PATIENT CARE TREATMENT PROTOCOLS

paladin

Clinical protocols designed for an aggressive, forward leaning rural transport and non-transport EMS (NTEMS) Programs.

Damon Darsey, MD

2025 Medical Protocols. Version 1

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Preamble

The purpose of this protocol manual is to set basic standards of patient care for the transport team and to serve as a basis on which to evaluate patient care for performance improvement measures.

The medical policies and procedures described in this manual are meant to serve as guidelines for the teams and agencies working under these protocols. Deviation from these policies and procedures may occur with the consultation of Medical Control and the individual training and abilities of the medical crew. Medical Control may be contacted for additional orders by telephone, radio, or other communication device. In the event direct verbal contact is not possible (radio/telephone failure), the transport team should use their best professional judgment in delivering patient care and notify medical control as soon as possible.

The protocols which follow include procedures which the State Board of Nursing prohibit registered nurses (RNs) from performing and procedures which the affiliated states' Bureau of Health-Emergency Medical Services prohibit Basics, Paramedics or Critical Care Paramedics from performing. However, all procedures listed herein are approved for RN, Basics, EMT-Advanced, Paramedic or Critical Care Paramedic. In no case will an RN or Paramedic or Critical Care Paramedic be encouraged or allowed to perform a skill that he/she is not allowed to perform by the appropriate state licensing/certifying agency.

Patient care requires the treatment team to function independently and rely upon their clinical judgment and interventional skills in delivering patient care. These protocols serve as recommendations only and do not represent absolutes in standard of care. It is recognized that appropriate medical or trauma care, at times, requires deviation from these guidelines. The transport team is allowed to deviate from these guidelines when, in their judgment, it is appropriate. Such deviation from protocols requires accurate documentation by the treatment team and contact with medical control as soon as possible. These protocols are subject to updates on a regular basis. Printed copies are for reference only; up-to-date protocols are maintained electronically and available to the crew.

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Damon Darsey, MD, FAEMS
Off-line Medical Director

Protocol Revision Log

Changes from previously approved protocols in 2024

Date	Protocol Number	Change Made
7/8/2025	Preamble	Changed from Mississippi specific to "affiliated state" to allow for larger use in other states.
7/8/2025	Air Transport Physiology (G-001)	Added documentation requirements for air medical resources and QR code for evaluation.
7/8/2025	Burn Scene Transports (G-003)	Updated burn center database and added accreditation to burn centers
7/8/2025	Emerging Infectious Threats (G-011)	REMOVED from protocols
7/8/2025	Abdominal Pain (T-002)	Added Consideration of blood transfusion for refractory hypotension with clinical signs of hemorrhage or clinical suspicion.
7/8/2025	Airway Obstruction (T-003)	Added consideration of plasma transfusion for critical angioedema.
7/8/2024	CV: Cardiac Arrhythmias (T-014)	Emphasis on Cardizem if available in powder form for EMS. Load with PO Cardizem for longer distance transports > 30 minutes
7/8/2025	GI Bleed Management (T-022)	Added consideration of blood transfusion with known Hb < 7 or suspected with hypotension.
7/8/2025	Neuro: Suspected CVA (T-028)	Emphasis on the *Rapid Arterial oCclusion Evaluation* (RACE) Scale for stroke and destination decisions
7/8/2025	Neuro: Seizure- Adult (T-029)	Added Keppra for refractory seizures
7/8/2025	OB: Preeclampsia/Eclampsia (T-031)	Emphasis on Magnesium treatment and destination decisions
7/8/2025	OB: Preterm Labor (T-034)	Emphasis on assessment and consideration of tocolysis
7/8/2025	Asthma/Status Asthmaticus (T-041)	Emphasis on terbutaline in status
7/8/2025	Trauma: Head Injuries (T-051)	Addition of hypertonic saline for significant head trauma
7/8/2025	Trauma: Hemorrhage Control & Blood Transfusion (T-052)	Adding calcium to blood transfusion protocol
7/12/2025	EMT and AEMT Scope- MS (G-014)	Clarified EMT and AEMT Scope of practice based on August 2024

- All protocols were reviewed and marked with the date reviewed in 2025

General Protocols

Clinical Policy

1. All crew members and communications specialists/dispatchers are to understand the physiology and effects of altitude on human physiological conditions.

General Protocol

1. Transporting patients by air has several effects on the organ systems below. All efforts to correct or lessen the effects shall be completed by the flight crew. VFR[1] flight will be at altitudes that do not provide significant changes in volume or pressure; however, it should be assumed that IFR[2] flights will cause at least a minimal effect on volumes and pressures and thus pose a potentially clinically significant changes in the patient's condition.
   - 1.1. Cardiovascular System
     - 1.1.1. Hypoxic stress could aggravate or precipitate occult cardiac ischemia. All cardiac patients should be on appropriate supplemental oxygen and should be continuously monitored.
     - 1.1.2. No current evidence indicates that modern pacemakers or implanted cardiac defibrillators (ICDs) are affected in any way with in-flight electromagnetic interference.
   - 1.2. Neurogenic
     - 1.2.1. Recent skull fractures or patients who are status post craniotomy must undergo risk/benefit analysis for intracranial air as this expands at altitude.
   - 1.3. Otolaryngologic
     - 1.3.1. Barotrauma is mediated through expansion and contraction of enclosed air spaces (air cells)
     - 1.3.2. Problems occur when expanding gas does not communicate freely with the external environment.
     - 1.3.3. This may occur within the middle ear, the sinus cavities, and, occasionally, the teeth.
       - 1.3.3.1. Delayed ear blocks
         - 1.3.3.1.1. Worse in those who are inhaling 100% FiO2.
         - 1.3.3.1.2. Wean oxygen as listed in the Oxygen Management Protocol
     - 1.3.4. All patients should be provided hearing protection regardless of clinical condition unless such protection interferes with resuscitation attempts.
   - 1.4. Gastroenterological
     - 1.4.1. GI tract complications from altitude are typically present on ascent.
     - 1.4.2. All intubated patients should have an NG/OG tube placed.
     - 1.4.3. Gastrointestinal perforation should be considered a relative contraindication to air transport. **The Medical Director (or designee) should be engaged before transport**.
   - 1.5. Pulmonary/Mediastinum
     - 1.5.1. Untreated, clinically significant pneumothorax is a contraindication to flight unless sea-level cabin pressure can be strictly guaranteed.

[1] Visual Flight Rules (VFR)
[2] Instrument Flight Rules (IFR)

1.5.1.1. Assumption of sea-level cabin pressures is difficult with IFR or flights where altitude is anticipated to be on the mid-upper limit of normal helicopter operations.

2. Other Conditions

2.1. Air sickness (Kinetosis)

2.1.1. Risk Factors include:

2.1.1.1. Young age (especially 2-12 y)

2.1.1.2. Anxiety

2.1.1.3. Lack of a window view

2.1.1.4. Poor ventilation

2.1.1.5. Seating in the rear of cabin

2.1.1.6. Excessive cabin heat

2.1.1.7. History of motion sickness

2.1.2. Pre-medication should be considered if risk factors are identified or if turbulence is expected in non-intubated patients.

2.1.3. A lower threshold for intubation and definitive airway protection may be prudent when long flights, spinal instability, or if turbulence is expected.

2.1.4. Special Considerations:

2.1.4.1. Gas gangrene has the potential to expand, spread or increase pain with ascent.

2.1.4.2. SCUBA diving accidents or suspected accidents

2.1.4.2.1. Flight crews will consult with on-line medical control about altitude and risk/benefits about air medical transport.

2.1.4.3. Intra-Aortic Balloon Pumps (IABP)

2.1.4.3.1. Be mindful of the changes of attitude and the pressures alarms on the IABP machine.

2.2. Temperature

2.2.1. It is important to remember that ambient temperature decreases with the increase in altitude. Core temperature should be monitored as well as ambient temperature to ensure adequate temperature is kept in the cabin.

Special Notes/Points

- Other impacts of altitude on human physiology and equipment:
  - Expansion of air in medical equipment: The endotracheal and tracheostomy tube cuff pressures should be constantly monitored; alternatively, the cuffs can be inflated with sterile water. The use of glass fluid bottles should be avoided; all fluid bottles and fluid collection systems should be vented. Chest tube drain with Heimlich valve should be used. Air casts or pneumatic splints should be avoided to prevent limb entrapment.

- Third spacing: This is due to pressure changes and increase in vascular permeability causing fluid shift from intra-vascular to extra-vascular space leading to edema, dehydration, and hypovolemia.

If there are on-line medical control orders the crew members are concerned will jeopardize the safety of transport or compromise the patient, crew members should contact the Off-line medical director (or designee in his/her absence) immediately.

Pneumothorax and Transporting by Helicopter

There is no need to place a chest tube to decompress the chest for a small or otherwise clinically insignificant pneumothorax. This includes IFR flights. (Parkyka C., et al Injury. 54(9): 110886 September 2023

Use of Air Medical Resources (Rotor Wing/Fixed Wing) from scene

The use of air medical resources provides an integral tool to the ground, austere or offshore medical team. The use of these resources can have a dramatic impact on the patient in nearly ever aspect of their life (Health, financial, etc). Medical crews utilizing aircraft must clearly document the need for air medical care to include the clinical, logistical and operational reasons this was needed. In a 2023-2024 review of scene request, rarely was the aircraft "faster" in overall time to the definitive therapy and/or arrival at tertiary care. "Fast" needs to be a consideration, but not the only consideration. Each air medical request should be accompanied with a completion of the evaluation notification system below.

Clinical Policy

All transport personnel are responsible for understanding and following this protocol.

General Protocol

Affiliated Medical Control team members should refer to your published controlled substances protocol.

Medical Marijuana (Cannabis)

In 2022, the Mississippi Medical Cannabis Program (MMCP) became law allowing physicians to prescribe medical cannabis for certain conditions. The use of Medical Cannabis has no current evidence for use in emergency medical services or emergency medicine and is NOT allowed in the ambulance or transport vehicle. If a patient has a MMCP card or documentation from another state, the medical cannabis should be left with a family member (with valid witness as outlined in the controlled substances program) and not taken in the ambulance. The use of medical cannabis in the ambulance, transport vehicle or while in care of the medical team is forbidden.

Clinical Policy

1. All transport personnel are responsible for understanding and following this protocol.
   1.1. Due to the clinical complexity and multiple variations with burn centers supporting the State of Mississippi, this protocol is changed often.

General Protocol (Scene)

2. Destination Decision:
   2.1. Burns without suspicion of traumatic mechanism:
   2.1.1. Options for Destination→ ***See below chart.***
   2.1.2. Patient or patient's family has preference of options.
   2.1.3. Transport crews should have destination centers based off initial reports.
   2.2. **Burns where traumatic mechanism is unable to be excluded.**
   2.2.1. Options for destination→ Memphis, TN (Region 1), Mobile, AL (USA), Birmingham, AL (UAB) or Jackson, MS (UMMC).
   2.2.2. A level I trauma center is default location.
   2.2.3. The closest appropriate trauma center should be considered with preference to those trauma centers with integrated burn/trauma units, especially with pediatric patients.

General Protocol (Destination Guidelines)

3. Burns without suspicion of traumatic mechanism:
   3.1. Consider transporting the patient to the closest primary burn center.
   3.2. Some burn centers have authorized automatic acceptance→ ***See chart below.***
   3.3. During initial flight planning, determination on burn center locations should be considered based on aviation factors.
   3.4. Once options are determined, family or patient should be given available options for burn center options.

4. Burns where traumatic mechanism is unable to be excluded:
   4.1. The default is a trauma center with associated accredited burn center unless there are stable traumatic wounds and based on the patient's condition, transport to a primary burn center and trauma center is appropriate.
   4.2. Mobile, AL, New Orleans, LA and Memphis, TN are the nearest accredited burn centers[3] with associated level I trauma centers and should be considered if those are closer or equal flight/transport times.
   4.3. Transport to UAB, UMMC or USA are the default locations for traumatic stabilization or if longer distance transport is not feasible due to clinical or transportation factors.

[3] ABA website- accessed 7/8/2025

5. Provide stabilizing care on arrival, after such care has been rendered based on the specific protocol- then inquire about destination.
   5.1. The patient (if able to communicate) or family member verbalizes which hospital they desire. This attempt shall be in good faith- not compromising scene time or patient care.
   5.2. If there is no preference, patients shall be transported to the nearest appropriate trauma center by regional trauma destination guidelines and not on diversion.

Non-Mississippi EMS operations shall follow local or regional protocols for burn transports.

Special Notes/Points

Mississippi Burn Center Reference Chart

Burn Centers Supporting Mississippi			
Burn Center	**City, State**	**Referral Number** *Unit Fax Number*	**Age Restrictions** ***Trauma Center***
Baton Rouge General's Regional Burn Center	Baton Rouge, LA	**(225) 387-7715** Unit Fax (225) 387-7088	All ages ***Not a Trauma Center***
University of South Alabama Regional Burn Center	Mobile, AL	**(800) 388-8721** Unit Fax (251) 471-7556 Unit Phone: (251) 471-7520	Age > 13 ***Trauma Center***
Burn Center at Children's Hospital (Birmingham)	Birmingham, AL	**205-638-7200** Unit Fax: (205) 638-6866 Unit Phone: (205) 638-9398	PEDS ONLY (Age <16) *Larger teenager patients will go to UAB. Call with questions and weight.* ***Pediatric Trauma Center***
Mississippi Burn & Hand Center (Baptist)	Jackson, MS	**833-672-8767**	Call for pediatric age restrictions
Firefighters Regional Burn Center	Memphis, TN	**(901) 545-8181** Unit Fax: (901) 545-6809 Unit Phone: (901) 545-8090	Age >12 ***Trauma Center***
UAB- Burn Center	Birmingham, AL	**(800) 822-6478** UAB MIST Line Unit Fax (205) 996-2876 Unit Phone (205) 934-0006	Age > 16 ***Trauma Center***
UMMC- Jackson	Jackson	**601-984-4367**	Limited Burns ***Trauma Center***
UMC – New Orleans	New Orleans, LA	**Unit Phone: 504-702-4527** **Burn Center Director: 336-782-5053** **Fax: 504-702-4976**	Age > 15 ***Trauma Center***
			UPDATED: 7/8/2025

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

2. Medical Control

2.1. Affiliated medical teams shall take medical director orders from the on-line medical director or designated medical control liaison as proxy for the on-line medical director. All order requests shall be handled through an EMS dispatch center or other associated and approved center and be documented in the approved system. If in doubt of an order, the transport crew should contact the on-line medical control physician. If transport to a hospital, the receiving physician can be used for on-line medical control as a last resort. (See *Control of EMS on Scene/Interfacility by on-scene physicians/mid-level providers for more details.)*

2.1.1. Due to the time-sensitive nature of EMS and critical care transport, medical control physicians shall be readily available by phone to answer questions or obtain updates from transport crews. It should be reasonable to expect a medical control physician to answer the radio or phone within five minutes. If five minutes have expired, medical crews are to continue treatment according to the approved protocols. Crews are expected to notify the medical director and respective program director of such delays within 24 hours of the occurrence via email.

2.1.2. Nurse Practitioners in Mississippi are not allowed to provide on-line medical control. If requested by the on-line medical control physician, mid-level providers can receive updates during the transport. The on-line physicians are expected to personally receive those updates. Only approved and published mid-level providers are allowed to provide on-line medical control as a designee for the on-line medical director.

3. Medical Communication

3.1. Communication with other hospitals should be via the statewide hospital radio frequency (155.340) (Mississippi, Tennessee, Alabama, Louisiana)

3.2. Calls between on and off duty crews for medical advice should be avoided and are not covered in the medical control plan. Any calls regarding patient care or movement should be made via the approved dispatch center.

4. Receiving Hospital Communication

4.1. Identify self and ensure that the base station is receiving your transmission well enough to understand what you are saying.

4.2. Origin of patient.

4.3. Age and gender of the patient.

4.4. Patient's chief complaint, level of distress, diagnosis, and treatment at sending facility.

4.5. Response to treatment at the sending facility.

4.6. Any additional pertinent information.

4.7. Treatment that you have provided.

4.8. Status of patient.

4.9. Level of consciousness.

4.10. Request for additional orders (if any).

4.10.1. Estimated time of arrival.

4.10.2. Special needs on the helipad (if any).

5. Medical Documentation: Patient Care Reports

5.1. All patient records shall be completed within 24 hours of the completion of the call and provided to the receiving hospital.

5.2. All EKG's provided during the transport or treatment shall be documented.

Special Notes/Points

- NONE

Clinical Policy

1. All crew members should be able to complete this skill.
   1.1. This policy also includes on-scene mid-level providers (Physician's Assistants/ Nurse Practitioners).
   1.2. Unless specifically mentioned, a "provider" will be assumed to be a mid-level provider or physician.
   1.3. For the purposes of this protocol a previous provider-patient relationship includes the following circumstances:
      1.3.1. The on-scene provider is the current physician on record of the patient being transported.
      1.3.2. The on-scene provider is the patient's primary care or specialty physician.

General Protocol

2. Due to the independently functioning transport crew under direct medical control by a physician lead team, on-scene orders from physicians and other mid-level practitioners shall be limited. This limitation is to provide a seamless and efficient critical-care transport environment. With the involvement of the transport teams, the assumption of an emergency patient is made and thus, the experienced clinicians that make up the transport crews shall have the ability to operate according to the protocols outlined in this protocol manual. If an on-scene physician or mid-level provider desires to direct care the following protocol should be followed.
3. Physicians/Mid-level providers **without** previous provider-patient relationship
   3.1. **For a fully licensed physician who is not a part of the EMS system to assume control at the scene of an emergency, all of the following must take place:** (otherwise known as an "intervener physician")
      3.1.1. Proof of the physician's identity and current licensure must be provided to the senior transport crew member (for ground ALS services this would be the paramedic) in a timely manner.
      3.1.2. The on-line medical command physician must be notified and agree to relinquish control to the on-scene physician. This can usually best be accomplished by having the medical command physician speak directly with the physician at the scene.
      3.1.3. Until such time as both of these conditions are met, personnel shall function under the approved protocols under the direction of established on-line medical control.
   3.2. **The physician/provider at the scene must agree to sign his or her orders**.
   3.3. **If control of the emergency is given to the on-scene physician, then the physician can only issue orders within the scope of training and practice of the transport crew.**
      3.3.1. In issuing the order, the on-scene provider will be willing to accompany the patient to the hospital if requested by the transport crew. For air medical transports, this decision will be made by the flight crew and pilot in command based on aviation and medical factors that routinely are used to determine the safety of third riders, family members, or observers. For ground transport, the decision will be made by the transport team.
   3.4. **Any orders or procedures outside of the transport crew's scope of practice will have to be carried out personally by the on-scene physician**.

3.5. **Contact Med-Control if/when needed to clarify this policy or request assistance.**

4. Physicians/Mid-Level providers **with** previous provider-patient relationships
   4.1. **As a rule, it is desirable that the transport crew called to the scene of an emergency, even within a physician's office or hospital, perform an assessment and manage the patient just as would be done in any other location.**
   4.2. **If the physician wishes to take control of the patient's management, he or she may do so if communication is established between on-line medical command and the physician at the scene.**
   4.3. **If control of the emergency is assumed by the on-scene physician, then:**
      4.3.1. The physician's license number will be recorded on the run report.
      4.3.2. Orders within the scope of training and practice of the transport crew will be carried out.
      4.3.3. Orders outside the scope of training and practice of the transport crew will be personally carried out by the on-scene physician.
      4.3.4. The on-scene physician will sign his or her orders. No verbal orders are accepted.
   4.4. **The on-scene physician must accompany the patient in the transport vehicle to the hospital unless released by the on-line medical command physician and giving deference to the pilot in command and crew members based on aviation factors**.
   4.5. Exceptions to this are made with a pre-planned mass gathering (athletic event) where there is a designated team of "Team or Event Physicians." This exception will be valid if discussed with the medical director prior to the event. No scope of practice or deviation from standard of care is authorized.

Special Notes/Points

- NONE

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

2. Shift Change (All crews)
   2.1. At the changing of shift, a crew sign-out should occur to review at a minimum:
      2.1.1. Medical equipment issues
      2.1.2. Diversion/Hospital status
      2.1.3. Communication issues or deviations
      2.1.4. Weather forecast
      2.1.5. Any other issues that are known by the off-going crew that might impact the next shift's operations.
   2.2. Each team/base should keep a log of shift briefings/sign-outs.
3. Patient Transition/Hand-off
   3.1. At each patient transition, crew members should provide written communication to the accepting crew. This hand off record should contain at a minimum:
      3.1.1. Two patient identifiers (Name, DOB, Age, Race, MR number)
      3.1.2. Important clinical findings (HPI/Physical Exam)
      3.1.3. Diagnostic findings (EKG, Labs, Glucose, etc.)
      3.1.4. Treatment provided and response to treatments.
      3.1.5. Contact number of family (if available)
   3.2. The person and title who received the written hand off should be documented in the transport patient care report.
      3.2.1. If there was only a verbal sign off, the reason for the lack of a written report shall be documented and the person receiving the report should be given an opportunity to ask questions and be given instructions on how to contact the treatment/transport team.
4. The clinical chart should be completed before the end of the shift and submitted to medical records at the receiving hospital.

Mass Gathering Assistance Documentation

Mass gathering medical care is unique and presents several challenges to responders and emergency personnel. Medical teams shall use a form for documentation of basic first aid, OTC medications dispensed and refusals to include (at a minimum) the patient's name, sex, age, DOB, chief complaint, treatment provided and disposition.

Special Notes/Points

- Patient sign-outs are widely considered a time in medical care where there is great risk for miscommunication or no communication that can directly affect the safety of patients.
- Non-transport personnel should also use a hand-off form for the transition of care to a transport agency.

Non-Transport EMS (NTEMS) Providers Documentation and Communication

Providers that are operating away from an ambulance during a disaster or mass gathering event are requested to complete a medical report form in accordance with their department policies. A full report is needed if ALS care is rendered.

At the time of the arrival of the transport unit, the arriving ambulance paramedic assumes command of the patient. Verbal agreement should be communicated between the first responding medical provider and documented time and hand off provider's name and credentials. If the responding crew is a less trained crew (BLS for instance); then the on-scene responding medical provider should make an assessment if transport is needed. IF ALS care has been started, and a paramedic is on scene the care needs to continue in the ambulance. CONTACT medical control with questions or issues.

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

2. Transport crews shall evaluate each patient's ventilation and oxygenation status and supplement where necessary. Oxygen shall be administered and be titrated to achieve oxygen saturations > 95%. Oxygen can be withheld if room air oxygen saturations are normal, and the patient is not in respiratory distress. The following clinical scenarios deviate from this statement:
   - 2.1. Smoke Inhalation/Burns/Suspected Cyanide Poisoning, known pneumothorax: 100% oxygen shall be delivered despite the oxygen saturation.
   - 2.2. Chronic Lung Conditions: there are documented or reliable reports of home oxygen saturations that are lower than 96% and no evidence of worsening cyanosis.
   - 2.3. Congenital Heart Defects: Detailed history should be obtained to include a request for brief review of patient's record to note normal oxygen saturations.
   - 2.4. Therapeutic Hypothermia-→ *See Specific Protocol*
   - 2.5. Acute Coronary Syndromes (ACS) and Cerebral Vascular Accident (CVA) oxygen administration shall be enough to achieve oxygen saturations to 95%.
   - 2.6. Consider humidified oxygen for neonates or small infants for ALS and CCT transports.
3. CCT assets should have an oxygen/air blender for use on patients not connected to the ventilator.

Oxygen Cylinder	Oxygen Cylinder Conversion Factor (OCCF)
D Cylinder	0.16
E Cylinder	0.28
H Cylinder	3.14
M Cylinder	1.56
EC-135	1.0
EC-145	1.0

Oxygen Consumption Calculation

Duration (minutes) = (OCCF x psi)/ Flow Rate

Special Notes/Points

- None

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

2. Normal Mental Capacity
   2.1. Mental competency is a legal status of a person's ability to make decisions. An individual who is alert, oriented, and has the capacity to understand the circumstances surrounding their illness, injury, or impairment, as well as the possible risk(s) associated with refusing treatment and/or transport typically is considered to have normal mental capacity. The individual's judgment must also not be significantly impaired by illness, injury, or intoxication[4]. Individuals who have attempted suicide, verbalized suicidal intent, or had factors that lead EMS crews on scene to suspect suicidal intent, should not be regarded as having mental capacity.
3. Patient Refusal
   3.1. Gain a complete HPI and brief physical exam (including vital signs)
   3.2. Determine the individual's capacity to make valid judgments concerning the extent of the individual's illness or injury (same for a parent or guardian of a minor child or special need adult).
      3.2.1. Consult medical control to assist with capacity determination if needed.
   3.3. If capacity is determined, explain the risk(s) of refusal of emergency care to include unexpected death from unknown and non-evaluated conditions or complications.
   3.4. Ensure that the patient or guardian can repeat the risk(s) back to you.
   3.5. Enlist others to assist in discussing risk(s) and encouraging transport (hospital providers, family, law enforcement, friends, etc.).
   3.6. Attempt to see if there is a middle ground (partial refusal) or compromise to ensure patient gets the care needed. A partial refusal still needs documentation, and the patient must still have capacity to refuse partial care.
      3.6.1. Offering to call a family member if refusing to ride in ambulance.
      3.6.2. Offering to transport by ambulance if refusing a helicopter/airplane.
      3.6.3. Offering some treatment but deferring the refused part (example: IV access).
   3.7. Medical Control should be contacted before completing the refusal process if an ALS procedure has been attempted or completed. This includes EKG, IV sticks, medication administration, etc.
   3.8. A complete chart should be obtained on refusals to include specific directions on the risk(s) and benefit(s) of recommended care, transport, and method to get assistance if needed in the future.

Special Notes/Points

[4] This is based on clinical provider judgement of clinical intoxication from medications or alcohol.

- EMS providers should not put themselves in danger by attempting to treat and/or transport an individual who refuses care. Local law enforcement should be contacted before restraining or transporting someone to the hospital against their will.
- In respect to these protocols, the age of majority to make medical decisions in Mississippi is eighteen (18).
- Some of this information might not be readily available and EMS providers should use their best judgment.
- Consent for Unemancipated Minor
    - *MISS. CODE ANN. § 41-41-3* (2012)
- It is hereby recognized and established that, in addition to such other persons as may be so authorized and empowered, any one (1) of the following persons who is reasonably available, in descending order of priority, is authorized and empowered to consent on behalf of an unemancipated minor, either orally or otherwise, to any surgical or medical treatment or procedures not prohibited by law which may be suggested, recommended, prescribed or directed by a duly licensed physician:
    (a) The minor's guardian or custodian.
    (b) The minor's parents.
    (c) An adult brother or sister of the minor.
    (d) The minor's grandparent.
- (2) If none of the individuals eligible to act under subsection (1) is reasonably available, an adult who has exhibited special care and concern for the minor and who is reasonably available may act; the adult shall communicate the assumption of authority as promptly as practicable to the individuals specified in subsection (1) who can be readily contacted.

Implied Consent

The legal term *implied consent* refers to situations in which it is assumed a person consented to something by his actions. This means that, although the person has not given verbal or written consent, circumstances exist that would cause a reasonable person to believe the other had consent. For the purposes of emergency medical care and treatment- this term and actions should give medical care unless there are specific notes or orders to the contrary.

Mass Refusals

Mass refusals are allowable under medical protocols. Mass refusals are used when there is an event at a school or school bus where multiple people were exposed, ill or involved in an accident where there are NO complaints of pain or illness. In these scenarios, it is acceptable for the senior crew member to obtain the names and DOB (or other means of secondary identification) and allow a single responsible person to complete the refusal document (School System employee, day care leader, etc.)

Risk Stratification of EMS Refusals:

No medical complaint: Those patients in which EMS was dispatched to a scene of an injury/illness by protocol, 911 call hang-up or third-party call where there is a potential patient, but NO MEDICAL request is made to EMS personnel on scene by the person(s) on scene. In this case, documentation of the name and age. The patient is not under any type of coercion and is making the statement of no medical care needed that is clear and free of any coercion and the patient doesn't appear to be in any distress/injury.

Documentation needs to reflect the lack of evidence of medical need and/or the statement of no medical need. **No physical patient contact is needed in these type refusals** (no vitals, etc.).

Low Risk Refusals: Those patient scenarios where a third party activated EMS or there is a patient (or surrogate) that has requested EMS to respond to the scene of an incident or illness. On arrival of EMS to a patient that has a medical complaint, or the EMS crews observe a medical need. Patients that are between 1 year old and 50 years old. This also includes those patients that are DNR on hospice or have obvious signs of death on arrival. There is no need to contact on-line medical control on these cases.

Patient assessment and documentation needs to include (at a minimum)

- Complete set of vitals
- Complete Demographic (Name and one of the following DOB: phone number or address)
- Documentation of lack of coercion, clearly document the decision to refuse medical care, clearly document advocacy efforts to get the patient to go to the hospital and
- The patient (or guardian) was able to understand, summarize and REPEAT the risk of refusal.

Moderate Risk Refusal: A few categories of patients automatically fall into this category.

- Patients > 64 year of age or < 3 years of age[5]
- Patients that are inmates, detained or arrested by law enforcement.
- Patients in which ALS care has begun and termination of resuscitation is being considered.

These cases require a call to on-line medical control with a peer on-duty paramedic to provide a recording of the thought, ensuring the patient is free and clear of any coercion and that protocols have been followed. The FEARS mnemonic[6] should be followed in these cases.

FEARS for Refusals

F: Full Exam

E: Explain real risk

A: Ask for assistance

R: Record the discussion

S: Supportive Attitude

Difficult Refusals: A few categories of patients/scenarios automatically fall into this category.

- Patient that appears by the on-scene medical personnel <u>to be under coercion and is not free and clear</u> to make a refusal of medical care.
    - ALL PATIENTS that are in police custody, arrested or otherwise detailed by law enforcement fall into this category.
- Patient that has provided a clear threat to self/others to the on-scene medical personnel and is refusing to go to the hospital.
- Patients where religious issues inhibit/limit or strain standard of medical care.

These cases require a call to on-line medical control with the medical director (or designee) via a recording of the situation, ensuring the patient is free and clear of any coercion and that protocols have been followed.

[5] Knight S, Olson LM, Cook LJ, Mann NC, Corneli HM, Dean JM. Against all advice: an analysis of out-of-hospital refusals of care. Ann Emerg Med. 2003 Nov;42(5):689-96. doi: 10.1016/S0196064403005249. PMID: 14581923.
[6] Hoyt BT, Norton RL. Online medical control and initial refusal of care: does it help to talk with the patient? Acad Emerg Med. 2001; 8:725–30

The FEARS mnemonic should be followed in these cases. These cases should provide the most clear and concise documentation. Encourage of documenting witness names, specific quotes of patient statements.

Return of Service: All refusal discussions should include a clear and concise method to activate the EMS system again if needed. For example, educating and providing directions to call 911 or otherwise activate the emergency response system and when do to so with the specific situation.

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

2. Scene Termination of Resuscitation Efforts
   2.1. If EMS personnel arrive on scene or are enroute to a scene and the patient that EMS was summoned to transport goes into cardiac arrest, EMS providers shall proceed to the scene if:
      2.1.1. They are the primary ALS response vehicle (ground ambulance)
      2.1.2. There are no ALS providers on scene and/or the ALS providers on scene are not able to secure IV/Airway access and are actively engaged in resuscitation.
      2.1.3. The on-scene crew request assistance.
      2.1.4. Declared MCI.
      2.1.5. Other serious/critical patients on scene requiring assistance.
   2.2. When employing this protocol certain extenuating circumstances, particularly hypothermia and submersion, must be considered and the potential for salvage should be assumed. In these instances, full on-scene resuscitative efforts should be initiated without delay.
   2.3. If the patient arrests while in the care of the EMS crew once on scene, the crews shall provide all appropriate and aggressive treatment based on the transport crew's assessment of injuries and lethality of sustained injuries. After appropriate medical care per protocols and current BLS/ACLS/PALS protocols have been completed without return of spontaneous circulation, termination of efforts can be made by the transport crew in consultation with on-line medical control. It should be noted that on scene resuscitation and CPR are:
      - More effective than CPR in moving ambulances.
      - EMS providers risk physical injury while attempting to perform CPR in a moving ambulance while unrestrained.
      - Continuing resuscitation in futile cases places other motorists and pedestrians at risk, increases the time that EMS crews are not available for another call, impedes emergency department care of other patients, and incurs unnecessary hospital charges.
   2.4. Patients in active cardiac arrest should not be transported from the scene unless on-scene pronouncement would endanger the medical crew or there are other extenuating circumstances or there is a short transport time with possible reversible factors. Short transport time is considered < 10 minutes to the nearest hospital.
   2.5. **Basic Life Support Personnel (BLS TOR)** can pronounce or conclude termination of resuscitation if the following exist without the need for an advanced life support provider:
      2.5.1. NO AED Shocks were advised and completed.
      2.5.2. The cardiac arrest was NOT Witnessed by the EMTs on scene.
      2.5.3. Provider safety or scene safety becomes unsafe.
      2.5.4. Three rounds of BLS
      2.5.5. Medical Control is contacted and agrees.

2.6. If patient contact is made, a patient care report should be generated and completed fully.
2.7. If EMS providers arrive on a scene and there are signs of death occurring before the call was initiated (Rigor Mortis, findings incapable with life, etc.), the EMS crew shall not start resuscitation and document findings in the report.
2.8. Once these orders have been obtained, the police or emergency medical personnel should be advised to summon the local coroner to the scene. The transport team is not required to remain on the scene to await the coroner's arrival, but should leave the following information in writing with the police officer:
2.8.1. Time of arrival at the patient's side if resuscitation is not initiated or the time CPR is terminated on the physician's order.
2.8.2. Names of the flight nurse, paramedic, and medical control physician.
2.8.3. Name of the provider and service on scene.
2.8.4. Mississippi HPI phone number if additional information is necessary.
2.9. Though every effort must be made to cooperate with law enforcement agencies and the coroner's/medical examiner's office regarding disturbing crime scenes when transporting victims in potential/probable homicides, the priority must remain patient salvage and crew safety.

3. In-Hospital Termination of Resuscitation Efforts
3.1. When employing this protocol certain extenuating circumstances, particularly hypothermia and submersion, must be considered and potential for salvage should be assumed. In these instances, full in-hospital resuscitative efforts should be initiated without delay.
3.2. If the patient arrests while in the care of the transport crew once in hospital, the crews shall provide all appropriate and aggressive treatment based on the flight crew's assessment of injuries and lethality of sustained injuries. After appropriate medical care per protocols and current BLS/ACLS/PALS protocols have been completed without return of spontaneous circulation, termination of efforts can be made by the transport crew in consultation with on-line medical control. If the on-scene sending physician is present, the crew shall provide the sending physician with the discretion to terminate resuscitation efforts.
3.2.1. Clear documentation and agreement of the control of the patient's belongings, death certification record, and body release process. Transport teams should allow local hospital staff to handle these issues and cases.
3.3. Patients in active cardiac arrest shall not be transported from the hospital. If a patient goes into cardiac arrest while loading or initial phase of transport, crew members can return to the sending facility or nearest hospital as feasible.

4. Clinical Documentation
4.1. Resuscitation attempt, medications, procedures, etc.
4.2. Physician terminating the resuscitation (Verbal orders or bedside)
4.3. Discussion with family
4.4. Person and title that will remain with body until appropriate family is notified and death procedures are completed.
4.5. A full patient care record is required if patient contact is made.

Special Notes/Points

- Pediatric Specific Recommendations

- While tragic and emotional, pediatric patients in cardiac arrest shall be considered in this protocol.
- Patients born below estimated gestational age of 24 weeks in cardiac arrest shall be considered non-viable and resuscitation efforts can be withheld in consultation with medical control. If in doubt of gestational age, continue resuscitation efforts per BLS/PALS protocols.

Do not Resuscitate (DNR) Orders

- Mississippi Do Not Resuscitate orders are covered in the MS Department of Health Code[7]
- Definitions as per Miss. Code Ann. §41-85-7; Rule 1.3.1
  - **Advance Directives** – Directive from the patient/family (see definition of family) such as a durable power of attorney for health care, a directive pursuant to patient self-determination initiatives, a living will, or an oral directive which either states a person's choices for medical treatment or, in the event the person is unable to make treatment choices, designates who shall make those decisions.
  - **Do Not Resuscitate Orders (DNR)** – Orders written by the patient's physician which stipulate that in the event the patient has a cardiac or respiratory arrest, cardiopulmonary resuscitation will not be initiated or performed.
- DNR orders should be a written order by a physician.
- DNR orders can be revoked by the patient at any time or by a legal representative with Durable Power of Attorney over Healthcare present.
- DNR can be revoked by EMT or Paramedic if the circumstances are felt to warrant resuscitation or the authenticity of the DNR order is in question.

[7] SOURCE: Miss. Code Ann. §41-85-7

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

2. Clinical crew members are expected to be knowledgeable of the medications that are stocked on the vehicle or unit. This includes the variances due to shortage, expiration or other reasons for variation of medicine or concentration.
3. Clinical crew members are expected to have knowledge and proficiency in the delivery of medications in the following routes based on the level of certification/licensure.
   - 3.1. Oral (includes OG/NG tube)
   - 3.2. Intramuscular injection
   - 3.3. Intravenous bolus/infusion
   - 3.4. Interosseous injection/infusion
   - 3.5. Subcutaneous injection
   - 3.6. Sublingual
   - 3.7. Intranasal delivery
   - 3.8. Nebulizer delivery (inhalational)
4. Clinical crew should have a reference for medications located in each vehicle in addition to medical treatment protocols.
5. Non-Formulary Medications (those not listed in these protocols)
   - 5.1. Clinical providers should receive a verbal order via HPI (recorded) or written order from a physician before administering medication.
   - 5.2. Clinical providers should ensure they are the correct provider allowed to administer the medication by the relevant state licensing/certification board.
   - 5.3. An email to the medical director/program director should be sent within 24 hours of the administration of non-formulary medications.
6. Adverse Reactions
   - 6.1. The occurrence of adverse reactions should be emailed to the medical director/program director within 24 hours of the incident.

Special Notes/Points

- None

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

2. EMS units being delayed for longer periods of time is becoming an unfortunate reality. This protocol seeks to provide some guidance on medical care and legal issues with patient care inside of a hospital BEFORE care has been turned over to the hospital.
3. **Notification:**
   - 3.1. The senior clinical team member (Paramedic or treating EMT) shall inform dispatch or their operations supervisor for any delay longer than **90 minutes** as defined from the time of arrival to the hospital. Local agency protocols may ask for quicker notification which will supersede this time requirement.
   - 3.2. Any time greater than 90 minutes (or the department designated time) shall inform their dispatch AND medical director (Email, text) every hour they are delayed.
   - 3.3. Medical crew shall provide a verbal update to the triage nurse or designated clinical provider (minimum of an RN) each time a notification is made to dispatch and/or medical director. This person's name shall be entered into the medical record.
4. **Documentation:**
   - 4.1. Charting and monitoring shall be maintained until the patient is turned over to the bedside nurse or patient is able to go to triage (see below).
   - 4.2. Documentation of notification to hospital personnel is required in the chart at the above-mentioned intervals.
5. **Clinical Care:**
   - 5.1. These protocols remain in place while waiting on a room. Pain control shall be maintained as well as clinical care. Each time a medicine is given, the designated intake clinical provider (i.e., Triage nurse) shall be notified.

Special Notes/Points

Wall-Holding: Request to go to another hospital.

Hospital capacity and emergency department boarding of patients is a national problem. Transport crews or affiliated medical control companies need to understand the relevant federal laws. At no time can an EMS unit take a patient from a hospital where there is a delay to another hospital WITHOUT the following:

- By coming into the hospital, the patient has triggered that hospital's EMTALA regulation[8] which means that the hospital and providers have a legal obligation to conduct a "medical screening exam" (MSE) which is more than a typical emergency department triage.

[8] EMTALA is Section 1867(a) of the Social Security Act, within the section of the U.S. Code which governs Medicare.

- Medical control must be called before leaving and after the MSE. The local manager must be notified before leaving the hospital.
- Off-Line medical director should be notified within 24 hours of the event by email or phone.

paladin	Medication Shortage/Expiration (G-013)	Protocol #	G-013
		Effective Date	6/1/2024
		Revision Date	3/19/2024
		Reviewed	7/8/2025

Clinical Policy

1. All transport crew members are to understand this protocol.

General Protocol

1.1. Medication shortages are becoming increasingly common, impacting the practice of emergency medicine and field medicine.

1.2. All efforts should be taken to ensure that expired medications are replaced.

1.3. The EMS service will complete the following items before adding a drug to the approved expired list:

1.3.1. EMS service will exhaust all efforts to obtain the medicine including reaching out to local hospitals and pharmacies for non-controlled substances.

1.3.2. The Medical Director will review protocols and see if there are any available alternatives.

1.4. If a critical medicine has expired and there is no reasonable date for replacement immediately available, the following protocol should be followed:

1.4.1. Alert the direct supervisor, operations manager, and medical director BEFORE the expiration date.

1.4.2. The EMS medical director will approve expired drugs to be used and maintain a list of these medications.

1.5. Before giving medicine:

1.5.1. Risk/benefit analysis should be done to document the risk of giving an expired drug (bacterial infection, less potent medicine) versus the emergency indication. This should be documented in the record clearly.

1.5.2. As with any medication (expired or not expired), medications will be visually inspected for the presence of particulate matter and for normal coloration of the solution prior to administration.

2. The EMS agency should keep a log of all patients that have received expired medicines.

Special Notes/Points

Clinical Policy

1. This protocol serves to inform and guide Emergency Medical Technicians (EMT) and Advanced Emergency Medical Technicians in Mississippi about the scope of their skills and practice. This general protocol applies to the rest of the protocols.

General Protocol

The following skills and pharmaceutical interventions are allowed according to the below chart.

