part of the brain.

**History:** any medical history suggesting possible cause as listed in the differential diagnosis below, any evidence of head trauma, what was patient doing when altered mental status began?

**Symptoms:** patient will have decreased level of consciousness. May have shortness of breath, weakness, seizure activity, chest pain, or fever.

**Physical Exam:** evidence of head trauma, unequal pupils, abnormal vital signs, abnormal neurological exam, and fever (however, may be hypothermic with severe sepsis).

### **Differential Diagnosis:**

- Alcohol intoxication
- Head trauma (subdural hemorrhage, epidural hemorrhage, subarachnoid hemorrhage, intracerebral hemorrhage, diffuse axonal shear)
- Overdose (*e.g.* opioids, sedatives, hypnotics, tricyclics)
- Toxic exposures
- Metabolic abnormalities (high or low blood sugar), low oxygen (hypoxia), high carbon dioxide (hypercarbia), low sodium, high calcium, high urea, high ammonia, high or low thyroid level
- Hypotension / shock
- Infection (meningitis, encephalitis, sepsis)
- Cerebral vascular accident (stroke)
- Carbon monoxide poisoning
- Cardiac dysrhythmias
- Hypothermia
- Brain tumor (cerebral mass)
- Seizure (postictal)
- Hypertension
- Psychiatric conditions

### **Basic Life Support:**

1. Scene safety. Remember changes in mental status may be secondary to toxic exposures (including carbon monoxide).
2. Airway, breathing, circulation. Use nasopharyngeal or oropharyngeal airway as needed.
3. High-flow oxygen. Patients with altered mental status must be on high-flow oxygen via non-rebreather mask. Assist ventilations with bag-valve-mask as needed.
4. Obtain vital signs.

5. Physical restraints as needed for provider and patient safety (see Patient Restraint appendix, p. 169).
6. Spinal motion restriction (if suspected traumatic etiology).
7. Check blood glucose. If blood glucose is < 70 mg/dL, administer oral glucose 15gm - 30gm (*10gm child*) if the patient still has an intact gag reflex and is awake enough to swallow. Never administer oral glucose to an unconscious patient who cannot protect his / her airway.
8. Pulse oximetry.
9. Refer to specific protocols if indicated:
  - Diabetic Emergencies, p. 37
  - Hypothermia, p. 42
  - Seizure, p. 61
  - Stroke / CVA, p. 66
  - Toxicological Emergencies, p. 71

### **Advanced Life Support:**

1. Intubate patient as needed. If ventilatory depression is suspected to be the result of an opioid overdose, establish an IV and administer naloxone (Narcan<sup>®</sup>) as described below prior to intubating the patient. Support the ventilatory rate with a bag-valve-mask until the naloxone can be administered. Consider intubation if the respiratory rate remains depressed after the naloxone.
2. Monitor EKG rhythm. If a dysrhythmia is present, proceed to the appropriate protocol.
3. Establish IV access on all patients with altered mental status.
4. Administer IV fluids. Normal saline (60 mL/hour) or 250mL - 1000mL (*20 mL/kg child*) IV bolus as needed to keep systolic BP > 100mmHg.
- ★5. If patient is hypoglycemic (< 70 mg/dL), administer Dextrose 10% (D<sub>10</sub>) 25gms via IV or IO. If IV access cannot be obtained and the symptomatic patient has a glucose < 70 mg/dL, administer glucagon 1mg (*0.5mg child*) deep IM.
6. Administer naloxone (Narcan<sup>®</sup>) 2mg (*0.5mg - 1mg child*) IV, IO, IM, or MAD for any possible suspicion of opioid overdose (including small pupil size, slow respiratory rate, needle track marks, altered mental status). The naloxone can be repeated as necessary based upon the patient's positive response (improved respiratory rate or improved level of consciousness) up to a maximum of 6mg which may be necessary in potent opioids.
7. Obtain a 12-lead EKG if indicated, time allows, and a 12-lead EKG is available.
8. If the non-hypoglycemic and non-hypoxic adult patient is extremely agitated and combative, midazolam (Versed<sup>®</sup>) 1mg - 5mg slow IV push, IM, or MAD may be considered to protect the provider and the patient. Realize that midazolam may mask the altered mental status and make examination difficult in the emergency department. Close pulse oximetry monitoring, cardiac monitoring, and BP monitoring must be done if midazolam is administered. **Contact medical control** if any questions exist about giving midazolam.
9. Administer sodium bicarbonate 1 amp (50mEq) IV if the altered mental status is thought to be due to a tricyclic antidepressant (TCA) overdose, including widened QRS complex, hypotension, and seizures.

**Notes:**

- Remember that patients who have alcohol on the breath may have other causes for their altered mental status besides the presumed alcohol intoxication including head trauma, hypoglycemia, postictal, etc.
- Be aware of altered mental status as a presenting sign of an environmental toxin or hazardous material exposure. Always think about your personal safety.

## Atrial Fibrillation / Atrial Flutter

### **Introduction:**

- Atrial fibrillation involves chaotic firing of the atrium suspected clinically by an “irregular irregular” pulse often caused by underlying heart disease and/or pulmonary hypertension.
- The patient will **not** have visible “P” waves in lead II (or V<sub>1</sub>) on the monitor.
- Atrial fibrillation by itself rarely causes hypotension. If an atrial fibrillation patient is hypotensive, always suspect another cause.
- Atrial flutter is a type of atrial dysrhythmia where the “P” (flutter) waves are usually found at a rate of 300 beats per minute. Typically, the ventricular rate will be slowed by AV nodal conduction, typically in a 2:1 block, giving a ventricular rate of around 150. The rate will usually not vary, in comparison with sinus tachycardia which usually varies over the course of several minutes.

History: heart disease, irregular heart beat, pulmonary hypertension, smoking.

Symptoms: palpitations, chest pain, shortness of breath, lightheadedness, dizziness.

Physical Exam: irregular, irregular pulse.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Oxygen (high flow if indicated). Hypoxia may be the underlying cause of atrial fibrillation.
3. Obtain vital signs.
4. Pulse oximetry.

### **Advanced Life Support:**

1. Place patient on a cardiac monitor. Obtain a 12-lead EKG if available and time allows.
2. Establish IV access.
3. IV fluid of normal saline at 60 mL/hour or bolus at 250mL - 1000mL (20 mL/kg child) IV if patient is hypotensive.
4. **Contact medical control** if synchronized cardioversion is being considered (severe shortness of breath, severe chest pain, or hypotension) for extremely unstable patients. **Medical control must be contacted** prior to cardioverting an unstable patient with atrial fibrillation or atrial flutter. The initial treatment of atrial fibrillation or atrial flutter is slowing the ventricular response (IV fluids,  $\beta$ -blockers, calcium-channel blockers, digoxin, etc.), **not** synchronized cardioversion. Synchronized cardioversion can potentially be dangerous in a patient with atrial fibrillation due to the risk of an embolic event to the brain (acute stroke). This is caused by the fibrillating heart being converted back to normal sinus and sending clots out of the atria, into the left ventricle, and out the aorta. If synchronized cardioversion is requested, consider midazolam (Versed®) 1mg - 5mg slow IV push (or IM / MAD) prior to cardioverting if the adult patient is still alert. Perform synchronized cardioversion for atrial fibrillation beginning at 120J,

followed by 200J as needed. For atrial flutter, perform synchronized cardioversion beginning at 120J, followed by 200J as needed. (*In children, use doses 1 J/kg, and 2 J/kg respectively*).

5. Adenosine (Adenocard®) 6mg - 12mg (*0.1 mg/kg - 0.2 mg/kg child*) rapid IV push will usually **not** be effective in converting atrial fibrillation or atrial flutter to normal sinus, but it will briefly slow down the ventricular response and may be considered to aid in identification of the rhythm in an unknown, narrow-complex tachycardia.

**Notes:**

- If the monitor allows for increasing the paper (sweep) speed, it can be increased from 25mm/sec to 50mm/sec. This may help in identifying the patient's cardiac dysrhythmia.
- Cardioverting atrial fibrillation is still part of ACLS teaching, but probably should not be done much due to the reasons mentioned above. **Medical control must be contacted first** if cardioversion is being considered in an unstable atrial fibrillation patient.

## Back Pain

### **Introduction:**

- Non-traumatic back pain

**History:** age, past medical / surgical history, medications, onset of pain, previous back injury, location of pain, fever, history of kidney stones, history of abdominal aortic aneurysm, history of peptic ulcer disease or pancreatitis.

**Symptoms:** pain, swelling, extremity weakness / numbness, bowel / bladder dysfunction, syncope, blood in urine (hematuria), melena, nausea / vomiting (type, amount, bloody or coffee-ground).

**Physical Exam:** pain with palpation, pain with range of motion, unequal pulses in legs.

### **Basic Life Support:**

1. Airway, breathing, circulation. Have suction ready if patient is nauseated or is vomiting.
2. Apply oxygen (if indicated).
3. Obtain vital signs.
4. Place in position of comfort (shock position if patient is hypotensive).
5. Keep patient NPO (nothing by mouth).
6. Check blood glucose (if indicated).
7. Pulse oximetry (if indicated).
8. Palpate the back for midline pain. If present, the patient should be placed in spinal motion restriction (even if no history of severe trauma as could represent osteopenia fracture or bony metastasis).

### **Advanced Life Support:**

1. Establish IV access if indicated.
2. Administer IV fluids. Administer 250mL - 1000mL (20 mL/kg child) IV normal saline bolus if patient is hypotensive (systolic BP < 100mmHg) or signs / symptoms of hypoperfusion (HR > 120, poor capillary refill, etc.). Repeat blood pressure measurement after each bolus. Maintain systolic BP > 100mmHg. A saline lock (or IV at 60 mL/hour) is acceptable in a hemodynamically stable patient.
- ★3. In patients with active vomiting, administer ondansetron (Zofran®) 4mg (2mg child) IV or IM (adult).
4. If a renal stone is suspected, administer morphine sulfate 2mg - 10mg slow IV push or IM (or fentanyl 50µg – 100µg) as needed for severe pain. Only administer morphine sulfate if the patient has a systolic BP > 100mmHg. Watch the blood pressure and respiratory status closely. **Contact medical control** for guidance if any questions exist.

**Notes:**

- Abdominal aortic aneurysms (AAA) must always be considered in patients > 50 y/o, especially if the patient has a history of hypertension.
- Kidney (ureteral) stones typically present with an acute onset of flank pain which radiates around to the groin area. Patients often may complain of hematuria and may vomit. They usually cannot stay in a comfortable position and are writhing around in pain.
- Any new bowel or bladder incontinence is a significant finding which requires immediate medical evaluation.
- An epidural spinal abscess must be considered in a febrile patient with back pain and a history of IV drug abuse.

## Bradycardia / Symptomatic Heart Block

### **Introduction:**

- This protocol is for **symptomatic patients only** (altered mental status, hypotension, severe chest pain, severe shortness of breath). It is **not** for patients in cardiac arrest (including PEA).
- Advanced cardiac life support (ACLS) guidelines define bradycardia as a heart rate < 60 beats per minute; however, many “normal” people have a resting heart rate < 60. Always remember to “treat the patient, **not** a pulse rate”.
- A heart rate < 80 beats per minute in an infant is considered bradycardic.

History: syncopal event, chest pain, altered mental status, shortness of breath, seizures, dizziness or lightheadedness, congenital heart disease, on antidysrhythmic medication, history of cardiac pacemaker.

Symptoms: lightheadedness, dizziness, chest pain, shortness of breath, palpitations.

Physical Exam: low heart rate (< 60 in adults), decreased level of consciousness, crackles on lung auscultation, hypotension.

Differential Diagnosis: vasovagal event, medication overdose ( $\beta$ -blockers, calcium-channel blockers, clonidine, digoxin), sepsis, cardiac conduction abnormalities (acute myocardial infarction), sick sinus syndrome, hypoxia, acidosis.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen (high flow if the patient is symptomatic). Always administer high-flow oxygen to a child with bradycardia, as bradycardia is usually the first manifestation of hypoxia. Use a bag-valve-mask as needed.
3. Obtain vital signs.
4. Pulse oximetry.
5. Check blood glucose. Hypoglycemia can cause hypothermia and bradycardia.

### **Advanced Life Support:**

1. If patient is hypotensive or unresponsive, proceed with immediate transthoracic pacing. **Never delay pacing in a symptomatic patient. Pace before an IV attempt in these symptomatic patients.**
2. Intubate patient as necessary.
3. Monitor EKG rhythm, and record a rhythm strip. Obtain 12-lead if time allows and 12-lead EKG available (skip the 12-lead and go on to the treatment below if the patient is unstable or severely bradycardic).
4. Establish IV access of normal saline at 60 mL/hour (or saline lock) if patient is not hypotensive.



5. IV fluid bolus of normal saline at 250mL - 1000mL (*20 mL/kg child*) IV if patient is hypotensive. Maintain a systolic BP > 100mmHg. Use IV fluid with caution in patients with crackles on lung auscultation.
6. Administer atropine 1mg (*0.02 mg/kg child, min 0.1mg - max 0.5mg*) IV or IO only if the patient is symptomatic. Atropine may be repeated x 2 every 3 - 5 minutes as needed to 3mg maximum of total atropine administered (*0.04 mg/kg child*). Atropine is best for sinus bradycardia, 1° AV block, and 2° AV block- type I (Wenkebach).
7. If the patient is in symptomatic 2° AV block- type II or 3° AV block, may proceed directly with transthoracic (external) cardiac pacing at an initial rate of 80 beats per minute with 80mA (see Transthoracic (External) Cardiac Pacing appendix, p. 188). Transthoracic pacing should also be used in other bradydysrhythmias if there is **no** response to atropine. *Use pediatric pacing pads in a child < 15kg.*
8. Administer midazolam (Versed®) 1mg - 5mg slow IV push (or IM, MAD) if sedation of a conscious adult patient is needed during transthoracic (external) cardiac pacing.
9. Consider norepinephrine drip 8 mcg/min – 12 mcg/min IV in adult patients with persistent hypotension unresponsive to IV fluid bolus, atropine, or transthoracic pacing. Maintain a systolic BP > 100mmHg.

**Notes:**

- If a patient is bradycardic, **and asymptomatic**, it is **not** necessary to treat the bradycardia.
- **Never** treat an idioventricular escape (wide-complex) bradydysrhythmia with lidocaine! This may cause the patient to go into asystole.
- The administration of atropine to a bradycardic acute MI patient will increase the heart rate and thus may increase the myocardial oxygen consumption. This could increase the size of the infarct and worsen the heart damage.
- Patients with a history of heart transplant, in 2° (type II) AV block, or in 3° AV block will usually **not** respond to atropine. Go directly to transthoracic (external) cardiac pacing if the patient is unstable.
- Always consider the early application of transthoracic pacing pads in elderly patients, bifascicular blocks, and those suspected of having an acute myocardial infarction. Transthoracic pacing must also be started for hemodynamically unstable patients who are awaiting IV access.
- Higher doses of atropine (> 3mg IV total) may cause paradoxical bradycardia (unless treating a suspected organophosphate poisoning).
- Elevated intracranial pressure (Cushing's response) and abdominal trauma (hemoperitoneum) may cause bradycardia.
- The majority of pediatric arrests are due to airway problems. Bradycardia in a child is usually the result of hypoxemia and hypoventilation. Make sure a good airway is established. Bradydysrhythmias are the most common pre-arrest rhythms in children, and need immediate attention.
- Always consider hyperkalemia in a patient with a wide-complex bradycardic rhythm.
- Pediatric Advanced Life Support (PALS) recommends epinephrine before atropine. Atropine does **not** have much effect on infants < 6 months old and a decreased effect on children < 4 y/o.

## Chest Pain

### **Introduction:**

- There are multiple causes of chest pain including: cardiac (angina, myocardial infarction, aortic dissection), pulmonary (pneumothorax, pulmonary embolus, pneumonia, pleurisy), musculoskeletal, psychiatric, and gastrointestinal (reflux, hiatal hernia, peptic ulcer disease).
- Acute myocardial infarction and pulmonary embolus are the most significant and should always be considered.
- Myocardial ischemia: still reversible myocardial damage (chest pain usually < 30 minutes in duration).
- Myocardial infarction: irreversible myocardial damage (dead heart tissue) due to insufficient blood flow from the coronary arteries (chest pain usually > 30 minutes in duration).
- The treatment goal of a suspected myocardial infarction is coronary revascularization (thrombolytic therapy or angioplasty) as soon as possible.

History: can use the “OPQRST” mnemonic:

**O**nset time of the pain

**P**rovocative or precipitating factors of the pain

**Q**uality of pain

**R**adiation of pain

**S**everity (on a 1 out of 10 scale)

**T**ime duration of the pain

History of coronary artery disease, positive family history, hypertension, diabetes mellitus, tobacco use, age > 55 y/o, elevated cholesterol, pulmonary embolus risk factors, use of erectile dysfunction medications.

Symptoms: chest pain (may be epigastric) or tightness across chest, shortness of breath, nausea or vomiting, diaphoresis, palpitations, coughing, weakness.

Physical Exam: jugular venous distention (JVD), abnormal breath sounds, pedal edema, unilateral calf pain, pain on palpation of chest wall, or epigastric pain.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen (high flow for severe pain or shortness of breath). The goal is to improve oxygenation at the myocardial tissue level.
3. Obtain vital signs.
4. Pulse oximetry.

### **Advanced Life Support:**

1. Maintain airway as needed.
2. Monitor EKG rhythm. If available and time allows, obtain a 12-lead EKG as early as possible.

3. If an inferior and / or posterior acute MI is indicated, perform a right-sided (15-lead) EKG if time permits. If ST segment elevation is present in lead V<sub>4</sub>R, use extreme caution in administering nitroglycerin. These patients will need a good preload to maintain their blood pressure. Do **not** administer nitroglycerin unless IV access has been started and a 1000mL normal saline IV bolus has been started. Ideally, the systolic blood pressure should be > 140mmHg in a right-ventricular infarct patient before nitroglycerin is administered.
4. Establish IV access of normal saline at 60 mL/hour (or saline lock). Establish an IV early, especially if giving nitroglycerin. Ideally, IV access should be initiated before nitroglycerin administration. Establish a second IV if time allows.
5. Administer IV fluid bolus of normal saline 250mL - 1000mL IV to keep systolic BP > 100mmHg.
6. Administer nitroglycerin 0.4mg sublingual (or spray) every 5 minutes x 3 doses total if the patient is suspected of having active cardiac chest pain and the systolic BP is > 100mmHg. Nitroglycerin should still be administered even if the patient has taken his or her own home dose of nitroglycerin prior to EMS arrival. Monitor the patient's blood pressure very closely. If the systolic blood pressure falls by > 50 mmHg, do not administer another nitroglycerin unless approved by **medical control** (see notes below). Do **not** administer nitroglycerin if patient has taken sildenafil (Viagra<sup>®</sup>), tadalafil (Cialis<sup>®</sup>), or vardenafil (Levitra<sup>®</sup>) within the previous **24 hours**. Nitroglycerin administered to a patient on an erectile dysfunction medication can cause irreversible and fatal hypotension.
- ★7. Administer aspirin if the patient is **not** allergic to it, is **not** pregnant, and cardiac chest pain is suspected. The aspirin can be administered as four 81mg baby aspirins (324mg) or one 325mg aspirin. Have the patient chew and swallow the aspirin. Do **not** administer if the patient has taken aspirin within the past **6 hours**, unless more aspirin is needed up to 324mg maximum (*i.e.* the patient only took a single 81mg baby aspirin earlier in the day).
8. Administer morphine sulfate 2mg - 10mg slow IV push (or fentanyl 50µg – 100µg) as needed for patients who have persistent chest pain unresponsive to 3 sublingual (or spray) nitroglycerins. Only administer morphine if the patient has a systolic BP > 100mmHg. Watch the blood pressure and respiratory status closely.
- ★9. Administer ondansetron (Zofran<sup>®</sup>) 4mg IV or IM (adult) as needed for active vomiting.
10. **Contact medical control** if the patient is suspected to have symptomatic chest pain as the result of recent cocaine use for a possible diazepam (Valium<sup>®</sup>) 5mg - 10mg slow IV push order.
11. Treat cardiac dysrhythmias with the appropriate protocol as indicated.
12. Establish a second IV site depending on patient severity.

**Notes:**

- Transport the patient to the closest appropriate cardiac hospital unless ordered otherwise by medical control or transferring physician.
- It is realized that some interfacility transports (including satellite clinics) may involve patients with active chest pain that have already been examined by a health care provider at that clinic or hospital. In these interfacility transport cases **only**, it will be at the discretion of the transferring physician as to what hospital the patient is transported.
- Ideally in patients with suspected myocardial infarction, the most experienced person should be establishing the IV to hopefully limit the number of attempts. If subsequent thrombolytics are given, it will dissolve all clots and any IV attempt sites may bleed extensively.

- Administer IV fluid bolus if the systolic BP < 100mmHg.
- Remember that chest pain may be atypical (even absent) in diabetic patients (“silent MI”), and may be atypical in females and the elderly.
- Weakness is a fairly common symptom of an acute myocardial infarction (MI) in the elderly.
- With cardiac ischemia or infarction “*time is muscle*”. A short scene time with rapid transport is essential.
- Lead II **only** detects **inferior** MI’s. Do **not** be misled by any lack of ST elevation on the monitor as the patient could still be having an anteroseptal or lateral MI, which will **not** cause ST elevation in lead II.
- Obtain a 12-lead EKG on all suspected cardiac chest pain patients. Transmit the 12-lead EKG to the receiving hospital if time allows, and if the monitor is capable of 12-lead transmission.
- A one-time dose of aspirin may still be administered to patients on warfarin (Coumadin®). The aspirin is administered to suspected cardiac ischemia patients for its anti-platelet effects and not as a “blood thinner”. Patients on Coumadin® may need an explanation of this before agreeing to have aspirin administered to them.
- Do not administer nitroglycerin to a pregnant patient.
- Many patients having an inferior MI are very sensitive to nitroglycerin, and it may cause a large drop in blood pressure. If the systolic blood pressure falls by > 50 mmHg after nitroglycerin, do **not** administer another nitroglycerin unless first approved by **medical control**. Instead treat the patient with aggressive IV fluids to improve preload and cardiac output. Up to 15% of patients with an acute inferior MI will have profound hypotension after the administration of nitroglycerin due to its preload reduction.
- Consider pulmonary embolus in a patient that has a history of tobacco use, prolonged travel or bed rest, lower extremity immobilization, recent pelvic surgery, history of deep vein thrombosis (DVT), or oral contraceptive use.
- Always ascertain if the patient has taken sildenafil (Viagra®), Levitra®, or Cialis® within the past 24 hours. Administering nitroglycerin to these patients who have used an erectile dysfunction medication can result in irreversible and fatal hypotension.

## Diabetic Emergencies (Hypoglycemia / Hyperglycemia)

### **Introduction:**

- **Hypoglycemia** is defined in this protocol is any blood glucose measurement < 70 mg/dL.
- **Hyperglycemia** is defined in this protocol as a blood glucose measurement > 250 mg/dL.
- The words dextrose and glucose will be used interchangeably throughout this manual.

History: any history of diabetes (diet-controlled, oral agents, insulin), has patient missed their meds (suggesting elevated glucose), has patient taken their med but not eaten (suggesting low glucose), history of fevers or chills, altered mental status, family history of diabetes.

Symptoms of Hypoglycemia: patients look like a stroke patient. Patient may have altered mental status, pallor, diaphoresis, tachycardia, or seizures. Can even have focal neurological findings.

Symptoms of Hyperglycemia (DKA): patients look dehydrated. Patient has hot, dry skin, polyuria (increased urination), polydipsia (increased thirst), nausea or vomiting, abdominal pain, weakness.

Physical Exam: altered mental status, diaphoresis, fruity odor on breath (acetone), rapid deep respirations (Kussmaul), tachycardia, hypotension, hypothermia, medical alert tag.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen (high flow if altered mental status). Use bag-valve-mask as needed.
3. Obtain vital signs.
4. Check blood glucose. If the glucose is < 70 mg/dL and able to swallow with an intact gag reflex, administer oral glucose 15gm - 30gm (*10gm child*). The oral glucose may be repeated in 15 minutes if no response and the patient is still able to protect their airway (intact gag reflex).
5. Pulse oximetry.

### **Advanced Life Support:**

1. Establish IV access of normal saline at 60 mL/hour (or saline lock).
2. Administer IV fluid normal saline bolus 250mL - 1000mL (*20 mL/kg child*) IV if the blood sugar is elevated > 250 mg/dL and patient showing signs of hyperglycemia (dehydration or hypoperfusion). Monitor patient closely for signs of fluid overload. Reduce the IV fluid bolus to 250mL if the patient is a dialysis patient.
- ★3. If the patient's glucose is < 70 mg/dL and symptomatic, administer Dextrose 10% (D<sub>10</sub>) 25gms IV (*0.5 gm/kg child*). May repeat the 250mL of D<sub>10</sub> in 15 minutes if the blood glucose measurement is still <70 mg/dL and the patient remains symptomatic. If IV access cannot be obtained and the symptomatic patient has a glucose < 70 mg/dL, administer glucagon 1mg (*0.5mg child*) deep IM. Oral glucose preparations may be used if the patient is only mildly symptomatic and able to swallow (*i.e.* can protect their airway).

4. Monitor EKG rhythm. Obtain a rhythm strip and 12-lead EKG if available and time allows.
5. Ideally, all hypoglycemic patients who receive intravenous D<sub>10</sub> in the field should be transported to the emergency department. At an absolute minimum, patients who were found to be hypoglycemic prior to D<sub>10</sub> must eat a high-starch meal and must be left in the presence of a responsible family member or friend who can stay with the patient a minimum of the next 6 hours. They must be educated on the signs and symptoms of hypoglycemia, and must be instructed to monitor the patient closely. **In addition, the family member or friend remaining with the hypoglycemic patient must sign as a witness on the patient care report.**

**Notes:**

- Often hyperglycemic diabetic patients who have been compliant with their insulin have an underlying source of infection (or stressor) causing their increased blood glucose level.
- The prehospital treatment of hyperglycemia is IV fluids (normal saline) if the patient can tolerate it. Insulin will be administered later in the ED.
- Alcoholic patients frequently present with hypoglycemia (poor glycogen liver stores). Always check a glucose determination on a patient with evidence of alcohol intoxication and altered mental status.
- Sodium bicarbonate is **no** longer used in the treatment of elevated blood sugars (possible metabolic acidosis) in the prehospital setting.
- Due to the long half-life of many oral diabetic medications, there may be a delayed and prolonged recurrence of their hypoglycemia. This is especially true on oral diabetic medications that have been taken in a suspected overdose, or in a pediatric patient. These patients are often admitted to the hospital for close monitoring of the blood glucose levels.
- Glucometer readings may be inaccurate by +/- 30 mg/dL. **Always treat a possible hypoglycemia patient if they are symptomatic and the blood sugar is within the 80 mg/dL range.**
- Glucagon is to be used for the hypoglycemic patient in which IV access cannot be established to administer D<sub>10</sub>. In most situations, glucagon should be administered **before** going to the EZ-IO<sup>®</sup> on a hypoglycemic patient. Glucagon will not work as fast as D<sub>10</sub> and sometimes will not work as well in patients with depleted glycogen stores (malnourished, cirrhosis).
- In the event that a hypoglycemic patient requires a **second** 25 grams of D<sub>10</sub> in order to elevate the blood glucose, the patient should be transported to the hospital. **Any exceptions to this must be discussed with medical control.**
- Not transporting a hypoglycemic patient is one of the most high-risk situations for an EMS service / Fire Department. Always be cognizant of this fact.

## Environmental Emergencies

### **Introduction:**

- This protocol will cover animal bites, snake bites, insect stings, electric shocks, lightning strikes, heat-related emergencies (hyperthermia), hypothermia, and near drowning.

### **Animal Bites / Snake Bites / Insect Stings**

#### **Basic Life Support:**

1. Scene safety. Make sure that the subject dog, animal, snake, etc. is not still nearby.
2. Airway, breathing, circulation.
3. Apply oxygen as needed.
4. If a snake bite is suspected, keep the patient as still and calm as possible. Immobilize a bitten extremity and keep it at a level **lower** than the heart.
5. If the snake is dead and can be safely transported with the patient, bring it to the ED to aid in identification. Remember a dead snake can still inject venom if handled carelessly.
6. The use of constrictive bands / tourniquets is **not** recommended for venomous snake envenomations.
7. Cleanse and bandage any wounds as needed.
8. Apply ice to insect or animal bites to decrease swelling. Ice is **contraindicated in snake bites** (results in more tissue damage).
9. Refer to the allergic reaction / anaphylaxis protocol as needed, p. 23.
10. Pulse oximetry as needed.
11. Mark the edge of the swelling with a pen and note the time directly on the skin next to this edge notation.
12. Remove any jewelry from the affected extremity.

#### **Advanced Life Support:**

1. Monitor EKG rhythm.
2. Establish an IV in an uninjured (non-bitten) extremity.
3. Administer IV fluids of normal saline at 60 mL/hour (or saline lock). Administer IV fluids of normal saline 250mL - 1000mL (*20 mL/kg child*) IV if patient shows evidence of hypoperfusion.
4. Administer morphine sulfate 2mg - 10mg (*0.1 mg/kg child*) slow IV push (or IM) (or fentanyl 50µg – 100µg) if patient is having severe pain.
- ★5. Administer diphenhydramine (Benadryl®) 25mg - 50mg (*0.75 mg/kg child*) IM or IV as needed for swelling or itching.
- ★6. Administer ondansetron (Zofran®) 4mg (*2mg child*) IV or IM as needed for active vomiting in an adult patient.
- ★7. Administer methylprednisolone (Solumedrol®) 125mg (*2 mg/kg child*) IV or IM in a patient having a significant allergic reaction to his / her bite or sting.

#### **Notes:**

- Crotalid snake venom is an anticoagulant. At the site of a poisonous snake bite there will usually be ecchymosis, pain, swelling, redness, numbness, or puncture marks. Patients often will have nausea or vomiting, and may complain of a metallic taste in their mouth.

- Up to 1/3 of **poisonous** snake bites do **not** result in envenomation (“dry bites”).
- Movement expedites the spread of venom. Keep the patient’s physical movement to a minimum. Do **not** let the patient walk. Provide calm reassurance to the patient. Do **not** apply ice to snake bites.
- If patient has been bitten by an animal, animal control needs to be notified. This can be done by family members at the scene or done later by the patient or guardian at the hospital. If patient is not transported, make sure the patient knows to contact animal control, or have MetroCom notify animal control directly.
- Black widow spider bites are minimally painful at first, but after a few hours can progress to severe abdominal pain.
- Brown recluse spider bites are minimally painful initially, but tissue necrosis at the site of the bite may develop over the next few days.
- If an insect stinger is present, remove it by scraping with the edge of a credit card or laminated ID badge. Do **not** use forceps to remove as they may inject further venom into the body if the stinger is pinched. It is best to remove the stinger(s) as soon as possible while enroute to the hospital to minimize the amount of envenomation from any residual stingers.
- For **jellyfish / Portuguese Man O’ War envenomations**- to prevent further injury to the patient, the following decontamination steps are important. Papain-based meat tenderizers (such as Adolph’s) can be mixed with rubbing alcohol (if available) or warm water to make a paste that can help inactivate the nematocysts by breaking down the proteins found in jellyfish toxins. Gently scrape the site with a credit card or tongue depressor covered with this paste to remove any tentacles (nematocysts) still on the skin. Remnants of the nematocysts are usually still present on the skin even if they cannot be seen. **Never apply fresh water** or ice to the stung area. Detached live tentacles should be treated with caution as envenomation may still occur for several hours. True allergic reactions are rare, but hyperventilation due to severe pain and anxiety is common.
- For **stingray envenomations**- clean the puncture site as normal standard of care for any wound. As soon as possible, immerse the bite area in hot water (as hot as the patient can tolerate without actually getting burned ~110°F) as the stingray toxin is heat-labile and inactivated by heat. The water will need to be exchanged for more hot water as it cools. The immersion duration of 30-90 is completed at the hospital. It is best to transport these patients (or have them seek immediate physician follow-up) due to potential for retained barb, tetanus status, and infection potential (*Vibrio vulnificus*, etc.). Morphine sulfate 5mg IV or IM (or fentanyl 50µg – 100µg) can be administered if the patient is experiencing severe pain.

## Electric Shock / Lightning

### **Basic Life Support:**

1. Scene safety. Have dispatch get the electric company enroute as needed. Make sure patient is **no** longer in contact with the electrical source before touching the patient.
2. Apply AED if indicated.
3. Airway, breathing, circulation.
4. Apply oxygen. Assist ventilations with bag-valve-mask as needed.
5. Cervical spine motion restriction as needed.
6. Obtain vital signs.



7. Physical Exam: look for entrance and/or exit wounds (electricity passes the organs between the entrance and exit wounds), burns, altered mental status, decreased hearing (ruptured ear drums), musculoskeletal dislocations (posterior shoulder dislocation).

**Advanced Life Support:**

1. Airway control. Intubate the patient as needed.
2. Monitor EKG rhythm. Electric shock and lightning strikes cause a high incidence of cardiac dysrhythmias. Go to the appropriate dysrhythmia protocol as needed.
3. Establish IV access.
4. Administer IV fluids normal saline bolus 250mL - 1000mL (*20 mL/kg child*) IV. Intravenous fluids help prevent rhabdomyolysis (skeletal muscle breakdown that can cause renal failure).
5. Administer morphine sulfate 2mg - 10mg (*0.1 mg/kg child*) slow IV push (or IM) (or fentanyl 50µg – 100µg) as needed for severe pain control.

**Notes:**

- Electric shock of alternating (AC / household) current tends to cause ventricular fibrillation, while direct current (DC / battery, or lightning) tends to cause asystole.
- Do not handle downed power lines until the power company has de-energized the lines. Do not get too close as current can be transmitted through the ground and cause the power lines to suddenly whip around.
- Downed power lines in contact with a vehicle usually pose no threat to victims in the car as long as the victim's make no attempt to get out of the vehicle. Reassure the victims from a safe distance until it is safe.

**Heat-Related Emergencies (Hyperthermia)**

**Introduction:**

History: medications (anticholinergics, antipsychotics, tricyclic antidepressants, beta-blockers, aspirin), drugs (cocaine, amphetamines), work-related physical activity (exercise-induced), history of sun or heat exposure.

Symptoms: cramps, dizziness, nausea or vomiting, syncope.

Physical Exam: often altered mental status, tachycardia, hypotension (dehydration), skin may be warm and dry, or diaphoretic and flushed.

**Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen.
3. Place patient in a cooler environment and remove patient's clothing. Use a cold-water sponge bath and cold, wet towels with fanning as needed. Evaporation by fanning is very effective. Ice packs may also need to be placed in the axilla, groin, and back of the neck as needed (over central vessels) until shivering occurs.
4. Obtain and monitor patient's temperature if a thermometer is available.
5. Obtain vital signs.
6. Check blood glucose, and treat as needed.
7. Obtain an accurate list of the patient's medications. (Many medications can worsen hyperthermia).

8. Pulse oximetry.
9. If patient is awake with an intact gag reflex, administer oral fluids (water, Gatorade™, etc.).

### **Advanced Life Support:**

1. Intubate the patient as needed.
2. Monitor EKG rhythm.
3. Establish IV access of normal saline at 60 mL/hour (or saline lock). Administer IV fluid of normal saline at 250mL - 1000mL (*20 mL/kg child*) IV as needed. If available, administer IV fluid of **cooled** normal saline (4°C) at 250mL – 1000mL to any **adult** hyperthermic patient that has any neurologic change. Cooled IV fluids need to be avoided in children as the cooled IV fluids may result in a too rapid drop in body temperature with counterproductive shivering.
- ★4. Administer ondansetron (Zofran®) 4mg (*2mg child*) IV or IM (adult) if the patient has vomiting (which is common in heat emergency patients).
5. Administer diazepam (Valium®) 5mg - 10mg (*0.2 mg/kg child*) slow IV push if patient has severe shivering.

### **Notes:**

- Consider infectious disease (*e.g.* meningitis, pneumonia) in all cases of heat-related illnesses and use proper OSHA precautions (gloves, mask, gown) as needed.
- Heat Cramps→Heat Exhaustion→Heat Stroke is an entire spectrum of symptoms. Historically heat exhaustion involved a sweating patient while heat stroke involved a non-sweating patient. However, the definition of heat stroke involves altered mental status, seizure, or coma (*i.e.* neurological changes) regardless of whether the patient is sweating or not.
- Usually the very young (infants) and very old are the most severely affected by heat-related emergencies.
- Do **not** overcool a hyperthermic patient. If shivering occurs, stop cooling, and lightly cover the patient. Shivering will generate an enormous amount of heat in the already hyperthermic patient.

## Hypothermia

### **Introduction:**

- Mild hypothermia is defined as core temperature between 90°F - 95°F. Patients often will have altered mental status and uncoordinated, intense shivering.
- Severe hypothermia is defined as a core temperature < 90°F. Patients usually will have profound lethargy (coma), slow or absent pulse, hypotension, and a decreased respiratory rate.

History: may have history of cold-water submersion, drugs, or alcohol ingestion, fall with inability to get up, exposure to the environment, sepsis.

Symptoms: fatigue, confusion, nausea.

Physical Exam: altered mental status, shivering, evidence of frostbite, abnormal vital signs.

**Basic Life Support:**

1. Airway, breathing, circulation. Check respiratory rate and pulse for 30 seconds as these patients are often profoundly bradycardic. Avoid rough handling of the hypothermic patient as they can have a sensitive myocardium.
2. Begin CPR if no pulse detected and patient without obvious signs of death (dependent lividity, rigor mortis, etc.).
3. Apply oxygen (high flow). Use warmed oxygen if available and assist with bag-valve-mask as needed.
4. Obtain vital signs.
5. Check patient's temperature if available (however, most standard thermometers will not register below 94°F).
6. Check blood glucose. Always check for a blood sugar in a suspected hypothermic patient as many hypothermic patients are also hypoglycemic. Treat hypoglycemia as indicated in the Diabetic Emergency protocol, p. 37.
7. Remove patient's wet clothes and dry the patient thoroughly. Cover the patient with dry blankets, clothes, or other insulating materials.
8. Move patient to a warmer environment (back of ambulance).
9. Pulse oximetry (may have difficulty obtaining a reading in the hypothermic patient).

**Advanced Life Support:**

1. Intubate patient as necessary.
2. Monitor EKG rhythm. The patient may have an elevated ST segment (J-point elevation) on the EKG known as the "Osborne wave". In addition, the patient may have all kinds of dysrhythmias present. Proceed to particular dysrhythmia protocol as needed. Obtain a 12-lead EKG if available and time allows.
3. Establish IV access of normal saline at 60 mL/hour (or saline lock).
4. Administer IV fluid normal saline 250mL - 1000mL (*20 mL/kg child*) IV bolus as needed to keep systolic BP > 100mmHg. It is best to give warmed normal saline if possible (using vehicle's heater, etc.). Use caution to avoid overheating IV fluids.
- ★5. Administer Dextrose 10% (D<sub>10</sub>) 25gms (*0.5 gm/kg in child*) IV and/or naloxone (Narcan®) 2mg (*1mg child*) IV, IV or MAD as needed.
6. If patient is in cardiac arrest, administer epinephrine 1:10,000 1.0mg (*0.01 mg/kg child*) IV. Defibrillate x 1 at 200J (*2 J/kg child*) if the patient is in ventricular fibrillation. Continue CPR and do **not** repeat ACLS meds or further defibrillation until the patient is warmed above 85°F. Medications will **not** work in hypothermic tissues. If the core temperature is not known, error on the side of giving the ACLS meds and continuing the proper dysrhythmia protocol.
7. Continue CPR as needed.
8. Cardiac pacing of bradycardic dysrhythmias is usually **not** indicated unless the bradycardia persists after rewarming. External cardiac pacing should not be performed in a patient with a temperature < 86°F.

**Notes:**

- The severely hypothermic patient is usually unresponsive to most cardiac medications, defibrillation, and external cardiac pacing. The best treatment in a severely hypothermic cardiac arrest patient is CPR, oxygen, and rewarming.

- It is important to be gentle in the movement of hypothermic patients to avoid precipitating ventricular fibrillation.
- The extremes of age (young and old) are more susceptible to hypothermia.

## Near Drowning

### **Introduction:**

History: length of submersion, approximate temperature of the water.

Physical Exam: crackles, altered mental status.

### **Basic Life Support:**

1. Allow appropriately trained rescuers to remove the victim from any areas of danger. Drowning is a leading cause of death among would be rescuers.
2. Airway, breathing, circulation. Suction patient as needed.
3. Apply oxygen (high flow via non-rebreather). Assist ventilations with bag-valve-mask as needed.
4. Start CPR as needed.
5. Strict cervical spine motion restriction. A significant number of near drownings involve injuries to the cervical spine due to diving accidents. Spinal precautions must be taken at all stages of rescue and resuscitation. Spinal motion restrict if a spinal injury is suspected.
6. If possible, determine submersion time.
7. Remove wet clothes and dry patient as needed.
8. Cover patient to prevent heat loss.
9. Pulse oximetry.
10. Refer to Spinal Motion Restriction appendix as needed, p. 183.

### **Advanced Life Support:**

1. Intubate patient as needed.
2. Monitor EKG rhythm.
3. Establish IV access of normal saline at 60 mL/hour (or saline lock).
4. Administer IV fluids of normal saline at 250mL - 1000mL (*20 mL/kg child*) IV as needed.
5. Proceed with ACLS protocols as needed.

### **Notes:**

- Always consider a spinal cord injury in a near-drowning patient. Use spinal motion restriction in all unconscious patients.
- In a recent cold-water near-drowning, always err on the side of attempting resuscitation. These patients have a possible chance of survival.
- **All near-drowning patients should be transported to the hospital** as a significant percentage of patients will develop delayed respiratory distress over the next several hours.

## Excited Delirium

### **Introduction:**

- This protocol is intended to provide EMS personnel with chemical-assisted restraint in an adult patient that who otherwise could not be safely restrained by conventional measures.
- Always protect yourself when dealing with a combative patient. Have law enforcement respond to the scene as needed.
- Excited (agitated) delirium is a **life-threatening medical emergency** (not a crime in progress), and patients exhibiting signs of excited delirium require **immediate** supportive care.

History: bizarre, agitated behavior, hyperactivity, often incomprehensible sounds, incoherent shouting, restless, often in various stages of undress, extreme paranoia, unexpected strength, history of drug ingestion (cocaine, amphetamines, synthetic marijuana), history of psychiatric illness, non-compliance with psychiatric medications.

Symptoms: bizarre thought content, hallucinations, restlessness, chest pain, anxiety, shortness of breath, agitation, moving towards bright lights (headlights) or shiny objects (mirrors), rapid changes in emotion, easily distracted (lack of focus), decreased awareness and perception, lack of sensation to pain.

Physical Exam: may act crazy or have unusual affect, hypertension, dilated pupils, rapid breathing, foaming at mouth, tachycardia, disorientated, diaphoresis, and elevated temperature.

### **Basic Life Support:**

1. Confirm scene safety and ensure a protective environment for yourself and the patient. Law enforcement should always be called for assistance in difficult or potentially dangerous situations. Make sure that dangerous objects (knives, guns, pills, etc.) are removed.
2. Establish rapport with the patient and constantly reassure the patient. Do **not** leave the patient alone, unless necessary for personnel safety.
3. If the patient allows it, obtain vital signs.
4. If restraints are required to protect the patient and EMS providers (*i.e.* control aggressive behavior), only authorized restraints (commercial soft, leather, or other soft materials such as KERLIX™, sheets, triangular cravats, etc.) are to be used (see Patient Restraint appendix, p. 169). If the patient is handcuffed by law enforcement, it is expected that they will either accompany the patient in the ambulance or follow the ambulance to the hospital.
5. Never restrain patients prone (face down) on the stretcher.
6. Masks (face shields) may be applied to patients threatening to spit.
7. Apply oxygen if the patient is lethargic or has unstable vital signs.
8. Check blood glucose. Administer oral glucose 15gm - 30gm by mouth if glucose < 70 mg/dL and patient has an intact gag reflex.
9. Check pulse oximetry.
10. Check temperature. This is very important. If temperature is elevated begin cooling methods with ice packs, tepid water / fanning, etc.

**Advanced Life Support:**

1. Monitor EKG rhythm if possible, on a diaphoretic, agitated patient.
2. Establish IV access and administer 1000mL IV fluid bolus.
3. Administer midazolam (Versed®) 1mg - 5mg slow IV push (2mg - 5mg IM / MAD) to control an extremely agitated patient, or to treat hyperthermia in an excited delirium patient. The patient must be on oxygen and the pulse oximeter if midazolam is administered. Use the IV route if it can be established safely. The IM or MAD route may be preferred in these combative patients.
- ★4. Administer naloxone (Narcan®) 2mg IV, IM, or MAD; and / or Dextrose 10% (D<sub>10</sub>) IV if indicated.
5. Continually reassess the patient and monitor the airway closely.

**Notes:**

- Excited delirium is a medical emergency with a mortality rate of 10%. These patients need to be transported quickly to the emergency department and will need **early administration** of midazolam (Versed®).
- Never forget to measure a blood glucose level and pulse oximeter reading in a combative patient. They may be hypoglycemic (especially alcoholic patients) or hypoxic.
- Paramedic personnel may utilize the Mucosal Atomization Device (MAD) as an alternative drug delivery adjunct for patients without IV or IO access who require the urgent administration of midazolam (Versed®). See protocol p. 152.

## Hypertensive Crisis / Hypertensive Emergency

### **Introduction:**

- Hypertensive crisis / emergency involves a systolic BP > 220mmHg, diastolic BP > 110mmHg, **and** signs and symptoms of CNS dysfunction (usually “stroke-like” symptoms).
- There is **no** need to treat asymptomatic hypertensive patients unless they have one of the below symptoms. If the patient just has elevated blood pressure without any symptoms, there is **no** need to treat this hypertensive reading in the prehospital setting.
- Acute lowering of the blood pressure may actually cause further harm to the patient by underperfusing end-organs.