Skill/Medication	EMT	AEMT
Interosseous	Not Allowed	Allowed for pediatric and Adult
CPAP	Not Allowed	Allowed (disposable units only)
Aspirin Administration	Allowed	Allowed
Non-Narcotic Pain Medication	Not Allowed	Allowed
Antiemetic	Not Allowed	Allowed (All under nausea and vomiting)
Epinephrine 1:10,000 (Cardiac arrest)	Not Allowed	Allowed.

Treatment Procedures

Minimum Skill Level

1. EMT-Advanced and higher; all trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Suction no longer than 10 seconds.
     - 2.1.1. Longer suctioning can cause hypoxemia, cardiac arrhythmias, mechanical trauma, infection, and increased ICP.
     - 2.1.2. Consider pre-oxygenation prior to suctioning.

If available, use commercial suction devices such as a Ballard, especially in those patients with anticipated suctioning and high PEEP settings.

Clinical Indications

3. Clinical Indications
   - 3.1. Obstruction
   - 3.2. Excessive secretions
   - 3.3. Dyspnea

Procedure Steps

4. Procedure Steps
   - 4.1. Choose an appropriate size suction catheter for the patient.
   - 4.2. Ensure suction device is working properly. Prepare and assemble all equipment.
   - 4.3. Utilize sterile technique.
   - 4.4. Lubricate suction catheter.
   - 4.5. Pre-oxygenate the patient, if possible, for 1 to 2 minutes
   - 4.6. Using the suprasternal notch and the end of the airway as guides, measure the depth desired for the catheter. Judgment must be used regarding the depth of suctioning with cricothyrotomy and tracheostomy tubes.
   - 4.7. If applicable, in an intubated patient remove ventilation device unless commercial suction device (Ballard) is in place. **PREFERRED for ALL AGES.**
   - 4.8. With suction port not engaged (there is no active suctioning occurring), insert catheter through airway device.
   - 4.9. Once the desired measured depth has been reached, engage suction port (suctioning through catheter now active), and slowly remove suction catheter in twisting motion for not more than 10 seconds.
   - 4.10. Reattach ventilation device and ensure patient is being ventilated appropriately.
   - 4.11. Continue to observe and assess patients as needed for further suctioning.
   - 4.12. As needed, rinse suction catheter with sterile water.

Documentation

5. Documentation
    5.1. Document time.
    5.2. Reasons for procedure
    5.3. Method/means used in procedure.
    5.4. Device used for suctioning.

Minimum Skill Level

1. EMT and higher; all trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Must maintain basic manual airway maneuvers along with adjuncts in patients with decreased level of consciousness.
     - 2.1.1. Head tilt-chin lift.
     - 2.1.2. Tongue lift
     - 2.1.3. Jaw thrust.
   - 2.2. A patient with an intact gag reflex should not have OPA inserted due to high risk of induction of vomiting causing aspiration.
   - 2.3. Patients with an intact gag reflex or clenched jaw should have nasopharyngeal airway (NPA) inserted.
   - 2.4. Advanced airway in place such as, but not limited to, endotracheal tubes, tracheostomies, supraglottic airways, and CombiTubes®.
   - 2.5. Epistaxis or anatomical obstructions for NPAs
   - 2.6. Basilar skull fractures, frontal sinus fractures, or cribriform plate fractures are all relative contraindications for NPA insertion.

Clinical Indications

3. Clinical Indicators
4. Suggested Indications for Basic Airway Adjunct Insertion
   - 4.1. Anytime basic airway interventions are optimized without advanced airway in place.
   - 4.2. Anytime artificial ventilations are administered with no advanced airway in place.
   - 4.3. Trauma patients with GCS of 9 or less with risk of airway failure.
   - 4.4. Closed head injury with unconsciousness.
   - 4.5. Respiratory exhaustion such as severe asthma, pulmonary edema, or COPD with hypoxia.
   - 4.6. Overdoses with altered mental status where loss of airway is inevitable.
   - 4.7. Trismus (NPA only).
   - 4.8. Any patient presenting with the following: failure to maintain/protect their own airway, failure to ventilate and/or oxygenate, or the potential for decompensation due to an anticipated clinical course.

Procedure Steps

5. Procedural Steps:
   - 5.1. Nasopharyngeal Airway Insertion
     - 5.1.1. Gather and prepare all the equipment.
     - 5.1.2. Determine the size of the airway to be used by measuring from the patient's nostril to the earlobe or the angle of the jaw. Use the largest airway possible, that is appropriate.
     - 5.1.3. One may use the patient's 5th digit as estimation size for diameter of airway.

5.1.4. Lubricate airway prior to insertion.
5.1.5. Place patient's head in neutral position.
5.1.6. Insert the airway gently, bevel towards septum, staying midline throughout insertion until flange rests against nostril.
5.1.6.1. The right nostril is typically larger and easier for insertion.
5.1.6.2. When inserting into left nostril it may be necessary to rotate the airway device 180 degrees to facilitate placement.
5.1.7. If resistance is met, the airway device should not be forced into place. It should be removed and placed in the other nostril if applicable.
5.1.8. Upon insertion one should be able to hear air moving back and forth with spontaneous breathing patients.

5.2. Oropharyngeal Airway Insertion
5.2.1. Gather and prepare all the equipment.
5.2.2. Determine the size of the airway to be used by measuring from the patient's nostril to the earlobe or the angle of the jaw. Use the largest airway possible, that is appropriate.
5.2.3. Insert OPA in patient's mouth upside down so that the tip of the OPA is facing the roof of the patient's mouth or at 90-degree angle so the tip of the OPA is facing the side of the patient's mouth.
5.2.4. If a patient begins to cough or gag at any point during or after insertion, remove OPA.
5.2.5. As inserted, rotate OPA 90 degrees if inserted at 90 degrees or 180 degrees if inserted upside down until the tip of OPA is pointing away from the roof of the mouth and follows the contour of the tongue.
5.2.6. Insert until the flange comes to rest on patient's lips and/or teeth.

Documentation

6. Documentation
6.1. Document time.
6.2. Reason for insertion
6.3. Airway utilized.
6.4. Any complications

Minimum Skill Level

1. Paramedics who have been checked off with the hospital based BiPAP machine may transport BiPAP initiated at a hospital AND have been stable for > 30 minutes on the proposed BiPAP settings.
2. Critical Care Paramedic and trained and approved nurses.

Clinical Restrictions

3. Clinical Restrictions
   - 3.1. Patients must be awake and able to follow commands.
   - 3.2. Patients must be able to maintain their own airway.
   - 3.3. Patients must have facial anatomy compatible with masks.
   - 3.4. Patients cannot be unwilling or unable to cooperate.
   - 3.5. There is no suspicion of pneumothorax.
   - 3.6. No significant chest trauma present.
   - 3.7. Severe epistaxis.
   - 3.8. No profound nausea, vomiting, or gastric distention.
   - 3.9. Use caution in patients with hypotension or inadequate perfusion status.
     - 3.9.1. Increased intrathoracic pressure from either non-invasive positive pressure ventilation or invasive PPV can cause exacerbation or cause hypotension and barotrauma.
   - 3.10. Penetrating chest wound cannot be present.

Clinical Indications

4. Clinical Indicators
   - 4.1. Dyspnea or respiratory distress secondary to restrictive airway disease
     - 4.1.1. These may include the disease processes pulmonary edema, near drowning, asthma, COPD, near drowning, obesity hypoventilation syndrome, hypoxemic respiratory failure, etc.
   - 4.2. Preferred treatment method for COPD exacerbation

Procedure Steps

5. Procedure Steps
   - 5.1. Explain procedure to patient.
   - 5.2. Place patient on monitoring equipment, SpO2, waveform capnography, ECG, NiBP or ABP
   - 5.3. Check, prepare, and assemble equipment.
     - 5.3.1. This may include additional attachments based upon disease process and patient condition such as in-line nebulizer setup.
   - 5.4. Ensure an appropriate oxygen supply is in place.
   - 5.5. Ensure delivery device is in proper position on patient with good seal.
   - 5.6. Set iPAP, ePAP, FiO2, and sensitivity on device for initial patient treatment.
     - 5.6.1. Inspiratory Positive Airway Pressure (iPAP) augments patient ventilation.
       - 5.6.1.1. Adults suggested an initial setting 10 cm H2O.
       - 5.6.1.2. Pediatrics suggested initial setting 10 cm H2O.

5.6.2. Expiratory Positive Airway Pressure (ePAP) treats refractory hypoxemia.
5.6.2.1. Adults suggested an initial setting of 5 cm H2O.
5.6.2.2. Pediatrics suggested initial setting 5 cm H_2O.
5.7. If applicable set apnea back- up.
5.7.1. Set tidal volume or pressure control, inspiratory time, and rate.
5.7.2. Alarms and limits.
5.8. Check patient for seal leaks around device.
5.9. Reassess patient and titrate iPAP, ePAP and FiO2 as needed.
5.9.1. Latest literature suggests, increase/decrease in increments of 2 cm H2O as tolerated.
5.10. If respiratory status deteriorates, consider removing device and assisting ventilations via bag valve mask (BVM) and/or invasive airway management.

Documentation

6. Documentation
6.1. Time initiated.
6.2. Initial settings and subsequent changes.
6.3. Any complications.
6.4. Patient status and changes.

If BiPAP settings are working for the patient from a clinical assessment, those should be continued after evaluation of ventilation and oxygenation status either from ABG, VBG or non-invasive monitoring.

BiPAP mask sizes

The range of BiPAP mask sizes should be available to all critical care transport teams either as stocked equipment or as rapid pull from each base of operation. The emphasis on non-invasive ventilation and its evolving use necessitates this measure.

Minimum Skill Level

1. Paramedic and above all trained and approved nurses.

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. A patient must be awake and able to follow commands.
   - 2.2. A patient must be able to maintain their own airway.
   - 2.3. A patient must have facial anatomy compatible with device.
   - 2.4. A patient cannot be unwilling or unable to cooperate.
   - 2.5. No suspicion of pneumothorax.
   - 2.6. No significant chest trauma present.
   - 2.7. No nausea, vomiting, or gastric distention.
   - 2.8. Use caution in patients with hypotension or inadequate perfusion status.
     - 2.8.1. Increased intrathoracic pressure from either non-invasive positive pressure ventilation or invasive PPV can cause exacerbation or cause hypotension and barotrauma.
   - 2.9. No penetrating chest wound present.

Clinical Indications

3. Clinical Indications
   - 3.1. Dyspnea or respiratory distress is secondary to restrictive airway disease.
     - 3.1.1. These may include the disease processes pulmonary edema, near drowning, asthma, COPD, near drowning, obesity hypoventilation syndrome, hypoxemic respiratory failure, etc.

**** EARLY and Aggressive use of CPAP by field providers can provide significant relief ****

Procedure Steps

4. Procedure Steps
   - 4.1. Explain procedure to patient.
   - 4.2. Place patient on monitoring equipment- SpO2, waveform capnography, ECG, NIBP or ABP.
   - 4.3. Check, prepare, and assemble equipment.
     - 4.3.1. This may include additional attachments based upon disease process and patient condition such as in-line nebulizer setup.
   - 4.4. Ensure appropriate oxygen supply is in place especially if device is flow dependent.
   - 4.5. Ensure delivery device is in proper position on patient with good seal.
   - 4.6. Initiate treatment with PEEP set.
     - 4.6.1. Suggestive that the PEEP setting is based upon patient size, severity and/or medical control suggestions or recommendations.
     - 4.6.2. Adult refractory hypoxemia suggested initial PEEP to 8-10 cm H2O.
     - 4.6.3. The pediatric suggested initial PEEP 8-10 cm H2O.
     - 4.6.4. Neonates suggested initial PEEP 4-5 cm H2O.

4.7. Check patient for seal leaks around device.
4.8. Titrate PEEP and FiO2 as needed.
    4.8.1. Latest literature suggests an increase/decrease in increments of 2 cm H2O as tolerated.
4.9. If respiratory status deteriorates, consider removing device and assisting ventilations via BVM and/or invasive airway management.

Documentation

5. Documentation
    5.1. Time initiated.
    5.2. Initial settings and subsequent changes
    5.3. Patient status and changes
    5.4. Any complications noted.

Minimum Skill Level

1. Critical Care Paramedics and trained and approved nurses.

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Apnea
   - 2.2. Nasopharyngeal obstruction
   - 2.3. Respiratory failure/ Unable to maintain airway.
   - 2.4. Airway obstruction

Clinical Indications

3. Clinical Indications
   - 3.1. Bronchiolitis
   - 3.2. Pneumonia
   - 3.3. Respiratory Syncytial Virus (RSV)
   - 3.4. “Periods of apnea” requiring stimulus
   - 3.5. Hypoxemia

Procedure Steps

4. Procedure Steps
   - 4.1. Apply appropriate monitoring equipment as applicable.
   - 4.2. Select an appropriate size cannula based upon the size of patient.
   - 4.3. Ensure cannula is attached to appropriate humidification.
     - 4.3.1. If applicable, ensure airway temperature monitoring is in place.
   - 4.4. Attach cannula to an appropriate oxygen supply device.
   - 4.5. Titrate Liters per minute (LPM)/Fraction inspired oxygen (FiO2) based on availability and patient requirement.
   - 4.6. Secure cannula to patient.
   - 4.7. Titrate settings (LPM/FiO2) based upon patient requirements.

Documentation

5. Documentation of liters per minute and patient tolerance.

Minimum Skill Level

1. Paramedic and Higher; All trained and approved nurses.

Clinical Restrictions

2. Clinical Restrictions
   2.1. Apnea
   2.2. Under 8 years of age
   2.3. Midface fractures (LeFort II and III)
   2.4. Basilar skull fractures, frontal sinus fractures, or cribriform plate fractures are all relative contraindications.

Clinical Indications

3. Indications

   3.1. Spontaneous respirations in any patient presenting with the following: failure to maintain/protect their own airway, failure to ventilate and/or oxygenate, or the potential for decompensation due to an anticipated clinical course.
   3.2. Trauma patients with Glasgow Coma Scale of eight or less.
   3.3. Unconsciousness
   3.4. Thermal or chemical burn patients with airway involvement and inevitable airway loss.
      3.4.1. Assess for soot in the oropharynx.
      3.4.2. Assess for burned facial hair and eyelashes.
      3.4.3. Assess for hoarseness or difficulty speaking.
      3.4.4. Assess edema to the nasopharynx and oropharynx.
   3.5. Respiratory exhaustion such as severe asthma, pulmonary edema, or COPD with hypoxia.
   3.6. Overdoses with altered mental status where loss of airway is inevitable.
   3.7. Near drownings
   3.8. Hyperemesis with risk of aspiration
   3.9. Concern for impending airway failure
   3.10. Angioedema
   3.11. Laryngeal or tracheal injury or expanding neck hematoma.

Procedure Steps

4. Preparation for Nasal Intubation
   4.1. Assess nasopharynx, oropharynx, and neck anatomy to anticipate difficult intubation. “Can I bag this patient if I cannot intubate him?” (See Difficult Airway Protocol)
   4.2. Administer 100% oxygen. Have BVM at hand. (See pre-oxygenation protocol.)

4.3. Check, prepare, and assemble your equipment.
4.4. Apply cardiac monitor, BP monitor, and pulse oximeter.
4.5. Secure intraosseous/intravenous access as applicable.
4.6. Test ET tube (ETT) balloon integrity and proper functionality of all required equipment.
4.7. Lubricate ETT.
4.8. Estimate patient's weight, calculate drug dosages, and draw into syringes as needed.
4.8.1. Have any pre-medications required as needed: lidocaine, atropine, analgesia, sedative agents, paralytics etc.
4.9. Intubation confirmation equipment readily available (ex. waveform capnography)
4.10. Consider having NS available when applicable for inflating ETT cuff.

5. Nasal Intubation Procedure
5.1. Provide high-flow oxygen at the highest concentration available to prepare the patient to tolerate the period of apnea without desaturation.
5.2. Pre-oxygenate for four minutes if situation allows. (See pre-oxygenation protocol.)
5.3. Administer pre-meds as necessary for individual patients.
5.4. Remove any nasal airways currently in place.
5.5. Gently insert ET tube into nostril, keeping the bevel of the ETT toward the septum.
5.6. Continue to pass ETT listening for air movement and looking for condensation in ETT. Note that as the ETT approaches the patient's larynx air movement will become louder.
5.7. Gently and evenly advance the ETT through glottis opening on inspiration. This will help facilitate passage of the ETT and reduce incidence of trauma to vocal cords with insertion.
5.8. Upon ETT entering the trachea, the patient may begin to gag, vomit, strain, or cough. Leave the tube in place and do not remove ETT.
5.9. Confirm ETT placement.
5.10. Secure ETT.
5.11. Administer medication post intubation as needed.
5.12. See **Difficult Airway Protocol** if unable to intubate.

Documentation

6. Documentation
6.1. Reason for nasal Intubation
6.2. Document method and complications encountered.
6.3. Document number of attempts
6.4. Document SPO2 prior and post intubation.
6.5. Document response to treatments and medication.
6.6. Document ETT placement confirmation.
6.6.1. Visualizing ETT passing through chords if able to after intubation completed.
6.6.2. ETCO2 waveform capnography with printed waveform graphic attached to the chart.
6.6.3. Assess symmetric rise and fall of the chest with ventilation.
6.6.4. Listen for presence of gurgling over the epigastrium which may indicate the tube is in the esophagus.
6.6.5. Listen for the presence of bilateral breath sounds.
6.6.6. Note any improvement in the patient's color.
6.7. Secure ETT and document ETT depth.

Minimum Skill Level

1. Paramedic (approved only) and Higher, all trained and approved nurses.

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Unable to palpate and define landmarks.
   - 2.2. Does not guard against aspiration.
   - 2.3. Able to maintain airway by other means.
   - **2.4. Age < 12 years old**

Clinical Indications

3. Clinical Indications
   - 3.1. Acute upper airway obstruction or inadequacy in which intubation is not possible or contraindicated

Procedure Steps

4. Procedure Steps
   - 4.1. Traditional Needle Cricothyrotomy
     - 4.1.1. Place patient in supine position if possible. Hyperextend the patient's neck if possible. Contraindications are c-spine injury or instability.
     - 4.1.2. Identify the cricoid membrane.
     - 4.1.3. Grasp the larynx with your thumb and middle finger.
     - 4.1.4. Locate the cricoid membrane with the index finger.
     - 4.1.5. Prep site with alcohol, betadine, or chlorhexidine solution.
     - 4.1.6. Attach a 14 gauge over-the-needle catheter, or larger in adults, or a weight/ size-based needle for pediatrics, to a syringe.
     - 4.1.7. Carefully insert the needle through the skin and cricothyroid membrane and into the trachea with the needle directed at a 45-degree angle caudally.
     - 4.1.8. Introduce dilator if indicated.
     - 4.1.9. Attach a 15mm connection endotracheal tube connector to the cannula and ventilate the patient.
     - 4.1.10. If ventilation via BVM fails to produce adequate air movement, attach a high flow oxygen source to the cannula. The oxygen source should be attached and removed in a manner to allow adequate ventilation. This may be accomplished using a three-way stopcock attached to the oxygen supply tubing and to the catheter. The stopcock can be adjusted to allow for insufflation and deflation of the chest.
     - 4.1.11. Continue ventilation with 100% oxygen and periodically assess the airway.
   - 4.2. Quick Trach
     - 4.2.1. Place patient in supine position. If possible, hyperextend the patient's neck. Contraindications are c-spine injury or instability.

4.2.2. Secure the larynx laterally between the thumb and forefinger. Find the cricothyroid membrane (in the midline between the thyroid cartilage and the cricoid cartilage). This is the puncture site.

4.2.3. Prep site with alcohol, betadine, or chlorhexidine solution.

4.2.4. Firmly hold the device and puncture cricothyroid membrane at a 90-degree angle.

4.2.4.1. After puncturing the cricothyroid membrane, check entry of the needle into trachea by aspirating air through the syringe.

4.2.4.2. If air is present, the needle is within the trachea. Change the angle of insertion to 60 degrees (from the head) and advance the device forward deeply into the trachea to the level of the stopper. The stopper reduces the risk of inserting the needle too deeply and causing damage to the rear wall of the trachea.

4.2.4.3. Should no aspiration of air be possible because of an extremely thick neck, it is possible to remove the stopper and carefully insert the needle further until entrance into the trachea is made.

4.2.5. Remove the stopper. After the stopper is removed, be careful not to advance the device further with the needle still attached.

4.2.6. Hold the needle and syringe firmly and slide only the plastic cannula along the needle into the trachea until the flange rests on the neck. Carefully remove the needle and syringe.

4.2.7. Secure the cannula with the neck strap.

4.2.8. Apply the connecting tube to the 15 mm connection and connect the other end to the bag-valve mask with supplemental oxygen.

4.2.9. Continue ventilation with 100% oxygen and periodically assess the airway.

4.3. Regardless of success or failure of needle cricothyrotomy, notify the receiving hospital or critical care transport team at the earliest possible time of surgical airway emergency.

Documentation

5. Documentation for needle cricothyrotomy
   - 5.1. Reason for needle cricothyrotomy
   - 5.2. Document method and complications encountered.
   - 5.3. Document number of attempts
   - 5.4. Document SPO2 prior and post procedure.
   - 5.5. Document response to treatments and medication

Commercially available device is preferred (QuickTrach®)

Minimum Skill Level

1. All Critical Care Personnel should be familiar with this procedure.

1.1. Critical Care Paramedics and Transport Nurses are the ONLY ones allowed to complete this procedure after signing off from the Medical Director.

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Unable to define or locate landmarks for procedure.
   - 2.2. Able to obtain or maintain patent airway by other means.

Clinical Indications

3. Clinical Indications
   - 3.1. Acute upper airway obstruction or inadequacy in which intubation is not possible or contraindicated.
   - **3.2. The patient must NOT be able to be ventilated/oxygenated by other non-invasive measures before a surgical attempt can be made. Benefits of the procedure must be considered, documented, and weighed against the risk of on-going hypoxia.**
   - 3.3. Age > 12 years old

Procedure Steps

4. Preparation

- 4.1. Prepare all the equipment needed and test ET tube bulb for integrity and proper functionality.
  - 4.1.1. Consider shortening the length of ET tube from connecting end.
- 4.2. Secure intraosseous/intravenous access as needed.
- 4.3. Estimate patient's weight, calculate drug dosages, and draw medication into syringes as needed.
  - 4.3.1. Have any pre-medications required: analgesia, sedative agents, paralytics etc.
- 4.4. Confirmation equipment readily available (ex. waveform capnography).

5. Procedure

- 5.1. Place patient in supine position if possible. Hyperextend the patient's neck, if possible, except where c-spine injury or instability contraindicates doing so.
- 5.2. Secure the larynx laterally between the thumb and forefinger. Find the cricothyroid membrane (in the midline between the thyroid cartilage and the cricoid cartilage). This is the puncture site.
- 5.3. Prep site with alcohol, betadine, or chlorhexidine solution.
- 5.4. Stabilize the thyroid cartilage with the non-dominant hand.
- 5.5. With a scalpel in dominant hand, make 1-2 cm vertical skin incision over the cricothyroid membrane.
- 5.6. Puncture the cricothyroid membrane and make a horizontal incision 1 cm in each direction from the midline (shallow incision, so as not to injure the posterior tracheal wall).
- 5.7. Place finger, hemostat, or Bougie through incision prior to removing scalpel ensuring that finger, hemostat, or Bougie is within the trachea.

5.8. Remove scalpel.
5.9. With a free hand insert the ET tube.
5.9.1. With finger technique, insert ET tube into trachea besides finger ensuring the ET tube is in the trachea by palpating tube as it is put into position.
5.9.2. With hemostats, insert ET tube between the tips of open hemostats into position in trachea.
5.9.3. With Bougie, use a Seldinger fashion technique and pass ET tube over the Bougie into the trachea.
5.10. Advance ET tube to where balloon is ideally placed 1.0- 1.5 cm below lower margin of incision.
5.11. Remove finger, hemostats, or Bougie.
5.12. Inflate the cuff with either air or saline as applicable.
5.13. Confirm ET tube placement.
5.13.1. ETCO2 waveform capnography
5.13.2. Assess for symmetric rise and fall of the chest with ventilation.
5.13.3. Listen for the presence of bilateral breath sounds.
5.13.4. Listen for presence of gurgling over the epigastrium which may indicate the tube is in the esophagus.
5.14. Secure ET tube in place by placing petroleum-based gauze around tube at incision site.

Documentation

6. Surgical Cricothyrotomy
6.1. Reason for surgical cricothyrotomy
6.2. Document method and complications encountered.
6.3. Document number of attempts
6.4. Document SPO2 prior and post procedure.
6.5. Document response to treatments and medication.
6.6. Document tube placement confirmation.
6.6.1. ETCO2 waveform capnography with printed waveform graphic attached to the chart.
6.6.2. Assess symmetric rise and fall of the chest with ventilation.
6.6.3. Listen for presence of gurgling over the epigastrium which may indicate the tube is in the esophagus.
6.6.4. Listen for the presence of bilateral breath sounds.
6.6.5. Note any improvement in patient's color.
6.7. Secure ETT and document ETT depth.

A commercial kit/package is preferred.

Minimum Skill Level

1. Paramedic and Higher; all trained and approved nurses

Clinical Restrictions

2. Considerations to refer to Difficult Airway Protocol:
   - 2.1. Inability to open mouth because of trauma, dislocation, spinal immobilization, or pathologic condition.
   - 2.2. Laryngeal edema
   - 2.3. Epiglottitis
   - 2.4. Inability to visualize the glottic opening.
   - 2.5. Foreign body obstructing airway

Clinical Indications

3. Indications for Oral Intubation
   - 3.1. Apnea
   - 3.2. Trauma patients with GCS≤ 8; unconsciousness
   - 3.3. Trauma patients with significant facial trauma and poor airway control
   - 3.4. Thermal or chemical burn patients with airway involvement and inevitable airway loss.
     - 3.4.1. Assess soot in the oropharynx.
     - 3.4.2. Assess burned facial hair and eyelashes.
     - 3.4.3. Assess hoarseness or difficulty speaking.
     - 3.4.4. Assess edema to the nasopharynx and oropharynx.
   - 3.5. Respiratory exhaustion such as severe asthma, pulmonary edema, or COPD with hypoxia.
   - 3.6. Overdoses with altered mental status where loss of airway is inevitable.
   - 3.7. Near drownings where pulmonary edema is expected.
   - 3.8. Hyperemesis with risk of aspiration.
   - 3.9. Concern for impending airway failure.
   - 3.10. Laryngeal or tracheal injury or expanding neck hematoma.
   - 3.11. Any patient presenting with the following: failure to maintain/protect their own airway, failure to ventilate and/or oxygenate, or the potential for decompensation due to an anticipated clinical course.

Procedure Steps

4. Preparation for Oral Intubation
   - 4.1. Assess oropharynx and neck anatomy to anticipate difficult intubation. “Can I bag this patient if I cannot intubate him?” (See Difficult Airway Protocol)
   - 4.2. Administer 100% oxygen. Have bag-valve-mask at hand. (See pre-oxygenation protocol.)
   - 4.3. Check, prepare, and assemble your equipment.
   - 4.4. Apply cardiac monitor, BP monitor, pulse oximeter.

4.5. Secure intraosseous/intravenous access.
4.6. Test ET tube balloon integrity and proper functionality of all required equipment.
4.7. Estimate patient's weight, calculate drug dosages, and draw medication into syringes.
4.7.1. Have any pre-medications required: lidocaine, atropine, analgesia, sedative agents, paralytics etc.
4.8. Oral Intubation confirmation equipment readily available (ex. waveform capnography).
4.9. Consider having NS available when applicable for inflating ET tube cuff.

5. Oral Intubation Procedure
5.1. Provide high-flow oxygen at the highest concentration available to prepare the patient to tolerate the period of apnea without desaturation.
5.2. Pre-oxygenate for four minutes if situation allows. (See pre-oxygenation protocol)
5.3. Consider high flow nasal cannula oxygen administration during the procedure.
5.4. Administer pre-meds as necessary for the individual patient.
5.5. Apply cricoid pressure/ BURP maneuver and hold until patient has been intubated, balloon of ETT has been inflated, position of tube tip has been assured, and ETT has been secured in place.
5.6. Intubate
5.7. Administer medication post intubation as needed.
5.7.1. Sedation
5.7.2. Analgesia
5.7.3. Paralytics
5.8. See Difficult Airway Protocol if unable to intubate.

Documentation

6. Documentation
6.1. Reason for oral Intubation
6.2. Document method and complications encountered.
6.3. Document number of attempts
6.4. Document SPO2 prior and post intubation.
6.5. Document response to treatments and medication.
6.6. Document tube placement confirmation:
6.6.1. Visualization of ETT passing through. cords
6.6.2. ETCO2 waveform capnography with printed waveform graphic attached to the chart.
6.6.3. Assess for symmetric rise and fall of the chest with ventilation.
6.6.4. Listen for presence of gurgling over the epigastrium which may indicate the tube is in the esophagus.
6.6.5. Listen for the presence of bilateral breath sounds.
6.6.6. Note any improvement in the patient's color.
6.7. Secure ETT and document ETT depth.

Minimum Skill Level

1. All Critical Care personnel should be familiar with this procedure.
   1.1. Critical Care Paramedics
   1.2. Transport nurses with approved training and sign off by medical director.

Clinical Restrictions

2. Clinical Restrictions → **See *Crash Airway Protocol* below.**
   2.1. Patients with unstable airways and failure to oxygenate or ventilate.
   2.2. Cardiac arrest or peri-arrest period

Clinical Indications

3. Clinical Indications
   3.1. Elective or emergent intubations in spontaneous breathing patients.
   3.2. Best for patients with agitated delirium from hypoxia, hypercapnia, or the underlying medical condition.

Procedure Steps

4. Procedures
   4.1. Perform airway assessment.
   4.2. Position Patient
      4.2.1. Semi-recumbent position with head of bed (HOB) < 30 degrees
   4.3. Pre-oxygenation Period
      4.3.1. Place NC and NRB on maximal oxygen delivery liters a minute.
   4.4. Dissociation Period
      4.4.1. Administer Etomidate 20mg (Adult)
         4.4.1.1. 0.2-0.6 mg/kg pediatric dose (Max 20mg)
   4.5. Continue Pre-oxygenation.
      4.5.1. If Oxygen Sats < 90%, then use BVM with PEEP, BiPAP or CPAP as an adjunct for <u>three minutes.</u>
   4.6. Apneic Period
      4.6.1. Administer Paralytic
         4.6.1.1. Rocuronium (Zemuron) 0.6-1mg/kg IV push **(Preferred Agent)**
            4.6.1.1.1. Vecuronium is an alternative.
         4.6.1.2. Succinylcholine 1mg/kg IV push
      4.6.2. Continue "ApOx" or Apnea Oxygenation
         4.6.2.1. Continue Nasal Cannula at 15 LPM during intubation attempt.

4.6.3. Sedation

4.6.3.1. Can give sedation medication if needed.

4.6.3.1.1. All allowable sedation medications can be used.

4.7. Push Dose vasopressor.

4.7.1. Have a push dose pressor available for use.

4.7.1.1. Can use pre-filled syringes.

Documentation

5. Document

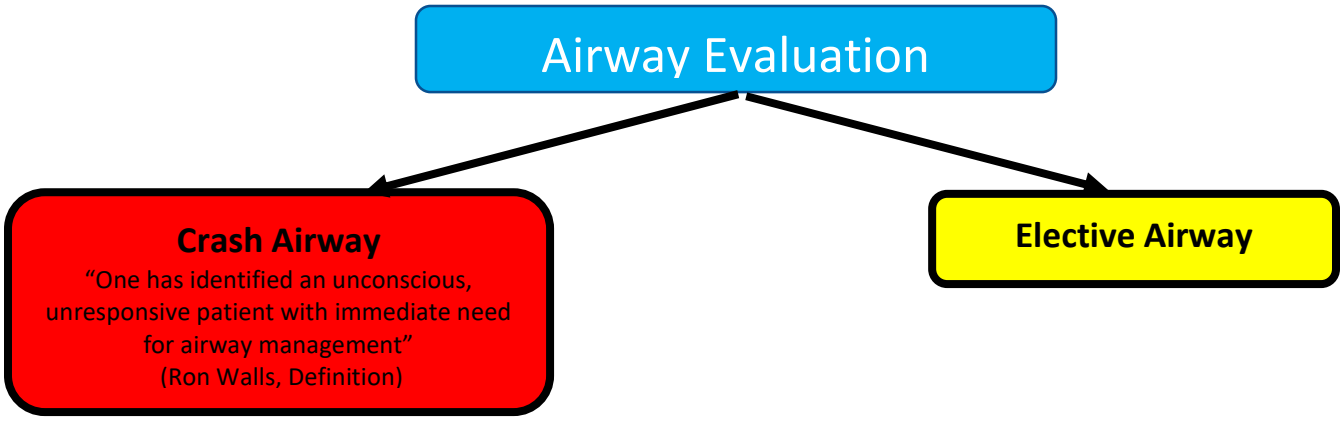
5.1. Document the AAGS per the protocol.

5.2. Document medications given.

5.3. Document Hypoxia (Sats < 90%) or hypotension.

Push Dose Pressors

Drug	Effects	Mixture	Dose/Onset
Epinephrine	Increases HR	- Take a 10 ml syringe with 9 ml of normal saline. - Into this syringe- draw 1 ml of EPI (cardiac amp- 1:10000)	- Onset—1 minute - Duration- 5-10 minutes - Dose 0.5-2ml every 2-5 minutes (5-20 mcg)
Phenylephrine	Pure Alpha No increase in HR Increase coronary input	- Take a 3 ml syringe and draw up 1 ml of phenylephrine from the vial (vial contains phenylephrine 10 mg/ml) - Inject this into a 100 ml bag of NS. - Now you have 100 mLs of phenylephrine 100 mcg/ml. - Draw up some into a syringe; each ml in the syringe is 100 mcg/ml.	- Onset—1 minute - Duration- 10-20 minutes - Dose 0.5-2 ml every 2-5 minutes (50-200 mcg)



Attempt Traditional Rapid Sequence Intubation

- **Administer Sedation**
- **Pre-oxygenate as needed.**
- **Use ApOx method as with DSI.**
- **Administer Paralytic**
- **Attempt Oral Intubation with ApOx is continuing.**

Attempt Delayed Sequence Intubation

See above for protocol.

Crash Airway Medications

- Preferred Sedation
  - Etomidate 20mg (Adult)
  - Versed 0.1 mg/kg (Preferred in pediatrics)
- Preferred Paralytic
  - Rocuronium (Zemuron) 0.6-1mg/kg IV push (Preferred agent in pediatrics)
  - Succinylcholine 1mg/kg IV push

Minimum Skill Level

1.1. EMT- Advanced and higher; all trained and approved nurses.

Clinical Restrictions

2. Clinical Restrictions
   2.1. Patients with a gag reflex
   2.2. Facial and/or esophageal trauma
   2.3. Suspected foreign body airway obstruction.

Clinical Indications

3. Indicators
   3.1. Anytime ET intubation is indicated but not possible or available in deep coma, cardiac arrest, and/or respiratory arrest.

Procedure Steps

4. LMA
   4.1. Choose, assemble, and check the appropriate size supraglottic airway.
   4.2. Check the cuff of the LMA by inflating it with 50% more air than is required, then deflate completely.
   4.3. Apply a water-soluble lubricant to the base of the device.
   4.4. Pre-oxygenate by providing high-flow oxygen at the highest concentration available to prepare the patient to tolerate the period of apnea without desaturation.
   4.5. Place the head in the sniffing position. Insert your finger between the cuff and the tube. Place the index finger of your dominant hand in the notch between the tube and the cuff.
   4.6. Open the patient's mouth and insert the supraglottic airway along the roof of the mouth with the mask facing the tongue and the back of the mask against the roof of the mouth.
   4.7. Use your finger to push the airway against the hard palate and blindly push until resistance is felt.
   4.8. The black line on the tube shaft should be opposite the upper lip.
   4.9. Inflate the cuff rim of the mask with the amount of air indicated for that size airway and remove the syringe.
   4.10. Attach the bag-mask device and begin to ventilate the patient checking for chest rise and fall, bilateral breath sounds vs epigastric sounds.
5. Additional supraglottic and esophageal intubating airways may be used according to manufacturer's direction for use and appropriate clinical competency is completed.

Documentation

6. Documentation
    6.1. Reason for using supraglottic airway.
    6.2. Document method and complications encountered.
    6.3. Document response to treatments and medication.
    6.4. Document placement confirmation:
        6.4.1. ETCO2 waveform capnography with printed waveform graphic attached to the chart.
        6.4.2. Assess for symmetric rise and fall of the chest with ventilation.
        6.4.3. Listen for presence of gurgling over the epigastrium.
        6.4.4. Listen for the presence of bilateral breath sounds.
        6.4.5. Note any improvement in the patient's color.

Minimum Skill Level

1. Paramedic or higher; all approved and trained nurses

Clinical Restrictions

1. Clinical Restrictions
   2.1. Electronic equipment malfunction
   2.2. Familiarity with specific equipment
   2.2. Obstruction of camera with oral secretions/blood

Clinical Indications

2. Clinical Indications
   3.1. Inability to visualize airway structures using traditional equipment.
   3.2. Anticipated or confirmed difficult airway.

Procedure Steps

3. Due to the various manufactures and individualized techniques depending on the specific equipment, refer to the manufacturer's directions for use when utilizing such equipment.

Documentation

4. Documentation
   5.1. Reason for oral intubation
   5.2. Type of device used.
   5.3. Visualizing ETT passing through chords. If recording capabilities are available on device, capture ETT passing through cords.
   5.4. Document method and complications encountered.
   5.5. Document SPO2 prior and post intubation.
   5.6. Document number of attempts.
   5.7. Document response to treatments and medication.
   5.8. Document placement confirmation:
      5.8.1. ETCO2 waveform capnography with printed waveform graphic attached to the chart.
      5.8.2. Assess for symmetric rise and fall of the chest with ventilation.
      5.8.3. Listen for presence of gurgling over the epigastrium.
      5.8.4. Listen for the presence of bilateral breath sounds.
      5.8.5. Note any improvement in the patient's color.
      5.8.6. Secure ETT and document ETT depth.

Recording: Where a recording feature is present on a video device, the attempt should be recorded for Quality Assurance purposes and sent to the medical director or uploaded into the approved QA system.

Minimum Skill Level

1. Minimal Skill Level:
   1.1. Critical Care Paramedics
   1.2. Transport Nurses with appropriate training, documentation, and complete competency.

Clinical Restrictions

2. Clinical Restrictions
   2.1. Evidence of impaired perfusion with significantly decreased pulse.
   2.2. Infection/inflammation over site.
   2.3. Anticoagulation therapy.
      2.3.1. Clinical providers need to document risk/benefit analysis if arterial line is needed for resuscitation or strict blood pressure monitoring.
   2.4. Radial artery is the only approved site[9] for transport nurses.
   2.5. Femoral artery is allowable if radial site has failed or not accessible and there is need for on-going hemodynamic monitoring or for access of REOBA for patients > 18 years. → See REOBA WATCH protocol.
   2.6. **Age > 12 years of age**

Clinical Indications

3. Clinical Indications:
   3.1. Need for frequent blood pressure monitoring or frequent blood draws.

Procedure Steps

4. Procedure Steps
   4.1. Ensure there is an adequate pulse in the radial artery prior to attempting the procedure.
   4.2. Perform an Allen's test to assess ulnar patency. Not recommended due to lack of sensitivity or specificity especially in patients >65 years old.
   4.3. Place a small towel roll under the dorsum of the wrist and tape the hand to a fixed surface.
      4.3.1 View anatomy
   4.4. Prep an area over the radial artery about 4-5 cm proximal to the wrist and cover with the drape provided. *Maintain sterile technique.
   4.5. Anesthetize the area over the artery with lidocaine.
      4.5.1.Too large a wheal can obscure the artery. Place a small amount of lidocaine on either side of the artery as well. Avoid placing it directly over the wrist.

Arterial Line Kit

   4.6. While palpating the artery with your non-dominant hand, use the large finder needle to advance through the skin at a 30-degree angle.

[9] As outlined in MS Board of Nursing allowance and Mississippi Critical Care Paramedic Scope (2017)-

4.7. When the artery is entered, a pulsatile flow of blood will be seen.
4.8. Once in the artery, advance the guide wire through the needle and remove the needle.
4.9. Before removing the needle, make a small skin incision with a scalpel at the site of needle entry into the skin.
4.9.1. Always making sure to be holding on to the guide wire. If the guide wire will not thread, remove it and the needle, and try a different spot.
****Avoid using the short needle/catheter if possible. ****

4.9.2. Place the catheter over the guide wire and advance until the hub is up to the skin. If advancement of the catheter becomes difficult, a twisting motion can be used to facilitate catheter passage.
4.9.3. Remove the guide wire and connect the catheter to a stopcock for measuring. See if an arterial tracing is obtained.
4.9.4. Suture the catheter to the skin. Use tape, or adhesive strips and apply semi-permeable sterile dressing over the site.

Quick Flash Catheter

4.10. Puncture the skin proximal to your fingers over arterial pulsations advancing the needle at a 30-45° angle toward the pulsation with its bevel facing up.
4.11. Observe the hub of the needle for a flash of bright red blood signifying arterial puncture. Once a flash has been obtained, lower the needle-catheter assembly to an angle of 10-20° from the skin and insert the needle 1-2 mm further to advance the catheter into the lumen of the artery.
4.12. Stabilize the needle and advance the catheter over the needle into the artery until the hub is at the level of the skin. If any resistance is felt, reposition the needle until free blood flow is obtained and then try to advance the catheter. *****Never pull the catheter back over the needle; this can shear the catheter tip.
4.13. After the catheter has been advanced into the artery, remove the needle, and attach the catheter to an appropriate arterial line tubing.
4.14. Suture the catheter to the skin. Use tape, or adhesive strips and apply semi-permeable sterile dressing over the site.

Transducer Calibration

4.15. Attach cable to monitor and then transducer.
4.16. Level the transducer with the atrium and secure with tape.
4.17. Turn transducer tap off to patient and open to air.
4.18. Press “zero” on the monitor soft keys and then press “zero” again on the acknowledge key. The monitor will confirm when the process is complete.
4.19. Close port that had been opened to air.
4.20. Open transducers tap to patient.
4.21. The trace should be labelled on the monitor as Arterial (in red numerical readings) so a clear trace can be seen and identified.
4.22. The alarms should be set within acceptable limits for age/condition.

Documentation

5. Documentation
5.1. Document indication.

5.2. Seldinger or Quick flash catheter.
5.3. Any medications given.

Pediatric Considerations[10]

Pediatric Considerations:

- In children with congenital heart disease, right radial artery measurements of blood gases more accurately reflect cerebral oxygenation and perfusion pressure.
- Radial site is preferred in children.
- Arterial lines should be attempted only twice in a single site.
- Arterial Lines should be used for patients that are being actively resuscitated but remain hemodynamically unstable.

Arterial Needle and Catheter sizes[11]

Artery	<10kg		10-40kg		>40kg	
	Needle/catheter size	**French**	**Needle/catheter size**	**French**	**Needle/catheter size**	**French**
Radial	25 or 23/24 or 22	3.0-4.0	23/22		23 or 21/22 or 20	
Umbilical		3.5-5.0				
Femoral	23/20 or 18	3.0-4.0	23 or 21/18 or 16	4.0-5.0	21/18, 16 or 14	5.0-6.0

[10] Up To Date- *Arterial puncture and cannulation in children*: Accessed May 2017
[11] Adapted from: Torrey SB, Saladino RA. Arterial puncture, and catheterization. In: Textbook of Pediatric Emergency Procedures, 2nd edition, King C, Henretig FM. (Eds), Lippincott Williams & Wilkins, Philadelphia 2008. p.715

Minimum Skill Level

1. Paramedic or higher; all trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   2.1. NONE

Clinical Indications

3. Clinical Indications
   3.1. Tachycardia associated with signs and symptoms of unstable hemodynamics.
      3.1.1. These include altered mental status, ongoing chest pain, hypotension, respiratory distress, or other signs of shock.
   3.2. Ventricular rate
      3.2.1. Adults > 160 beats/min
      3.2.2. Infants > 220 for infants less than one year old.
      3.2.3. Children > 180 for (1-8 years old)

Procedure Steps

4. Procedure Steps
   4.1. Attach cardiac monitor to patient using Combo adhesive pads.
   4.2. Press the synchronization button on the defibrillator.
   4.3. Select appropriate energy level for:
      4.3.1. Atrial fibrillation 120-200 J
      4.3.2. Stable Monomorphic Ventricular Tachycardia 100 J
      4.3.3. Supraventricular Tachycardia (SVT), Atrial Flutter: 50-100 J
      4.3.4. Pediatric: 1st dose 0.5-1 J/kg. 2nd dose 2 J/kg
   4.4. Announce “Charging Defibrillator”.
   4.5. Push the charge button on the defibrillator.
   4.6. When fully charged, announce “I am going to shock on three”, “1, 2, 3, All Clear”.
   4.7. After confirming all personnel are clear, push the shock delivery button on the defibrillator.
   4.8. Reassess the patient and his/her heart rhythm.
   4.9. Perform unsynchronized cardioversion/defibrillation if there is a rhythm change to pulseless V-tach or V-fib.

Precautions:

- Establish IV/IO access prior to attempt.
- Have the primary and back-up airway equipment ready.
- Consider premedication with sedation with a Benzodiazepine or Narcotic.

Documentation

5. Documentation
    5.1. Document cause(s).
    5.2. Document the procedure, response, and time.
    5.3. Document the patient's clinical stability.

Minimum Skill Level

1. Critical Care Paramedics and trained and approved nurses.

Clinical Restrictions

2. Clinical Restrictions
   2.1. In severe trauma – NONE

Clinical Indications

3. Clinical Indications
   3.1. Clinical evidence of tension pneumothorax.
   3.2. Clinical, CXR or eFAST evidence of a traumatic pneumothorax and patient is intubated.
   3.3. Critical hypovolemia (SBP<90mmHg) and/or low SpO2 plus chest injury.
   3.4. Clinical, CXR or eFAST evidence of hemothorax (having established ROSC/resuscitation).
   3.5. Cardiac arrest is secondary to trauma (bilateral decompression).

Procedure Steps

4. Procedural Steps
   4.1. Oxygen delivery per patient requirements.
   4.2. Premedicate patient for pain control and assess the need for further medication throughout the procedure.
   4.3. Position patient supine with affected side slightly elevated and the arm on the affected side secured (If room and space allow).
   4.4. Identify the insertion site which is usually the fourth or fifth intercostal space in the mid-to-anterior axillary line, just lateral to the nipple in males, immediately behind the lateral edge of the pectoralis major muscle.
   4.5. Make a 2-3 cm transverse incision at the predetermined site along the top of the rib and bluntly dissect through the subcutaneous tissues. Extend the incision by blunt dissection with a Kelly clamp through the fascia toward the superior aspect of the rib above. After the superior border of the rib is reached, close and turn the Kelly clamp and push it through the parietal pleura with steady, firm, and even pressure. Open the clamp wide, close it, and then withdraw it.
   4.6. Insert a gloved finger into the incision to determine where lung and other organs are located. Once in the pleural space, palpation of the parietal pleura and lung with the finger is necessary to ensure you have entered the thoracic cavity and that the possible tension pneumothorax causing the traumatic cardiac arrest has been managed.
   4.7. An occlusive dressing is then utilized to cover the wound.
   4.8. Each wound is circled with a permanent marker and labeled “EMS–L” (left) or “EMS–R” (right). This identifies incisions made by EMS in the event of autopsy or criminal investigation.

Documentation

5. Documentation
    5.1. Date and time.
    5.2. Patent's tolerance
    5.3. Crew member performing the procedure.
    5.4. Respiratory (Spo2/Etco2) and cardiac assessment.
    5.5. Drainage amount, color, and consistency (if any)

The use of a finger thoracostomy should be preferred over needed for approved providers. While awaiting tube placement in the resuscitation- a chest seal or occlusive dressing should be placed over the thoracostomy site. Suggestion can be to place a bougie (sterile) into the site and secure under chest seal for future track location and tube insertion.

Minimum Skill Level

1.1. Paramedics and higher; nurses trained and approved nurses.

Clinical Restrictions

2. Clinical Restrictions
   2.1. Patient has only simple pneumothorax (loss of breath sounds on one side but normal systolic blood pressure is not an indication for decompression).
   2.2. The patient with symptomatic tension pneumothorax can be relieved by the removal of an occlusive dressing from an open chest wound.

Clinical Indications

3. Clinical Indications
   3.1. Primary Indications
      3.1.1. Absent breath sounds on one side with indication of increased ventilation pressure/hypotension.
      3.1.2. Profound shock with a systolic blood pressure of 60 mmHg or less in an adult.
      3.1.3. A patient with a flail chest severe enough to require endotracheal intubation for persistent hypoxia should have precautionary needle decompression on the side of the injury.
      3.1.4. Ultrasound/eFAST/Radiograph evidence
   3.2. **Secondary Indications** (Suggestive but not sufficient without or in combination of the above)
      3.2.1. Increased airway resistance
      3.2.2. Tracheal shift away from the affected side (late and rare).
      3.2.3. Altered mental status (always present).
      3.2.4. Distended neck veins
      3.2.5. Respiratory distress/tachypnea/dyspnea
      3.2.6. Hypoxia or increasing FiO2 requirements.
      3.2.7. Hyperresonance to percussion on the affected side

Procedure Steps

4. Procedure Steps
   4.1. Provide 100% oxygen and assist ventilations as needed.
   4.2. Identify the second or third intercostal space on the anterior chest at the midclavicular line on the same side as the tension pneumothorax. This may be done by feeling for the “angle of Louis,” the bump located on the sternum about a quarter of the way from the suprasternal notch.
      4.2.1. Commercial needles are preferred over standard IV catheters.
   4.3. Follow the interspace just below this bump to the midclavicular line to insert the catheter.
   4.4. Alternative Site: 5th Intercostal space, mid-axillary line.
      4.4.1. Prepare the area with an antiseptic.
      4.4.2. Insert 10ga, 12ga, or 14ga needle into the skin over the superior border of the third rib, midclavicular line, and direct it into the intercostal space at a 90-degree angle to the rib.

4.4.3. Direction of the bevel is irrelevant to successful results. As the needle enters the pleural space, there will be a "pop." If a tension pneumothorax is present, there will be a hiss of air as the pneumothorax is decompressed. Advance the catheter all the way to the hub and remove the needle. The catheter hub must be stabilized to the chest with tape.

4.5. Pediatric Considerations

4.5.1. Use 18ga Needle.

4.5.2. Attach a one-way valve such as a Chest Seal Kit, if possible.

4.5.3. Leave the catheter in place until it is replaced by a chest tube.

4.5.4. Monitor the catheter to be sure it remains patent.

4.5.5. Place another needle next to the original if needle becomes occluded.

Documentation

5. Documentation
   - 5.1. Reason for decompression
   - 5.2. Document patient's response.
   - 5.3. Document eFAST/radiological used.
   - 5.4. Document On-line Medical Control Physician contacted.

As tension pneumothorax is considered a reversible cause in traumatic cardiac arrest, all patients in traumatic cardiac arrest with any evidence of chest trauma or suggestive mechanism should receive bilateral chest decompression attempts.

Alternative Locations for Needle Decompression

Based on established research and growth in body habitus, a normal 5cm angiocatheter might not be long enough to enter the pleural space in adult obese men and women.[12] Other approved location is the 4th/5th mid axillary line. This is position "B" on the diagram.

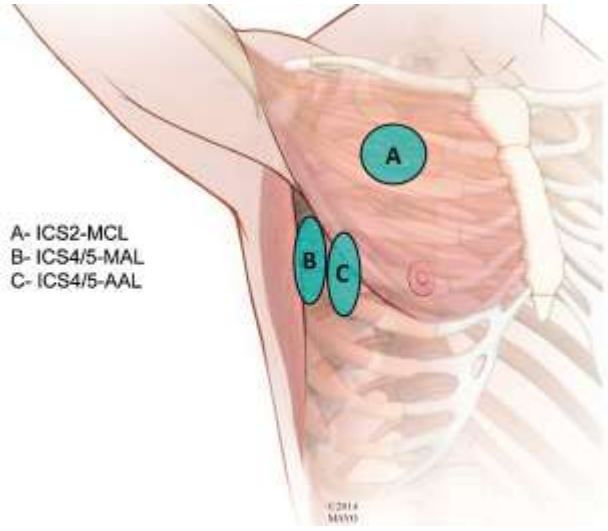


Figure 1: Photo Credit- Interntaional Journal of the Care of the Injured

[12] Laan DV et al. Chest Wall Thickness and Decompression Failure: A systematic Review and Meta-Analysis Coparing Anatomic Locations in Needle Thoracostomy. Injury 2015

Minimum Skill Level

1. Critical Care Paramedics; trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Anticoagulation of a bleeding patient
     - 2.1.1. Relative- document risk/benefit MDM in chart.
   - 2.2. Small, stable pneumothorax (may spontaneously resolve).
   - 2.3. Loculated fluid accumulations.

Clinical Indications

3. Clinical Indications (for emergent field placement)
   - 3.1. Pneumothorax >20% (Also, consider flight altitude for placement)
   - 3.2. Hemothorax
   - 3.3. Tension pneumothorax.
   - 3.4. Signs and Symptoms
     - 3.4.1. Evidence of barotrauma or mechanical trauma with:
       - 3.4.1.1. Respiratory distress
       - 3.4.1.2. Tachypnea, use of accessory muscles, tracheal deviation, restlessness
       - 3.4.1.3. Absent or diminished breath sounds
       - 3.4.1.4. Asymmetrical chest movement

Traditional Tube Thoracostomy for patients < 13 years of age require medical director order. This does not include pig-tail tubes < 13 years old which is the preferred method for pediatrics.

Procedure Steps

4. Procedural Steps
   - 4.1. Oxygen delivery per patient requirements.
   - 4.2. Pre-medicate patient for pain control and assess the need for further medication throughout the procedure.
   - 4.3. Position patient supine with affected side slightly elevated and the arm on the affected side secured (If room and space allow).
   - 4.4. Assemble the suction/drain device and connect to the wall suction.
   - 4.5. Prepare the skin with Chlorhexidine or Povidone-iodine and allow it to dry. Drape the site. Use a 10ml syringe and 25ga needle inject the interspace one rib below and above with 1% solution of Lidocaine with Epinephrine. Liberally infiltrate the subcutaneous tissue and intercostal muscles, including the tissue above the middle aspect of the inferior rib to the interspace where pleural entry will occur and down to the parietal pleura.

4.6. Identify the insertion site which is usually the fourth or fifth intercostal space in the mid-to-anterior axillary line, just lateral to the nipple in males, immediately behind the lateral edge of the pectoralis major muscle.

4.7. Make a 2-3 cm transverse incision at the predetermined site along the top of the rib and bluntly dissect through the subcutaneous tissues. Extend the incision by blunt dissection with a Kelly clamp through the fascia toward the superior aspect of the rib above. After the superior border of the rib is reached, close and turn the Kelly clamp and push it through the parietal pleura with steady, firm and even pressure. Open the clamp wide, close it, and then withdraw it.

4.8. Insert a gloved finger into the incision to determine where lung and other organs are before inserting tube. Rotate the finger 360º to appreciate the presence of dense adhesions that cannot be broken and require placement of the chest tube in a different site. ***It is important to confirm your location with a finger before placing the chest tube.***

4.9. Clamp the proximal end of the thoracostomy tube with Kelly clamps and advance it through the hole into the pleural space using your finger as a guide. Direct the tip of the tube posteriorly for fluid drainage or anteriorly and superiorly for pneumothorax evacuation. Advance it until the last side hole is 2.5 to 5 cm (1 to 2 inches) inside the chest wall. Direct the tube as high and anteriorly as possible for a pneumothorax. For a hemothorax, the tube is usually inserted at the level of the nipple and directed posteriorly and laterally.

4.9.1. If there is resistance, DO NOT force the tube.

4.10. Remove the clamp and look for fogging in the tube with expiration.

4.11. Connect the end of the tube to the drainage system.

4.12. Suture the tube in place using 1-0 or 2-0 silk or nylon.

4.12.1. Commercial Chest Seal is sufficient if active resuscitation is on-going or space limits suturing.

4.13. Apply dressing and tape the tube to the chest. Create an occlusive dressing to place over the chest tube by turning regular gauze squares (4 x 4 in) into Y-shaped fenestrated gauze squares and using 4-inch adhesive tape to secure them to the chest wall.

4.14. Obtain a chest x-ray as soon as feasible.

Documentation

5. Documentation
   5.1. Date, time, chest tube size, insertion site, practitioner inserting chest tube, and patient's tolerance.
   5.2. Assessment of drainage unit.
   5.3. Respiratory (Spo2/Etco2) and cardiac assessment.
   5.4. Drainage amount, color, and consistency.
   5.5. Suction settings.
   5.6. Confirmation at receiving hospital by physician. (Document name of physician and time).

Pigtail Chest Thoracostomy Procedure

This procedure is for patients < 13 years of age with a life-threatening pediatric tension or presumed tension pneumothoraces.

1. Place the patient in either lateral recumbent position or supine, with the head of the bed up 40-45 degrees (best for pneumothorax) or in a sitting position for posterior access to effusions posteriorly.
2. Determine the best place for insertion. For pneumothorax, optimal placement is in the safety triangle, bordered by the lateral edge of the pectoral muscle, the lateral edge of the latissimus dorsi and a line

along the fifth intercostal space at the level of the nipple. Insertion here minimizes the risk of damage to nerves, vessels, and organs.

3. Sterilize and drape.
4. Measure the small-bore catheter (6-12F) against the chest to determine how far it should be inserted for placement into the superior aspect of the chest with all side holes within the pleural cavity. Remember that pigtails can easily be drawn back but cannot be inserted further in after the procedure is completed.
5. Anesthetize the skin and deeper tissues with increasingly larger needles inserted over the superior aspect of the rib to minimize damage to the neurovascular bundle which travels along the inferior aspect of the rib. Anesthetize to the parietal pleura. The pleura is particularly sensitive; be generous with anesthetic at this location.
6. Load the finder needle with a few ml of sterile water so that you can visualize the aspiration of air during insertion. Insert the needle over the superior aspect of the rib while drawing back. Once in the pleural space, the syringe plunger will give way aspirating bubbles in pneumothorax and pleural fluid in effusions.
7. Remove the syringe from the needle and pass the guide wire in just enough to clear the needle. Most of the guide wire should be hanging out. If inserted too far it will be difficult to direct the pigtail catheter superiorly into the apex of the thorax.
8. Removed the needle leaving the wire in place. Make a small incision in the skin adjacent to the guide wire just as in central line insertion, then pass the dilator over the wire and into the pleural space. You should feel the dilator "give way" once you are in. Check that the guide wire is moving freely in and out of the dilator throughout this process to avoid kinking the wire.
9. Pass the pigtail and its trocar over the wire, making sure that the last side hole is within the pleural space.
10. Remove the trocar and guide wire leaving the pigtail catheter in place and suture the pigtail to the chest wall in a similar manner to conventional chest tubes.
11. Place the Heimlich (flutter) valve onto the end of the pigtail catheter and either leave it open to air or connect to water seal with suction.
12. Obtain a confirmatory x-ray after the procedure is complete. The entire procedure should take 10-15 minutes.

ANY tube placed in the chest cavity shall have a picture taken of the arrival chest x-ray in critical care documentation platform (electronic health record) and uploaded to the system. The picture/image should be deleted from the device.

Minimum Skill Level

1. Paramedic or higher; trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions:
   - 2.1. NONE in cardiac arrest
   - 2.2. Precautions
     - 2.2.1. Thorough knowledge and operation of your defibrillator.
     - 2.2.2. Ensure adequate contact between electrodes and skin.
     - 2.2.3. Dysrhythmias are common following successful defibrillation.
     - 2.2.4. Avoid direct contact with the patient during defibrillation.
     - 2.2.5. Dry chest wall if wet. Remove dermal medication patches.
     - 2.2.6. Defibrillation may not be successful in ventricular fibrillation due to hypothermia until core temperature is above 88 degrees F (31C). Likewise, hypoxia and acidosis may prevent successful defibrillation.
     - 2.2.7. Defibrillation is not the only treatment in fibrillation due to hypovolemia (trauma situation). IV fluids must also be administered.
     - 2.2.8. Defibrillation should be accompanied by visible muscle contraction.

Clinical Indications

3. Clinical Indications
   - 3.1. Ventricular fibrillation.
   - 3.2. Ventricular tachycardia in a pulseless patient.

Procedure Steps

4. Procedure Steps
   - 4.1. Establish unresponsiveness and pulselessness.
   - 4.2. Perform BLS until the defibrillator is available.
   - 4.3. Apply defibrillator pads or paddles according to type.
   - 4.4. Stop CPR and defibrillate according to current AHA guidelines.
   - 4.5. If a patient remains in cardiac arrest, see appropriate AHA ACLS or PALS protocol.

Documentation

5. Documentation
   - 5.1. Rhythm requiring defibrillation.
   - 5.2. Energy level delivered.
   - 5.3. # of shocks
   - 5.4. Effective/ Ineffective/ ROSC

Minimum Skill Level

1. Paramedic or higher; trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   2.1. NONE in the emergency setting

Clinical Indications

3. Clinical Indications
   3.1. Symptomatic bradycardia refractory to Atropine.
      3.1.1. Slow heart rate WITH associated hypotension or altered mental status.
   3.2. Third degree AV block and Second-degree type II AV block.
   3.3. Non-demand TCP should be considered for a new onset asystole (must be used immediately to be effective.)

Procedure Steps

4. Procedure Steps
   4.1. Prepare and assemble essential equipment including the following:
      4.1.1. Pacemaker/pads
      4.1.2. Cardiac monitor/ Defibrillator and electrodes
      4.1.3. Therapy cable
   4.2. Confirm the presence of the dysrhythmia (include a copy of the ECG strip) and evaluate the patient's hemodynamic status.
   4.3. Adjust the QRS amplitude so the machine can sense the intrinsic QRS activity.
   4.4. Apply pacing pads to the patient's chest in either of the following positions- anterior-anterior or anterior-posterior. (Pediatric patients requiring external transcutaneous pacing require the use of pads appropriate for pediatric patients per the manufacturers' guidelines.)
   4.5. Attach the pacing pads to the therapy cable from the machine.
   4.6. Turn the pacer on.
   4.7. Observe the ECG screen for a "sense" marker on each QRS complex. If a "sense" marker is not present, readjust ECG size or select another lead.
   4.8. Set the desired pacing rate (60-80bpm).
   4.9. Start at the lowest setting and increase the current slowly while observing the ECG screen for evidence of electrical pacing capture.
   4.10. Assess the patient's response to the pacing therapy.
   4.11. Consider the use of sedation or analgesia if the patient is uncomfortable.
   4.12. Consider arterial line placement after external pacing has been started.

Documentation

5. Documentation
   5.1. Date/ Time/ Dysrhythmia/ ECG strips/ Vital Signs
   5.2. Start/end amplitude and rate at time of capture/ Response to TCP

Chemical Pacing: Dopamine should be considered in refractory bradycardia as well as Beta Blocker overdoses.

Minimum Skill Level

1. Paramedics and all trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Phlebitis, hematoma, infiltration/ known occlusion involving one external jugular vein.
   - 2.2. Diagnosis or previous history of venous stenosis or occlusion involving the external jugular, subclavian, internal jugular, or brachiocephalic veins on the same side unless vein patency has been demonstrated by Doppler or venogram.
   - 2.3. Traumatic injury or surgery involving the superficial or deep tissues/structures of the neck (i.e., tracheostomy, radical neck dissection, etc.)
   - 2.4. Elevated Intra-cranial pressure. (Relative)
   - **2.5. Patients < 8 years of age**

Clinical Indications

3. Clinical Indications
   - 3.1. Any seriously ill, injured, or patient requiring intravenous access and in whom a peripheral IV cannot be established. The external jugular vein is an acceptable first choice site for IV insertion in a cardiac arrest patient. The site is close to the central venous circulation and allows for near direct access.
   - 3.2. A maximum of two (2) attempts on one side only will be allowed.

Procedure Steps

4. Procedural Steps
   - 4.1. Explain procedure.
   - 4.2. Place patient supine in a slight Trendelenburg or head down position to allow better filling of the external jugular vein and prevents air embolism.
   - 4.3. Turn the patient's head to the opposite side of the procedure site exposing the neck.
   - 4.4. Clean site with 2% chlorhexidine or 70% alcohol per institutional policy.
   - 4.5. Select an appropriately sized IV catheter dependent upon vein size and prescribed therapy.
   - 4.6. Align the catheter with the vein and aim toward the same side shoulder.
   - 4.7. "Tourniqueting" the vein lightly with one finger above the clavicle, puncture the vein slowly midway between the angle of the jaw and the clavicle, verify entry by flashback of blood and cannulate the vein in the usual method.
   - 4.8. Apply digital pressure below the catheter tip and remove the needle stylet. Attach a primed IV tubing, prefilled saline lock, or extension set to the catheter.
   - 4.9. Flush with saline and secure the device with transparent occlusive dressing and tape.

Documentation

5. Documentation

5.1. Date/ Time/ Procedure
5.2. Site/ Gauge
5.3. Result (success/failure)/ Condition
5.4. Response to procedure.

Minimum Skill Level

1. Critical Care Paramedics and all trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. It should be accessed only in emergent conditions where no other vascular options exist.
   - 2.2. Precautions should be weighed:
     - 2.2.1. Fracture, suspected fracture, or vascular compromise to the targeted limb.
     - 2.2.2. Femoral sticks may be painful in the conscious patient.
     - 2.2.3. Inadvertent cannulation of the femoral artery.
     - 2.2.4. The femoral vein may be difficult to locate/cannulate in the pulseless patient.
     - 2.2.5. Hematoma, excessive bleeding may occur.

Clinical Indications

3. Clinical Indications
   - 3.1. Inability to establish a peripheral IV line in an acutely ill or injured patient in the EMERGENCY Setting where peripheral IV attempts were unsuccessful.
   - 3.2. To allow delivery of medications directly into the central circulation.

Procedure Steps

4. Procedural Steps
   - 4.1. Cleanse overlying areas with chlorohexidine or betadine.
   - 4.2. Locate landmarks and or the femoral artery by its pulsation, or by finding the midpoint of a line drawn between the anterior superior iliac spine and the symphysis pubis. The femoral vein is just medial to the femoral artery.
   - 4.3. Make the puncture with a 14 or 16 gauge 2 ½-inch over-the-needle catheter attached to a small syringe. The point of insertion should be two finger widths below the inguinal ligament, medial to the artery.
   - 4.4. The needle should be directed cephalad at a 45-degree angle.
   - 4.5. Maintain suction on the syringe while advancing. If resistance is met, gradually withdraw the needle while continuing to maintain suction.
   - 4.6. Once a blood return is noted, lower the needle more parallel to the frontal plane, confirm placement, and advance the catheter.
   - 4.7. Secure the catheter in place and cover it with sterile dressing.
   - 4.8. A Commercial Central Venous Catheter kit could be utilized to establish femoral vascular access only if the clinician is familiar and properly trained in the procedure utilizing Seldinger technique.
   - 4.9. An ultrasound shall be used to confirm placement or identify landmarks.

Documentation

5. Documentation
   5.1. Date and time.
   5.2. Procedure, type of device
   5.3. Gauge
   5.4. Site
   5.5. Result(success)/ Condition
   5.6. Response to procedure
   5.7. Need for emergent vascular access and decision to access the femoral vein.

Emergency Placement: Sterile technique is the preferred way to insert femoral lines (Venous and arterial), but in cases of emergency where no adequate IV access can be obtained or maintained, femoral lines shall be placed with the Seldinger technique or direct access with angiocath. Receiving staff should be informed if aseptic or sterile technique was used.

Pediatric Considerations:

For ages < 12 years old, the approved method for accessing the femoral vein is with traditional IV angiocatheter with Ultrasound guidance. This can be sutured in place if needed. For patients > 12 years of age and of typical adult habitus, the Seldinger technique can be used.

Minimum Skill Level

1. Paramedics and higher; trained and approved nurses

****Advanced EMT's can place IO's in pediatric patients < 16 years of age****

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Fracture or suspected fracture to the targeted bone.
   - 2.2. Previous orthopedic procedure to targeted limb (Prosthetic limb or joint).
   - 2.3. IO within the past 24-48 hours in the targeted bone.
   - 2.4. Infection at the insertion site.
   - 2.5. Inability to locate landmarks or excessive tissue.
   - 2.6. For pediatrics, place needle below the tibial tuberosity and directed caudally to prevent damage to the epiphyseal plate.
   - 2.7. For anesthetic effect in patients responsive to pain prior to flush, consider the use of 2% lidocaine without preservatives or epinephrine (cardiac lidocaine). Administer slowly.

Clinical Indications

3. EZ-IO by *Vidacare* is the preferred method of intraosseous vascular access.
   - 3.1. For adults and pediatrics anytime, vascular access is difficult to obtain in an emergency, urgent, or medically necessary.
   - 3.2. Absence of contraindications.
   - 3.3. When blood products, fluid and/or medication administration is necessary, and IV access cannot be obtained within three attempts or 90 seconds of searching for a suitable vein.

Procedure Steps

4. Procedure
   - 4.1. Prepare equipment: EZ-IO driver, intraosseous needle, EZ connect extension tubing, NS flush/ 2% lidocaine, EZ-stabilizer, skin cleanser-chlorohexidine, 70% ETOH swab, betadine.
   - 4.2. Choose appropriate size IO needle (15mm-pink, 25mm-blue, 45mm-yellow).
     - 4.2.1. Estimate soft tissue depth using your finger.
     - 4.2.2. Visualization of black line after skin penetration.
     - 4.2.3. Consider use of a 45mm needle for all proximal humerus insertions – patients >40kg (edema or excessive soft/ muscle tissue).
   - 4.3. Open package, prime tubing with NS flush/ 2% lidocaine. Leave syringe attached.
   - 4.4. Attach driver to needle set (leave needle safety cap until ready to insert).
   - 4.5. Explain procedure if appropriate and locate the optimal insertion site.
     - 4.5.1. Proximal Humerus
     - 4.5.2. Proximal Tibia
     - 4.5.3. Distal Tibia
     - **4.5.4. Oher site identified by the manufacturer.**
   - 4.6. Confirm and clean the insertion site (Chlorohexidine preferred).

4.7. Remove needle safety cap.
4.8. Stabilize extremity.
4.9. Insert needle set at a 90° angle to bone. Insert through skin until you touch bone (Do not apply excessive force).
4.10. Apply the minimal amount of pressure required while squeezing driver trigger to keep the driver advancing straight into the bone.
4.11. When you feel a sudden release of resistance, release trigger and remove driver from needle set (stabilize the needle set while disconnecting driver).
4.12. Continue to stabilize needle set and rotate the stylet counterclockwise.
4.13. Remove stylet and dispose in sharps container.
4.14. Apply EZ-stabilizer before attaching the primed EZ-connect extension tubing.
4.15. Confirm IO catheter placement. Attach the primed EZ-connect extension tubing to hub.
4.15.1. IO firmly seated in bone.
4.15.2. May or may not note a flash of blood at the IO catheter hub or in tubing on aspiration.
4.15.3. Pressurized fluids flow without difficulty.
4.15.4. Observed pharmacological effects.
4.16. Flush IO catheter with 10ml of NS. Flush must overcome initial resistance and more than one flush may be required.
4.16.1. Consider cardiac lidocaine slow IVP.
4.17. Attach the pink wrist band to the patient's extremity and annotate time and date. Monitor the patient for the desired therapeutic effects as well as for signs of extravasation.
4.18. If using Betadine, apply as soon as possible and allow to work until ready for insertion. Wipe away excess with alcohol prep.

Documentation

5. Documentation
5.1. Date/ Time
5.2. Procedure/ Site/ Gauge
5.3. Device/ Result (success/ failure)
5.4. Condition of the IV
5.5. Response to procedure

IO Access should be used for resuscitation but not for on-going care. Attention should quickly turn to a more stable and long-term IV access for patients after initial resuscitation has been accomplished.

Minimum Skill Level

1. EMT-Advanced and higher; trained and approved nurses

Clinical Restrictions

2. The dorsal aspect of the hand, the antecubital fossa, and the forearm are the sites of choice for peripheral venous access. If these sites are unavailable, refer to specific procedures for Jugular Vein, Femoral Vein, and Intraosseous Access.

Clinical Indications

3. Clinical Indications
   - 3.1. Fracture, suspected fracture, or vascular compromise to the targeted extremity.
   - 3.2. Hydration/replace fluid loss.
   - 3.3. Administer medications.
   - 3.4. Obtain venous blood specimens.
   - 3.5. Any patient where intravenous access is indicated (significant trauma or mechanism, emergent or potentially emergent medical condition).

Procedure Steps

4. Procedure Steps
   - 4.1. Inspect the IV solution for expiration date, cloudiness, discoloration, leaks, or the presence of particles.
   - 4.2. Connect IV tubing to the solution in a sterile manner. Fill the drip chamber half full and then flush the tubing, bleeding all air bubbles from the line.
   - 4.3. Place a tourniquet around the patient's extremity to restrict venous flow only.
   - 4.4. Select a vein and appropriate gauge catheter for the vein and the patient's condition.
   - 4.5. Prep the skin with chlorohexidine, 70% ETOH pad, or betadine solution.
   - 4.6. Insert the needle with the bevel up into the skin in a steady, deliberate motion until bloody flashback is visualized in the catheter.
   - 4.7. Advance the catheter into the vein. (**Never** reinsert the needle through the catheter).
   - 4.8. Dispose of the needle into the proper container without recapping.
   - 4.9. Draw blood samples when appropriate.
   - 4.10. Remove the tourniquet and connect the IV tubing or saline lock.
   - 4.11. Open the IV to assure free flow of the fluid and then adjust the flow rate as per protocol or as clinically indicated.
   - 4.12. Cover the site with a transparent dressing (op-site) and secure the IV and tubing.
   - 4.13. Label the IV with date and time, catheter gauge, and name and title of the person starting the IV.

Documentation

5. Documentation
   5.1. Date/ Time/Procedure/ Gauge/ Site
   5.2. Result (success/failure)/ Condition
   5.3. Response to procedure

Use of Ultrasounds for starting peripheral IV's:

Use of Ultrasound as an adjunct for starting a peripheral IV is allowed and encouraged for all critical care personnel. The insertion of the IV is not a separate procedure with the ultrasound. The provider should document the use of the ultrasound if used to locate or cannulate a peripheral IV

Minimum Skill Level

1. Paramedic (Venous cannulation only) and higher; all trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. In the emergency setting of a neonate, there are no clinical restrictions.
   - 2.2. Precautions:
     - 2.2.1. Peritonitis
     - 2.2.2. Necrotizing Enterocolitis
     - 2.2.3. Omphalitis
     - 2.2.4. Omphalocele
     - 2.2.5. UAC – Evidence of local vascular compromise in lower limbs or buttocks area
     - 2.2.6. UVC – portal venous hypertension

Clinical Indications

3. Clinical Indications
   - 3.1. Arterial Cannulation
     - 3.1.1. Arterial blood sampling.
     - 3.1.2. Arterial blood pressure monitoring.
     - 3.1.3. Administration of fluids and drugs.
     - 3.1.4. Exchange transfusions (removal of blood).
       - 3.1.4.1. Never infuse PRBC's through an umbilical arterial catheter.
   - 3.2. Venous Cannulation
     - 3.2.1. Intravenous access for the administration of fluid, drugs, or hypertonic glucose.
     - 3.2.2. Monitoring central venous pressure.
     - 3.2.3. Venous blood sampling.
     - 3.2.4. Exchange transfusions.

Procedure Steps

4. Procedure Steps
   - 4.1. Assess the need to pre-medicate the infant for pain control and/or sedation. Assess the need for further medication throughout the procedure.
   - 4.2. Check appropriate labs as necessary.
   - 4.3. If time permits, inform the patient/family of the treatment plan, otherwise notify them after the procedure is completed.
   - 4.4. Restrain extremities for the procedure.
   - 4.5. Use appropriate sterile techniques including gloves, cap, gown, and mask.
   - 4.6. Cleanse umbilical cord and abdomen with ChloraPrep. Allow it to dry. Drape area so that only umbilical cord is exposed.

4.7. Place the cord tie around stump of cord and tie loosely; do not put tie on skin. Use scissors or scalpel to cut the umbilical cord 1 cm from the skin. If bleeding occurs, tighten the cord tie only enough to stop bleeding; the tie may have to be loosened during catheter insertion.
4.8. The vein is a large, thin-walled vessel.
4.9. If the catheterization is not done immediately after birth, be careful to avoid dislodging clots in the lumen.
    4.9.1. Remove any visible clots with forceps.
4.10. When the fluid-filled catheter is first introduced, have a syringe on the stopcock. If withdrawing on the syringe does not produce an easy flow of blood, the catheter may have a clot at the tip.
    4.10.1. Do not flush but withdraw the catheter, maintaining only gentle suction with the syringe. This will remove the clot, and catheterization can then proceed.
4.11. Throughout this procedure, keep the catheter filled with fluid, and never open it to the atmosphere.

Documentation

5. Documentation
    5.1. Catheter size and depth of insertion.

In 2023, this protocol was removed.

Transport ventilators are preferred for patient safety

Minimum Skill Level

1. Use during transport.
    1.1. Paramedics that have been trained and checked off to use the make/model of the ventilator can transport a patient that has been established on that ventilator for at least 20 minutes with stable pressures and SaO_2 (this time can be shortened with approval from on-line medical director)
2. Initiating ventilator use
    2.1. Is restricted to trained and approved critical care paramedics and nurses.

Clinical Restrictions

3. Clinicians should be competent to operate ventilator(s)
    3.1. Initial clinical equipment training
    3.2. Recurring / Ongoing competencies
    3.3. Pertinent in-services

Clinical Indications

4. Clinical Indications
    4.1. All patients intubated with endotracheal tube.
    4.2. All patients with supra-glottic airway placed.
    4.3. Other:
        4.3.1. CPAP
        4.3.2. BiPAP

Procedure Steps

5. Procedure Steps (Approved Paramedic)
    5.1. The transporting paramedic will receive an approved ventilator with settings in place and documented with sending emergency provider.
    5.2. Sending provider or respiratory therapist will determine the settings for the patient.
    5.3. Ideally, there is an Arterial blood gas drawn after being on the settings for 30 minutes prior to departure by the transport team.
    5.4. Any changes to the ventilator during transport must be discussed with the sending provider OR on-line medical control.

An email to the off-line medical director within 24 hours of ventilator transport shall be sent.

6. Procedure Steps (Ventilator initiation- Critical Care Paramedics and approved nurses)
    6.1. Ensure continuous monitoring.
    6.2. Confirm adequate IV Access.
    6.3. Selection of desired ventilator.
    6.4. Follow manufacturer guidelines for set-up and operation of selected equipment.
    6.5. Selection of patient specific ventilator settings based on condition.
    6.6. For settings, utilize:
        6.6.1. Clinician judgment

6.6.2. Appropriate pertinent clinical protocol(s)
6.6.3. Special considerations:
6.6.3.1. Patient
6.6.3.2. Environment
6.6.3.3. Medical gas supply

6.7. **Definition of Modes and Suggestions for Use of Modes**

6.7.1. Definition - Mandatory breath modes

6.7.1.1. **Volume ventilation (VV)**: a preset volume is delivered. VV is used in either assist/control where every breath receives at least the set volume; or SIMV, where the minimum set volume is delivered at a rate based on the breath rate set for mandatory breaths (SIMV rate).

6.7.1.2. **Pressure ventilation (PV)** or pressure control ventilation (PCV): a preset pressure is delivered. PV (PCV) is used in either assist/control where every breath receives at least the set volume; or SIMV, where the minimum set pressure is delivered at a rate based on the breath rate set for mandatory breaths (SIMV rate).

6.7.1.3. **PRVC (pressure regulated volume control)** *: pressure ventilation is delivered such that the pressure is automatically adjusted by the ventilator to provide a set tidal volume. This mode is used in either assist/control where every breath receives at least the set volume; or SIMV, where the minimum set volume is delivered at a rate based on the breath rate set for mandatory breaths (SIMV rate).

7. Support Breath Modes:

7.1. Pressure support (PS): a patient-triggered, pressure targeted, flow-cycled mode. This can be a stand-alone breath type in patients who have an intact respiratory drive, or it can be used in combination with mandatory breath types.

7.2. Volume support (VS): a patient-triggered, pressure targeted, flow-cycled mode that guarantees a set volume delivery. This can be a stand-alone breath type in patients who have an intact respiratory drive, or it can be used in combination with mandatory breath types.

7.3. Spontaneous/CPAP: Spontaneous breathing through the ventilator which allows for monitoring and alarms and allows for adjustment of the baseline to a continuous positive airway pressure value. This breath type provides only pressure or flow assist to the patient. It can be used alone in patients with adequate respiratory drive and ventilation capabilities or in combination with mandatory breath types.

8. Suggestions for Use of Modes

* The specific goal for using ventilation should be established for each patient.

8.1. In the initial phases of acute respiratory failure, near total ventilator support is recommended.

8.2. As the patient's condition improves, methods of ventilation (support breath modes) that allow some amount of spontaneous ventilator activity should be considered as tolerated, in lieu of total support.

9. Example Uses

9.1. Volume ventilation using assist/control is familiar to most practitioners and can provide basic management of patients.

9.2. Pressure ventilation using assist/control (pressure-limited, time-cycled assist/control) may help to reduce the work of breathing in patients with a high work of breathing compared to other modes. Since volume delivery varies, monitoring of tidal volume is important.

9.3. Pressure support by itself may be effective in patients who have an adequate respiratory drive and who might tolerate mechanical ventilation better when a variable I: E ratio is available.

10. Adult Invasive Ventilation - Initial Goals and Considerations

10.1. **Use IBW to determine tidal volume**:

10.1.1. FEMALES IBW (kg) = (height in inches – 60) * 2.3 + 45.5
10.1.2. MALES IBW (kg) = (height in inches – 60) * 2.3 + 50

10.2. Volume-Ventilation may be used for most patients, but pressure-ventilation (PV or PRVC) should be considered, especially if peak pressures > 40 cm H_2O or plateau pressures $\geq$30 cm H_2O.

10.2.1. Tidal Volume: 4-10 mL/Kg of ideal body weight (IBW), while maintaining plateau pressure $\leq$ 30 cm H_2O.

10.2.2. Minute ventilation: 4.0 x BSA (Body Surface Area) = V_E (L/min) for males and 3.5 x BSA = V_E (L/min) for females.

10.2.3. Rate: 10 to 30 breaths/minute adjusted to achieve desired total cycle time, minute ventilation, while maintaining goal plateau pressure $\leq$ 30 cm H_2O.

10.3. Pressure Support (PS): 8 to 20 cm H_2O. Maintain Plateau $\leq$30 cm H_2O PS should be adjusted to reduce work of breathing and patient fatigue and support effective ventilation.

10.4. All settings and all modes should be adjusted and tailored to fit clinical picture and course of treatment.

11. Usage: Place patient on ventilator
    11.1. Confirm appropriate ventilation.
    11.2. Confirm appropriate oxygenation.
12. Confirm patency of airway after every patient movement.
13. Ensure effectiveness of settings throughout transport.
    13.1. Clinical assessments
    13.2. Monitoring data
14. Troubleshooting
    14.1. Poor Oxygenation
        14.1.1. Consider FiO2 % Change
        14.1.2. Utilize PEEP changes.
    14.2. Poor Ventilation
        14.2.1. Consider changing volume or PIP, based on mode.
        14.2.2. Change rate based on EtCO2 or ABG.
    14.3. Ventilation High Pressures
        14.3.1. Suction ETT or device.
        14.3.2. Check tubing for kinks, secretions, or blockages.
        14.3.3. Consider changing volume or PIP, based on mode.
15. Perform effective communication and complete transfer of patient care at destination to include all settings and pertinent information.