**History:** history of hypertension or stroke (CVA), is patient taking blood pressure medications (compliance), increased stressors, coronary artery disease, drug (cocaine) use, onset of symptoms, any erectile dysfunction medications. If patient is in the third trimester of pregnancy up to 2 weeks’ post-partum, refer to the Obstetrical Emergencies (Preeclampsia / Eclampsia) protocol, p. 56.

**Symptoms:** altered mental status, headache, epistaxis (nosebleed), blurred vision, dizziness, severe chest pain, severe shortness of breath, and seizures.

**Physical Exam:** strong pulses, crackles, focal neurological deficits, altered mental status, neck stiffness (nuchal rigidity).

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen as needed (high flow if patient has shortness of breath or altered mental status).
3. All symptomatic patients with a hypertensive emergency should be transported in a sitting (semi-Fowler) position.
4. Obtain vital signs. Make sure the blood pressure cuff used is the correct size (not too small which will give an artificially high reading). It is always a good idea to check the blood pressure in both arms.
5. Check blood glucose, and treat as appropriate.
6. Pulse oximetry as needed.

### **Advanced Life Support:**

1. Monitor EKG rhythm. Obtain 12-lead EKG if available and time allows.
2. Establish IV access of normal saline at 60 mL/hour (or saline lock). There is **no** need to administer IV fluids to the **hypertensive** patient.
3. Administer labetalol (Normodyne®) 10mg – 20mg slow IV over 2 minutes if the patient has (either a systolic BP > 220mmHg or diastolic BP > 110mmHg), **and** severe chest pain, severe headache, or altered mental status. Monitor the blood pressure closely and check and record the blood pressure before the administration of labetalol. Do **not** administer labetalol if the patient has a history of recent cocaine ingestion (< 6 hours), has a history of severe asthma, or if the patient

has any wheezing on exam. Make sure you inform the ED staff that labetalol was administered to the patient in the field.

4. Administer diazepam (Valium®) 5mg - 10mg slow IV push as needed for seizure activity. If patient is in the third trimester of pregnancy up to 2 weeks' post-partum, refer to Preeclampsia / Eclampsia protocol, p. 56.
- ★5. Administer ondansetron (Zofran®) 4mg IV or IM (adult) if the patient is having active vomiting.
6. Transport patient in a position of comfort. Reassure an anxious patient.
7. **Contact medical control** if the patient is suspected to have drug-induced symptomatic hypertension (*e.g.* cocaine) for possible diazepam (Valium®) 5mg - 10mg slow IV push order.

**Notes:**

- Once again, **asymptomatic** hypertensive patients do **not** require treatment in the prehospital setting.
- Never treat an elevated blood pressure on just one set of vital signs.
- If any doubt exists about whether to treat with labetalol, **contact medical control**.
- The blood pressure should **not** be rapidly lowered in patients suspected of having a transient ischemic attack (TIA), or stroke. The goal should be to reduce the systolic BP by 10% - 20% in the prehospital setting. The systolic BP should initially be maintained in the 160mmHg - 180mmHg range.



## Hypotension (Non-Traumatic)

### **Introduction:**

- This protocol is for non-pregnant patients with hypotension **not** thought to be associated with trauma.
- The patient may have altered mental status if the blood pressure is low enough (usually a systolic BP < 90mmHg will cause changes in mental status due to poor brain perfusion).
- For pediatric patients, refer to the Pediatric Blood Pressures by Age appendix, p. 172, for the minimum systolic BPs in children.

History: fluid loss (vomiting, diarrhea), blood loss (GI bleed, vaginal bleed), allergic reaction (history of insect bites, new foods, or medications), chest pain / cardiac ischemia, poisoning or overdose, pulmonary embolus risk factors, pregnancy, poor oral intake, dehydration, infection, syncope, drug use.

Symptoms: altered mental status, lightheadedness, chest pain, palpitations, melena, shortness of breath, weakness, dizziness.

Physical Exam: tachycardia, skin changes (cold, pale, cyanotic, hives, or diaphoretic), altered mental status (anxiety, confusion, restlessness), delayed capillary refill, coffee-ground emesis, black tarry stools, fever, unilateral leg swelling / leg pain.

Differential Diagnosis: hypovolemia (dehydration, vomiting, diarrhea, GI bleed, ruptured ectopic pregnancy), septic shock, anaphylactic shock, cardiogenic shock (acute MI), medication-induced (overdose), pulmonary embolus.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen (high flow via non-rebreather if indicated).
3. Obtain thorough history to identify possible causes of hypotension.
4. Place the patient in the shock position (legs elevated) if the patient tolerates it. Be cautious in patients with shortness of breath.
5. Obtain vital signs, including temperature (possible sepsis).
6. Check blood glucose.
7. Pulse oximetry. May have difficulty reading due to hypotension and poor tissue perfusion.

### **Advanced Life Support:**

1. Intubate as necessary.
2. Establish IV access (large bore).
3. Administer IV fluid of normal saline at 250mL -1000mL (*20 mL/kg child*) IV bolus. Titrate to keep systolic BP > 100mmHg in an adult. Follow the vital signs and lung sounds closely. If the patient develops rhonchi, crackles, or wheezes, consider the administration of a norepinephrine drip 8 mcg/min – 12 mcg/min IV.

4. Monitor EKG rhythm. Obtain 12-lead if available and time allows.
5. Establish a second large bore IV if able.
6. If patient's blood pressure shows no improvement and patient is still hypotensive after 2000mL of normal saline (unresponsive to IV fluid therapy), consider the administration of norepinephrine drip 8 mcg/min – 12 mcg/min IV. Titrate norepinephrine to keep systolic BP > 100mmHg.

**Notes:**

- Use caution when infusing large volumes of IV fluid to CHF patients or patients on dialysis. **Contact medical control** for any guidance needed on using norepinephrine as it may be used earlier depending on physician preference.
- Avoid norepinephrine in patients who are significantly volume depleted. The treatment of hypovolemia is IV fluids, **not** norepinephrine. Due to the typically short transport times in Corpus Christi, it will be very rare for norepinephrine to be administered.
- Remember that small patients (especially young females) often have a baseline systolic BP of 90mmHg. This protocol is intended for the **symptomatic patient only**.
- Consider all possible causes of shock and treat using the appropriate protocol.

## Newborn Resuscitation

### **Introduction:**

- Most term newborns require **no** resuscitation beyond positioning of the airway (supine with the neck slightly extended), warming, suctioning, and stimulation (see Childbirth protocol, p. 53).
- This protocol deals with the resuscitation of a newborn that has **not** responded to normal post-delivery measures.

History: infant field delivery, mother may have excessive bleeding, premature rupture of membranes, maternal fever, maternal hypertension, maternal seizures.

Symptoms: infant with low APGAR score.

Physical Exam: poor or absent respiratory effort, central cyanosis, decreased muscle tone, abnormal newborn heart rate (< 120 to > 160 beats per minute) with abnormal respiratory rate (< 40 to > 60 breaths per minute).

### **Basic Life Support:**

1. Maintain airway.
2. Suction mouth and nose with bulb syringe.
3. Thoroughly dry, stimulate, and keep the baby warm (wrap in towel or blanket). **It is extremely important to keep the newborn baby warm.** Spontaneous respirations should begin 15 seconds after tactile stimulation (flicking or rubbing soles of feet or buttocks). If shallow, slow, or absent respirations, begin bag-valve-mask immediately.
4. Assess heart rate (palpate umbilical cord, brachial or femoral artery, or auscultation of apical heart sounds) and skin color. If patient is breathing with a heart rate < 100 beats per minute and skin shows evidence of central cyanosis, hold 100% blow-by oxygen close to patient's airway.
5. If the heart rate remains < 100 beats per minute after oxygen and labored respirations persist with **central** cyanosis (cyanosis of hands and feet is normal), use bag-valve-mask with 100% oxygen. Do **not** delay oxygen treatment.
6. If heart rate remains < 60 beats per minute (or is absent) after 30 seconds of adequate assisted ventilation with a bag-valve-mask and 100% oxygen, then begin chest compressions with a depth of 1/2" (or 1/3 the anterior-posterior depth of the chest) and a rate of 120 beats per minute. Coordinate chest compressions with ventilation at a ratio of 3:1 (90 chest compressions and 30 ventilations per minute).
7. Determine APGAR score at 1 minute and 5 minutes if time allows. Do **not** delay resuscitation in order to obtain accurate APGAR scores.
8. Check blood glucose. Always consider hypoglycemia in a newborn resuscitation (especially if there is a history of maternal diabetes mellitus).

### **Advanced Life Support:**

1. Intubate infant as needed. Secure the endotracheal tube carefully as neonates can be easily extubated due to their short trachea. All heavily stained meconium deliveries should be

intubated, and suctioning should be applied directly to the endotracheal tube, or alternatively a small suction catheter can be inserted down the endotracheal tube. Only suction for 5 seconds at a time to avoid removing too much oxygen from the lungs. Once the infant is thoroughly suctioned and if the infant is breathing well, the endotracheal tube may be removed.

2. Monitor EKG rhythm. Refer to specific dysrhythmia protocol as needed.
3. Establish IV access. May need to place a proximal tibia intraosseous (IO) line if unable to easily place peripheral IV (on 2 attempts or after 90 seconds), or if the child is in cardiac arrest.
4. Administer IV fluids of normal saline 10 mL/kg IV if signs of hypoperfusion exist.
- ★5. If blood sugar is < 70 mg/dL, administer Dextrose 10% (D<sub>10</sub>) 2 mL/kg (0.5 gm/kg peds) IV.
6. If heart rate remains < 80 beats per minute, administer epinephrine 1:10,000 at 0.01 mg/kg IV or IO initially. If needed, subsequent doses are of epinephrine 1:10,000 at 0.01 mg/kg IV or IO.
7. Consider naloxone (Narcan<sup>®</sup>) 0.5mg IV, IM, or IO if the possibility of maternal opioid ingestion exists.

**Notes:**

- Keep all newborn infants warm to preserve body temperature, decrease oxygen demand, and prevent acidosis.
- Atropine does **not** work in neonatal resuscitation (undeveloped parasympathetic nervous system). Furthermore, it can cause paradoxical bradycardia and asystole if administered to children <3 months old.
- Very few infants will require epinephrine. Most will respond to oxygenation and ventilation.
- The 2 thumb-encircling hands technique of chest compression is preferred for chest compressions in infants performed by healthcare workers when 2 rescuers are available. This replaces the old 2-finger compression technique for 2-rescuer infant CPR by healthcare providers. Data shows that the 2 thumb-encircling technique can provide better blood flow (higher peak systolic and coronary perfusion pressures) than the 2-finger technique. The 2 thumbs are placed on the middle 1/3 of the sternum with the fingers encircling the chest and supporting the back.
- It is recognized that there may be situations in which the gestational age of the newborn cannot be easily ascertained in regards to the viability of the newborn. As a guideline, if the neonate has **both** developed ears and eyes, it is likely that they are above 24 weeks' gestation and should have attempts at resuscitation. Newborns without ears are likely less than 22-24 weeks' gestation (< 400 gms) and will not be viable to be resuscitated. These cases will be difficult for the medic on scene and always involve **medical control** for guidance as needed.

## Obstetrical Emergencies

### **Introduction:**

- Most pregnancies progress in a normal, orderly fashion. Any abnormality in pregnancy will affect both the mother and the child. Always remember you are treating two patients.
- Transport to the hospital is the priority unless delivery is imminent. Field delivery will usually be unavoidable if the mother cannot stop herself from pushing or if the head is visible at the vaginal opening. If the birth has a known high-risk or anticipated complication, it may be best to begin transport to the hospital.
- If a pregnant trauma patient > 20 weeks' gestation requires spinal motion restriction, securely package the patient supine, and tilt the spine board on its left side at a 45° angle with blanket or padding.

**History:** due date (is baby full term) or last normal menstrual period, is this a multiple birth (call for second ambulance), time interval between contractions and duration of contractions, number of times pregnant (gravity), number of prior births (parity), history of complications with this or prior pregnancies (gestational diabetes, hypertension, edema, visual changes), any vaginal bleeding, has the bag of water (amniotic sac) ruptured (what time and what color), is fetal movement present, prenatal care, prior (non-pregnant) maternal medical history

**Symptoms:** contractions, vaginal bleeding, rupture of membranes.

**Physical Exam:** gravid abdomen, vaginal bleeding, rupture of amniotic fluid, crowning of fetus, presenting fetal parts, fetal heart tones.

### **Childbirth**

#### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen (nasal cannula if patient is stable, non-rebreather if evidence of maternal or fetal distress).
3. Obtain vital signs.
4. Maternal pulse oximetry.
5. Perineal exam. Look for crowning (top of baby's head visible between contractions), which signifies imminent delivery. If patient is crowning and it is **not** the head, refer to the breech delivery or limb presentation section below.
6. Anticipate immediate delivery if the contractions are < 2 minutes apart or crowning is present. If imminent delivery is **not** anticipated, place the patient in the left lateral recumbent position (on patient's left side) and begin transport to the hospital. The left lateral recumbent position avoids compression of the inferior vena cava by the gravid uterus that decreases venous return to the heart.
7. For delivery, place the mother supine at the edge of a bed or stretcher with her feet on a flat surface and her knees bent.
8. Place a clean sheet or towel under the buttocks area.
9. Remove patient's underwear and any constrictive clothing.

10. Open the OB kit while maintaining as sterile a field as possible. Put on sterile gloves, mask, and gown if available.
11. Have mother pant breathe during contractions and relax in between.
12. Recheck for crowning.
13. Once crowning is seen, apply gentle pressure to the baby's head (remember the soft fontanelle) to prevent an explosive delivery with resultant tearing of the vaginal tissue.
14. Allow the head to deliver gently (usually the face will be facing down / posteriorly). Immediately use the bulb syringe to suction the baby's mouth (before it takes its first breath), then nose as soon as the head delivers (suctioning the nose should stimulate breathing). If meconium is present, refer to the section on meconium that is found on the next page.
15. Check for the umbilical cord around the neck (nuchal cord). If found gently slip it over the infant's head. If too tightly wrapped and not a multiple birth, clamp it in 2 places and cut between the clamps. Use caution in clamping a cord when multiple gestations are expected.
16. After the head delivers, there is normal rotation of approximately 45°. Next, deliver the shoulders, one at a time (gently guide the head down for the upper shoulder delivery then upward for the lower shoulder delivery).
17. Suction the infant again.
18. If baby does **not** begin breathing spontaneously after delivery of the baby, stimulate it (slap the feet). If normal respirations do not begin within 15 seconds, refer to the Newborn Resuscitation protocol, p. 51.
19. Dry the infant thoroughly (**very important**).
20. Assess the infant for respiratory effort and heart rate assessment. Determine the APGAR score at 1 minute and 5 minutes.

Score	0	1	2
Appearance	Blue or pale	Body pink; hands and feet blue	Completely pink
Pulse (Heart Rate)	Absent	Less than 100 beats per minute	More than 100 beats per minute
Grimace (Reflex Irritability)	Absent	Grimace	Grimace and cough or sneeze
Activity (Muscle Tone)	Limp	Some flexing of arms and legs	Active motion
Respiration	Absent	Slow, irregular; weak cry	Good; strong cry

21. Maintain the baby's warmth (cover the body).
22. After the delivery is complete, the baby should be kept at the mother's birth canal level and with head down slightly to allow for further drainage of airway secretions.
23. Cut the umbilical cord by first applying clamps (hemostats or umbilical tape) 6 inches from the baby's navel, with the second clamp 1 inch distal from the first. Cut between the clamps with a sterile instrument (scissors or scalpel blade).
24. Third stage of pregnancy- the delivery of the placenta. During this phase, the placenta, the remaining umbilical cord, the amniotic sac, and the lining membranes should all be delivered. Delivery of the placenta should take place naturally. Do **not** wait for delivery of the placenta to begin transport to the hospital (the placenta delivery may take 20 minutes - 30 minutes). **Never** tug on the umbilical cord to "aid" in placenta delivery, rather allow the placenta to deliver on its own. Gently massaging the lower abdomen will minimize bleeding and facilitate delivery of the placenta.

25. Post-delivery care- the placenta delivery will always be followed by some vaginal hemorrhage. Place a dressing over the vaginal opening. Rather vigorous massage of the lower abdomen over the uterus (fundal massage) will help in the contraction of the uterus and will usually slow the vaginal bleeding.
26. If delivered in the field, bring the placenta to the hospital for verification that the entire placenta was delivered.

### **Advanced Life Support:**

1. Place mother on the cardiac monitor.
2. Establish IV access of normal saline at 60 mL/hour (or saline lock). Only administer an IV fluid normal saline bolus to keep the systolic BP > 100mmHg, or if significant hemorrhage.

### **Notes:**

- Attempt to transport the patient to their hospital of choice; however, if any complications occur (hemorrhage or neonatal distress), divert to the closest **appropriate** hospital that has labor and delivery services.
- It is also best to attempt to transport to hospital for delivery at hospital (especially if short transport times) if premature delivery, breech or limb presentation, prolapsed cord, or unstable vital signs.
- A pregnant patient in cardiac arrest should be managed according to ACLS guidelines with rapid transport to the closest appropriate facility. Give the hospital early notification of your transport so that a neonatal team can be mobilized for a possible emergent c-section.

### **Delivery Complications:**

1. Breech Presentation (buttocks first)- Deliver the buttocks and support the baby as the head is delivered. If necessary, insert 2 fingers in a "V" shape on either side of the baby's nose to provide an airway while completing the delivery. The baby's head should deliver within 2 minutes. Gentle pressure over the lower abdomen (uterus) may be of help.
2. Limb Presentation (foot, arm)- Place mother in left lateral recumbent position and keep exposed parts moist with normal saline dressings. Do **not** pull on any body part. Limb presentations (transverse lies) are **not** deliverable in the field. Transport immediately with mother on high-flow oxygen via a non-rebreather mask.
3. Prolapsed Umbilical Cord- The umbilical cord is delivered before the baby. Do **not** push the cord back in. Administer 100% high-flow oxygen and begin rapid transport to the hospital. Using a gloved hand in the vagina to continuously push the baby's head away from the cervix and keep pressure off the cord (maintain a pulsatile cord). This may be helped with the mother in the knee-to-chest position (hips elevated as high as possible). Keep exposed cord moist with normal saline.

4. Meconium- If heavily stained meconium (brownish-yellow fetal stool) staining is noted with the delivery, thorough suctioning of the mouth and nose is indicated. This should be performed immediately after the head is accessible and before the thorax is delivered. Immediately perform endotracheal intubation in the standard procedure and apply suction directly to the endotracheal tube (or using a meconium aspirator if available) and suction out the lungs. Repeat as needed until the tube is clear of secretions.
5. Excessive Bleeding- If excessive bleeding is encountered after the placenta has been delivered, proceed with **vigorous massage** of the uterine fundus using a circular motion. If effective, the uterus should be felt to harden under your massaging hand. Place pads externally over the vaginal opening and hold gauze bandages over any visible vaginal or labial lacerations seen. Make sure the patient is on high-flow oxygen. Administer IVF normal saline bolus.
6. Prematurity- A pre-term delivery is a neonate less than 36 weeks' gestation and usually less than 2500 grams. Deliver a premature infant as with a normal infant. They require more conscientious drying and warming procedures as they are much more prone to hypothermia. A non-porous device can be used to aid in warming such as the aluminum-wrap "silver swaddler". They are more prone to hypoglycemia; thus a blood glucose assessment should be done if indicated. (See Newborn Resuscitation protocol, p. 51).
7. Multiple Births- Suspect if strong contractions continue after the first delivery and the baby is smaller than expected. Labor for the second baby usually begins about 10 minutes after the first delivery is completed. Fraternal twins each have their own placenta, while identical twins share the same placenta. Attempt transport if time permits, but be prepared to deliver en route to the hospital.

### Preeclampsia / Eclampsia (Toxemia)

#### **Introduction:**

- Pregnant patients with an intrauterine pregnancy > 20 weeks with new-onset maternal hypertension (systolic BP > 140mmHg and diastolic BP > 90mmHg). Remember the pregnant patient usually has a **lower** blood pressure than a non-pregnant patient.
- Preeclampsia is the condition of hypertension, swelling, and visual disturbances, while eclampsia refers to a pre-eclamptic patient who has a seizure or has altered mental status.
- Preeclampsia usually occurs in the third trimester of the mother's first pregnancy. It may occur up to 4 weeks post-partum.

History: history of pre-eclampsia, edema, visual changes, usually normotensive prior to pregnancy.

Symptoms: headache, swelling, visual changes, abdominal pain, nausea or vomiting, tremors.

Physical Exam: swelling, hypertension, seizures, altered mental status, tremors, increased reflexes.



**Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen (high flow if altered mental status, or seizing). Use nasopharyngeal airway and bag-valve-mask as needed.
3. Obtain vital signs.
4. Check blood glucose. If < 70 mg/dL, refer to Diabetic Emergencies protocol, p. 37.
5. Reassure the patient and keep her as quiet as possible. Place patient in the left lateral decubitus position (right-side up). Protect patient from injury if actively seizing.
6. Pulse oximetry.

**Advanced Life Support:**

1. Intubate patient if needed.
2. Establish IV access of normal saline at 60 mL/hour (or saline lock).
3. Monitor EKG rhythm.
- ★4. Administer ondansetron (Zofran®) 4mg (*2mg child*) IV or IM (adult) for active vomiting.
5. Administer magnesium sulfate **2gm** IV over 2 minutes if patient has had a seizure, but is **not** actively seizing. Administer magnesium sulfate **2gm** IV over 2 minutes if the patient has an extremely elevated blood pressure (either systolic > 160mmHg or diastolic > 110mmHg **and any** significant signs and symptoms of preeclampsia including swelling, headache, visual changes), even if they have not seized yet. If the patient is **actively seizing**, administer a total of magnesium sulfate **4gm** IV over 2 minutes. Monitor the patient's respiratory status closely.
6. If patient is still seizing after 4gm of IV magnesium sulfate, then administer diazepam (Valium®) 5mg - 10mg slow IV push. Administer diazepam until the seizure stops or until a total of 20mg diazepam has been administered. Use diazepam conservatively as it will result in fetal intoxication. If IV or IO access **cannot** be obtained, midazolam (Versed®) 2mg – 5mg IM or via MAD may be administered for seizure treatment. **Contact medical control** for guidance if patient is still seizing after 4grams of magnesium sulfate and 20mg of diazepam (or 5mg of IM midazolam) have been administered. The patient must be on the pulse oximeter and cardiac monitor if diazepam or midazolam is administered.
7. Proceed with rapid transport to an appropriate OB receiving hospital for likely emergency c-section.

**Notes:**

- Hypertension results in the decreased perfusion of the placenta. **A blood pressure > 140/90mmHg is always significant in a third trimester patient**, regardless of the extent of maternal symptoms.
- Seizures are due to chemical changes which occur with pre-eclampsia. These chemicals lower the maternal seizure threshold. Seizures cause hypoxia in the fetus.
- Magnesium sulfate is a potent vasodilator which decreases the blood pressure and increases the seizure threshold (reduces the seizure risk).
- The definitive treatment of eclampsia is delivery of the baby.

## Third Trimester Bleeding

### **Introduction:**

- Patient is greater than 28 weeks pregnant.
- Never attempt a vaginal (bimanual) exam in the field as severe bleeding may result.
- Two main causes of third trimester bleeding are:
  1. Abruptio Placenta- premature separation of the implanted placenta from the uterine wall. Associated with toxemia, diabetes, drug use (cocaine), trauma, or idiopathic (unknown). Causes **painful**, bright red bleeding.
  2. Placenta Previa- occurs when the placenta is located either close to or overlying the cervical opening to the vagina (cervical os). Causes **painless**, bright-red bleeding.

History: amount of bleeding (number of pads used), time bleeding began, any clots or tissue passed, syncope, estimated date of confinement (EDC)- due date.

Symptoms: dizziness, weakness, increased thirst, shortness of breath, syncope.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen (high flow via a non-rebreather).
3. Obtain vital signs. Often significant hypotension is present.
4. Place patient in the left-lateral recumbent position and in shock position.

### **Advanced Life Support:**

1. Monitor EKG rhythm.
2. Establish IV access (large bore antecubital if possible).
3. Administer IV fluid normal saline 250mL -1000mL IV bolus and titrate as needed to maintain a systolic BP > 100mmHg.
4. Monitor vital signs closely.
5. Start a second IV line if the patient is hypotensive.
6. Rapid transport to the hospital. Notify the receiving hospital early so that packed red blood cells can be acquired from the blood bank as needed. In addition, labor and delivery can be notified and an obstetrician present on arrival in the ED if needed.

## Psychiatric (Behavioral) Emergencies

### **Introduction:**

- Always protect yourself when dealing with a potentially combative patient. Have law enforcement respond to the scene as needed.
- Consider other causes for bizarre behavior besides psychiatric disorders such as stroke, seizure, infection (meningitis), hypoglycemia, hypoxia, head trauma, or drug / alcohol ingestion. Refer to Altered Mental Status protocol as needed, p. 25.

**History:** alcohol or drug use, auditory or visual hallucinations, paranoia, suicidal or homicidal ideations, history of psychiatric disorders (or patient on psychiatric medications), behavioral changes, depression, situational crisis.

**Symptoms:** bizarre thought content, hallucinations, chest pain, anxiety, shortness of breath, evidence of suicide attempt (wrist laceration, etc.), agitation, confusion, expression of suicidal / homicidal thoughts or actions.

**Physical Exam:** determine patient's mental status (person, place, time, events), thought content, and level of consciousness. Patient may act bizarre or have unusual affect. Patient hemodynamically stable (**no** hypotension, **no** hypoxia), pupillary size.

### **Basic Life Support:**

1. Confirm scene safety and ensure a protective environment for yourself and the patient. Law enforcement should always be called for assistance in difficult or potentially dangerous situations. Make sure that dangerous objects (knives, guns, pills, etc.) are removed.
2. Establish rapport with the patient and constantly reassure the patient. Use verbal calming techniques to calm the patient. Communication is very important. Do **not** leave the patient alone, unless necessary for personnel safety. Remove the patient from any stressful environment.
3. If the patient allows it, obtain vital signs.
4. If restraints are required to protect the patient and EMS providers (*i.e.* control aggressive behavior), only authorized restraints (commercial soft, leather, or other soft materials such as KERLIX™, sheets, triangular cravats, etc.) are to be used (see Patient Restraint appendix, p. 169). If the patient is handcuffed by law enforcement, it is expected that they will either accompany the patient in the ambulance or follow the ambulance to the hospital.
5. **Never restrain patients prone** (face down) on the stretcher.
6. Masks (face shields) may be applied to patients threatening to spit.
7. Apply oxygen if the patient is lethargic or has unstable vital signs.
8. Check blood glucose. Administer oral glucose 15gm - 30gm by mouth if glucose < 70 mg/dL and patient has an intact gag reflex.
9. Pulse oximetry as needed.

**Advanced Life Support:**

1. Monitor EKG rhythm.
2. Establish IV access if patient allows using normal saline 60 mL/hour (or saline lock).
- ★3. Administer naloxone (Narcan®) 2mg IV, IM, or MAD; and / or Dextrose 10% (D<sub>10</sub>) IV if indicated. Glucagon 1mg (*0.5mg child*) IM can be administered if the patient is hypoglycemic and IV access cannot be obtained.
4. Administer midazolam (Versed®) 1mg - 5mg slow IV push (2mg - 5mg IM, or MAD) if needed to control an extremely agitated patient. The patient must be on oxygen and pulse oximeter if midazolam is administered.

**Notes:**

- Always be suspicious of other etiologies in patients suspected of behavioral disorders and with alcohol on their breath (especially head trauma or hypoxia).
- Never forget to measure a blood glucose level in a combative patient. They may be hypoglycemic (especially alcoholic patients).
- Suicidal patients are **not** permitted to sign a refusal of care / no transport. Use law enforcement and **contact medical control** as needed for guidance.
- Paramedic personnel may utilize the Mucosal Atomization Device (MAD) as an alternative drug delivery adjunct for patients without IV or IO access who require the urgent administration of naloxone (Narcan®) and/or midazolam (Versed®). See protocol p. 152.

## Seizures / Status Epilepticus

### **Introduction:**

- Status epilepticus is defined as either continuous seizure activity for 5 minutes or more, or 2 or more seizures which occur without full return of consciousness between them. Status epilepticus is a true medical emergency.

History: how many seizures has the patient had (was there a lucid interval between seizures), history of seizures (epilepsy), medication list (anticonvulsants) and compliance with meds, what did the seizure look like, was seizure preceded by any trauma, check scene for signs of drug overdose (pill bottles), alcohol (intoxication or withdrawal) or drug use, fever (febrile seizure in a child), head trauma, duration and description of the seizure (often inaccurate), history of diabetes (hypoglycemia).

Symptoms: headache, neurological changes, seizure activity, confusion.

Physical Exam: altered mental status, eyes deviated or twitching, tonic and/or clonic movements, tongue biting, incontinence (urine or fecal), look for joint dislocations (shoulder).

### **Basic Life Support:**

1. Airway, breathing, circulation. Use nasopharyngeal airway and suction as necessary. Do **not** place anything between the teeth (it can break them off).
2. Apply oxygen (high flow via a non-rebreather if patient still has a decreased level of consciousness). Assist ventilations with bag-valve-mask as needed.
3. Protect the patient from physical harm and embarrassment.
4. Spinal motion restrict if any suspicion of head or neck trauma.
5. Check blood glucose. Hypoglycemia may be the cause of a seizure. Administer oral glucose 15gm - 30gm (*10gm child*) by mouth if patient has an intact gag reflex and the blood glucose is < 70 mg/dL. **All seizing patients need a blood glucose checked.**
6. Cool a febrile pediatric patient by removing clothing, applying tepid water, and fanning.
7. Pulse oximetry. Keep oxygen saturations > 94%.

### **Advanced Life Support:**

1. Control airway. Often intubation is **not** needed. Use bag-valve-mask initially, and only intubate patients who remain with an inadequate ventilatory effort after using the bag-valve-mask.
2. Establish IV access. All patients with a recent seizure need IV access if it can be obtained. Establish IV of normal saline 60 mL/hour (or saline lock).
3. Monitor EKG rhythm. Refer to particular cardiac dysrhythmia protocol as needed. Obtain 12-lead EKG if available, patient has stopped seizing, and time allows.
4. If patient is having active persistent seizures, administer diazepam (Valium®) 5mg - 10mg (*0.2 mg/kg child*) IV, **or** midazolam (Versed®) 2mg – 5mg (*0.1 mg/kg child*) IV, IM, or MAD. Up to 20mg (*10mg child*) of total diazepam or 10mg (*5mg child*) of total midazolam may be administered without on-line medical control. **Medical control must be contacted** for further guidance if a

patient still seizing after 20mg (10mg child) of total diazepam or 10mg (5mg child) of total midazolam has been administered. In a **child** in whom IV (or IO access if indicated) **cannot** be established, diazepam (0.5 mg/kg child) may be administered rectally. May repeat **rectal** diazepam dose 2.5mg every 5 - 10 minutes up to total dose of 10mg child. Midazolam (Versed®) 5mg (0.1 mg/kg child) IM or via MAD may be administered for seizure treatment before an IV attempt if clinically indicated. The patient should be on the cardiac monitor and pulse oximeter if either diazepam or midazolam is administered.

- ★5. If patient is hypoglycemic (glucose < 70 mg/dL), administer 25gms of Dextrose 10% (D<sub>10</sub>) IV (0.5 gm/kg peds), or glucagon (paramedic only) 1mg (0.5mg child) IM if unable to obtain IV access.
  - ★6. If patient is febrile with temperature > 101°F and is conscious with an intact gag reflex, consider the administration of acetaminophen 1000mg po (≥ 70 kg), or 500mg po (50-70kg) (15mg/kg child).
7. Reassess vital signs frequently.

### Notes:

- Do **not** administer diazepam (Valium®) by the intramuscular (IM) due to poor and erratic absorption. Midazolam (Versed®) is more water-soluble (*i.e.* well absorbed) and may be used IM (or MAD) in an adult.
- Pulse oximetry and cardiac monitoring is mandatory for all patients who receive diazepam or midazolam. It is best to administer diazepam or midazolam slowly to prevent hypotension or respiratory depression.
- Suspect a cardiac etiology in patients > 50 y/o with seizure activity. **Seizure activity is often the first sign of cerebral hypoxia from cardiac arrest** due to severe hypoperfusion of the brain.
- Febrile seizures are uncommon in patients > 6 y/o.
- All first time (new-onset) seizure patients should be transported to the emergency department for evaluation and work-up.
- Rectal diazepam may take up to 5 minutes to take effect.
- Always check a blood glucose in a seizure patient, and treat hypoglycemia as needed.
- Remember that not all seizures are tonic-clonic (gran mal) in nature. Often it is necessary to look closely for subtle signs of a focal seizure.
- Patients that are still conscious and talking to you or following commands are not having a true seizure. Adjust your treatment plan accordingly for these patients and **contact medical control** for guidance as needed in these pseudoseizure patients.
- Always consider eclampsia in the seizing third-trimester pregnant patient or within 1-month postpartum. Magnesium sulfate 4gm total slow IV push over 2 minutes is the treatment of choice in these patients.
- Paramedic personnel may utilize the Mucosal Atomization Device (MAD) as an alternative drug delivery adjunct for patients without IV or IO access who require the urgent administration of midazolam (Versed®). See protocol p. 152.

## Shortness of Breath (Non-Traumatic)

### **Introduction:**

- This protocol will cover shortness of breath including CHF, pulmonary edema, COPD, pulmonary embolus, asthma, stridor, and croup.
- There are many causes of shortness of breath, and it is often very difficult to diagnose the exact cause of shortness of breath in the field. This protocol will give you a basis on how to manage any shortness of breath patient, regardless of the cause. Often the patient's history can aid in your assessment and treatment plan.

History: history of congestive heart failure, reactive airway disease, COPD, fever (pneumonia, bronchitis), chemical inhalation or exposure, tobacco abuse (home O<sub>2</sub>), coronary artery disease, history of leg swelling or recent pelvic or leg surgery, prolonged bed rest (pulmonary embolus), spontaneous pneumothorax, possible foreign body obstruction, hives, anxiety, compliance to meds.

Symptoms: shortness of breath, chest pain, wheezing, sweating, peripheral edema, cough, fevers, hives, inability to lie flat, dyspnea with exertion.

Physical Exam: wheezing, chest wall pain, retractions, hives, facial or oral swelling, jugular venous distension, peripheral edema, calf pain, cyanosis, crackles, coughing, emotionally upset, carpopedal spasms, facial or hand tingling, dizziness, stridor, hoarseness, inability to talk in complete sentences.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen. Any patient with significant shortness of breath should be on high-flow oxygen via a non-rebreather mask unless primary hyperventilation is suspected. Patients with very mild shortness of breath can be treated with oxygen via nasal cannula at 2 LPM - 4 LPM.
3. Place patient in a position of comfort, usually sitting up if no trauma is suspected.
4. Assist ventilations with bag-valve-mask as needed. Consider bag-valve-mask if the adult patient has a respiratory rate < 10 per minute or > 30 per minute.
5. Obtain vital signs. Patients with a congestive heart failure exacerbation will often have an elevated blood pressure initially.
6. Pulse oximetry.
7. If patient is wheezing, administer albuterol 5mg (*2.5mg child*) via nebulizer or metered-dose-inhaler (2-4 puffs). May repeat in 5 minutes - 10 minutes as needed.
8. If patient has a suspected allergic component, see the Allergic Reaction / Anaphylaxis protocol, p. 23.

### **Advanced Life Support:**

1. Intubate patient if necessary, such as decreased level of consciousness (lethargy and unable to follow commands), absent gag reflex, increased respiratory distress, etc.

2. Monitor EKG rhythm. Frequently, shortness of breath patients will have ventricular ectopy or atrial fibrillation. If a dysrhythmia is encountered, refer to particular protocol. Obtain 12-lead EKG if available and time allows. Patients may have difficulty lying supine for the acquisition of the 12-lead, and it should be obtained in a position of comfort as close as possible to supine.
3. Establish IV access of normal saline 60 mL/hour (or saline lock).
4. Administer IV fluids normal saline if patient is hypotensive 250mL -1000mL (*20 mL/kg child*) IV bolus. If patient has evidence of fluid overload on lung auscultation (crackles), do **not** administer IV fluids to avoid further fluid overload.
5. If patient is wheezing, administer albuterol 5.0mg (*2.5mg child*) via nebulizer. May repeat albuterol every 5 minutes - 10 minutes up to 15mg (*7.5mg child*) total. If patient has severe wheezing, may administer albuterol 15mg (*7.5mg child*) continuous albuterol nebs.
- ★6. If an allergic component is suspected, administer diphenhydramine (Benadryl®) 25mg - 50mg (*0.75 mg/kg child*) IV or IM. Consider epinephrine 1:1,000 IM 0.3mg (*0.01 mg/kg child*) for very poor air movement and cyanosis. Be very cautious administering IM epinephrine to patients who are > 50 y/o, pregnant, or have a history of coronary artery disease. Be very cautious giving epinephrine IM to a hypoxic patient as it will increase oxygen demand on an already irritable heart. See Allergic Reaction / Anaphylaxis protocol, p. 23.
- ★7. If a patient is wheezing significantly and has a history of asthma or has a suspected allergic component to the patient's wheezing), administer methylprednisolone (Solumedrol®) 125mg (*2 mg/kg child*) IV or IM over one minute. **It is very important to let the receiving ED staff know that methylprednisolone has been administered in the field, so that it will not be repeated in the ED.** If significant wheezing and respiratory distress persists, consider using CPAP therapy (see protocol p. 133).
8. If bilateral crackles (rales) are present and the patient has pedal edema and/or JVD with a suspected CHF / pulmonary edema diagnosis, administer furosemide (Lasix®) 40mg (*1 mg/kg child*) IV if the patient is **not** currently on furosemide. If the patient is already on furosemide, double the patient's single dose amount up to 100mg (*3 mg/kg child*) IV. **Do not administer furosemide to a patient suspected of having pneumonia (fever, productive cough).**
9. If patient has suspected acute CHF exacerbation (crackles, pedal edema, JVD, hypertension), administer nitroglycerin 0.4mg SL (or spray) every 5 minutes up to 3 total doses (even if the patient has taken their own nitroglycerin prior to EMS arrival). Keep systolic BP > 100mmHg. Monitor the blood pressure very closely. **Do not administer nitroglycerin to a patient with suspected pneumonia (fever, productive cough).** In addition to nitroglycerin, morphine sulfate can be administered at 2mg - 10mg slow IV push (or fentanyl 50µg – 100µg) for significant pulmonary edema to reduce preload and afterload. If significant respiratory distress is present, consider using CPAP therapy (see protocol p. 133).
- ★10. If a decreased respiratory rate is thought to be due to an overdose or overmedication of opioids, administer naloxone (Narcan®) 2mg (*1mg child*) IV, IM, or via MAD.
- ★11. If patient is febrile with temperature > 101°F and is conscious with an intact gag reflex, consider the administration of acetaminophen 1000mg po (≥ 70 kg), or 500mg po (50-70kg) (*15mg/kg child*).
12. Consider norepinephrine drip 8 mcg/min – 12 mcg/min IV drip if the adult patient is suspected of being in cardiogenic shock (systolic BP < 100mmHg with pulmonary edema), and unresponsive to 500mL IV fluid normal saline bolus. Try and maintain a systolic BP > 100mmHg.

**Notes:**



- Make sure that if nitroglycerin is administered the patient has not taken any erectile dysfunction medications (Viagra®, Levitra®, or Cialis®) in the last 24 hours.
- Remember epinephrine is only indicated for non-pregnant patients less than 50 y/o without a history of coronary artery disease who are in severe respiratory distress (hypotension without relief from albuterol), and thought to have an allergic component to their wheezing.
- Do **not** withhold high-flow oxygen on a COPD patient. If they are having severe shortness of breath and dysrhythmias, often high-flow oxygen in the field can help them. If there is a prolonged transport time, look closely for hypoventilation (due to abolishing the COPD patient's hypoxic drive). Assist with bag-valve-mask as necessary.
- **Just because a patient has a history of congestive heart failure and has pedal edema on exam does not mean that they all need furosemide. Only administer furosemide if the patient is having shortness of breath with evidence of fluid overload (crackles).**
- Do **not** have a suspected hyperventilation patient breathe into a paper bag (or non-rebreather mask without oxygen). Instead, use verbal coaching and reassurance to slow their respiratory rate. The patient may in fact be acidotic (especially DKA) and are having Kussmaul breathing to blow off carbon dioxide. By having the patient breathe into a paper bag, the carbon dioxide could become dangerously high and could be fatal.
- Often pneumonia and congestive heart failure will both have crackles (rales) on auscultation of the chest. To help distinguish, congestive heart failure patients may have pedal edema, JVD, and an acute onset, while pneumonia patients will often have fever, cough, nasal congestion, chest wall pain, and a more gradual onset. **Do not administer furosemide (Lasix®) or nitroglycerin to a patient with suspected pneumonia.**
- Remember that the amount of wheezing auscultated may worsen after albuterol treatment. In fact, the patient may be improving due to the opening up of bronchioles which causes better air flow and louder wheezing.
- Consider pulmonary embolus in a patient that has a history of tobacco use, prolonged travel or bed rest, lower extremity immobilization, recent pelvic surgery, history of deep vein thrombosis (DVT), or oral contraceptive use.

## Stroke / CVA

### **Introduction:**

- This protocol applies to patients with altered mental status, slurred speech, or focal weakness without any other obvious etiology.
- In an ischemic stroke, a clot forms (thrombotic) in a blood vessel in the brain or travels (embolic) from a distant blood vessel (*e.g.* carotid artery). Embolic strokes are most common in the middle cerebral artery. Ischemic strokes account for 85% of all strokes and are usually secondary to atherosclerosis.
- A hemorrhagic stroke occurs from a rupture of a cerebral vessel, with bleeding occurring into brain tissue (intracerebral hemorrhage- ICH) or areas surrounding the brain (subarachnoid hemorrhage- SAH). Hemorrhagic strokes are usually due to hypertension, but may also be due to an aneurysm or arteriovenous malformation (AVM).
- An intracerebral hemorrhage (ICH) is usually the result of severe hypertension with bleeding into the brain tissue.
- A subarachnoid hemorrhage (SAH) is bleeding into the subarachnoid space (CSF space) which is usually the result of the rupture of a congenital aneurysm, or after head trauma.
- A transient ischemic attack “mini-stroke” (TIA) is defined as a reversible neurological event. The symptoms will completely resolve within 24 hours.
- An acute stroke is described in a patient that has symptoms which began < 6 hours ago. This is the time from when the patient was “last normal”.

History: previous strokes (old neurological deficits), hypertension, diabetes, known brain aneurysm, brain cancer, when did symptoms begin (usually sudden onset).

Symptoms: headache, neurological deficit (focal weakness), slurred speech, facial drooping, altered mental status (coma, stupor, confusion, seizures, delirium), incoordination, paralysis, numbness, ataxia (poor balance), difficulty swallowing, vertigo, vomiting, changes in vision.

Physical Exam: altered mental status, slurred speech, or inability to speak, facial droop, focal neurological weakness (paresis) or numbness, ataxia, cranial nerve abnormality.

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Establish “Time Last Normal” for patient. This will be the presumed time of onset of the stroke.
3. Apply oxygen. Use a nasopharyngeal or an oropharyngeal airway and bag-valve-mask as needed if either the respiratory rate or tidal volume is inadequate.
4. Perform spinal motion restriction if the possibility of a spinal injury exists.
5. Obtain vital signs.
6. Examine patient closely for any signs of head trauma.
7. Check the blood glucose. Administer oral glucose 15gm - 30 gm by mouth if glucose < 70 mg/dL and patient has an intact gag reflex.
8. Consider other causes of altered mental status (see Altered Mental Status protocol, p. 25).
9. Elevate the head of bed to 30° if **no** trauma is suspected.
10. Apply pulse oximetry and monitor oxygen saturation levels.

**Advanced Life Support:**

1. Intubate as necessary to protect or maintain the patient's airway.
2. Monitor EKG rhythm.
3. Establish IV access normal saline at 60 mL/hour rate (or saline lock).
- ★4. If patient has a blood glucose < 70 mg/dL, administer 25gms Dextrose 10% (D<sub>10</sub>). Do **not** administer D<sub>10</sub> unless the blood sugar is low as the hypertonic glucose load can be harmful to already ischemic brain tissue.
5. If patient seizes, administer diazepam (Valium®) 5mg - 10mg slow IV push (see Seizure protocol, p. 61).
6. If the **symptomatic** stroke patient has either a systolic BP > 220mmHg and/or a diastolic BP > 110mmHg, administer labetalol (Normodyne®) 10mg – 20mg slow IV over 2 minutes. Monitor the blood pressure closely. **Make sure you inform the ED staff that labetalol was administered to the patient in the field.**
- ★7. If patient is vomiting severely (having repetitive vomiting or retching), administer ondansetron (Zofran®) 4mg IV or IM (adult). Significant vomiting will increase intracranial pressure.
8. Perform the Cincinnati Stroke Screen for all suspected stroke patients. If at least one of the 3 exam findings are abnormal and the time of symptoms ("Time Last Normal") is < 3 hours, then all acute stroke patients should be transported to an accredited stroke center for possible thrombolytic (tPA) administration. The goal is symptom onset to thrombolytic (tPA) time less than 3 hours; however, some neurologists are now extending this window out to 4.5 hours. (See Cincinnati Prehospital Stroke Scale appendix, p. 132). In addition, perform the EMS VAN acute stroke screening tool (See p. 191).