At any time if the patient begins to deteriorate, consider mechanical failure of the ventilator. Disconnect the ventilator and begin BVM/ETT ventilation immediately. If deterioration continues, search for other causes of ventilatory failure – ET Tube displacement, obstruction, pneumothorax, or equipment failure. Check ET tube placement each time the patient is moved to ensure the ET tube is not displaced.

Documentation

16. Documentation should include:
    16.1. Placement confirmation of airway device.
    16.2. Specific ventilator equipment used.
    16.3. Pertinent settings, default and clinician selected.
17. All patients shall have the following vital signs recorded every fifteen (15) minutes for a stable patient and every ten (5) minutes for other patients. Minimum continuous monitoring includes:
    17.1. Cardiac monitoring
    17.2. Heart Rate
    17.3. Pulse oximetry.
    17.4. Blood pressure (Non-Invasive or Invasive)
    17.5. Respiratory / Ventilation rate
    17.6. End-Tidal Capnography
18. Any special considerations or deviations ***

Special Considerations

19. ARDS
    19.1. Monitor the patient for clinical issues/decompensation.
    19.2. Trend pressures on ventilator.
    19.3. Ventilator adjustments should be made as follows:
        19.3.1. Regular assessment of general appearance, vital signs, breath sounds, and hemodynamic stability should be evaluated prior to and during any ventilator adjustments.
        19.3.2. For a pH $\leq$ 7.30, evaluate to ensure the cause is respiratory. If appropriate, increase rate to a maximum of 24 breaths/min until pH is $\geq$ 7.30. If further adjustment is needed increase V_T until PIP $\geq$ 40 cm H_2O or Plateau $\geq$ 30 cm H_2O. If unable to maintain these parameters, consider allowing permissive hypercapnia.
        19.3.3. For a pH $\geq$ 7.45, evaluate to ensure the cause is respiratory. If appropriate, reduce rate to a minimum of 8 breaths/minute or until pH is $\leq$ 7.45. After rate is decreased to 8 breaths/minute, if pH is still $\geq$ 7.45, reduce volume to a minimum of 4 mL/Kg (IBW).
        19.3.4. PaO_2 or SpO_2 should be maintained based on patient's targeted values.
        19.3.5. Hemoglobin/ Hematocrit should be checked to ensure the absence of anemia. Hemodynamic data should be checked, when possible, to ensure adequate circulation.
    19.4. See ARDSnet.org for additional information and a reference card.

Minimum Skill Level

1. Paramedic and higher; all trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   - 2.1. Central Venous Catheter Access (Chemoport) if no alternative IV is found.
   - 2.2. Hemodialysis Catheter Access- Only in emergencies in unstable patients.

Clinical Indications

3. Clinical Indications
   - 3.1. Dialysis Catheters
     - 3.1.1. **HD catheters must be preserved and represent a lifeline for patients needing dialysis and other forms of renal replacement therapies**.
     - 3.1.2. Ideally, HD catheters should only be used for dialysis and renal replacement therapies.
     - 3.1.3. HD catheters for IV infusions are to be avoided and will only be used in emergencies. The use of HD catheters for IV infusions can lead to clotting or damage to the inner lining of the HD catheter.
     - 3.1.4. The HD catheter should not be used for routine blood drawers as it increases the risk of infection and catheter clotting.
     - 3.1.5. Staff must adhere to meticulous infection prevention guidelines.
     - 3.1.6. ONLY ACCESSED IN UNSTABLE Patients to provide emergency care.
     - 3.1.7. If the HD Catheter is used the transport crew member must:
       - 3.1.7.1. Immediately notify the inpatient dialysis unit to ensure that the catheter is properly cleaned, flushed, and locked after the emergency.
   - 3.2. Chemoport
     - 3.2.1. Accessing a Chemoport is permissible when there is no other alternative IV access or in case of emergency.
     - 3.2.2. PICC Lines or mid-line IV's can be used when there is no other alternative IV access or in case of emergency. It should be noted that 10cc of fluid should be pulled from the line BEFORE using it for medication infusion. Once completed, a TKO rate of fluids should be maintained through the line until signed off at hospital.

Procedure Steps

4. Procedure Steps:
   - **4.1. Dialysis Catheters Emergency Access:**
     - 4.1.1. Wash hands to reduce the spread of microorganisms.
     - 4.1.2. Prepare syringes with normal saline and heparin per order; verify per weight protocol.
     - 4.1.3. Identify patient using two patient identifiers to ensure proper patient identification.
     - 4.1.4. Explain procedure to patient and family to reduce anxiety and promote patient cooperation.

4.1.5. Wash hands, don PPE, ensure that the patient, family, and all staff present don masks.
4.1.6. Carefully remove any tape or gauze to expose the lumen port and lumen clamp. This allows for easier access to flush and administer medication.
4.1.7. Soak catheter hub and connection with Alcavis (or CHG in an emergency). Grasp end cap with gauze and scrub catheter from connection to 10 cm down the catheter.
4.1.8. Close the lumen clamp and remove cap. Attach empty 10 ml luer-lock syringe. Place syringe onto port and open clamp. Strict aseptic technique must be maintained throughout the procedure. This prevents line contamination.
4.1.9. Aspirate at least 2 times the lumen volume, close the clamp, then remove the syringe, and discard into sharps container. This controls the amount of heparin the patient receives when entering the catheter lumen and verifies placement.
4.1.10. Attach 10 ml luer-lock syringe and flush the line with normal saline, volume based on patient weight; this clears the line for usage. Close clamp to prevent leakage into the lumen of the catheter. Attach lines, syringes, etc.
4.1.11. Administer prescribed medication, fluids, dialysis/renal replacement therapy, etc. as ordered. Close the clamp.
4.1.12. Immediately after each use, attach a 10 ml luer-lock syringe and flush the line with normal saline volume based on patient weight. Close the clamp and remove the syringe. Heparin must be checked by 2 licensed practitioners. Verify concentration based on order. Instill only the volume noted on catheter lumen. Close the clamp and remove the syringe. Cap the port using a new sterile cap.
4.1.13. Tape and secure the line in place to prevent accidental dislodgement.
4.1.14. Attach label on cap end(s) with date, time and initials, and heparin concentration.
4.1.15. Remove personal protective equipment and wash hands.

4.2. Chemoport Access

4.2.1. Assemble equipment and select appropriate size Huber needle.
4.2.2. Identify patient using appropriate patient identifiers to ensure correct patient identification.
4.2.3. Explain procedure to patient to promote patient cooperation and relieve anxiety.
4.2.4. Wash hands: don non-sterile gloves to reduce the spread of microorganisms.
4.2.5. To identify injection site, palpate entry site.
4.2.6. Don face mask: open sterile supplies (Huber Needle Infusion Set, Centurion Dressing Change Tray, and Positive Bolus Needle Free Valve).
4.2.7. To mechanically cleanse and disinfect the site, swab injection site with chlorhexidine gluconate one step skin antiseptic for thirty (30) seconds in a back-and-forth motion. Allow to air dry for thirty (30) seconds.
4.2.8. Connect injection port to extension tubing using aseptic technique. Do not touch Huber needle.
4.2.9. Attach 10ml syringe system with 10ml saline into injection port and flush tubing and the Huber needle with saline to evacuate air from the tubing and needle. Do not insert the needle in the injection port.
4.2.10. Don sterile gloves to reduce the spread of microorganisms.
4.2.11. Remove needle tip cover from Huber needle.
4.2.12. To identify injection site, palpate for septum with non-dominant hand. Place index and second finger on either side of septum.
4.2.13. M. Blunt cannula, non-coring safety needle:

4.2.13.1. Using your dominant hand, hold blunt cannula, non-coring safety Huber needle (with attached tubing and Injection port) at the top, widest portion of the introducer so your forefinger is on the top and fingers surround the area that is directly over the actual trocar.

4.2.14. Safety Huber needle with power injection:

4.2.14.1. Using your dominant hand, hold Huber Needle (with attached tubing and Injection Port).

4.2.14.2. Insert Huber needle into center of entry septum to prevent extravasation until the needle reaches bottom, all the while maintaining a 90-degree angle. It will feel like hitting metal when the needle reaches the bottom.

4.2.15. *Blunt cannula, non-coring safety needle*:

4.2.15.1. From the back of the inserter, place fingers on each side of the inserter's base to stabilize it. With the other hand, place a finger on the tip of the inserter's safety arm. Press the tab in and lift the safety arm straight back until the needle CLICKS into the locked position. This removes the sharp and leaves a blunt tip safety cannula infusion site. This must be done prior to aspiration of blood.

4.2.16. Safety Huber needle with power injection:

4.2.16.1. Remove the clip by sliding it towards the end of the needle arm and lifting (does not affect use of needle if not removed, only application of dressing and patient comfort).

4.2.16.2. Aspirate for blood return to confirm placement of needle.

4.2.16.3. If there is no blood return, follow nursing clinical policy and procedure (H-NC-GEN-GEN-PO-00125).

Documentation

5. Documentation
   5.1. Document need for access and practice followed.
   5.2. Document who was contacted after HD Catheter access was used.

Minimum Skill Level

1. Paramedic or higher; trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions
   2.1. See site restrictions as enclosed.

Clinical Indications

3. Clinical Indications
   3.1. Arterial Blood Draw
      3.1.1. When needed in support of clinical care and venous gases would not provide needed clinical data.
      3.1.2. Assessment of general cardiopulmonary status to aid in evaluation of ventilatory, acid-base, and oxygen status.
      3.1.3. Assessment of effects of therapy on ventilatory, acid-base, and oxygen status.
   3.2. Venous Blood Draw
      3.2.1. When needed in support of clinical care.
   3.3. Capillary Blood Draw
      3.3.1. When needed in support of clinical care and venous blood is not accessible or practical.

Procedure Steps

4. Procedure Steps
   4.1. Arterial Blood Draw
      4.1.1. A positive Allen's test demonstrates adequate collateral circulation to the hand via the ulnar artery indicating that the radial artery should be the puncture site of choice.
      4.1.2. A negative Allen's test demonstrates inadequate collateral circulation indicating that the brachial artery should be the puncture of choice. Alternatively, Allen's test can be repeated on the opposite wrist.
      4.1.3. The puncture site must be thoroughly cleansed with chlorhexidine gluconate swab and the arterial puncture procedure performed with strict adherence to aseptic techniques.
      4.1.4. Numerous variations of arterial puncture technique exist. One should be selected which best assures optimum prevention of bleeding, arterial obstruction, and infection while providing an acceptable anaerobic sample.
      4.1.5. Upon completion of the arterial puncture, direct pressure should be applied to the puncture site for a minimum of 5 minutes for radial and 10 minutes for femoral arteries.
      4.1.6. All samples should be mixed thoroughly immediately after sample collection and transported to the appropriate analyzer within the appropriate container.
      4.1.7. Universal Precautions should be practiced during the entire process.

Documentation

5. Documentation

Arterial Access

Adult Arterial Sticks (ABG)	Nurse	Critical Care Paramedic	Paramedic
Radial Artery	Allowed	Allowed	**Not Allowed**
Femoral Artery		Allowed	**Not Allowed**

Pediatric/Neonate Arterial Sticks (ABG)	Nurse	Critical Care Paramedic	Paramedic
Radial Artery	Allowed	Allowed	**Not Allowed**
Femoral Artery		Allowed	**Not Allowed**

Minimum Skill Level

1. EMT or above; trained and approved nurses

Clinical Restrictions

2. Clinical Restrictions (absolute)
   - 2.1. Absolute Exclusion Criteria
     - 2.1.1. Tracheal Surgery or sternotomy within the previous 15 days
     - 2.1.2. Unstable spine, pelvic or femur fractures
     - 2.1.3. Massive hemoptysis
     - **2.1.4. Patient Age > 16 years of age[13]**
   - 2.2. Relative Exclusion Criteria
     - 2.2.1. Facial trauma or surgery in the previous 15 days
     - 2.2.2. Intracranial hypertension (ICP)
     - 2.2.3. Intra-abdominal hypertension/open abdomen
     - 2.2.4. Pregnancy > 24 weeks
     - **2.2.5. Weight Restrictions- See below[14]**

Clinical Pearl:

Prone positioning has been used safely for many years in patients with ARDS. Physiologically, prone positioning increases blood flow to better-aerated lung (improved V/Q matching), increases functional residual capacity (FRC), reduces atelectasis, distributes plateau pressure more homogenously across the lung, and facilitates secretion drainage. It is, however, associated with the potential complications of endotracheal tube (and other line and tube) dislodgement, pressure ulcers, and increased intra-abdominal and intracranial pressure, and the logistics of the position complicate many routine patients care activities. Studies have shown significant decrease mortality in ARDS (non-COVID) in 28-day mortality. (Guérin C, 2013) (Munshi L, 2017) Transporting a ventilated patient in the prone position is feasible and safe. (DellaVolpe JD, 2016)

Clinical Indications

3. Clinical Indications
   - 3.1. **Acute Respiratory Distress Syndrome (ARDS)** - NON-*COVID-19- this treatment has been considered a bridge to ECMO or an adjunct to advanced ventilator settings.*
     - 3.1.1. Following a 12–24-hour stabilization period on traditional ventilator settings
     - 3.1.2. FiO2 > 60%

[13] Age consideration added due to the lack of available evidence on transporting prone patients and the limited critical need in pediatric COVID-19 patients.

[14] Weigh restrictions are arbitrary based on the current providers on the ambulance/helicopter and the ability to roll the patient to the supine position if needed. These weight restrictions are listed are estimates and the crews will make the final determination along based on their safety.

3.1.3. PEEP > 10%

3.1.4. Total duration of ARDS for 36 hours

3.2. **Acute Respiratory Distress Syndrome (ARDS)** – *COVID-19 Related*

3.2.1. Advanced Life Support (ALS)

3.2.1.1. Acute Shortness of Breath with oxygen (> 5lpm) that traditional seated positions are not providing adequate relief.

3.2.1.2. Intubated Interfacility transfer (IFT) only **IF two providers** are in the back of the ambulance. This is needed for safety and the ability to "roll" the patient back. This can be a nurse, EMT or another paramedic if available.

3.2.1.3. All ALS Crews much contact the medical director (or designee) and operations manager before transporting an intubated prone patient.

3.2.2. Critical Care Transport

3.2.2.1. Intubated Interfacility transfer (IFT) with above ARDS criteria and difficultly ventilating with traditional methods. *The exception is that there is no time to wait for starting prone protocols in COVID-19 patients*.

Procedure Steps

4. Procedural Steps (Lateral Positioning- ALS Units)

4.1. Placing patients in a lateral recumbent position can assist in ventilation, especially with obese patients or those with large breast/chest mass. (See Image 1)

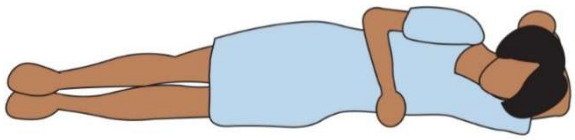


Figure 2: Picture Source: Open Website: www.thoughtco.com

4.2. Provided need oxygen to maintain sats > 96%

4.3. $EtCO_2$ is helpful (if available)

5. Procedural Steps (Prone Positioning- non-intubated)

5.1. Patients that do not improve in a lateral position can be placed in a prone position. These patients should be capable and allowed to "Self-prone" themselves. Careful consideration to ensure that patients are fully monitored (SaO_2, EKG, and EtCO2 if available) prior to being placed in the prone position. "Self-proning" might help early in the course of disease. This reduces the lifting and patient contact exposure.

5.2. Careful consideration should be taken to have a plan for getting back to a supine position in case of emergency. This should include plans to stop the ambulance or land the helicopter to obtain appropriate help in this emergency procedure.

Figure 3: Supine Position - Picture Source: examnotes.com

6. Procedural Steps (Prone Positioning- Intubated)

6.1. Should be limited initiation to the hospital prior to departure. Should not be attempted in transport. Transporting PRONE patients that are intubated MUST have two providers in the patient compartment.

6.2. Careful consideration should be taken to have a plan for getting back to a supine position in case of emergency. This should include plans to stop the ambulance or land the helicopter to obtain appropriate help in this emergency procedure.

6.2.1. **Weight Considerations**: weight of the patient acceptable to the crewmembers is based on the ability of the crewmembers to allow for reversal of the patient to the supine position for

emergency access. This will be a weight less than 200lbs and space considerations would be less impactful in the larger H-145 airframe.

6.3. Securing all tubes and lines before proning is advised- more so than before. Lines should be run to the shoulder- clavicle region and secured. This will allow for improved emergency reversal if needed.

6.4. Confirm tube placement three ways before transfer.

6.4.1. $EtCO_2$ is REQUIRED before procedure is started.

6.4.2. Properly sedate and administer paralytic to patient.

6.5. Paralytic and Sedation infusions are preferred over push does medications.

6.6. Place any tubes (Chest tubes, drains, Foley bag) between legs.

6.7. Start Proning Procedure

6.7.1. Move electrodes to the back while the patient is in the lateral recumbent position.

6.7.2. It is easier to adjust the patient in the bed so that the head/ET tube is secured (like c-spine precautions) OFF the head end of the bed.

6.8. Reversal of Prone Patient Indications

6.8.1. ET Tube dislodgement/malposition

6.8.2. Bradycardia (< 30bpm for > 1 minute)

6.8.3. Hypotension (SBP < 60 for > 5 minutes

6.8.4. New evidence of ICP (Acute pupillary change)

6.9. Cardiac Arrest

6.9.1. Can be performed in the prone position.

6.9.2. Defibrillation can be done with similar pad placements (avoid scapula region) as anterior.

6.10. Family Discussion

6.10.1. It should be noted that placing patients in the prone position does limit the ability to resuscitate a patient. Family discussion should be held about the risk and families should be informed of the limitations and inherent challenges to this type of transport.

Documentation

7. Documentation

7.1. Documentation of the medical reason(s) for initiating PRONE Positioning.

7.2. Documentation response to therapy

7.3. Documentation of tube position by continuous $EtCO_2$

References

Colella, M. R. (2015). Field EMS Physician Limb Amputation Training and Guidelines. *Field EMS Physicians*, Web.

DellaVolpe JD, L. J.-G. (2016). Transport of Mechanically Ventilated Patients in the Prone Position. *Prehospital Emergency Care*, 643-647.

Guérin C, R. J. (2013). Prone positioning in severe acute respiratory distress syndrome. *New England Journal of Medicine*, 2159-68.

Munshi L, D. S. (2017). Prone Position for Acute Respiratory Distress Syndrome. A Systematic Review and Meta-Analysis. *Annals of Ameican Thoracic Society*, S280-S288.

Treatment Protocols

Protocol Key

HPI (GREEN)

The History of Present Illness (HPI) section includes important information for Mississippi HPI to collect from the sending provider for improved decision making and for clinical providers to collect during their History of Present Illness (HPI) evaluation. This information is then used to improve patient care and documentation for the transport crew and/or receiving hospital.

Level I Protocol (YELLOW)

Treatment guidelines and procedures for **all transport/treatment providers** to include those protocols specifically for Emergency Medical Technicians (EMT) and specialty care transport nurses. EMT should not proceed to additional levels.

Level II Protocol (BLUE)

Treatment guidelines and procedures for **EMT- Advanced providers, Paramedics, transport nurses, and critical care paramedics.** Paramedics should not proceed to additional levels. EMT-Advanced providers must remain within scope of practice and have limited ability to function in this section.

Level III Protocol (RED)

Treatment guidelines and procedures for Critical Care Paramedics and approved transport nurses[15]. Some procedures and guidelines are specific to a certain age population or specific team. See notes under specific protocols.

PEDS (GOLD)

Protocols are specific for pediatric patients (< 16 years old).

SPEC (LIGHT BLUE)

Special recommendations, precautions, and special advisories on treatments or procedures.

DOC (LIGHT GREEN)

Documentation recommendations for each protocol and procedure.

[15] Approved transport nurses are those that have been signed off by the medical director for operations in a pre-hospital/field/scene environment.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Phone Number for family members or next of kin (Cell number preferred)
- Interfacility Transports/HPI Documentation:
  - See specific protocols for detailed information.

Level I Protocol (Basic Life Support)

1. Level I Protocols:

1.1. Standard Precautions

1.1.1. Standard Infectious Disease policies and procedures are to be always followed when delivering patient care.

1.2. Major Bleeding Evaluation/Corrective Actions

1.2.1. All trauma patients shall receive a "blood sweep" to check for active hemorrhage and will correct that hemorrhage if found by direct pressure, elevation, or tourniquet. Tourniquet should be applied quickly if bleeding is not stopped with direct pressure. (*See Hemorrhage Control Protocol*)

1.3. Airway Evaluation

1.3.1. The patient's airway should be assessed for current ability to manage own airway and should be evaluated for deterioration of the airway enroute.

1.3.1.1. Consider oral or nasal airway as appropriate.

1.4. Breathing Assessment

1.4.1. Administer supplemental oxygen. Assist ventilations with a bag-valve-mask device if breathing is inadequate.

1.4.2. Evaluate oxygen treatment needs and administer- refer to the Oxygen Administration/Management Protocol.

1.5. Circulation Assessment

1.5.1. General assessment of perfusion shall be obtained (skin color, urine output, etc.)

1.5.2. Heart rate and blood pressure shall be measured and trended based on pre-arrival information and documentation.

1.6. Level of Consciousness Assessment

1.6.1. Assess and document level of consciousness based off interviews with patient, family, bystanders, and healthcare providers if possible.

1.6.2. Include questions about patient's baseline status and any specific acute changes.

1.6.2.1. Always suspect hypoglycemia in altered patients.

1.7. Environmental Exposure

1.7.1. Expose the patient for secondary assessment.

1.7.2. Remove damp/wet clothing.

1.7.3. Perform decontamination if suspected chemical exposure.

1.7.4. Correct temperature variances with appropriate measures and maintain normal body temperature during transport.

1.8. Obtain Detailed History

1.8.1. SAMPLE History

1.8.2. OPQRST History of present Illness/injury as indicated.

1.9. Other Common Practices

1.9.1. Reassure the patient and provide comfort.

1.9.2. Place the patient in the position of comfort.

1.9.3. All patients should be kept NPO during transport.

1.9.3.1. Except for water as needed oral (PO) medications.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Airway Evaluation

2.1.1. Manage airway with advanced airway as appropriate.

2.2. Breathing Assessment

2.2.1. Pulse Ox should be monitored throughout transport. Low perfusion sensors (if available) should be considered with two failed peripheral attempts.

2.3. Circulation Assessment

2.3.1. Laboratory evidence of poor perfusion shall be recognized and documented (acid-base balance, lactate, etc.) if available.

2.3.2. Clinical evidence of poor perfusion shall be recognized and documented.

2.4. Environmental Exposure

2.4.1. Obtain core body temperature (rectal/esophageal) if clinical suspicion of temperature imbalance. Oral or axillary are acceptable.

2.4.2. Axillary or oral temperature is an acceptable alternative.

2.4.3. Helicopter operations (See below in Documentation for additional.)

2.5. Continuous Monitoring

2.5.1. All patients shall have the following vital signs recorded every fifteen (15) minutes for a stable patient and every ten (10) minutes for other patients. Minimum continuous monitoring includes:

2.5.1.1. Cardiac monitoring

2.5.1.2. Heart Rate

2.5.1.3. Pulse oximetry.

2.5.1.4. Blood pressure (non-invasive or invasive)

2.5.1.5. Respiratory Rate (Includes spontaneous and ventilated rates if intubated)

2.5.1.6. End-Tidal Capnography (all intubated patients and non-intubated respiratory patients)

2.6. Spinal Trauma

2.6.1. All patients being transported for unknown reasons where trauma cannot be ruled out should be transported in spinal precautions. (***Refer to Spinal Trauma Protocol for specifics)***

2.7. Bedside to Bedside Transport

2.7.1. Unless there are extenuating circumstances, transport crews provide bedside to bedside ALS/CCT transport. Exception example is- hospital to airport/LZ transport of non-complicated patient requiring a time sensitive condition that is being transported solely to decrease time. All ALS/CCT patients will have continuous monitoring from the scene or point of origin to the destination hospital bed.

2.7.2. For ALS services with transport ventilators, the expectation is for bedside-to-bedside ventilator use.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Airway Evaluation

3.1.1. Elective airway control shall be completed if it is believed by both crew members that patient deterioration is a high possibility. Elective intubation is preferred to be completed before departure as reasonable based on scene/hospital circumstances.

3.2. Ventilator Management (if required)

3.2.1. Determine a strategy for ventilation and document reasons for choice. (See below)

3.2.2. Initially set the ventilator at parameters and adjust based off non-invasive measurements.

3.2.3. All patients should have ABG performed in transport if on a ventilator for transports greater than 15 minutes. Preference is made to get an ABG for transport before departure if longer than 20 minutes.

3.2.3.1. Exceptions are allowable for time sensitive conditions and on-going active resuscitation. Document in chart reasons for deviation from this standard.

3.2.4. Patients with an ET tube should have the following:

3.2.4.1. NG/OG tube unless contraindicated.

3.2.4.2. Ophthalmic lubricating ointment applied for eyes and/or eye protection.

3.2.4.3. In-line suction and suctioning as required. Commercial in-line suction Ballard preferred.

3.2.4.4. Adequate sedation (evaluation of HR, LOC, and other findings to determined sedation)

3.2.4.5. Pain control should be provided to all patients.

3.2.4.6. Long term Paralytics

3.2.4.6.1. Should be avoided unless needed for improved ventilator management.

3.2.4.6.2. If used, use in small doses and documented reasons.

3.2.4.7. ET tube cuff pressure should be evaluated during flight *(Air Medical only).*

3.2.4.7.1. Commercial manometer preferred but manual evaluation is acceptable.

3.2.5. Document the following as frequent as vital signs:

3.2.5.1. Mode

3.2.5.2. Respiratory Rate (Total rate- Set Ventilator Rate + Spontaneous)

3.2.5.3. Set Ventilator Rate

3.2.5.4. Tidal Volume

3.2.5.5. Pressure Support

3.2.5.6. Peak Pressures

3.2.5.7. FIO2

3.2.5.8. PEEP

3.3. Temperature Management

3.3.1. Unless a specific reason is identified, core temperature should be measured on patients in transport and efforts should be made to maintain normal core body temperature, especially important in trauma, neonates, and pediatric patients.

3.4. Medications infused before arrival.

3.4.1. Unless infusions are mixed by pharmacy (with noted sticker/label) or in a commercially prepared bag, the transport crew shall mix the infusion and replace the existing infusion.

3.5. Labs

3.5.1. Only relevant positive or negative labs shall be documented.

3.5.2. POCT labs→ **See relevant protocols.**

3.6. Other Considerations

3.6.1. Noise Reduction

3.6.1.1. Exposure to aircraft/ambulance noise may add to physiological stress for patients. Patients should utilize headsets, earmuffs, or some type of hearing protection for noise attenuation.

3.6.1.2. Pediatric patients can be calmed with distractions (Video, games, etc.) during transport.

Normal Vital Signs for Age of Pediatric Patients

Table 3. Normal Vital Signs For Age Of Pediatric Patients.

Age	Heart Rate (bpm)	Respiratory Rate (bpm)	Systolic Blood Pressure (mm Hg)	Diastolic Blood Pressure (mm Hg)
Newborn	90-180	30-50	60 ± 10	37 ± 10
1-5 months	100-180	30-40	80 ± 10	45 ± 15
6-11 months	100-150	25-35	90 ± 30	60 ± 10
1 year	100-150	20-30	95 ± 30	65 ± 25
2-3 years	65-150	15-25	100 ± 25	65 ± 25
4-5 years	65-140	15-25	100 ± 20	65 ± 15
6-9 years	65-120	12-20	100 ± 20	65 ± 15
10-12 years	65-120	12-20	110 ± 20	70 ± 15
13+ years	55-110	12-18	120 ± 20	75 ± 15

*Adapted from: Silverman BK. Practical Information. In: *Textbook of Pediatric Emergency Medicine*, ©2006. Also: Jorden RC. Multiple Trauma. In: *Emergency Medicine: Concepts and Clinical Practice*, ©1990. All rights reserved. See References 94 and 95, respectively.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Additional History for pediatric patients

4.1.1. Immunization status should be obtained.

4.1.2. Birth history (if <2 years old) should be obtained.

4.1.3. Family history or exposure to illness.

4.2. Pediatric patients should have IV access.

4.2.1. If determined by the crew that IV access will or has been difficult to obtain and the risk/benefit of obtaining IV access could worsen condition, IV can be withheld if planning for emergency venous or IO access is completed.

4.3. All pediatric doses and assessment should be checked with a weight assessment device (*Broselow* Tape or similar).

4.4. Pediatric Airways

4.4.1. Cuffed endotracheal tubes are preferred.

4.4.1.1. Downgrade a ½ size in smaller infants with cuffed tubes.

4.4.2. If uncuffed tubes are used, document reason in chart.

4.4.3. For interfacility transport, CXR should be reviewed to determine the depth of ET tube before transport.

4.4.3.1. Variances from this standard should be documented in the chart.

4.5. Pediatric Maintenance Fluids:

4.5.1. D_5 ½ NS should be the preferred fluids for all pediatric fluids except:

4.5.1.1. Newborns- $D_{10}W$ should be used (<48 hours hold)

4.5.1.2. TBI, Seizures, AMS (DKA) and hyponatremia, Normal Saline (NS) should be used.

4.5.2. Calculation of Maintenance Rate

4.5.2.1. 4 mL/kg for the first 10 kilograms, + 2 mL/kg for the next 10 kilograms, + 1 mL/kg for every kilogram > 20 kilogram. Commercial calculators are helpful in this calculation.

4.5.2.2. Obtain medical direction for other rates based on clinical condition.

4.6. All pediatric patients shall be transported in approved age/weight sized transport devices.

4.6.1. Patients < 5 kg shall be transported in an isolette unless coming from scene.

4.6.2. Patients between 5 and 20kg should be transported in a size appropriate five-point harness. For stable infants from the scene of a trauma, patients can be secured in their child seat in the ambulance.

4.6.3. If two neonatal or pediatric patients who are intubated are assumed to be critically ill and demand the upmost in care and preparation, thus shall not be transported in the same isolette unless there are in extreme conditions that show a benefit of transport over the elevated risk of transport. If two patients are transported in the same isolette, the medical director should be contacted after completion of transport via email.

Special Recommendations/Notes

- **Transport of non-employees/patients in transport vehicle**
    - Family Members:
        - Ground: Family members are encouraged to accompany minor patients to the hospital. The decision to allow family not to accompany the patient is the sole decision of the transport crew. Documentation of reasons for family not riding should be documented in the chart.

Documentation

5. Documentation
    5.1. Complete vital signs should be documented every fifteen (15) minutes for stable patients and every ten (10) minutes for unstable patients or those requiring active resuscitation.
    5.2. A minimum of two complete vital signs are required on each transport. Ideally one vital sign set shall be obtained shortly before arrival at the destination/rendezvous.
    5.3. Aircraft Temperature Monitoring:
    5.4. The interior of the aircraft will be climate controlled to avoid adverse effects on patients and personnel on board.

Pediatric Maintenance Infusion Chart[16][17]

Age	Ideal Maintenance Infusion Fluid
Term Neonates w/ Birth weight > 1000 grams	10% Dextrose ($D_{10}W$)
Preterm Neonates w/ birth weight 1000-1500grams	5% Dextrose (D_5W)- Until Glucose obtained
Infant > 48 hours	D_5 Normal Saline
Pediatric > 1 year	D_5 Normal Saline
Pediatric < 1 year	D_5 Normal Saline

This chart refers to what maintenance fluids are for a normal neonate or pediatric patient.

Available fluids on transport teams:

IV Fluid Type	CCT team	Pediatric CCT	Neonatal CCT	ALS EMS
Normal Saline	X	X		X
Lactated Ringers	X	X		
Plasma-Lyte A Injection	RP	RP		
D_5W	X	X		
$D_{10}W$	X	X	X	
D_5 ½ NS	X	X		

[16] Richard J. Martin, Avroy A. Fanaroff, Michele C. Walsh. (2015). Fanaroff and Martin's neonatal-perinatal medicine: diseases of the fetus and infant. Philadelphia, PA: Elsevier/Saunders
[17] American Academy of Pediatrics Clinical Practice Guidelines (2018)

Ideal Body Weight Chart

Male			Female	
Height	**Ideal Weight**		**Height**	**Ideal Weight**
4' 6"	63 - 77 lbs.		4' 6"	63 - 77 lbs.
4' 7"	68 - 84 lbs.		4' 7"	68 - 83 lbs.
4' 8"	74 - 90 lbs.		4' 8"	72 - 88 lbs.
4' 9"	79 - 97 lbs.		4' 9"	77 - 94 lbs.
4' 10"	85 - 103 lbs.		4' 10"	81 - 99 lbs.
4' 11"	90 - 110 lbs.		4' 11"	86 - 105 lbs.
5' 0"	95 - 117 lbs.		5' 0"	90 - 110 lbs.
5' 1"	101 - 123 lbs.		5' 1"	95 - 116 lbs.
5' 2"	106 - 130 lbs.		5' 2"	99 - 121 lbs.
5' 3"	112 - 136 lbs.		5' 3"	104 - 127 lbs.
5' 4"	117 - 143 lbs.		5' 4"	108 - 132 lbs.
5' 5"	122 - 150 lbs.		5' 5"	113 - 138 lbs.
5' 6"	128 - 156 lbs.		5' 6"	117 - 143 lbs.
5' 7"	133 - 163 lbs.		5' 7"	122 - 149 lbs.
5' 8"	139 - 169 lbs.		5' 8"	126 - 154 lbs.
5' 9"	144 - 176 lbs.		5' 9"	131 - 160 lbs.
5' 10"	149 - 183 lbs.		5' 10"	135 - 165 lbs.
5' 11"	155 - 189 lbs.		5' 11"	140 - 171 lbs.
6' 0"	160 - 196 lbs.		6' 0"	144 - 176 lbs.
6' 1"	166 - 202 lbs.		6' 1"	149 - 182 lbs.
6' 2"	171 - 209 lbs.		6' 2"	153 - 187 lbs.
6' 3"	176 - 216 lbs.		6' 3"	158 - 193 lbs.
6' 4"	182 - 222 lbs.		6' 4"	162 - 198 lbs.
6' 5"	187 - 229 lbs.		6' 5"	167 - 204 lbs.
6' 6"	193 - 235 lbs.		6' 6"	171 - 209 lbs.
6' 7"	198 - 242 lbs.		6' 7"	176 - 215 lbs.
6' 8"	203 - 249 lbs.		6' 8"	180 - 220 lbs.
6' 9"	209 - 255 lbs.		6' 9"	185 - 226 lbs.
6' 10"	214 - 262 lbs.		6' 10"	189 - 231 lbs.
6' 11"	220 - 268 lbs.		6' 11"	194 - 237 lbs.

HPI/Pre-arrival Information

- Scene/Interfacility Transports relevant points in HPI documentation:
  - Demographic Data
  - Onset
  - Progression
  - Last PO Intake/Last Meal
  - Bowel Habits/Changes
  - Menstrual History/Pregnancy
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted from sending facility.
    - Patients > 55 years old- inquire about anticoagulation status→ ***See Anticoagulation Protocol***
    - Women <55 should have a Urine Pregnancy Test preformed (UPT)-
      - Request a UPT if not available.
    - Hematocrit and Lactate (if available)
  - Document sending providers reason for ALS transfer or critical care transport request.

Level I Protocol (Basic Life Support)

1. Level I Protocols:

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV access.

2.2. Treat hypotension (Desired MAP > 70)

2.2.1. Crystalloid fluids preferred.

2.3. Patients > 30 years old

2.3.1. Perform 12 lead EKG.

2.4. Treat Nausea/Vomiting-→ ***See Nausea/Vomiting Protocol***

2.5. If patient is suspected of ingesting THC or other drug and has abdominal pain associated with hyperemesis – Haldol 10mg IM can be given (5mg IV)

2.6. Treat Pain- moderate/severe → ***See Pain Management Protocol***

2.7. Refractory Hypotension

2.7.1. Evaluate for potential blood loss (Clinical or laboratory evidence)→ ***See Blood Transfusion Protocol***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1.1. Preform eFAST exam and communicate findings to receiving hospital.

3.1.2. Repeat clinical or ultrasound exams should be performed with hypotension or pain.

3.2. Elevated INR →***See Supratherauptic INR protocol.***

3.3. Labs- POCT Testing

3.3.1. Review labs from OSH if available.

3.3.2. If no labs available or there is an abnormal finding:

3.3.2.1. Repeat abnormal lab test.

3.3.2.2. Ensure that the following labs have been drawn/reviewed/documented.

3.3.2.2.1. Hb/Hct

3.3.2.2.2. Lactate

3.3.2.2.3. PT/INR

3.3.2.2.4. Potassium/BUN/Cr

3.3.3. Serial Lactate and Hct can be of value in the transport environment for assisting in treatment and destination decisions.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.

4.1.1. Provide 20cc/kg bolus and repeat if necessary.

4.2. Start maintenance fluids for transfers → ***See General Patient Transport- Pediatric Section***

4.3. Pediatric Special Considerations

4.3.1. Differential for pediatric patients is quite large. Important to ensure the patient is hydrated and if known electrolytes are monitored and/or corrected if able.

Special Recommendations/Notes

- Abdominal pain specific considerations:
  - Ectopic Pregnancy
    - First consideration in all women of childbearing age with acute abdominal pain.
  - Splenic Rupture/Infarction
    - Common in sickle cell patients.
  - Mesenteric Ischemia
    - Elderly patients with pain out of proportion to physical exam, history of clots or a-fib.

Documentation

5. Documentation
    5.1. Suspected cause of abdominal pain based on review of pre-arrival information.
    5.2. Document abnormal or relevant normal labs in the chart.
    5.3. Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Specific attempts are made to remove objects.
  - Angioedema
    - History of hereditary angioedema (HAE)?
      - If so, contact HPI immediately.

Level I Protocol (Basic Life Support)

1. Level I Protocols:
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - 1.2. If mechanical obstruction is suspected, perform basic life support maneuvers as trained.
   - **1.3.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   - 1.4. Reassure the patient and provide comfort.
   - 1.5. Perform manual obstructive techniques according to most recent American Heart Association Guidelines.
   - 1.6. Once removed, ensure NPO status through transport.

Level II Protocols (Advanced Life Support)

2. Level II Protocols
   - 2.1. Attempt to visualize foreign body with laryngoscope and remove with Magill forceps.
   - 2.2. Mechanical Obstruction: Foreign Body
   - 2.3. Continue BLS unresponsive techniques during attempt.
     - 2.3.1. If unable to visualize obstruction and no air movement achieved via BVM
       - 2.3.1.1. Consider QuickTrach® → ***See QuickTrach® Procedure Protocol (if available)***
   - 2.4. Mechanical Obstruction: Inflammatory Reaction (Burns, Reaction, etc.)
     - 2.4.1. Aggressive pharmacological management according to the proper protocol.
   - 2.5. Establish IV access (after obstruction is removed or the airway is established).
   - 2.6. If Angioedema is suspected, transport crew shall consider Liquid Plasma (LP) administration.
     - 2.6.1.Angiotensin-converting enzyme inhibitors (ACEIs) can cause angioedema. There is evidence to support the use of Liquid Plasma (LP)
       - 2.6.1.1. The usual dose is 2 units for adults and 20cc/kg for pediatric patients (not to exceed 2 units).
       - 2.6.1.2. A direct medical control order is required to administer FFP in this setting.

Level III Protocols (Critical Care)

3. Level III Protocols
   - 3.1. Mechanical Obstruction: Inflammatory Reaction (Burns, Reaction, etc.)
     - 3.1.1. Aggressive pharmacological management according to the proper protocol.
     - 3.1.2. If intubation is indicated, all efforts should be made to evaluate the airway and prepare for difficult airway as outlined in the difficult airway protocol. Intubation should be considered early in patients with chemical or airway burns.
   - 3.2. Hereditary Angioedema (See below)
     - 3.2.1. Patients often have treatment medicine with them.
     - 3.2.2. If the patient does not have the medication, it can be retrieved from the listed pharmacies.
     - 3.2.3. Berinert (C1 Esterase Inhibitor-Human) is the drug of choice in these patients.
       - 3.2.3.1. Dose 20 Units/kg infused at 4 ml/min.
       - 3.2.3.2. Direct medical control order is required for administration.
     - 3.2.4. Typical allergic reaction medications are of little clinical value.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
   - 4.1. Perform manual obstructive techniques according to most recent American Heart Association Guidelines.
   - 4.2. No other specific recommendations for pediatric patients.

Special Recommendations/Notes

6. Airway Obstruction specific considerations:
   - 6.1. Adult Patient
     - 6.1.1. Most common location of adult airway obstruction (Foreign body) is in the larynx or trachea.
     - 6.1.2. Hoarseness or aphonia are ominous signs in adults.
   - 6.2. Pediatric Patient
     - 6.2.1. Children ages 1-3 are the most susceptible.
     - 6.2.2. Unilateral wheezes without other symptoms should be considered an aspiration.
     - 6.2.3. CXR will often be normal in in the traditional AP view.
     - 6.2.4. Inhalation/Exhalation chest radiographs can show air trapping which could assist in diagnosis.
   - 6.3. Special Mechanical Obstruction: Inflammatory Reaction
     - 6.3.1. Angioedema: Allergic Reaction treatments should proceed per protocol; however, their response is much less effective in isolated angioedema. Airway control is of paramount importance and should be preceded with extreme caution.

Documentation

7. Documentation
   - 7.1. Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
   - 7.2. Document response to treatments and medications.