**Notes:**

- Strokes are the third leading cause of death in the United States. Like an acute myocardial infarction, immediate recognition of a stroke condition and initiation of treatment can reduce the amount of disability and death.
- Thrombolytics (tPA) may be administered at the stroke center hospital if the patient has an ischemic stroke of < 4.5 hours' duration (clearly defined time onset of symptoms), no history of intracranial hemorrhage, neoplasm, AV malformation, no recent (< 3 months) major surgery or serious head trauma, and no active internal bleeding. The goal for treatment for the selected tPA patient is 60 minutes from door (arrival in ED) to thrombolytic administration.
- The onset of symptoms is defined as the last time the patient was witnessed to be symptom free.
- Stroke patients are at an increased risk of vomiting, aspiration, and loss of airway control.
- Do **not** lower the blood pressure too low. Maintain the systolic BP between 160mmHg - 180mmHg to assist with adequate blood flow to the brain. A higher-than-normal blood pressure is needed to help perfuse in and around the area of cerebral ischemia or hemorrhage. Never lower the blood pressure too low.
- Current stroke centers include CHRISTUS Spohn Shoreline, Bay Area Medical Center, and Doctors Regional Hospital.

## Supraventricular Tachycardia (SVT)- Stable & Unstable

### **Introduction:**

- The **stable** SVT patient may have palpitations, dizziness, or lightheadedness.
- The **unstable** SVT patient may also have chest pain, shortness of breath, hypotension, or altered mental status.

History: coronary artery disease, hypoxia, heavy caffeine use, smoking, thyroid disorders, congenital heart disease, on antidysrhythmic medication.

Symptoms: palpitations (“racing heart”), shortness of breath, lightheadedness, dizziness, chest pain, hypotension, altered mental status, cough.

Physical Exam: usually unremarkable (may have decreased level of consciousness if hypotensive), tachycardia, hypoperfusion (delayed capillary refill).

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen.
3. Obtain vital signs. The pulse will usually be between 150 - 250 beats per minute.
4. Pulse oximetry.

### **Advanced Life Support:**

1. Control airway as needed.
2. Monitor EKG rhythm and obtain rhythm strip for later ED review. The EKG will show a ventricular rate between 150 - 250 beats per minute, QRS < 0.12 sec, and usually absent P waves. It must be differentiated from sinus tachycardia. Obtain a 12-lead EKG prior to treating the patient if available, patient is stable, and time allows. This will be very helpful to the treating emergency physician and cardiologist.
3. Establish IV access. Establish large bore IV at a proximal site (antecubital fossa).
4. Start IV fluids of normal saline at 60 mL/hour (or saline lock) if patient is stable. Administer IV fluids of normal saline 250mL -1000mL (*20 mL/kg child*) IV bolus if patient is unstable (hypotension, chest pain, decreased level of consciousness).
5. Consider vagal (Valsalva) maneuvers if the patient is cooperative. Vagal maneuvers consist of having the patient bear down against a closed glottis. Do **not** perform carotid sinus massage due to the risk of embolizing carotid artery plaques.
6. If patient is stable, administer adenosine (Adenocard®) 6mg - 12mg (*0.1 mg/kg - 0.2 mg/kg child*) rapid IV push followed immediately by a 10mL - 20mL normal saline flush. If there is **no** response to the initial adenosine dose after 2 minutes (*i.e.* the patient remains in SVT), the adenosine may be repeated at 12mg rapid IV push, followed immediately by a 10mL - 20mL normal saline flush. A total of 30mg (*0.5 mg/kg child*) IV adenosine may be administered total. It is very important to warn the patient before giving them adenosine that they will experience

transient flushing, nausea, head rush, and chest tightness shortly after the adenosine administration.

7. If the patient is unstable (significant chest pain, shortness of breath, hypotension, altered mental status), consider adenosine 12mg (*0.2 mg/kg child*) rapid IV push followed immediately by a 10mL -20mL normal saline flush, or go directly to synchronized cardioversion. Perform synchronized cardioversion 120J (*1 J/kg child*). If still in SVT after the initial synchronized cardioversion, increase the energy to 200J (*2 J/kg child*). If still in SVT, consider adenosine 12mg (*0.2 mg/kg child*) rapid IV push, then repeat synchronized cardioversion at 200J (*2 J/kg child*). Consider midazolam (Versed®) 1mg - 5mg slow IV, IO, or via MAD prior to synchronized cardioversion in awake adult patients. Have bag-valve-mask and intubation equipment readily available prior to giving midazolam.

**Notes:**

- Given the very short duration of adenosine (approximately 10 seconds), it must be administered in a proximal IV site (antecubital, external jugular). Give the flush immediately after administering the adenosine to make sure the adenosine reaches the heart quickly. Adenosine will often **not** work on patients taking theophylline, aminophylline, or high-dose caffeine due to the antagonistic effects of methylxanthines.
- Synchronized cardioversion should rarely be needed if patients with a heart rate < 150 beats per minute (high likelihood it is **not** SVT).
- SVT is the most common dysrhythmia seen in the pediatric age group. If the rate is > 220 beats per minute in an infant or > 200 beats per minute in a child, then it is usually SVT.
- For suspected cocaine or amphetamine induced SVT, administer diazepam (Valium®) 5mg – 10mg slow IV push. Alternatively, midazolam (Versed®) 1mg – 5mg slow IV push, IM, or via MAD can be used.
- A good rule of thumb for the maximum sinus tachycardia rate in a patient is 220 minus the patient's age. This works for patients up to age 50 or so. If a patient has a heart rate greater than this, it is usually **not** sinus in origin.

## Syncope

### **Introduction:**

- Syncope is the brief loss of consciousness, also referred to as fainting.

History: cardiac history, stroke, seizure, history of syncope, occult blood loss (GI, ectopic), females (last menstrual period, vaginal bleeding), fluid loss (vomiting, diarrhea), past medical history, medications, what was patient doing when patient fainted

Symptoms: loss of consciousness with recovery, lightheadedness, dizziness, palpitations.

Physical Exam: low blood pressure, irregular pulse, bradycardia

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Obtain pulse oximeter.
3. Apply oxygen as needed.
4. Obtain vital signs.
5. Check blood sugar.
6. Assess for any signs and symptoms of trauma. Spinal motion restriction should be used if there is any indication of head trauma, neck pain, or back pain during syncope.

### **Advanced Life Support:**

1. Monitor EKG rhythm, and record a rhythm strip. Obtain a 12-lead if time allows (skip the 12-lead and go on to the treatment below if the patient is unstable).
- ★2. Administer dextrose 10% 25gm IV if patient is hypoglycemic. If unable to obtain IV on these hypoglycemic patients, administer glucagon (paramedic only) 1mg (*0.5mg child*) IM.
3. Establish IV access of normal saline at 60 mL/hour (or saline lock) if patient is not hypotensive.
4. IV fluid bolus of normal saline at 250mL - 1000mL (*20 mL/kg child*) IV if patient is hypotensive. Maintain a systolic BP > 100mmHg. Use IV fluid with caution in patients with crackles on lung auscultation.
5. If any relevant signs / symptoms found, refer to that appropriate protocol.

### **Notes:**

- More than 25% of all geriatric (> 65 y/o) syncope is related to cardiac dysrhythmias.

## Toxicological Emergencies / Drug Overdose / Poisonings

### **Introduction:**

- Patient may have history of suspected, witnessed, or alleged ingestion, inhalation, or exposure.
- The management of the poisoned patient depends on 3 principles:
  1. Decontamination- limit further absorption and minimize the extent of toxicity.
  2. Supportive Care- limit the effects of the poisoning on the primary organ systems at risk.
  3. Definitive Care- limit severity or duration of toxicity through use of antidotes that enhance elimination or reverse the effects of the toxin itself.

History: (use patient, family, or bystanders as needed), type of meds or drugs taken or exposed to, time of ingestion (very important to determine), amount taken, has patient vomited or coughed since ingestion, reason for poisoning (accidental or intentional), history of suicide attempts, current medications, allergies, history of drug abuse.

Symptoms: agitation, altered mental status, pupillary changes, skin changes, abnormal vital signs, unusual odor on breath, respiratory distress, nausea or vomiting, seizures, muscle cramps.

Physical Exam: altered mental status, pupillary changes, skin changes, abnormal vital signs, unusual odor on breath, venous "track" marks, gag reflex, secretions, oral mucosal burns.

### Look for a Toxidrome:

1. Cholinergics: **SLUDGE** (Salivation, Lacrimation, Urination, Diarrhea, GI cramping, Emesis) for cholinergic exposures (including organophosphates). Also may have muscle fasciculations, miosis (constricted pupils), wheezing, bradycardia, or seizures.
2. Opioids: Triad of miosis (constricted pupils), decreased respiratory rate, and decreased level of consciousness.
3. Anticholinergics: Confusion, warm and dry skin, blurred vision (mydriasis-dilated pupils), urinary retention, and dry mouth. Can be remembered as "Mad as a hatter, Red as a beet, Blind as a bat, Dry as a bone".
4. Tricyclic Antidepressants (TCAs): Altered mental status, seizures, dysrhythmias, hypotension.

### **Basic Life Support:**

1. Make sure the scene is safe. Do not contaminate yourself while treating the patient. Ensure a protective environment for yourself and the patient. Park the ambulance upwind if applicable. Use appropriate personal protective equipment.
2. Airway, breathing, circulation.
3. Obtain vital signs.
4. Apply oxygen (high flow via non-rebreather mask if altered mental status). Use bag-valve-mask as needed.
5. If evidence of contamination exists, immediately decontaminate. Remove patient from the contaminated environment. Remove patient's clothes if indicated. Wash patient's skin if indicated. Flush patient's eyes and/or mucous membranes if needed.

6. Attempt to locate nature of exposure or ingestion. Collect pill bottles if present and bring them to the hospital with the patient. Bring chemical or cleaner containers if possible and if they can be transported in a safe manner. If not, carefully record the name and ingredients off the label. Attempt to obtain time of ingestion from family or bystanders.
7. Check blood sugar. Treat as necessary. Some poisonings are associated with a sudden, profound hypoglycemia (*e.g.* aspirin, opioids, alcohol, etc.).
8. Have portable suction (or the ambulance suction) readily available as emesis is common after a poisoning.
9. Pulse oximetry. Remember that carbon monoxide poisoning will register a falsely “elevated” (normal) pulse oximeter reading (treat the patient and **not** the pulse oximetry reading).

### **Advanced Life Support:**

1. Intubate the patient as necessary for respiratory distress or to protect the patient’s airway.
2. Monitor the EKG rhythm. Record a rhythm strip if abnormal. Many overdoses will affect the heart (digoxin,  $\beta$ -blockers, calcium channel blockers, tricyclic antidepressants, amphetamines, etc.). Refer to particular dysrhythmia protocol as indicated. Obtain a 12-lead EKG if available and time allows.
3. Establish IV access with normal saline at 60 mL/hour (or saline lock).
4. Administer IV fluid of normal saline at 250mL -1000mL (*20 mL/kg child*) IV bolus as needed to keep systolic BP > 100mmHg.
- ★5. Administer dextrose 10% (D<sub>10</sub>) 25gms (*0.5 gm/kg child*) IV if blood glucose < 70 mg/dL.
- ★6. Administer naloxone (Narcan<sup>®</sup>) 2mg (*1mg child*) IV, IM, or MAD if suspected opioid use and respiratory depression / decreased gag reflex exists. It may be prudent to administer naloxone (Narcan<sup>®</sup>) slowly and titrate to effect to avoid appropriate opioid withdrawal. Remember the goal is only to normalize the respiratory rate and protect the gag response.
7. If a tricyclic antidepressant (TCA) overdose is suspected, administer sodium bicarbonate 1 amp (50mEq) IV. A tricyclic antidepressant overdose (TCA) overdose may include a widened QRS (> 0.12sec) on the monitor, HR > 120, hypotension, or seizures. Note that the newer antidepressants (Zoloft<sup>®</sup>, Prozac<sup>®</sup>, Effexor<sup>®</sup>, Pristiq<sup>®</sup>, Celexa<sup>®</sup>, and Paxil<sup>®</sup>) are **not** TCAs, rather selective serotonin reuptake inhibitors (SSRIs).
8. If an organophosphate poisoning is suspected and patient is symptomatic (SLUDGE syndrome), then administer atropine 2mg (*0.04 mg/kg child*) IV. **Contact medical control** for possible repeat of atropine 2mg (*0.04 mg/kg child*) IV every 5 minutes if possibility of significant organophosphate exposure. Administer atropine until signs of atropinization occur (mydriasis, tachycardia, drying of the secretions or skin).
9. If a calcium channel blocker overdose is suspected (bradycardia, EKG conduction delays, hypotension, lethargy, nausea or vomiting), administer IV fluid bolus as above. If symptomatic bradycardia is present, administer atropine 1mg IV. May repeat atropine 1mg IV every 5 minutes as needed (patient remains bradycardic and hypotensive) until 3mg IV total is administered. **Contact medical control** for possible calcium gluconate order 1gm IV over 5 minutes if patient remains refractory to the IV fluid bolus and atropine. **Contact medical control** for possible glucagon 3mg – 5mg IV order if patient remains symptomatic after IV fluids and atropine.



10. If a **β-blocker overdose** is suspected (bradycardia, hypotension), administer IV fluid bolus as above. If symptomatic bradycardia is present, administer atropine 1mg IV. May repeat atropine 1mg IV every 5 minutes as needed (patient remains bradycardic and hypotensive) until 3mg IV total administered. **Contact medical control** for possible glucagon 2mg IV order if patient remains symptomatic after IV fluids and atropine.
11. **Contact medical control** as needed for guidance on all complex overdoses, poisonings, and exposures.

**Notes:**

- Do not rely on the patient’s history of ingestion in a suicidal patient. Make sure that the patient is still not carrying other medications or weapons on their person.
- Actively suicidal patients can **not** refuse transport. Involve law enforcement and **medical control** as needed.
- Contact Poison Control (1-800-222-1222) as needed.
- Victims of fires may have been exposed to toxic gases, especially carbon monoxide and cyanide. They may have associated burns, singed nasal hairs, or carbonaceous sputum. Always administer high-flow oxygen and intubate early if indicated. Signs of carboxyhemoglobinemia include: “flu-like” symptoms, headache, nausea or vomiting, weakness, altered mental status, dizziness, shortness of breath, and chest pain. Remember that cherry-red skin is a very late finding.
- Do **not** administer syrup of ipecac in the prehospital setting.
- Contaminated patients should **not** be transported by aeromedical transport given the potential risk to the safety of the aircraft crew.
- EMS personnel may utilize the Mucosal Atomization Device (MAD) as an alternative drug delivery adjunct for patients without IV or IO access who require the urgent administration of naloxone (Narcan®) and/or midazolam (Versed®). See protocol p. 152.

**Tricyclic Antidepressants (TCAs):**

Generic Name	Trade Name®
Amitriptyline	Elavil®
Clomipramine	Anafranil®
Desipramine	Norpramin®
Doxepin	Sinequan®
Imipramine	Tofranil®
Nortriptyline	Pamelor®, Aventyl®
Protriptyline	Vivactil®

**Calcium-Channel Blockers:**

Generic Name	Trade Name®
Amlodipine	Norvasc®
Diltiazem	Cardizem®, Dilacor®, Tiazac®
Felodipine	Plendil®
Isradipine	DynaCirc®
Nicardipine	Cardene®
Nifedipine	Procardia®, Adalat®
Nimodipine	Nimotop®
Verapamil	Isoptin®, Calan®, Verelan®
Nisoldipine	Sular®

**Beta-Blockers:**

Generic Name	Trade Name®
Acebutolol	Sectral®
Atenolol	Tenormin®
Bisoprolol	Zabeta®
Carvedilol	Coreg®
Esmolol	Brevibloc®
Labetalol	Trandate®, Normodyne®
Metoprolol	Lopressor®, Toprol®
Nadolol	Corgard®
Propranolol	Inderal®
Timolol	Blocadren®

## Ventricular Ectopy / Ventricular Tachycardia (Stable with Pulse)

### **Introduction:**

- Ventricular tachycardia is defined as 3 or more successive beats of premature ventricular contractions (PVCs) with a QRS > 0.12sec. It is usually associated with a ventricular rate > 150 beats per minute.
- Ventricular Tachycardia may or may not cause hemodynamic compromise. This protocol deals with “stable” ventricular tachycardia- patients with a pulse and without either severe shortness of breath, severe chest pain, or altered mental status. If the patient has **no** pulse or one of these above symptoms, refer to the Unstable Ventricular Tachycardia protocol, p. 80.
- Bigeminy refers to PVC’s alternating with a normal sinus beat (every other beat is a PVC).
- Trigeminy refers to PVC’s occurring with 2 normal sinus beats between them (every third beat is a PVC).
- Couplets refer to pairs of PVC’s occurring together.

History: usually have history of coronary artery disease, may have pacemaker or automatic internal cardiac defibrillator (AICD), may have history of syncopal event, may be on antidysrhythmic medication.

Symptoms: syncope, mild shortness of breath, mild chest pain, palpitations. If patient has severe chest pain, severe shortness of breath, or altered mental status, proceed to Unstable Ventricular Tachycardia protocol, p. 80).

Physical Exam: pulse (tachycardia).

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen. High-flow oxygen via a non-rebreather mask is the primary treatment for ventricular ectopy (“irritable ventricle”). It may take 5 minutes for the oxygen to have full effect.
3. Obtain vital signs.
4. Pulse oximetry.

### **Advanced Life Support:**

1. Monitor EKG rhythm, and obtain a rhythm strip printout. Obtain 12-lead EKG if available and time allows.
2. Establish IV access with normal saline at 60 mL/hour (or saline lock).
3. Administer lidocaine 1.5 mg/kg IV if indicated. Lidocaine should be administered only if the patient is having > 10 PVCs per minute, has a heart rate > 80 beats per minute, multifocal PVC’s, couplets, “R on T” phenomenon, runs of ventricular tachycardia, and is not in 2° or 3°AV heart block. **Discuss with medical control** if patient is very stable as some physicians do **not** believe in administering lidocaine for PVC’s.

4. May repeat lidocaine 0.75 mg/kg IV (one-half of original dose) every 5 minutes until the dysrhythmia resolves or a total of 3mg/kg IV of lidocaine has been administered.
5. If needed, start a lidocaine drip at 1 mg/min – 4 mg/min IV. Monitor patient closely for signs of lidocaine toxicity (altered mental status, seizures).
6. If **no** response with lidocaine in an adult patient, administer magnesium sulfate 2gm IV over 2 minutes.
7. If hyperkalemia may be present (ESRD / dialysis patient), administer sodium bicarbonate 1 amp (50mEq) IV along with calcium gluconate 1gm IV, followed by sodium bicarbonate 1 amp (50mEq) IV. Be sure to thoroughly flush the IV tubing between medications to avoid precipitation between the calcium and bicarbonate. Ideally these medications should be administered in 2 different IVs (or IO and separate IV) to avoid precipitation.

**Notes:**

- Look closely at the rhythm strip for evidence of pacemaker spikes. Patients with pacemakers normally have wide QRS complexes and usually do **not** need lidocaine.
- Prophylactic lidocaine is **no** longer indicated for routine use when PVCs are associated with an acute MI.
- Never administer lidocaine to a wide complex rhythm that is **< 80 beats per minute**. It may be an accelerated junctional rhythm, and giving lidocaine may result in immediate asystole!
- Magnesium sulfate is the drug of choice if the rhythm is Torsades de Pointes (polymorphic ventricular tachycardia). If the patient is in Torsades de Pointes, administer magnesium sulfate 2gm IV over 2 minutes before lidocaine.
- Some patients may have “chronic bigeminy”. If a patient is known to have chronic bigeminy or ventricular ectopy, lidocaine may be withheld after **discussing with medical control**.

## Asystole

### **Introduction:**

- Asystole (“flat line”) and pulseless idioventricular or agonal rhythm (wide complex, irregular with rate < 60 beats per minute) in 2 consecutive leads will be considered in this protocol.
- Make sure the leads are connected properly and **not** accidentally disconnected.

History: events leading up to arrest, sudden collapse, electric shock, past cardiac history, was bystander CPR started?, time arrest started (estimated downtime), congenital heart disease, ESRD / dialysis, hypothermia, no valid state DNR form.

Symptoms: unresponsive.

Physical Exam: unconscious, not breathing, no pulse, and no signs of obvious death (dependent lividity, rigor mortis, etc.).

### **Basic Life Support:**

1. Establish that patient is unresponsive **and** without signs of obvious death (rigor mortis, dependent lividity, etc.).
2. Check for breathing. If **not** breathing, begin ventilations using bag-valve-mask. Place an oropharyngeal airway.
3. Immediately perform chest compressions at a rate of 100-120 beats per minute. Notify dispatch and the responding units that CPR is in progress if not already known.
4. Apply AED. It will **not** shock asystole, but may shock fine ventricular fibrillation, so apply the AED. If the AED fires, be sure and tell the ALS crew how many shocks were delivered. Follow the AED prompts.
5. Place i-gel<sup>®</sup> airway and ventilate with 100% oxygen.
6. Check closely for evidence of trauma (gun shot wound, stab wound, etc.).

### **Advanced Life Support:**

1. Apply the electrode pads and obtain a rhythm strip printout. If asystole, check in 2 leads.
2. Continue CPR as necessary.
3. Establish IV access (large bore antecubital or external jugular if possible) and administer IV fluids of normal saline wide open (250mL - 1000mL IV bolus).
4. Administer epinephrine 1:10,000 1mg (*0.01 mg/kg child*) IV push. Repeat with 1mg of epinephrine 1:10,000 (*0.01 mg/kg 1:10,000 child*) IV every 5 minutes if the patient remains pulseless.
5. Perform endotracheal intubation (or place i-gel<sup>®</sup> airway) and ventilate with 100% oxygen. Confirm placement with an end-tidal CO<sub>2</sub> detector and perform continuous CO<sub>2</sub> capnography.
6. Attempt to pace with transthoracic (external) cardiac pacing if epinephrine has **not** worked (see Transthoracic (External) Cardiac Pacing appendix, p. 188). If external pacing does **not** produce mechanical capture, continue CPR and reattempt in one minute.
7. Administer sodium bicarbonate 1 amp (50mEq) IV if patient has had a prolonged down time (> 20 minutes of CPR).

8. **If the patient is a dialysis patient (possible hyperkalemia present), administer 1gm of IV calcium gluconate, followed by sodium bicarbonate 1 amp (50mEq) IV.** Be sure to thoroughly flush the IV tubing between medications to avoid precipitation between the calcium and bicarbonate. Ideally these medications should be administered in 2 different IVs (or IO and separate IV) to avoid precipitation.
9. If patient develops a return of spontaneous circulation, obtain vital signs (blood pressure), monitor closely, and refer to the Post-Resuscitation Management protocol, p. 83.
10. If patient remains in asystole after patient is intubated, IV or IO access is obtained, and has had 2 rounds of epinephrine with CPR, consider termination of resuscitation efforts. **Medical control must be contacted** prior to terminating resuscitation (see Termination of Resuscitation appendix, p. 138). All patients in persistent or recurrent ventricular fibrillation, PEA, or those who have had a **perfusing** rhythm at any time during the last **20 minutes** of resuscitation should be transported to the hospital. In addition, all cardiac arrest patients in whom intubation or IV / IO access has **not** been successfully completed should **not** be called in the field **unless approved by on-line medical control**.

**Notes:**

- **Uninterrupted chest compressions are the key to success!** It takes 10 compressions to get blood flow reestablished if chest compressions are interrupted / stopped.
- Always administer the medications in a cardiac arrest via IV or IO. The endotracheal route is **no longer** used to deliver medications.
- Transthoracic (external) cardiac pacing should be used early in the arrest. The effectiveness of this modality decreases as the patient's down time increases.
- Asystole is usually an ominous prognostic sign and signifies prolonged hypoperfusion or ischemia of the heart.
- At any time the patient's EKG rhythm changes, refer to that appropriate protocol.
- Always recheck the leads when the monitoring shows asystole to make sure there is a good connection and that no leads have peeled off. Always check for asystole in 2 leads.
- Sudden Infant Death Syndrome (SIDS) occurs in infants between the ages of 1 month - 1 year.
- Per the new 2010 AHA guidelines, atropine is **not** recommended for routine use in the management of asystole. Routine atropine in asystole is not recommended in the PALS guidelines.
- In cardiac arrest patients where the maintenance of continued chest compressions is of utmost importance, the placement of an i-gel<sup>®</sup> airway as the initial airway device (before an intubation attempt) is an acceptable practice.
- If available the ResQCPR<sup>™</sup> system can be used on patients in cardiac arrest. See ResQCPR<sup>™</sup> protocol on p. 181.

## Pulseless Electrical Activity (PEA)

### **Introduction:**

- Pulseless Electrical Activity (PEA) formerly referred to as Electrical Mechanical Disassociation (EMD) refers to evidence of electrical activity on the monitor, but **no** palpable carotid pulses.
- PEA is used to describe **only** those rhythms that would be expected to produce a pulse, thus agonal rhythms are **not** included.
- The optimal treatment for PEA is to consider and treat the underlying causes:
  1. Hypovolemia- administer 1000mL (*20 mL/kg child*) IV fluid bolus.
  2. Hypoxia- administer high-flow oxygen with bag-valve-mask or intubation.
  3. Acidosis / Drug Overdoses- IV fluid bolus and consider sodium bicarbonate.
  4. Pericardial Tamponade- IV fluid bolus and rapid transport.
  5. Tension Pneumothorax- always consider if cardiac arrest occurs after a severe asthma attack, COPD, chest trauma, or in any intubated patient. Perform pleural decompression as outlined in appendix, p. 175.
  6. Massive Myocardial Infarction- rapid transport.
  - ★7. Hypoglycemia- administer dextrose 10% 25gms IV if blood sugar < 70 mg/dL.
  8. Pulmonary Embolus- high-flow oxygen and rapid transport.

History: usually sudden collapse with history of hypovolemia (GI bleed, massive trauma), hypoxia, drug overdose, hypoperfusion, pneumothorax, or chest trauma.

Symptoms: unresponsive.

Physical Exam: patient unconscious, no respirations, no pulse.

### **Basic Life Support:**

1. Confirm absent respirations and absent pulse. Start CPR.
2. Ventilate with bag-valve-mask (100% oxygen).
3. Place patient on AED.
4. Place i-gel® airway and ventilate with 100% oxygen.
5. Apply pressure to any sources of external hemorrhage.
6. Continue CPR.

### **Advanced Life Support:**

1. Monitor EKG rhythm. Obtain a rhythm strip print out.
2. Check for carotid pulses. If **no** pulse is felt, perform CPR. Do not forget to continue CPR even though there is electrical activity on the cardiac monitor.
3. Establish IV or IO access (large bore and antecubital)
4. Start IV fluids normal saline 1000mL (*20 mL/kg child*) IV bolus.
5. Administer epinephrine 1:10,000 1mg (*0.01 mg/kg child*) IV. May repeat epinephrine 1:10,000 1mg (*0.01 mg/kg child*) IV every 5 minutes.

6. Perform endotracheal intubation (or place i-gel<sup>®</sup> airway) and ventilate with 100% oxygen. Confirm placement with an end-tidal CO<sub>2</sub> detector and perform continuous CO<sub>2</sub> capnography.
7. Establish 2nd IV line if able and continue IV fluid normal saline bolus.
8. Consider bilateral needle thoracostomy (pleural decompression) if the possibility of a tension pneumothorax exists (see Pleural Decompression appendix, p. 175).
9. Administer sodium bicarbonate 1 amp (50mEq) IV if time of arrest > 20 minutes.
10. Administer calcium gluconate 1gm IV to adult patients if possibility of a hyperkalemic cardiac arrest (renal failure and dialysis) exists, followed by sodium bicarbonate 1 amp (50mEq) IV. Be sure to thoroughly flush the IV tubing between medications to avoid precipitation between the calcium and bicarbonate. Ideally these medications should be administered in 2 separate IVs (or IO and separate IV) to avoid precipitation.
11. Consider transthoracic (external) cardiac pacing (see appendix, p. 188).
12. If patient develops a return of spontaneous circulation, see Post-Resuscitation protocol, p. 83.

**Notes:**

- Always check for the pulse in the **carotid** artery on an unconscious patient. It may be present in the carotid but absent elsewhere.
- Always avoid any interruptions in chest compressions. It takes 10 compressions to get blood flow reestablished if chest compressions are interrupted. **Uninterrupted chest compressions are the key to success.**
- High-flow oxygen (intubation) and IV fluids remain the hallmarks for treating PEA in the prehospital setting.
- Per the 2010 AHA guidelines, atropine is **not** recommended for routine use in the management of PEA. Routine atropine in PEA is not recommended in the PALS guidelines.
- In cardiac arrest patients where the maintenance of continued chest compressions is of utmost importance, the placement of an i-gel<sup>®</sup> airway as the initial airway device (before an intubation attempt) is an acceptable practice.
- If available the ResQCPR<sup>™</sup> system can be used on patients in cardiac arrest. See ResQCPR<sup>™</sup> protocol on p. 181.

## Ventricular Fibrillation / Ventricular Tachycardia (Unstable Pulseless)

### **Introduction:**

- **Unstable** ventricular tachycardia refers to patients who are pulseless, hypotensive, have new-onset altered mental status, severe chest pain or severe shortness of breath.
- Make sure that ventricular fibrillation is **not** an artifact. Always double-check the lead connections before proceeding with defibrillation.
- Treatment priorities are effective uninterrupted chest compressions at a rate of 100-120, prompt defibrillation, then IV access and airway control.
- Do **not** stop chest compressions for placement of an endotracheal tube or to administer medications.

History: sudden collapse, coronary artery disease.

Symptoms: severe chest pain, severe shortness of breath, significant new-onset confusion, unresponsive.

Physical Exam: hypotensive or pulseless, altered mental status or unconscious.

### **Basic Life Support:**

1. Open airway as needed. Check for breathing and for a carotid pulse.
2. Apply high-flow oxygen via non-breather mask. Use bag-valve-mask as needed with oropharyngeal or nasopharyngeal airway.
3. Start CPR if patient is pulseless. Notify dispatch and responding units that CPR is in progress. If cardiac arrest was not witnessed by EMS, perform 5 cycles of CPR prior to the first defibrillation.
4. Apply AED if patient is unresponsive and AED available. Refer to AED appendix, p. 118.
5. Place i-gel<sup>®</sup> airway and ventilate with 100% oxygen.
6. Obtain vital signs if they become present. Refer to Post-Resuscitation Management protocol, p. 83.

### **Advanced Life Support:**

1. Monitor EKG rhythm. Obtain a rhythm strip print out.
2. If in ventricular fibrillation or pulseless ventricular tachycardia, defibrillate at 200J (*2 J/kg child*). Repeat and all subsequent shocks (biphasic waveform) are at 200J (*4 J/kg child*). If prior shocks have been given by the AED, then start defibrillation at 200J (*2 J/kg child*). Perform chest compressions immediately after defibrillation for 2 minutes before reassessing the patient.
3. If the adult patient is in unstable ventricular tachycardia but still has a pulse (or severe chest pain, severe shortness of breath, or new onset altered mental status), perform synchronized cardioversion at 120J (*2 J/kg child*). Consider midazolam (Versed<sup>®</sup>) 1mg - 5mg slow IV push, IM, or MAD in a conscious patient who is still awake prior to synchronized cardioversion.
4. Establish IV or IO access (large bore antecubital).
5. Start IV fluids of normal saline 1000mL wide open (*20 mL/kg child*) IV.
6. Perform endotracheal intubation (or place i-gel<sup>®</sup> airway) and ventilate with 100% oxygen. Confirm placement with an end-tidal CO<sub>2</sub> detector and perform continuous CO<sub>2</sub> capnography.



7. Administer epinephrine 1:10,000 1mg (*0.01 mg/kg child*) IV push. Repeat 1mg of epinephrine 1:10,000 (*0.01 mg/kg 1:10,000 child*) IV every 5 minutes if patient remains in ventricular fibrillation, pulseless ventricular tachycardia, or asystole.
8. Defibrillate at 200J (*4 J/kg child*).
9. Administer lidocaine 1.5 mg/kg IV.
10. If still in ventricular fibrillation or pulseless ventricular tachycardia, defibrillate at 200J (*2 J/kg child*).
11. If no response, repeat lidocaine administration at one-half the initial dose every 5 minutes up to 3 mg/kg IV administered. A lidocaine drip may be started at 1 mg/min – 4 mg/min IV if the patient develops a return of spontaneous circulation (ROSC).
12. If still in ventricular fibrillation or pulseless ventricular tachycardia, defibrillate at 200J (*2 J/kg child*).
13. If possible Torsades de Pointes in an adult patient, administer 10% magnesium sulfate 2gm IV over 2 minutes. Do **not** administer magnesium sulfate if patient has known renal failure or is on dialysis.
- ★14. If glucose is < 70 mg/dL, administer Dextrose 10% (D<sub>10</sub>) 25gms IV (*0.5 gm/kg child*).
- ★15. If suspected opioid overdose, administer naloxone (Narcan<sup>®</sup>) 2mg (*1mg child*) IV, IM, or MAD.
16. If possible hyperkalemia is possible (dialysis patient), administer calcium gluconate 1gm IV over 2 minutes, followed by sodium bicarbonate 1 amp (50mEq) IV. Be sure to thoroughly flush the IV tubing between medications to avoid precipitation between the calcium and bicarbonate. Ideally these medications should be administered in 2 different IVs (or IO and separate IV) to avoid precipitation.
17. Administer sodium bicarbonate 1 amp (50mEq) IV if hyperkalemia suspected or patient has been in arrest for 20 minutes or more.
18. If patient regains a return of spontaneous circulation, proceed to the Post-Resuscitation Management protocol, p. 83.

**Notes:**

- **Uninterrupted chest compressions are the key to success!** It takes 10 compressions to get blood flow reestablished if chest compressions are interrupted.
- Patients in ventricular fibrillation will **not** have a pulse.
- If patient converts to a different rhythm, but then reverts to ventricular fibrillation or pulseless ventricular tachycardia, defibrillate at the most recent energy level.
- If the collapse is witnessed by EMS, a precordial thump (~12 J) may be administered immediately.
- Defibrillation should **never** be delayed, even for airway intervention. Rapid defibrillation is the treatment of choice for ventricular fibrillation. Make sure that the cardiac monitor / defibrillator is taken from the ambulance on scene arrival for all patients who have the potential to be in cardiac arrest (unconscious, chest pain, syncope, shortness of breath, etc.). Having to return back to the ambulance for the defibrillator is **always unacceptable**.
- Perform defibrillation if ventricular fibrillation or pulseless ventricular tachycardia, and perform synchronized cardioversion if patient has ventricular tachycardia with a pulse.
- If hypothermia is present and the patient does **not** respond to the initial defibrillation, continue CPR. Do **not** perform further defibrillation attempts until the patient is warmed (core

temperature > 90°F). Refer to the Hypothermia section in the Environmental Emergencies protocol, p. 39.

- Make sure that after the administration of a medicine the IV site is immediately flushed with IV fluid or 10mL saline flush to ensure delivery of the medication into the central circulation.
- Patients converted to ventricular fibrillation or ventricular tachycardia from a perfusing rhythm (with a heart rate > 80 beats per minute and absence of 2° or 3° AV block) should receive a lidocaine bolus of 1.5 mg/kg IV if lidocaine was **not** previously administered. A lidocaine drip at 1 mg/min – 4 mg/min IV should also be started.
- A patient in ventricular fibrillation should **never** be considered dead. Continue to work the code and transport the patient to the hospital.
- Ventricular fibrillation is rare in children. If seen, suspect myocardial hypoxia, poisoning, or cardiomyopathy.
- Always consider hyperkalemia as a cause for cardiac arrest. In dialysis patients, administer sodium bicarbonate 1 amp (50mEq) IV followed by calcium gluconate 1gm IV to all cardiac arrest dialysis patient codes, or any other patient suspected of having hyperkalemia (*i.e.* crush injury, potassium overdose, chronic renal insufficiency). Be sure to thoroughly flush the IV tubing between medications to avoid precipitation between the calcium and bicarbonate. Ideally these medications should be administered in 2 different IVs (or IO and separate IV) to avoid precipitation.
- In cardiac arrest patients where the maintenance of continued chest compressions is of utmost importance, the placement of an i-gel<sup>®</sup> airway as the initial airway device (before an intubation attempt) is an acceptable practice.
- If available the ResQCPR<sup>™</sup> system can be used on patients in cardiac arrest. See ResQCPR<sup>™</sup> protocol on p. 181.

## Post-Resuscitation Management

### **Introduction:**

- This protocol applies to all patients with a return of spontaneous circulation (*i.e.* palpable carotid pulse) after having undergone CPR for any non-perfusing rhythm (cardiac arrest).
- The condition of post-arrest patients can fluctuate rapidly, and all of these patients require strict, close monitoring for any deterioration.

### **Basic Life Support:**

1. Maintain the airway as appropriate. Suction patient as needed.
2. Place nasopharyngeal airway and high-flow oxygen via non-rebreather mask and assist ventilations with bag-valve-mask as needed. Most patients immediately post-resuscitation will require ventilatory assistance. Do **not** hyperventilate a patient post-arrest as this can lead to hypotension and a recurrence of cardiac arrest.
3. Obtain vital signs every 5 minutes and frequently re-evaluate.

### **Advanced Life Support:**

1. Continuous and close cardiac monitoring is mandatory. Obtain a 12-lead EKG if available and time allows.
2. Establish IV access if not already done.
3. Administer IV fluid normal saline bolus 250mL -1000mL (*20 mL/kg child*) IV as needed to keep systolic BP > 100mmHg.
4. Intubate patient if needed and not already performed.
5. If patient is bradycardic with a pulse, refer to the Bradycardia protocol, p. 32.
6. If an adult patient remains hypotensive (systolic BP < 100mmHg) despite IV fluid bolus, start a norepinephrine drip 8 mcg/min – 12 mcg/min IV and titrate up as necessary to keep systolic BP > 100mmHg. Do **not** start norepinephrine until the patient has received adequate IV fluid bolus (500mL minimum) or unless the patient is showing signs of pulmonary edema (cardiogenic shock, crackles on lung auscultation).
7. If patient was converted from ventricular tachycardia or ventricular fibrillation and patient has a heart rate > 80 beats per minute, administer lidocaine at 1.5 mg/kg IV if it was **not** already administered. Start a lidocaine drip at 1 mg/min – 4 mg/min if patient had significant ventricular ectopy. Do **not** administer lidocaine in the post-resuscitation patient with a heart rate < 80 beats per minute, an idioventricular rhythm, or 2° or 3° AV heart blocks regardless of previous ventricular ectopy or lidocaine use.
8. If an appropriate patient, begin targeted temperature management protocol as outlined in protocol on next page.

## Therapeutic Hypothermia (Targeted Temperature Management)

### **Introduction:**

- There may be an improvement in the survival of cardiac arrest in patients who have a return of spontaneous circulation (ROSC) and remain unconscious that are subsequently cooled (or kept from having a fever). In addition, those patients that survive may have improved outcomes (better neurological functioning and independence).
- Early hypothermia (prehospital) delays the cascade of cellular death that occurs after cardiac arrest.
- Targeted temperature management (TTM) is recommended by the American Heart Association for comatose cardiac arrest survivors (sustained return of a pulse).
- Annville FD will be using Engel™ coolers (model # MHD 13F-DM) to keep 2 liters of 0.9% normal saline at 4°C.

### **History:**

- Non-traumatic cardiac arrest (including warm-water arrest and asphyxiation) with a return of spontaneous circulation (ROSC) within 30 minutes after cardiac arrest
- Age > 16 y/o
- Patient not pregnant
- Patient is unconscious with no purposeful reaction to pain
- Systolic BP > 90 mmHg

### **Exclusion Criteria:**

- Active bleeding or coagulopathy
- Purposeful response to verbal commands or noxious stimuli prior to starting targeted temperature management
- Recent major surgery
- Traumatic arrest
- Pregnant
- Age ≤ 16 y/o
- Terminal illness or DNR patient
- Downtime > 30 minutes

### **Symptoms:**

- Sustained return of a pulse (ROSC) > 5 minutes

### **Physical Exam:**

- Palpable pulse but patient is unconscious
- Patient does not open eyes to pain and does not follow commands
- No signs of trauma or extensive burns
- Initial temperature > 34°C (93.2°F)
- No evidence of significant / severe pulmonary edema

### **Advanced Life Support:**

1. Place endotracheal tube or i-gel® airway if not already done. Confirm placement with an end-tidal CO<sub>2</sub> detector and perform continuous CO<sub>2</sub> capnography.

2. Make sure end-tidal CO<sub>2</sub> reading is > 20 mmHg. Be careful not to hyperventilate. The target end-tidal CO<sub>2</sub> should be 35-40 mmHg.
3. Perform brief neuro exam (GCS and pupil size) and record in patient care report.
4. Obtain baseline tympanic temperature.
5. Expose patient to underwear. If ice is readily available, apply ice packs to axilla and groin.
6. If able, establish bilateral antecubital IVs. An IO line can be used if peripheral IV access cannot be obtained.
7. If ice packs are available, apply bilateral ice packs to axilla (axillary artery) and groin (femoral artery).
8. Monitor patient for shivering. Administer diazepam (Valium®) 5mg – 10mg IV to treat shivering should it occur.
9. Administer cold (4°C) normal saline boluses (wide open) at 30 mL/kg IV (or IO) up to a maximum of 2000mL. Goal is to use pressure infusion to get 1000mL of cold saline infused within 15 minutes. Start 2 large-bore IVs if able.
10. Frequently reassess breath sounds for evidence of pulmonary edema.
11. Administer norepinephrine drip 8 mcg/min – 12 mcg/min IV to maintain SBP > 100 mmHg.
12. Transport the patient to the emergency department at either CHRISTUS Spohn Shoreline, Bay Area Medical Center, or Doctors Regional where Targeted Temperature Management protocols are in place.

**Notes:**

- If there is sustained loss of pulse and blood pressure during cooling, discontinue therapeutic hypothermia and revert to the appropriate protocol.
- Each 1000mL of cold saline bolus should decrease the patient's temperature by 1°C.
- Eligible patients will be maintained at a hypothermic temperature (32°C - 36°C) for at least 24 hours after their cardiac arrest.
- Continue to address specific differentials associated with the original dysrhythmias.

# Section 3:

# Trauma

Adult and  
Pediatric

Patient Care  
Field Protocols  
&

# Standing Orders

## General Trauma Management

### Introduction:

- A quick and accurate initial assessment of the traumatically injured patient is essential.
- Evaluate and manage any airway and breathing problems first, followed by assessment of circulation. Then perform a brief neurological examination with complete exposure of the patient.
- Always remember to protect the axial spine with in-line stabilization.
- With major trauma, one of the most important goals of prehospital management is a brief scene time- "**LOAD AND GO**"- rapid patient assessment and rapid patient transport to a trauma center capable of resuscitation and definite management of the victim. Spend as little time as possible to evaluate the patient, to perform life-saving maneuvers, and to prepare the patient for transport to the hospital. Optimally, all scene times for the critically injured trauma patient should be **less than 10 minutes** unless extenuating circumstances (extrication, multiple patients, etc.). Do **not** delay scene times on non-lifesaving procedures! In most cases, IV's can be started enroute to the hospital, unless IV access is needed for medication administration. EMS personnel must accept the reality that "stabilization" of the severely injured patient may be impossible.
- Time should not be wasted on elaborate assessments, splints, and dressings.
- Often major trauma is a surgical disease and rapid transport to the closest appropriate hospital is vital in all unstable patients (see Trauma Criteria, p. 13).
- Request additional resources (additional ambulances, rescue equipment, etc.) **early** in the scene assessment.
- Always evaluate geriatric trauma patients with a high index of suspicion. Often occult injuries are more difficult to recognize, and patients can decompensate unexpectedly with little warning.

### Basic Life Support:

1. Scene safety.
2. Airway, breathing, circulation. Assess adequacy of perfusion (mental status), character of pulses, and capillary refill.
3. Stabilize the cervical spine with manual in-line stabilization.
4. Apply oxygen (high flow via non-rebreather if altered mental status, shortness of breath, or severe multisystem trauma). Assist with bag-valve-mask as needed.
5. Control gross external bleeding with direct pressure. Remember to also hold pressure over penetrating trauma sites (gunshot wounds, stab wounds) to stop any internal bleeding into the tissues.
6. Perform a brief neurological exam (level of consciousness (AVPU), pupil reactivity, gross motor function).
7. Motion restrict the cervical spine as needed with long backboard, head blocks, cervical collar, straps, etc. See Spinal Trauma protocol, p. 104.
8. Obtain vital signs.
9. Pulse oximetry.
10. Expose the patient and perform a secondary survey (head-to-toe). Preserve body heat when possible.

11. Immobilize and splint obviously fractured extremities.
12. Obtain history (**SAMPLE**): **S**igns and **S**ymptoms, **A**llergies, **M**edications, **P**ast medical / **P**ast surgical history, **L**ast oral intake / **L**ast menstrual period (if applicable), **E**vents of accident (mechanism of injury).