Hereditary Angioedema Treatment- C1 Esterase Inhibitor (Human) Berinert®

- HAE occurs in about 1 in 10,000 to 1 in 50,000 people. HAE symptoms include episodes of edema (swelling) in various body parts including the hands, feet, face, and airway.
- In addition, patients often have bouts of excruciating abdominal pain, nausea and vomiting that is caused by swelling in the intestinal wall. Airway swelling is particularly dangerous and can lead to death by asphyxiation.
- C1 inhibitor deficiency, such as HAE, is believed to suppress contact system activation via inactivation of plasma kallikrein and factor XIIa, thus preventing bradykinin production. Unregulated bradykinin production is thought to contribute to the increased vascular permeability and angioedema observed in HAE[18]
- There are several known clusters of families with HAE in Mississippi.
- Hospitals that stock C1 Esterase Inhibitor (Human) Berinert®[19]
    - **University of Mississippi Medical Center (Jackson)**
    - **Baptist Memorial – North Mississippi (Oxford)**
    - **North Mississippi Medical Center (Tupelo)**
- **Administration Instructions:**
    - **Berinert (C1 Esterase Inhibitor-Human)**
        - **20 Units/Kg at rate 4ml/min**
        - **Need to call Med Control**

TXA

In angioedema in the field setting in either HAE or suspected ACE induced angioedema – TXA has been shown to reduce the need for intubation and given the limitations of ALS units to perform elective intubations, TXA should be considered. 1 gram IV over 10 minutes should be given for anyone over 18 years of age for suspected angioedema

[18] UpToDate: Accessed 7/15/2017
[19] As of Set per Roxi Quirin CSL Behring Area Manager, Critical Care, and Immunology Phone- 601-259-8880

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Known history of anaphylaxis?
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - Sending providers reason for critical care transport request
  - Treatment and Response to treatment
  - Pending airway failure?

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - 1.1. Assess the patient and treat them according to the **Patient Preparation and General Transport Protocol.**
   - **1.2.** Provide supplemental oxygen as needed according to the **Oxygen Administration and Management Protocol.**
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place the patient in the position of comfort.
   - 1.5. NPO
   - 1.6. Assist patient with their EpiPen© or EpiPen JR© (If available).

Level II Protocols (Advanced Life Support)

2. **Level II Protocols**
   - **2.1. Remove injection mechanism (bee stinger) if still present.**
   - **2.2. Epinephrine Intramuscular**
     - 2.2.1. Adults: 0.3-0.5 (1mg per mL solution) to the mid-anterolateral thigh (EpiPen© is 0.3 mg)
     - 2.2.2. Pediatric: (1mg/ml) is 0.01mg/kg (up to 0.5mg per dose)
     - 2.2.3. May repeat every 5-15 minutes as required.
     - 2.2.4. Consider IV epinephrine if refractory to IM (0.3mg IV 1:10,000)
       - 2.2.4.1. Cautious in patients > 55 years of age
     - 2.2.5. May repeat every 3-5 minutes; consider infusion if dose > 2 times.
   - **2.3. Venous Access- ensure two large bore IV.**
   - **2.4. Fluid Resuscitation**

2.4.1. Should be begun in patients that do not immediately respond to IM epinephrine or have signs/symptoms of hypotension/hypoperfusion.

2.4.2. 1-2 liters of normal saline immediately.

2.4.3. Pediatric: 20cc/kg in pediatrics repeated as necessary.

2.4.4. Significant fluid requirements (6-7 liters) in the emergency period are not uncommon and shall be determined based on the clinical response in adults.

2.4.4.1. Pediatrics: 60cc/kg in pediatrics is not uncommon.

2.5. Refractory symptoms or impending shock

2.5.1. Epinephrine infusion can be started 2-10 mcg/min and titrated to effect with continuous monitoring of both cardiovascular function AND symptoms.

2.5.2. Pediatric: 0.1-1 mcg/kg/min

Epinephrine is the drug of choice for true anaphylaxis. This drug should be given and repeated before the bother below drugs which are mainly for cutaneous reactions.

2.6. Consider H1 Antihistamine

2.6.1. Diphenhydramine 25-50mg IV (may repeat to maximum dose over 24 hours of 400mg). May relieve cutaneous/mucosal symptoms but will have no effect on systemic reaction.

2.6.2. Pediatric (less 40kg) 1 mg/kg.

2.6.3. For mild allergic reactions without systemic symptoms, diphenhydramine can be given IV to relieve cutaneous/mucosal symptoms. PO diphenhydramine is an option for mild reactions (if available).

2.7. Consider H2 antihistamine.

2.7.1. Famotidine (Pepcid) – 20 mg IV

2.7.2. Pediatric: 0.5mg/kg to a dose of 40 mg

2.7.3. Rapid infusion can cause hypotension in both pediatric and adult populations.

2.8. **Consider nebulized albuterol treatment**.

2.8.1. For refractory wheezing and bronchospasm to epinephrine.

2.9. Consider glucocorticoids.

2.9.1. Long onset of action thus does not relieve initial symptoms. Can help reduce the incident of biphasic or protracted reactions.

2.9.1.1. Methylprednisolone: 125mg IV

2.9.1.1.1. Pediatric: 2mg/kg IV (Max 125 mg)

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Fluid Resuscitation

3.1.1. Normotensive patients: crystalloids 125 ml/hr. infusion should be started.

3.1.2. 1.5 x maintenance rate in pediatrics.

3.1.3. Use caution in fluid administration in patients having conditions sensitive to volume overload.

3.2. EPI Infusion

3.2.1. Start planning for an EPI infusion after the second dose and start the infusion after the third dose.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
   4.1. See above recommendations and doses.

Clinical Alert (Pediatric): Anaphylaxis and Compensated Shock

Children are more likely to have **compensated shock** in which tachycardia and signs of hypoperfusion (e.g., decreased peripheral pulses, cool extremities) are present, but the blood pressure is normal. A systolic pressure of less than the 5th percentile for age would indicate uncompensated shock, which correlates to the following:

- < 70 mm Hg in children aged 1-12 months.
- < 70 mm Hg + (2× age in years) in children aged 1-10 years.
- < 90 mm Hg in children aged ≥10 years.

Source: American Heart Association. Part 12: Pediatric Advanced Life Support. Circulation. 2005. 112(Suppl 1): IV-167-87

Special Recommendations/Notes

5. Anaphylaxis Pathophysiology/Disease Process
   5.1. Anaphylaxis can be a fatal reaction and missed due to a variable presentation. Below are some criteria established in 2006.
      5.1.1. Criteria 1: Acute onset of illness involving the skin or mucosal tissue and at least one of the following:
         5.1.1.1. Respiratory Distress/Stridor/wheezing
         5.1.1.2. Hypotension
      5.1.2. Criteria 2: Two or more of the following symptoms that occur rapidly after exposure to an antigen for the patient.
         5.1.2.1. Involvement of cutaneous tissues
         5.1.2.2. Respiratory symptoms
         5.1.2.3. Hypotension or associated symptoms
         5.1.2.4. Persistent GI symptoms
      5.1.3. Criteria 3: Reduced blood pressure after exposure to a KNOWN allergen.
         5.1.3.1. SBP < 90mmHg or 30% below patient's baseline
            5.1.3.1.1. Hypotension in pediatric/infant population based on published ranges by AHA.
         5.1.3.2. Cutaneous/Mucosal Symptoms
            5.1.3.2.1. Hives, flushing, mucosal swelling, tongue swelling
      5.1.4. Respiratory Signs/Symptoms
            5.1.4.1.1. Respiratory distress, wheezing, stridor, hypoxemia, hoarseness
      5.1.5. Gastrointestinal Symptoms
         5.1.5.1. Vomiting, diarrhea, crampy abdominal pain
6. Anaphylaxis specific considerations:

6.1. There are NO absolute contraindications to epinephrine in anaphylaxis. Caution in patients with known CV disease, patients receiving TCA (prolong epinephrine duration of action) or Monoamine oxidase inhibitors (MAOIs) (block epinephrine metabolism)[20]
6.2. Cutaneous signs/symptoms are present in over 90% of episodes.
6.3. Patients taking beta-blockers may be resistant to treatment with epinephrine and develop refractory hypotension. Glucagon 5 mg IV over 5 minutes can improve hypotension by improving the response to epinephrine.
6.4. Epinephrine increases myocardial oxygen demand and may precipitate angina or MI in susceptible individuals.
6.5. Adverse effects of epinephrine may include anxiety, tremor, palpitations, nausea, tachycardia, and headache.
6.6. Epinephrine should only be administered if anaphylaxis is present. Milder allergic reactions are not anaphylaxis.
6.7. The patient with significant edema to the tongue, pharynx, or other parts of the upper airway may develop airway obstruction.
6.8. Pregnant Women:
6.8.1. Positioning the pregnant patient on the left side is important.
6.8.2. High Flow oxygen is critical regardless of Pulse ox readings.
6.8.3. SBP should be maintained at least 90mmHg.
6.8.4. Fetal HR and activity should be monitored closely.

Documentation

7. Documentation
7.1. Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
7.2. Document response to treatments and medications.

Clinical Alert: Biphasic or Delayed Anaphylactic Response

A delayed or biphasic anaphylactic response may occur in 1-20% of patients. The literature is unclear as to which patients are at greatest risk from having this condition. The secondary response may be milder, the same, or more severe than the initial presentation. The importance of explaining this to patients and to ensure close observation is vital. Patients with signs and symptoms of an allergic reaction that have been treated should be transported to the hospital for observation.

Source: Lieberman P. Biphasic anaphylactic reactions. Ann Allergy Asthma Immunol. 2005 Sep. 95(3):217-26

[20] Fineman SM, Bowman SH, Campbell RL, Dowling P, O'Rourke D, Russell WS, et al. Addressing barriers to emergency anaphylaxis care: from emergency medical services to emergency department to outpatient follow-up. Ann Allergy Asthma Immunol. 2015 Oct. 115 (4):301-5.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Immediate and past medical history
  - A complete history of the patient's behavior and subsequent interventions by the referring facility or first responder agency is required for risk analysis.
  - History of recent emotional stress, suicidal or homicidal tendencies, bizarre or abrupt changes in behavior, alcohol/drug abuse, or toxic exposure.
  - Previous diagnosis of psychiatric disorders, organic brain changes or chemical abuse.
  - Suspicion of head trauma?
  - Hypoxia and hypoglycemia should be excluded for behavioral disorders.
  - Medical conditions should be considered as causes of behavioral disorders.

Level I Protocol (Basic Life Support)

1. Level I Protocols
   - 1.1. Assess the patient and treat them according to the **Patient Preparation and General Transport Protocol.**
   - **1.2.** Provide supplemental oxygen as needed according to the **Oxygen Administration and Management Protocol.**
   - 1.3. Scene Safety is paramount.
     - 1.3.1. Law Enforcement should be involved early.
     - 1.3.2. Ensure patient is searched for weapons (preferably by law enforcement) before patient is placed in vehicle or confined space.
     - 1.3.3. Refuse to transport any patient that you believe poses a direct and imminent threat to your safety, contact law enforcement then medical control.
   - 1.4. Reassure the patient and provide comfort.
   - 1.5. Attempt to establish rapport with patient.
   - 1.6. Attempt verbal de-escalation.
     - 1.6.1. Approach cautiously. The safety of medical personnel is always a priority. If the patient demonstrates any potential for violent behavior, he must be securely restrained prior to transport.
   - 1.7. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Consider Chemical Restraints

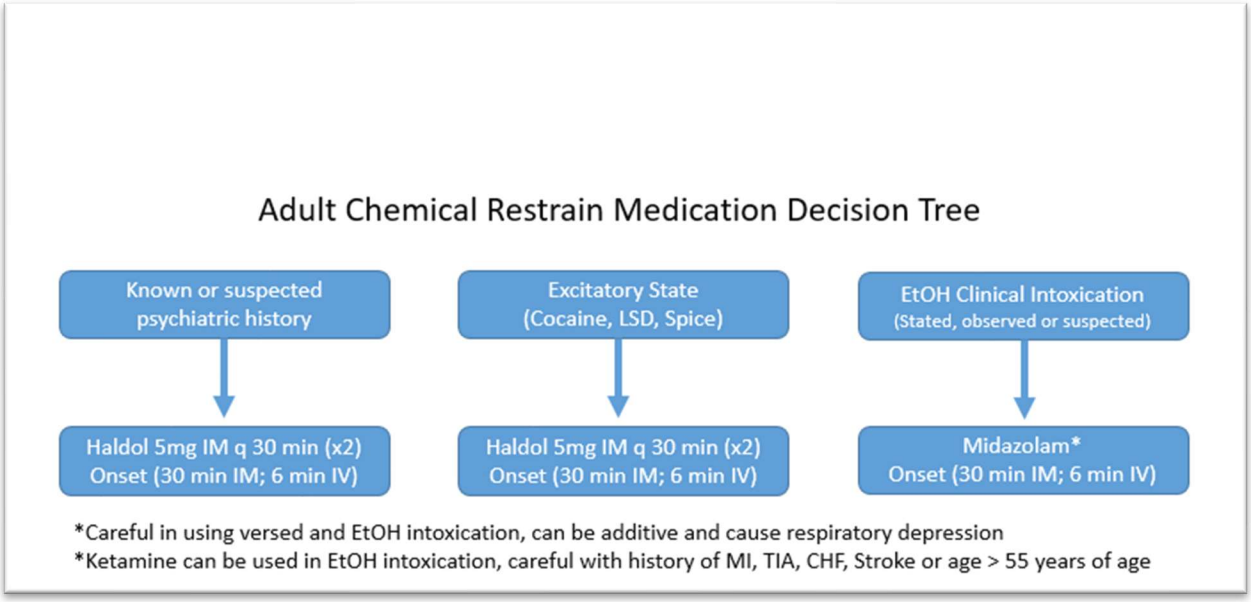
2.1.1. SEE Adult Chemical Restrain Medication Decision Tree

2.1.2. Ketamine can be used (3mg/kg IM) x 1 (**>16 years or older)**

2.1.2.1. Onset 3-4 minutes

2.1.2.2. Duration 12-25 minutes

2.1.3. There is no reason to rush the patient or the situation, allow the medications to take effect.



2.2. Consider Physical Restraints

2.2.1. Crews should request enough help to restrain all four limbs. Cloth restraints are the only approved restraint devices. When a patient is restrained, the following must be checked and documented every 15 minutes.

2.2.1.1. Distal pulse

2.2.1.2. Tightness/skin injury to the restrained extremity

2.2.1.3. Mental status of the patient

2.2.1.4. Preferred that the head of bed is elevated to at least 30 degrees.

2.3. If handcuffed by police, the officer will provide handcuff key to personnel or accompany suspect to the hospital with the key. **Handcuffs for physical restraint should be a last resort**.

2.4. If the patient presents an immediate danger to himself or to others.

2.4.1. If a patient becomes violent in transport and poses an immediate threat to the safety of the medical crew and/or to the transport vehicle, crew members should immediately administer one of the following medications. In such cases a verbal order is not necessary as treatment is required for safe operation of the vehicle and the crew. (Choose one).

2.4.1.1. Ketamine (3mg/kg) IM (Patients > 16 years or older)

2.4.1.2. Midazolam 1-2 mg IM

2.4.1.3. Diazepam 5-10mg IM (Start with 5mg if IV is present)

2.4.1.4. Lorazepam 2-5 mg IM (Start with 2 mg if IV is present)

2.5. Patients should be monitored carefully following the administration of chemical restraint.

2.6. Check blood glucose level and administer D50 IV if indicated.

2.7. Consider naloxone 1-2 mg IV if indicated.

2.8. Transport the patient in a calm and non-threatening manner.

2.8.1. Any patient who unexpectedly becomes violent during transport (Ground)

2.8.1.1. Immediately notify HPI and pull the ambulance/vehicle to a safe place.

2.8.1.2. HPI will request local police jurisdiction to respond.

2.8.2.Attempt to de-escalate.

2.9. Alert the hospital of the patient's condition as soon as possible.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Any patient who unexpectedly becomes violent during transport

3.1.1. Notify HPI when possible.

3.1.2. It should be seen as a threat to the safety of the aircraft/vehicle and crew and should be subdued immediately. If there is any danger of physical restraint failure, chemical restraint should be rapidly decided upon and used.

3.1.3. If the patient is refractory to chemical restraints that pose a significant threat to the aircraft/vehicle safety or safety of the crew, the aircraft/vehicle shall find an appropriate place to land/pull over, and the crew shall call medical control for orders.

3.1.4. If that is not possible, transport crews should consider rapid sequence intubation as an option.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Ketamine is the preferred medication for sedation (3mg/kg IM) (Age < 13 years old)

4.2. Versed 0.1 mg/kg IM x 1.

Special Recommendations/Notes

5. Important Clinical Information:

5.1. Note pupil size, symmetry, reactivity.

5.2. Mental status, orientation, ability to do simple mental tasks.

5.3. Breath odors

5.4. Medical alert tags

5.5. All patients with AMS or suspected behavioral disorders should be considered to have a medical condition and treated for conditions. Unless a psychiatric diagnosis is known before the age of 40, all patients older than 40 should be considered to have a primary medical cause for delirium or behavioral disorder.

5.6. CAREFUL with giving benzodiazepines to patients with known or suspected intoxication of alcohol. Combined effects induce respiratory depression.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- Document response to medications and restraint checks.

HPI/Pre-arrival Information

Mississippi HPI Protocol

- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Mississippi HPI will perform ***Anticoagulant Medication Screen.***
    - Any patient with a significant bleed (defined below) should be screened for anticoagulation medications.
      - Inclusion Criteria for significant Bleed:
        - Known evidence of ongoing blood loss
        - Known ICH
        - Known intra-abdominal, retroperitoneal, or pelvic blood loss.
        - Prolonged altered mental status (AMS) prior to CT
        - Presumptive evidence of ongoing blood loss based on persistent hypotension or tachycardia resistant to fluid resuscitation.
  - HPI to ask the sending provider if a patient with a significant bleed is on any of the following medications:
    - Coumadin (Warfarin)
    - Rivaroxaban (Xarelto); Dibigatran (Pradaxa); Apixaban (Eliquis)
    - Enoxaparin (Lovenox); Fondaparinux (Arixtra)
    - Aspirin; Clopidogrel (Plavix); Pasugrel (Effient); Cilostazol (Petal); Dipyridamole (Persantine), Ticagrelor (Brilinta)
  - If the patient is on the above medication and has a significant bleed, begin the acceptance and notification protocol.

1.1. HPI will provide the following information to the sending provider:

1.1.1. HPI will document the following results:

1.1.1.1. PT/INR and CBC (Hemoglobin, Hematocrit and Platelets→ Essential)

1.1.1.2. If these are not obtained in a patient that meets the above inclusion criteria→ **HPI shall request these tests be performed while the transport team is enroute and results called to HPI.**

1.1.2. Ask if the sending provider of the hospital has the reversal factors or antidotes?

Level I Protocol (Basic Life Support)

1. **Level I Protocols**

1.1. Assess patients and treat them according to the ***Patient Preparation and General Transport Protocol***.
1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
1.3. Reassure the patient and provide comfort.
1.4. Place the patient in a position of comfort.
1.5. Perform the Anticoagulant ***Medication Screen*** on all patients >55 year of age with AMS, coma, seizure, or hemorrhage.
1.6. Control external hemorrhage → **Hemorrhage *Control Protocol***
1.7. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access
2.2. Treat underlying bleeding process → ***Relevant Protocol*** (Abdominal pain, head trauma, etc.)
2.3. **Contact Medical Control EARLY** if the patient meets inclusion criteria and is on an anticoagulation medication.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Follow associated protocols for primary condition→ ***See specific protocol.***
3.2. All reversal protocols must have a direct verbal order from an on-line physician to administer reversal medications.
3.3. This protocol is intended for patients >16 years of age.
3.4. Coumadin
3.4.1. Administer Vitamin K- 10 mg IV (Mix in 100ml bag over 20 minutes)
3.4.2. KCentra Dosing:
3.4.2.1. See chart below.

KCentra Dosing	
INR	**Dose**
ALL Abnormal INR Levels with Coumadin (Warfarin)	1500 U IV then recheck INR in 10 minutes after completion of dose. Can re-dose 1000 U if INR is > 2

Kcentra Dosing:

- Use dosing chart enclosed in the rapid pull kit.
- Round to the nearest vial.
- Record the medication LOT # in the free text area of the medication section.
- Reconstitute the infusion in the vials provided. Transfer the reconstituted solution into the enclosed piggyback bag in the rapid pull kid.
- Administer over 30 minutes on IV pump.

3.5. Rivaroxaban (Xarelto) & Apixaban (Eliquis)

3.5.1. For severe, life-threatening bleeding, treat with KCentra at a dose of 50 IU/kg (Max 5,000U).

3.5.1.1. Or the Maximum up to 5,000U on the transport vehicle

3.5.1.2. Documentation of PT is more of an indication of reversal than INR or PTT

3.6. Dabigatran (Pradaxa)

3.6.1. For severe, life-threatening bleeding administer Idarucizumab (Praxbind), two doses of 2.5 grams no more than 15 minutes apart.

3.6.2. Drug is dialyzable if clinical situation warrants.

3.7. Enoxaparin (Lovenox)

3.7.1. Protamine sulfate will reverse 60% of Lovenox function.

3.7.2. If the last dose of Lovenox was < 8 hours ago → Give 1 mg of Protamine IV for each mg of Lovenox given (Max dose 50mg).

3.7.3. If the last dose of Lovenox was 8-12 hours ago → Give 0.5 mg of Protamine IV for each mg of Lovenox given (Max Dose 50mg).

3.7.4. If the last does of Lovenox was > 12 hours ago → No reversal required.

3.8. Mix Protamine in 100 mL of NS and infuse for over 10 minutes.

3.8.1. *****Caution may cause hypotension*****

Pediatric Specific Protocols

4. Pediatric Specific Protocols:

4.1. Contact Medical Control for orders.

Special Recommendations/Notes

5. Specific Recommendations/Considerations:

5.1. Transport crew and communications personnel should attempt to determine why a patient is on anticoagulation medication. Patients with mechanical heart valves or bicuspid valve and atrial fibrillation, notify the on-line physician before starting reversal medications.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Activity patient was participating in.
  - Length of time participating in activity
  - The two main criteria for suspecting heat stroke in the field environment are rectal temperature >105°F (40.5°C) immediately post collapse and central nervous system (CNS) dysfunction (e.g., irrational behavior, irritability, emotional instability, altered consciousness, collapse, coma, dizziness, etc.)
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific treatments attempted.
  - Core temperature on arrival.
  - Changes in the temperature with treatment

Heat stroke carries a mortality rate of 24%[21]. This is one of the few conditions in EMS and pre-hospital medicine where rapid transport to the hospital is SECONDARY to primary cooling. The only reliable way to determine where the patient is on the heat injury spectrum is with rectal temperature.

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - 1.1. Assess the patient and treat them according to the **Patient Preparation and General Transport Protocol.**
   - **1.2.** Provide supplemental oxygen as needed according to the **Oxygen Administration and Management Protocol.**
   - **1.3. Remove the patient from the environment.**
   - 1.4. Remove as much clothing as practical; loosen restrictive clothing.
   - **1.5. GAIN A RECTAL TEMPERATURE if any indication of heat stroke immediately upon identification.**
     - 1.5.1. Temp >105°F (40.5°C) is indication of a heat stroke and immediate immersion therapy should be started.
   - 1.6. If alert and oriented, give small sips of cool (not ice cold) water.
   - 1.7. Immersion in ice/cold water is preferred if able to be accomplished safely and rapidly.

[21] Ash CJ, Cook JR, McMurry TA, Auner CR. The use of rectal temperature to monitor heat stroke. Mo Med. 1992 May;89(5):283-8. PMID: 1608386.

1.7.1. Place the patient in a tub of water (preferably between 35-58 °F) and stir the ice bath as needed to ensure cold water is in contact with most of the body.

1.7.2. Prepare a towel roll under the shoulders to keep the head above water.

1.7.3. If immersion is not possible (no tub or no water supply), take patients to a shaded, cool area and use rotating cold, wet towels to cover as much of the body surface as possible.

1.7.4. Cease cooling when rectal temperature reaches 101–102°F (38.3–38.9°C).

1.7.5. Rectal temperature is the ONLY way to measure temperature reliably.

1.8. Reassure patients and provide comfort.

1.9. Place patient in a position of comfort.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Give Zofran 4mg IV (in anticipation of nausea).

2.3. Check temperature (if significantly altered/unresponsive, check core temperature).

2.4. Patients > 30 years of age

2.4.1. Perform 12 lead EKG.

2.5. <u>ACTIVE COOLING</u>

2.5.1. If temperature is >104 degrees F (or 40 degrees C) or if altered mental status is present.

2.5.1.1. Immersion is the best method and should be done immediately.

2.5.1.2. See special note below.

2.5.2. Mist the exposed skin with tepid water while fanning patient.

2.5.3. Truncal ice packs can be used, but not as substitute for evaporation.

2.5.4. Shivering should be treated as soon as possible.

2.6. <u>IV Treatment</u>

2.6.1. Give cool fluids→ 2 liters for adults unless contraindicated.

2.6.2. 20cc/kg x 2 bolus for pediatric patients

2.7. <u>Shivering</u>

2.7.1. Treat shivering that occurs when rewarming (unless patient was altered).

2.7.2. Versed 2.5 mg IM/IV- may repeat x 1.

2.8. Treat Nausea/Vomiting→ See Nausea/Vomiting Protocol

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Advanced Airway Management

3.1.1. Elective intubation shall have a low threshold in patients with altered mental status.

3.2. POCT Labs (Repeat critical labs or ensure complete labs documented)

3.2.1. ABG

3.2.2. Glucose, Na, PT/PTT, INR, BUN, Cr

3.2.3. Lactate

3.2.4. If available Urinalysis with myoglobin, AST/ALT, and Creatinine Kinase

3.3. Visualize CXR or CT Chest imaging results if available.

3.4. Obtain best history with co-morbidities possible.

3.4.1. Including medications as they can be a contributing factor.

3.5. Assess underlying disease process and situation surrounding insult and injury.

Pediatric Specific Protocols

4. Pediatric Specific

4.1. Pediatrics are at a higher risk of heat related illness and emergencies.

4.1.1. Younger populations have higher surface area to mass ratios and thus a higher heat absorption in hot environments.

4.1.2. They have a smaller overall blood volume that can be easily dissipated to dehydration status.

4.1.3. Rapid cooling should be evaporative in younger populations rather than ice water immersion after utilization of ice packs and towels if available. This can be done by spraying patients with tepid water, minimizing shivering, Cold water immersion could also be another alternative if evaporative is not available.

4.2. Consider additional boluses up to 60 cc/kg total volume.

4.3. Antipyretics are ineffective and should not be used for hyperthermia just like in adults.

4.4. Isopropyl alcohol baths are contraindicated due to possible dermal absorption with toxicity.

Special Recommendations/Notes

5. Specific Considerations

5.1. Heat Stroke is any patient above 40 degrees Celsius.

5.2. Common Complications

5.2.1. Rhabdomyolysis, Acute Kidney Injury, DIC, Liver failure, GI Bleeds can all be complications from exertional heat illness and heat related emergencies.

5.2.2. Cardiac ischemia can be present but is often due to dehydration and once the patient is normothermic will resolve.

5.2.3. Agitated Delirium

5.2.3.1. Benzodiazepines are a preferred method of treatment.

5.2.4. Consistent Shivering after cooling patient below 102.2 degrees F

5.2.4.1. Benzodiazepines are the preferred method of treatment.

5.2.5. If seizures are present, barbiturates should be avoided if possible.

5.2.5.1. Consider hyponatremia.

5.3. Heat Cramps can usually be treated with oral solution replacement with mild sodium (Na) content but can require IV therapy with isotonic saline administration.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

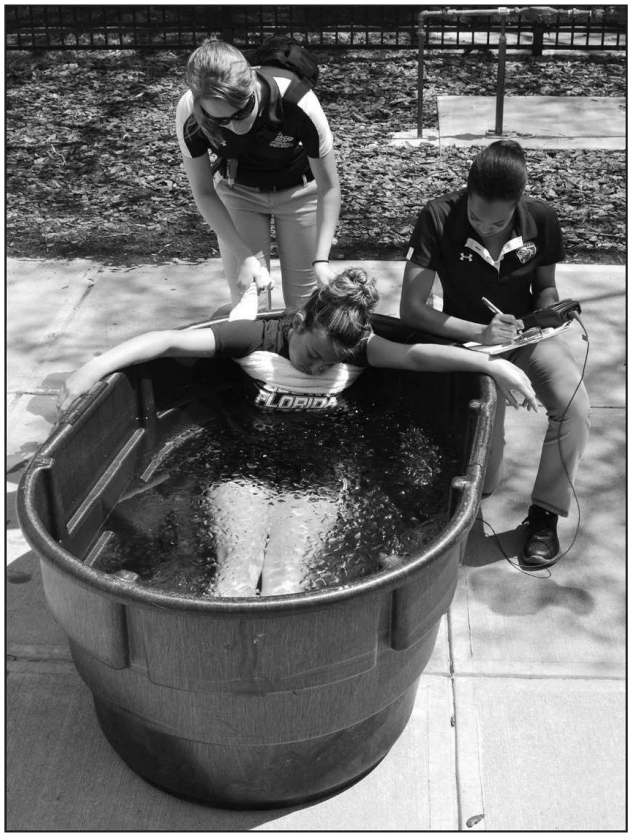


Photo Credit: Lopez RM, ed. Quick Questions in Heat-Related Illness and Hydration: Expert Advice in Sports Medicine. Thorofare, NJ: SLACK Incorporated; 2015:87-91.

Postmortem Bag Immersion Technique

This technique is preferred over the traditional tank immersion technique since it allows for management and transport to an emergency department. Each BLS and ALS unit should be stocked with one extra-large postmortem bag and six large paper clamps.

1. Place the plastic bag on the stretcher in anticipation of the patient (See Image #1)
2. Remove patient's clothes and place in belonging bag.
3. Place relevant cardiac monitoring on patient and elevate Head of Bed (HOB) to 30 degrees.
4. Establish IV access and resuscitate as per the clinical provider's judgement.
5. Don't FORGET other signs of confusion or collapse (hypoglycemia, hypotension, hypoxia)
6. If the patient is smaller than the bag, the bag can be rolled to meet the size of the patient.
    i. Large paper clamps work best.
7. Pack the patient in ICE retrieved local gas station, school, or restaurant.
    i. Typically, will take at least three 5-gallon buckets of ice.
    ii. The ideal temp of the cooling fluid is 50^{o}F.

Immerse until temp reaches < 101.5^{o}F - Remove the patient from the immersion and dry.

*** Pediatric Specific Protocol***

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Birth or known cardiac history.
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - Sending providers reason for critical care transport request
  - Treatment and Response to treatment

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - **1.1.** Assess the patient and treat them according to the **Patient Preparation and General Transport Protocol.**
   - 1.2. Provide supplemental oxygen as needed according to the **Oxygen Administration and Management Protocol.**
   - 1.3. Attempt to obtain material/birth history or cardiac history if known.
     - 1.3.1. Family can be a good resource typically, otherwise discharge papers or patient education materials can be of help.
   - 1.4. Blood pressures are needed in ALL four extremities.
   - 1.5. Evaluate pulses in ALL four extremities.
   - 1.6. Determine whether the cyanosis is central or peripheral.

Level II Protocols (Advanced Life Support)

2. **Level II Protocols**
   - 2.1. Establish IV access.
   - 2.2. Unknown Pediatric Respiratory Distress/Shock--- SUSPECTED Congenital Health Disease Etiology
     - 2.2.1. Determine patient's cardiovascular status- (i.e., shock vs. no-shock)
       - 2.2.1.1. If shock is suspected → 10cc/kg bolus of Normal Saline
       - 2.2.1.2. If Improved→ Suspect sepsis and monitor closely
     - 2.2.2. If bolus didn't improve CV status, start vasopressors (EPI is preferred in ALS Prehospital setting).
     - 2.2.3. Contact Medical Control EARLY for more directions. If suspect CHD in the pre-hospital setting, consider helicopter service (that carries advanced medications) or a hospital with a newborn nursery.

2.3. Known Congenital Heart Disease Lesion

2.3.1. Attempt to determine normal vital signs (by parents, discharge paperwork or calling MED-CONTROL).

Congenital Heart Disease Lesion Categories

Skin Color	Physiology	Shunt
Pink	Congestive Heart Failure	Left to Right Shunt
Blue	Cyanotic Heart Disease	Right to Left Shunt
Gray (ashen are pale)	Outflow Obstruction	Hypoperfusion & Shock

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Patients with pre-ductal and or postnatal diagnosis of Ductal Dependent lesion and patients with suspected congenital heart defects

3.1.1. Ensure IV Access (2 peripheral IVs preferred)

3.1.2. Ensure appropriate labs are obtained and reported.

3.1.2.1. ABG

3.1.2.2. Glucose

3.1.2.3. CBC

3.1.2.4. Electrolytes

3.1.3. Initiate prostaglandin → Start at 0.025 mcg/kg/min.

3.1.3.1. Prepare intubation for all patients getting PGE.

3.1.4. Sedation after intubation

3.1.4.1. Fentanyl 1mcg/kg

3.1.4.2. Rocuronium 1mg/kg

3.1.5. CXR after intubation for ET tube depth placement.

3.1.6. Oxygen Saturation goals

3.1.6.1. 75-85% (ensuring good waveform)

3.1.6.2. Keep oxygen at a minimum level to achieve above goal oxygenation.

3.1.7. IV Fluids

3.1.7.1. Start D_{10} at 80/kg/day.

3.1.8. Inotropes

3.1.8.1. If acidotic with poor perfusion, consult medical control prior to starting inotropes.

3.1.8.1.1. Low dose epinephrine is preferred 0.03 mcg/kg/min.

3.2. Patients with prenatal and or postnatal diagnosis of non-Ductal dependent lesions.

3.2.1. Ensure IV Access (2 peripheral IVs preferred)

3.2.2. Ensure appropriate labs are obtained and reported.

3.2.2.1. ABG

3.2.2.2. Glucose

3.2.2.3. CBC

3.2.2.4. Electrolytes

3.2.3. Airway management

3.2.3.1. Only acidotic patients and/or with poor perfusion will require intubation for transport.
3.2.3.2. If needed, use same drugs and doses as above.
3.2.4. Oxygen Saturation goals
3.2.4.1. >90 % (ensuring good waveform)
3.2.4.2. Unless advised by on-line medical control
3.2.5. IV Fluids
3.2.5.1. Start D_{10} at 80/kg/day.
3.2.6. Inotropes
3.2.6.1. If acidotic with poor perfusion, consult medical control prior to starting inotropes.
3.2.6.1.1. Low dose epinephrine is preferred 0.03 mcg/kg/min.

Pediatric Specific Protocols

4. SEE ABOVE

Special Recommendations/Notes

5. CHD Notes
   5.1. Congenital heart disease is often accompanied by absent or effortless tachypnea.
   5.2. An audible systolic murmur is heard in most forms of cyanotic CHD (exception: d-TGA with intact ventricular septum & no pulmonary stenosis).
   5.3. A reduced pH level raises concern about poor cardiac output and pending shock which can be seen in cases of severe hypoxemia and/or heart failure.

Documentation

Hyperoxia Test

- CHD associated with intracardiac right-to-left shunting resulting in cyanosis, blood in the pulmonary veins is fully saturated with oxygen in ambient air. Administering higher concentrations of inspired oxygen increases the amount of dissolved oxygen but has minimal effect on oxygen tension levels because there is no effect on the deoxygenated blood that is shunted to the systemic circulation.
- In contrast, patients with pulmonary disease have pulmonary venous desaturation. Supplemental oxygen administration in pulmonary disease typically increases pulmonary venous oxygen levels and improves systemic oxygenation.
- Patient is given 100% oxygen for 10 minutes.
- Arterial blood gas obtained from right radial artery.
- PaO_2 > 150 mmHg during the hyperoxia test makes it more likely that the patient has pulmonary disease.

Notes:

- Patients with lesions, such as transposition of the great arteries or severe pulmonary outflow obstruction, generally have PaO_2 <50 to 60 mmHg during the administration of 100 percent oxygen.
- In contrast, in patients with mixing lesions involving both right-to-left and left-to-right shunting, such as truncus arteriosus or single ventricle with patent ductus arteriosus, the systemic oxygen tension may increase with administration of 100 percent oxygen. In these cases, supplemental oxygen may decrease pulmonary vascular resistance, thereby increasing pulmonary flow. The increased pulmonary flow mixed with a fixed amount of systemic venous return results in increased aortic oxygenation, typically to PaO_2 values of 75 to 150 mmHg, but rarely higher.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset of symptoms
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Demographic Data
  - Specific laboratory information obtained/resulted.
  - Sending providers reason for critical care transport request
  - Systemic effects (EKG changes, mental status changes) attributed to alterations in electrolytes.
  - Treatment and Response to treatment
- Suspected cause of electrolyte abnormality

Level I Protocol (Basic Life Support)

1. **Level I Protocols**

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. If hypoglycemia is suspected and the patient can maintain airway, consider oral glucose.

1.5. Place patient in a position of comfort.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access
2.2. Treat hypotension (Desired MAP > 70)
2.2.1. Crystalloid fluids preferred.
2.3. Patients > 30 or with electrolyte abnormalities
2.3.1. Perform 12 lead EKG.
2.4. Hypoglycemia—Administer D-50 IV
2.4.1. If IV is not available, Glucagon 1mg IM can be administered.
2.5. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol***
2.6. Treat pain, moderate/severe → ***See Pain Management Protocol***
2.7. Critical Electrolyte Management (Potassium)
2.7.1.Hyperkalemia/hypocalcemia should be suspected in patients with known end-stage renal disease or on dialysis.
2.7.1.1. Sodium Bicarb 1mEq/kg should be given IV.
2.7.1.2. If signs of cardiovascular collapse (wide QRS, bradycardia, etc.), give 1 gram Calcium Chloride IV.
2.8. Critical Electrolyte Management (Glucose)
2.8.1.Perform a finger blood glucose.
2.8.1.1. Adults' hypoglycemia < 60mg/dl
2.8.1.2. Pediatric hypoglycemia < 60mg/dl
2.8.1.3. Neonate hypoglycemia <40mg/dl
2.8.2.Hypoglycemia
2.8.2.1. Adult: 25 ml (50 grams) of D50 IV push
2.8.2.2. Pediatric: (0.25 g/ml) 2 ml/kg IV or IO for pediatrics (D25 solution)
2.8.2.3. Neonate: (0.10g/ml) 2 ml/kg IV or IO for neonates (D10 solution)
2.8.2.4. Re-check Finger Blood Glucose 20 minutes after administration
2.8.3. Refractory hypoglycemia- consider ingestion of ORAL medications- ***See Poisons/Overdose Protocol***

Advanced EMT's are allowed to provide point of care (POC) testing and providing glucose replacement to the patient with hypoglycemia and altered mental status.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Critical Electrolyte Management (Potassium)

3.1.1. Perform 12 lead EKG.
3.1.2. <u>Hypokalemia</u>
3.1.2.1. Consider potassium replacement if serum potassium is < 2.5 and clinical signs/symptoms.
3.1.2.2. Medication, Infusion of Potassium Chloride- Adult
3.1.2.2.1. Peripheral Route:
3.1.2.2.1.1. Concentration max (60mEq/liter) Bolus 10mEq/100ml fluid

3.1.2.2.1.2. Max Rate: 10mEq/hour

3.1.3.Hyperkalemia

3.1.3.1. Consider treating hyperkalemia if suspected based off clinical suspicion or with confirmed serum potassium level and clinical signs and symptoms.

3.1.3.1.1. Cardiac Membrane Stabilization (Only with signs of cardiac involvement on EKG)

3.1.3.1.1.1. Calcium Gluconate

3.1.3.1.1.1.1. 2 grams slow IV push

3.1.3.1.1.1.2. Pediatric Dose: 60mg/kg (10% gluconate)

3.1.3.1.1.2. Calcium Chloride (if Gluconate is unavailable or first line in pediatrics)

3.1.3.1.1.2.1. Delivers 3x amount of calcium as compared to Calcium Gluconate

3.1.3.1.1.2.2. Adult Dose: 1 gram slow IV push

3.1.3.1.1.2.3. Pediatric Dose: 20mg/kg

3.1.3.1.1.2.4. The onset of action is 5 minutes. If no EKG changes, repeat dose x 1 after 5-7 minutes.

3.1.3.1.2. Antidote Chart

Initial Blood Glucose	Insulin Dose	Dextrose Dose
< 100 mg/dL	Regular insulin 10 units IV push 5 units if CrCl <30	50 grams D50W
100 – 200 mg/dL	Regular insulin 10 units IV push 5 units if CrCl <30	25 Grams D50W
> 200 mg/dL	Regular insulin 10 units IV push 5 units if CrCl <30	No dextrose

3.1.3.1.3. Alkalinizing agents

3.1.3.1.3.1. Give 1 mEq/kg of Sodium Bicarb (8.4%)

3.1.3.1.3.2. Give 1 mEq/kg of Sodium Bicab (4.2% for < 2 years old)

3.1.3.1.4. Beta2-adrenergic agonists

3.1.3.1.4.1. Consider Beta-2- agonist for continued treatment.

3.1.3.1.4.2. Especially of benefit in ESRD when volume overload is a concern.

3.1.3.2. Monitor EKG changes closely and continue treatment as above until cardiac effects noted on EKG are resolved or show sustained improvement.

3.2. Critical Electrolyte Management (Calcium)

3.2.1. Perform 12 lead EKG.

3.2.2. Hypocalcemia

3.2.2.1. Consider calcium replacement if serum calcium and there are signs/symptoms.

3.2.2.2. Calcium gluconate (10mL) contains 90 mg of elemental calcium mixed with 100ml of D_5W given over 10 minutes.

3.2.2.3. Calcium Chloride (10mL) contains 272mg of elemental calcium- mixed with 100mL of D5W given over 10 minutes.

3.2.2.4. Pediatric Dose: Calcium Gluconate 60mg/kg or Calcium Chloride 20mg/kg

3.2.2.5. Routine replacement in transport should not be attempted. Calcium should be infused through the largest vein possible. Serious complications have been reported from infusion of calcium through small veins.