### **Advanced Life Support:**

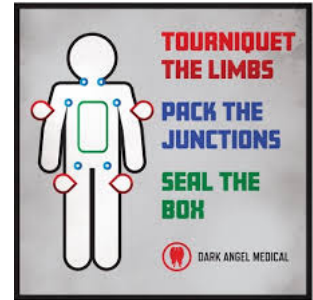
1. Advanced airway control (intubation, i-gel®) as needed (unresponsive with GCS < 8).
2. If patient has a suspected tension pneumothorax (shortness of breath, hypotension, decreased breath sounds, hyper resonance to percussion) perform a needle thoracostomy (pleural decompression). Refer to Pleural Decompression appendix p. 175. The patient **must** be hypotensive (systolic BP < 100mmHg) for a needle decompression.
3. Establish IV access (large bore antecubital or external jugular). Establish a second IV line if patient is hemodynamically unstable and time allows.
4. Administer IV fluid normal saline bolus 250mL - 1000mL (*20 mL/kg child*) IV if the patient is hypotensive or tachycardic. Titrate the IV fluids to keep systolic BP > **100mmHg**.
5. Monitor EKG rhythm. Refer to specific dysrhythmia protocol as needed.
6. Administer morphine sulfate 2mg -10mg (*0.1 mg/kg child*) slow IV push (or IM) (or fentanyl 50µg – 100µg) if patient has isolated extremity trauma. Do **not** administer morphine if the patient has abdominal pain / trauma, chest pain / trauma, or altered mental status, unless it is absolutely needed to facilitate intubating a patient (see Head Injury protocol, p. 101). If morphine is administered, the patient must be on the cardiac monitor and pulse oximeter. If any question exists about the proper use of morphine in extremity trauma, **contact medical control**.
7. Administer tranexamic acid (TXA) 1000mg IV over 10 minutes if patient meets the criteria for administration. See Tranexamic Acid protocol, p. 186.
8. Assess the Glasgow Coma Score (GCS), and Revised Trauma Score (RTS) enroute.
9. Notify the receiving hospital early with the patient report so that the trauma team can be assembled.
10. Reassess the vital signs frequently.

### **Notes:**

- Remember **not** to overlook potential chest and abdominal injuries which are often more life-threatening than the obviously deformed limb. Anyone can recognize a severely displaced limb, but it takes a hyper vigilant prehospital provider to recognize a potentially more severe injury in the abdomen or chest.
- Do **not** overlook the possibility of child abuse in pediatric trauma.
- All lacerations should have direct pressure held on them. The first responder should hold pressure on the wound and **not** place a formal bandage until the ALS crew has visually assessed the wound. The paramedic is ultimately responsible for the wound and needs to visualize them. Remember that penetrating lacerations (*i.e.* gunshot wounds, stab wounds) may still be bleeding internally even if external bleeding is absent. Always hold direct pressure on these wounds.



- For some severe wounds, it may not be possible to hold direct pressure on the wound. For these large defect wounds, the goal is to “Stop the Bleeding” and **wound packing** can be employed in an attempt to reduce or stop the bleeding. The concept of (“Tourniquet the Limbs”, “Pack the Junctions”, and “Seal the Box”) can be used to treat the severely injured trauma patient.
- In a single car MVC, always consider the “6 S’s” as a possible cause for the wreck:
  - Syncope (dysrhythmia, MI), Seizure, Sugar (hypoglycemia), Suicide, Slush (intoxication), and Stroke.
- Never remove any penetrating object from the body **unless** the object is impaled into the face and impairs effective airway management.
- For a suspected “open-book” pelvic fracture (both lower extremities will be externally rotated to look like frog legs), a bed sheet can be wrapped around the pelvis to reduce the volume of the pelvis. The device or sheet should be slid beneath the arch of the lower back and over the greater trochanters, then tightened to an appropriate tension is achieved.



### Special Trauma Considerations

(Eye Injuries, Hemorrhage Control, Hypovolemia / Hypotension, Traumatic Arrest)

#### Eye Injuries:

History: contacts, glasses, mechanism of injury, prior eye surgeries, history of unequal pupil size, history of eye trauma.

Physical Exam: visual acuity, visual fields, pupillary reflex, shape of pupil, extraocular movements.

Differential Diagnosis: corneal abrasion, corneal ulcer, chemical burn, foreign body, lacerated (open) globe, welder’s burn (UV keratitis).

#### BLS / ALS Treatment:

1. Do **not** remove a foreign body from the eye. Cover, patch, and transport. Support any impaled object in place, and do **not** apply pressure to the eye.
2. If there is an open globe (penetrating) injury to the eye, the pupil will often appear tear-dropped shape. Use a cup or hard cover to protect the eye. Never apply any pressure to the eye. Often it is best to patch both eyes to prevent extraocular consensual movements; however, many patients will become anxious in the ambulance if both eyes are patched.
3. If a potential chemical burn has occurred, determine if it was an alkali or acid (obtain name or bring bottle to the ED if possible). The eyes should be **immediately irrigated** copiously with tap water or saline using gloved hands. Hold the patient’s eyelids open and irrigate for 15 minutes. Normal saline run through 10-drop IV tubing can be used for irrigation at the scene and enroute. It is **not** necessary to rush patients with isolated chemical injuries to the eyes directly to the hospital. The definitive treatment is copious irrigation of the eyes, and it should always be initiated as soon as possible (on scene or enroute).

**Hemorrhage Control:****Direct Wound Care:**

1. Use proper body substance isolation precautions.
2. Remove any sharp, loose fragment of glass or other foreign substances which, if pressed upon, could result in further injury to the patient or rescuer.
3. Impaled objects (knives, etc.) should **not** be removed, but should be stabilized in place to prevent further movement or deeper insertion.
4. Cover the bleeding site with a gauze dressing and apply firm pressure directly over the wound. To be most effective, pressure should be directed so that the injured vessels lie between where the pressure is applied and an underlying bone.
5. Coban® can be used to make an effective pressure dressing.
6. Elevate the limb such that the wound is above the level of the heart.

**Tourniquet Use:**

1. If bleeding control of an injured extremity cannot be adequately achieved with direct pressure (or Coban™, etc.) then using a tourniquet device can be considered.
2. Apply the tourniquet to the injured extremity **at least 1 inch proximal** to the bleeding site.
3. Tighten the windlass per manufacturer instructions until the hemorrhage and/or distal pulses in the affected extremity disappear. Secure the tourniquet per manufacturer instructions.
4. Make note of the application time and continuously reassess for hemostasis.
5. The tourniquet should be used only in **traumatic** situations of severe hemorrhage that cannot be controlled by less aggressive measures. A tourniquet should not be used for a bleeding dialysis shunt.

**Israeli Trauma Dressing Use:**

1. Use the Israeli trauma bandage for bleeding wounds that don't require a tourniquet. This may include junctional wounds (near shoulders / groin), and venous bleeds (dark, oozing blood).
2. If needed (deep wounds), pre-pack the wound with gauze.
3. Place the rectangular gauze pad over the wound and continue holding pressure.
4. Wrap the elastic band around the wounded area. Wrap around the edges of the gauze and then loop the elastic through the pressure applicator.
5. Pull the pressure applicator back over the wound. Wrap until one runs out of elastic band. Apply pressure as one wraps. Twist the elastic band as one passes over the pressure applicator to help apply pinpoint pressure.
6. The Israeli trauma dressing can be used as a tourniquet (if needed and a dedicated tourniquet is not readily available).



1. Apply dressing pad to wound and wrap elastic bandage around limb



2. Slip elastic bandage through V-notch of pressure applicator



3. Draw bandage through pressure applicator to tighten firmly



4. Fold bandage back over applicator to apply pressure to wound



5. Wrap bandage over pressure applicator overlapping pad edges



6. Secure bandage in place with closure clip at end of bandage

**Hypovolemia / Hypotension:****BLS / ALS Treatment:**

1. Follow the above general trauma management guidelines. Hypotensive patients always need high flow oxygen. Intubate as needed (if ALS crew).
2. Control external hemorrhage to avoid further blood loss (including scalp lacerations). Scalp lacerations without control of the bleeding with direct pressure have the potential to be fatal (especially in children).
3. Remember that all penetrating injuries (gunshot wounds, stab wounds) need direct pressure applied, even if **no** external hemorrhage is visualized.
4. If ALS crew, establish 2 large-bore IV's and run normal saline in wide open 250mL - 1000mL (20 mL/kg child) IV bolus using pressure bags if available. Titrate IV fluids as needed to maintain a systolic BP > 100mmHg.
5. Bandage and splint any fractures to prevent further tissue trauma and bleeding from the bone fragments.
6. Assess and treat for causes of hypotension: tension pneumothorax, pericardial tamponade, chest trauma, abdominal trauma, spinal shock, cardiogenic shock, or heart attack.
7. Obtain a 12-lead EKG if available and a cardiac etiology is being considered.
8. Rapid transport.
9. A closed head injury is almost never the cause of hypotension. Always look for another cause (chest, abdomen, pelvis).
10. Administer tranexamic acid (TXA) 1000mg IV over 10 minutes if patient meets the criteria for administration. See Tranexamic Acid protocol, p. 186.

**Traumatic Arrest:****BLS / ALS Treatment:**

1. If obvious signs of death on arrival (decapitation, crushed head, asystole on monitor), do **not** attempt resuscitation.
2. If patient had vital signs by first responders (or movement) or if patient is > 20 weeks pregnant (possibility of fetal survival with an emergency c-section on hospital arrival), proceed with resuscitation per General Trauma Management protocol, p. 87.
3. If patient has sustained penetrating trauma and had vital signs in the field, proceed immediately to the trauma hospital. A small percentage of penetrating trauma arrest patients can be saved with emergent thoracotomy and cross-clamping of the aorta. All penetrating chest wound traumatic arrests should receive bilateral pleural needle decompression.
4. If patient has sustained a blunt traumatic arrest and still in arrest after CPR, intubation, IV access with IV fluid bolus, and ACLS medications, then **contact medical control** for possible pronouncement in the field. This situation will probably **not** occur much as scene time should be < 10 minutes. If the arrest is being worked, it is better to **LOAD AND GO**. The mortality of blunt traumatic arrests approaches 100%.
5. If a question exists, always error on the side of continuing the code and transporting the patient to the hospital. As always, **contact medical control** for guidance as needed.

## Abdominal Trauma

### **Introduction:**

- Blunt abdominal trauma often causes solid organ injuries (liver or spleen lacerations, mesenteric vessel vascular injuries).
- Penetrating abdominal trauma often causes bowel or vascular injuries.
- The presence of a seat-belt abrasion increases the incidence of intestinal perforations (especially jejunal perforations in children).

History: mechanism of injury (speed of vehicle, height of fall, etc.), was patient wearing seatbelt or helmet, vehicle deformity (bent steering wheel, starred windshield), loss of consciousness.

Symptoms: abdominal pain.

### **Physical Exam:**

#### Inspect:

- External signs of soft tissue injury (ecchymosis, abrasions, lacerations, seat belt abrasion across abdomen)
- Lateral flank bruising or hematoma
- Blood at urethral meatus, contusion, ecchymosis and/or lacerations of perineum
- Scaphoid abdomen
- Abdominal distention or masses
- Hollow visceral injury should be suspected in with all penetrating abdominal wounds.
- Entrance and/or exit wound

#### Palpation:

- Voluntary guarding
- Peritoneal signs (heel tap)
- Abdominal masses

### **Basic Life Support:**

1. Follow the General Trauma Management protocol as outlined on p. 87.
2. Keep patient NPO (nothing by mouth).
3. If an evisceration exists, cover the exposed parts with saline-soaked gauze or sterile burn sheet and keep the area moist.

### **Advanced Life Support:**

1. Follow the General Trauma Management protocol as outlined on p. 87, with the following additional notes below specific for abdominal trauma and also pregnant trauma patients.
2. Administer tranexamic acid (TXA) 1000mg IV over 10 minutes if patient meets the criteria for administration. See Tranexamic Acid protocol, p. 186.

**Notes:**

- Significant abdominal trauma is associated with a high-mortality (especially the elderly).
- Always assume tachycardia in the normotensive trauma patient is compensated shock. Remember tachycardia will usually be seen before hypotension.
- It is important to frequently reassess vital signs (minimum of every 5 minutes).
- There is debate about the optimal systolic BP for a hypotensive trauma patient and the role of aggressive IV fluid administration in the prehospital resuscitation of the trauma patient. Does increasing the BP too high without immediate surgery “wash-out” and dislodge the clots or does it increase perfusion? There have been **no** definitive human studies yet, and the current practice will be to continue to administer IV fluids as necessary to keep the systolic BP > 100mmHg. It is clear that the benefit of IV fluids in a trauma patient is much less than that of high-flow oxygen (including early intubation), rapid transport to the hospital, and early surgical intervention.
- Patients with seat belt abrasions across their abdomen have an increased incidence of intestinal perforations, and this finding should **not** be considered benign.
- Lower extremity IV lines are relatively contraindicated if serious abdominal injury is suspected.

**Pregnant Trauma Patients:**

- Always apply high-flow oxygen to the pregnant trauma patient. The fetus is much more sensitive to hypoxia and hypovolemia than the mother. Pregnancy alters vital signs as well as response to hypovolemia. Normally the blood pressure will be lower normally with a slightly increased heart rate. Also, changes in hypovolemia are often delayed.
- Deceleration forces can cause abruptio placenta (placental separation from the uterine wall).
- All obviously pregnant patients (> 20 weeks) should be transported to the hospital for subsequent fetal monitoring.
- Ascertain the presence of fetal movement, patency of the bag of water (amniotic sac), and the presence of any vaginal bleeding.
- Avoid supine positioning in obviously pregnant patients. When necessary to perform spinal motion restriction, secure patient precisely and then turn the backboard on its side (left side down at 45°) to keep pressure of the gravid uterus off the inferior vena cava which can decrease the venous return to the heart (causing hypotension).

## Burns (Chemical, Electrical, Thermal)

### **Introduction:**

- The key to burn treatment is “stop the burning”. While protecting yourself, remove burning or contaminated clothing. Use caution in removing clothing that has stuck to the skin as a result of burning.
- Certain dry chemicals (lime and soda ash) may be harmful when wet (forms a corrosive substance). When possible, wipe and brush the dry chemicals off without using water.
- Phenol (carbolic acid) is **not** water soluble and will **not** be removed by water irrigation. It is alcohol-soluble and affected areas should be washed with an alcohol product (isopropyl alcohol prep pads) prior to prolonged flushing with water.
- Use cold water to stop the burning process and to limit the depth of injury. Do **not** apply ice to burns as burn patients are susceptible to hypothermia. It is very important for burn patients to maintain a normal body temperature.
- Do **not** apply ointment or solutions to the wound in the field.
- In the case of electrical burns, it is important to determine alternating current (AC) vs. direct current (DC), high voltage (>1,000 volts) vs. low voltage, and duration of contact with the source. In severe electrical burns, remember most injuries are internal. Fatal dysrhythmias may occur early if the heart has been electrically injured.
- Maintain a high level of suspicion for an inhalation injury in patients with throat pain, voice hoarseness, dysphonia, mucosal burns, or cough. The presence of singed nasal hairs is **no longer** considered an accurate factor by itself for a patient in need of emergent intubation. Early intubation is required when the patient has sustained a significant inhalation injury.
- Depending on the mechanism of injury, always evaluate for underlying multisystem injuries in a trauma patient.

**History:** determine the nature of the burn (what caused the burn), duration of exposure, whether the patient was in an enclosed space, time of the burn, possibility of smoke inhalation, whether chemicals were involved, whether any related trauma.

### **Basic Life Support:**

1. Scene safety. Wear personal protection. Extinguish flames as needed. Have dispatch contact the electric department as needed. Initiate a hazardous material response if indicated.
2. Airway, breathing, circulation. Suction patient as necessary.
3. Apply oxygen. All patients exposed to fire should be treated with high-flow oxygen via a non-rebreather mask (may have potential carbon monoxide exposure and elevated carboxyhemoglobin level).
4. Obtain vital signs.
5. Use saline to decontaminate the skin as needed. Make sure the skin is blotted dry after decontamination. Apply **moistened** gauze (sterile, saline dressing) if burned surface area (2° or 3°) is < 10%. If burned body surface area is > 10%, use **dry** burn dressings or clean dry sheets to avoid hypothermia.
6. Spinal motion restrict the patient as needed.

7. Assess the burned surface area using the “Rule of Nines” (only include 2° or 3° burns). Do **not** include 1° burn areas (erythematous areas like sunburn) in the percent determination. See the chart at the end of this protocol, p. 97. Notice that pediatric patients have different percentages given their different body proportions.
8. Pulse oximetry.
9. Splint fractures as needed.
10. Keep the patient warm as burned patients are very susceptible to heat loss.
11. Remove rings or other constrictive jewelry if the hand is burned as swelling can be rapid. Make sure the jewelry is transported securely with the patient and have a witness observe your removing the jewelry and packaging it with the patient.

### **Advanced Life Support:**

1. Expect airway problems whenever patient has burns to the face, was exposed to smoke in an enclosed space, or exposed to toxic fumes. Check the patient for coughing, tachypnea, hoarseness, or wheezing. If patient has any of the above with carbonaceous (black) sputum, be very concerned about rapid upper airway swelling. It is best to intubate these patients early.
2. Establish IV or IO access. Avoid starting an IV in a burned extremity or distal to any circumferential extremity burns unless it is absolutely necessary.
3. Administer IV fluids of normal saline (or lactated ringers) at 500 mL/hr in patients 14 years and older (*250 mL/hr 6 – 13 y/o; and 125 mL/hr in patients 5 y/o and younger*) if significant burns > 10% body surface area. Maintain a systolic BP > 90mmHg. IV fluids will usually be switched to lactated ringers in the ED as large amounts of normal saline (> 3 liters) can cause a hyperchloremic metabolic acidosis. Prehospital IV fluids should be kept to maximum of 500mL per current American Burn Life Support (ABLS) guidelines.
4. Monitor EKG rhythm and treat dysrhythmias as needed.
5. If the patient is wheezing, administer albuterol 5mg (*2.5mg child*) via nebulizer.
6. If pain control is needed and there is **no** possibility of abdominal, chest, or head trauma, administer morphine sulfate 2mg -10mg (*0.1 mg/kg child*) slow IV push (or IM) (or fentanyl 50µg – 100µg).
7. Midazolam (Versed®) 2mg – 5mg (*0.1 mg/kg child*) IV, IM, or MAD can be administered with the morphine as needed for patients in severe pain. It is imperative that the patient be on continuous pulse oximeter with close cardiac monitoring if midazolam and morphine are used.

### **Notes:**

- Critical or Serious Burns: (*\*These burns may require subsequent transfer to a burn center\**)

- > 5% - 15% total body surface area 2° and 3° burns
- 3° burns > 5% total body surface area burns 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
- Shock in the very early presentation of a burn is often **not** associated with the burn. Always consider other life-threatening injuries. Always consider other medical or traumatic causes for hypotension in a burn patient and treat them accordingly. Make sure the major trauma is treated first, and then the burns can be treated.
- The bolusing of IV fluids (*i.e.* Parkland Formula) is no longer routinely recommended in burn resuscitation without evidence of a concomitant traumatic contribution of blood loss.
- Consider the possibility of child abuse in children with an atypical history and physical exam finding.
- Circumferential burns to the extremities are dangerous due to the potential for vascular compromise secondary to soft tissue swelling.
- If chemicals are involved, attempt to identify the source. Any chemical information or material safety data sheets should be brought to the hospital with the patient.
- Do **not** try to neutralize an acid or alkali burn with the opposite chemical (alkali or acid).

### **Hydrofluoric Acid Exposure:**

- With patients exposed to less than 50% hydrofluoric acid their symptoms may be delayed for up to 24 hours. Pain will be out of proportion compared to the physical findings at the burn site.
- Assure proper patient decontamination has been performed prior to patient contact.
- Assure adequate airway, ventilation, and oxygenation.
- Monitor cardiac rhythm. Obtain 12-lead EKG for burns greater than or equal to 2% total body surface area (BSA). Severe systemic effects may be seen with burns greater than or equal to 2% total BSA and with ingestion or inhalation. Hypocalcemia, hypomagnesemia, and hyperkalemia may occur and lead to cardiac dysrhythmias.
- Treat cardiac changes and seizures per paramedic standing orders.
- If there are any burns encountered after an HF exposure (rare), it is best to peel and drain these particular blisters (HF only) as they may contain residual HF in the serous blister fluid.

### **Hydrofluoric Acid Treatment:**

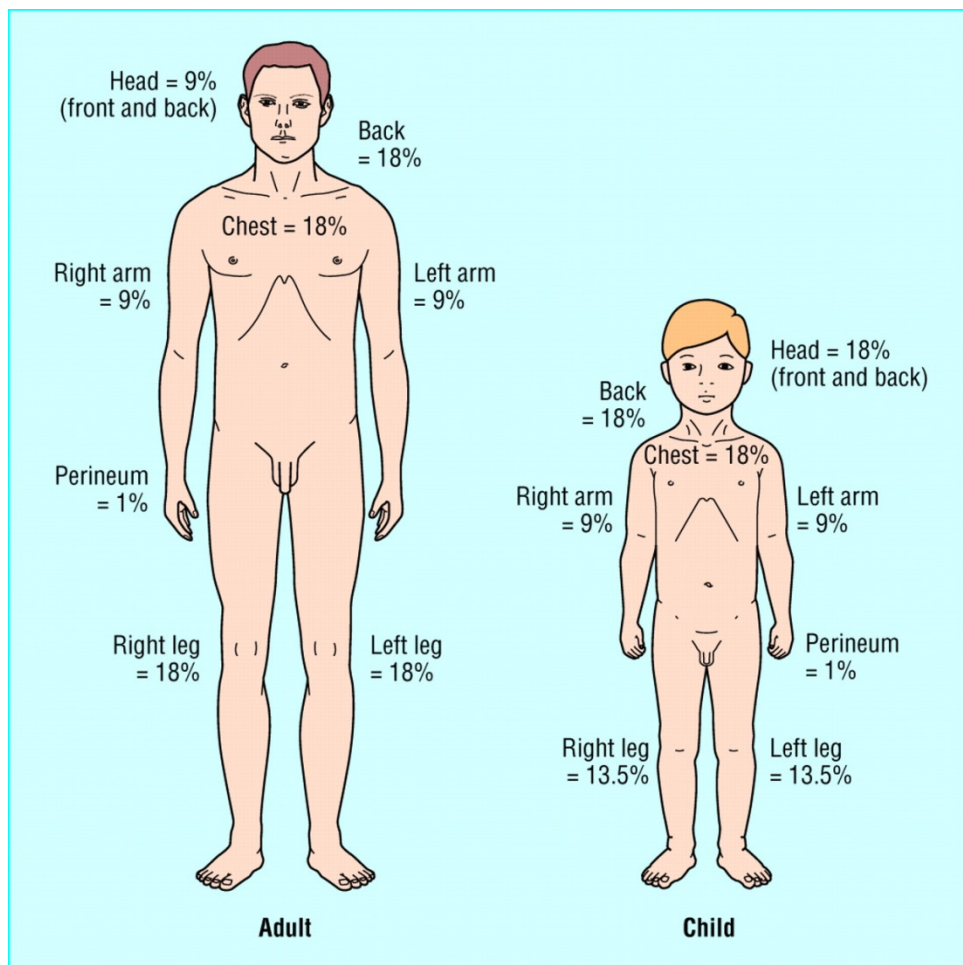
- ★For skin burns apply topical calcium gluconate 2.5% gel after copious skin irrigation. Massage calcium gluconate 2.5% gel into affected areas. Reapply until pain is relieved. Calcium gluconate works by binding fluoride ions.
- Ice applied to hydrofluoric acid burns (if it is available) is advocated by some as an additional treatment modality.
- Consider IV calcium gluconate 1-2 grams IV titrated to control cardiac dysrhythmias.
- For **ocular** hydrofluoric acid burns, irrigate with water or normal saline for 15 minutes.
- For **inhalational** hydrofluoric acid exposure, administer high-flow oxygen. As soon as possible, give a 2.5% calcium gluconate solution by inhalation using a nebulizer. A 2.5% solution is made by mixing 1gm (10mL) of calcium gluconate 10% with 20mL of normal saline flush.

### **Burn Characteristics:**



Degree of Burn	Appearance	Sensation
First (1°) Degree Burn	- Erythematous (Red) - No blisters - "Sunburn-like" - skin blanches with direct pressure	Painful
Second (2°) Degree Burn	- Erythema (Red) - Blisters present	Painful
Third (3°) Degree Burn	- May be white, leathery, with thrombosed vessels seen beneath the skin. - Skin not blistered, may be charred. - Skin does not blanch with direct pressure.	Not painful

### Rule of Nines:



## Chest Trauma

### **Introduction / Notes:**

- Follow the general trauma management protocols (p. 87) with the following additional considerations listed below if chest trauma is found.
- Monitor the EKG rhythm closely. Patients with a cardiac contusion can have significant ectopy.
- If a traumatic arrest is secondary to possible chest trauma, perform bilateral pleural needle decompressions. See Pleural Decompression appendix, p. 175.
- All penetrating chest wounds below the nipple line must be suspected of also having entered the abdominal cavity.
  
- **Rib Fractures:** May have crepitus or subcutaneous (SQ) air on physical exam. The presence of SQ air on exam often indicates the presence of a pneumothorax; however, very few pneumothoraces are under tension. Remember to **only perform pleural needle decompressions if patient has decreased breath sounds with hypotension**. Always suspect a pneumothorax if rib fractures are felt. The chest can be splinted with a pillow in the prehospital setting for patient comfort.
  
- **Flail Segment:** Two or more adjacent ribs broken in 2 or more places. Will see paradoxical movement of the flail segment with respirations. Always inspect the motion of the chest wall closely. The chest can be splinted with a pillow in the prehospital setting for patient comfort.
  
- **Hemothorax / Simple Pneumothorax:** Will get **hypo** resonance to percussion with a hemothorax (blood), and **hyper** resonance to percussion with a pneumothorax (air). Monitor patient closely for the development of a tension pneumothorax (JVD, hypotension, tracheal deviation) and treat with pleural decompression as needed.
  
- **Tension Pneumothorax:** Perform pleural needle decompression if indicated as outlined in the appendix, p. 175. The patient must have **hypotension**, decreased breath sounds on the affected side, hyper resonance, and shortness of breath. Additionally the patient may have JVD or tracheal deviation.
  
- **Sucking Chest Wound:** Cover wound with an occlusive petrolatum (Vaseline®) gauze on 3 sides. Look for exit wounds (do not forget to look carefully in the axilla) and monitor closely for the development of a tension pneumothorax.
  
- **Airway Obstruction:** Directly visualize and use the Magill forceps to remove a foreign body if able (see Airway Obstruction protocol, p. 20).
  
- **Pericardial Tamponade:** Will see Beck's Triad (a narrowed pulse pressure (systolic and diastolic pressures becoming closer) or hypotension, JVD, and muffled heart sounds). Rapid transport to the hospital.

## Extremity Trauma / Amputations / Crush Injury

### **Introduction:**

- Always expose the injured extremity so proper assessment can be accomplished regarding the extent of injury. Cut away the clothing on the involved extremity as needed.
- General Principles:
  - Protecting open wounds
  - Positioning the limb
  - Immobilizing the injury (include joint above and below injury site)
  - Checking neurovascular function (pulses, motor function, and sensation) in the distal extremity before and after splinting
- Remove gross debris (gravel, grass, etc.) from the wound before bandaging.

**History:** type of injury, mechanism of injury (crush, penetrating, amputations, fall, MVC), time of injury, open vs. closed wounds.

**Symptoms:** pain over an extremity or decreased range of motion, deformity, diminished pulse or capillary refill.

**Physical Exam:** pain on palpation or movement of an extremity, ecchymosis, swelling, deformity to an area. Look closely for signs of an open fracture (maybe small puncture holes from fractured bone fragments).

### **Basic Life Support:**

1. Airway, breathing, circulation.
2. Apply oxygen as needed.
3. Maintain in-line cervical stabilization as needed.
4. Obtain vital signs.
5. Control hemorrhage as needed. Apply sterile dressing to open fractures.
6. Assess distal neurovascular-motor status.
7. Splint and immobilize the extremity in the position found if adequate distal pulses are present. Do **not** attempt reduction in the field unless the distal circulation is acutely compromised (blue and cold). Attempt reduction with firm in-line traction. (See Repositioning Injured Extremities with Compromised Circulation below).
8. Apply a traction splint for closed femur fractures. This helps control bleeding, decreases pain, and helps prevent a fat embolus originating from the bone marrow. The traction splint is **contraindicated** in hip dislocations, knee dislocations, pelvic fractures, **open** femur fractures, and a second fracture distal to the knee (tibia, fibula, and ankle).
9. Reassess distal neurovascular-motor function after the extremity has been splinted. Always assess neurovascular-motor status before and after immobilizing a suspected fracture or dislocation.
10. Ice to a musculoskeletal injury if it is available, and if the injury is less than 12 hours old.
11. If an amputated part is encountered, gently irrigate the amputated part with normal saline and wrap in moistened sterile gauze. Place in an airtight plastic bag (or specimen cup) and put bag (or cup) in an ice water bath. Transport the amputated part with the patient to the hospital.

Never allow amputated parts to come into direct contact with ice (prevent freezing). Cover the amputated stump with a wet sterile dressing and apply uniform pressure across the entire stump. Do **not** use a tourniquet unless bleeding cannot be controlled with adequate direct pressure.

12. Pulse oximetry if needed.
13. Whenever possible, elevate the injured extremity above the level of the heart once splinted.

#### Repositioning Injured Extremities with Compromised Circulation:

1. Injured extremities with apparent fractures should be repositioned only if there is loss of circulation to distal extremity (blue and cold).
2. Grasp the limb firmly with both hands and exert longitudinal traction with an attempt to restore normal anatomic positioning.
3. After an injury has been repositioned, confirm the presence of pulses and capillary refill in the distal extremity. If no return of blood flow and color, make one more attempt to reposition the injured area.
4. Maintain traction until the splint has been applied and secured.

#### Advanced Life Support:

1. Establish IV access.
2. Start IV fluids of normal saline at 250mL - 1000mL (*20 mL/kg child*) IV bolus as needed for signs of hypoperfusion or long-bone fractures (humerus, femur, tibia). Otherwise, start IV fluids at 60 mL/hour (or saline lock).
3. Monitor EKG rhythm.
4. Administer morphine sulfate 2mg - 10mg (*0.1 mg/kg child*) slow IV push (or IM) (or fentanyl 50µg – 100µg) for severe pain and **isolated extremity trauma**. Morphine may be administered prior to splinting and immobilizing an injured extremity if time allows, and the patient is in severe pain.
5. For a prolonged entrapment with a significant crush injury, **administer** sodium bicarbonate 1 amp (50mEq) IV prior to the extrication to help minimize the release of potassium from crushed cells (causing potentially deleterious hyperkalemia effects on the heart). The sodium bicarbonate administration should ideally be done 10-15 minutes before the extrication and may need to be repeated depending on the situation and the amount of crushed tissue.
6. Emergently transport any injury with continued vascular compromise.

#### Notes:

- Remember that a midshaft femur fracture can cause 1500mL of blood loss while a pelvic fracture can result in > 2000mL of blood loss.
- If patient has avulsed a permanent tooth, replant the tooth back into the socket as soon as possible after gently irrigating the tooth with normal saline. Make sure the tooth is in proper orientation before replanting. Irrigation of the tooth should be done carefully with **no** debriding or scrubbing the tooth that can remove the delicate periodontal ligament. Avulsed primary (baby) teeth should **not** be replanted.

## Head Trauma

### **Introduction:**

- The treatment goals are high-flow oxygen (intubate early as needed), spinal motion restriction, and rapid transport.

History: time of injury, mechanism of injury, loss of consciousness (if any) and duration, any seizure activity (type and duration), nausea or vomiting since injury, helmet worn (if applicable), loss of sensation or movement, seat belt use, did air bags deploy.

Symptoms: altered mental status, headache, weakness, visual changes, nausea or vomiting, neck pain, seizures.

Physical Exam: calculate Glasgow Coma Scale (GCS); head trauma (ecchymosis, contusions, abrasions, lacerations); neck pain; pupil size and reactivity; CSF or blood from ears, nose, or mouth; neuro deficits; spinal shock (hypotension without tachycardia).

### **Basic Life Support:**

1. Determine responsiveness (AVPU): Alert, Verbal stimuli, Painful stimuli, Unconscious.
2. Airway, breathing, circulation.
3. Apply oxygen (high flow if altered mental status). Assist with bag-valve-mask as needed. Use nasopharyngeal or oropharyngeal airway as needed.
4. Maintain strict in-line cervical stabilization. Assume a high index of suspicion for a cervical spine injury on all head injury patients. Spinal motion restriction should be considered on all head trauma patients.
5. Control external hemorrhage with direct pressure.
6. Obtain vital signs.
7. Check blood sugar.
8. Pulse oximetry.
9. Refer to Altered Mental Status protocol, p. 25 as needed.

### **Advanced Life Support:**

1. Intubate patient as needed maintaining strict in-line cervical spine immobilization. Consider intubation for all patients with a GCS < 8. If intubated, bag with respiratory rate of 16 breaths per minute to keep pCO<sub>2</sub> 30 mmHg – 35 mmHg. Use continuous end-tidal CO<sub>2</sub> monitoring (capnography). Mild hyperventilation in the prehospital setting will cause vasoconstriction that will decrease cerebral blood flow and can decrease cerebral edema and lower intracranial pressure (ICP). Head trauma patients that may need to be intubated often have significant jaw clenching which prevents intubation. In these cases, support with bag-valve-mask through a nasopharyngeal airway, and transport patient to the hospital where paralytics are available. Avoid using a nasopharyngeal airway if the patient has suspected nasal fractures, mid-face fractures, or basilar skull fractures. Midazolam (Versed<sup>®</sup>) 1mg - 5mg IV (adults only) (or IO / IM / MAD), or morphine sulfate 2mg - 10mg (0.1 mg/kg child) slow IV push (or IO / IM) (or

fentanyl 50µg – 100µg) may be administered to relax patient’s jaw muscles for an intubation attempt. **Contact medical control** if repeat doses are needed.

2. Monitor EKG rhythm.
3. Lidocaine 1.5 mg/kg IV may be administered 30 seconds - 60 seconds before intubating if IV access can be established quickly. Lidocaine will help block the ICP rise induced by the laryngoscope-reflex mediated pathway.
4. Establish IV access with normal saline at 60 mL/hour (or saline lock).
5. Do **not** administer IV fluids to a head trauma patient unless the patient is hypotensive or showing signs of hypoperfusion. Large volumes of IV fluid in a closed head injury may worsen the cerebral edema.
6. If spinal shock is suspected, proceed with IV fluids of normal saline at 250mL -1000mL (20 mL/kg child) IV bolus. Consider norepinephrine drip 8 mcg/min – 12 mcg/min IV administration for an adult patient to maintain systolic BP > 100mmHg.
- ★7. If blood glucose is < 70 mg/dL, administer Dextrose 10% (D<sub>10</sub>) 25gm IV (0.5 gm/kg child).
8. Consider midazolam (Versed®) 1mg - 5mg slow IV (or IO / IM / MAD) push (adults only) and/or morphine sulfate 2mg - 10mg (0.1 mg/kg child) slow IV push (or IO / IM) (or fentanyl 50µg – 100µg) for sedation (endotracheal tube tolerance) as needed.
9. Elevate head of backboard to 15° - 30° if able.
10. Continually reassess mental status and vital signs enroute. Changes in the level of consciousness are very important to monitor and document.
11. If patient seizes, refer to the Seizure protocol, p. 61.
12. Refer to Altered Mental Status protocol as needed, p. 25.

### **Notes:**

- Decorticate Posturing- abnormal flexion of arms (lesion above brain stem).
- Decerebrate Posturing- abnormal extension of arms (lesion below brain stem).
- Hypotension after isolated head trauma is very unusual. Always look for other sources (especially chest, abdomen, and pelvic injuries).
- Head injury patients are often combative and may have alcohol or drugs on board. Never assume a combative patient with alcohol on the breath is “just drunk”. Look for signs of a closed head injury. Agitation or restlessness may be due to hypoxia (lack of oxygen) and not just the traumatic insult or mind-altering drugs.
- “Battle’s Sign” and “Raccoon Eyes” usually take hours to develop and usually will **not** be seen acutely in the prehospital environment.
- High-flow oxygen via a non-rebreather mask is very important as oxygenation reduces a secondary brain ischemic insult after the initial injury.
- Head lacerations can be fatal (especially in children). Always hold firm, direct pressure (unless an open skull fracture with exposed brain, or an obviously depressed skull fracture).
- Patients with helmets on (football, motorcycle, etc.) should be immobilized with the helmet on if it fits securely. If the helmet fit is loose and good cervical alignment cannot be obtained, or if access to the head or airway is needed, the helmet may be removed with 2-3 people assisting. Any potential obstructive barriers (facemasks, shields, etc.) should be removed (cut away) from the helmet. Refer to Spinal Trauma protocol, p. 104.

- Cushing's response may be seen in a severe head injury (increasing BP with decreasing pulse and irregular respirations).

- Traumatic Causes of Increased ICP:

1. Epidural Hematoma (EDH): usually results from injury to middle meningeal artery (direct blow over the ear). Patient will have decreased level of consciousness, lucid interval, then unconsciousness.
2. Subdural Hematoma (SDH): injury to the bridging veins under the dura. Often a more subacute onset.
3. Subarachnoid Hemorrhage (SAH): injury to the cerebral arterial vessels. A SAH can occur after an aneurysmal rupture or after trauma.
4. Shear Injury- small vessel injury after a deceleration injury (coup-countercoup).

Glasgow Coma Score (GCS) 3-15:

Points (3-15)	Eye Opening	Verbal Response	Motor Response
1	None	None	None
2	To Pain	Garbled Sounds	Abnormal Extension
3	To Speech	Inappropriate Words	Abnormal Flexion
4	Spontaneously	Disoriented Sentences	Withdrawals to Pain
5		Oriented	Localizes Pain
6			Obeys Commands

## Spinal Trauma / Spinal Motion Restriction

### **Introduction:**

- If **not** properly recognized and managed in the field, spinal cord trauma can result in significant life-long injury and impairment. A high index of suspicion must be maintained for any patient with significant signs or symptoms of head injury, decreased level of consciousness, or possible mechanism (*e.g.* major falls, motor vehicle crashes, diving accidents).
- The patient's ability to walk should **not** be a factor in determining whether a patient needs to be spinal motion restricted or not. Up to 10% of unstable spinal injuries may be ambulatory on scene.

History: mechanism of injury, prior spinal or back surgeries, loss of consciousness, seizures.

Symptoms: head pain, neck or back pain, paralysis, numbness, nausea or vomiting.

Physical Exam: head injuries, point tenderness along spinal column, paralysis, loss of sensation or movement, priapism (erection), calculate GCS, detailed neuro exam.

### **Basic Life Support:**

1. Airway, breathing, circulation. Look for diaphragmatic breathing in a cervical spinal cord injury. The patient will only be able to breathe with their diaphragm, as they have lost innervation to their intercostal muscles that expand the chest cavity outward.
2. Apply oxygen (high flow if decreased level of consciousness or shortness of breath).
3. Control any external hemorrhage with direct pressure.
4. Spinal restrict the patient (prior to moving the patient) using backboard, cervical collar, appropriate straps (safety belts, spider straps, webbing, cravats, etc.), head blocks, etc. Always immobilize the patient with the straps first and then secure the head blocks to the board. This is in case the patient vomits and needs to be turned quickly.
5. Obtain vital signs. Patient may have hypotension with relative bradycardia if in spinal shock.
6. Check blood sugar if indicated.
7. Pulse oximetry.

### **Advanced Life Support:**

1. Advanced airway support as needed. Always maintain in-line cervical stabilization.
2. Establish IV access.
3. Start IV fluids of normal saline at 250mL -1000mL (*20 mL/kg child*) IV if patient displays evidence of hypoperfusion or spinal (neurogenic) shock. Maintain systolic BP > 100mmHg.
4. Monitor EKG rhythm.
5. Frequent vital signs (every 5 minutes or less).
6. If an adult patient remains hypotensive after IV fluid bolus and spinal shock is suspected, consider administering a norepinephrine drip 8 mcg/min – 12 mcg/min IV to titrate systolic BP > 100mmHg.



**Notes:****Special Note on Helmeted Patients:**

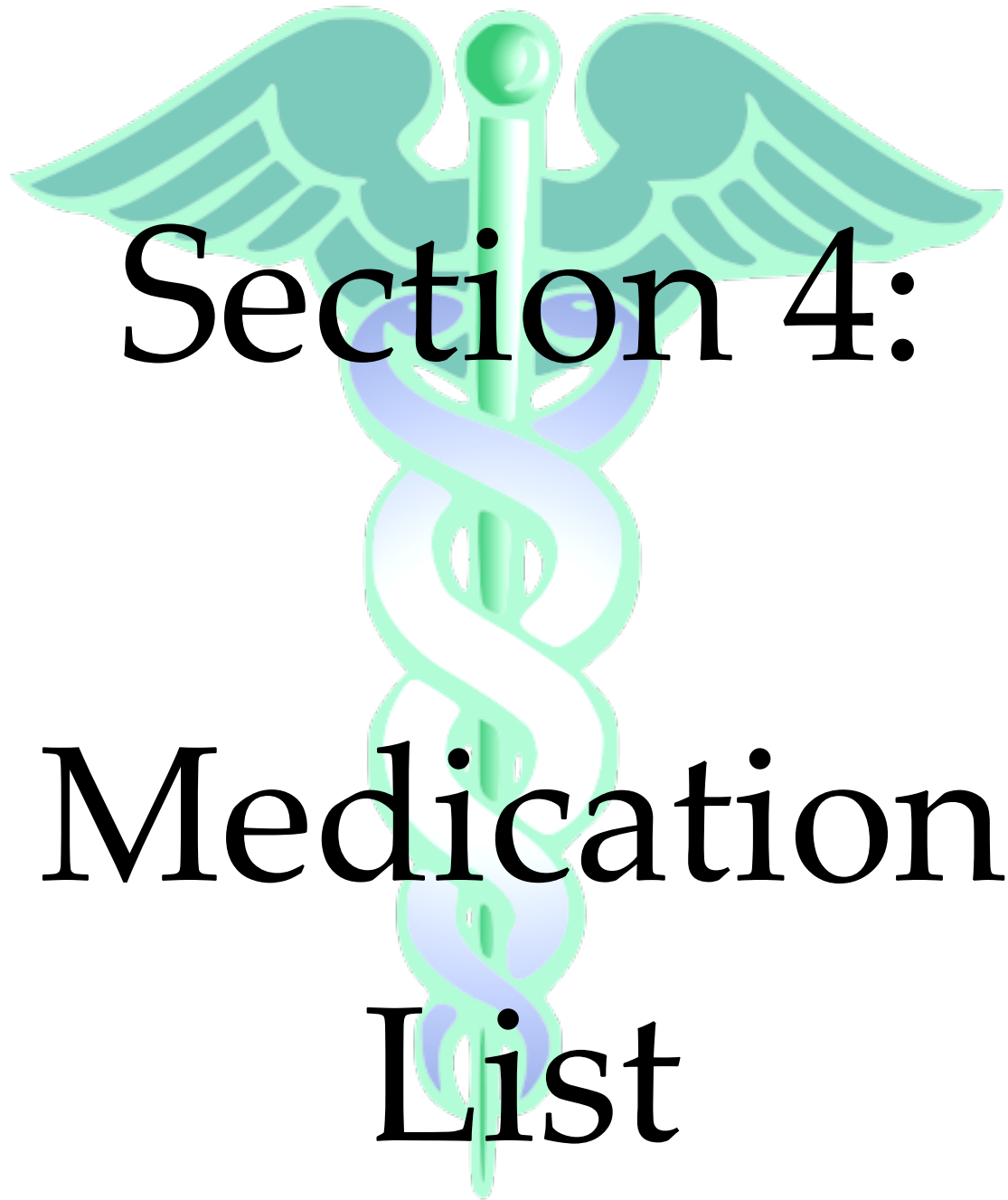
- It is best to spinal motion restrict the patient with the helmet in place as long as it fits snugly, and **no** access is needed to the patient's head or face. Extra padding should be placed under the shoulders to maintain good in-line cervical alignment.
- Remove any face shields that may impede good access to the airway.
- Remove the helmet using ideally 3 personnel if the helmet blocks management of airway control, head injury treatment, or if the helmet is too large and does not fit securely for effective cervical spine motion restriction.

**Paramedic Clearing of Cervical Spine in the Field:**

- **Spinal motion restriction of the patient may be omitted if ALL of the following conditions exist and documented clearly in the patient care report (NO EXCEPTIONS). Strict adherence to these guidelines must be maintained:**
  1. Patient age  $\geq 8$  y/o. Children  $< 8$  y/o need to be spinal motion restricted as they cannot consistently verbalize neck pain.
  2. Alert and oriented x 4 (person, place, time, events) with good short-term memory.
  3. Normal neurological exam. Motor and sensation are intact in all 4 extremities.
  4. **No** evidence of drug or alcohol use.
  5. **No** evidence (or reliable history) of loss of consciousness.
  6. **No** complaints of neck pain or back pain.
  7. **No** penetrating injury near midline spine area.
  8. **No** distracting injuries defined as any significant painful injury. For example: long-bone (femur, humerus, tibia) fractures, abdominal pain, chest pain, pelvic fractures, etc.
  9. **No** strong evidence of potential spinal injury in mechanism of injury (e.g. high-speed, severe damage motor vehicle crash, diving accident, etc.).

**Additional Notes:**

- Always err on the side of over utilization of cervical spine motion restriction if any question exists.
- Spinal motion restriction is an "**all-or-none**" treatment. Either the patient is supine with cervical collar, backboard, head-blocks, straps, or not at all. Applying only a cervical collar to a sitting patient is **unacceptable**.
- In elderly patients with severe kyphosis "hunch-back", remember to immobilize them with extra padding using sheets or pillows under their head. Do **not** attempt to "flatten" them into a supine position.
- Spinal (neurogenic) shock involves a spinal cord injury where there has been injury to the spinal cord with resultant loss of sympathetic vascular tone. The patient will have hypotension with warm, pink skin and "relative bradycardia" ( $< 100$  beats per minute).
- It will be assumed that the patient can speak English or that a reliable translator is available on scene to assist with questioning. It is **not** permissible to clear the c-spine in a patient who can **not** communicate effectively with the prehospital provider (e.g. language barrier, deafness, etc.).



# Section 4:

# Medication List

## Medication List

The following table on the next page contains all the medications that are used in this Patient Care Field Protocols and Standing Orders manual. These are the **only** medications that are to be carried in the ambulances. The MICU ambulances should carry all of these medications in the minimum amount specified. *The pediatric dosages listed are for patients < 8 y/o.*

### Notes:

- Always determine the patients' allergies prior to giving a medication unless this is **not** possible (*i.e.* unconscious patient).
- From time to time the medications on the following list may be supplied in concentrations or amounts other than those indicated. Regardless of the particular manner in which the medications are supplied, equivalent total amounts must be present, and it is the paramedic's responsibility to be certain that the correct dosages are administered to patients. Generic and brand name products are considered interchangeable.
- Remember to keep medications stored at the proper temperature. A departmental "operational policy" for maintaining the appropriate storage temperature is required for Texas DSHS licensure.

Medication	Recommended Temperature Range (in °F)
Adenosine Albuterol Sulfate Aspirin Atropine Calcium Gluconate (Gel & Inj) Diazepam Diphenhydramine Epinephrine 1:10,000 & 1:1,000 Furosemide Labetalol Lidocaine Magnesium Sulfate Midazolam Morphine Sulfate Naloxone Nitroglycerin Normal Saline Oral Glucose Ondansetron Sodium Bicarbonate 8.4% Tranexamic Acid (TXA)	59° - 86°
Acetaminophen D <sub>10</sub> Fentanyl Glucagon Ketamine	68° - 77°

Methylprednisolone Norepinephrine	
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- Some medications encountered on interfacility transfers (*i.e.* heparin, antibiotics, blood) may have already been started by the transferring facility. Most may be continued while enroute by the EMS personnel at the proper drip rate with the exception of the following four medication types listed below. If there are any questions or unfamiliarity about the medications encountered, **contact medical control**. Patients on the below medication types require personnel familiar with drip pumps to accompany the EMS crew due to their potential for **rapid and profound hypotension**:
  1. IV nitroglycerin
  2. IV nipride
  3. IV  $\beta$ -blockers (esmolol, labetalol)
  4. IV calcium channel blockers (verapamil, diltiazem).

### **Controlled Substances:**

- The Drug Enforcement Administration (DEA), the Texas Department of Public Safety (DPS), and the Texas Division of State Health Services (DSHS) require the EMS Medical Director to assure that all medications purchased under his/her medical license be stored and secured according to state and federal regulations.
- Schedule II & III medications will be secured by EMS personnel while on duty either:
  1. On the person of the paramedic that accepted receipt of the medications and is assigned to that apparatus, or
  2. In a locked container on the apparatus, where the only person with the key or combination is the paramedic that accepted receipt of the meds and is assigned to the apparatus.
- All medications stored in the field must be stored according to current Texas DSHS rules and regulations (double lock box). This should include all manufacturer temperature recommendations.

### **Engine Company Medications:**

- Annville FD engine companies will carry the following medications:
  - 2 Albuterol 3 mL/.083%
  - 1 Aspirin Bottle 81 mg/ tablet
  - 1 Atropine 1 mg/10mL
  - 1 Dextrose 10% 25 gm/250mL
  - 1 Diphenhydramine (Benadryl®) 50 mg/1mL
  - 1 Epinephrine 1:1,000 1 mg/1mL
  - 2 Epinephrine 1:10,000 1 mg/10mL
  - 1 Glucagon 1 mg/mL
  - 1 Glucose Paste 15 gms/tube
  - 1 Lidocaine 100 mg/5mL
  - 2 Naloxone (Narcan®) 2 mg/2mL
  - 1 Nitrostat® Spray 0.4 mg/m. dose

Generic Name	Trade Name®	Drug Class	Indications	Contraindications	Adult Dose	Pedi Dose (< 8 y/o)	Comments
Acetaminophen	Tylenol®	Antipyretic, Analgesic	Fever > 101°F	Severe liver disease, acetaminophen allergy	1000mg po (if ≥ 70kg). 500mg po (if 50-70kg)	15 mg/kg po via elixir	Make sure the receiving ER nurse is aware that acetaminophen was administered in the field. Only use acetaminophen for treating fevers if indicated- it is not intended to be used as an analgesic in these protocols.
Adenosine	Adenocard®	Antidysrhythmic	Conversion of SVT, Diagnostic Aid for Tachycardias	2° (type II) or 3° AV block without pacemaker, sick sinus syndrome, cardiac transplant patients. Caution with patients taking dipyridamole (Persantine®) or carbamazepine (Tegretol®) as may cause 2° (type II) or 3° AV blocks	6mg - 12mg rapid IV push, followed immediately by 10mL - 20mL NS flush. Opening the IV up to flush is <b>not</b> adequate. May repeat up to 30mg total.	0.1 mg/kg rapid IV push, followed immediately by 10mL NS flush. May be doubled once (0.2 mg/kg). No third dose indicated for pediatrics.	Half-life only 10 seconds- must administer flush immediately. Warn patient before of possible facial flushing, chest tightness, palpitations before giving adenosine. May <b>not</b> work well with patients on theophylline or that ingest large amounts of caffeine. Always best to rapidly infuse through proximal (AC or external jugular) IV site.
Albuterol	Ventolin® Proventil®	Bronchodilator (β2 Agonist)	Wheezing	Significant Ventricular Ectopy	5.0mg (2 unit doses) via nebs. May repeat up to 15mg total.	2.5mg (1 unit dose) via nebs. May repeat up to 7.5mg total.	May give pt tremors, restlessness, palpitations, ectopy, nausea or vomiting.
Aspirin	Ecotrin®	Non-Steroidal Anti-Inflammatory (NSAID) Inhibits Platelet Aggregation	Chest Pain of Suspected Cardiac Origin	Aspirin Allergy, Active Bleeding, Melena, Patient has Taken Aspirin Within the Last 6 Hours, Pregnancy	Administer four 81mg chewable baby aspirins	<b>NOT INDICATED</b>	Should be used only for suspected cardiac chest pain. Do <b>not</b> administer if patient has taken aspirin in last 6 hours. Do <b>not</b> use for traumatic chest pain.

Generic Name	Trade Name®	Drug Class	Indications	Contraindications	Adult Dose	Pediatric Dose (< 8 y/o)	Comments
<b>Atropine</b>	Atropine®	Anticholinergic	Symptomatic Bradycardia, Organophosphate or nerve agent poisoning	Tachycardia	1mg IV q 5min up to 3mg IV total.	0.02 mg/kg IV or IO (min 0.1mg - max 0.5mg) q 5min up to 1mg total in child (2mg total in teen).	Will <b>not</b> work well with 3° AV block, and heart transplants. Does <b>not</b> work well in patients < 4y/o. For Organophosphate poisonings, administer 2mg IV /IO (0.05 mg/kg IV/IO child) q 5min until secretions dry. May cause paradoxical slowing of heart rate if sub therapeutic (too low) dose is administered.
<b>Calcium Gluconate 10%</b>	(None)	Electrolyte	Hyperkalemia, Cardiac Arrest in Dialysis Pts	None	1gm of 10% solution IV over 2 minutes	<b>NOT INDICATED</b>	Do <b>not</b> administer in same tubing as sodium bicarbonate.
<b>Calcium Gluconate Gel 2.5%</b>	Calgonate®	Electrolyte Gel	Hydrofluoric (HF) acid dermal burns	None	2.5% applied topically to suspected areas of HF burns	2.5% applied topically to suspected areas of HF burns	Apply immediately to any areas where a dermal HF acid burn is suspected.
<b>Dextrose 10%</b>	D <sub>10</sub>	Sugar Solution	Hypoglycemia	Intracranial Hemorrhage Acute CVA, Acute MI	25gm (250 mL) IV in patent IV or IO.	Administer 0.5 gm/kg IV or IO.	Perform blood glucose measurement prior to giving if possible. May repeat D <sub>10</sub> in 15 minutes if blood sugar < 70 mg/dL.
<b>Diazepam</b>	Valium®	Benzodiazepine	Active Seizures, Sedation	Hypotension, Pregnancy (Class D), Caution in breast-feeding mothers	2mg - 10mg slow IV push	0.2 mg/kg IV or IO at 1mg/min. If cannot establish IV or IO in child, administer rectally at 0.5 mg/kg PR.	Patient should be on cardiac monitor and pulse ox when giving. Does <b>not</b> work well IM (erratic absorption).

Generic Name	Trade Name®	Drug Class	Indications	Contraindications	Adult Dose	Pediatric Dose (< 8 y/o)	Comments
<b>Diphenhydramine</b>	Benadryl®	Antihistamine	Allergic reactions, Anaphylaxis, Insect Bites	No Absolute Contraindications	25 mg - 50 mg IV or IM	0.75 mg/kg IV or IM	May cause sedation of patient.
<b>Epinephrine 1:1,000 IM</b>	Adrenalin®	Sympathomimetic (Catecholamines)	Anaphylaxis, Severe Stridor Severe Asthma	Hypoperfusion be very cautious if patient has Age > 50 y/o (possible underlying heart disease), History of Coronary Artery Disease, Pregnancy	0.3 mg IM	0.01 mg/kg IM (up to max single dose of 0.3 mg IM)	Increases myocardial oxygen demand.
<b>Epinephrine 1:10,000 IV / IO</b>	Adrenalin®	Sympathomimetic (Catecholamines)	Cardiac Arrest, Asystole, PEA, Ventricular Fibrillation, Pulseless Ventricular Tachycardia, severe pediatric bradycardia	Patient Awake Without Hypotension	1mg q 3min - 5min as needed.	0.01 mg/kg - IV or IO q 3-5 minutes. 0.01 mg/kg = 0.1 mL/kg of 1:10,000 solution	Epinephrine is inactivated by sodium bicarbonate. Use 2 <sup>nd</sup> IV site or thoroughly flush the IV before and after administration of sodium bicarbonate.
<b>Fentanyl</b>	Sublimaze®	Opioid Analgesic	Pain Control, Severe Chest Pain Refractory to Nitroglycerin, Congestive Heart Failure	Hypotension, Opioid Hypersensitivity	50µg – 100µg slow IV push (or IO / IM / IN)	1 µg/kg slow IV push (or IO / IM)	Patient must be on cardiac monitor and pulse ox. May need to administer ondansetron (Zofran®) 4mg IV or IM (adult) to prevent or treat vomiting.

Generic Name	Trade Name®	Drug Class	Indications	Contraindications	Adult Dose	Pediatric Dose (< 8 y/o)	Comments
<b>Furosemide</b>	Lasix®	Diuretic	Pulmonary Edema	Hypovolemia, Patient Without Shortness of Breath, Digoxin Toxicity, Pregnancy	40mg IV over 1min, or double pts single dose if already taking furosemide (up to 100mg IV).	1 mg/kg IV over 1min	Do <b>not</b> administer if patient has pedal edema without shortness of breath. Will cause tinnitus if administered too rapidly. Do <b>not</b> administer furosemide to a patient suspected of having pneumonia (fever, productive cough), or with a SBP < 100 mmHg.
<b>Glucagon</b>	GlucaGen®	Insulin Antagonist	Hypoglycemia without IV Access, $\beta$ -Blocker OD	IV Access Can be Obtained Easily	1mg IM. Administer 3mg – 5mg IV in Calcium-channel and $\beta$ -Blocker OD	0.5mg IM (Not for children < 4 y/o)	Repeat blood sugar in 15 minutes- if still < 70 mg/dL repeat glucagon dose.
<b>Glucose (oral) 40%</b>	InstaGlucose® Glucose® Monogel®	Oral Sugar Agent	Hypoglycemia	Decreased Gag Reflex, Altered Mental Status	15gm - 30gm by mouth	10gm by mouth (Not for children < 1 y/o)	Pt must be awake with an intact gag reflex.
<b>Ketamine</b>	Ketalar®	Sub-dissociative Analgesic	Severe Pain, Airway Adjunct	Severe head trauma (GCS $\leq$ 12), Severe Hypertension, Penetrating Eye Injury	0.3 mg/kg IV, IO, IM, IN	0.3 mg/kg IV, IO, IM, IN	Not for use in excited delirium patients. Can cause excessive salivation and nystagmus. Laryngospasm is very rare but serious complication.
<b>Labetalol</b>	Normodyne® Trandate®	Antihypertensive Agent ( $\beta$ 1, $\beta$ 2, $\alpha$ 1 Blocker)	Hypertensive Emergencies	Severe CHF, Severe Asthma, 2° (type II) or 3° AV block, HR < 70, Allergy to $\beta$ -blockers	10mg – 20mg slow IV push over 2 minutes	Not Indicated	Only administer for symptomatic hypertensive patients with BP > 220/110 with evidence of end-organ changes



Generic Name	Trade Name®	Drug Class	Indications	Contraindications	Adult Dose	Pediatric Dose (< 8 y/o)	Comments
<b>Lidocaine</b>	Xylocaine®	Antidysrhythmic Agent	Significant (Symptomatic) Ventricular Ectopy (> 10 PVCs/min, Couplets, Multifocal PVCs, Runs Ventricular Tachycardia), Ventricular Fibrillation, Ventricular Tachycardia, Closed Head Injury Needing ETT, EZ-IO® Discomfort (See p. 156)	2° (type II) and 3° AV Block, Idioventricular Rhythm, PEA, Junctional Escape rhythms, Wide Complex Rhythms with Pulse Rate < 80	1.5 mg/kg IV. Repeat at 0.5 mg/kg - 0.75 mg/kg IV up to 3 mg/kg IV total. Lidocaine drip at 1 mg/min – 4 mg/min.	1 mg/kg IV or IO. Do <b>not</b> repeat dose in pediatric patients. Go straight to lidocaine drip at 40 mcg/kg/min IV.	<b>Never</b> administer for bradycardic rhythms as it may cause asystole. Can be administered before intubating closed head injury patients to help block ICP rise. Stop lidocaine if the patient seizes or develops altered mental status.
<b>Magnesium Sulfate</b>	(None)	Electrolyte	Eclampsia, Torsades de Pointes, Ventricular Tachycardia or Ventricular Fibrillation Unresponsive to Lidocaine	Heart Block, Renal Failure, Dialysis	2gm IV of 10% solution over 2 mins. Use 4gm IV in eclampsia.	<b>NOT INDICATED</b>	Patient must be on pulse ox. Watch closely for respiration depression.
<b>Methylprednisolone</b>	Solumedrol®	Anti-Inflammatory Glucocorticoid (Corticosteroid)	Severe Allergic Reaction, Anaphylaxis, Asthma Requiring Albuterol Tx	<b>No</b> Absolute Contraindications	125mg IV or IM	2 mg/kg IV or IM	Administer methylprednisolone to asthma patients who are wheezing severely enough to require albuterol, or in patients having a significant allergic reaction. <b>Notify ED staff receiving the patient at bedside that methylprednisolone was administered in the field.</b>

Generic Name	Trade Name®	Drug Class	Indications	Contraindications	Adult Dose	Pediatric Dose (< 8 y/o)	Comments
Midazolam	Versed®	Benzodiazepine	Short Acting Sedation	Hypotension, Intoxication, Abdominal Pain, Caution in Breast-feeding mothers, Pregnancy (Class D)	1mg - 5mg IV slow IV push (or IO). Can administer 2mg - 5mg IM or via MAD if clinically indicated in a seizing patient.	0.1 mg/kg slow IV push (or IO / IM / MAD)	Patient must be on cardiac monitor and pulse ox. Administer either diazepam or midazolam 5mg (0.1 mg/kg) for seizure control. Be cautious giving midazolam too rapidly as can result in respiratory depression especially if patient on opioids, barbiturates, alcohol, or another CNS depressant. There is no minimum age limit for MAD use.
Morphine Sulfate	Morphine	Opioid Analgesic	Pain Control, Severe Chest Pain Refractory to Nitroglycerin, Congestive Heart Failure	Hypotension, Opioid Hypersensitivity	2mg - 10mg slow IV push (or IO / IM)	0.1 mg/kg slow IV push (or IO / IM)	Patient must be on cardiac monitor and pulse ox. May need to administer ondansetron (Zofran®) 4mg IV or IM (adult) to prevent or treat vomiting.
Naloxone	Narcan®	Opioid Antagonist	Altered Mental Status Possibly Due to Opioid Overdose, Respiratory Rate < 10	May Precipitate Opioid Withdrawal in Addicted Patients-Causing Violent and Combative Behavior	2mg – 6mg IV (or IO / IM / MAD).	0.5mg - 1mg IV, IO, IM up to 2mg max.	More potent street opioids may require up to 6mg to reverse. Naloxone only lasts 30 minutes-may have to repeat dose in long-acting opioids. Can also be used for suspected clonidine overdoses. Naloxone will <b>not</b> reverse opioid-induced hypotension.
Nitroglycerin	Nitrostat® Nitrolingual®	Vasodilator (Coronary Arteries)	Cardiac Chest Pain, CHF, Hypertension	SBP < 100mmHg, Pregnancy, Patient has Taken (Viagra®), (Cialis®), or (Levitra®) in Last 24hrs, Patient with Decreased Gag Reflex, Age < 18 y/o	0.4mg SL (or spray) q 5 min x 3 total.	<b>NOT INDICATED</b>	Causes venodilation which decreases preload. Do not administer to hypotensive pts. Use with extreme caution in patients with inferior wall MI due to HypoTN risk (right ventricular infarct).

Generic Name	Trade Name®	Drug Class	Indications	Contraindications	Adult Dose	Pediatric Dose (< 8 y/o)	Comments
Norepinephrine	Levophed®	Vasopressor	Hypotension refractory to IV fluids, Hypotension where IV fluids contraindicated	Hypotension secondary to hypovolemia (without appropriate volume replacement)	8 – 12 mcg/min IV drip. Add 4mg to 250mL NS. Use microdrip starting at 30 drops / min (8 mcg/min)	<b>NOT INDICATED</b>	Watch the norepinephrine drip rate closely. Make sure to administer in a widely patent IV- extravasation must be avoided.
Normal Saline 0.9% Flush	(None)	Isotonic Flush Solution	Flushing IV Caths, Dissolving or Diluting Meds	None	As needed	<i>As needed</i>	Discard once bottle opened. <b>Not</b> for multi-use.
Ondansetron	Zofran®	Antiemetic	Active Vomiting, Motion Sickness, Morphine Adjunct	No Absolute Contraindications	4mg IV or IM	<i>2mg IV (no IM dose for pediatrics)</i>	Should be administered with morphine to avoid histamine-related nausea and vomiting.
Sodium Bicarbonate 8.4%	(None)	Alkalinizing Buffer Agent	Tricyclic Antidepressant Overdose, Suspected Hyperkalemia (Dialysis Patients), Prolonged CPR (acidosis) > 20 minutes	Respiratory Acidosis (Inadequate Ventilations)	1 amp (50mEq) IV in patent (free-flowing IV)	<i>1 mEq/kg IV in patent (free-flowing IV). In infants &lt; 1y/o, dilute to 4.2%. Also dilute if administered by IO route.</i>	Extravasation may cause tissue necrosis- make sure IV is patent before giving. Be sure to thoroughly flush IV tubing between medications to avoid precipitation between calcium and bicarbonate. Ideally these meds should be administered in 2 different IVs.
Tranexamic Acid (TXA)	Cyklokapron®	Anti-fibrinolytic	Hemodynamically unstable trauma patients with non-compressible hemorrhage (SBP < 100 mmHg). Blunt or penetrating trauma patients with suspected hemorrhage and within 3 hours of their injury.	DVT, Suspected CVA, MI, or PE. <b>Medical control</b> should be contacted prior to administering TXA to patients taking warfarin (Coumadin®). Isolated head injury. Injury > 3 hours old. Known pregnancy.	1000mg IV in 100mL of 0.9% normal saline administered over 10 minutes.	<i>Not indicated for patients &lt; 16 y/o.</i>	Make sure the receiving staff at the trauma center are aware that TXA was administered in the prehospital setting. TXA will be started by EMS as a 10-minute bolus. The 8-hour infusion will be completed later in the hospital. TXA works by preventing blood clots from breaking down.

**EMS Equipment & Supplies List- Daily Minimums**

Medic Unit: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_ Inventoried By: \_\_\_\_\_ Captain: \_\_\_\_\_

**AIRWAY**

1 ADULT BVM  
 1 EACH BVM: CHILD & INFANT  
 1 LARYNGOSCOPE HANDLE  
 1 PEDI LARYNGOSCOPE HANDLE  
 1 EACH INTUBATION BLADES:  
     MILLER 0,1,2,3,4 & MAC 2, 3, 4  
 1 EACH ETT: 3, 3.5, 4, 6, 7, 7.5, 8, 8.5, 9  
 1 EACH i-GEL® TUBE: 1.5, 2, 2.5, 3, 4, 5  
 1 ADULT ETCO<sub>2</sub> DETECTOR  
 1 PEDI ETCO<sub>2</sub> DETECTOR  
 1 EACH MAGILL FORCEPS (LG & SM)  
 1 OXYGEN "D" CYLINDER/REGULATOR  
 1 SPARE OXYGEN CYLINDER  
 1 O<sub>2</sub> WRENCH  
 1 "K" CYLINDER W/REG  
 1 WRENCH FOR "K" CYLINDER  
 1 SET ADULT ORAL AIRWAYS  
 1 SET PEDI ORAL AIRWAYS  
 1 SET ADULT NASOPHARYNGEAL AIRWAYS  
 4 NASAL CANNULAS  
 4 NON-REBREATHER MASKS  
 2 INFANT O<sub>2</sub> MASKS  
 2 PEDI O<sub>2</sub> MASKS  
 2 NEBULIZER SETUPS  
 2 ADULT AEROSOL MASKS  
 2 PEDI AEROSOL MASKS  
 1 WALL O<sub>2</sub> CONNECT  
 1 PORTABLE SUCTION W/ TUBING  
 1 YANKAUER TIP  
 1 #6 OR #8 FRENCH CATHETER  
 1 #14 OR #18 FRENCH CATHETER  
 1 BULB SYRINGE  
 1 MECONIUM ASPIRATOR  
 1 WALL SUCTION UNIT  
 2 12 or 14 GAUGE ANGIOCATHS (-3")  
 1 CPAP UNIT  
 1 BOUGIE TRACHEAL TUBE INTRODUCER  
 1 LIFEVAC AIRWAY CLEARANCE DEVICE

**IV**

2 NS 1000 ML BAGS  
 1 NS 500 ML BAG  
 1 NS 250ML BAG  
 1 NS 100 ML BAG  
 2 MULTI DRIP SETS  
 4 START PAKS  
 2 OF EACH SIZE ANGIOS: 16, 18, 20, 22, 24 GAUGE  
 21-PADS  
 4 PREFILLED SALINE FLUSHES  
 1 PEDI IV BOARDS  
 1 EACH EZ-IO® NEEDLE: (Pink, Yellow, Red)  
 1 EZ-IO® DRIVER  
 10 ALCOHOL PREPS  
 1 SHARPS CONTAINER

**DIAGNOSTIC**

1 ADULT BP CUFF  
 1 EACH BP CUFF: CHILD & INFANT  
 1 STETHOSCOPE  
 1 CARDIAC MONITOR  
 2 ADULT HANDS FREE PADS

1 PEDI HANDS FREE PADS  
 1 PKT. ADULT ELECTRODES  
 1 PKT. PEDI ELECTRODES  
 1 GLUCOMETER  
 1 BOTTLE GLUCOMETER STRIPS  
 5 LANCETS  
 1 THERMOMETER W/ COVERS

**TRAUMA**

4 4X4 SINGLES  
 4 2X2 SINGLES  
 2 MULTI-TRAUMA DRESSINGS  
 8 KERLIX™  
 6 TRIANGULAR BANDAGES  
 2 VASELINE® GAUZE  
 1 ROLL TRANSPORE TAPE  
 4 ROLLS 2" CLOTH TAPE  
 2 STERILE SHEETS  
 1 BOTTLE ALCOHOL  
 2 BOTTLES OF WOUND CLEANSER  
 3 HOT PAKS  
 3 COLD PAKS  
 1 BANDAGE / TRAUMA SHEAR  
 1 PENLIGHT  
 2 ROLLS COBAN™  
 1 COMMERCIAL TOURNIQUET  
 1 ISRAELI TRAUMA DRESSING (6")

**PEDIATRIC**

1 BROSELOW TAPE OR PEDI SLIDE  
 1 OBSTETRICAL KITS  
 1 SILVER SWADDLERS  
 1 #5 FR FEEDING CATHETER  
 1 PEDI CAR SEAT

**PPE**

2 ISOLATION KITS  
 2 EYE PROTECTION SHIELDS OR GOGGLES  
 4 N-95 MASKS  
 2 RED BIOHAZARD BAGS  
 1 SPRAY BOTTLE CAVICIDE®  
 1 BOTTLE HAND CLEANER  
 1 BOX EACH EXAM GLOVES (S, M, L, XL)  
 1 BOTTLE EYE WASH  
 1 SHARPS CONTAINER

**MULTI-PATIENT**

25 TRIAGE CARDS

**IMMOBILIZATION**

1 ADULT TRACTION SPLINT  
 1 PEDI TRACTION SPLINT  
 2 SMALL PADDED BOARD  
 2 MEDIUM PADDED BOARD  
 2 LONG PADDED BOARD  
 2 6' BACKBOARDS W/ STRAPS  
 1 EXTRICATION DEVICE (KED)  
 1 PEDI IMMOB DEVICE  
 1 SCOOP STRETCHER  
 3 DISP. HEAD IMMOBILIZERS  
 2 PEDI ADJUSTABLE C-COLLARS  
 4 ADULT ADJUSTABLE C-COLLARS

**MISCELLANEOUS**

1 TOUGHBOOK (OR TABLET EQUIVALENT)  
 1 PAIR BINOCULARS  
 1 FLASHLIGHT  
 1 HAZMAT GUIDE  
 1 SET EMS PROTOCOLS  
 3 SAFETY VESTS  
 NO SMOKING SIGNS: CAB & PT CARE AREA  
 1 5# ABC EXTINGUISHER  
 1 SET EMERG REFLECTIVE TRIANGLES  
 1 STRETCHER

**MEDICATIONS:\* (see note below)**

1 ACETAMINOPHEN BOTTLE 500MG TABLET  
 1 ACETAMINOPHEN ELIXIR BOTTLE 160MG/5ML  
 3 ADENOSINE 6 MG/ 2ML  
 3 ALBUTEROL 3 ML/.083%  
 1 ASPIRIN BOTTLE 81 MG/ TABLET  
 2 ATROPINE 1 MG/10ML  
 1 CALCIUM GLUCONATE 10% IV 1 GM/10ML  
 1 CALCIUM GLUCONATE 2.5% GEL 25 GM/TUBE  
 1 DEXTROSE 10% 25 GM/250ML  
 2 DIAZEPAM (VALIUM®) 10MG TUBEX  
 1 DIPHENHYDRAMINE 50 MG/1ML  
 1 EPI 1:1000 1 MG/1ML  
 3 EPI 1:10,000 1 MG/10ML  
 1 FENTANYL 100µG/2ML (OR MORPHINE)  
 1 FUROSEMIDE (LASIX®) 40 MG/4ML  
 1 GLUCAGON 1 MG/ML  
 1 GLUCOSE PASTE 15 GMS/TUBE  
 1 KETAMINE 10MG/ML (CONC. MAY VARY)  
 1 LABETALOL 20 MG/4ML  
 2 LIDOCAINE 100 MG/5ML  
 1 LIDOCAINE 2 GM/500ML  
 1 MAGNESIUM SULFATE 50% 5 GM/10ML  
 1 METHYLPRED (SOLU-MEDROL®) 125 MG/2ML  
 2 MIDAZOLAM (VERSED®) 5 MG/5ML  
 2 MORPHINE SULFATE 4 MG/ML (OR FENTANYL)  
 2 NALOXONE (NARCAN®) 2 MG/2ML  
 1 NITROSTAT SPRAY 0.4 MG/M.DOSE  
 1 NOREPINEPHRINE 4 MG/ML  
 1 ONDANSETRON (ZOFRAN®) 4 MG/2ML  
 1 SODIUM BICARBONATE 50 MEQ/50M  
 1 TRANEXAMIC ACID (TXA) 1000MG/10ML  
 1 BOTTLE OF PAPAINE-BASED MEAT TENDERIZER

**MEDICATION ADJUNCTS**

1 CARPUJECT OR TUBEX INJECTOR  
 2 18 GA. HYPO (DRAW) NEEDLES  
 2 21 OR 22 GA. HYPO NEEDLES  
 1 EA. SYRINGE: 1, 3, 10, 60 ML

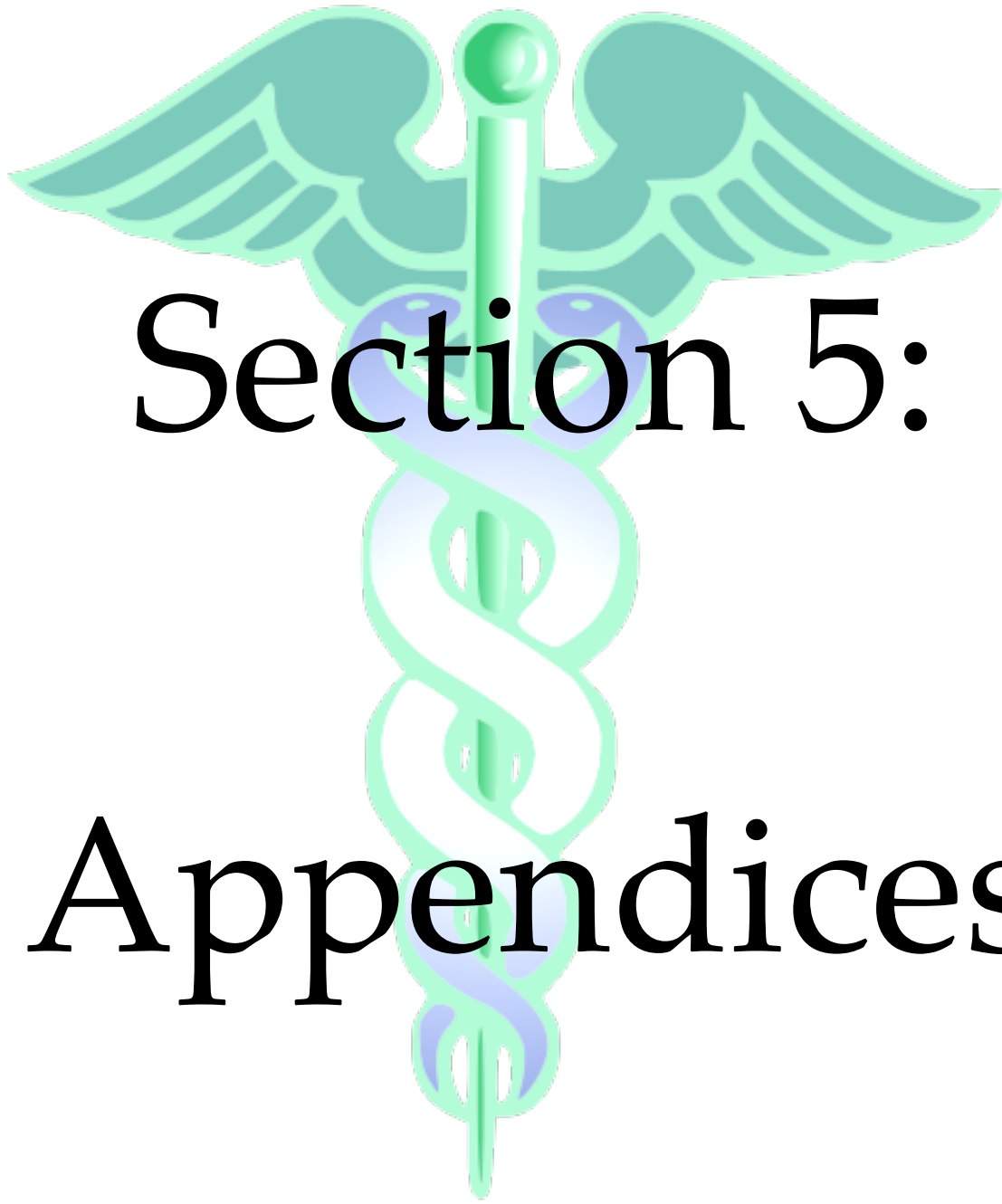
*\* Please note that due to supply issue variability with medication concentrations- at times the medications may not be in the exact concentrations listed above.*

**EFFECTIVE: 10/01/21 TO 09/30/23**



**Daniel M. Roberts MD, FACEP**  
**Medical Director**

Revised: September 2023



# Section 5:

# Appendices

## Automatic External Defibrillator (AED)

### Introduction:

- The AED should be applied only to patients who are unresponsive and have no signs of circulation.

### Indications:

1. Sudden unresponsiveness presumed to be of cardiac origin.
2. Patient is pulseless **and** unconscious.
3. Patient  $\geq$  1 month old.

### Contraindications:

1. Patients who are documented to be Do-Not-Resuscitate (DNR).
2. Patient has pulse or is still conscious.
3. Patient  $<$  1 month old.
4. Patient with obvious signs of death (rigor mortis, dependent lividity).

### Procedure:

1. Establish patient responsiveness.
2. Check the airway and open as needed.
3. Determine if the patient is breathing. Use bag-valve-mask (BVM) as needed.
4. Check for pulse. If pulse is absent, begin CPR. Make sure the patient is supine and on a dry surface (if possible).
5. Expose patient's chest.
6. Attach AED cables to appropriate-sized AED pads (adult or pediatric). Do not apply to a patient lying in the water. Make sure the unit is turned on and that no portable cellular phones or radios are within 6 feet of the patient.
7. Remove the self-adhesive defibrillator pads from the packaging, peel off the protective backing, and apply to the patient's chest in the proper locations (in accordance with the illustration in the AED pad packaging). Make sure that the chest is dry and that any medication patches (nitroglycerin) are removed. Do **not** apply the pads directly over a pacemaker or AICD.
8. Stop CPR and do not touch the patient. Allow the AED to assess the rhythm. Voice and/or visual prompts may be given depending on the unit. The "assess" or "analyze" button on some AED models may need to be pressed. It is very important **not** to touch or disturb the patient during the analysis phase. Doing so may potentially result in misinterpretation of the cardiac rhythm.
9. There are 3 possible messages after pressing "analyze":
  - A. If the AED detects a shockable rhythm, it will state "Start CPR" and allow 2 minutes for chest compressions. During this time, the AED is silently charging for defibrillation. After 30 seconds, the AED will state "Shock Advised, Stand Clear, Push to Shock". Immediately clear from the patient and depress the shock button. Chest compressions shall resume immediately after the defibrillation without a pulse check.
  - B. If the AED detects a non-shockable rhythm, it will state "No Shock Advised, Start CPR". Not all patients in cardiac arrest will have a rhythm that should be shocked. After 2 minutes, the defibrillator will prompt "Push Analyze".

C. The AED may state "Motion Detected, Stop Motion". The AED is unable to analyze due to motion. Make sure no one is touching the patient, wires, or device. The device will automatically analyze when the motion stops.

10. Recheck patient's airway, breathing, and for a pulse. If needed, resume CPR. If the patient loses a pulse at any time (EMS witnessed arrest), immediately press "Analyze".
11. After every 2 minutes, stop CPR, do not touch the patient, and allow the AED to reassess the rhythm. The "Analyze" or "Assess" button may need to be pressed on some models.
12. Continue these above steps until the MICU ambulance arrives (if applicable). Report to the MICU crew the time and number of shocks which were delivered.
13. If a patient has return of spontaneous circulation, refer to the Post-Resuscitation Management protocol, p. 83.

**Notes:**

- Patients with automatic implanted (internal) cardiac defibrillators (AICDs) should be treated just as other patients. **No** special considerations are needed in the prehospital setting, except avoid placing the defibrillator pads directly over the AICD (or pacemaker).
- There is no limit to the maximum number of shocks delivered, as long as the AED is advising a shock be administered.

## Airway Management / Oxygen Administration

### **Introduction:**

- Oxygen therapy remains one of the most important interventions a prehospital provider can do.
- The early administration of oxygen is very important, and is stressed throughout these protocols.
- Any patient with altered mental status, significant shortness of breath, significant ventricular ectopy, cyanosis, or evidence of hypoxia or ischemia needs to be on high-flow oxygen via a non-rebreather mask.
- Patients without active shortness of breath or altered mental status that need oxygen can be placed on oxygen via nasal cannula at 2 LPM (28% oxygen delivered) - 4 LPM (36% oxygen delivered) based on the paramedic's judgment. Oxygen at a rate > 4 LPM is very irritating to the nasal mucosa and should be avoided.
- Often agitation and restlessness are the result of hypoxia.
- Consider intubation for all patients with an altered mental status and a decreased gag reflex.
- Never withhold oxygen from a patient who needs it. In COPD or emphysema patients with a hypoxic drive, oxygen is still indicated. Watch closely for respiration depression and assist ventilations with bag-valve-mask as needed.
- Always use an end-tidal CO<sub>2</sub> detector (Easy Cap<sup>®</sup>) to verify endotracheal tube placement. It should turn from purple → yellow/gold if in the trachea ("Gold is golden"). In addition, continuous CO<sub>2</sub> capnography should be monitored on all intubated patients. See End-Tidal CO<sub>2</sub> Monitoring appendix, p. 146.
- Do **not** let a normal pulse oximeter reading give you a false sense of security that the patient is ventilating okay. Often a patient will have a relatively good pO<sub>2</sub> (normal oxygen saturation) while the pCO<sub>2</sub> is increasing dangerously high. Always treat the patient, **not** a pulse oximeter reading. See Pulse Oximetry appendix, p. 177.
- Administer oxygen to keep the pulse oximetry reading > 94%. In COPD patients, an O<sub>2</sub> saturation > 94% may not be achieved.

### **Progression of Airway Management:**

Nasal Cannula (2 LPM - 4 LPM) → Non-Rebreather Mask with high-flow oxygen (10 LPM - 15 LPM) → CPAP → Bag-Valve-Mask → Endotracheal Intubation.

### **Endotracheal Intubation:**

- Indications for intubation:
  - Protect the airway (decreased or absent gag reflex)
  - Glasgow Coma Score (GCS) < 8
  - Oxygenate (provide oxygen) or ventilate (remove carbon dioxide)
  - Airway control in a burned patient
  - Medication administration (cardiac arrest patients)
- Remember to administer naloxone (Narcan<sup>®</sup>) prior to intubating a patient with suspected opioid overdose. Intubation may **not** be needed after naloxone is administered.
- Administer midazolam (Versed<sup>®</sup>) 1mg - 5mg slow IV (or IO) push (or 2mg - 5mg IM / MAD) may be needed for sedation in a head injured patient who has significant jaw clenching. Given the



time constraints involved, midazolam may be administered by the medic before contacting medical control if needed to aid the intubation attempt.

### **Intubation Equipment:**

- Have all equipment out and available before attempting intubation:
  - Bag-Valve-Mask with oxygen
  - End-Tidal CO<sub>2</sub> detector (Easy Cap<sup>®</sup>)
  - Laryngoscope with appropriate blades. Due to the infant's "floppy" epiglottis a straight (Miller) blade should be preferred over a curved (Macintosh) blade in infants
  - 10mL syringe
  - Endotracheal tube stylet
  - Bougie tracheal tube introducer
  - Suction
  - Stethoscope
  - Appropriately-sized endotracheal tube. Often it is a good idea to have out the tube size above and below the tube being used in case an adjustment is needed. The approximate endotracheal tube size in a child is the size of a child's external nare or the size of the child's little finger. Alternatively, the pediatric endotracheal tube size is  $[\text{Age} \div 4] + 4$ . Use uncuffed tubes in patients < 8 y/o (cricoid cartilage is the narrowest portion of the child's airway)
  - Twill tube (umbilical tape), tie downs (or "pink" tape), or commercial "tube-tamer" type device
  - Magill forceps (remove foreign bodies if encountered)
  - i-gel<sup>®</sup> (for rescue airway device if needed)

### **Intubation Procedure:**

- Prepare and oxygenate the patient with 100% oxygen.
- Select a proper ET tube size and insert stylet into the tube. Have suction ready if needed.
- A nasopharyngeal or oropharyngeal airway should be placed on any patient who is receiving bag-valve-mask ventilations. Avoid a nasopharyngeal airway for suspected nasal, mid-face, or basilar skull fractures.
- All patients that are to be intubated should be on a cardiac monitor and pulse oximeter if time allows. Hypoxia will rapidly lead to bradycardia in a child.
- Lidocaine 1.5 mg/kg IV may be administered 1 minute before intubating a closed head injury patient with suspected increased intracranial pressure.
- Remove any dentures present before intubating a patient.
- If unable to pass the endotracheal tube after 30 seconds, stop the attempt, preoxygenate with bag-valve-mask, and reattempt with any adjustments as needed (change head position, change cricoid pressure- use BURP maneuver, different medic, different size tube or blade, etc.). The bougie tracheal tube introducer can also be used to aid in placement.
- Once the tube is correctly placed, inflate the ETT cuff up to 10mL of air, and check for equal breath sounds in all 4 lung quadrants and absent over the epigastrium. If the breath sounds are unequal, adjust the endotracheal tube position as it might be too deep (*i.e.* right-mainstem bronchus intubation). Confirm the endotracheal tube placement with an end-tidal CO<sub>2</sub>

detector (or better perform continuous CO<sub>2</sub> capnography) on all intubated patients. Document the end-tidal CO<sub>2</sub> results on the patient care report. End-tidal CO<sub>2</sub> capnography should be > 20 mmHg if the patient has a pulse. In a pulseless patient, an end-tidal CO<sub>2</sub> waveform with an end-tidal CO<sub>2</sub> value > 10 mmHg may be used to confirm the adequacy of airway.

- In adults, placing the tube to a depth of 21 cm in a female and 23 cm in a male will have the tube in the correct location in 90% of all patients.
- Secure the tube carefully in a child. A child's trachea is short in length and only a small amount of movement can lead to incorrect movement of the tube. A cervical collar can be placed in a child to better maintain the ET tube placement.
- Always disconnect the bag-valve-mask from the endotracheal tube whenever moving the patient (onto backboard or stretcher, into the back of ambulance, etc.) to avoid dislodging the tube. Always reassess the breath sounds immediately after moving the patient and frequently during transport.
- Continuous end-tidal CO<sub>2</sub> capnography monitoring should be the standard of care on all patients with respiratory failure and / or an advanced airway placed.
- **Never feel obligated to have a patient intubated.** A bag-valve-mask with a good seal and nasal trumpet or oropharyngeal airway usually does an excellent job of oxygenating and ventilating a patient. **Always pull an endotracheal tube immediately if any doubt exists whether the tube is correctly in the trachea- "When In Doubt, Take It Out"**. Never place an endotracheal tube unless it can be seen passing through the vocal cords. Unrecognized esophageal intubations will not be tolerated.
- Administer midazolam (Versed®) 1mg - 5mg slow IV push (or IO / IM / MAD) or morphine sulfate 2mg - 10mg (*0.1 mg/kg child*) slow IV push (or IO / IM) (or fentanyl 50µg – 100µg) for tube tolerance if needed (patient biting down on endotracheal tube).

#### i-gel® Protocol

- The i-gel® is for adult and pediatric patients and is meant to be a rescue device for those patients that cannot be successfully endotracheally intubated, or as the **initial airway device** for a patient in **cardiac arrest**. There is no need to later place an endotracheal tube.
- EMS personnel that use the i-gel® must demonstrate proficiency in its use prior to having authorization to use it.
- The end-tidal CO<sub>2</sub> detector should be used to help confirm ventilation of the proper tube.
- The i-gel® **cannot** be used as a medication administration route. **No** medications are to be administered down the i-gel® airway.
- The i-gel® by its design does not require a mask seal and thus may be very useful in situations in which an adequate BVM facemask seal **cannot** be maintained.



The i-gel® will be carried in six sizes:

	Color	I-gel size	Patient size	Patient weight (kg)	Patient weight (lbs)
	Blue	1.5	Infant	5-12 kg	11-25 lbs
	Grey	2.0	Small pediatric	10-25 kg	22-55 lbs
	White	2.5	Large pediatric	25-35 kg	55-77 lbs
	Yellow	3.0	Small adult	30-60 kg	65-130 lbs
	Green	4.0	Medium adult	50-90 kg	110-200 lbs
	Orange	5.0	Large adult	90+ kg	200+ lbs

i-gel® is **indicated** in the following patients:

- Apneic patient when endotracheal intubation is not possible or not available.
- Initial airway device in a cardiac arrest patient.
- Patient unconscious, without a gag reflex.

i-gel® is **contraindicated** in the following patients:

- Under 5kg.
- Intact gag reflex.
- History of recent caustic ingestion, known esophageal trauma, or known esophageal disease.
- Obstructive lesion below the glottis.
- Patient with tracheostomy or laryngectomy.


i-gel® device warnings / precautions:


- The i-gel® is considered a supraglottic airway.
- The i-gel® is **not** a definitive airway and does **not** completely protect the airway from the effects of regurgitation and aspiration.
- After placement, perform standard checks for breath sounds and utilize an appropriate carbon dioxide monitor as required by protocol.
- The i-gel® is not intended for re-use.