3.2.3. Hypercalcemia

3.2.3.1. Assess volume status and treat dehydration.

3.3. Critical Electrolyte Management (Sodium)

3.3.1. Perform 12 lead EKG.

3.3.2. Hyponatremia

3.3.2.1. Provide supportive care.

3.3.2.1.1. Adults- Normal Saline 100cc/hr.

3.3.2.1.2. Pediatrics- Contact Medical Control for orders.

3.3.2.2. Consider hypertonic saline if seizure activity is present. Contact Medical Control for orders.

3.3.3. Hypernatremia

3.3.3.1. Provide supportive care.

3.3.4. Hyperglycemia

3.3.4.1. Question history for DKA

3.3.4.2. Evaluate labs if available and calculate Anion Gap

3.3.4.3. If DKA is determined- **see age relevant *DKA protocols***

3.3.4.4. Hydrate patients (if not in DKA)

3.3.4.4.1. Adult: 1-2 liters of Normal Saline (unless contraindicated)

3.3.4.4.2. Pediatrics- 20cc/kg normal saline bolus x 2 (if needed and not clinically contraindicated)

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.

4.1.1. Provide 20cc/kg bolus and repeat if necessary.

4.2. Start maintenance fluids for transfers → ***See General Patient Transport Protocol***

Special Recommendations/Notes

5. Critical Electrolyte Abnormalities

5.1. Potassium

5.1.1. Hyperkalemia (K> 5.2)

5.1.1.1. Symptoms: Generalized fatigue, Weakness, Paresthesias, Paralysis, Palpitations

5.1.1.2. Cardiac and Neurologic symptoms predominate.

5.1.1.3. The rapidity of change in the potassium level influences the symptoms observed at various potassium levels.

5.1.1.4. Common reasons for elevated potassium: Trauma (burns, crush injury), medications (NSAIDs, diuretics, digoxin), redistribution (DKA) or renal failure.

5.1.1.5. EKG Changes:

5.1.1.5.1. Early: peaked T waves, shortened QT interval, and ST-segment depression

5.1.1.5.2. Progression: bundle-branch blocks causing a widening of the QRS complex, increases in the PR interval, and decreased amplitude of the P wave

5.1.1.5.3. Late: Sine Wave, Ventricular fibrillation, or asystole

5.1.1.6. ECG findings correlate with the potassium level, but potentially life-threatening arrhythmias can occur without warning at almost any level of hyperkalemia.

5.1.2. Hypokalemia (<3.5mEq/L)

5.1.2.1. Symptoms are often due to the underlying cause of hypokalemia rather than the hypokalemia itself.

5.1.2.2. Hypokalemia should be suggested by a constellation of symptoms that involve the GI, renal, musculoskeletal, cardiac, and nervous systems.

5.1.2.3. Calcium and Magnesium levels should also be evaluated in patients with hypokalemia.

5.2. <u>Calcium</u>

5.2.1. Hypercalcemia (Ca > 10.5mg/dL; >2.5mmol/L)

5.2.1.1. Most common cause include malignancy or primary hyperparathyroidism.

5.2.1.2. Hypercalcemic crisis does not have an exact definition, although marked elevation of serum calcium, usually more than 14 mg/dl, is associated with acute signs and symptoms of hypercalcemia.

5.2.1.3. Signs/Symptoms: Nausea, vomiting, alterations of mental status (Severe elevations can cause coma), abdominal or flank pain, weakness, depression, and constipation.

5.2.1.4. Elderly patients are more likely to be symptomatic from only moderate elevations of calcium levels.

5.2.2. Hypocalcemia (Ca < 8mg/dL; < 2mmol/L)

5.2.2.1. Presentations of patients with hypocalcemia vary widely, from asymptomatic to life-threatening situations.

5.2.2.2. Symptoms: numbness and tingling sensations (especially perioral), muscle cramps (particularly in the back and lower extremities), wheezing, fatigue, and seizures (focal or generalized).

5.2.2.3. On occasion, severe hypocalcemia may result in seizures, tetany, refractory hypotension, or arrhythmias that require a more aggressive approach, including intravenous infusions of calcium.

5.2.2.4. Previous neck surgery suggests hypoparathyroidism; a history of seizures suggests hypocalcemia secondary to anticonvulsants.

5.2.2.5. Acute hypocalcemia may lead to syncope, congestive heart failure (CHF), and angina due to the multiple cardiovascular effects.

5.3. <u>Sodium</u>

5.3.1. Hypernatremia (>145 mEq/L)

5.3.1.1. In patients with an intact thirst response, hypernatremia is a rare entity.

5.3.1.2. When hypernatremia does occur, it is associated with a high mortality rate.

5.3.1.3. Two questions should be addressed with hypernatremia-

5.3.1.3.1. What is the volume status?

5.3.1.3.1.1. Fluid Loss (Burns, Vomiting, Diarrhea, etc.)

5.3.1.3.1.2. Fluid Excretion- polyuria or polydipsia complaint

5.3.1.3.2. Acute or Chronic Problem?

5.3.1.3.2.1. Nursing Home patient? Chronic hospitalization? Dementia?

5.3.1.4. Signs/Symptoms: nonspecific. anorexia, restlessness, nausea, vomiting, altered mental status, lethargy, or irritability, and, eventually, stupor or coma.

5.3.1.5. Physical findings are those of dehydration or even hypovolemic shock, with tachycardia, orthostasis, and hypotension.

5.3.2. Hyponatremia (<135 mEq/L)

5.3.2.1. Many medical illnesses, such as congestive heart failure, liver failure, renal failure, or pneumonia, may be associated with hyponatremia.

5.3.2.2. Symptoms range from nausea and malaise, with mild reduction in the serum sodium, to lethargy, decreased level of consciousness, headache, and (if severe) seizures and coma.

5.3.2.3. Sodium <115mEq/L often are associated with significant neurologic signs/symptoms.

5.3.2.4. Hypertonic hyponatremia

5.3.2.4.1. Low measured sodium due to normal total body sodium and a dilutional drop in the measured serum sodium due to the presence of osmotically active molecules in the serum (Elevated Glucose is an example- See below calculations and mannitol as examples).

5.4. <u>Glucose</u>

5.4.1. Hyperglycemia (Glucose > 200mg/dL)

5.4.1.1. Glucose should be evaluated as a component of management but unless the patient is in DKA, routine treatment in critical care transport is not indicated.

5.4.1.2. See DKA protocols.

5.4.2. Hypoglycemia (Adult- Glucose < 60 mg/dL; Pediatric- Glucose < 60mg/dL; Neonates- Glucose < 45mg/dL)

5.4.2.1. Signs/Symptoms: altered mental status and/or sympathetic nervous system stimulation.

5.4.2.2. Condition typically arises from abnormalities in the mechanisms involved in glucose homeostasis.

5.4.2.3. Conditions of special interest:

5.4.2.3.1. Overdose of oral hypoglycemic agents (sulfonylureas)

5.4.2.3.1.1. Glipizide has been reported to produce hypoglycemia within 5 minutes of ingestion in an adult.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer La

Drug Shortage Substitution:

Due to recent drug shortages of D50. The following can be substituted when D50 is not available for adult patients.

$D_{10}W$ IV pushes in 50ml doses to a total of 200 mL or stop at symptoms improvement.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Presentation complaint
  - Relevant labs- if not available request they are drawn and available for transport crew.
    - Hemoglobin
    - Hematocrit
    - BUN/Creatinine
    - Platelets
    - PT/INR
  - Medications and response to medications
  - Previous Surgeries (specifically vascular surgeries, heart surgeries or surgeries in chest)
  - CT Findings (if available) Attempt to get the CT results FAXED when able.
    - Involving the Aortic Arch?
    - Involve the ascending aorta?
    - Involve the descending aorta?
    - Cross the diaphragm (Thoracoabdominal)
- EKG findings if noted (Ischemia noted on EKG)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. IV Access and Resuscitation Management

2.1.1. Initiate two large bore IV lines.

2.1.2. Maintenance rate unless hypotensive

2.2. Patients > 30 yo

2.2.1. Perform 12 lead EKG.

2.3. Treat Nausea/Vomiting-→ ***See Nausea/Vomiting Protocol***

2.4. Treat Pain- moderate/severe → ***See Pain Management Protocol***

2.4.1. Pain Management

2.4.2. Opioids are required for pain relief.

2.4.3. Evaluate pain score and clinical signs/symptoms of pain.

2.4.4. Frequently large doses are required.

2.5. Heart rate can be an indicator of inadequate pain control.

2.6. Interfacility Transports- KNOWN Aortic Emergency

2.6.1.Targets for hemodynamics:

2.6.1.1. The target heart rate should be 60 beats per minute.

2.6.1.2. The target systolic blood pressure should be 100-120 mm Hg.

Blood pressure should be maintained at a lowest level possible without compromising mentation or urine output for thoracic dissections. See notes below for AAA blood pressure management.

2.6.2.Heart Rate/Blood Pressure Control: (Anti-Impulse therapy)

2.6.2.1. Labetalol 20mg IV- repeat every 10 min as needed.

Labetalol is preferred to Esmolol infusion. If BP is a concern and rate control is needed, metoprolol 5mg IV push every 10 minutes is preferred.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Airway Management

3.1.1. Intubation may be needed to provide adequate pain relief and management. Early and aggressive management should be considered before transport.

3.2. Invasive blood pressure via arterial line pressure should be initiated if not already and no contraindications.

3.2.1. Should be placed, if possible, in the arm with the highest blood pressure if there is a variant.

3.3. See notes above about Labetalol.

3.3.1. Esmolol infusion (Start 150mcg/kg/min)

3.3.1.1. If HR < 70 then start with Cardene

3.3.2. If blood pressure remains elevated, start Cardene.

3.3.2.1. Start 5mg/hr. increase by 5mg/hr. every 10 minutes until desired blood pressure obtained.

3.3.2.2. Nitroprusside can be added if systolic blood pressure is not responsive to above treatments.

3.4. PAIN CONTROL

3.4.1. Provide adequate pain control for the patient as a component of blood pressure and HR control.

3.5. Labs- POCT Testing

3.5.1. Review labs from OSH if available.

3.5.2. If no labs available or there is an abnormal finding

3.5.2.1. Repeat abnormal findings.

3.5.2.2. Ensure that the following labs have been drawn/reviewed/documented:

3.5.2.2.1. Hb/Hct

3.5.2.2.2. Lactate

3.5.2.2.3. INR

3.5.2.2.4. Potassium/BUN/Cr

3.5.2.2.5. Troponin (Suspected Type A or Thoracic Dissection)

3.6. Hypotensive Patients

3.6.1. Should be evaluated for cause of hypotension (blood loss, tamponade, or cardiac failure)

3.6.1.1. FAST exam should be performed.

3.6.2. Contact medical control for blood/fluid infusions for hypotensive patients with signs and symptoms of inadequate perfusion.

3.6.2.1. Consider neo synephrine.

3.7. Inotropic agents should be avoided as they will increase aortic wall shearing.

Types of Thoracic Aortic Dissections: (See graph below)

1) **Ascending (Type A) Aortic Dissection:** in the absence of significant co-morbidities this is a surgical emergency. Life-threatening complication such as aortic regurgitation, cardiac tamponade, stroke, frank rupture, and myocardial infarction with mortality rates as high as 1 to 2 percent per hour early after symptom onset without surgical intervention.
2) **Descending (Type B) Aortic Dissection:** Type B dissection is generally managed medically with critical care measures discussed above including pain and anti-impulse therapies.

Pediatric Specific Protocols

4. Pediatric Specific Protocols:

4.1. Pediatric patients with this condition are rare, so contact medical control for recommendations.

Special Recommendations/Notes

5. Special Recommendations/Notes

5.1. Pulsating abdominal mass

5.2. Signs/symptoms of inadequate perfusion despite normal or elevated BP

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications.

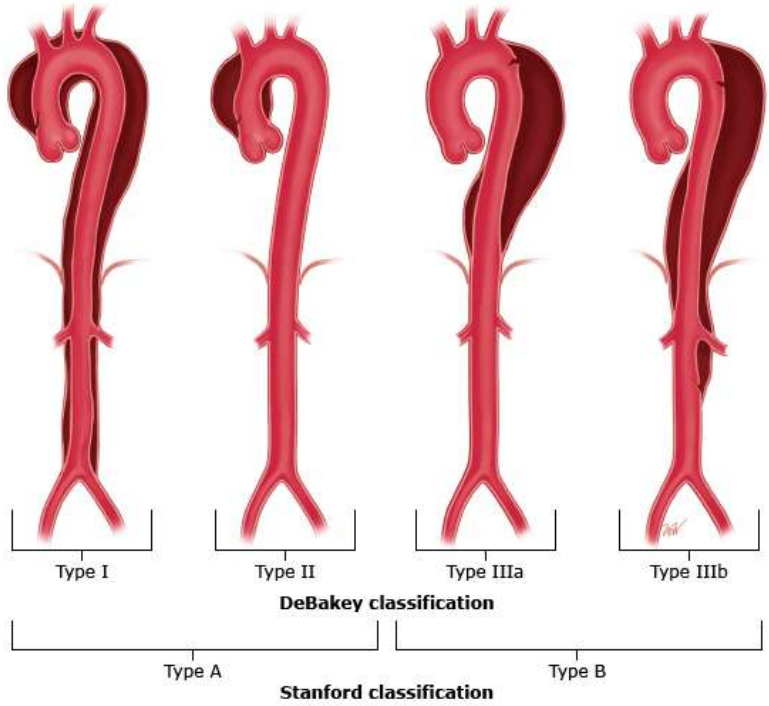


Figure 4: Source: Up to Date (Accessed 12/26/2017)

Abdominal Aortic Aneurysm (AAA)

1) **Symptomatic (non-ruptured) AAA**- key to treatment is to manage symptoms. Treatment of hypertensive emergencies but no aggressive BP management is indicated unless considered hypertensive emergency. **NORMAL BP and HR VALUES is the goal with pain control being the first line therapy to achieve that normalization.**
2) **Ruptured AAA:** Permissive hypotension may minimize further tearing and limit blood loss. FAST exams can help here to determine blood loss.

For purposes of this protocol and communication of findings, AAA diameters are classified as:

- Small aneurysm < 4.0 cm
- Medium aneurysm 4.0- 5.5 cm
- Large aneurysm > 5.5 cm

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Suspected cause for arrest
  - Known initial rhythm?
  - Functional status before arrest (if known)
  - Resuscitation Wishes (if known)
- Interfacility Transports/HPI Documentation:
  - 12 lead performed pre/post arrest.
  - Specific imaging data obtained/resulted.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Perform BLS measures in accordance with current American Heart Association Guidelines.

1.3.1. Effective CPR should be performed with minimal interruptions. Every effort should be made to minimize interruptions.

1.3.1.1. Ground ALS- Automatic CPR Devices are preferred ONLY if no other providers can assist with BLS measures and a machine is available.

1.3.2. Femoral pulses (Adult) and brachial pulses (pediatrics) should be assessed during CPR to evaluate the effectiveness of CPR. This should be checked every 5 minutes and documented.

1.4. Automatic External Defibrillator shall be placed (if available) in accordance with established American Heart Association Guidelines.

1.5. Consider deviation to the closest medical facility if cardiac arrest persists.

1.6. Automatic CPR machine/device can be utilized as per company policy and manufacturer guidelines.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. According to current AHA ACLS/PALS guidelines

2.1.1. All reversible causes need to be treated or ruled out in active cardiac arrest performed by crew members and documented in the clinical record.

2.2. Documentation of effective CPR is required to be checked every 5 minutes and documented (+ femoral pulse).

2.3. Airway Management

2.3.1. In an Adult cardiac arrest, <u>one attempt</u> at direct oral intubation is allowed then supraglottic airway will be placed.

2.3.2. In a pediatric cardiac arrest, <u>a supraglottic airway shall be the first line airway.</u>

2.3.3. Once ROSC has been obtained or supraglottic ventilation has failed, a second attempt (Adult) or initial attempt (Pediatric) can be attempted as long SaO_2 remains above 90% AND HR is not bradycardic.

7.3. EtCO2 should be monitored during resuscitation and should be used in the evaluation of the cardiac resuscitation attempt and patient's physiological response to the attempt.

7.3.1. $EtCO_2$ < 10 mmHg after aggressive resuscitation is associated with poor outcomes.

7.4. Return of Spontaneous Circulation (ROSC) → ***See ROSC protocol.***

7.5. Cardiac arrest in transport (Ground 911 ALS/BLS Ambulance)

7.5.1. Patient that goes into cardiac arrest during interfacility transport, transport crew should consider deviation to the nearest hospital.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Termination of Resuscitation (Interfacility/Scene Transport)

3.1.1. Patients presenting with medical cardiac arrest will not be transported by the CCT Team. If a medical patient is present in cardiac arrest at the sending facility, the resuscitation effort should be carried out at that facility. The physician in attendance at that facility will be responsible for the effort. However, if no physician is present the CCT team will be responsible for the resuscitation effort. If no physician is present and the effort is not successful after 20-25 minutes of ALS medical care, Medical Control should be contacted for orders to terminate the effort.

3.1.2. Ultrasound can be used to confirm cardiac systole and should be used to confirm cardiac death with other clinical findings on a patient that arrested while in the presence of the flight crew or if the flight crew makes patient contact in an active cardiac arrest resuscitation attempt.

3.2. In-transport cardiac arrest (Interfacility ONLY)

3.2.1. If a patient goes into cardiac arrest during transport, the effort should be worked according to the appropriate ACLS or PALS algorithm.

3.2.2. If a patient presents with a condition obviously not compatible with long term survival, the transport team should obtain advance directives from Medical Control prior to beginning the flight or as soon as feasible after lift-off. (Helicopter ONLY)

3.2.2.1. Transport crew should land at the closest feasible and appropriate location or hospital to safely perform CPR.

3.3. If a patient persists in cardiac arrest during ground transport→ Crew should consider deviation to closest hospital.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
   4.1. See above.

Special Recommendations/Notes

5. Cardiac Arrest Specific considerations:
   5.1. EMS/CCT crews shall consider the causes of a medical cardiac arrest and treat the findings appropriately according to ACLS or PALS.
   5.2. The exact mechanism of collapse/sudden cardiac arrest is difficult to obtain.
   5.3. Ventricular arrhythmias are the most common causes of sudden cardiac arrest.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Initial presenting cardiac rhythm.
- Treatment provided and response to treatment.
- Clinically suspected medical cause of cardiac arrest.
- Identification of reversible causes and attempts to treat/reverse those causes.
- If the medical crew terminates the resuscitation, the following shall be documented:
  - Cardiac asystole in two or more leads
  - Length of resuscitation time
  - Ultrasound confirmation of lack of cardiac activity (CCT Only)
  - Time of Death as documented on the clinical record.
  - Medical Control Physician name
  - Person/Agency that the body will be turned over to awaiting local protocols or laws regarding death certification and notification.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Suspected cause for arrest
  - Known initial rhythm?
  - Functional status before arrest (if known)
  - Resuscitation Wishes (if known)
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Due to the high mortality rate of patients that are present in traumatic arrest, the helicopter will not be dispatched to a patient in traumatic arrest unless there are special circumstances identified by HPI staff or requesting agency/department/hospital.

Level I Protocol (Basic Life Support)

1. **Level I Protocols**

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Perform BLS measures in accordance with current American Heart Association Guidelines.

1.3.1. Effective CPR should be performed with minimal interruptions. Every effort should be made to minimize interruptions.

1.3.1.1. Ground ALS- Automatic CPR Devices are preferred ONLY if no other providers can assist with BLS measures and a machine is available.

1.3.2. Femoral pulses (Adult) and brachial pulses (pediatrics) should be assessed during CPR to evaluate the effectiveness of CPR. This should be checked every 5 minutes and documented.

1.4. Automatic External Defibrillator shall be placed (if available) in accordance with established American Heart Association Guidelines.

1.5. Automatic CPR machine/device can be utilized as per company policy and manufacturer guidelines.

1.6.

Level II Protocols (Advanced Life Support)

2. **Level II Protocols**

2.1. According to current AHA ACLS/PALS guidelines

2.1.1. All reversible causes need to be treated or ruled out in active cardiac arrest performed by crew members and documented in the clinical record.

2.1.2. Reverse Hypoxia

2.1.2.1. In an Adult cardiac arrest- One attempt at direct oral intubation is allowed, then supraglottic airway will be placed.

2.1.2.1.1. In a pediatric cardiac arrest, supraglottic airway shall be the first line airway.

2.1.2.1.2. Once ROSC has been obtained or supraglottic ventilation has failed, a second attempt (Adult) or initial attempt (Pediatric), can be attempted as long SaO2 remains above 90% AND HR is not bradycardic.

2.2. Assess and control Bleeding.

2.2.1.1. Control external bleeding.

2.2.1.2. Volume resuscitation with crystalloids (limit to the least amount to maintain MAP > 60mmHg)

2.3. Patient Monitoring

2.3.1. Treat arrhythmias according to the AHA ACLS or PALS algorithms.

2.3.2. EtCO2 should be monitored during resuscitation and should be used in the evaluation of the cardiac resuscitation attempt and patient's physiological response to the attempt.

2.3.2.1. EtCO2 < 10 after aggressive resuscitation is associated with poor outcomes.

2.4. Bilateral Pleural needle thoracostomy if arrest is felt to be a result of a chest trauma or a tension pneumothorax is suspected. <u>Commercially available decompression needles are preferred</u>.

2.5. Documentation of effective CPR is required to be checked every 5 minutes and documented (+ femoral pulse).

2.6. EtCO2 should be monitored during resuscitation and should be used in the evaluation of the cardiac resuscitation attempt and patient's physiological response to the attempt.

2.7. Consider blood product administration→ ***See Hemorrhage Control Protocol***

2.8. Return of Spontaneous Circulation (ROSC) → ***See ROSC protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Consider blood transfusion if clinical history supports resuscitation.

3.2. Preform eFAST exam (if time permits).

3.3. Tube thoracostomy should be performed on the patient with chest trauma in cardiac arrest.

3.3.1. At a minimum, a finger thoracostomy should be performed to vent the chest during cardiac arrest.

3.4. Auto-transfusion should be anticipated and prepared for use.

3.5. Termination of Resuscitation (Interfacility/Scene Transport)

3.5.1. Patients presenting with traumatic cardiac arrest will not be transported by the CCT Team. If a trauma patient presents in cardiac arrest at the sending facility, the resuscitation effort should be carried out at that facility. The physician in attendance at that facility will be responsible for the effort. However, if no physician is present the CCT team will be responsible for the resuscitation effort. If no physician is present and the effort is not successful after 20-25

minutes of ALS medical care, Medical Control should be contacted for orders to terminate the effort.

3.5.2. Ultrasound can be used to confirm cardiac systole and should be used to confirm cardiac death with other clinical findings on a patient that arrested while in the presence of the flight crew or if the flight crew makes patient contact in an active cardiac arrest resuscitation attempt.

3.6. In-transport cardiac arrest (Interfacility ONLY)

3.6.1. If a patient goes into cardiac arrest during flight, the effort should be worked according to the appropriate ACLS or PALS algorithm.

3.6.2. If a patient presents with a condition obviously not compatible with long term survival, the transport team should obtain advance directives from Medical Control prior to beginning the flight or as soon as feasible after transport. (Helicopter ONLY)

3.6.2.1. Transport crew should land/transport at the closest feasible location or hospital to safely perform CPR.

3.6.3. If a patient persists in cardiac arrest during ground transport→ Crew should consider deviation to closest, feasible or appropriate hospital.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. See above.

Special Recommendations/Notes

5. Cardiac Arrest Specific considerations:

5.1. Tension pneumothorax should be ruled out and treated before termination.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Initial presenting cardiac rhythm.
- Treatment provided and response to treatment.
- Clinically suspected medical cause of cardiac arrest.
- Identification of reversible causes and attempts to treat/reverse those causes.
- If the medical crew terminates the resuscitation, the following shall be documented:
  - Cardiac asystole in two or more leads
  - Length of resuscitation time
  - Ultrasound confirmation of lack of cardiac activity (CCT Only)
  - Time of Death as documented on the clinical record.
  - Medical Control Physician name
  - Person/Agency that the body will be turned over to awaiting local protocols or laws regarding death certification and notification.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Length of down time (CPR time) Bystander CPR?
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Known initial rhythm.
  - Length of down time (CPR time) Bystander CPR?
  - Was AED utilized? # of shocks?
  - EMS arrest or in-hospital arrest
  - Suspected cause of arrest
  - Neurological/mental status- Sedation given?
  - Hemodynamic status?

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Place in a position of comfort.

1.4. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Optimizing cardiopulmonary function and perfusion of vital organs.

2.2.1. Arrhythmia management

2.2.1.1. Accelerated Idioventricular Rhythm ("slow VT")

2.2.1.1.1. Most require no treatment.

2.2.1.2. Anti-arrhythmic infusion should be started if patient was converted from a ventricular arrhythmia with an infusion of the anti-arrhythmic that was suspected to convert the patient.

2.2.1.3. 12 Lead EKG should be performed on all ROSC ADULT patients.

2.3. Hypotension/hypoperfusion management (ADULTS)

2.3.1. Ideally MAP should be maintained >60mmHg. Ideally MAP between 70-80 mmHg.

2.3.2. Fluid Resuscitation: Judicious fluid resuscitation (crystalloids) should be considered in patients without known contraindications.

2.3.3. Vasopressors should be considered – Levophed is preferred.

2.4. Oxygen Management:

2.4.1. Patients with ROSC- oxygen should be weaned aggressively to sats > 94% and monitoring $EtCO_2$.

2.5. Transport vent should be used to provide consistent ventilation for long distance transports (>40 miles).

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Vasopressor management

3.1.1. Norepinephrine is preferred over Dopamine for post-resuscitation management.

3.1.2. Titrate to desired MAP.

3.1.3. Consider insertion of Arterial Line.

3.2. Ventilator Management

3.2.1. Reduce FiO_2 to sats >94%

3.2.2. Avoid aggressive ventilation. Ventilator rate should be normal for age or just below normal for age.

3.2.3. EtCO2 should monitored and ventilator should be adjusted for EtCO2 of 35-40 mmHg.

3.3. Managing acute coronary syndromes

3.3.1. All post-resuscitation patients should get a 12-lead EKG.

3.3.2. Transport crew members should have a high index of suspicion for myocardial infarction.

3.4. Labs- POCT Testing

3.4.1. Review labs from OSH if available.

3.4.2. If no labs available or there is an abnormal finding

3.4.2.1. Repeat abnormal findings.

3.4.2.2. Ensure that the following labs have been drawn/reviewed/documented:

3.4.2.2.1. Hb/Hct

3.4.2.2.2. Lactate

3.4.2.2.3. INR

3.4.2.2.4. Potassium/BUN/Cr

3.4.2.2.5. ABG

3.4.2.2.6. Troponin

3.5. Consider therapeutic hypothermia in patients with witnessed cardiac arrest with an initial rhythm of VF/VT.

3.5.1. If therapeutic hypothermia has started, continue with cooling.

3.6. Monitor core temperature. Keep core temperature normal or slightly below normal. Prevent hyperthermia.

Pediatric Specific Protocols

4. Pediatric Specific Protocols[22]
    4.1. Avoid low and high arterial oxygen.
        4.1.1. Wean as above.
    4.2. Monitor ventilation.
        4.2.1. Normal ranges of $PaCO_2$ and $EtCO_2$ should be maintained.
    4.3. Avoid Recurrent Shock
        4.3.1. Cardiogenic shock should be suspected. Fluid resuscitation should be limited to 10cc/kg initially followed by vasoactive drug therapy (EPI is preferred). Monitor lactate as a good indicator of perfusion status.
    4.4. Maintain normal glucose.
        4.4.1. Hyper or hypoglycemia can impact mortality. Normal glucose should be maintained.
    4.5. Temperature management
        4.5.1. Core body temperature should be monitored.
        4.5.2. Treatment should focus on maintaining normal core temperature.

Special Recommendations/Notes

5. Signs of ROSC
    5.1. Signs of ROSC include:
        5.1.1. Breathing (more than an occasional gasp), coughing, or movement.
        5.1.2. Include evidence of a palpable pulse or a measurable blood pressure.
    5.2. Initial objectives in ROSC care are to[23]:
        5.2.1. Optimize cardiopulmonary function and vital organ perfusion.
        5.2.2. Transport a patient to a comprehensive post-cardiac arrest treatment hospital.
        5.2.3. Attempt to identify the precipitating cause of cardiac arrest and prevent recurrent arrest.
        5.2.4. Controlling body temperature optimizes survival and neurological recovery.
        5.2.5. Identify occult acute coronary syndrome as a cause.
        5.2.6. Optimize ventilator management to prevent acute lung injury.
    5.3. Most deaths occur in the first 24 hours after injury.
    5.4. Brain injury and cardiac instability remain the leading causes of death and morbidity in ROSC patients.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications.

[22] As per Pediatric Advanced Life Support Guidelines (2015)- Reviewed in Up to Date on 12/26/2017
[23] 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - Onset of symptoms: sudden or gradual
  - Current clinical status of patient including mental status, dizziness, angina, syncope.
  - Past medical history and current medications
  - ECG rhythm
  - 12 lead EKG- fax to HPI when able
  - Previous history of arrhythmia and required treatment.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access.

2.2. Correct any life-threatening condition.

2.3. Obtain 12-lead EKG and repeat as necessary.

2.3.1. Any chemical cardioversion attempted shall have a continuous EKG reading printed during attempted conversion.

2.3.2. This EKG shall be placed in the chart and labeled with the event and drug that was used.

2.4. Bradycardia

2.4.1. Follow current ACLS or PALS Guidelines.

2.4.2. Transport crew should consider Beta-Blocker overdoses as causes for refractory bradycardia.

2.4.2.1. Glucagon 2-5 mg IV shall be given for refractory bradycardia (ADULT).

2.4.3. Transport crew should consider transcutaneous pacing as an early treatment of refractory bradycardia.

2.5. Atrial arrhythmia

2.5.1. Follow current ACLS or PALS Guidelines

2.6. Ventricular arrhythmia

2.6.1. Follow current ACLS or PALS Guidelines

2.7. Atrial Fibrillation with Rapid Ventricular Response (RATE CONTROL ONLY)

2.7.1. Consider Diltiazem

2.7.1.1. 0.25 mg/kg (average adult dose, 20 mg) direct IV over 2 minutes

2.7.1.1.1. After 15 minutes, may repeat bolus by administering 0.35 mg/kg actual body weight over 2 min (average adult dose, 25 mg).

2.7.1.1.2. Followed by 60mg PO dose of diltiazem if transport > 30 minutes to cardiac center.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Labs- POCT Testing

3.1.1. Review labs from OSH if available.

3.1.2. If there are no labs available or there is an abnormal finding-

3.1.2.1. Repeat abnormal findings.

3.1.2.2. Ensure that the following labs have been drawn/reviewed/documented:

3.1.2.2.1. Hb/Hct

3.1.2.2.2. Lactate

3.1.2.2.3. INR

3.1.2.2.4. Potassium/BUN/Cr

3.1.3. Consider Lopressor if refractory or allergic to Diltiazem.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Follow relevant PALS guidelines.

4.2. Suspected B-Blocker overdose- Glucagon dose

4.2.1. <25 kg or <6-8 years old and weight unknown: 0.5 mL SC/IM/IV

4.2.2. >25 kg or older than 6-8 years and weight unknown: 1 mL SC/IM/IV

4.3. Start maintenance fluids for transfers → ***See Pediatric Infusion Protocol***

Special Recommendations/Notes

5. Special Considerations:

5.1. Wolff-Parkinson-White Syndrome

5.1.1. Avoid Beta blockers, calcium channel blockers and digoxin.

5.1.2. Treatment with procainamide or amiodarone for rate control.

5.1.3. Treatment of unstable patients is immediate cardioversion.

Documentation

- Suspected cause of arrhythmia based on review of pre-arrival information.
- Document abnormal or relevant normal labs in the chart.
- Document response to treatments and medications.
- Document the patient's clinical stability.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Cardiac risk factor evaluation

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place in a position of comfort.

Level II Protocols (Advanced Life Support)

2. **Level II Protocols**
   - 2.1. Ensure IV Access
   - 2.2. Treat hypotension (Desired MAP > 70)
     - 2.2.1. Crystalloid fluids preferred.
   - 2.3. Patients > 30 yo
     - 2.3.1. Perform 12 lead EKG.
     - ***2.3.2.*** STEMI→ ***See Chest Pain: STEMI Protocol***
       - ***2.3.2.1.*** Divert to a hospital with PCI capability if the patient is hemodynamically stable.
   - 2.4. Give Aspirin 324 mg PO.
   - 2.5. Nitroglycerin 0.4 mg SL every 5 minutes x 3
     - 2.5.1. Caution should be shown in inferior or right sided injury patterns on EKG.
     - 2.5.2. Nitroglycerin should be considered in patients with atypical chest pain symptoms and high suspicion of acute myocardial ischemia.
     - 2.5.3. Improvement in PAIN with nitro can be a key indicator in your risk stratification of this patient.
   - 2.6. Consider other causes of Chest Pain
     - 2.6.1. Chest wall injury/strain
     - 2.6.2. Pneumonia
     - 2.6.3. Sickle Cell Anemia/Acute Chest Syndrome
     - 2.6.4. Referred upper abdominal pain.
     - 2.6.5. Pericarditis

2.6.6. Pulmonary Embolism

2.6.7. Chest pain is related to elevated heart rate or blood pressure.

2.6.8. Aortic Dissection→ ***See Aortic Emergencies Protocol***

2.7. Treat Nausea/Vomiting-→ ***See Nausea/Vomiting Protocol***

2.8. Treat pain with IV Morphine (5mg IV every 10 minutes or to a maximum of 15mg).

2.8.1. If refractory to Nitroglycerin, suspect non-cardiac cause of chest pain or hypotension.

2.8.2. Consider fentanyl only if the patient is allergic to morphine.

2.8.2.1. 25mcg every 10 minutes to a maximum of 200 mcg.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Determine NSTEMI vs. STEMI for cardiac patients→ ***See specific protocols.***

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.

4.1.1. Provide 20cc/kg bolus and repeat if necessary.

4.2. Start maintenance fluids for transfers → ***See Pediatric Infusion Protocol***

Special Recommendations/Notes

5. Chest pain considerations

5.1. Women, the elderly, and diabetics may not have chest pain, but instead might have pain in atypical locations or anginal equivalents—sudden weakness, nausea, diaphoresis, near syncope/syncope, etc.

5.2. Bradycardia may be protective for patients with myocardial infarction. Do not increase heart rate unless bradycardia is symptomatic.

5.3. Sickle Cell Anemia- Acute Chest Syndrome

5.3.1. Acute chest syndrome (ACS) is a common complication and reason for hospital admission in patients with sickle cell disease (SCD). It is also the most common cause of death in this patient population.

5.3.2. Treatment includes:

5.3.2.1. Pain Control

5.3.2.2. Oxygen

5.3.2.3. Bronchodilators

5.3.2.4. Transfer to center where plasmapheresis is available.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Interfacility Transfer
  - Demographic Data
  - Cardiac risk factors evaluation
  - Time of onset of chest pain
  - The below shall be gathered only if the communication doesn't delay patient preparation for transport:
    - Previous cardiac history
    - Risk Factors
    - EKG findings
      - When providers have time, request EKG be faxed to HPI.
    - Request a repeat EKG before transport crew arrival (<15 minutes from arrival)
    - Specific laboratory information to be obtained/documented.
      - Troponin levels (with documentation of upper limit of normal)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.2.1. ***Do not administer oxygen to normoxic patients.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat hypotension (Desired MAP > 70)

2.2.1. Crystalloid fluids preferred.

2.3. Perform 12 lead EKG:

2.3.1. Should be repeated during any change in pain, clinical condition, or vital signs.

2.3.2. Minimum of two EKG's should be obtained during transport (with transport times > 15 minutes).

2.4. Ensure Aspirin 324 mg PO was given (Document time and who gave ASA).

2.5. Nitroglycerin 0.4 mg SL every 5 minutes x 3.

2.5.1. Caution should be shown in inferior or right sided injury patterns on EKG.

2.5.2. Nitroglycerin should be considered in patients with atypical chest pain symptoms and high suspicion of acute myocardial ischemia.

2.5.3. Evaluate male AND female patients for phosphodiesterase inhibitor for erectile dysfunction or other conditions (Viagra, Levitra, etc.).

2.6. Treat Nausea/Vomiting-→ ***See Nausea/Vomiting Protocol***

2.7. Treat pain with IV Morphine (5mg every 10 minutes or to a maximum of 15mg).

2.7.1. Morphine "Mask" pain and thus increases mortality rate, if morphine is given- patients should be transported to a cardiac center with active therapeutic catheterization lab.

2.7.2. Consider Fentanyl only if the patient is allergic to morphine.

2.7.2.1. 25 mcg every 10 minutes to a maximum of 200 mcg.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Nitroglycerin Infusion

3.1.1. 5mcg/min start; increase by as needed while maintaining MAP >65mmHg.

3.1.2. Maximum 200 mcg/min

3.2. Beta Blocker (only give if tachycardia is present).

3.2.1. Review contraindications to beta-blocker therapy.

3.2.2. Inquire about illicit drug use.

3.2.3. Hold if age > 70, systolic BP <120, HR <60 bpm, signs of CHF, or heart block.

3.2.4. Administer Metoprolol 5mg slow IV push.

3.2.5. Repeat two additional times q 5 minutes.

3.2.6. Monitor blood pressure and pulse!

3.3. Administer second antiplatelet agent **(ONLY IN NSTEMI)**

3.3.1. Ticagrelor (Brilinta) 180 mg PO/NG/OG (PREFERRED)

3.3.2. Clopidogrel (Plavix) 600mg PO/NG/OG

3.4. Anticoagulation therapy **(ONLY IN NSTEMI)**

3.4.1. Review contraindications to heparin administration.

3.4.2. Unfractionated Heparin (UFH)

3.4.3. 50 Units/kg bolus (max 4,000U)

3.4.4. Followed by 12 U/kg/hr. infusion of Heparin (Max 1000 U/Hour).

3.4.5. This is not required if Lovenox has been given by the sending facility.

Clinical Advisory: Enoxaparin (Lovenox) and NSTEMI

Heparin is preferred for NSTEMI patients. But if enoxaparin has been given prior to arrival the dose should be Single SQ 1mg/kg (max 100mg).

Pediatric Specific Protocols

4. Pediatric Specific Protocols
   4.1. Contact medical control for orders if needed.

Special Recommendations/Notes

5. Chest Pain Considerations
   5.1. NSTEMI
      5.1.1. Concerning EKG findings found during angina episodes for NSTEMI.
         5.1.1.1. Transient ST-segment elevations
         5.1.1.2. Dynamic T-wave changes: Inversions, normalizations, or hyper acute changes
         5.1.1.3. ST depressions: These may be junctional, down sloping, or horizontal.
   5.2. Unstable Angina
      5.2.1. Anginal pain lasts longer than 15 minutes and is unrelieved with nitroglycerin or rest.
      5.2.2. No EKG findings listed above in NSTEMI.
      5.2.3. In unstable angina, patients have increased risk for adverse cardiac events, such as myocardial infarction or death.
   5.3. If the patient becomes significantly apprehensive in transport and if morphine is not indicated, consider sedation with midazolam 1-2 mg IV slowly prior to moving the patient into the transport vehicle.
   5.4. Remember atypical chest pain in the female population, diabetics and obese patient population can mimic other disease processes.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- Document abnormal or relevant normal labs in the chart.
- Note reference ranges with cardiac enzymes and BNP values.
- Document response to treatments and medications.
- Document EKG findings and changes enroute.

NSTE-ACS (formally NSTEMI) is often complex and have many other factors associated with their management unlike the more formal and time sensitive. STEMI's need immediate reperfusion- while clinical trials have not determined a clear advantage with early reperfusion (within 24 hours) with NSTEE-ACS; local practice is dependent on physician, clinical picture, and patient response to treatment. Unless otherwise clinically critically ill, there is not a time savings by rapid transport or air medical transport. Most hospitals have the treatment medications needed to provide evidence-based care while awaiting transport.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Cardiac Risk Factors evaluation
- Interfacility Transfer
  - Request outside hospital or EMS crew have patient "ready to roll" upon landing of helicopter.
  - Ways to decrease Door- in- Door out time.
    - Have patient ready at doorway of ED/hallway to helipad.
    - Give belongings to family.
    - "Hep lock" infusions.
    - Fax paperwork to HPI (to send to the receiving center).
  - Determine if the patient will be going for Primary Percutaneous Coronary Intervention (PCI) or has received fibrinolytics and is being transferred for "Rescue PCI."
  - Time of Onset of Chest Pain
  - The below shall be gathered only if the communication doesn't delay patient preparation for transport:
    - Previous cardiac history
    - Risk Factors
    - EKG findings
    - When the providers have time, please request faxing of EKG.
    - Request a repeat EKG before transport team arrival (Prefer < 15 minutes from arrival).
    - Specific laboratory information obtained/resulted (with upper limits).
  - Notify cardiology at receiving facility as per policy when transport crew leaving referral facility.

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place patient in a position of comfort.