Using the i-gel® (see illustration below):


## Using the i-gel supraglottic airway

### Preparations for use

- 


Open the i-gel package, and on a flat surface take out the cage pack containing the device
- 


Release catch and open the cage pack and transfer the device into the lid of the cage
- 


Place a small bolus of a water based lubricant (such as K-Y Jelly) on to the smooth inner surface ready for use
- 

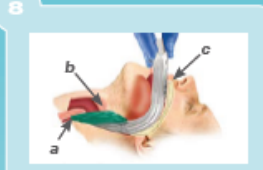
Grasp the i-gel along the integral bite block and lubricate the front, back and sides of the cuff with a thin layer of lubricant


### Insertion technique

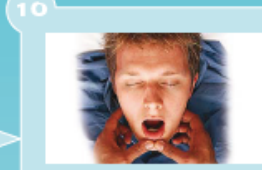
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Place the i-gel back into the cage pack in preparation for insertion
- 

Grasp the lubricated i-gel firmly along the integral bite block. Position the device so that the i-gel cuff outlet is facing towards the chin of the patient. The patient should be in the 'sniffing the morning air' position with head extended and neck flexed. The chin should be gently pressed down before proceeding. Introduce the leading soft tip into the mouth of the patient in a direction towards the hard palate
- 

Slide the device downwards and backwards along the hard palate with a continuous but gentle push until a definitive resistance is felt
- 

The tip of the airway should be located into the upper oesophageal opening (a) and the cuff should be located against the laryngeal framework (b). The incisors should be resting on the integral bite-block (c)
- 

i-gel may be taped or tied down by the anaesthetic assistant as required
- 

If there is early resistance during insertion a 'jaw thrust' (above) or 'Insertion with Deep Rotation' (right) is recommended

### i-gel® Device Procedure:

1. Attach pulse oximeter to monitor oxygen saturation readings (if patient still breathing).
2. Choose the correct size i-gel® based on the patient's weight (see prior chart).
3. Suction patient prior to inserting i-gel® (if indicated).
4. Apply a small amount of lubricating gel to the back, sides, and front of the i-gel® to aid in insertion, but do not over lubricate.
5. Hold the i-gel® at the integrated bite block with your dominant hand. With your non-dominant hand, open the patient's mouth and apply a chin lift, unless contraindicated by c-spine precautions. The patient should be in the "sniffing" position, with the head extended and the neck slightly flexed forward. **If a cervical injury is suspected, use a modified "jaw thrust" instead of any flexion at the neck.** The chin should be gently pressed down/inferior before proceeding to insert the i-gel®.

6. Position the device so the gel cuff outlet faces the patient's chin. Advance tip into the mouth of the patient in a direction towards the midline of the hard palate.
7. Without exerting excessive force, continually advance the device downwards and backwards along the hard palate until a definitive resistance is felt. If there is excessive resistance felt during the i-gel® insertion, a jaw thrust and slight rotation of the device is recommended.
8. At this point, the tip of the i-gel® should be located into the upper esophageal opening and the cuff should be located against the laryngeal framework. The incisors should be resting on the integral bite block.
9. Attach the BVM to the 15mm connector of the i-gel® and begin BVM ventilation with 100% oxygen.
10. Confirm proper placement by auscultation of breath sounds, chest rise, oxygen saturation, and verification of end-tidal CO<sub>2</sub> when available.
11. Secure the i-gel® to the patient using tape or with the included manufacturer's securing device.
12. Reassess the position of the i-gel® device after each and any significant movement of the patient.
13. Continue to monitor, and sedate per protocol as necessary.

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APGAR Score

Based on a 0-10 point scale:

	0	1	2
Appearance (Color)	Cyanotic	Infant Pink with Blue extremities	Infant all Pink
Pulse	Absent	< 100 beats per minute	> 100 beats per minute
Grimace (Irritability on Suctioning)	None	Grimace	Cough, Sneeze, Good Cry
Activity (Muscle Tone)	Limp	Some Flexion	Active Motion
Respiratory Effort	Absent	Slow, Irregular	Strong, Regular with Good Cry

**Notes:**

- The APGAR score is measured at the time of birth and repeated 5 minutes after birth.
- It is unusual for an infant to have an APGAR of 10 (even at 5 minutes) because the infant usually is **not** totally pink (will have some residual cyanosis of fingers and toes).

## Cardiac Monitoring (4-Lead) and 12-Lead Acquisition and Transmission

- Any patient who receives ALS interventions (medications, advanced airway, IV, etc.) must be on the cardiac monitor.
- All patients with altered mental status, chest pain, shortness of breath, abdominal pain, syncope, dizziness, tachycardia, hypotension, vomiting, or seizures must be on the cardiac monitor.

### 4-Lead cardiac monitoring:

- Apply the 3 EKG electrode patches in the standard fashion to clean, dry skin:
  - White: Right Upper Chest (distal right clavicle)
  - Black: Left Upper Chest (distal left clavicle)
  - Red: Left Lower Abdomen
- It is usually best to monitor lead II (will give the best tracing of the P waves).
- Record an EKG strip of 10 seconds or more as soon as possible after applying the monitor.
- Record an EKG strip before and after any intervention that will affect cardiac rhythm or rate (medications, synchronized cardioversion, or defibrillation, etc.).

### 12-Lead cardiac monitoring (If the ambulance has 12-lead capability):

- A 12-lead EKG should be obtained on adult patients presenting with suspected myocardial (cardiac) chest pain, cardiac dysrhythmias (including bradycardia, tachycardia) on monitor, altered mental status, suspected congestive heart failure, or possible tricyclic antidepressant (TCA) drug overdoses.
- 12-lead EKGs are **not** considered vital interventions and should be obtained at paramedic discretion depending on the patient and if time allows. The paramedic must feel that a 12-lead EKG would not interfere with life-saving care. Twelve-lead EKGs should **never** significantly delay transport to the hospital, and should **not** be done on unstable patients (hypotensive, ventricular tachycardia, ventricular fibrillation, 3° AV block). They should not be obtained in a public place unless the patient's privacy and dignity can be maintained.

### Procedure for Obtaining 12-Lead EKG's:

1. Attach the electrode patches to the patient in the standard fashion. On females, always place the leads V<sub>3</sub>-V<sub>6</sub> under the breast (not on top of the breast).
  - V<sub>1</sub>: 4th Intercostal Space (ICS) at right side of sternum
  - V<sub>2</sub>: 4th ICS at left side of sternum
  - V<sub>3</sub>: Between leads V<sub>2</sub> and V<sub>4</sub>
  - V<sub>4</sub>: 5th ICS at left mid-clavicular line
  - V<sub>5</sub>: Level with V<sub>4</sub> at left anterior axillary line
  - V<sub>6</sub>: Level with V<sub>5</sub> at left mid-axillary line
2. Attach the limb leads on the right and left volar surfaces of the forearm and the right and left anteromedial tibial surfaces of the legs. They may be placed more proximal if the distal positions are not accessible.
3. Obtain the 12-lead and print out a paper copy.

4. If the ambulance is equipped, transmit any abnormal 12-leads to the receiving hospital. Notify the receiving hospital that a 12-lead EKG was or will be sent so the physician can review the 12-lead EKG prior to arrival.
5. If the patient is having an inferior and/or posterior acute myocardial infarction, perform a right-sided (15-lead) EKG to evaluate for a right ventricular infarct. Move V<sub>4</sub> to V<sub>4R</sub> (5<sup>th</sup> ICS at right mid-clavicular line) where a RV infarct will show ST-segment elevation in V<sub>4R</sub>. The posterior wall can be rapidly and effectively evaluated by moving leads V<sub>5</sub> and V<sub>6</sub> from the conventional placement to the positions of V<sub>8</sub> (on the back just inferior to the left scapular tip) and V<sub>9</sub> (midway between V<sub>8</sub> and the lateral edge of the bony spine). Make sure you re-label the 15-lead EKG to account for V<sub>4</sub>, V<sub>5</sub>, and V<sub>6</sub> changing to V<sub>4R</sub>, V<sub>8</sub>, and V<sub>9</sub>.

**Notes:**

- Due to artifact from excessive vibration and electrical interference on the ambulance, ideally the 12-lead EKG should be performed only when the motor has been turned off during 12-lead acquisition. It is realized that this might not be possible in certain situations (*i.e.* extreme hot and cold days) when the ambulance must be continuously running.
- Acquiring the 12-lead EKG should not normally prolong scene times for more than 2 minutes.



## Cardiopulmonary Resuscitation (CPR)

### CPR Parameters by Age:

	Age Range	Ventilation Rate	2 Rescuer CPR Ratio	Chest Compression Rate
<b>Neonate</b>	< 1 hour of age	40 – 60 per min	3:1	120 per min
<b>Infant</b>	≥ 1 hour to < 1 y/o	12 – 20 per min	15:2	100-120 per min
<b>Child</b>	≥ 1 y/o to < 8 y/o	12 – 20 per min	15:2	100-120 per min
<b>Adolescent</b>	≥ 8 y/o to < 16 y/o	8 – 10 per min	30:2	100-120 per min
<b>Adult</b>	≥ 16 y/o	8 – 10 per min	30:2	100-120 per min

### Neonatal CPR:

#### A. Neonatal CPR (< 1 hour of age)

1. Assess unresponsiveness– shout loudly and attempt to stimulate neonate by rubbing its hands and/or feet. If unresponsive, make certain the appropriate resources are responding.
2. Position the neonate face-up on a flat, firm surface. Place a folded towel under the shoulders to prevent further flexion of the neck and resultant obstruction of the airway.
3. Place the neonate’s head in a neutral position. Do not hyperextend the neonate’s head and neck as this may collapse the airway. If trauma is suspected use the jaw thrust maneuver.
4. Check for breathing for no more than 10 seconds by watching for the rise and fall of the chest, listening for the sounds of respiration at the neonate’s mouth and nose and feeling for air movement from the neonate’s mouth on your cheek.
5. If inadequate spontaneous breathing is detected, maintain a patent airway, and deliver two effective breaths with a neonatal BVM. Maintain a seal using the neonatal sized facemask around the neonate’s nose and mouth. The patient should be ventilated using the bag-valve-mask device just enough to cause the chest to rise.
6. Check for signs of circulation. Observe for breathing, coughing or movement. Check for a brachial artery (or umbilical artery) pulse for no more than 10 seconds.
7. If there is a pulse, continue with rescue breaths at a rate of 40-60 per minute with frequent checks to ensure pulse remains.
8. If there are no signs of circulation or definite pulse, begin chest compressions.
  - a. Compress the chest with two hands encircling the chest and compress the chest with two thumbs on the midline sternum just below the nipple line. As an alternative, two-finger chest compressions can be performed on the sternum just below the nipple line.
  - b. Compress the sternum one-third the depth of the chest.
  - c. Provide 3 chest compressions (at a rate of 120 per minute) to 1 ventilation.
  - d. “Push hard, push fast.” Allow complete recoil of the chest wall between compressions and minimize interruptions of chest compressions.

**Infant CPR:****B. Infant CPR (1 hour to < 1 y/o)**

1. Assess unresponsiveness – shout loudly and attempt to stimulate infant by rubbing its hands and/or feet. If unresponsive, make certain the appropriate resources are responding.
2. Position the infant face-up on a flat, firm surface. Place a folded towel under the shoulders to prevent further flexion of the neck and resultant obstruction of the airway.
3. Open the airway using a gentle head tilt-chin lift maneuver. Do not hyperextend the infant's head and neck as this may collapse the airway. If trauma is suspected use the jaw thrust maneuver.
4. Check for breathing for no more than 10 seconds by watching for the rise and fall of the chest, listening for the sounds of respiration at the infant's mouth and nose and feeling for air movement from the infant's mouth on your cheek.
5. If inadequate spontaneous breathing is detected, maintain a patent airway, and deliver two effective breaths with a properly sized BVM. Maintain a seal using the infant sized facemask around the infant's nose and mouth. The patient should be ventilated using the bag-valve-mask device just enough to cause the chest to rise.
6. Check for signs of circulation. Observe for breathing, coughing or movement. Check for a brachial pulse for no more than 10 seconds.
7. If there is a pulse, continue with rescue breaths at a rate of 12-20 per minute with frequent checks to ensure pulse remains.
8. If there are no signs of circulation or a definite pulse, begin chest compressions.
  - a. Compress the chest with two hands encircling the chest and compress the chest with two thumbs on the midline sternum just below the nipple line. As an alternative, two-finger chest compressions can be performed on the sternum just below the nipple line.
  - b. Compress the sternum one-half to one-third the depth of the chest.
  - c. Provide 15 chest compressions (at a rate of 100-120 per minute) to 2 ventilations.
  - d. "Push hard, push fast." Allow complete recoil of the chest wall between compressions and minimize interruptions of chest compressions.

**Child CPR:****C. Child CPR (1 y/o to 8 y/o)**

1. Assess unresponsiveness – shout loudly and attempt to stimulate the child by rubbing its hands and/or feet. If unresponsive, make certain the appropriate resources are responding.
2. Position the child face-up on a flat, firm surface.
3. Open the airway using a gentle head tilt-chin maneuver. If trauma is suspected use the jaw thrust maneuver.
4. Check for breathing for no more than 10 seconds by watching for the rise and fall of the chest, listening for the sounds of respiration at the child's mouth and nose, and feeling for air movement from the child's mouth on your cheek.
5. If inadequate spontaneous breathing is detected, maintain a patent airway, and deliver 2

effective breaths with a properly sized BVM. A seal should be maintained using the appropriately sized facemask around the child's nose and mouth. The patient should be ventilated using the BVM device just enough to cause the chest to rise.

6. Check for signs of circulation. Observe for breathing, coughing or movement. Check for a carotid pulse for no more than 10 seconds.
7. If there is a pulse, continue with rescue breaths at a rate of 12-20 per minute with frequent checks to ensure pulse remains.
8. If there are no signs of circulation or definite pulse, begin chest compressions.
  - a. Compress the chest with the heel of one or both hands over the lower half of the sternum at the nipple line.
  - b. Compress the sternum one-half the depth of the chest.
  - c. Provide 15 chest compressions (at a rate of 100-120 per minute) to 2 ventilations.
  - d. "Push hard, push fast." Allow complete recoil of the chest wall between compressions and minimize interruptions of chest compressions.

### Adolescent / Adult CPR:

#### D. Adolescent /Adult CPR (8 y/o and greater)

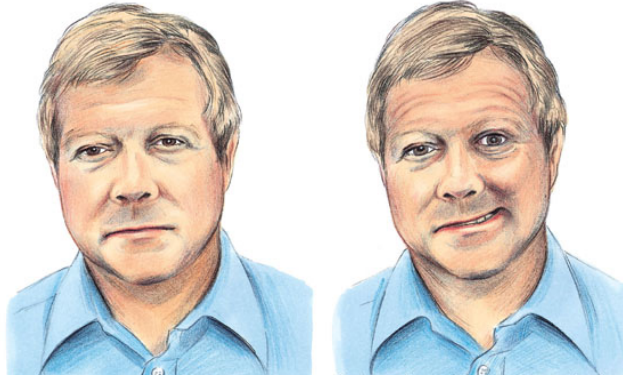
1. Assess unresponsiveness – shout loudly and attempt to stimulate patient. If unresponsive, make certain the appropriate resources are responding.
2. Position the patient face-up on a flat, firm surface.
3. Open the airway using a gentle head tilt-chin lift maneuver. If trauma is suspected use the jaw thrust maneuver.
4. Check for breathing for no more than 10 seconds by watching for the rise and fall of the chest. Listen for the sounds of respiration in the patient's mouth and nose and feel for air movement from the patient's mouth on your cheek.
5. If inadequate spontaneous breathing is detected, maintain a patent airway, and deliver 2 effective breaths with a properly sized BVM. Maintain a seal using the appropriately sized facemask around the patient's nose and mouth. Ventilate the patient using the BVM device just enough to cause the chest to rise.
6. Check for signs of circulation. Observe for breathing, coughing or movement. Check for a pulse for no more than 10 seconds.
7. If there is a pulse, continue with rescue breaths at a rate of 8-10 per minute with frequent checks to ensure pulse remains.
8. If there are no signs of circulation or definite pulse, begin chest compressions.
  - a. Compress in the center of the chest midline at the nipple line with the heel of one hand and the other hand on top.
  - b. Compress the sternum 1 ½ to 2 inches.
  - c. Provide 30 chest compressions (at a rate of 100-120 per minute) to 2 ventilations.
  - d. "Push hard, push fast." Allow complete recoil of the chest wall between compressions and minimize interruptions of chest compressions.

### Notes:

- The goal of CPR is that chest compressions should **not** be interrupted for more than **5 seconds**. **Uninterrupted chest compressions are the key to success.**

## Cincinnati Prehospital Stroke Scale

1. Have patient smile.
2. Have patient hold arms out with palms up for 10 seconds, with patient's **eyes closed**.
3. Have patient speak a simple sentence.



### **Facial Droop**

- *Normal*: Both sides of face move equally
- *Abnormal*: One side of face does not move at all



### **Arm Drift**

- *Normal*: Both arms move equally or not at all
- *Abnormal*: One arm drifts compared to the other

### **Speech**

- *Normal*: Patient uses correct words with no slurring
- *Abnormal*: Slurred or inappropriate words, or mute

## Continuous Positive Airway Pressure (CPAP)

### **Indications for Continuous Positive Airway Pressure (CPAP):**

- CPAP ventilation is indicated for the treatment of impending ventilatory failure in an attempt to avoid endotracheal intubation and invasive ventilation.
- This non-invasive positive pressure ventilation (NIPPV) support system is best applied to patients whose respiratory failure is expected to respond quickly to medical therapy.
- The patient must meet **all** of the following criteria:
  1. Dyspnea with pulmonary edema / CHF (rales, crackles) or wheezing auscultated. May include COPD patients in moderate to severe COPD exacerbation.
  2. An awake patient who is able to still follow commands.
  3. Patient able to protect airway (gag reflex present) and handle secretions.
  4. Respiratory distress with resistant hypoxia. For example, the asthma patient has not responded to albuterol nebulizer and oxygen administration.

### **Contraindications:**

- Decreased level of consciousness / unconscious.
- Respiratory arrest / agonal respirations.
- Patient unable to maintain and protect airway (aspiration risk).
- Uncontrolled / persistent vomiting.
- Suspected pneumothorax / penetrating chest trauma.
- Hypotension (SBP < 90 mmHg).
- Impediment to proper mask placement / fitting (*e.g.* recent facial surgery, epistaxis, etc.).
- Pediatric patient (< 10 y/o) who is too small for the CPAP mask to fit properly.
- Tracheostomy.
- Weak respiratory effort (patient must be able to overcome the CPAP pressure during expiration).

### **Equipment:**

- CPAP machine with head straps, mask, tubing, and pressure relief valve.
- Oxygen cylinder with 25 LPM regulator.
- T-piece (if albuterol nebulizer needs to be administered).

### **Procedure:**

1. Assure patent airway. Try to have the patient in an upright sitting position.
2. Inform the patient of the purpose of the CPAP, and the need to place a mask over the nose and mouth. Fully explain the procedure to the patient in advance.
3. Obtain 12-lead EKG.
4. Make sure the patient is on continuous pulse oximetry and 4-lead EKG (or 12-lead EKG) monitoring.
5. Connect the CPAP system components to the oxygen source at 15 LPM (PEEP of 5 cm H<sub>2</sub>O).
6. Connect the tubing and pressure relief valve to the connection port.
7. Turn on the oxygen supply.
8. Verify the oxygen concentration.
9. Hold the mask in place over the patient's mouth and nose. Instruct him/her to breathe slowly and deeply until the patient adjusts to the ventilatory support. Once the patient is comfortable with

the mask, securely attach the headpiece and tighten to fit. Modify the CPAP system settings to optimize the patient's ventilatory status. Titrate the pressure to effect; usually 5 - 10cm H<sub>2</sub>O of PEEP in adults.

10. Encourage the patient to breathe deeply.
11. Adjust the mask for comfort and to minimize air leak (especially around the eyes). Some air leakage is acceptable / unavoidable unless it is in the eye area.
12. Periodic evaluation of the patient's status should be coupled with ongoing vital signs (including pulse oximetry) every 5 minutes. Be aware that CPAP can cause the patient's blood pressure to drop so monitor closely. If available, utilize end-tidal CO<sub>2</sub> monitoring for the duration of CPAP placement.
13. If patient's anxiety level prevents the patient from effectively tolerating the CPAP, consider the **cautious** use of midazolam (Versed®) 1 - 5mg IV, IM, or MAD. Be aware that the patient's agitation may be from worsening hypoxia which may require BVM ventilation instead and/or an advanced airway. Also, be aware that midazolam may result in some respiratory suppression.
14. Continue to closely monitor and document the patient's respiratory response to treatment and readjust mask as needed. Monitor the patient for gastric distension and have suction equipment readily available.
15. If the wheezing patient requires a nebulizer treatment, utilize the T-piece to administer the albuterol neb concurrently with the CPAP. CPAP pressures may decrease when the nebulizer is activated- adjust the flow meter as needed. A second oxygen source will be required to supply both the nebulizer and CPAP.
16. If the patient's respiratory status deteriorates despite the CPAP, remove the CPAP, and provide BVM ventilation and/or an advanced airway as needed.

**Notes:**

- CPAP is considered an advanced life support skill and is only to be used and monitored by paramedic personnel.
- CPAP has been shown to improve the gas exchange, to improve the work of breathing, decrease the sense of dyspnea and the need for endotracheal intubation in patients who suffer shortness of breath from asthma, COPD, pulmonary edema, CHF, and pneumonia.
- CPAP raises the inspiratory pressure above the atmospheric pressure, and then applies PEEP (positive end-expiratory pressure) during exhalation.
- CPAP is a method of patient ventilation which provides a non-invasive continuous positive-pressure ventilation to prevent alveolar collapse. The goal is to decrease the work of breathing, enhance oxygenation, and improve carbon dioxide ventilation.
- Most patients will improve within 5 to 10 minutes (increased oxygen saturation with less work of breathing). If there is no improvement within this time, consider assisted ventilation with a BVM if indicated.
- Make sure the receiving emergency department is aware in the radio report that CPAP is being used in order for the ED to prepare the necessary equipment and personnel for the patient. Upon hospital arrival, do **not** remove the CPAP until the ED is ready to transfer the patient over.
- Consider the use of nitroglycerin 0.4mg sublingual (or spray) for hypertensive patients with suspected CHF / pulmonary edema prior to initiating CPAP. Do not give nitroglycerin to significantly wheezing patients.

- CPAP does **not** violate Out-of-Hospital “Do Not Resuscitate (DNR)”, or “Do Not Intubate (DNI)” orders.
- CPAP Flow-Pressure Reference Table:

O <sub>2</sub> Flow Rate	Pressure (PEEP)
15 LPM	5 cm H <sub>2</sub> O
20 LPM	7.5 cm H <sub>2</sub> O
25 LPM	10 cm H <sub>2</sub> O

## Crime Scenes

### Introduction:

- It is very common for EMS personnel to respond to a scene where there is the possibility that a crime has been committed. Possible crime scenes may include victims of crime (assault and battery, sexual assault) as well as suspects under arrest and injured police officers. Even a motor vehicle collision can be a crime scene and may potentially involve the investigation of charges such as driving while intoxicated, possession of narcotics, vehicular manslaughter, reckless driving, and a variety of other crimes.
- In dealing with a possible crime scene it is important to protect yourself, preserve important evidence, and still carry out the function of providing emergency care. When prehospital personnel encounter a dead person or if they enter a scene where foul play is suspected or being considered, the following guidelines should be strictly adhered to:

### Procedure:

1. Establish scene safety. Make sure law enforcement is enroute if not already present. Do **not** enter an unsafe scene until it is safely secured by law enforcement.
2. If you unknowingly arrive at a scene and suspect the possibility that a crime has been committed, have dispatch send out law enforcement.
3. Be careful **not** to touch or alter any surroundings unless it is absolutely necessary. This includes telephones, doorknobs, and other articles that might contain fingerprints. Do **not** leave any personal items (gum wrappers, cigarette butts, medical supplies, or packages, etc.) at the scene. If anything at the scene (including the patient) is moved, law enforcement must be advised. Never touch anything that may have been used as a weapon.
4. Limit access of the immediate scene to essential personnel only. The fewer the people who walk through the crime scene, the lesser the chance of disturbing evidence. Entry and exit routes should remain the same (one path of travel). When establishing if a patient is still alive (especially at a suspected homicide scene), it is often best if only one crew member enters the immediate patient area initially.
5. Avoid walking through blood if present.
6. Any suicide note should **not** be handled.
7. If a **viable** patient is encountered, proceed with patient care. The following situations and responses may be indicated:
  - A. Hangings- leave all knots intact, including the knot that the rope is suspended from and the knot making the noose. If the rope has to be cut to care for the patient, cut the rope in an area halfway between the noose and the suspension point.
  - B. Weapons- unless absolutely necessary, EMS personnel should **not** move any weapons. If possible, this should be left to law enforcement. The weapon should be removed to a safe place, far away from the patient and bystanders. Firearms should **not** be tampered with, opened, or unloaded. When treating patients that have sustained penetrating wounds and the clothes need to be removed, do **not** cut through knife or bullet holes (may affect subsequent evidence analysis).
  - C. Sexual Assault- it is important that victims of sexual assault be moved quickly to a safe environment. It is vital that the patient **not** shower or wash any part of their body or clothing, change their clothing, or use the bathroom. If the clothing / underwear have



already been removed, then either bring them into the ED with the patient for evidence collection or leave with law enforcement. All sexual assault victims should be transported to Doctors Regional Center (**adults**) and Driscoll Children's Hospital (**children**) unless immediate trauma care is needed at CHRISTUS Spohn Shoreline. Never use the verbiage "sexual assault" or "rape" on any radio communications (protect patient privacy). The term "assault" can be used by itself, or if necessary, the ED may be contacted via cellular phone.

8. Bodies of patients determined to be dead at the scene are **not** to be moved until authorized to do so by the Justice of the Peace / Medical Examiner. This may require in some instances that the ambulance remain on the scene until released by the Justice of the Peace.
9. All invasive interventions on crime victims should be noted in the EMS run report and if needed by marking the victim's skin with the letters "EMS" at the sites of invasive interventions (sites where IV access was attempted, etc.).
10. Occasionally, crime scenes are such that law enforcement officers may declare a patient dead and prohibit EMS personnel from entering the scene. When this situation arises, the senior paramedic should discuss the situation thoroughly with the officer in charge.

Notes:

- Whenever it is necessary to remove any item from a crime scene, it is important that every effort be made to comply with the chain of custody or chain of evidence procedures. The evidence must always be in the possession or custody of an identifiable person or secure (locked) place.
- Dying Declaration- statement made by a severely injured patient prior to death which either indicates the name of the person responsible or provides other facts relevant to the commission of the crime. Such statements may be admissible in court if the victim is critically injured, has a sense of impending death, and does not believe that there is any hope of recovery. In the event that you are present during such a statement, it is important that you try to remember the victim's exact words and the circumstances surrounding the statement. Try to record this information in writing and pass it on to law enforcement as soon as possible.
- EMS Patient Care Report- the EMS run report is a medical record and is thus subject to confidentiality. You should **not** release the EMS patient care report to law enforcement unless presented with a valid subpoena.
- When dealing with a conflict with a law enforcement officer in the field, always remember that the EMS person's primary obligation is to the patient as a provider of emergency medical care.
- Always document your observations carefully on the patient care report.

## Determination of Death in the Field / Termination of Resuscitation

There are certain situations in which life support measures may be withheld or terminated in the prehospital setting. The following protocol describes these situations:

1. There is a written, valid **Texas DSHS “Out-of-Hospital” Do Not Resuscitate (DNR) Order**, advance care directive, or nursing home order signed by the patient’s physician. A valid DNR form has been signed by the patient or next of kin or legal guardian, notarized, and dated. The EMS crew must be confident in the authenticity of the DNR paperwork and in confirming the patient’s identification. Ideally, the original DNR form should be transported to the hospital with the patient; however, it is realized that there are instances when a **copy** the DNR form is presented to the EMS personnel. As of September 1999, a copy of the valid state DNR is acceptable. **Medical control should be contacted** for guidance as needed.
2. The patient has sustained injuries that are obviously incompatible with life including:
  - A. Burned beyond recognition (incineration).
  - B. Decapitation.
  - C. Blunt trauma with absent vital signs (no pulse, no respirations), and no signs of life.
  - D. Mortal gross evisceration.
  - E. Crushed head with protruding brain matter.
3. Obvious signs of death are present including:
  - A. Dependent (Post-Mortem) Lividity- venous pooling of blood in gravity dependent areas occurring 1 hour - 2 hours after death and peaks at 6 hours.
  - B. Rigor Mortis- stiffness which occurs 2 hours after death and peaks at 5 hours - 12 hours after death.
  - C. Gross Decomposition
4. When life support measures have already been initiated by the First Responders or other medical personnel, **resuscitation may only be terminated by medical control**, unless any of the above criteria are present. When contacting medical control, begin the radio report by stating, “This is a request to discontinue CPR”.
5. If a patient has **not** responded to confirmed intubation (or i-gel® airway), IV fluids, 2 rounds of ACLS medications, **and remains pulseless in asystole (or PEA < 20)**, **medical control may be contacted** for pronouncement in the field. **Medical control must be contacted for an order to discontinue resuscitation.**

### Notes:

- Remember that paramedics are **not** legally able to declare a person dead. Only physicians, a coroner, or the Justice of the Peace can legally declare a person dead in Texas. The prehospital personnel do **not** pronounce death, but rather determine death.

- Make sure the Medical Examiners Office is notified. The paramedics should stay with the body until law enforcement allows them to clear the scene. It is **not** necessary in all situations to wait for the Justice of the Peace.
- Patients with potential or suspected hypothermia should **not** be pronounced in the field.
- Occasionally, it may be necessary to transport a child with obvious death due to parental expectations of EMS personnel. Use good judgment depending on the scene situation or environment and **contact medical control** for guidance as needed.
- If any doubt exists, **always** error on the side of continuing resuscitation and transporting the patient to the hospital.
- **Patients in ventricular fibrillation or ventricular tachycardia should never be pronounced in the field.**
- **Penetrating** chest and abdominal traumatic arrests have a small chance of survival. If vital signs were present in the field, these patients should be transported to the hospital.
- If the resuscitation is terminated in the field, tie-off and knot any established IV lines. All IV (and IO) catheters, and the endotracheal tube (or i-gel<sup>®</sup>) will remain in place.
- The family, and relevant bystanders should be approached and notified that all resuscitative efforts have failed to restore a pulse and that transport of the patient to the hospital is not going to change the patient's ultimate outcome.
- At all times, EMS personnel need to be very attentive to the social and psychological support needs of the "survivors" (*i.e.* family, friends, witnesses).
- Mass casualty incidents (MCI's) may require exceptions to this appendix.

## Do Not Resuscitate (DNR)

Based on the Texas DSHS Out-of-Hospital Do Not Resuscitate Orders, “Health care professionals (physicians, nurses, EMS personnel) must honor out-of-hospital DNR orders in accordance with the statewide DNR protocol”.

### Purpose of the DNR:

The purpose of the DNR is to allow patients to direct health care professionals in the out-of-hospital setting to withhold or withdrawal specific life sustaining treatments (CPR, defibrillation, ACLS meds, intubation, artificial ventilation, and transthoracic (external) cardiac pacing) in the event of respiratory or cardiac arrest. An out of hospital DNR applies **after** the cessation of spontaneous respirations or circulation. The DNR is used in addition to “Living Wills” and “Durable Power of Attorney for Health Care” documents. The DNR does not include authorization to withhold medical interventions or therapies considered necessary to provide comfort care (including water or nutrition) or to alleviate pain.

There are **no** time-related criteria (*e.g.* 6-month life expectancy) for the DNR form. An out-of-hospital DNR order is effective until it is revoked. Since September 1, 1999, a physician is no longer required to certify that an individual has a terminal condition (Texas Senate Bill 1260). Out-of-hospital DNR orders do **not** apply to known pregnant persons.

### DNR Form:

The DNR form used must have a title that readily identifies the document as an out-of-hospital DNR order.

Either the original DNR form or a photocopy should travel with the patient during interfacility transfers. It is realized that some nursing homes may be reluctant to release the original for fear of being misplaced in the ED, etc. A copy (or facsimile) of the original DNR will suffice and this was placed into law by the state of Texas in September 1999.

### Definitions:

Advanced Directive- document or order which is prepared at request of the patient, an authorized family member or other legal representative or, in some cases, a physician, to ensure that certain treatment choices are followed at a time when the patient is unconscious, comatose, or otherwise unable to make medical decisions.

Living Will- document which states the type of life-sustaining medical treatment that a patient wants or does not want in the event of terminal illness, coma, or persistent vegetative state.

Health Care Power of Attorney (Durable Power of Attorney)- allows a person to appoint or designate a specific individual to make health care decisions when the patient is incapable of doing so.

### Patient Identification:

EMS providers identify patients as having a DNR order when the:

1. Texas DSHS Out-of-Hospital DNR form is present and appears valid (signatures are present in the required areas).
2. The patient is **wearing** an approved ID device (must verify that the ID device is in fact the patient with witnesses on scene if possible). Approved ID devices consist of a vinyl bracelet, metal bracelet, or necklace. The presence of a DNR identification device on the body of a person is conclusive evidence that the person has executed or issued a valid out-of-hospital DNR order. Responding health care professionals shall honor the DNR identification device as if a valid out-of-hospital DNR order form executed or issued by the person was found in the possession of the person.
3. The patient's attending physician either on scene (or via phone) directs the provider to withhold any resuscitative measures. Phone conversations should be documented with a call back number and should be confirmed by your partner.

Patient care documentation on the EMS patient care report must include (per Texas DSHS guidelines) the following information:

1. Detailed physical assessment of the patient.
  2. Confirmation that a DNR order was presented.
  3. Any problems accepting the DNR order.
  4. Name of the patient's attending physician.
  5. Name, address, and phone number of witnesses used for patient identification.
- Texas DSHS regulations require that a record shall be made and maintained of the circumstances of each emergency medical services response in which an out-of-hospital DNR order or DNR identification device is encountered.
  - Interventions to be withheld include CPR, endotracheal intubation, or i-gel®, artificial ventilation, defibrillation (includes AED), transcutaneous cardiac pacing, and cardiac resuscitative medications.

#### Revocation of a DNR:

The DNR order may be revoked by the:

1. Patient
2. Someone with the patient's direction (medical power of attorney).

The DNR is **automatically revoked** in cases of:

1. Known pregnancy of patient.
2. Suspected criminal activity involving the patient (including suspected suicide or homicide).

#### Protocol Considerations (per Texas DSHS recommendations):

1. On-site Conflict Resolution Process- in the event of an on-scene conflict, EMS personnel should start or continue the resuscitation until a verbal order is given by **medical control** or the patient's attending physician.
2. Transport Guidelines- EMS providers who recognize a DNR order while transporting a patient should withhold or withdrawal life sustaining efforts upon discovery of the DNR order and continue transport to the receiving hospital.
3. Out-of-State DNR Orders- written, out-of-state DNR orders are to be accepted if there is no reason to question the authority / authenticity of the DNR.

Reporting Requirements for Health Care Providers:

All out-of-hospital health care providers are **required** to report specific information regarding DNR encounters to the Texas DSHS Bureau of Emergency Management at the time of relicensure. EMS records should include all of the following:

1. Number of DNR orders encountered by EMS agency (include number of DNR orders you were presented and honored, as well as those presented and not honored).
2. Number of DNR orders you were unable to comply with (provide brief detail, if available).
3. Assessment of patient's physical condition.
4. Whether a DNR form or identification device was used to confirm the DNR order.
5. Any problems relating to the implementation of the DNR order.
6. Name of the patient's attending physician.
7. Full name, address, phone number, and relationship of any witnesses used to identify the patient.

Out-of-Hospital Do Not Resuscitate Procedure:

The following care will be initiated if a patient presents with a complete Texas DSHS out-of-hospital DNR form (with verified identification):

1. Honor the DNR order if:
  - Patient presents **without** a pulse.
  - Patient presents **without** respirations (excluding airway obstruction).
  - A DNR order from the patient's physician present at the scene will be honored.

Notes:

- EMS personnel should get in the habit of inquiring about the DNR (Code) status of **all** elderly patients encountered, especially **all** nursing home patients.
- In any case where doubt exists about a DNR order, the paramedic should commence appropriate resuscitative measures and **contact medical control** for guidance. In the event of a radio communication failure, resuscitative measures shall be instituted.
- The state DNR form will **not** expire unless there is an expiration date added to the document itself. However, if an expiration date exists and the patient lacks the capacity to make informed health care decisions on or after that date, the DNR order shall remain in effect.
- If the patient with capacity states that he or she wishes resuscitative measures, the DNR order shall be ignored.
- Rarely, a DNR order will be found on a minor patient with a terminal condition. This can be done by the minor's parents, legal guardian, or managing conservator (§166.085 Texas DSHS).
- A copy of the TDH standardized DNR form (per rule §157.25) is included on the next page.

**RESUSCITATE**

This document becomes effective immediately on the date of execution. It remains in effect until the patient is pronounced dead by authorized medical or legal authority or the document is revoked. Comfort measures will be given as needed.

1. \_\_\_\_\_ **Date of Birth:** \_\_\_\_\_ **Male/Female (Circle One)**  
Patient's full legal name – printed or typed.

2. COMPLETE **ONE** OF THE FOUR BOXES: **A, B, C, or D.** If using Box A, B, or C, Witnesses and Physician's Statement must be completed.

**A. Patient's Statement:** I, the undersigned, am an adult capable of making an informed decision regarding the withholding or withdrawing of CPR, including the treatments listed below, and I direct that none of the following resuscitation measures be initiated or continued: **Cardiopulmonary resuscitation (CPR), Transcutaneous Cardiac Pacing, Defibrillation, Advanced Airway Management, Artificial Ventilation.**

\_\_\_\_\_  
Signature Date Printed or Typed Name

**B. Only use this box if the order is being completed by a person acting on behalf of an adult patient who is incompetent or otherwise unable to make his or her wishes known.**

I am the patient's:  legal guardian;  agent under Medical Power of Attorney;  or Qualified Relative (see back); **AND:**

I attest to issuance of an Out-of-Hospital DNR by the patient by nonwritten means of communication, **OR**  
 I am acting under the guidance of a prior Directive to Physicians, **OR**  
 I am acting upon the known values and desires of the patient, **OR**  
 I am acting in the patient's best interest based upon the guidance given by the patient's physician.

**I direct that none of the following resuscitation measures be initiated or continued on behalf of the patient: Cardiopulmonary resuscitation (CPR), Transcutaneous Cardiac Pacing, Defibrillation, Advanced Airway Management, Artificial Ventilation.**

\_\_\_\_\_  
Signature Date Printed or Typed Name

**C. Only use this box if the order is being completed by a person acting on behalf of a minor patient who has been diagnosed with a terminal or irreversible condition.**

I am the minor patient's:  Parent;  legal guardian; or  managing conservator.

**I direct that none of the following resuscitation measures be initiated or continued on behalf of the patient: Cardiopulmonary resuscitation (CPR), Transcutaneous Cardiac Pacing, Defibrillation, Advanced Airway Management, Artificial Ventilation.**

\_\_\_\_\_  
Signature Date Printed or Typed Name

**WITNESSES:** (see qualifications on reverse). We have witnessed all of the above signatures.

\_\_\_\_\_  
Witness 1 Signature Date Witness Printed or Typed Name

\_\_\_\_\_  
Witness 2 Signature Date Witness Printed or Typed Name

**PHYSICIAN'S STATEMENT:** I, the undersigned, am the attending physician of the patient named above. I have noted the existence of this order in the patient's medical records, and I direct out-of-hospital health care professionals to comply with this order as presented.

\_\_\_\_\_  
Date Physician's signature Printed name License number

**D. Only use this box if the order is being completed by two physicians acting on behalf of an adult who is incompetent or otherwise unable to make his or her wishes known, and who is without a legal guardian, agent, or qualified relative.**

I attest to issuance of an Out-of-Hospital DNR by the patient by nonwritten communication, **OR**  
 The patient's specific wishes are unknown, but resuscitation measures are, in reasonable medical judgment, considered ineffective in these circumstances or are otherwise not in the best interest of the patient.

**I direct that none of the following resuscitation measures be initiated or continued on behalf of the patient: Cardiopulmonary resuscitation (CPR), Transcutaneous Cardiac Pacing, Defibrillation, Advanced Airway Management, Artificial Ventilation.**

\_\_\_\_\_  
Signature Treating Physician Date Printed or Typed Name

\_\_\_\_\_  
Signature Second Physician who is not involved in treating the patient Date Printed or Typed Name

3. ALL PERSONS WHO SIGNED MUST SIGN HERE (Pursuant to H&SC 166.083(b)(13). This document has been properly completed.

\_\_\_\_\_  
Signature of Patient, Agent or Relative (A, B, or C) Signature of Second Physician (D) Signature of Attending Physician

\_\_\_\_\_  
Signature of Witness Signature of Witness Date

**SHOULD TRANSPORT OCCUR, THIS DOCUMENT OR A COPY MUST ACCOMPANY THE PATIENT**

## Electronic Control Weapon (ECW) / TASER®

### **Introduction:**

- EMS may be called by law enforcement after an Electronic Control Weapon (ECW) / TASER® has been deployed on a subject to assess the patient and / or remove the TASER® dart probes from the skin.
- Always be aware to look closely for secondary injuries that may result from falls sustained after the ECW has been deployed.
- Once the TASER® probes have been removed, the patient does **not** always need to be transported to the hospital if they have capacity and refuse EMS transport. These patients can be released into police custody.
- All patients with altered mental status require a full assessment and transport to the emergency department (ED).

### **Procedure:**

1. Identify the location of the probes on the patient's body. If any of the probes are embedded in the following areas (face, eyes, ears, mouth, neck, genitals, spinal column) do not remove the probes and transport the patient to the emergency department.
2. Determine from law enforcement the patient's condition before and after the TASER® discharge until EMS arrival.
3. Obtain vital signs at the earliest opportunity to include pulse oximetry. Do not forget the finger stick blood sugar. Reasons for violent and combative behavior include intoxication, psychosis, hypoxia, hypoglycemia, overdose, or CNS infection.
4. Determine from the patient any cardiac history, any ingestion of drugs or alcohol, and the date of his / her last tetanus vaccine. Make sure to document these answers in the patient care report.
5. A medical evaluation should be obtained to ensure that the suspect / patient can be safely taken to the detention center / jail.

### **Removal of Probe by EMS Provider:**

1. Ensure that the TASER® device is no longer applying electrical charge prior to contacting the darts or wires. Make sure the cartridge has been disconnected from the TASER® device.
2. Use scissors / trauma shears to cut the wire about 6-8 inches from each dart.
3. Wearing exam gloves, firmly grasp the dart probe between the thumb and index finger of one hand. Use the other hand to stabilize the skin surrounding the probe site. Remove the dart with a hard, firm jerk directed perpendicular to the skin surface. Repeat procedure for the other probe. Use extreme caution while handling the very sharp dart probe to avoid an accidental stick.
4. Visually examine the barb tip to ensure that it is fully intact. If any part of the barb remains in the subject, transport the patient to the ED for removal.
5. Ascertain from the law enforcement officer whether or not they will need the dart probes to log into evidence, or if they can be disposed of safely into a sharps container.
6. Clean each dart probe site with antiseptic solution or alcohol pad.



7. Cover each area with a sterile dressing. Inform the patient of basic wound care and the need to seek additional medical care in the event infection occurs (pain, redness, warmth, swelling, fever).
8. Make sure to document the anatomic location of dart probe embedment, and the physical findings after dart removal in the patient care report.
9. If the patient is combative, they may require chemical restraint. Please refer to Patient Restraint protocol, p. 169.

**Notes:**

- If the patient's tetanus status is unknown or > 10 years (> 5 years on a dirty / contaminated wound), ensure that the patient receives a tetanus booster within 72 hours.
- Due to the increased potential for litigation on a tased subject, make sure that the medical documentation on the patient care report is complete. This includes patients that are not transported to the hospital.

## End-Tidal Carbon Dioxide (CO<sub>2</sub>) Monitoring

### Introduction:

- Physical examination alone is often inadequate to determine the correct endotracheal tube location.
- “Fogging” of the endotracheal tube does **not** ensure that it is in the trachea. “Fogging” (condensation) of the tube may occur in up to 83% of cases in which the endotracheal tube is inadvertently placed in the esophagus.
- Devices that measure the concentration of exhaled carbon dioxide are useful in confirming correct endotracheal tube (ETT) placement. The end-tidal CO<sub>2</sub> detector is an important adjunct in verifying proper ETT placement along with direct visualization of the tube passing through the vocal cords, bilateral breath sounds, absent epigastric sounds, and a good pulse oximetry reading.
- The most common end-tidal CO<sub>2</sub> (ETCO<sub>2</sub>) detector device on the market is the Easy Cap<sup>®</sup> (Pedi Cap<sup>®</sup> for children < 15kg).
- In respiratory arrest patients, adjust the BVM ventilatory rate to keep the end-tidal CO<sub>2</sub> between 35 – 45 mmHg.

### Easy Cap<sup>®</sup> Description:

The Easy Cap<sup>®</sup> end-tidal CO<sub>2</sub> detector is a disposable, colorimetric (visible color change) device used to detect the presence of carbon dioxide in the exhaled air of an intubated patient. The device attaches to the end of the endotracheal tube and uses a chemical-treated indicator to change color if the presence of CO<sub>2</sub> is detected. The Easy Cap<sup>®</sup> is standard of care in the emergency department after a patient is intubated and has recently been shown in legal rulings to be expected in the prehospital arena as well.

### Easy Cap<sup>®</sup> Purpose:

The Easy Cap<sup>®</sup> is used to rapidly and easily verify the endotracheal tube placement in adults, while the Pedi Cap<sup>®</sup> is used in children < 15kg. The device has been well studied in the literature showing prehospital benefits (especially in COPD patients in whom breath sounds are diminished and often transmitted to the epigastrium).

### Procedure for Easy Cap<sup>®</sup> Use:

- An end-tidal CO<sub>2</sub> detector **must be used** (mandatory) after **all** intubations.
- Intubate the patient and inflate the cuff (if using cuffed ETT). The ETT cuff (balloon) has to be inflated before using the end-tidal CO<sub>2</sub> detector.
- The device must be kept sealed in its aluminum wrapper until the time of use.
- The single-use Easy Cap<sup>®</sup> is placed between the endotracheal tube and the bag-valve-mask.
- The device should change color from purple to gold (yellow) after 6 ventilations if the ETT is correctly located in the trachea (see notes below). Interpreting the color change before administering 6 breaths can yield false-positive results as the CO<sub>2</sub> may have built up in the stomach of a patient who has been ventilated with a bag-valve-mask before intubation. Remember “**Gold is Golden**”.
- The device does **not** take the place of visualizing the ETT passing through the vocal cords, auscultating the presence of breath sounds over the chest, and the absence of breath sounds over the epigastrium, and observing the chest to rise and fall.