Level II Protocols (Advanced Life Support)

2. **Level II Protocols**

2.1. Ensure IV Access
2.2. Treat hypotension (Desired MAP > 60).
2.2.1. Crystalloid fluids preferred.
2.3. Transport patient to a hospital with PCI capability directly.
2.3.1. If a PCI hospital is closer and the patient is hemodynamically stable and has a patent airway, divert to the PCI center.
2.3.2. Contact Medical Control if concerned about diversion.
2.4. Perform 12 lead EKG:
2.4.1. Should be repeated during any change in pain, clinical condition, or vital signs.
2.4.2. Minimum of two EKG's should be obtained during transport (with transport times > 15 minutes).
2.5. Ensure Aspirin 324 mg PO was given (Document time and who gave ASA).
2.6. Nitroglycerin 0.4 mg SL every 5 minutes x 3.
2.6.1. Caution should be shown in inferior or right sided injury patterns on EKG.
2.6.2. Nitroglycerin should be considered in patients with typical chest pain symptoms and high suspicion of acute myocardial ischemia.
2.6.3. Evaluate male AND female patients for phosphodiesterase inhibitor for erectile dysfunction or other conditions (Viagra, Levitra, etc.).
2.7. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol.***
2.8. Treat pain with IV Morphine (5mg IV every 10 minutes or to a maximum of 15mg).
2.8.1. If refractory to Nitroglycerin, suspect non-cardiac cause of chest pain or hypotension.
2.8.2. Consider fentanyl only if the patient is allergic to morphine.
2.8.2.1.1. 25mcg every 10 minutes to a maximum of 200mcg
2.9. Rescue PCI- patients that have received thrombolytics and are being transported to a PCI center for cardiac catheterization or monitoring:
2.9.1. 12 lead EKG monitoring
2.9.2. Monitoring pain status
2.9.3. Report to receiving hospital on pain control, EKG changes and vitals.
2.10. Anticoagulation therapy
2.10.1. Review contraindications to heparin administration.
2.10.2. Unfractionated Heparin (UFH)
2.10.3. 50 Units/kg bolus (max 4,000U)

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Nitroglycerin Infusion
3.1.1. 5mcg/min start- increase as needed while maintaining MAP >60 mmHg.
3.1.2. Maximum 200 mcg/min
3.2. Beta Blocker (Only if tachycardia is present)
3.2.1. Contact Medical Control if borderline tachycardia.
3.2.2. Review contraindications to beta-blocker therapy.
3.2.3. Inquire about illicit drug use.

3.2.4. Hold if age > 70, systolic BP <120, HR <60 bpm, signs of CHF, or heart block.
3.2.5. Administer metoprolol 5mg slow IV push.
3.2.6. Repeat two additional times q 5 minutes.
3.2.7. Monitor blood pressure and pulse.

3.3. Administer second antiplatelet agent.
3.3.1. Ticagrelor (Brilinta) 180 mg PO/NG/OG (PREFERRED)

3.4. Anticoagulation therapy → ***See Anticoagulation Table located below.***

3.5. Place EKG leads and pads as shown below in picture.

3.6. All patients coming from the scene where INR and Creatinine are not documented should have a Point of Care test run and reported to the catheterization lab or emergency department team.

Clinical Advisory: Enoxaparin (Lovenox) and STEMI

Heparin is preferred for STEMI patients. But if enoxaparin has been given prior to arrival the dose should be Single SQ 1mg/kg (max 100mg). Age > 75 years- does should be 0.75mg/kg (Max 75 mg)

Pediatric Specific Protocols

4. Pediatric Specific Protocols:
4.1. Contact medical control for specific orders.

Special Recommendations/Notes

5. Chest Pain Considerations

5.1. SCENE TIME: On stable- uncomplicated STEMI patients, scene time should be <10 minutes.
5.1.1. Assuming no aviation or safety factors, all patient loads/unloads should be completed "HOT".

5.2. If the patient becomes significantly apprehensive about flying and if morphine is not indicated, consider sedation with midazolam 1-2 mg IV slowly prior to moving the patient to the aircraft or Ativan 1 mg IV.

5.3. Remember atypical pain in the female population, diabetics and obese.

5.4. In the unlikely event that Primary PCI is delayed or unavailable in a reasonable time
5.4.1. Senior crew members shall contact medical control immediately.
5.4.2. Flight crew shall perform the STEMI thrombolytic evaluation for contraindications.
5.4.3. SEE BELOW Protocol for Thrombolytic Treatment

5.5. Onset of pain < 12 hours

5.6. If patient meets criteria and PCI is delayed→ Contact medical control for orders for thrombolytics.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- Document abnormal or relevant normal labs in the chart.
- Note reference ranges with cardiac enzymes and BNP values.
- Document response to treatments and medications.
- Document EKG findings and changes enroute.
- Document contraindications to above medications.

Absolute contraindications for fibrinolytic use in STEMI include the following:

- Prior intracranial hemorrhage (ICH)
- Known structural cerebral vascular lesion
- Known malignant intracranial neoplasm
- Ischemic stroke within 3 months
- Suspected aortic dissection
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed head trauma or facial trauma within 3 months

Relative contraindications for fibrinolytic use in STEMI include the following:

- History of chronic, severe, poorly controlled hypertension
- Severe uncontrolled hypertension on presentation (systolic blood pressure > 180 mm Hg or diastolic blood pressure > 110 mm Hg)
- Traumatic or prolonged (> 10 minutes) cardiopulmonary resuscitation (CPR) or major surgery less than 3 weeks previously
- Recent (within 2-4 weeks) internal bleeding
- Non-compressible vascular punctures
- Pregnancy
- Active peptic ulcer
- Current use of an anticoagulant (e.g., warfarin sodium) that has produced an elevated international normalized ratio (INR) higher than 1.7 or a prothrombin time (PT) longer than 15 seconds

STEMI (Delayed PCI)[24] *(If primary PCI cannot be performed within 120 minutes)*	**TNKase (Tenecteplase)**	<60 kg: ≥60 to <70 kg: ≥70 to <80 kg: ≥80 to <90 kg: ≥90 kg:	30 mg 35 mg 40 mg 45 mg 50 mg
STEMI > 75 years	Use ½ dose of TNKase		

[24] (ACC/AHA [O'Gara 2013]; ESC [Ibanez 2017])

HPI/Pre-arrival Information

Scene/Interfacility Transports:

- Scene Request
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Which hospital placed the VAD?
  - Specific Test Obtained

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place patient in a position of comfort.
   - 1.5. NPO
   - 1.6. Assess the LVAD function:
     - 1.6.1. Auscultate left upper abdominal quadrant and left chest. Continuous humming sound and no alarms= **pump IS working.**
     - 1.6.2. Non-pulsatile pump function. Patients may not have palpable pulse or measurable BP (with standard BP Cuff) or pulse oximeter readings even if pump is working properly.
   - 1.7. CPR:
     - 1.7.1. LVAD patients often will not have a pulse, so if they are unconscious, they would not need chest compressions if LVAD pump is working (humming sound and no alarms). OK to use ACLS protocols except for chest compressions. Decisions on the use of chest compressions and other treatments rest with the on-line medical control physician in consultation with the Advanced Heart Failure Cardiologist on call. MEDICAL CONTROL SHOULD BE CONTACTED BEFORE THE CHEST COMPRESSIONS INITIATED.
   - 1.8. Patient Spare Equipment
     - 1.8.1. Always bring all available LVAD equipment to the Emergency Department with the transported patient. This is often called the patient's "GO BAG." (Also known as "Back-up bag").

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. VAD needs to always be connected to power source.

2.3. Treat non-LVAD associated conditions in accordance with the appropriate protocol.

2.4. Signs of hypoperfusion:

2.4.1. Evaluate device for "low flow" indicator alarm or light.

2.4.2. Administer boluses of 0.9% NaCl at 250 ml.

2.4.3. LVADs are volume dependent and afterload sensitive.

2.5. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol***

2.6. Treat moderate/severe pain→ ***See Pain Management Protocol***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Blood Pressure Evaluation

3.1.1. Manual Doppler BP- most often represents MAP.

3.1.2. Arterial line is the most accurate MAP.

3.1.3. MAP should be between 70-85 mmHg[25].

3.2. Vasoactive Medications

3.2.1. Concerned for right heart failure → give Dobutamine.

3.2.1.1. Patients are more prone to arrhythmias Dobutamine.

3.2.2. Concerned for sepsis and has markedly reduced afterload, consider norepinephrine.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. No specific recommendations

Special Recommendations/Notes

5. LVAD Specific Considerations

5.1. ACLS

5.1.1. Defibrillation can still be performed in patients with ventricular dysrhythmias.

5.2. Alarms

5.2.1. Contact HPI for connection to VAD Coordinator or advanced heart failure attending.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

[25] As per 2020 Recommendation from UMMC Advanced Heart Failure

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Demographic Data
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - Sending providers reason for critical care transport request
  - Treatment and Response to treatment
  - Specific laboratory request
    - Venous or Arterial Blood Gas
    - Lactate (Point of care or laboratory) if available.
    - Basic Metabolic Panel
    - Calculate Anion Gap (See below for calculation)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Evaluate mental status.

2.3. Evaluate for possible precipitating events (MI, infection)

2.4. Assess volume status.

2.5. Assess capillary glucose level- if “HIGH” or >400 and no clinical signs of volume overload.

2.5.1.CBG should be checked every 30 minutes or at a minimum of two times in transport.

2.5.2. Fluid Resuscitation

2.5.2.1. Normal Saline wide open x 2 liters then 10-15 mL/kg/hr. (Maintenance Rate if bolus was given).

2.6. When CBG (Blood glucose) drops below < 300 then start D_5W at 100 cc/hour or at a maintenance rate with manual calculations.

2.7. Treat nausea/vomiting → ***See Nausea/Vomiting Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Calculate serum Anion Gap (See Below)

3.1.1. Document in chart.

3.2. Regular Human Insulin:

3.2.1. 100 units of Human insulin in 100cc of NS at 0.05- 0.1 units/kg/hr.

3.3. Labs- POCT Testing

3.3.1. Review labs from OSH if available.

3.3.2. If no labs available or there is an abnormal finding

3.3.2.1. Repeat abnormal findings.

3.3.2.2. Ensure that the following labs have been drawn/reviewed/documented:

3.3.2.2.1. Hb/Hct

3.3.2.2.2. Lactate

3.3.2.2.3. INR

3.3.2.2.4. Potassium/BUN/Cr/Bicarb

3.3.2.2.5. Chemistry should be repeated every 30 minutes with a minimum of one chemistry in transport OR if there is a mental status change.

3.4. Assess capillary blood glucose every <u>30 minutes.</u>

3.4.1. When capillary blood glucose reaches 300mg/dL, switch IV fluids to D_5W.

3.5. Contact medical control is pH is less than 6.9 for orders to give sodium bicarbonate. It should be considered an adjunct treatment to the above. (Use is controversial)

Pediatric Specific Protocols

4. See SPECIFIC Pediatric Protocol.

Special Recommendations/Notes

5. DKA and HHS

5.1. Diabetic Ketoacidosis (DKA)/ Hyperosmolar Hyperglycemia State (HHS)

5.1.1. DKA:

5.1.1.1. Hyperglycemia, ketoacidosis, and ketonuria

5.1.1.2. Serum glucose usually less than 800mg/dL

5.1.1.3. Signs/Symptoms:

5.1.1.3.1. Malaise, generalized weakness, and fatigability.

5.1.1.3.2. Nausea and vomiting may be associated with diffuse abdominal pain, decreased appetite, and anorexia.

5.1.1.3.3. Rapid weight loss in patients newly diagnosed with type 1 diabetes.

5.1.1.3.4. History of failure to comply with insulin therapy or missed insulin injections due to vomiting or psychological reasons.

5.1.1.3.5. Decreased perspiration.

5.1.1.3.6. Altered consciousness (e.g., mild disorientation, confusion); frank coma is uncommon but may occur when the condition is neglected or with severe dehydration/acidosis.

5.1.2. Hyperglycemia, hyperosmolarity, and dehydration without significant ketoacidosis. Most patients present with severe dehydration and focal or global neurologic deficits. Serum glucose usually exceeds 1000 mg/dL.

5.1.3. Cerebral edema- typically seen within 12-24 hours; ensure above protocol is followed and careful neurological monitoring is conducted during transport.

5.1.4. Careful monitoring in patients that have received a bolus subcutaneous injection of insulin; this has variable absorption and can complicate treatment.

5.1.5. Patients with an insulin pump in DKA- once insulin infusion is started; the pump should be turned off.

6. Patient's home insulin pumps should be stopped by CCT personnel during transport.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications.

Anion Gap Calculation:

$[Na^+] - ([Cl^-] + [HCO^-]) = \text{Anion Gap}$

Adult Diabetic Ketoacidosis (DKA) vs. Hyperosmolar Hyperglycemic State (HHS)

Clinical/Laboratory Finding	DKA	HHS
Major Finding	Metabolic Acidosis	Little/no Acidosis
Ketones Present (Urine)	Yes, Heavy	Little or none
Glucose Levels	Below 800mg/dL	Frequently exceeds 1000 mg/dL
Plasma Osmolality (Osm)	Variable	>320 mOsmol/kg
Serum Ketones	+ Beta-hydroxybutyric	(-) Beta hydroxybutyric
Plasma pH	7.0-7.30	> 7.30

paladin	Diabetic Ketoacidosis: Pediatric (T-020) **Includes DKA and HHS**	**Protocol #**	**T-020**
		Effective Date	**9/1/2014**
		Revision Date	**9/17/2018**
		Reviewed	**7/8/2025**

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Demographic Data
  - History of DKA? ICU admission? New Onset?
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - Sending providers reason for critical care transport request
  - Treatment and response to treatment
  - Specific laboratory request
    - Venous or arterial blood gas
    - Lactate (Point of care or laboratory) if available.
    - Basic metabolic panel
    - Calculate anion gap (See Below)
  - Bolus dose insulin either IV or subcutaneous is NOT indicated in treatment of DKA.

New Onset diabetics (pediatrics) in DKA are at a HIGH risk for deterioration and/or cerebral edema. It is HIGHLY recommended that these patients are transported by a critical care

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place patient in a position of comfort.
   - 1.5. NPO

Level II Protocols (Advanced Life Support)

2. **Level II Protocols**
   - 2.1. Ensure IV Access.
   - 2.2. Evaluate mental status.
   - 2.3. Evaluate for possible precipitating events (infection, GI illness).
   - 2.4. Assess volume status; place peripheral IV.

2.5. Assess capillary glucose level.
2.5.1. If glucose if "HIGH" or > 400 mg/dl.
2.5.2. Fluid Resuscitation.
2.5.2.1. 10mL/kg normal saline bolus over one hour.
2.6. Neuro Checks every 30 minutes to include documentation of the following:
2.6.1. Pupils
2.6.2. Evaluation of headache
2.6.3. Inappropriate slowing of heart rate
2.6.4. Sensorium
2.6.5. GCS
2.6.6. Especially important in new onset DKA, young children and severe DKA with history of previous mental status changes.
2.7. Treat nausea/vomiting → ***See Nausea/Vomiting Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols
3.1. Calculate serum anion gap (See Below)
3.1.1. Document in chart.
3.2. POCT Testing
3.2.1. Preform POCT testing and document the following:
3.2.1.1. ABG or VBG (pH)
3.2.1.2. Sodium, Chloride, Glucose, Bicarb and Potassium
3.2.1.3. Lactate
3.3. Fluid Resuscitation
3.3.1. 10 mL/kg normal saline bolus over one hour (unless CV compromised then 20mL/kg).
3.3.2. The hourly rate of fluids should not exceed 1.5x maintenance rate in hemodynamically stable pediatric patients.
3.4. Regular Human Insulin:
3.4.1. Start/Correct insulin infusion to 0.1 units/kg per hour.
3.4.1.1. Consider 0.05 units/kg/hr. if patient is < 5 years old or hyperosmolar coma.
3.4.2. Consider syringe pump or piggyback as close to the IV site as possible; IV tubing can bind insulin reducing the concentration.
3.4.3. Glucose should not be lowered more than 100 mg/dl/hour.
3.5. Check capillary blood sugar every 15 minutes or if any signs of hypoglycemia or neurologic changes are present.
3.6. When **glucose reaches 300 mg/dL**
3.6.1. Change IVF to D_5 Normal Saline with dextrose added to solution.
3.6.2. Insulin infusion should be decreased 0.05 units/kg/hr. Insulin infusion is needed to prevent gluconeogenesis.
3.7. Mental Status Change
3.7.1. Check glucose immediately→ If hypoglycemic- ***see Critical Electrolyte Protocol***
3.7.2. Contact Medical Control

3.7.2.1. Consider 3% Saline

3.7.3. Early recognition of this condition is KEY. The outcomes of these patients are particularly bad.

Pediatric Specific Protocols

4. Pediatric specific protocols:
   4.1. See above.

Special Recommendations/Notes

5. DKA
   5.1.1. Hyperglycemia, ketoacidosis, and ketonuria
   5.1.2. Serum glucose usually less than 800mg/dL
   5.1.3. Signs/Symptoms:
   5.1.4. Malaise, generalized weakness, and fatigability.
   5.1.5. Nausea and vomiting may be associated with diffuse abdominal pain, decreased appetite, and anorexia.
   5.1.6. Rapid weight loss in patients newly diagnosed with type 1 diabetes.
   5.1.7. History of failure to comply with insulin therapy or missed insulin injections due to vomiting or psychological reasons.
   5.1.8. Decreased perspiration.
   5.1.9. Altered consciousness (e.g., mild disorientation, confusion); frank coma is uncommon but may occur when the condition is neglected or with severe dehydration/acidosis.

   5.2. Cerebral Edema
      5.2.1. Most cases present 4-12 hours after treatment.
      5.2.2. Clinically the patient is improving (both labs and clinical status) until a sudden deterioration occurs with increasing coma, fixed-dilated pupils and respiratory arrest.
   5.3. Patients with an insulin pump in DKA- once insulin infusion is started; the pump should be turned off.
   5.4. Careful monitoring in patients that have received a bolus subcutaneous injection of insulin; this has variable absorption.
6. Patient's home insulin pumps should be stopped by CCT personnel during transport.
7. HHS can be considered in post-pubertal patients and is defined as listed in the adult protocol. Treatment is the same except for very high glucose levels; it is advisable to start with a lower initial insulin dose of 0.05u/kg/hr.
8. Insulin Pump
   8.1. Discontinue patient's insulin pump during treatment for DKA.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications.

Anion Gap Calculation:

$[Na^+] - ([Cl^-] + [HCO^-]) = \text{Anion Gap}$

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - HPI shall alert transport crew as early as possible about known airway management attempts.
  - Once informed, the transport crew shall prepare necessary alternative airway devices.
- HPI should attempt to elicit any known barriers to successful intubation (weight, trauma, head/neck cancer, etc.)
- HPI should inform transport crew of difficult airway as soon as possible.

Level I Protocol (Basic Life Support)

1. Level I Protocols:
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place patient in a position of comfort.
   - 1.5. NPO

Level II Protocols (Advanced Life Support)

8. Level II Protocols
   - 8.1. Ensure IV Access
   - 8.2. Difficult/Failed Airway Management Protocol
     - 8.2.1. Evaluate need for intubation (risk vs. benefit); discuss with medical control if time permits.
     - 8.2.2. Minimize risks as able with patient position; ensure proper equipment is available.
     - 8.2.3. Prepare alternative airways for use. Approved airway devices for airway management:
       - **8.2.3.1. Supraglottic airway (Preferred)**
       - 8.2.3.2. Video laryngoscopy
       - 8.2.3.3. Blind nasotracheal intubation
       - 8.2.3.4. Combi-Tube (Adults only)
       - 8.2.3.5. BLS oral airway and Bag-Valve mask
       - 8.2.3.6. Bougie assisted intubation.
       - 8.2.3.7. QuickTrach ® *(depending on EMS policy and inventory)*

8.2.4. Transport crew should have two alternative airways at bedside if attempting a known difficult airway before initiating airway manipulation.

8.2.5. All attempts shall be documented in chart *(See below definition of attempt).*

8.2.6. Teams with dual providers- a single provider should not perform more than **two attempts** of direct laryngoscopy without changing to a different adjunct or changing providers.

8.3. Failed Airway Procedure:

8.3.1. If patient can be oxygenated with BLS (BVM)

8.3.1.1. Continue BLS measures and plan for additional airway adjuncts and attempts to secure airway.

8.3.1.2. Unless extenuating circumstances present, patients should have a definitive airway established **before transport**; medical control should be contacted at that point.

8.3.2. If patient can be ventilated with non-definitive airway

8.3.2.1. Continue non-definitive airway while planning for attempts for definitive airway.

Level III Protocols (Critical Care)

2. Level III Protocols

2.1. Prepare alternative airways for use. Approved airway devices for airway management (CCT)

2.1.1. Laryngeal Mask Airway (LMA) (Newborn-adult)

2.1.2. Video laryngoscopy

2.1.3. Supra-glottic airway (King, etc.)

2.1.4. Intubating laryngeal mask (iLMA)

2.1.5. Blind nasotracheal intubation

2.1.6. Combi-Tube (Adults only)

2.1.7. BLS oral airway and Bag-Valve mask

2.1.8. Retrograde intubation (over wire)

2.1.9. Bougie assisted intubation.

2.1.10. Needle Cricothyrotomy (traditional method)

2.1.11. Cook Catheter (Quick trach©)

2.2. If the patient is unable to be ventilated and/or oxygenated:

2.2.1. The transport crew should consider needle cricothyrotomy (Age > 8yrs)

2.3. As soon as possible, medical control should be contacted; do not delay procedure for contacting medical control.

2.3.1. All patients who undergo cricothyrotomy shall have an NG/OG tube placed and care taken to suction to the posterior oropharynx frequently.

Pediatric Specific Protocols

3. Pediatric Specific Protocols

3.1. Supraglottic airway is the preferred alternative airway for patients <12 years old.

Special Recommendations/Notes

4. Special Recommendations/Notes

4.1. Failed/Crash Airway Management

4.1.1. Crash Airway- patient presenting in extremis with little or no cardiovascular or respiratory activity and unlikely to respond to insertion of laryngoscope; intubation shall be attempted without delay by the most experienced provider.

4.1.2. Failed Airway- three or more attempts by transport crew or experienced provider constitute a failed airway and alternative plans shall be made.

4.2. All attempts by OSH or scene EMS personnel shall be documented and considered when planning for intubation.

5. All patients who do not meet the crash airway definition shall undergo evaluation process:

5.1. Non-Crash Airway Evaluation (Non-RSI)

5.1.1. External look: abnormal facial or body habitus, unusual anatomy, or facial trauma

5.1.2. Evaluate (3-3-2 rule) - size of the mandible, extent of mouth opening (3 fingers) distance between the mentum and the hyoid bone (3 fingers), and the space between the superior notch of the thyroid cartilage and the neck/mandible junction (2 fingers).

5.1.3. Mallampati Score shall be observed and documented (See figure below)

5.1.4. Obstruction/Obesity:

5.1.4.1. Neck Mobility: (if able)

Endotracheal Tube Confirmation Methods and Documentation

5.2. Tube confirmation Methods:

5.2.1. Direct visualization of the ET tube passing cords (IDEAL)

5.2.2. EtCO2 measurements

5.2.2.1. Qualitative measurements are preferred.

5.2.2.2. Colorimetric devices may take up to six breaths to show change.

5.2.2.3. Low perfusion or shock states might not produce $EtOC_2$ changes.

5.2.3. Auscultation of lung and epigastric sounds

5.2.4. Chest rises and falls with manual ventilation.

5.2.5. Chest Radiograph shall be used as an adjunct for ET tube placement for tube **DEPTH only**.

5.3. The use of "tube-misting" as a confirmation technique is sensitive but not specific and therefore, should be used with caution and in conjunction with other confirmation measures.

5.4. If direct visualization of correct ET tube placement- documented confirmation is required by three different of the above approved methods.

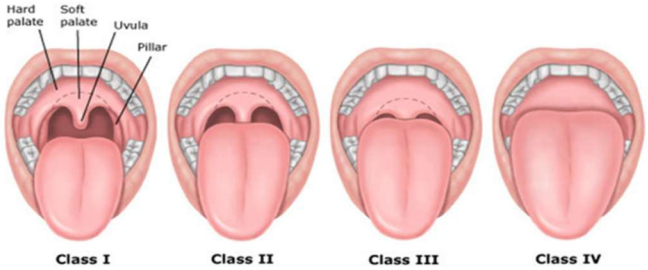
5.5. If direct visualization is not seen (blind insertion) but there is a reasonable assumption by the performing provider that the tube is in place OR the tube was placed by a person before arrival of the transport crew, the tube should be confirmed by four of the above methods (excluding CXR).

5.6. If the ET tube was placed by an outside provider, the tube must be confirmed four ways from the above list (excluding CXR).

Documentation

- Clinical documentation for difficult airway should include in addition other necessary items based on the non-airway presentation/illness of the patient.
- Failed airway attempts and methods attempted.
- Treatment provided and response to treatment.
- Clinically suspected cause of difficult airway.
- Presence of oral or pharyngeal trauma.
- Patient condition between intubation attempts.
  - Hypoxia and hypotension should be documented during the attempt.
- Visual documentation of tube depth.

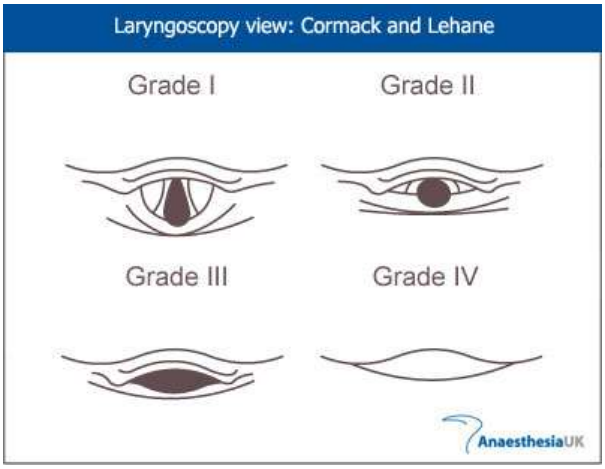
GAMUT Data Point: An intubation attempt shall be considered and attempted when the laryngoscope blade **enters the mouth**. Each time is counted as a separate attempt in the chart.



Airway Classification	Score
AAGS Grade 1 (Moderate)	5-15
AAGS Grade 2 (Difficult)	15-25
AAGS Grade 3 (Extremely Difficult)	25-32

ASA PS Classification	Definition	Examples, including, but not limited to:
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
ASA II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Examples include (but not limited to): current smoker, social alcohol drinker, pregnancy, obesity (30 < BMI < 40), well-controlled DM/HTN, mild lung disease
ASA III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Examples include (but not limited to): poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, premature infant PCA < 60 weeks, history (>3 months) of MI, CVA, TIA, or CAD/stents.
ASA IV	A patient with severe systemic disease that is a constant threat to life	Examples include (but not limited to): recent (< 3 months) MI, CVA, TIA, or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis
ASA V	A moribund patient who is not expected to survive without the operation	Examples include (but not limited to): ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes	

Source: ASA PHYSICAL STATUS CLASSIFICATION SYSTEM: Last approved by the ASA House of Delegates on October 15, 2014



HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic data
  - Onset
  - Rectal and/or hematemesis
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
    - Hct/Hb on arrival
  - Blood products
  - Anticoagulation Screen → ***See Specific Protocol***
  - Sending providers reason for critical care transport request

Level I Protocol (Basic Life Support)

1. Level I Protocols:
   1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   1.3. Reassure the patient and provide comfort.
   1.4. Place patient in a position of comfort.

Level II Protocols (Advanced Life Support)

2. Level II Protocols
   2.1. Ensure IV Access
   2.2. Treat hypotension (Desired MAP > 70).
      2.2.1. Crystalloid fluids preferred.
   2.3. Patients > 30 yo
      2.3.1. Perform 12 lead EKG.
   2.4. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol***
   2.5. Treat pain- moderate/severe → ***See Pain Management Protocol***
   2.6. If Upper GI bleed is suspected, TXA should be given[26]
      2.6.1. In the context of a known GI bleed, coffee ground emesis is highly specific for an upper GI bleed.

[26] Lee PL, Yang KS, Tsai HW, Hou SK, Kang YN, Chang CC. Tranexamic acid for gastrointestinal bleeding: A systematic review with meta-analysis of randomized clinical trials. Am J Emerg Med. 2021 Jul; 45:269-279. doi: 10.1016/j.ajem.2020.08.062. Epub 2020 Aug 29. PMID: 33041136.

2.6.2.Load dose of 1 gram of TXA.

2.7. Consider blood transfusion.

2.7.1.Hemoglobin < 7 g/dL or clinical evidence of hypotension and active bleeding.

2.7.2.If the Hb is unavailable and the patient has signs and symptoms.

2.7.3.Contact Medical Control for orders for transfusion

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Place NG tube.

3.1.1. Use caution with suspected esophageal varices.

3.2. Refractory Hypotension

3.2.1. Evaluate for potential blood loss (Clinical or laboratory evidence)→ ***See Blood Transfusion Protocol.***

3.3. Elevated INR →***See*** Anticoagulation ***with Significant Bleed Protocol***

3.4. Place and monitor arterial line and measure arterial pressure (if hypotensive or variable).

3.5. Labs- POCT Testing

3.5.1. Review labs from OSH if available.

3.5.2. If no labs available or there is an abnormal finding:

3.5.2.1. Repeat abnormal findings.

3.5.2.2. Ensure that the following labs have been drawn/reviewed/documented:

3.5.2.2.1. Hb/Hct

3.5.2.2.2. Lactate

3.5.2.2.3. INR

3.5.2.2.4. Potassium/BUN/Cr

3.6. Temperature management

3.6.1. Monitor core body temperature (if intubated).

3.6.2. Monitor peripheral temperature (if not intubated).

3.7. Administer Pantoprazole sodium (Protonix) for ALL GI bleeds:

3.7.1. 80mg IV push (**BOLUS ONLY- No need for infusion)**

3.8. Administer Somatostatin (Octreotide) for <u>suspected or confirmed variceal bleeding</u>.

3.8.1. 20 to 50 mcg followed by a continuous infusion of 25 to 50mcg/hr.

3.9. Fluid refractory hypotension **lower GI Bleeds**- consider vasopressor agent.

3.9.1. Vasopressin should be considered superior to other vasopressor agents (0.4 units/minute).

3.9.2. Vasopressin should be used with caution in cardiac patients; can cause cardiac ischemia.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. GI Bleed in children requiring critical care transport are rare.

4.2. Contact medical control for orders.

4.3. Treatment medications are the SAME except for TXA which has not been studied in children.

Special Recommendations/Notes

5. Pathophysiology/Disease Process
   5.1. Type of bleeding and quality of vomitus or stool.
   5.2. Past medical history and medications.
   5.3. Signs and symptoms
      5.3.1. Massive lower GI bleeding usually occurs in patients aged 65 years and older who have multiple medical problems and produces the following manifestations:
         5.3.1.1. Systolic blood pressure of less than 90 mm Hg.
         5.3.1.2. Hemoglobin (Hb) level of 6 g/dL or less.
         5.3.1.3. The passage of maroon stools or bright red blood from the rectum.
   5.4. Potential causes
      5.4.1. Perforated ulcer
      5.4.2. Esophageal varices
      5.4.3. Severe gastroenteritis
      5.4.4. Diverticulitis
6. Special Considerations/Precautions
   6.1. Hematemesis (either red blood or coffee-ground emesis) suggests bleeding proximal to the ligament of Treitz.
   6.2. Frank blood emesis suggests active bleeding.
   6.3. Estimated blood loss for a hypotensive patient that is supine is around 40%.

Documentation

- Suspected cause or location (upper or lower GI Bleed) based on symptoms.
- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- **Scene/Interfacility Transports:**
  - Demographic Data
  - Onset
- **Interfacility Transports/HPI Documentation:**
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - Sending providers reason for critical care transport request
  - Treatment and Response to treatment

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - 1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol*.**
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Remove any wet clothing and replace it with warm, dry materials.
     - 1.4.1. Gingerly handle patients identified with profound hypothermia and take immediate measures to prevent degeneration of cardiac activity into malignant dysrhythmia.
   - 1.5. Re-warming
     - 1.5.1. Place warmed blankets.
     - 1.5.2. Cover head (especially in pediatrics).
   - 1.6. Place in a position of comfort.
   - 1.7. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols
   - 2.1. Ensure IV Access
     - 2.1.1. Provide warmed IV fluids.
   - 2.2. Treat hypotension (Desired MAP > 70).
     - 2.2.1. Warm crystalloid fluids are preferred.
   - 2.3. Perform 12 lead EKG.
   - 2.4. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol***
   - 2.5. Treat pain- moderate/severe → ***See Pain Management Protocol***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Temperature Management

3.1.1. Rectal/Esophageal temperature should be monitored continuously.

3.1.2. Temperatures should be managed >95°F (35°C).

3.2. Rewarming

3.2.1. Warmed nasogastric lavage.

3.2.2. Warmed foley irrigation.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.

4.1.1. Provide 20cc/kg bolus and repeat if necessary.

4.1.2. Start Maintenance fluids for transfers → ***See Pediatric Infusion Protocol.***

4.2. Due to the size of the pediatric head in relation to the rest of the body, special attention should be paid to ensure the head is covered to prevent excessive heat loss or improved rewarming techniques.

Special Recommendations/Notes

5. Hypothermia

5.1.1. Heat loss occurs by several mechanisms:

5.1.1.1. Radiation

5.1.1.2. Conduction and convection.

5.1.1.3. Respiration and evaporation.

5.1.1.4. Conductive and convective heat loss.

5.2. The threshold for shivering is 1 degree lower than that of vasoconstriction and is considered a last resort mechanism by the body to maintain temperature.

5.3. Hypothermia effects on body systems:

5.3.1. Central nervous system (CNS) - progressively depresses the CNS, decreasing CNS metabolism in a linear fashion as the core temperature drops.

5.3.2. Cardiovascular (CV) - results in decreased depolarization of cardiac pacemaker cells causing bradycardia. Since this bradycardia is not vagally mediated, it can be refractory to standard therapies such as atropine. EKG changes associated with the Osborn wave (or J wave).

5.3.3. Core-Temperature After Drop- refers to a further decrease in core temperature and associated clinical deterioration of a patient after rewarming has been initiated.

5.4. Special Considerations

5.4.1. Providers should avoid inadvertent jerky movement of severely hypothermic patients.

5.4.2. Patients developing hypothermia from cold-water immersion appear to be at high risk of fibrillation.

5.4.3. Both cardiac pacing and atropine are ineffective for bradyarrhythmia.

5.4.4. Lidocaine is ineffective in preventing hypothermia induced ventricular dysrhythmias.

5.5. Defibrillation is ineffective at hypothermic core temperatures.

Documentation

- Document abnormal or relevant normal labs in the chart.
- Document response to treatment and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Underlying condition

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1. Start maintenance infusion of crystalloids.

2.2. Treat hypotension (Desired MAP > 70).

2.2.1. Crystalloid fluids preferred.

2.3. Patients > 30 years old

2.3.1. Perform 12 lead EKG.

2.4. Treat nausea/vomiting

2.4.1. Zofran 4 mg IV/IM/ODT (**Preferred agent).**

2.4.1.1. 4mg Zofran ODT (PO) is acceptable when no IV access is obtained.

2.4.1.2. Can repeat IV/IM dose in 10 minutes to a max of 8 mg IV/IM/PO.

2.4.1.3. Start with 8mg IV if patient is actively vomiting.

2.4.2. Promethazine (Phenergan)

2.4.2.1. 12.5 mg IV (Must in in AC IV or higher) otherwise give as IM injection.[27]

2.4.2.2. Can repeat as needed x 1.

[27] Promethazine (Phenergan) causes significant vein damage with smaller veins when given as a bolus.

2.4.3. Metoclopramide (Reglan)- ADULT ONLY – Optional for services

2.4.3.1. 10 mg IV

2.4.4.Prochlorperazine (Compazine)- ADULT ONLY – Optional for services

2.4.4.1. 10 mg IV (Can be given IM as well)

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Zofran is preferred in pediatrics.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.

4.1.1. Provide 20cc/kg bolus and repeat if necessary.

4.1.2. Start maintenance fluids for transfers → **See *General Transport Protocol.***

4.2. Zofran Dose (IV)

4.2.1. Infants ≥1 month: 0.15 or 0.3 mg/kg/dose once.

4.2.2. Zofran dose (PO) Infants and Children 6 months to 10 years, ≥8 kg

4.2.2.1. 8-15 kg: 2 mg/dose once

4.2.2.2. >15-30 kg: 4 mg/dose once

4.2.2.3. >30 kg: 8 mg/dose once

Special Recommendations/Notes

5. No specific recommendations/Notes

Documentation

- Document treatment and response to treatment

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Attempt to determine gestation.
  - Attempt to determine prenatal care.
  - Attempt to determine previous pregnancies/deliveries/complications.
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Attempt to determine gestation.
  - Attempt to determine prenatal care.
  - Attempt to determine maternal data (previous pregnancies/deliveries/complications/ROM)
  - Attempt to determine the current level of medical support being provided to the infant.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. All transport of pregnant patients requires advanced planning for the delivery of the infant.

1.2. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.3. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.4. Reassure the patient and family and provide comfort to mother.

1.5. Place patient in a position of warmth, safety and with open airway.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Review High Risk OB Assessment: Infants are more likely to require resuscitation.

2.1.1. Maternal conditions – Advanced or very young maternal age, maternal diabetes mellitus or hypertension, maternal substance abuse, no prenatal care (PNC), previous history of stillbirth, fetal loss, or early neonatal death.

2.1.2. Fetal conditions – Prematurity, postmaturity, congenital anomalies, or multiple gestations.

2.1.3. Antepartum complications – Placental anomalies (e.g., placenta previa) or presence of either limited amniotic fluid (oligohydramnios) or too much amniotic fluid (polyhydramnios), prolonged ROM, maternal illness.

2.1.4. Delivery complications – Transverse lie or breech presentation, chorioamnionitis, foul-smelling or meconium-stained amniotic fluid, antenatal asphyxia with abnormal fetal heart rate pattern,

maternal administration of a narcotic within four hours of birth, or delivery that requires instrumentation (e.g., forceps, vacuum, or cesarean delivery), placental abruption, home births.

After Delivery of Newborn/Neonate- Neonatal Resuscitation

8.4. Provide Warmth

8.4.1. Hypothermia, increased oxygen consumption, and metabolic demand

8.4.2. Warm towels to dry then quickly swap towels for clean, dry, and warm towels and apply stocking hat.

8.4.3. Radiant warmer is preferred but not available in the field/small hospital delivery situation; maternal chest is an appropriate heat source if infant is stable.

8.4.4. For preterm infants, consider using saran wrap and warming mattress for thermoregulation assistance.

8.5. Airway Evaluation

8.5.1. Suctioning of nose then mouth should be done with bulb suction after birth.

8.5.2. Manual airway opening maneuvers should be done to open the airway.

8.5.3. Meconium-stained amniotic fluid.

8.5.3.1. Non-vigorous infant (decreased tone and respiratory effort) should be suctioned with ET tube and repeat intubations to suction the airway. Do not delay proceeding with NRP for decreasing HR below 60 with repeated intubation attempts for the purpose of suctioning.

8.5.3.2. Vigorous infants should not receive intubation for suctioning purposes of MSAF.

8.6. Medications

8.6.1. Medications are rarely indicated in resuscitation of newborns.

8.6.2. If bradycardia is refractory to ventilation, compressions, and oxygenation:

8.6.2.1. Give Epinephrine 0.01mg/kg (0.1mL/kg of a 1:10:000 solution). Recommended IV dose is 0.1-0.3mL/kg followed by rapid NS flush.

8.6.2.2. Repeat every 3-5 minutes.

8.6.2.3. Volume Expansion

8.6.2.3.1. Indications for volume expansion include not responding to resuscitation efforts; baby appears in shock with history of suspected blood lost (i.e., abruption).

8.6.2.3.2. Normal Saline is the preferred volume expander. The dosage is 10mL/kg IV over 5 to 10 minutes. Care should be taken to give volume expansion slowly in preterm infants less than 1500 grams and infusion should be slowed to over 30 minutes.

8.7. **Post-Resuscitation Complications**

8.7.1.Post-Resuscitation Complications

8.7.1.1. Hypoglycemia

8.7.1.1.1. Check glucose frequently with target goal greater than 50 mg/dl.

8.7.1.1.2. Administration of D10W at a rate of 80ml/kg/day will provide a normal GIR to prevent hypoglycemia in most infants.

8.7.1.2. Hypothermia

8.7.1.2.1. Maintain body temperature, rewarm slowly; if hypothermic, monitor for cardiovascular instability during the warming phase.

8.7.1.2.2. In the event of suspected HIE from perinatal asphyxia, contact medical Control MD for review of criteria for Therapeutic Hypothermia for further instructions.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. See Above

3.2. Additional Indications for intubation:

3.2.1. Intubation is needed for transportation for stability of airway.

3.2.2. Certain circumstances (Congenital diaphragmatic hernia, severe choanal atresia).

3.2.3. Administration of surfactant.

3.2.4. Transport crew decision- document reason.

3.3. Attempt to gain vascular access.

3.3.1. Peripheral IV

3.3.2. Umbilical Venous Catheter (UVC) low lying

3.4. Perform POCT testing → treat per specific protocol.

3.4.1. Chemistry

3.4.2. Glucose

3.4.3. Lactate

3.4.4. ABG's

3.4.5. Blood Culture prior to the initiation of antibiotics

3.5. Oxygen Saturation

3.5.1. Get pre and post ductal oxygen saturations in the presence of unstable O2 saturations and 100% O2 administration.

3.6. Consider Prostaglandin E1 in infants with suspected CHD.

3.6.1. 0.05 - 0.1mcg/kg/min IV continuous infusions. May advance to 0.2 mcg/kg/min if necessary.

3.6.2. Intubation is needed before transport of these patients as apnea should be expected in transport.

3.7. Respiratory Distress Syndrome (RDS) Evaluation

3.7.1. Infants < 30 weeks gestation are at highest risk for RDS.

3.7.2. If surfactant is used, it is best when given within the first 30-60 minutes of life.

3.7.3. Contact Medical Control for RDS if evaluation is consistent with needing surfactant.

3.8. Before Transport of intubated neonate

3.8.1. Post intubation Chest x-ray is preferred.

3.8.2. A delay in immediate transition to isolette is preferred to ensure consistent and stable vitals and tolerance of the ventilator.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. See above.