- If the color changes to gold (yellow), the ETT is correctly located in the trachea. If **no** color change is detected and CPR is in progress (*i.e.* the patient is pulseless) then the tube may or may not be in the trachea (see notes below). If the color remains purple after 6 ventilations in a patient with a pulse, then the ETT is incorrectly placed in the esophagus.

**Easy Cap® Indications:**

- The Easy Cap® (or other brand) end-tidal CO<sub>2</sub> detector will be used on **all** patients who are intubated in the prehospital setting. The Easy Cap® (or other brand) will be used patients ≥15kg (approximately age 2 and up), while the Pedi Cap® (or other brand) will be used on pediatric patients < 15kg. It can be used for up to 2 hours as long as it does not become contaminated with secretions, medications, or vomitus.

**Notes:**

- In about 10% - 30% of adult patients who are in cardiac arrest, the end-tidal CO<sub>2</sub> detector will **not** exhibit good color change **despite** a correct ETT placement into the trachea. This is due to poor pulmonary blood flow that occurs during chest compressions. The poor cardiac output causes suboptimal CO<sub>2</sub>-O<sub>2</sub> exchange in the lungs which reduces the amount of CO<sub>2</sub> returned to the lungs and **not** enough is present to cause a color change.
- The end-tidal CO<sub>2</sub> detector is **not** useful for detecting right mainstem bronchus intubation.
- The Easy Cap® will change color according to the following chart:

Color Change	Corresponding CO <sub>2</sub> Level	Indication
Purple →Purple	CO <sub>2</sub> level between 0.03 to 0.5% (< 4 torr)	ETT <b>not</b> in trachea, or ineffective CPR
Purple → Tan	CO <sub>2</sub> level between 0.5% and 2.0 % (4-15 torr)	ETT may be in the trachea in a patient with a reduced cardiac output
Purple →Yellow (Gold)	CO <sub>2</sub> level > 2.0 % (> 16 torr)	ETT in trachea

**Waveform Capnography / End-Tidal CO<sub>2</sub> Monitoring:**

- The American Heart Association (AHA) guidelines now endorse wave form capnography as a Level I recommendation for ET tube verification, a Level IIa recommendation for detecting return of spontaneous circulation, and a IIb for monitoring CPR quality.
1. Capnography is a noninvasive method for monitoring the level of carbon dioxide in exhaled breath to assess a patient’s ventilatory status. Waveform capnography is also an indirect measure of circulatory status / cardiac output of the patient.
  2. All patients having their airway maintained by i-gel®, or ET tube should have their ETCO<sub>2</sub> monitored to ensure successful airway control, both initially and throughout the prehospital care of that patient.

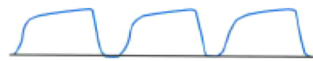
**Definitions:**

- Capnography: the measurement of carbon dioxide (CO<sub>2</sub>) in exhaled breath.

- Capnometer: the numeric measurement of CO<sub>2</sub>.
- Capnogram: the wave form.
- Oxygenation: how we get oxygen to the tissue. Oxygen is transported to the tissues through the blood stream. Pulse oximetry measures oxygenation. At the cellular level, oxygen and glucose combine to produce energy. Carbon dioxide, a waste product of this process diffuses into the blood.
- Ventilation: how we get rid of carbon dioxide. Carbon dioxide is carried back through the blood and exhaled by the lungs through the alveoli. Capnography measures ventilation.

**Interpretation:**

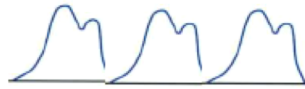
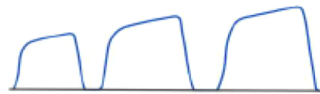
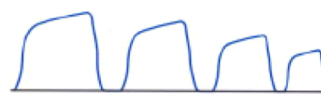
- Hypocapnia: ETCO<sub>2</sub> < 35 mmHg may reveal:
  - Hyperventilation
  - Decreased metabolic rate
  - Hypoperfusion
  - Airway obstruction
  - Air trapping
  - Cardiac arrest
- Hypercapnia: ETCO<sub>2</sub> > 45 mmHg may reveal:
  - Hypoventilation
  - Increased metabolic rate
  - Hypertension
  - Return of spontaneous circulation (ROSC) post cardiac arrest
  - Acidosis
- Waveforms:
  - Normal is a square shape
  - Bronchospasm has an increasing alveolar plateau “shark fin” and/or rounded shape
  - Pulmonary embolus may have a “notched” alveolar plateau
  - ET tube cuff is not inflated adequately or if the ET tube is too small in a child, then there will be a delayed downstroke in Phase IV
  - Rebreathing ET-CO<sub>2</sub> will have a rising baseline that does not return to zero
  - Sudden drop in ET-CO<sub>2</sub> level may indicate a sudden drop in cardiac output
  - Cessation of waveforms may indicate apnea or arrest.



Normal Waveform



Bronchospasm

Notched Waveform  
(PE or Paralytic Effect)Loss of Waveform  
(ETT dislodged or Apnea)Increasing CO<sub>2</sub>Trending WaveformsDecreasing CO<sub>2</sub>**Notes:**

- Continuous waveform capnography is recommended by the AHA in addition to clinical assessment as the most reliable method of confirming and monitoring correct placement of an endotracheal tube.
- Waveform capnography should be used "to confirm and monitor endotracheal tube placement in the field, in the transport vehicle, on arrival at the hospital, and after any patient transfer to reduce the risk of unrecognized tube misplacement or displacement."
- Studies on wave form capnography "have shown 100% sensitivity and 100% specificity in identifying correct endotracheal tube placement."
- The Easy Cap® (colormetric) ETCO<sub>2</sub> devices should only be used "when waveform capnography is not available."
- It is reasonable to consider using quantitative waveform capnography in intubated patients to monitor CPR quality, optimize chest compressions, and detect ROSC during chest compressions or when rhythm check reveals an organized rhythm. If the ETCO<sub>2</sub> abruptly increases to a normal value (35 to 40 mm Hg), it is reasonable to consider that this is an indicator of ROSC.
- Capnography is the vital sign of ventilation. By tracking the carbon dioxide in a patient's exhaled breath, capnography enables paramedics to objectively evaluate a patient's ventilatory status (and indirectly circulatory and metabolic status), as the medics utilize their clinical judgment to assess and treat their patients.
- Capnography provides an immediate picture of patient condition. Pulse oximetry is delayed. Hold your breath. Capnography will show immediate apnea, while pulse oximetry will show a high saturation for several minutes.

- While capnography is a direct measurement of ventilation in the lungs, it also indirectly measures metabolism and circulation. For example, an increased metabolism will increase the production of carbon dioxide increasing the ETCO<sub>2</sub>. A decrease in cardiac output will lower the delivery of carbon dioxide to the lungs, decreasing the ETCO<sub>2</sub>.
- In patients with a prolonged down time, the ETCO<sub>2</sub> reading may be so low (sometimes < 6 mmHg) that some monitor's apnea alarms may go off even though the monitor is still providing an ETCO<sub>2</sub> reading and a small wave form. If the apnea alarm goes off and you continue to bag without resistance and have equal lung sounds and negative epigastric sounds, do **not** automatically pull your tube. A small but distinct square wave form along with even a marginal ETCO<sub>2</sub> reading is still verification the tube is in the trachea.

### **Abnormal Wave Forms:**

- Hyperventilation: when a person hyperventilates, their CO<sub>2</sub> goes down. Hyperventilation can be caused by many factors from anxiety to bronchospasm to pulmonary embolus. Other reasons CO<sub>2</sub> may be low: cardiac arrest, decreased cardiac output, hypotension, cold, severe pulmonary edema.
- Hypoventilation: when a person hypoventilates, their CO<sub>2</sub> goes up. Hypoventilation can be caused by altered mental status such as overdose, sedation, intoxication, postictal states, head trauma, or stroke, or by a tiring CHF patient. Other reasons CO<sub>2</sub> may be high: Increased cardiac output with increased breathing, fever, sepsis, pain, severe difficulty breathing, depressed respirations, and chronic hypercapnia. A steadily rising ETCO<sub>2</sub> (as the patient begins to hypoventilate) can help a paramedic anticipate when a patient may soon require assisted ventilations or intubation.

Glasgow Coma ScoreGlasgow Coma Score (GCS) 3-15:

<b>Points (3-15)</b>	<b>Eye Opening</b>	<b>Verbal Response</b>	<b>Motor Response</b>
<b>1</b>	None	None	None
<b>2</b>	To Pain	Garbled Sounds	Abnormal Extension
<b>3</b>	To Speech	Inappropriate Words	Abnormal Flexion
<b>4</b>	Spontaneously	Disoriented Sentences	Withdrawals to Pain
<b>5</b>	-----	Oriented	Localizes Pain
<b>6</b>	-----	-----	Obeys Commands

## Intranasal Mucosal Atomization Device (MAD Nasal™)

### **Indications for Intranasal Mucosal Atomization Device (MAD Nasal™):**

- The intranasal route can eliminate the risk of needle sticks while delivering effective medication levels to a combative patient.
- The rich vasculature of the nasal cavity provides a direct route into the bloodstream for medications that easily cross the mucous membranes. Due to this direct absorption into the bloodstream, rate and extent of absorption are relatively comparable to IV administration.
- EMS personnel may utilize the Mucosal Atomization Device (MAD) as an alternative drug delivery adjunct for patients without IV or IO access who require the urgent administration of naloxone (Narcan®) and/or midazolam (Versed®).
- Nasal drug administration is quick and easy with no special sterile technique required.

### **Contraindications:**

- Epistaxis
- Nasal trauma (suspected fractured nose)
- Severe nasal congestion / discharge

### **Equipment:**

- Medication indicated by treatment protocol (naloxone (Narcan®) or midazolam (Versed®))
- Syringe with appropriate transfer device
- Mucosal Atomizer Device (MAD)

### **Procedure:**

1. Determine appropriate medication dose per applicable protocol.
2. Draw up medication into a syringe using appropriate transfer needle. An extra 0.1mL of medication should be drawn up to account for dead space in the MAD.
3. Purge air from the syringe.
4. Place mucosal atomization device on the end of the luer-lock syringe and screw into place.
5. Using the free hand to hold the occiput of the head stable, place the tip of the MAD snugly against the nostril aiming slightly up and outward (toward the top of the ear).
6. Lean head back slightly (if no cervical spine injury concern exists) or lay flat.
7. Gently insert the atomizer into the nostril. Stop once resistance is met.
8. Administer ½ of the total dose in each nostril. Splitting the dose doubles the available mucosal surface area for drug absorption and increases the rate and amount of absorption. Do not exceed 1.0 ml per nostril.
9. Administer medication by briskly compressing the plunger to expel and atomize the medication. Rapidly administer the medication when the patient fully exhales and before inhalation.
10. In the case of suspected opioid overdose, continue ventilating the patient as needed after the naloxone has been administered.



### **Notes:**



- Nasal administration does not always work for every patient.
- Nasal administration is less likely to be effective if the patient has been abusing inhaled vasoconstrictors such as cocaine.
- The *ideal* volume for intranasal administration is 0.2 - 0.3mL and the maximum recommended volume **per nostril** is 1mL. If dose is greater than 0.5mL, apply it in two separate doses allowing 5-10 minutes apart for each dose. The spacing allows the former dose to absorb.
- The MAD atomizer has a dead space of 0.1mL, so particularly for doses less than 0.9mL be sure to take the dead space into account by adding 0.1mL to the final volume (*i.e.* volume of dose + 0.1mL).
- Ideally, the patient should be in a supine or recumbent position. If the patient is sitting, then compress the nostrils after administration.



## Intraosseous (EZ-IO®) Access and Infusion

### Indications for Intraosseous (EZ-IO®) Access:

- There are 3 sizes of EZ-IO® needles used by the Annaville FD: 45mm (yellow), 25mm (blue) and 15mm (pink).
- IV access in an emergent (**life-threatening**) patient when peripheral IV lines are unsuccessful (after 2 IV attempts or 90 seconds). The patient should have evidence of hemodynamic instability (hypotension, poor perfusion), or respiratory arrest.
- An intraosseous (IO) line **may be placed prior** to any peripheral IV attempts in the setting of **cardiac arrest**; however, it is still preferable to place a peripheral IV if it can easily be obtained (*i.e.* patient has good veins).
- Throughout the protocols, all medications specified as intravenous (IV) may be administered via the intraosseous (IO) route at the same dosage as indicated by the IV route.
- The EZ-IO® can be placed in either the proximal humerus (adults only) or proximal tibia depending on paramedic preference.

### Contraindications:

- Patient awake, alert, and hemodynamically stable.
- Patent peripheral IV line.
- Suspected fracture of the bone selected for IO infusion.
- Cutaneous infection or burn overlying the insertion site.

### Equipment:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>- EZ-IO® driver</li> <li>- EZ-IO® needle set</li> <li>- Alcohol prep pads</li> <li>- 10 mL syringe</li> <li>- 3-inch roll of KERLIX™</li> </ul> | <ul style="list-style-type: none"> <li>- EZ-Connect® or standard extension set, including IV fluid (NS) and tubing</li> <li>- Pressure bag (if available)</li> <li>- Adhesive tape</li> <li>- Saline flush</li> </ul> |
|--|---|

### Procedure for Proximal Tibial Insertion:

1. Have patient supine with a rolled sheet behind the knee to give the knee approximately 30° of flexion.
2. Expose the medial aspect of the proximal tibia (have leg slightly externally rotated).
3. Identify landmarks. Palpate the proximal tibia by palpating the tibial tuberosity in the midline just below the patella, then palpate the anteromedial flat space approximately 2cm medial to the tuberosity. The insertion site should be 1-2 fingerbreadths (1cm - 3cm) below the tibial tuberosity.
4. Clean the insertion site with an alcohol prep pad.
5. Open the EZ-IO® case and remove the driver and one EZ-IO® cartridge. Use the pink cartridge for pediatric patients, and the blue or yellow cartridge for adult patients. Open the cartridge and attach the needle set to the driver. Remove the needle set from the cartridge and remove the safety cap from the needle.
6. While holding the EZ-IO® in one hand, stabilize the patient near the insertion site. Position the driver at the insertion site with the needle at a 90° angle to the surface of the bone.

7. Power the needle set through the skin at the insertion site until you feel the needle set tip encounter the bone itself. Verify the 5mm mark (black line closest to the hub) is visible on EZ-IO® catheter needle. If this black 5mm mark is not visible, then there is excessive tissue over the site.
8. Apply firm and steady pressure on the driver and power through the cortex of the bone, ensuring that the driver is maintained at a 90° angle at all times.
9. Stop when the needle flange touches the skin or a sudden decrease in resistance is felt. This indicates entry into the bone marrow cavity.
10. While supporting the needle set in one hand, gently pull straight up on the driver, and lift away to remove the driver. Return the driver to its case.
11. While grasping the hub firmly with one hand, rotate the stylet counter-clockwise, pulling the stylet out of the catheter and place it in the empty cartridge. Discard it into a biohazard sharps container.
12. Do **not** aspirate blood (bone marrow) as it may occlude the EZ-IO® needle. It can be assumed that the IO needle is in the proper location if:
  - A. The saline flush is easily infused with little resistance.
  - B. No evidence of swelling or extravasation into the soft tissues. If swelling or extravasation is observed, discontinue the IO line.
  - C. Ability of the IO needle to stand alone in the bone without support. It should not be able to fall over.
13. If it is determined that the IO needle is **not** in the marrow cavity, pull the needle back slightly and attempt to flush again. If a “pop” or “give” (loss of resistance) is appreciated but IV fluid will subsequently not flow, do the following:
  - A. Reinsert and withdrawal the stylet to clean any bone that may have lodged in the IO needle.
  - B. Slowly pull back the IO needle in case the tip was lodged against the other side of the bone. Continue to carefully flush saline through the syringe while manipulating the needle.
  - C. If this fails, remove the IO needle, and try an IO again in the other tibia if needed.
14. After the IO needle is properly positioned and flushed, attach the primed EZ-Connect® extension set to the EZ-IO® hub and then flush with 10mL of saline. Remove the syringe and connect the IV tubing to the needle. Tape and secure the needle in place (use KERLIX™ as needed).
15. Splint the tibia with 2 leg boards as needed to keep the IO needle in place.
16. Continue to monitor the IO insertion site for extravasation and patency. If possible, avoid applying opaque dressings directly over the site so it can be easily visualized.
17. Due to the anatomy of the IO space, the IV flow rates will be slower than those achieved with IV catheters. Administer the medication or IV fluids with pressure on the IV bag to maintain adequate flow rates.

**Procedure for Proximal Humerus Insertion:**

1. Place the patient’s hand over the abdomen (elbow adducted and humerus internally rotated).
2. Place your palm on the patient’s shoulder anteriorly. The area that feels like a “ball” under your palm is the general target area. The insertion site is on the most prominent aspect of the greater tubercle of the humerus.

3. Clean the insertion site with an alcohol prep pad.
4. Open the EZ-IO® case and remove the driver and one EZ-IO® cartridge. Use the yellow (45mm) cartridge for proximal humerus insertion in adult patients. Open the cartridge and attach the needle set to the driver. Remove the needle set from the cartridge and remove the safety cap from the needle.
5. While holding the EZ-IO® in one hand, stabilize the patient near the insertion site. Position the driver at the insertion site with the needle tip downward at a 45° angle to the horizontal plane. The correct angle will result in the needle hub lying perpendicular to the skin.
6. Power the needle set through the skin at the insertion site until you feel the needle set tip encounter the bone itself. Verify the 5mm mark (black line closest to the hub) is visible on EZ-IO® catheter needle. If this black 5mm mark is not visible, then there is excessive tissue over the site.
7. Apply firm and steady pressure on the driver and power through the cortex of the bone.
8. Stop when the needle flange touches the skin or a sudden decrease in resistance is felt. This indicates entry into the bone marrow cavity.
9. While supporting the needle set in one hand, gently pull straight up on the driver, and lift away to remove the driver. Return the driver to its case.
10. While grasping the hub firmly with one hand, rotate the stylet counter-clockwise, pulling the stylet out of the catheter and place it in the empty cartridge. Discard it into a biohazard sharps container.
11. If available, place an EZ-Stabilizer® dressing over the hub.
12. After the IO needle is properly positioned and flushed, attach the primed EZ-Connect® extension set to the EZ-IO® hub and then flush with 10mL of saline. Remove the syringe and connect the IV tubing to the needle. Tape and secure the needle in place (use KERLIX™ as needed).
13. Secure the arm in place across the abdomen to prevent accidental dislodgement of the EZ-IO® catheter.
14. Continue to monitor the IO insertion site for extravasation and patency. If possible, avoid applying opaque dressings directly over the site so it can be easily visualized.
15. Due to the anatomy of the IO space, the IV flow rates will be slower than those achieved with IV catheters. Administer the medication or IV fluids with pressure on the IV bag to maintain adequate flow rates.
16. In the rare event that an EZ-IO® may be placed in a patient that is experiencing pain from the EZ-IO® site the following can be done with lidocaine:
 

**Recommended anesthetic for adult patients responsive to pain:**

  - A. Observe recommended cautions/contraindications to using 2% preservative and epinephrine free lidocaine (intravenous lidocaine).
  - B. Slowly infuse lidocaine 40mg IO (*0.5 mg/kg peds*) over 2 minutes. Allow lidocaine to dwell in IO space for 60 seconds. Flush with 5 to 10mL of normal saline.
  - C. As needed, slowly administer additional 20mg (*0.25 mg/kg peds*) of lidocaine IO over 60 seconds, up to a maximum of 1.5 mg/kg IO.
  - D. Consider systemic pain control for patients not responding to IO lidocaine

**Notes:**

- The humeral head site can also be used in adults only.

- Any medication that can be administered IV can be administered via the IO route at the same dose. Sodium bicarbonate **may** be diluted 1:1 in normal saline prior to being administered. Medications should be administered using a syringe or pressure bag (gravity flow will **not** be enough).
- Only use dedicated EZ-IO® needles. **Never** use an angiocath to place an IO line.
- Only one IO attempt per tibia or humerus should be attempted in the prehospital setting.
- Always flush the IO line after each medication has been administered. Make sure the IO line is treated just like an IV line in regard to avoiding any air in the line during disconnection.

## Intravenous (IV) Access and Infusion

### **Introduction:**

- All IV fluids used will be normal saline (0.9% NS).
- When establishing IV access, the IV fluid rate should be based on paramedic judgment of the current patient needs. A saline lock or IV at 60 mL/hour (to keep vein open) can be used in patients who do not need IV fluids, but rather a site for possible medication administration (*e.g.* seizure patient, adenosine in SVT patient, etc.). A saline lock may also be established as a second IV site when it may be needed.
- Angiocaths should always be of an appropriate size (gauge) for the patient's condition size.
- IV tubing and drip rates should be selected according to the patient's needs. Medication drips should generally be set up using the mini drip (60 drop/cc set). All hypotensive patients, trauma patients, cardiac patients, and patients displaying decreased perfusion should have the macro drip (10 drops/mL) "volume" tubing used.
- Patients who are expected to require large volumes of IV fluid and/or may require blood at the hospital should receive IV fluids through blood or "Y" tubing if it is available.
- In post-mastectomy patients, avoid intravenous access (or blood pressure measurements) in the arm on the affected side.
- Upper extremity sites are preferable to lower extremity sites. **Lower** extremity sites are **strongly discouraged** in patients with vascular disease or diabetes mellitus.
- External jugular vein cannulation is indicated in critically ill patients > 8 y/o who require IV access for IV fluid or medication administration, and an extremity IV can not be obtained.
- Error on the side of using larger needles and macro tubing (10 drops per mL) in any patient that has the possibility for deterioration enroute. (acute MI, etc.).

### **Procedure:**

1. Follow proper personal protection (wear exam gloves).
2. Locate a suitable venipuncture site. The antecubital fossa or the forearm should be the preferred site. The foot or external jugular may be utilized in a critically ill patient. The foot location is always a last stage location, especially in a diabetic patient.
3. Place a constricting band above the chosen site, only tight enough to block venous return, not arterial flow.
4. Cleanse the site using alcohol prep pads. Maintain aseptic technique.
5. Select the proper size angiocath.
6. Once the IV angiocath is placed in the proper position (as confirmed by good blood return) securely tape the catheter in place using tape, Veni-gards<sup>®</sup>, etc.
7. Start the IV fluids as needed. The IV fluid should flow freely without evidence of infiltration. Adjust the flow rate according to patient presentation as outlined in the specific protocol.
8. A saline lock may be placed instead of IV tubing at 60 mL/hour for stable patients who may need a port for possible medication administration. Flush any air out of the saline lock by injecting 1mL – 2mL of normal saline (using a 3cc syringe) into the port, and then recapping the Luer lock device. Remove the protective cap on the Luer lock and carefully twist it into the IV angiocath hub. Make sure that no fluid leaks exist.

**Use of Implanted Vascular Access Devices:**

- If a patient is encountered that has an implanted vascular access device, only use such device in an **emergency** situation in which no other peripheral access can be obtained. Strict adherence to aseptic technique must be maintained at all times. Cleanse the inject port with alcohol prep pad before using.
- Implanted vascular access devices are indwelling catheter devices placed into one of the central lines to provide vascular access for patients requiring long-term IV therapy (antibiotics, chemotherapy) or hemodialysis.
- Groshong™, Hickman™, and Broviac™ catheters are inserted into the superior vena cava via the subclavian vein (usually under the clavicle).
- Hemodialysis catheters will have a blue port and a red port and are used as temporary dialysis catheters. These can be accessed **only in an emergency** (*i.e.* life-threatening situation). When using a hemodialysis catheter, remove at least 3-5mL of catheter fluid (heparin solution) from either port (however, by convention it is always better to use the blue port). Then flush the port with 10mL of normal saline prior to attaching the IV tubing and infusing fluids or medications.
- Peripherally Inserted Central Catheters (PICC) are inserted into the superior vena cava via the antecubital vein.
- Porta-A-Cath® is a permanent catheter that is placed under the skin below the clavicle. It is used for chemotherapy and permanent IV access (including sickle-cell anemia patients). Due to the risk of penetrating the subcutaneous Porta-A-Cath® tubing, they should **not** be accessed in the prehospital setting. No under-the-skin access sites should be accessed in the prehospital setting as it takes a specialized non-coring (Huber) needle to avoid permanent damage to these IV access sites.

**Notes:**

- Do **not** establish an IV in an injured extremity, in an insulin-dependent diabetic foot, or into a dialysis shunt (surgically created arteriovenous fistula) unless absolutely needed in an immediate life-threatening situations only, and there is absolutely no other IV site available.
- An **external jugular IV** may be placed **without** contacting medical control. The patient's head must be maintained in a mid-line neutral position if any possibility of spinal trauma exists.
- No more than three IV attempts should be made in the field.
- Do **not** leave angiocath needles lying on the stretcher. Always dispose of needles properly in a sharps container.
- Always expel air from the IV tubing or syringe prior to administration of IV fluids or medications. This is of utmost importance when using an external jugular or an implanted vascular access device. The introduction of air into the venous system can cause an air embolism that can be fatal if large enough.

**Annaville FD EMT-Basics:**

- *This applies only to EMT-Basics working within the Annville FD.*
- EMT-Basics in the Annville FD may perform peripheral intravenous cannulation in accordance with this protocol manual provided they pass a yearly IV class, and have their skills credentialed by the Annville EMS Medical Director.

## Ketamine Protocol

### Introduction:

- Ketamine is an analgesic at low doses (sub-dissociative) and an anesthetic at high doses (dissociative). It will be used only in low doses (0.3 mg/kg) in these EMS protocols. Higher doses (2-4 mg/kg) are used in the hospital setting.
- The benefit of ketamine is that it provides analgesia while preserving airway patency (no respiratory depression) and hemodynamic stability (no hypotension).
- Ketamine produces amnesia, sedation, as well as its analgesic effects.
- Ketamine can be added to opioids for synergistic pain control, or used directly by itself for patients that are hypotensive and require pain control. Ketamine stimulates catecholamine release and may improve cardiac contractility. Ketamine binds to *mu* and *kappa* opioid receptors.

### Indications:

1. Ketamine is only to be administered by paramedics.
2. Consider ketamine use in patients that have severe pain.
3. Ketamine can be used to aid in airway management control (with or without intubation).
4. Pain management to be used as an adjunct with opioid administration. Ketamine may be used as a first-line analgesic when the patient presentation is appropriate for its use alone (*e.g.* hypotension, patient is chronic opioid user).
5. Ketamine may be considered first-line for patients with severe burns, or in patients with suspected multiple fractures.

### Contraindications:

1. Patients with severe head trauma (GCS  $\leq$  12)
2. Patients with severe hypertension (paramedic discretion)
3. Allergy / sensitivity to ketamine
4. Penetrating eye injury (ketamine can increase intraocular pressure)

### Side Effects:

- Emergence reactions (nightmares) when waking up from ketamine can occur
- Hallucinations
- Hypertension
- Increased cardiac output
- Tachycardia
- Increased oral secretions
- Nausea and vomiting (consider ondansetron as needed)
- Involuntary myoclonus (may mimic seizure activity)

### Procedure:

1. For all ketamine use, the patient **must be** on the pulse oximeter, ETCO<sub>2</sub> monitor, and have continuous 4-lead EKG monitoring.
2. Make sure the airway is maintained appropriately. Have oxygen and suction equipment readily available.



3. Ketamine can be administered IV, IO, IM, and IN.
4. The ketamine prehospital dose for analgesia for all routes of administration is **0.3 mg/kg** in both adults and pediatrics. It may be repeated **one time** after 10-15 minutes if needed.
5. The onset of action is 30 seconds when administered IV or IO, and 3-4 minutes when administered IM or IN. The duration of action is 10 minutes IV or IO, and 20 minutes IM or IN.

**Notes:**

- Ketamine will **not** be used for excited delirium patients in these protocols- use benzodiazepines instead.
- Ketamine can cause excessive salivary production which can be managed with suction.
- Ketamine is pregnancy category C.
- Ketamine can cause nystagmus and may cause patient to have an eyes-wide open, glazed expression with drooling.
- Use ketamine with extreme caution in significantly intoxicated patients (do **not** use for patients with GCS  $\leq$  12).
- Ketamine doesn't have a reversal agent. The effects commonly seen with ketamine can be managed supportively until the drug is eliminated from the body.
- Laryngospasm is a very rare but serious complication that can occur with ketamine administration. It is treated in the prehospital environment by providing respiratory support using a BVM.

## Medication Administration

### Introduction:

- This appendix deals with the administration routes and techniques of various medications.
- Always double check the medication name and amount.
- Verify the expiration date on the medication.

### Endotracheal (ETT) Meds:

- The IV (or IO) site is preferred in all patients, and administering medications via the endotracheal route is **no longer an accepted practice**. **Do not administer any medications via the ETT.**

### Hand-Held Nebulized (HHN) Meds:

- The HHN delivers albuterol into the bronchioles for patients who are wheezing.
- Have the oxygen flow rate enough to cause misting of the medication (typically 8LPM - 10LPM).
- Patient can hold a HHN (mouthpiece) if old enough or awake and cooperative, or the albuterol can be administered via a nebulizer face mask.

### Intramuscular (IM) Meds:

- Provides meds into deep muscles for absorption into the venous circulation.
- Inject into a large muscle body (lateral thigh or deltoid area).
- Procedure:
  1. Expose the skin at the site of injection (lateral thigh or deltoid). Cleanse the skin with an alcohol prep pad.
  2. Inject the medication at a 90° angle into the muscular tissue.

### Intravenous Drip (IV gtt) Meds:

- Includes lidocaine, norepinephrine.
- IV drip meds should be administered through 60 drop/mL IV tubing.
- Monitor the drip rate closely.
- Do **not** transport a patient on a drip pump unless the crew is thoroughly familiar with its use and how to trouble-shoot any problems which could occur enroute to the hospital.

### Intravenous (IV) / Intraosseous (IO) Meds:

- All prehospital IV medications may be administered via the IO route. Sodium bicarbonate may be diluted 1:1 in normal saline prior to being administered.
- Provides direct medication access to the venous circulation by direct injection of a medication into an IV or IO line.
- Make sure air is expelled from the IV tubing or syringe.
- IO medications should be administered using a syringe or pressure bag (gravity flow will **not** be enough).
- Only use dedicated EZ-IO® needles. **Never** use an angiocath to place an IO line.
- Intraosseous access should be limited to emergency resuscitation of the child and discontinued as soon as other venous access has been obtained.
- Only one IO attempt per tibia or humerus should be attempted in the prehospital setting.

- The AD needle (blue) is 15 gauge and 25mm long, while the PD needle (pink) is 15 gauge and 15mm long. The 45mm needle is 15 gauge and 45mm long.
- Always flush the IO line after each medication has been administered.

**Oral (PO) Meds:**

- Includes oral glucose, aspirin, and acetaminophen.
- Procedure:
  1. Patient must have an intact gag reflex (to avoid aspiration).
  2. Administer the tube of glucose between the cheek and gum allowing for mucosal absorption.
  3. Administer aspirin by having patient chew and swallow (baby aspirin is preferred).

**Rectal (PR) Meds:**

- Includes diazepam *0.5 mg/kg PR in children*.
- For treatment of status seizures in **pediatric** patients where IV access is unobtainable. (Midazolam IM or MAD should be used in adults). The IV site is preferred because rectal absorption (while rapid) is unpredictable.
- Procedure:
  1. Instill using a 14 gauge – 16 gauge flexible angiocath or a 10Fr pediatric suction catheter. Never administer into the rectum using a needle.
  2. Administer the diazepam 4cm into the rectum. It should advance with little or no resistance. The diazepam may need to be pre-mixed with normal saline if only a small volume of medication is being administered.
  3. Hold the buttocks together for 2 minutes to prevent any leakage of the diazepam.

**Sublingual (SL) Meds:**

- Includes nitroglycerin SL and spray.
- Procedure:
  1. Make sure the systolic BP is > 100mmHg.
  2. Place one nitroglycerin tablet (or one spray) under the tongue.
  3. Have the patient close their mouth and the nitroglycerin tablet will dissolve within 2 minutes.
  4. Monitor the blood pressure carefully. It should be rechecked and recorded every 5 minutes.
  5. If patient has continued suspected cardiac chest pain, repeat the nitroglycerin times 3 total as long as the systolic BP remains > 100mmHg. The three total is regardless of the previous doses taken by the patient prior to EMS arrival. The patient's nitroglycerin may have lost efficacy.
  6. Ideally, the nitroglycerin should not be administered until after IV access has been established.

## Off-Duty Patient Care

It is realized that EMS personnel might encounter a patient care situation while off-duty where their assistance may be needed. This appendix will address these situations where off-duty personnel may assist in EMS care (*e.g.* stopping to render aid if you should happen upon an accident or assisting a neighbor during an emergency while off-duty). This appendix does **not** apply to personnel that are paid or volunteer with a local fire department (or EMS agency) and are responding to an EMS call as a representative of that paid / volunteer fire department (or EMS agency). It also does **not** cover personnel who are intentionally responding to scenes in another area from which they are employed by monitoring dispatch via a scanner or other means.

This off-duty patient care guideline will only cover the local South Texas area (**within 100 miles of Corpus Christi city limits**) and assume that off-duty personnel may perform their patient care just as if on-duty provided that the patient care adheres directly to the protocols and standing orders found in this manual. This will include performing patient care and treatments at their current level of state EMS certification recognized by the EMS Medical Director. Remember that performing any ALS interventions (including IV fluids, invasive airway management, medication administration, etc.) while off-duty may necessitate your accompanying the patient to the hospital in the ambulance depending on the local area and capabilities of the ambulance. **No ALS skills will be performed in an area where a BLS ambulance may be transporting to avoid any possible issues with subsequent patient care or abandonment.**

If there is any concern about the capabilities of the EMS agency you are assisting, it is strongly recommended that EMS personnel **only perform non-invasive BLS skills** (*i.e.* no medications except oxygen).

It is also very important to realize that while off-duty you are on scene as an assistant to the crew on duty and are there to help them. Furthermore, if off-duty in another geographic area from where you are normally employed, remember that you are there as an assistant to help the EMS crew in the jurisdiction in which you have stopped. The local crew should maintain incident command of the scene in which you are “visiting”.

### Notes:

- Due to the wide variation of EMS levels of care and laws outside of Texas, it is strongly recommended that while out-of-state only avail yourself in a “Good Samaritan” type role.
- This protocol does **not** apply to individuals working or volunteering as an EMT/paramedic in a situation such as a sporting event, camp medic, fire watch, scouting / church event, etc.

## Pain Management

### Introduction:

- Pain is a common reason that patients seek medical attention and call EMS.

### Indications for Consideration of Analgesia Administration:

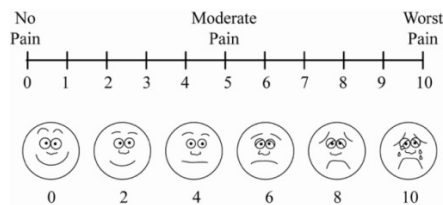
1. Isolated extremity trauma (fractures, dislocations) **without** head, chest, or abdominal trauma. Patient has to be awake and alert times four (person, place, time, events). An exception to this is if the morphine (or fentanyl) is being used to facilitate an endotracheal intubation and control the airway.
2. Significant burns.
3. Sickle cell anemia patients with a typical pain crisis for that patient.
4. Suspected renal colic (flank pain radiating to the groin, patient unable to lay still, blood in the urine) **not** associated with abdominal pain.
5. Suspected cardiac chest pain (including CHF) after 3 sublingual / spray nitroglycerins without relief.

### Contraindications to Analgesia:

1. Hypotension (SBP < 100mmHg).
2. Opioid allergy.
3. Altered mental status (including head trauma or intoxication with alcohol / drugs).

### Notes:

- Assess patient's level of pain using the Pain Assessment Scale (0-10):



- Morphine sulfate, fentanyl, or ketamine are to be used in the prehospital setting with good paramedic judgment. If any doubt exists about its use on a patient, **contact medical control** for guidance. Be aware that many physicians will be reluctant to order pain medications in the prehospital setting.
- Morphine and fentanyl are **not** to be administered to any patient suspected of abusing narcotics.
- Patients receiving morphine sulfate or fentanyl must be on the cardiac monitor, pulse oximeter, and have close blood pressure monitoring done. Ideally, they should have an IV established to allow IV fluids if any hypotension occurs following morphine administration.
- Sickle cell anemia patients need to have IV fluids and oxygen in addition to analgesics.
- Morphine sulfate, fentanyl, diazepam, midazolam, and ketamine are expected to be “double-locked” in all storage areas, and should be kept **only** in the back of the ambulance.
- If a patient experiences profound respiratory depression (or hypotension) after morphine or fentanyl, naloxone (Narcan<sup>®</sup>) may need to be administered.
- Diazepam (Valium<sup>®</sup>) and midazolam (Versed<sup>®</sup>) are **not** analgesics. They are sedatives and should **not** be used independently for pain control.

## Patient Refusal of Treatment / No Transport

### **Introduction:**

- Occasionally, alert, and oriented adult patients may refuse the proposed treatment and/or transport recommended by the EMS provider, regardless of their medical condition. However, this decision must be an informed one.
- It is encouraged that all patients who may have a possible significant injury or illness be transported to the hospital; however, individuals with capacity may refuse services / treatment.
- Patients with capacity must demonstrate each of the following:
  1. Age  $\geq 18$  y/o (unless parent or guardian is present), or patient is an emancipated minor (married, court order).
  2. Oriented to person, place, time, and events (AOx4).
  3. **Not** actively homicidal, suicidal, or displaying irrational thinking.
  4. **No** evidence of impaired judgment manifested as the significant intoxication, incoordination, slurred speech, or disorientation.
  5. Patient understands (and can express an understanding of) his/her injury or illness and potential for adverse outcome (including death) of not treating his/her illness or injury. Patient must understand the consequences of his/her decision.
- All patients  $< 18$  y/o must have a parent or legal guardian contacted as soon as possible (unless emancipated minor). An emancipated minor is one who is / has been married or has had his/her classification of a minor removed for general purposes in accordance with Texas Family Code. If the patient has an emergent illness or injury, "implied consent" is invoked, and the patient transported to the hospital with the parents being contacted as soon as possible. Implied consent involves "what a reasonable individual would consent to under the same circumstances". The parent or legal guardian must sign the Refusal of Transport if possible, or a verbal refusal over the phone with a witness (law enforcement if possible) may suffice in certain situations. **Contact medical control** for guidance as needed.
- Establish and document competency to refuse care on the EMS patient care report.
- Enlist the help of family and friends in changing the patient's mind (if necessary).
- Look for and negotiate alternatives (if needed).

### **Procedure:**

- When a patient refuses care, the following procedure will be followed. This **must** be documented completely in the EMS patient care report.
  1. Patient will be thoroughly evaluated with pertinent history, and physical findings communicated to the patient.
  2. Treatment interventions and transported will be offered.
  3. The risks of refusing care must be discussed and documented in the patient care report. Risks shall include permanent disability and death. The patient must understand these risks of not seeking medical attention. Ideally, the patient should recite back the nature of his/her medical condition, the risks and benefits of the proposed care, and the risks of refusing the proposed care.

4. All patient questions should be answered.
5. Reasonable scene treatment should be offered.
6. A witness signature must be obtained on the patient care report. This can be a law enforcement officer or your partner if no other family / competent friends are available.
7. Patient will fall into one of the following 4 situations outlined in the table below.
8. The patient must be assured that at any time in the future the ambulance will respond for any other injury or illness that may occur. They may call EMS back for assistance in the future as needed.
9. In the patient care report narrative, thoroughly describe the patient encounter, vital signs, and medical advice given.

Does Patient Have the Capacity ?	Paramedic Assessment of Serious Injury or Illness	Treatment Action and Disposition
Patient with Capacity	No potential for loss of limb or life ( <i>i.e</i> not an emergent condition)	Patient signs standard patient refusal on EMS patient care report
Patient with Capacity	Potential exists for loss of limb or life (paramedic recommending transport to the hospital)	Patient signs standard patient refusal on EMS patient care report.
Patient <b>without</b> Capacity	No potential for loss of limb or life ( <i>i.e</i> not an emergent condition)	Patient must have vital signs done and <b>medical control must be contacted</b> for guidance.
Patient <b>without</b> Capacity	Potential exists for loss of limb or life (paramedic recommending transport to the hospital)	<b>Medical control must be contacted</b> , and patient must be brought to the hospital (using law enforcement as needed).

### Notes:

- Involve law enforcement on all patients **without** capacity who are refusing care. If the patient has an injury or illness with **no** potential for loss of limb or life based on the paramedics judgment, **contact medical control** for guidance as needed. The physician will either order transport to the hospital or refusal based on their assessment of the situation. If the patient **without** capacity has an injury or illness with potential for loss of limb or life based on the paramedic's judgment, **contact medical control**, and bring the patient to the hospital using law enforcement as needed.
- It is recognized that various law enforcement agencies (and individual officers) will have different levels of support for EMS regarding patients refusing care. Always involve medical control as needed.
- If a patient with capacity has unstable or severely altered vital signs and is refusing treatment or transport, **contact medical control** for guidance. Often any patient with significantly abnormal vital signs cannot be considered to have the capacity to refuse care.
- The patient's signature should be obtained in a legible script. Unsteadiness may imply that the patient is not medically capable or mentally able to think and act rationally.
- All efforts should be made to have the patient sign the refusal. If they continue to refuse to sign the refusal, proper documentation should be made describing the refusal and a third-party witness

the refusal to sign. A witness should be a non-biased individual who actually witnesses the patient's signature. If available, law enforcement can be selected to sign as witness.

- Situations involving multiple refusals (*i.e.* school bus collisions) may have all refusals listed on a common EMS patient care report. This should list the name of those patients refusing (or not needing) treatment and should be signed by a person taking responsibility for those patients refusing (*e.g.* school administrator, responsible driver of vehicle, bus driver, etc.).
- EMS personnel should at no time mention the cost of transport, status of system (unit availability), or any other non-clinical subject in an attempt to influence a patient's decision to accept or decline treatment and/or transport.
- **A witness must sign the patient refusal.** If a witness is not available, please document this in the patient care report.



## Patient Restraint / Transporting Against Patient Will / Combative Patients

### **Introduction:**

- Occasionally, patients may be encountered that refuse transport to a medical facility, but may be suffering from an illness or injury that impairs their ability to make an informed decision.
- If the patient does not have capacity (as outlined below) and the prehospital provider feels that the patient needs emergency medical treatment or evaluation, the patient should be transported to the ED for further evaluation and treatment. See Patient Refusal of Treatment / No Transport appendix, p. 166.
- If the patient is displaying behavior which is an immediate threat to the health and safety of themselves and/or the prehospital providers, the patient may need to be safely and humanely restrained. Inform the patient of the reason for restraint.
- Any patient that is agitated needs to be closely examined for correctable causes of agitation (*e.g.* hypoxia, hypoglycemia).
- Physical and/or chemical restraint should be used as a last resort technique.
- Attempts should be made to de-escalate verbally aggressive behavior with a calm, reassuring approach, and manner.
- Use only the minimum amount of force necessary to restrain the patient and make sure there are enough personnel on scene to safely place the patient in restraints. The patient should be searched for weapons prior to transport.
- Realize that every patient with capacity has a legal and moral right to refuse treatment, even if that treatment refusal results in potential harm to the patient. Hostile, angry, or unwilling patients who have capacity may refuse service. The prehospital provider must make sure that if a patient refuses, he or she has capacity and is able to make an informed decision. See Patient Refusal of Treatment / No Transport appendix, p. 166.
- Only restrain with soft restraints (commercially available wrist and leg restraints, cravats, cling, KERLIX™, sheets, etc.). If handcuffs are used by law enforcement, the officer should either accompany the patient in the ambulance or follow the ambulance in a patrol car to the hospital. Restrain patients in a manner that does not impair circulation, cause choking, or aspiration.
- See Excited Delirium protocol as needed, p. 45.

### **Procedure:**

1. Scene safety. Never attempt to restrain a patient without appropriate law enforcement assistance. Do not endanger yourself or the crew.
2. Assess patient if able and determine if the patient has capacity:
  - Age ≥ 18 y/o (unless parent or guardian is present), or patient is an emancipated minor (married, court order).
  - Oriented to person, place, time, and events.
  - **Not** actively homicidal, suicidal, or displaying irrational thinking.
  - **No** evidence of impaired judgment manifested as the odor of alcohol, incoordination, slurred speech, drug use, or disorientation.
  - Patient understands his/her injury or illness and potential for adverse outcome (including death) of not treating his/her illness or injury.

3. If EMS provider feels that the patient is **not** capable of making an informed decision and the patient has a potentially serious illness or injury; the patient should be strongly advised to seek medical care.
4. If the patient still refuses transport, **contact medical control**. It is expected that medical control will advise to bring the patient into the hospital using law enforcement as needed.
5. Physically restrain the patient only if needed for the safety of the patient and/or EMS personnel. Restrain the patient with soft restraints in a supine position of comfort and safety. At **no** time should a patient be struck or managed in such a way as to inflict pain. Do **not** restrain the patient in a manner which could compromise the airway, breathing, or circulation.
6. Cover the patient's mouth with a face mask as needed (patient spitting).
7. Document on the EMS patient care report the reason (indication) for restraint and the procedure used / type of restraint applied.
8. If chemical restraint is needed (*e.g.* combative psychotic patients, PCP/LSD overdose, etc.) administer midazolam (Versed®) 1mg - 5mg slow IV push, IM, or MAD for sedation. Ideally, the patient should be on the pulse oximeter and the cardiac monitor to receive midazolam. This may be difficult in a very combative patient.
9. Monitor the patient closely while restrained, and document clearly the findings on the patient care report every 5 - 7 minutes. Never leave a patient alone while restrained (physical or chemical). The patient must be under constant observation by the EMS crew at all times. This includes direct visualization of the patient, as well as cardiac monitoring and pulse oximetry.
10. If possible, take extra personnel while transporting to the hospital for assistance as needed.
11. Check blood glucose.
12. Use oxygen as needed to maintain the oxygen saturation > 94%.
13. Refer to the Psychiatric Emergencies p. 59 and/or Excited Delirium p. 45 protocols as needed.

**Notes:**

- Always rule out other causes for combative behavior such as hypoxia, hypoglycemia, hypotension, head injury, etc.
- Patients who have capacity (as outlined above) may refuse medical treatment and transport.
- **Never restrain a patient in the prone (face down) or "hog-tied" position.**
- Plastic restraint devices (nasal cannulas, duct tape, etc.) are **not** to be used.
- **Contact medical control** for assistance if any questions arise regarding the care and transport of a combative patient.
- Documentation on the patient care report should include the reason for the use of the restraints, the type of restraints used, and the time the restraints were placed.

## Pediatric Patient Transport Guidelines

### Purpose

- To provide a safe method of transporting pediatric patients within an ambulance.
- To protect the EMS system and personnel from potential harm and liability associated with the transportation of pediatric patients.

### Procedure

1. Tightly secure all monitoring devices and other equipment.
2. Ensure that all pediatric patients < 40 pounds are restrained with an approved child restraint device secured as per manufacturer's instructions.
3. Ensure that all parents, caregivers, or other passengers are properly restrained during transport.
4. Do not allow the parents or caregivers to hold the patient during transport.
5. For patients with medical conditions that may be aggravated by stress (*e.g.* croup, partial airway obstruction) make every attempt to optimize safety when comforting the child and transporting.
6. It is best to **not** transport any pediatric patients meeting trauma code criteria in a child safety seat that was involved in the collision that produced the child's injury.

## Pediatric Patient Weight, Heart Rate, and Systolic BP by Age

This table gives the 50th percentile weights for pediatric patients in kilograms, as well as maximum heart rate, and minimum systolic blood pressure based on patient's age:

Age	Weight (Kg)	Normal Pulse Rate Range (Beats/min)	Normal Maximum Pulse (Beats/min)	Normal Minimum Systolic BP (mmHg)	Normal Respiratory Rate (RR/min)
Newborn	3	120 - 160	190	60	30 - 60
6 mos	8	120 - 160	180	60	25 - 40
1 yr	10	-	160	72	-
18 mos	11	-	160	73	-
2 yrs	12	-	160	74	-
3 yrs	14	-	140	76	-
4 yrs	17	-	130	78	-
5 yrs	19	80 - 120	130	80	20 - 30
6 yrs	21	-	130	82	-
7 yrs	23	-	120	84	-
8 yrs	25	-	120	86	-
9 yrs	28	-	120	88	-
10 yrs	32	-	120	90	-
11 yrs	36	-	120	92	-
12 yrs	40	-	120	94	-
13 yrs	45	-	110	96	-
14 yrs	50	60 - 110	110	98	15 - 20
Adult	70	60 - 100	100	120	8 - 12

### Notes:

- Make sure the blood pressures obtained are with the correct sized BP cuff. Too large a cuff will give falsely low BP readings, while too small a cuff will give falsely elevated BP readings.
- Medication dosing in pediatric patients should be based on the patient's weight, and not on patient's age.
- The **median** systolic BP for a child from age 1 year - 16 years is estimated with the formula:  
Median Systolic BP = 90mmHg + (2 x Age in Years)
- The **lower limit** of systolic BP (below which a patient is considered hypotensive) can be estimated using the formula:  
Lower Limit of Systolic BP = 70mmHg + (2 x Age in Years)

### Pediatric Endotracheal Tube Size:

$$\text{ETT Size} = (\text{Age} \div 4) + 4$$

## Physician Intervener (On-Scene Physician)

### **Introduction:**

- The EMS Medical Director and / or the on-line medical control physician are ordinarily responsible for patient care in the field. Occasionally, a physician will be present on the scene of a call which may cause confusion, uneasiness, and medicolegal considerations. Two scenarios are potentially possible in this setting:
  1. The physician who knows the patient and has established a formal doctor-patient relationship.
  2. The physician who does **not** know the patient.
- Both scenarios present with different physician responsibilities.
- Cooperation and communication are essential.
- Prehospital providers should recognize and acknowledge the expertise of other medical professionals (RN, LVN, Nurse Practitioner, Respiratory Therapist, Physician Assistant, etc.) and use them as needed for the best outcome of the patient.

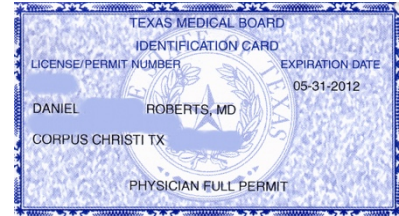
### **The Physician with an Established Doctor-Patient Relationship:**

1. EMS personnel will assess and manage the patient upon arrival at the scene regardless of on-scene physician direction. This applies to a physician's private office or clinic.
2. Should the on-scene physician wish to assume control of patient management, he or she may do so. If the paramedic is uncomfortable with any specified treatment or management, the following **must** be satisfied:
  - A. **Communication established between the medical control physician and the on-scene physician.**
  - B. The on-scene physician agrees to accompany the patient in the ambulance to the hospital.
3. In the event that the intervener (on-scene) physician agrees to assume control and the above 2 criteria are satisfied, then the following medicolegal details must be adhered to:
  - A. Orders given by the on-scene physician may be carried out by the EMS crew, provided that they are part of the provider's level of training. Orders that are not must be done by the intervener physician.
  - B. All orders given by the on-scene physician must be signed by the physician on the EMS patient care report.
  - C. If the paramedic feels uncomfortable about any aspect of patient care in the field, he or she should **contact medical control** and communicate those concerns. The on-line medical control physician has the authority to supersede any or all of the orders given by the intervener physician at any time during the prehospital phase.

### **The Physician Without an Established Doctor-Patient Relationship:**

1. EMS personnel will assess and manage the patient upon arrival at the scene regardless of on-scene physician direction.

2. If the physician on-scene agrees to assume care of further patient management, **ALL** of the following must be satisfied and told to the intervener physician:
- A. Physician must show proof of current Texas medical license (wallet card with name, medical license #, if possible- *see photo at right*). If any doubt of their identity exists, the physician must provide proof of further identity if he or she wishes to assist with patient care.
  - B. **A physician must accompany the patient to the hospital in the ambulance.** An intervener physician who elects not to accompany the patient to the hospital will immediately and automatically relinquish control to the on-line medical control physician.
  - C. Physician must carry out all orders that are **not** part of the prehospital providers training.
  - D. Physician must sign all orders given on the EMS patient care report.
  - E. Physician must assume complete medicolegal responsibility for all patient care activities until such time care is formally transferred to another physician at the receiving hospital.
  - F. The medical control physician may supersede the on-scene physician at any time during the prehospital phase.



### Special Situations:

- In the event of a mass casualty incident (MCI), an on-scene physician may be best utilized at the scene and not accompany a patient to the hospital.
- If the on-scene physician wishes to terminate resuscitation measures, he or she may do so provided that this action is communicated to and concurred by **on-line medical control**.
- Orders communicated for patients undergoing interfacility transport should be followed as long as those orders are within the paramedic's level of training. If possible, those orders should be signed by the transferring physician.

### Non-Physician Medical Personnel on the Scene:

- If a bystander at an emergency scene identifies himself or herself as a health care provider other than a physician, the EMS provider should:
  1. Inform the individual that he or she may assist the emergency team and/or offer suggestions, but may **not** assume medical management for the patient. These individuals should **not** direct patient care.

## Pleural Decompression (Needle Thoracostomy)

### **Introduction:**

- Pleural decompression (needle thoracostomy) is indicated for the treatment of a tension pneumothorax manifested by **ALL three** of the following:
  1. Hypotension (systolic BP < 100 mmHg)
  2. Decreased breath sounds
  3. Shortness of breath (or increased resistance to bagging)
- In addition to these **3** things, the patient may also have jugular venous distension (JVD), tracheal deviation, hyper resonance to percussion, and cyanosis.
- **A pleural decompression (needle thoracostomy) cannot be done unless the patient has ALL three of the above findings, with the exception of traumatic arrest with PEA which may have bilateral pleural decompressions performed without all 3 of the items listed.**
- In an intubated patient, always check the depth of the ETT before performing pleural decompression. The ETT may be too deep (usually a right mainstem bronchus intubation that will cause decreased breath sounds on the left).
- A pleural decompression (needle thoracostomy) may be done prior to contacting medical control given the urgent nature of this condition.

### **Procedure (Paramedic Level ONLY):**

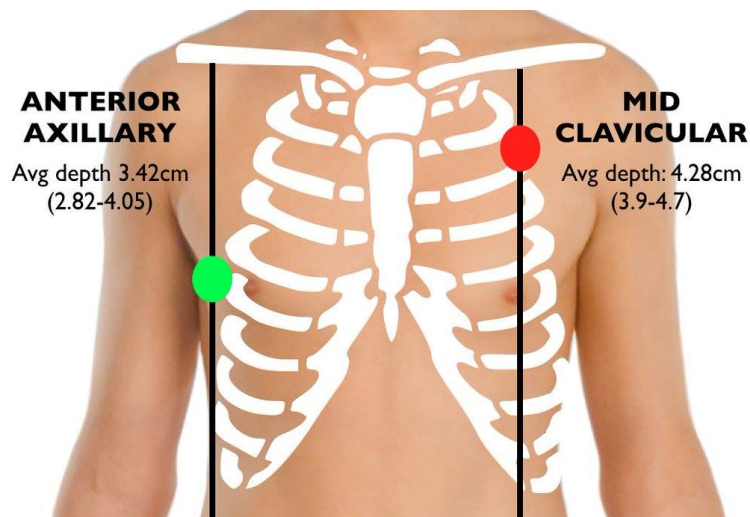
1. Apply oxygen (non-rebreather, bag-valve-mask, or intubation as needed). Have the patient on the pulse oximeter.
2. Expose the chest site.
3. Cleanse the insertion site (5th intercostal space, anterior axillary line) with alcohol prep pad.
4. Attach a 12 gauge – 14 gauge angiocath to a 10mL syringe. Saline may be placed in the syringe to help with placement (air bubbling will occur).
5. Pass the angiocath through the end of an exam glove to establish a one-way flutter valve. (Alternatively, a commercial-type flutter valve can be used).
6. Identify the 5th intercostal space (between the 5th and 6th ribs). Insert the angiocath directly over the top of the 6<sup>th</sup> rib in the anterior axillary line, perpendicular to the skin. (*see illustration on next page*). The syringe should be aspirated while advancing the angiocath needle. Note any rush of air.
7. Once the pleural space is entered (loss of resistance, air aspirated into the syringe), advance the catheter into the pleural space until the hub is flush with the skin.
8. Remove the needle, leaving the angiocath in place.
9. Secure the catheter in place using tape.
10. Reassess vital signs and breath sounds.
11. If needed, the above procedure can be repeated.

### **Notes:**

- Pleural decompression (needle thoracostomy) is **not** indicated for a suspected simple pneumothorax or hemothorax. It is only indicated for a tension pneumothorax manifested by hypotension,

decreased breath sounds, hyper resonance, and shortness of breath (or increased resistance to bagging).

- Tracheal deviation away from the affected side is a rare and late finding, therefore the possibility of a tension pneumothorax should **not** be ruled out in its absence.
- Remember that while pleural decompression can be life-saving in a patient with a tension pneumothorax, its use in a stable patient **without** hypotension, decreased breath sounds, or shortness of breath can be costly. All patients who receive pleural decompression in the field will need a subsequent chest tube placed in the ED which may necessitate a hospital admission for 2-3 days. **Always leave the plastic angiocath in place so the ED staff will know the pleural space has been entered.**
- If at any time a pleural decompression is performed on a patient, it is imperative that the **receiving ED personnel must be aware that a pleural decompression was attempted (or done)**. This is to avoid a possible tension pneumothorax later.
- Always remember to remove the needle from within the angiocath once the pleural decompression has been performed.
- Ideally, the angiocath needles used should be 3" in length. This is to make sure that the angiocaths are long enough to enter the pleural space in an obese patient.
- The 2nd ICS-mid-clavicular line is the recommended insertion landmark by ATLS; however, new evidence shows that the 5th ICS-anterior axillary line may be better, with the advantages of: thinner chest wall and no major blood vessels nearby (being further away from subclavian vessels and internal mammary artery and its medial branches).





## Pulse Oximetry

### Introduction:

- Continuous pulse oximetry should be utilized in all patients with an inadequate respiratory function.
- Pulse oximetry is an important tool for determining the oxygen saturation of the patient; however, be aware that there are several limitations where pulse oximetry is inaccurate:
  1. Carbon monoxide (carboxyhemoglobin), cyanide, or methemoglobin poisoning. These 3 conditions will cause falsely elevated readings, as the pulse ox measures percent of hemoglobin bound and does **not** discriminate if it is binding oxygen, carbon monoxide, methemoglobin, or other toxins.
  2. Hypovolemia with poor perfusion. The probe will have a hard time detecting capillary blood flow due to low perfusion status.
  3. Cardiac arrest
  4. Hypothermia
  5. Severe anemia
  6. Vasoconstriction (norepinephrine drip, etc.)
  7. Fingernail polish
- Always treat the patient and **not** a pulse oximeter reading. The pulse ox should be used in conjunction with an accurate patient history and physical examination.

### Indications for Pulse Oximetry:

- All patients receiving morphine, fentanyl, ketamine, diazepam, or midazolam.
- Adjunct to patient assessment when administering oxygen.
- Patients with shortness of breath, chest pain, or altered mental status.
- Patients with trauma to the chest.
- During and after endotracheal intubation.

### Procedure:

1. Assemble equipment.
2. Attach proper monitoring probe (adult vs. pediatric) if needed on some machines.
3. Determine the site to place the probe (index finger most reliable). Make sure any nail polish is removed if needed. Alternate sites are other fingers, toes, or ear lobes.
4. Verify pulse oximeter reading corresponds with the patient's palpated pulse.
5. Apply oxygen as needed to keep oxygen saturations > 94% (minimum).
6. Document the oxygen saturation (pulse ox reading) every time vital signs are recorded if the patient is on continuous pulse oximetry.

### Notes:

- The pulse oximeter is a good tool to **monitor** a patient's respiratory status, but should be used with great caution in **diagnosing** a respiratory problem. Remember the pulse ox is measuring

percent hemoglobin bound with oxygen, but gives **no** information on ventilation (carbon dioxide levels).

- A good pulse oximeter reading should never be used as the sole determinant to withhold oxygen from a patient in respiratory distress, or when it is standard of care to apply oxygen (*e.g.* cardiac chest pain).

## Radio Communications / On-Line Medical Control

### **Introduction:**

- A radio report must be given to the emergency department on all patients being transported to the hospital.
- The patient radio report should be given to the hospital the patient is being transported to (receiving hospital). If the receiving hospital cannot be contacted, CHRISTUS Spohn Shoreline will serve as the medical control hospital for the area.
- Physician on-line medical control situations required in this field protocol manual will be in **bold type**.
- Always **contact medical control** when any question arises regarding any aspect of patient care.
- **Medical control must also be contacted** for pronouncement in the field when CPR has been started, difficult situations (certain cases of patient refusing care, etc.), or in other instances as indicated in this protocol manual.
- In situations where either 3 or more critical patients or 5 total patients are being transported to the same hospital concurrently from the same incident, it is imperative that the receiving ED be informed of this situation as soon as possible- preferably while still on scene. This is to ensure that appropriate ED staff and hospital resources can be assembled to optimally care for these patients.
- When medical control is **not** available due to natural disaster or malfunction, these patient care field protocols and standing orders must be followed exactly.

### **Procedure for Patient Radio Report:**

*(See example of patient radio report on next page).*

- The patient radio report should be concise, accurate, and adhere to the guidelines below.
- The radio report on a non-emergent patient should be brief.
- Only report the patient's past medical history, medications, and allergies which are pertinent to the patient's chief complaint.
- Remember that hundreds of people with scanners (including the media) will be listening to your patient report. Do **not** use slang terminology. Be very professional on the radio. Never say the patient's full name, or the words "drunk", "rape", or "sexual assault".
- "Ectopics" is not a word by itself in regard to cardiac dysrhythmias. Instead say "Ectopic Beats".
- Do **not** use radio "10" codes during radio communications (except "10-4" for okay).
- Speak slowly with good pronunciation of words.
- The patient's race or national origin should **not** be given over the radio.
- Give the patient radio report as soon as possible once enroute to the hospital to allow for adequate ED preparation (room cleaning, equipment, personnel, etc.).
- Make sure that the completed EMS patient care report is left at the ED prior to departing from the receiving facility. Only under unusual circumstances should the ambulance depart without leaving a copy of the EMS patient care report.

**Sample Patient Report:**

**EMS:** “Medic 71 to Spohn Shoreline. We are enroute Code \_\_\_\_ with a \_\_\_\_ minute ETA. On board, we have a \_\_\_\_ year-old \_\_\_\_ (*male or female*) complaining of \_\_\_\_\_.

**EMS:** (Follow the following format for the remainder of the patient radio report in **SOAP** format):

**Subjective:** History of Present Illness / Mechanism of Injury

Patient’s Symptoms and Complaints

**Pertinent** Past Medical History / Medications

**Objective:** Vital Signs: HR: \_\_\_\_\_ with \_\_\_\_\_ rhythm on monitor (if applicable)

BP: \_\_\_\_\_ RR: \_\_\_\_\_ O<sub>2</sub> Sats: \_\_\_\_\_ Glucose: \_\_\_\_\_

If applicable, GCS: \_\_\_\_\_

If applicable (CVA patient), last known normal time: \_\_\_\_\_: \_\_\_\_\_

**Pertinent Physical Exam:** AO x 4  
 General Appearance  
 HEENT  
 Chest  
 Abdomen  
 Extremities  
 Neuro

**Assessment:** (Working impression of patient’s injury or illness)

**Plan:** Treatment performed (oxygen, spinal motion restriction, medications, procedures done) and response to treatment.

Request any orders (be specific) or specific needs (“extra stretcher”, “need security to meet us at ambulance dock”, etc.).

Repeat any orders given to ensure that the orders have been correctly understood.

Repeat ETA in \_\_\_\_\_ minutes.

## ResQCPR™ System

### **Purpose of ResQCPR™ System:**

- This document provides suggested recommendations for the use of the ResQCPR™ System, which includes the ResQPOD® ITD 16 and the ResQPUMP® ACD-CPR Device.
- The ResQPOD® ITD 16 is an impedance threshold device (ITD) that regulates airflow into the lungs during CPR to enhance the negative pressure (*i.e.* vacuum) in the chest, allowing more blood to be pulled back to the heart, and lowering intracranial pressure.
- The ResQPUMP® ACD-CPR Device is used to perform active compression decompression CPR (ACD-CPR), which is intended to promote complete and active chest wall recoil to further enhance the vacuum. Used together, these devices increase blood flow to the brain and vital organs, and may improve the likelihood of survival.

### **Indications for ResQCPR™ System:**

- The ResQCPR™ System is intended for use as a CPR adjunct to improve the likelihood of survival in adult patients with non-traumatic cardiac arrest.

### **Contraindications:**

- Pediatric patient < 18 y/o.
- Traumatic cardiac arrest.

### **Equipment:**

- ResQPOD® ITD 16
- ResQPUMP® ACD-CPR Device

### **Procedure:**

1. Before beginning CPR with the ResQCPR™ System (ACD-CPR with an ITD), assess the patient for signs of circulation (*e.g.* consciousness, breathing, coughing, movement, pulse). If no signs of life are present, begin performing ResQCPR™ as soon as possible, but do not delay chest compressions while preparing the ResQCPR™ devices.
2. Perform active compression decompression CPR (ACD-CPR) by positioning the ResQPUMP®'s suction cup in the middle of the sternum, between the nipples (mid-nipple line). Make sure that the edge of the suction cup does not extend below the xiphoid process, as this could result in inadequate suction and / or rib injury.
3. Compress with elbows locked and shoulders directly over the sternum. Bend at the waist, using the entire upper body and large thigh muscles to compress and lift.
4. Compress at a rate of 80/min using the metronome (push button) as a guide (compress on one tone, lift on the other tone). Use the force gauge to monitor forces and rescuer fatigue.
5. Decompression: To fully achieve the benefits of ACD-CPR, attempt to actively pull up until the tip of the red arrow on the force gauge registers ≈10 kg. Lift using the upper body and large thigh muscles, and bend at the waist. If the suction cup dislodges, then pull up with slightly less force on the subsequent compression. It is not necessary to lift with more than 10 kg of force.
6. Attach the ResQPOD® ITD 16 to the facemask as soon as chest compressions begin; use a 2-handed technique to maintain a tight facemask seal and airway position.

7. After 30 compressions, pause and use one hand to administer two ventilations (one second duration each) until the chest rises.
8. Continue to provide a 30 : 2 compressions to ventilation ratio until a pulse returns or an advanced airway is placed.
9. Once an advanced airway (ETT or i-gel® airway) is placed confirm tube placement and secure with commercial tube restraint. Move the ResQPOD® ITD to the airway and turn on the timing assist lights. Provide asynchronous ventilations; ventilate once (over one second) until chest rise is seen, each time light flashes (10/min).
10. Perform continuous chest compressions at 80/min. Do not pause compressions for ventilations.
11. Rotate ACD-CPR duties every two minutes (or more often) to avoid fatigue.
12. If the patient has a return of spontaneous circulation (ROSC) the ResQPOD® ITD should be immediately removed from the airway circuit, and use of the ResQPUMP® ACD-CPR Device should be discontinued. Support ventilations as needed.
13. If the patient re-arrests, resume use of both devices immediately.

**Notes:**

- Improper use of the ResQCPR™ System could cause serious injury to the patient and ineffective chest compressions/decompressions. The ResQCPR™ System should only be used by personnel who have been trained in its use.
- Improper positioning of the ResQPUMP® suction cup may result in possible injury to the rib cage and/or internal organs, and may also result in suboptimal circulation during ACD-CPR.
- Do not use the ResQPUMP® if the patient's chest is not large enough for the ResQPUMP® suction cup to provide adequate compressions / decompressions during use.
- Moisture, gels, or other lubricating materials on the patient's chest should be removed before applying the ResQPUMP®. Failure to do so may result in sliding of the suction cup on the chest, ineffective chest compressions / decompressions, and possible injury to the rib cage or internal organs.
- The ResQPUMP® ACD-CPR Device should **not** be used in patients who have had a recent sternotomy. Use of the ResQPUMP® ACD-CPR Device in patients with a recent sternotomy (within the past 6 months) has not been evaluated, but this may potentially cause serious injury.
- If the patient has a return of spontaneous circulation (ROSC) during the resuscitation efforts, the ResQPOD® ITD should be immediately removed from the airway circuit and use of the ResQPUMP® should be discontinued. Failure to do so may cause shortness of breath, difficulty breathing and potential pulmonary edema if the patient begins to breathe spontaneously.
- Spend equal time compressing and lifting. Avoid interruptions. Compress to recommended depth (e.g. 2"). Observe the force required to achieve that depth, as it will vary according to how compliant the chest is. The tip of the red arrow indicates the force being applied. Once the amount of force required is known, use that target as a guide for continued compressions. The approximate amount of force required to compress the chest 2 inches is as follows: **30 kg:** soft/supple chest, **40 kg:** chest of average compliance, **50 kg:** stiff/rigid chest.

## Spinal Motion Restriction / Immobilization- Clearance in the Field

### Paramedic Clearing of Cervical Spine in the Field:

- **Spinal motion restriction of the patient may be omitted if ALL of the following conditions exist and are documented clearly on the patient care report (NO EXCEPTIONS). Strict adherence to these guidelines must be maintained:**
  1. Patient age  $\geq$  8 y/o. Children  $<$  8 y/o need to be spinal motion restricted as they cannot consistently verbalize neck pain.
  2. Alert and oriented x 4 (person, place, time, events) with good short-term memory.
  3. Normal neurological exam. Motor and sensation intact in all 4 extremities. No focal neurological deficit (including tingling, reduced strength, or numbness in any extremity).
  4. **No** evidence of drug or alcohol intoxication.
  5. **No** evidence (or reliable history) of loss of consciousness.
  6. **No** complaints of neck pain or back pain.
  7. **No** penetrating injury near midline spine area.
  8. **No** distracting injuries defined as any **significant painful** injury. For example: long-bone (femur, humerus, tibia) fractures, abdominal pain, chest pain, pelvic fractures, etc.
  9. **No** strong evidence of potential spinal injury in mechanism of injury (*e.g.* high-speed, severe damage motor vehicle crash, ejection from vehicle, falls from great height).

### Notes:

- The decision to **not** implement spinal motion restriction in a patient is the responsibility of the **lead paramedic** on the call.
- The clearing of the cervical spine must **not** be abused by prehospital providers.
- It will be assumed that the patient can speak English or that a reliable translator is available on scene to assist with questioning. It is **not** permissible to clear the c-spine in a patient who can **not** communicate effectively with the prehospital provider (*e.g.* language barrier, deafness, etc.).
- Always consider spinal motion restriction in any patient with arthritis, cancer, or other underlying spinal disease or bone disease. In the very old, a normal exam may not be sufficient to rule out spinal injury.
- **Never** test cervical range of motion if the patient has any midline spinal tenderness.

## Synchronized Cardioversion / Defibrillation / Automatic Internal Cardiac Defibrillator (AICD)

### **Introduction:**

- **Synchronized Cardioversion:** the monitor searches for the peak of the QRS complex and delivers a shock a few milliseconds after the highest part of the R wave. This avoids shock delivery during the “vulnerable period” of ventricular repolarization (T wave) which can induce ventricular fibrillation.
- **Defibrillation:** the monitor will deliver a shock without regard for the rhythm.
- **Automatic Implantable (Internal) Cardiac Defibrillator (AICD):** permanent defibrillator implanted into the patient (usually in abdomen) which senses ventricular fibrillation and ventricular tachycardia and fires automatically.

### **Procedure for Synchronized Cardioversion:**

1. Apply self-adhesive electrodes in the correct location (the right upper chest and the left lower chest, or the anterior-posterior to “sandwich” the heart). Confirm that the rhythm on the monitor requires synchronized cardioversion **and** the patient is unstable (severe chest pain, severe shortness of breath, decreased level of consciousness, hypotension).
2. A precordial thump can be delivered immediately if ventricular tachycardia or ventricular fibrillation was directly witnessed.
3. To perform synchronized cardioversion, depress the “synchronize” button on the cardiac monitor. Make sure the QRS complex amplitude is enough so that the monitor can recognize the QRS complexes (adjust QRS amplitude as needed).
4. If time allows and sedation is needed in an adult patient, administer midazolam (Versed®) 1mg - 5mg IV (or IO / IM / MAD) over 1 minute prior to performing synchronized cardioversion. Patient must be on the pulse oximeter and airway equipment must be nearby.
5. Select the appropriate energy level:
  - **SVT / Atrial Fibrillation / Atrial Flutter:** 120J (1 J/kg child)
6. Charge the monitor to the desired energy level.
7. Clear personnel from direct patient contact.
8. Depress and hold both discharge buttons until an electrical charge is delivered.
9. Reassess the patient and rhythm after the shock is delivered.
10. Repeat synchronized cardioversion as needed. On some models, it may be necessary to depress the “synchronize” button after each synchronized cardioversion.
11. If the rhythm deteriorates into ventricular fibrillation or pulseless ventricular tachycardia, switch off the “synchronize” mode and defibrillate immediately. Refer to the Ventricular Fibrillation / Unstable Ventricular Tachycardia protocol, p. 80.

### **Procedure for Defibrillation:**

1. Using the cardiac monitor/defibrillator, apply the electrode self-adhesive pads in the correct location confirm that the rhythm is ventricular fibrillation or pulseless ventricular tachycardia.
2. Select energy level to be delivered: 200J (2 J/kg child).
3. Charge the defibrillator to the desired energy level.
4. Make sure all personnel are clear of the patient.
5. Depress “discharge” shock button until the electrical energy is delivered.



6. Reassess the EKG rhythm and check the patient for a carotid pulse.

**Automatic Implantable (Internal) Cardiac Defibrillator (AICD):**

1. If a patient's AICD is discharging, the main dilemma is to determine whether it should be delivering shocks (*i.e.* working properly). Place the patient on the cardiac monitor and note when the AICD is firing.
2. If the **unconscious** patient receives shocks from the AICD, but ventricular fibrillation or pulseless ventricular tachycardia persists, then deliver external defibrillation anyway with the normal amounts of defibrillator energy. Avoid placement of the self-adhesive electrode pads over the AICD. Defibrillate as you normally would using the Ventricular Fibrillation / Pulseless Ventricular Tachycardia protocol, p. 80.
3. If a **conscious** patient is receiving appropriate shocks from the AICD (*i.e.* patient having runs of ventricular tachycardia) **no** external synchronized cardioversion is necessary (as long as patient remains conscious). Administer lidocaine 1.5 mg/kg IV as needed. The lidocaine may be repeated at one-half the original dose as necessary up to 3 mg/kg IV maximum.
4. If the AICD appears to be shocking inappropriately (usually sinus tachycardia or SVT), begin rapid transport to the hospital. In the emergency department, a donut magnet can be used to inactivate the AICD.

**Notes:**

- Atrial fibrillation rarely causes hypotension by itself. Always look for other causes. Cardioverting atrial fibrillation can be very risky due to the potential for dislodging thrombi in the heart. Use very careful judgment when deciding whether to cardiovert atrial fibrillation. **Medical control must be contacted prior to cardioverting atrial fibrillation.**
- Do **not** cardiovert a potentially digoxin toxic patient.
- Rapid defibrillation is the most important intervention for patients in ventricular fibrillation or pulseless ventricular tachycardia.
- If the patient has a permanent pacemaker, place the electrode self-adhesive pads as far away as possible from the pacemaker.
- Any medication patches (nitroglycerin, clonidine, etc.) should be removed prior to synchronized cardioversion or defibrillation.

## Tranexamic Acid (TXA) Protocol

### Introduction:

- Tranexamic acid (TXA) is an anti-fibrinolytic medication that prevents the breakdown of clots formed in a bleeding patient. TXA forms a reversible complex that displaces plasminogen from fibrin resulting in inhibition of fibrinolysis. It also inhibits the proteolytic activity of plasmin.
- TXA has been shown to reduce overall mortality and death due to bleeding among severely injured trauma patients, especially in the first 3 hours following injury.
- The purpose of TXA is to reduce blood loss in trauma patients with severe hemorrhage.

### Indications:

1. TXA should be administered to hemodynamically unstable trauma patients, who are felt to have non-compressible ongoing hemorrhage (**SBP <100 mmHg**) and that is not amendable to tourniquet use.
2. Major trauma with suspicion for pelvic and/or abdominal injury.
3. Signs of hypoperfusion (altered mental status, cool extremities, delayed capillary refill, etc.).
4. Blunt or penetrating trauma patients with suspected or known specific hemorrhage and are known or thought to be **within 3 hours of their injury**.

### Contraindications:

1. Known hypersensitivity to TXA.
2. Active thromboembolic disease (including DVT), disseminated intravascular coagulation (DIC) or history / risk of thrombosis.
3. Not indicated for **patients < 16 y/o**.
4. Suspected CVA, MI, or PE.
5. Medical control should be contacted prior to administering TXA to patients taking warfarin (Coumadin®).
6. Non-hemorrhagic and non-traumatic shock.
7. Isolated head injury.
8. Injury > 3 hours old.
9. Known pregnancy stated by patient or obvious pregnancy clinically.

### Procedure:

1. TXA is supplied in vials of 1000mg/10mL. The standard loading dose is 1000mg IV.
2. Withdraw TXA from vial and inject 1000mg of TXA into a bag of 100mL of sodium chloride 0.9%.
3. Infuse TXA 1000mg IV over 10 minutes. Do not inject more rapidly than 100mg/min to avoid hypotension. The 1 gram of TXA IV should never be administered faster than 10 minutes.
4. Clearly document in the patient care report the mechanism and time of injury, indications for TXA use, and the time TXA was administered. **Make sure the receiving staff at the trauma center**

**is aware that TXA was administered in the prehospital setting.** This notification is vitally important, and the names of the nurses and physicians told should be documented on the PCR.

**Notes:**

- TXA will be started by EMS as a 10-minute bolus. The 8-hour infusion will be completed later in the hospital.
- Don't forget the basics. In a bleeding patient, hemorrhage control and appropriate resuscitation should remain the priority.
- **Hypotension** can worsen if infused too rapidly.
- TXA may also cause nausea, vomiting, and diarrhea.

## Transthoracic (External) Cardiac Pacing

### Indications:

1. Symptomatic bradycardia (hemodynamically unstable with hypotension, poor perfusion, or altered mental status) unresponsive to atropine or epinephrine. This should be done **prior to attempting an IV in an unstable patient**.
2. Symptomatic bradycardia with malignant ventricular escape beats unresponsive to atropine or epinephrine.
3. 2°AV block type II, 3°AV block, or junctional block unresponsive to atropine.
4. Symptomatic bradycardia in a patient with a heart transplant (it will not respond to atropine).
5. Brady-asystolic cardiac arrest.

### Contraindications:

1. Severe hypothermia (temp < 86°F).

### Procedure:

1. Place the transthoracic pads on the thorax as follows (depending on pacer monitor used):
  - Positive (+) pad on back (to the left of the spine beneath the left scapula), **or** right anterior chest under clavicle.
  - Negative (-) pad on anterior chest (placed between the xiphoid process and left nipple). In females, place the negative electrode pad underneath the breast.
  - Some pacer monitors require the application of the 3 monitoring (limb-lead) electrodes on the patient.
  - Do not place the pacing pads directly over cardiac pacemakers or an AICD.
  - The anterior-posterior approach is the best method for capturing to “sandwich the heart”.
  - Adjust the QRS amplitude on the monitor to obtain adequate QRS height.
2. Start pacing with a rate of 80 beats per minute and a current of 80mA.
3. Increase by 20mAs every 10 seconds until:
  - A. Mechanical capture occurs.
  - B. Significant pain is noted by the patient.
  - C. Maximum current output is reached.
4. After mechanical capture has been obtained, decrease the energy output in 5mA increments until capture has been lost. Then increase the energy output 10mA from this last setting. This “fine-tuning” should be the lowest setting that will capture.
5. Monitor the carotid pulse and try to obtain a blood pressure.
6. Midazolam (Versed®) 1mg - 5mg slow IV push (or IO / IM / MAD) may be administered for sedation in awake patients who are experiencing discomfort from the transthoracic pacer. The midazolam may be repeated as needed.

### Notes:

- If there is no mechanical capture within 30 seconds of attempted pacing, discontinue the attempt at pacing.

- It is safe to touch the patient during pacing.
- Remove any medication patches (nitroglycerin, etc.) prior to pacing the patient.
- Monitor patients with 2° AV block type II, or 3°AV block closely due to the high likelihood of decompensation. Always apply the pacer pads early.
- In the setting of a suspected acute myocardial infarction with symptomatic bradycardia, pacing may be more advantageous than atropine therapy because of atropine's effect of increasing oxygen demands on an already compromised myocardium.
- **Electrical** capture: evident by wide QRS complexes and tall, broad T waves on the monitor immediately after a pacemaker spike.
- **Mechanical** capture: evident by a palpable pulse. It is best to palpate the right carotid artery or right femoral artery to avoid possible misinterpretation between the jerking muscle contractions caused by the external pacemaker.
- Pacing is generally most successful in symptomatic bradycardia. Pacing is not nearly as successful in pulseless patients.
- *For pediatric pacing: start pacing at a rate of 100 beats per minute and a current of 20-40mA. Increase by 10mA until mechanical capture is met.*

Trauma Score (Revised Trauma Score) Adult & Pediatric

<b><u>Revised Trauma Score</u></b>	
<b><u>Glasgow Coma Scale:</u></b>	
13 to 15	4
9 to 12	3
6 to 8	2
4 to 5	1
3	0
<b><u>Systolic BP (mmHg):</u></b>	
> 89	4
76 to 89	3
50 to 75	2
1 to 49	1
None	0
<b><u>Respiratory Rate:</u></b>	
10 to 29	4
> 29	3
6 to 9	2
1 to 5	1
None	0
<b>Total:</b>	0 to 12

**Pediatric Trauma Score**

	<b><u>+2</u></b>	<b><u>+1</u></b>	<b><u>-1</u></b>
<b>Patient Weight</b>	≥ 20 Kg	10 to 20 Kg	≤ 10 Kg
<b>Airway</b>	Normal	Maintainable	Unmaintainable
<b>CNS</b>	Awake	Obtunded	Coma
<b>Systolic BP</b>	≥ 90	50 to 90	≤ 50 mmHg
<b>Open Wound</b>	None	Minor	Major
<b>Bony Injury</b>	None	Closed Fx	Open or Mult. Fxs

## VAN Acute Stroke Screening Tool

1. Is **arm** weakness present? If **YES**, continue VAN exam. If **NO** arm weakness (patient can hold both arms up for 10 seconds) then patient is VAN negative and stop the VAN exam.

	YES	NO
Visual Disturbance?		
Aphasia?		
Neglect?		

2. If patient has **any** degree of **weakness plus** any one of the VAN positive criteria below, then the patient may have a large clot (cortical symptoms). These patients should be transported to an endovascular-capable hospital- with the receiving hospital notified in advance of a "VAN positive" patient arriving.

- Visual Disturbance- assess visual fields by testing both sides using fingers. Evaluate for blind spots using fingers to test all 4 quadrants. Have the patient look right and left and assess for double vision.
- Aphasia- inability to speak (don't count slurring of words) or understand words. Repeat and name 2 objects, close eyes to command, make a fist on command.
- Neglect- forced gaze to one side (or ignoring one side when touching both sides).

## Zoll® LifeVest®

The Zoll® LifeVest® is a wearable defibrillator worn by patients at risk for sudden cardiac arrest (SCA). The LifeVest® is non-invasive and consists of two main components- a garment and a monitor. The garment, worn under the clothing, detects dysrhythmias and delivers treatment shocks. The monitor is worn around the waist or from a shoulder strap and continuously monitors the patient's heart. The garment (vest) contains electrodes and therapy pads. The vest is connected by a wire to the monitor.



The LifeVest® can be used by patients in danger of sudden cardiac arrest, including those with the following conditions:

- After heart attack (MI)
- Before or after cardiac stent placement
- Before/after cardiac bypass surgery
- Cardiomyopathy
- Congestive Heart Failure (CHF)
- Implantable Cardioverter/Defibrillator (ICD) explant (patients who had an internal device, and are waiting for reimplant)

If a patient is encountered wearing the Zoll® LifeVest®, proceed with standard evaluation and treatment measures. CPR can be performed as long as the device is not broadcasting any voice commands. If the EMS provider has external defibrillation available, a decision can be made to disable the LifeVest® by removing the battery located in the monitor unit. They can then place their own monitor / defibrillator device on the patient.



### Be Aware:

- The LifeVest® has an alert sequence that is initiated upon recognition of a treatable shock.
- Make sure to listen to the voice prompts before making physical contact with the patient.
- EMS providers can be shocked if in contact with the patient during treatment sequence.
- If the LifeVest® has blue stains, the device has delivered a shock. The LifeVest® therapy pads release blue gel prior to defibrillation, improving electrical conduction and reducing skin burning.
- After the LifeVest® detects a ventricular dysrhythmia (ventricular tachycardia or ventricular fibrillation), time to defibrillation will be between 25 and 60 seconds depending on the exact dysrhythmia characteristics.
- Avoid patient contact during defibrillation. The LifeVest® will warn of impending defibrillation with a tactile vibration alarm, a two-tone siren alert and a voice command stating "Electrical shock possible. Do not touch patient." or "Bystanders do not interfere."





- Avoid CPR with the LifeVest® powered on. To ensure powered off status, remove the battery from the LifeVest® monitor. Unbuckle or remove the garment as needed for access to the patient's chest.
- The LifeVest® monitor should be disconnected from the electrode belt prior to delivering defibrillation with an AED or manual monitor/defibrillator. The garment and belt do not need to be removed.
- All LifeVest® system components should be transported with the patient to allow for data download and component checks at the hospital when indicated.
- Zoll® LifeVest® technical support can be contacted 24/7 at 1-800-543-3267.

## Community Paramedicine / Outreach Program

- The Community Paramedicine program will utilize the current patient care field protocols and standing orders.
- Occasionally, a community paramedicine patient may require transport to a non-emergency department facility such as a doctor's office. Ideally, this transport will be performed in one of the back-up (*i.e.* non-frontline) ambulances.
- While on these non-emergency transports, if a medical emergency ensues, the current patient care field protocols and standing orders will be followed. If any special situation arises, contact on-line medical control immediately.

## COVID-19: Annaville Fire Department (NCESD#1) Non-Transport Guidance

### **Purpose:**

To identify patients that are safe to assess and **not** transport to a hospital during widespread cases of confirmed COVID-19 patients.

### **Indication for COVID-19 Non-Transport Protocol:**

Healthcare infrastructure is overwhelmed with hospitals exceeding maximum census, and emergency departments experiencing overcrowding.

### **History:**

- Flu-like symptoms

### **Signs and Symptoms:**

- Fever > 100.4°F, chills
- Sore throat
- Cough, shortness of breath
- Body aches
- Loss of taste and/or smell
- Nausea, vomiting, diarrhea (especially in delta variant)

### **Differential Diagnosis:**

- COVID-19
- Pneumonia
- Viral URI
- Bronchitis
- Influenza

### **1. Initial Assessment**

- EMS personnel should have on appropriate PPE (droplet / fluid contamination) which includes N95 mask, impermeable gown, gloves, and eye protection.
- Limit patient contact to only one provider if possible.
- All providers should attempt to maintain a distance of at least 6 feet from the patient when feasible and does not interfere with patient care.

### **2. Patient Assessment**

- Is the patient > 50 y/o?
- Are the vital signs outside (not within) the following limits?
  - Respiratory rate < 8 or > 20
  - Oxygen saturation on room air > 94%
  - Pulse < 100 bpm
  - Systolic BP > 100 mmHg
  - GCS 15 (not intoxicated)
- If **No to All**, proceed to Step 3 below. If **Yes** to any of these, proceed with standard medical treatment protocol.

### 3. **Exclusions:**

- Chest pain (other than mild from coughing)?
  - Syncope?
  - Diaphoresis?
  - Cyanosis?
  - Respiratory Distress?
  - New confusion or inability to stay awake?
  - Obvious indications that the patient is experiencing an exacerbation of a chronic illness (such as COPD, CHF, or asthma)?
- If **yes** to any of these exclusion questions, proceed with standard medical treatment protocol.
  - If **no** to all these exclusion questions, decide if patient is a non-transport candidate:
    - The patient has an adequate support system.
    - The patient has the capacity to understand the decision of non-transport.
    - The patient consents to not being transported to the emergency department.
    - The patient must be able to contact 911 if needed again (patient has access to functional phone, Life Alert®, or responsible adult who will be with patient most of the time).
    - Patient should be followed up by county public health authority, community paramedic, or other mechanism if at all possible.

### 4. If the patient qualifies after the above guidelines are met and consents to non-transport, then:

- Provide the patient with the COVID-19 Care Instructions – Treatment at Home packet.
- Discuss self-quarantine, and when to seek care (chest pain, shortness of breath, syncope).

### 5. EMS Checklist for safe to leave at home (no transport):

- Patient is stable enough to receive care at home.
- Patient meets all inclusion criteria in this protocol.
- Appropriate caregivers are available at home.
- Recommended- there is a separate bedroom where patient can recover without sharing immediate space with others.
- Resources for access to food, phone, and other necessities are available.
- The patient and other household members have access to appropriate, recommended PPE (at minimum gloves and facemask), and are capable of adhering to precautions recommended as part of home care or isolation (e.g. respiratory hygiene, cough etiquette, hand hygiene).

## LifeVac Airway Clearance Device

LifeVac is a non-powered, non-invasive, portable, airway clearance device developed for resuscitating a victim with an airway obstruction when current choking protocols have been followed without success (refer to Choking protocol, p. 20). It is a simple rescue suction device that can be used on someone disabled, pregnant, or large in stature.



The negative pressure generated by the force of the suction is 3 times greater than the highest recorded abdominal thrusts- capable of generating over 300mmHg of suction.

LifeVac is used to help resuscitate a choking victim when standard maneuvers fail. The LifeVac consists of a facemask that fits over the nose and mouth attached to a plunger with a one-way valve. When you push down on the plunger air is pushed out the sides and not into the victim, and when you pull back on the plunger negative pressure suctions the obstruction out of the airway.

This device can be used on children who weigh 22 pounds (>10kg) or more, including seniors.

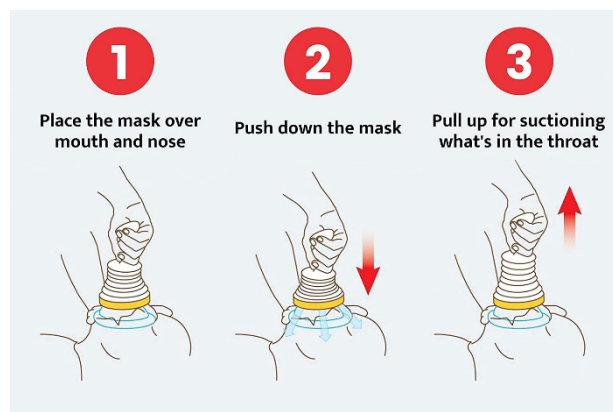
The LifeVac can be used in any position (sitting, standing, lying down).

The device is designed for one-time use. It should not be used again for sanitary reasons.

Use of the LifeVac is considered a BLS skill in these protocols.

### Simple instructions:

- “Place, Push, and Pull.”
- Use the appropriate mask for the individual who is choking. The system contains 2 adult sizes and 1 pediatric size.
- Place mask over the nose and mouth to create a seal.
- Push the handle all the way down.
- Pull up the handle swiftly to create suction to remove the lodged food or object in seconds.
- Repeat this step if necessary.





# Section 6:

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