Special Recommendations/Notes

5. Neonatal Resuscitations PEARLS

5.1. Ductal-Dependent Lesions:

5.1.1. An infant suspected of having a ductal-dependent congenital cardiac defect and ductal-dependent pulmonary blood flow should be treated with prostaglandin E1 because he/she is at risk for progressive hypoxia and metabolic acidosis if the ductus closes.

5.1.2. Most often the neonate with ductal-dependent congenital cardiac disease is a full-term infant whose size is appropriate or large for gestational age. CHD should be suspected in infants who present with one of 3 symptomatic modes of presentation:

5.1.2.1. Central cyanosis despite 100% oxygen administration and effective ventilation. Rarely an Infants with cyanotic heart disease will have an increase in arterial oxygen concentration. more than 150mm Hg when exposed to 100% oxygen.

5.1.2.2. Hypo-perfusion of either upper or lower extremities or both, infant will appear in shock. with presenting history without evidence of delivery complications or blood loss.

5.1.2.3. New onset respiratory distress, lethargy, and failure to thrive.

5.2. Respiratory Distress Syndrome

5.2.1. Because surfactant protects the immature lungs, several investigators have recommended its prophylactic use after resuscitation in extremely premature neonates (< 27 weeks' gestation).

5.2.2. Recommended dosages of clinically available surfactant preparations are 50-200mg/kg, the surfactant pool of term newborn lungs.

5.2.3. PEEP (4-5 cmH2O) can help improve distribution and support establishment of functional residual capacity of the surfactant deficient lung.

5.2.4. Watch for pneumothorax in RDS, especially when flight is anticipated and after surfactant administration.

Documentation

ET tube Sizes for neonatal resuscitation

Tube Size	Gestational age (weeks)	Weight (Grams)
2.5	<28 weeks	<1000 grams
3	28-34 weeks	1000 to 2000 grams
3.5	34-38 weeks	2000-3000 grams
3.5 to 4	>38 weeks	>3000 grams

	Targeted SaO_2[i28]
1 minute	60-65%
2 minutes	65-70%
3 minutes	70-75%
4 minutes	75-80%
5 minutes	80-85%
10 minutes	85-95%

[28] Part 15: neonatal resuscitation: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

paladin	Neuro: ICH (T-026)	Protocol #	T-026
		Effective Date	9/1/2014
		Revision Date	1/3/2018
		Reviewed	7/8/2025

This protocol includes all ICH, SAH and IVH <u>without</u> involving trauma.

HPI/Pre-arrival Information

- <u>Scene</u>
  - Demographic Data
  - Onset of symptoms
  - Medical History (previous CVA, CAD, etc.)
  - Witness seizure or history of seizures?
- <u>Interfacility Transports/HPI Data Collection-Documentation:</u>
  - Transfer Specific Data (per protocol)
  - Demographic Data
  - Onset of Symptoms
  - Medical History (previous CVA, CAD, etc.)
  - Lab Results Completed (Glucose/INR Critical)
  - Witness seizure or history of seizures.
  - Location of ICH? Mid-line shift?
  - History of trauma?

Level I Protocol (Basic Life Support)

1. Level I Protocols:
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
     - 1.2.1. Preferred 2 lpm NC as a minimum.
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place patient in a position of comfort.
     - 1.4.1. Preferred head of bed elevated 30 degrees or less.
   - 1.5. Strict NPO
   - 1.6. Suction patient as needed.

Level II Protocols (Advanced Life Support)

2. Level II Protocols
   - 2.1. Ensure IV Access
     - 2.1.1. 18-gauge peripheral IV access, prefer bilateral if time permits. (AC or above is preferred)
   - 2.2. Preform 12 lead EKG.
   - 2.3. IV maintenance fluids (if normotensive).

2.3.1. Crystalloid fluids preferred- maintenance rate unless hypotensive.

2.3.2. If hypotensive, keep MAP > 70 mmHg.

2.3.2.1. If hypotension persists after correction of volume deficit, continuous infusions of vasopressors should be considered, particularly for low systolic blood pressure such as less than 90 mmHg.

2.3.3.See Targeted BP Chart below and treat accordingly.

2.4. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol***

2.5. Complete NIHSS and document in the chart.

2.6. Measure $EtCO_2$ continuously.

2.6.1. Watch for hypoventilation or elevated $EtCO_2$.

2.7. Measure glucose, treat if hypoglycemic.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Complete NIHSS and document.

3.2. Blood Pressure Monitoring

3.2.1. Prefer continuous invasive blood pressure. Insert an arterial line for exact management.

3.3. Blood Pressure Management *(See chart below)*

3.3.1.Nicardipine (Cardene ®)

3.3.1.1. Start at 2.5mg/hr. then increase by 2.5mg/hr. to a max of 15mg/hr.

3.3.2. Nitroprusside (Nipride®) can be considered if refractory to Nicardipine.

3.4. Labs- POCT Testing

3.4.1. Review labs from OSH if available.

3.4.2. If there are no labs available or there is an abnormal finding:

3.4.2.1. Repeat abnormal findings.

3.4.2.2. Ensure that the following labs have been drawn/reviewed/documented:

3.4.2.2.1. Hb/Hct

3.4.2.2.2. Lactate

3.4.2.2.3. INR

3.4.2.2.4. Potassium/BUN/Cr

3.5. Elevated INR? →**See Anti-coagulation with significant bleed protocol.**

3.6. Seizures

3.6.1. Prepare for seizure activity and closely monitor.

3.6.1.1. Limit the use of long-acting paralytics unless needed or ventilation that is refractory to adequate pain and sedation.

3.6.1.2. For confirmed SAH→ Give Keppra 20mg/kg (max 1500mg)

3.6.1.3. ***See Neuro: Seizure Protocol***

3.7. Intubated patients should receive adequate pain control.

3.8. Temperature

3.8.1. Temperature should be monitored, and all efforts should be made to prevent hyperthermia.

3.9. Mental Status/Neuro Exam

3.9.1. Close attention should be paid to neurological exams during transport; any changes should be reported to HPI and relayed to the receiving hospital.

Target Blood Pressure Monitoring[29]

Blood Pressure	BP Management Strategy	Target/Goals with BP and MAP
SBP > 200 mmHg or MAP > 150 mmHg	Aggressive reduction of blood pressure	Target is to reduce to the BP as listed below based on evidence of ICP
SBP > 180 mmHg or MAP > 130 mmHg AND evidence or suspicion of ICP	Careful reduction of BP due to SBP to target. Careful to maintain CCP	Target is 140 mmHg. If ICP is monitored- CCP should be between 61-80 mmHg
SBP > 180 mmHg or MAP > 130 mmHg AND no evidence or suspicion of elevated ICP	Modest Reduction of BP	Target MAP of 110 mmHg or targeted BP of **140/90**

An increased MAP may be necessary to maintain cerebral perfusion in some patients, and lowering the arterial pressure (e.g., to a systolic blood pressure [SBP] below 130 mmHg) may cause ischemia and worsen neurologic injury.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
   4.1. None that are specific to pediatrics.

Special Recommendations/Notes

5. Common focal neurological findings/relationship to brain hemorrhage:
   5.1. Putamen - Contralateral hemiparesis, contralateral sensory loss, contralateral conjugate gaze paresis, homonymous hemianopia, aphasia, neglect, or apraxia
   5.2. Thalamus - Contralateral sensory loss, contralateral hemiparesis, gaze paresis, homonymous hemianopia, miosis, aphasia, or confusion
   5.3. Lobar - Contralateral hemiparesis or sensory loss, contralateral conjugate gaze paresis, homonymous hemianopia, abulia, aphasia, neglect, or apraxia
   5.4. Caudate nucleus - Contralateral hemiparesis, contralateral conjugate gaze paresis, or **confusion**
   5.5. Brain stem - Quadriparesis, facial weakness, **decreased level of consciousness**, gaze paresis, ocular bobbing, miosis, or autonomic instability.
   5.6. Cerebellum - **Ataxia**, usually beginning in the trunk, ipsilateral facial weakness, ipsilateral sensory loss, gaze paresis, skew deviation, miosis, or **decreased level of consciousness.**

[29]. Broderick J, Connolly S, Feldmann E, et al. Guidelines for the management of spontaneous intracerebral hemorrhage in adults: 2007 update: a guideline from the American Heart Association/American Stroke Association Stroke Council, High Blood Pressure Research Council, and the Quality of Care and Outcomes in Research Interdisciplinary Working Group. Stroke 2007; 38:2001

Documentation

- Document abnormal or relevant normal labs (see above) in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- Clearly document onset of symptoms and clinical suspicion of cause of stroke-like symptoms.

HPI/Pre-arrival Information

- Interfacility Transports/HPI Data Collection-Documentation:
  - Transfer Specific Data (per protocol)
  - Demographic Data
  - Onset of Symptoms
  - Medical History (previous CVA, CAD, etc.)
  - Lab Results Completed (Glucose/INR Critical)
  - Witness seizure or history of seizures.
  - Recent surgical history
  - Obtaining phone number(s) of next of kin is vital.
  - NIH score (if available)
  - Last Known normal (time that patient was last seen without symptoms)
  - Wake up stroke that is significant should be considered in-window for basilar artery stroke or anterior circulation stroke up to 24 hours of last known well.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to **the *Oxygen Administration and Management Protocol.***

1.2.1. Preferred 2 lpm NC as a minimum.

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.4.1. Preferred head of bed elevated 30 degrees or less.

1.5. NPO- Strict

1.6. Complete Pre-hospital Inclusion Criteria thrombolytics.

1.7. Suction patient as needed.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1. 18-gauge peripheral IV access; prefer bilateral if time permits **(antecubital or higher preferred**).

2.2. Perform 12 lead EKG.

2.3. IV Maintenance Fluids (if normotensive)

2.3.1. Crystalloid fluids preferred, maintenance rate unless hypotensive.

2.3.2. If hypotensive, bolus one liter of normal saline.

2.3.3. If fluid responsive, evaluate fluid status and bolus second liter.

2.3.4. If fluid refractory or signs/symptoms of volume overload, Levophed titrated to MAP >70mmHg.

2.4. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol.***

2.5. Measure $EtCO_2$ continuously.

2.5.1. Watch for hypoventilation or elevated $EtCO_2$.

2.6. Measure glucose.

2.6.1. Hypoglycemic → Give ½ Amp of D-50 (25 grams) IV.

Transfer of post t-PA Patients

2.7. Transfer of post t-PA patients.

2.7.1. **Close neurologic monitoring (every 15 minutes)** and document any changes to presenting symptoms or worsening symptoms.

2.7.2. Limit IV sticks unless limited or positional IV access.

2.7.3. Vital signs every 15 minutes for transfer.

2.7.4. If t-PA infusion is still infusing, monitor closely for acute neurologic deterioration, new headache, acute hypertension or acute nausea and vomiting (change from initial presentation.)

2.7.4.1. CONTACT MEDICAL CONTROL

2.7.4.2. If unable to get medical control, discontinue t-PA infusion and treat symptoms.

2.7.5. Hypertension (SBP > 180 or DBP > 100mmHg for two or more readings 5-10 minutes apart)→ treat as below.

2.7.5.1. **Labetalol** 10mg over 1-2 minutes (if HR > 60)

2.7.5.1.1. May repeat dose every 10 minutes for a total dose of 100mg.

2.7.5.2. If HR < 60 use **hydralazine** 30mg IV q 10 minutes as needed. (If available, if not contact medical control)

2.7.5.2.1. Lower does to 20mg IV q 20 minutes for renal patients.

2.7.6. Watch for allergic reactions during the infusion of t-PA → ***See Allergic Reaction Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Calculate NIH (before and after t-PA)

3.2. Blood Pressure Monitoring

3.2.1. Prefer non-invasive blood pressure monitoring. If unable to get BP (body habitus, suspected low BP), then evaluate risk/benefits of radial arterial line.

3.2.2. Radial artery only; attempt only once in each arm.

3.2.3. Radial arterial line only if necessary.

3.3. Treat blood pressure SBP > 180mmHg or DBP > 100mmHg.

3.3.1. See treatment above for initial treatment.

3.3.2. If refractory to Labetalol or if rebound hypertension is seen, start Nicardipine (Cardene ®)

3.3.2.1.Start at 2.5mg/hr. then increase by 2.5mg/hr. to a max of 15mg/hr.

3.4. Laboratory Evaluation

3.4.1. Review OSH results (if provided).

3.4.2. Ensure the following lab values are on the chart.

3.4.2.1. Hemoglobin, hematocrit, Platelet, and white blood count.

3.4.2.2. Coagulation (PT/INR),

3.4.2.3. Sodium, potassium, chloride, BUN, Cr, and lactate

3.4.3. Provide POCT for those labs missing or critical values.

3.4.4. Treat critical results → ***See specific electrolyte protocols.***

3.5. Perform POCT testing on critical or unavailable labs.

3.5.1. Hct/Hb

3.5.2. Glucose/potassium/sodium/BUN/Cr/chloride

3.5.3. INR

3.5.4. Lactate

3.6. Monitor temperature (invasive preferred if intubated).

Transport Crew initiated TNKase.

3.7. Transport crew-initiated t-PA.

3.7.1. Requirements:

3.7.1.1. Confirmed negative CT head, either by observing official read or via communication of negative CT head to HPI or transport crew.

3.7.1.2. Confirm no contraindications/negative screening evaluation.

3.7.1.3. MEDICAL CONTROL ORDERS REQUIRED

3.7.1.3.1. Verbal orders from accepting physician via HPI.

3.7.1.3.2. Written orders from sending physician.

Acute Ischemic Stroke (AIS)[30]	**TNKase (Tenecteplase)**	.25 mg/kg with max of 25 mg- **IV Push** *Followed by saline flush 20cc*

Confirmed post tPA ICH Treatment

3.8. Confirmed Post t-PA ICH.

3.8.1.CONTACT MEDICAL CONTROL FOR EMERGENCY REVERSAL for KNOWN post tPA OR sudden change in mental status where is would assume to be a hemorrhagic conversion.

3.8.2. Questions/Treatment

3.8.2.1. Has Heparin been given in the last three (3) hours? --> YES- See Table 1.1 below

3.8.2.2. Cryoprecipitate. 10units IV

3.8.2.3. If Cryoprecipitate is not available, give TXA 100mg IV over 10 minutes.

[30] (AHA/ASA [Powers 2019]; Campbell 2018; Campbell 2020; Menon 2022)

Pediatric Specific Protocols

4. Pediatric Specific Protocols
   4.1. Contact medical control for directions.

Special Recommendations/Notes

5. Special Recommendations/Notes
   5.1. Important to review stroke mimics[31] :
      5.1.1. Seizure (17%)
      5.1.2. Systemic infection (17%)
      5.1.3. Brain tumor (15%)
      5.1.4. Toxic-metabolic disorders, such as hyponatremia and hypoglycemia (13%)
      5.1.5. Positional vertigo (6%)
      5.1.6. Conversion disorder
   5.2. Definitive distinction of ischemic stroke from hemorrhagic stroke requires neuroimaging; the following features increase the likelihood of a hemorrhagic CVA[32]:
      5.2.1. Coma
      5.2.2. Neck stiffness
      5.2.3. Seizures accompany the neurologic deficit.
      5.2.4. Diastolic blood pressure >110 mm Hg
      5.2.5. Vomiting

Documentation

- Document abnormal or relevant normal labs (see above) in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications.
- Document time of t-PA start and complete as well as the exact dose.

Table 1.1: Heparin Reversal:

- Discontinue the heparin infusion and prepare Protamine sulfate. Calculate total amount of heparin received over the preceding 3 hours.
- If initiated within 30 minutes of last heparin dose: Give 1mg protamine per 100U heparin.
- If initiated within 30-60 minutes: Give 0.5-0.75 mg protamine per 100U heparin.
- If initiated within 60-120 minutes: Give 0.375-0.5mg protamine per 100U heparin.
- If heparin stopped greater than 120 minutes ago: Give 0.25-0.375 mg protamine per 100U heparin.
- Give by slow IV injection, not to exceed 5mg/min, with total dose not to exceed 50mg.

[31] Libman RB, Wirkowski E, Alvir J, Rao TH. Conditions that mimic stroke in the emergency department. Implications for acute stroke trials. Arch Neurol. Nov 1995;52(11):1119-22
[32] Runchey S, McGee S. Does this patient have a hemorrhagic stroke? clinical findings distinguishing hemorrhagic stroke from ischemic stroke. JAMA. Jun 9, 2010;303(22):2280-6

Protocol intended for patients that present with undifferentiated stroke-like symptoms.

HPI/Pre-arrival Information

- Scene
  - Demographic Data
  - Onset of symptoms
  - Medical History (previous CVA, CAD, etc.)
  - Witness seizure or history of seizures?
- Interfacility Transports/HPI Data Collections-Documentation:
  - Transfer Specific Data (per protocol)
  - Reason for no CT scan- (Machine inoperable, no CT capability)
  - Demographic Data
  - Onset of Symptoms
  - Recent Surgical history
  - Medical History (previous CVA, CAD, etc.)
  - Lab Results Completed (Glucose/INR Critical)
  - Witness seizure or history of seizures?
  - The last known normal/well (LKW)- Phone number of next of kin is VERY important to capture on scene.
  - Wake up strokes[33]

Level I Protocols (Basic Life Support)

1. **Level I Protocols**
   - **1.1.** Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - **1.2.** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
     - 1.2.1. Preferred 2 lpm NC as a minimum.
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Place patient in a position of comfort.
     - 1.4.1. Preferred head of bed elevated 30 degrees or less.
   - 1.5. Strict NPO.
   - 1.6. Suction patient as needed.

[33] *Wake-up strokes (WUS) are strokes with unknown exact time of onset as they are noted on awakening by the patients. They represent 20% of all ischemic strokes. The chronobiological pattern of ischemic stroke onset, with higher frequency in the first morning hours, is likely to be associated with circadian fluctuations in blood pressure, heart rate, hemostatic processes, and the occurrence of atrial fibrillation episodes. (Derex/Derex- 2019)*

1.7. Perform a Common Stroke Screen

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1.18 gauge peripheral IV access- prefer bilateral if time permits.

2.2. Perform 12 lead EKG.

2.3. IV Maintenance Fluids (if normotensive)

2.3.1. Crystalloid fluids preferred- maintenance rate unless hypotensive.

2.4. Manage Blood Pressure

2.4.1. If hypotensive, bolus one liter of normal saline.

2.4.2. If fluid responsive, evaluate fluid status and bolus second liter.

2.4.3. If fluid refractory or signs/symptoms of volume overload, Levophed titrated to MAP >70mmHg.

2.5. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol.***

2.6. IF Stroke screen in BLS assessment is positive THEN:

2.6.1. *Complete a Rapid Arterial oCclusion Evaluation* (RACE) Scale[34;35]

2.6.1.1. Any score >\= 5 indicates a greater possibility of a Large Vessel Occlusion (LVO)

2.6.1.1.1. Scores of 5 or greater place patient into YELLOW stroke category and transport to an interventional stroke center should be a consideration.

2.6.2.Complete NIHSS and document.

2.6.3.Review Modified Rankin scale for patient PRIOR to CVA- this provides a good standard picture of patient's pre-stroke functionality and can be helpful in triaging patients to take out of service area vs remaining local. The higher the pre-stroke Modified Rankin Score the less likely thrombolytics or an interventional procedure would be performed.

2.7. Measure EtCO2 continuously.

2.7.1. Watch for hypoventilation or elevated EtCO2.

2.8. Measure glucose – treat if hypoglycemic.

2.8.1. Give ½ amp of D-50 if hypoglycemic.

2.9. Communicate early for suspicion of an acute ischemic CVA; request direction immediate to CT scanner on arrival at receiving hospital.

Advanced EMT- If an A-EMT is the primary ALS response vehicle, a suspected stroke patient should be transported to the nearest hospital with an operational CT Scanner.

[34] Pérez de la Ossa N, Carrera D, Gorchs M, et al. Design and validation of a prehospital stroke scale to predict large arterial occlusion: The Rapid Arterial Occlusion Evaluation Scale. Stroke. 2014; 45: 87-91.

[35] Pérez de la Ossa N, Ribó M, Jiménez X, et al. Prehospital scale to identify patients with large vessel occlusion: It is time for action. Stroke. 2016; 47:2877-2878.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Complete Inclusion Criteria for thrombolytics Screening Questions.

3.2. Blood Pressure Monitoring

3.2.1. Prefer continuous invasive blood pressure.

3.2.2. Radial artery only; attempt only once in each arm.

3.2.3. Treat blood pressure due to unknown cause of suspected CVA; prefer reduction via continuous infusion of Nicardipine (Cardene ®) by only **20% of the initial SBP.**

3.2.3.1. Start at 2.5mg/hr. then increase by 2.5mg/hr. to a max of 15mg/hr.

3.3. Perform POCT testing on critical or unavailable labs.

3.3.1. Hct/Hb

3.3.2. Glucose/potassium/sodium/BUN/Cr

3.3.3. INR

3.3.4. Lactate

3.4. Elevated INR? → ***See Anti-coagulation with significant bleeding***.

3.5. Confirmed ischemic stroke → ***See Ischemic CVA protocol.***

3.6. Confirmed ICH→***See ICH protocol.***

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. A rare condition that requires detailed analysis of glucose and symptoms.

Special Recommendations/Notes

5. Special Recommendations/Notes

5.1. Important to review stroke mimics[36] :

5.1.1. Seizure (17%)

5.1.2. Systemic infection (17%)

5.1.3. Brain tumor (15%)

5.1.4. Toxic metabolic disorders, such as hyponatremia and hypoglycemia (13%)

5.1.5. Positional vertigo (6%)

5.1.6. Conversion disorder

5.2. Definitive distinction of ischemic stroke from hemorrhagic stroke requires neuroimaging; the following features increase the likelihood of a hemorrhagic CVA[37]:

5.2.1. Coma

5.2.2. Neck stiffness

5.2.3. Seizures accompany the neurologic deficit.

5.2.4. Diastolic blood pressure >110 mm Hg

5.2.5. Vomiting

[36] Libman RB, Wirkowski E, Alvir J, Rao TH. Conditions that mimic stroke in the emergency department. Implications for acute stroke trials. Arch Neurol. Nov 1995;52(11):1119-22

[37] Runchey S, McGee S. Does this patient have a hemorrhagic stroke? clinical findings distinguishing hemorrhagic stroke from ischemic stroke. JAMA. Jun 9, 2010;303(22):2280-6

Documentation

- Document abnormal or relevant normal labs (see above) in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- Clearly document onset of symptoms and clinical suspicion of cause of stroke-like symptoms.

Modified Rankin Scale (MRS)

The modified Rankin Scale should be documented under the "EVENTS" tab for all patients being transported by CCT for a diagnosis of CVA.

Modified Rankin Scale (MRS)
0 No symptoms
1 No significant disability, despite symptoms; able to perform all usual duties and activities
2 Slight disability; unable to perform all previous activities but able to look after own affairs without assistance
3 Moderate disability; requires some help, but able to walk without assistance
4 Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5 Severe disability; bedridden, incontinent, and requires constant nursing care and attention
6 Death

Thrombolytic Dose

Acute Ischemic Stroke (AIS)[38]	**TNKase (Tenecteplase)**	.25 mg/kg with max of 25 mg- **IV Push** *Followed by saline flush 20cc*

[38] (AHA/ASA [Powers 2019]; Campbell 2018; Campbell 2020; Menon 2022)

Suspected Stroke EMS Recommendations for Destination and Helicopter use

HPI can recommend these destination guidelines when talking to paramedics or other field personnel that are requesting helicopter transport for suspected stroke patients. Due to the stocking of t-PA and four-hour factor PCC (reversal of Coumadin) on some helicopters, it is important that patients are differentiated as quickly as possible.

Stroke Categories & Decision Assistance Tool:

Stroke Category	RED STROKE	YELLOW	GREEN
Last Known Well (LKW)	LKW < 4.5 Hours	LKW 4.5 – 24 Hours Wake up Stroke. RACE >	Last known well > 24 hours
Destination Decision	Local Hospital w/CT scanner and tPA	Transport to Stroke center with interventional capabilities	
Air Medical Use?	Transport to above hospital by ground	If total time to transport by air < total time by ground, activate air medical	No evidence to support air medical use

HPI/Pre-arrival Information

- Scene Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Medications given and response to medicines.
  - Specific Information
  - Noncompliance with medications
  - Recent fall or trauma
  - Pregnancy
  - Alcohol Abuse
  - Type of seizures (description)
  - Focal or General
  - Change in focal location.
  - Chronic seizure- is this seizure typical?

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Consider nasopharyngeal airway.

1.4. Reassure the patient and provide comfort; attempt to prevent self-injury to patient.

1.5. Place patient in a position of comfort.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access (Preferred; IM route is acceptable)

2.2. Early treatment is important to stop seizure activity.

2.2.1. Provide initial benzodiazepine (IV, IM or Rectal).

2.2.1.1. Lorazepam 4 mg IV (Repeat 4mg dose x 1 5 minutes- max 8mg)

2.2.1.2. Versed 5-10 mg IM (repeat x 1 in five-minute intervals)

IV established- Use Ativan

No IV—Use IM Versed

2.3. Complete quick screen of seizure cause:
2.3.1. Pregnancy (Eclampsia) →see specific protocol.
2.3.2. Trauma
2.3.3. Intracranial Hemorrhage (ICH)
2.3.4. Alcohol withdrawal or medication withdrawal
2.3.5. Drug-induced seizures
2.3.6. Hypoglycemia (check glucose)
2.4. Refractory Seizures- Consider in this order:
2.4.1. Keppra 60mg/kg (max 2 grams) Run over 10 minutes (Preferred)[39]

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Refractory Seizures- Consider in this order:
3.1.1. Continue with Ativan 4mg q 5 minutes x 2 doses.
3.1.2. Keppra 60mg/kg (max 4.5 grams) Run over 10 minutes (**Preferred)**
3.1.3. Fosphenytoin (Cerebyx) 15-20 mg/kg IV, infuse at 100-150 mg/min.
3.1.4. Phenobarbarbital 15mg/kg IV.
3.2. Advanced Airway Management
3.2.1. Treatment of seizures is sedating. Prepare for intubation.
3.2.2. Low threshold for intubation should be used.
3.2.3. Limitation of paralytics to short term only.
3.2.4. Deep sedation with Propofol.
3.3. After intubation or multiple medications, special attention should be paid to evaluation for on-going seizure activity.
3.4. Review Labs (repeat critical or missing labs)
3.4.1. Hb/Hct
3.4.2. Chemistry panel
3.4.3. Lactate
3.4.4. ABG (or VBG)

Pediatric Specific Protocols

4. Pediatric Specific Protocol

4.1. SEE Specific pediatric seizure protocol.

Special Recommendations/Notes

5. Seizure Management

5.1. More than 90% of generalized tonic–clonic seizures (either primary or secondarily generalized) terminate within 2 minutes.
5.2. Status epilepticus (SE) is a common, life-threatening neurologic disorder that is an acute, prolonged epileptic crisis. SE can represent an exacerbation of a preexisting seizure disorder, the initial

[39] Clinical max is 4.5 grams; limited to 2 grams due to field application

manifestation of a seizure disorder, or an insult other than a seizure disorder. In patients with known epilepsy, the most common cause is a change in medication. Most seizures terminate spontaneously.

5.3. Use caution when adding barbiturates to benzodiazepines because their co-administration may potentiate ventilatory failure. This may be especially true for patients (e.g., elderly patients) with impaired drug clearance.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

paladin	Neuro: Seizure- Pediatric (T-030)	Protocol #	T-030
		Effective Date	9/1/2014
		Revision Date	1/3/2018
		Reviewed	7/8/2025

***** Pediatric ONLY Protocol*****

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Medications given and response to those medicines.
  - Specific Information:
    - Noncompliance with medications (recent change in weight or dose of meds?)
    - Recent fall or trauma or suspected abuse

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Consider nasopharyngeal airway.

1.4. Reassure the patient and provide comfort; attempt to prevent self-injury to patient.

1.5. Place patient in a position of comfort.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Check Blood Glucose

2.2. Ensure IV Access

2.2.1. If not available:

2.2.2. RECTAL ROUTE

2.2.2.1. Rectally administered diazepam (0.5 mg/kg/dose) or

2.2.3. Intramuscular ROUTE

2.2.3.1. Intramuscularly administered midazolam (0.1-0.2 mg/kg/dose).

2.2.3.2. Not to exceed a cumulative dose of 10 mg.

2.2.4. Intranasal ROUTE

2.2.4.1. Ativan 0.1 mg/kg intranasal

2.2.4.2. Versed 0.2 mg/kg intranasal.

2.3. IV Available

2.3.1. Ativan 0.05-.1mg/kg IV or IO

2.3.2. Repeat as needed.

2.4. Supplement airway as needed.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Refractory Seizures

3.1.1. Continue with Ativan as above while preparing other medications.

3.2. Administer Antiepileptic Drug (AED):

3.2.1.Keppra 40mg/kg IV over 10 minutes. (Max 2.5 grams)

3.2.2. Fosphenytoin 20mg/kg IV over 20 minutes.

3.2.3. Consider administering 20 mg/kg IV.

3.2.3.1. Prepare for deep sedation/respiratory depression.

3.2.3.2. Consider Advanced Airway Management if adding AED.

3.2.3.3. Treatment of seizures is sedating. Prepare for intubation.

3.2.3.4. Low threshold for intubation should be used.

3.2.3.5. Limitation of paralytics to short term only.

3.2.3.6. The addition of versed infusion can be considered for intubated patients.

3.3. Review labs (repeat critical or missing labs).

3.3.1. Chemistry

3.3.2. ABG (or VBG)

3.3.3. Sodium (especially important in seizure patients)

3.3.4. Lactate

3.3.5. Hb/Hct

3.3.6. <u>Sodium is important.</u>

3.4. Maintenance fluids (including glucose) should be started.

3.5. Frequent monitoring of blood glucose should be obtained (minimum every 20 minutes for intubated patients using this protocol).

Special Recommendations/Notes

4. Seizure Management:

4.1. Status epilepticus (SE) is defined as a seizure that lasts more than 30 minutes.

4.2. In cases of repetitive convulsions without recovery of consciousness, the duration of the seizure is defined as the time elapsed from the onset of the first seizure to the termination of the last.

4.3. Prolonged seizures are associated with cerebral hypoxia, hypoglycemia, and hypercarbia and with concurrent and progressive lactic and respiratory acidosis.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset of presenting symptoms
  - History of previous preeclampsia/eclampsia in previous pregnancies
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - History of hypertension before pregnancy
  - Specific important lab values
    - Platelet Count (usually low)
    - Creatinine (usually elevated)
    - Liver Enzymes (usually elevated)
    - Bilirubin (usually elevated)
    - Protein in urine (usually elevated)
  - Specific symptoms:
    - Severe hypertension (see below)
    - Persistent or severe headache
    - Nausea and Vomiting
    - Upper Abdominal pain
    - Altered mental status.
- Definition of diagnosis: Preeclampsia
  - The diagnosis of pre-eclampsia is based on the new onset of hypertension and either proteinuria or end-organ dysfunction after 20 weeks of gestation in a previously normotensive woman.
    - Systolic blood pressure **≥140 mmHg** or diastolic blood pressure **≥90 mmHg**, and
    - Signs of end-organ dysfunction (platelet count <100,000/microliter, serum creatinine >1/1 mg/dL or doubling of the serum creatinine, elevated serum transaminases (liver enzymes) to twice normal concentration.
- Definition of diagnosis: Eclampsia
    - Eclampsia is a clinical diagnosis based upon evidence of one or more generalized convulsions and/or coma in a pre-eclamptic woman and in the absence of other neurologic conditions.
- Definition of diagnosis: HELLP Syndrome
  - HELLP is an acronym that refers to a syndrome characterized by Hemolysis with a microangiopathic blood smear, elevated liver enzymes, and a low platelet count. It represents a severe form of pre-eclampsia, but the relationship between the two disorders remains controversial.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

GIVE MAGNESIUM FIRST

2.1. Ensure IV Access

2.2. Treat seizures

2.2.1. Give Magnesium Sulfate 4.0 grams IV over 1-2 minutes (Seizure dose).

2.2.1.1. No IV access, 5 grams Magnesium IM into each ventral gluteal muscle.

2.3. Refractory seizures

2.3.1. Administer Versed 5.0 mg (IV, IM, IO, IN).

2.4. Treat nausea/vomiting- →***See Nausea/Vomiting Protocol.***

2.5. Transport to hospital with OB services.

2.6. Monitor BP closely.

2.7. Treat hypertension with:

2.7.1. Hydralazine 5-10 mg IV (if available, if not- contact medical control)

2.7.2. Labetalol 20 mg IV

2.7.3. Can give either medication every 15 minutes if heart rate remains >60.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Seizure Prophylaxis

3.1.1. Magnesium 6 grams IV over 15-20 minutes then,

3.1.2. Magnesium infusion 2 grams/hour as continuous infusion.

3.1.2.1. Creatinine elevated by < 1-1.5 decreased infusion to 1gram/hour.

3.1.2.2. Creatinine elevated > 1.5 no maintenance infusion.

3.1.3.If not aborted, repeat Magnesium dose 2-4 grams IV x 1.

3.2. Fluid Management

3.2.1. Pulmonary edema is a risk factor thus no fluid bolus is given.

3.2.2. The maintenance rate of 80cc/hr. is adequate.

3.3. Blood Pressure Monitoring

3.3.1. Consider arterial line placement if non-invasive means are variable and medications are being administered.

3.4. Review Labs (Repeat critical labs or missing labs).

3.4.1. Hb/Hct

3.4.2. Lactate
3.4.3. Chemistry

3.5. Fetal Heart Tones should be assessed.
3.5.1. Preform limited Trans-abdominal Ultrasound; describe below to medical control MD.
3.5.2. Estimate Fetal Heart Tones (FHT)
3.5.3. Describe fetal movement (arms moving, etc.)
3.5.4. Describe fluid around infants.
3.5.5. Presentation (Head down, breech, etc.)

Pediatric Specific Protocols

4. Pediatric Specific Protocols
4.1. NONE

Special Recommendations/Notes

5. Special Recommendations/Notes
5.1. Eclampsia Spectrum:
5.1.1. The new development of hypertension and either proteinuria or end-organ dysfunction after 20 weeks of gestation is usually due to preeclampsia, particularly in a nulliparous woman. In most women, these findings first become apparent after 34 weeks of gestation, including when the woman is in labor (i.e., "late onset preeclampsia").
5.1.2. Pre-eclampsia prior to 20 weeks of gestation is usually associated with a complete or partial molar pregnancy.
5.1.3. Delayed postpartum onset or exacerbation of disease, delayed postpartum pre-eclampsia can be defined as signs and symptoms of the disease leading to readmission more than two days but less than six weeks after delivery.
5.1.4. Pre-eclampsia is a progressive disease. Although most women develop signs of the disease in late pregnancy with gradual worsening until delivery, in about 25 percent of women, especially those with early onset pre-eclampsia, hypertension becomes severe and/or signs and symptoms of end-organ damage become apparent over a period of days to weeks. Two percent of these women develop eclampsia.[40]
5.1.5. Superimposed pre-eclampsia in women with known primary (essential) hypertension and increasing blood pressure and/or proteinuria, the presence of systemic manifestations of severe features of preeclampsia, such as thrombocytopenia, increased serum levels of aminotransferases, and visual symptoms strongly suggest development of superimposed pre-eclampsia.
5.1.6. Eclamptic seizures are always self-limiting and seldom last longer than three to four minutes (usual duration 60 to 75 seconds).
5.1.7. Fetal bradycardia lasting at least three to five minutes is a common finding during and immediately after an eclamptic seizure and does not necessitate emergent cesarean delivery.
5.1.8. HELLP syndrome (hemolysis with a microangiopathic blood smear, elevated liver enzymes, and low platelet count) develops in <1 percent of pregnancies, but in 10 to 20 percent of pregnancies with severe preeclampsia/eclampsia.

[40] Magnesium sulfate prophylaxis in preeclampsia: Lessons learned from recent trials. Am J Obstet Gynecol. 2004;190(6):1520

5.2. Magnesium Administration

5.2.1. Rapid infusion of magnesium sulfate causes diaphoresis, flushing, and warmth, related to peripheral vasodilation and a drop in blood pressure.

5.2.2. Magnesium toxicity is related to serum concentration: loss of deep tendon reflexes occurs at 8 to 10 mEq/L, respiratory paralysis at 10 to 15 mEq/L, and cardiac arrest at 20 to 25 mEq/L. Calcium gluconate (1 gram intravenously over 5 to 10 minutes) should be administered to counteract life-threatening symptoms of magnesium toxicity.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

This protocol is used for patients that are pregnant and have another condition that requires transport.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset of complaint
  - Maternal History (Previous pregnancies, deliveries, complications, prenatal care)
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Reason for transport
  - Onset of complaint
  - Maternal History (Previous pregnancies, deliveries, complications, prenatal care)

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Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.1.1. Special attention to blood pressure.

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1. Initiate Maintenance fluids (NS).

2.2. Evaluate blood pressure- if elevated→ ***see specific OB Protocol.***

2.3. Evaluate for contractions/dilation → if imminent delivery- ***See specific OB Protocol.***

2.4. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Evaluate for contractions/dilation → if imminent delivery- ***See specific OB Protocol.***

3.1.1. Preform digital exam of cervix (Sterile Gloves)

3.2. Preform limited trans-abdominal ultrasound; describe below to medical control MD.

3.2.1. Estimate Fetal Heart Tones (FHT).

3.2.2. Describe fetal movement (arms moving, etc.).

3.2.3. Describe fluid around the infant.

3.2.4. Presentation (head down, breech, etc.)

3.3. Abnormal Presentation→ ***See specific OB Protocol.***

3.4. Evaluate blood pressure, if elevated→ ***see specific OB Protocol.***

3.5. Treat underlying condition per relevant protocol→ ***See specific protocol.***

3.6. FHT should be documented with each set of maternal vitals.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. NONE

Special Recommendations/Notes

5. Special Recommendations/Notes

5.1. General obstetrics specific considerations:

5.1.1. Transport of a pregnant patient from her present facility to another facility should be considered when the present facility does not have sufficient resources for maternal and/or neonatal care.

5.1.2. Physiological changes in pregnancy.

5.1.3. Increased metabolic requirements of the mother and the needs of the fetus lead to a 30%-60% increase in oxygen consumption.

5.1.4. Increased progesterone levels in pregnancy lead to an increase in total body water and generalized edema (INCLUDING Airway Edema).

5.1.5. The gravid uterus compresses the vena cava and aorta when the patient is in the supine position leading to decreased venous return to the heart. Decreased venous return, in turn, leads to decreased cardiac output, maternal hypotension, and uteroplacental insufficiency.

5.1.6. Diaphragm displacement leads to a decrease in residual volume, expiratory reserve volume, and functional residual capacity (FRC). FRC is further reduced by up to 70% in the supine position. These changes mean rapid onset of hypoxemia when the patient is hypoventilating or apneic.

5.1.7. These manifestations include increased gastric acid content and acidity, as well as decreased function and tone of the lower esophageal sphincter.

5.1.8. The resting heart rate usually increases by only 10-15 beats per minute. Thus, tachycardia or hypotension in the pregnant trauma patient should not be attributed solely to the gravid state.

5.1.9. Physiologic anemia in pregnancy is due to a dilutional effect of plasma volume increasing by 50% but red blood cell volume increasing by only 18-30%.

5.1.10. Maternal hypovolemia may result in vasoconstriction of the uterine vasculature. The third trimester fetus can adapt to a decrease in uterine blood flow and oxygen delivery by diverting blood distribution to the heart, brain, and adrenal glands. Because fetal hemoglobin has a

greater affinity for oxygen than adult hemoglobin, fetal oxygen consumption does not decrease until the delivery of oxygen is reduced by 50%. Thus, maternal shock may have a significant impact on the developing embryo/fetus.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset of contractions
  - Time of rupture of membranes ("Water broke")
  - Sensation of fetal activity
  - Past medical history
  - Medications

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Keep patient NPO.

1.5. Place patient in a position of comfort.

1.5.1. Inspect perineum.

1.5.2. Place mom in left lateral position.

1.6. Prepare for imminent birth of infant.

1.7. Delivery of Infant

1.8. Delivery of Head

1.8.1. Firm, gentle pressure with flat of hand to slow expulsion. Allow head to rotate normally, check for cord around neck, and wipe face free of debris.

1.8.2. Suction mouth and nose with bulb syringe.

1.9. Delivery of the Body

1.9.1. Place one palm over each ear with the next contraction gently move downward until upper shoulder appears. Then lift gently to ease out lower shoulder Support the head and neck with one hand and buttocks with other. REMEMBER THE NEWBORN IS SLIPPERY.

1.9.2. Use towels to help warm and provide additional grip on infant.

1.10. Newborn and cord

1.10.1. Keep newborn at level of vaginal opening. Keep warm and dry. After 10 seconds, clamp cord in two places with sterile equipment at least 6-8" from newborn. Cut between clamps.

1.10.2. Preform APGAR Scoring (See below).

1.10.3. One and five minutes if abnormal again at 10 minutes.

1.11. Delivery of Placenta

1.11.1. Allow placenta to be delivered itself but do not delay transport waiting. DO NOT PULL-ON CORD TO DELIVER PLACENTA. Take placenta to hospital with patient.

1.12. Abnormal Presentations:

1.12.1. Nuchal cord (Cord around neck)

1.12.1.1. Loosen cord or clamp/cord if too tight during the delivery of the infant.

1.12.2. Prolapsed Cord (Cord is the presenting through cervix or in vagina)

1.12.2.1. Transport mother in knee-chest position and hips elevated.

1.12.2.2. Insert sterile gloved hand into vagina to relieve anterior pressure off cord.

1.12.3. Breech Birth

1.12.3.1. Transport unless delivery is imminent.

1.12.3.2. Do not encourage the mother to push.

1.12.3.3. Support- but do not pull presenting parts.

1.12.3.4. If delivery is in process and the head is caught inside vagina, create air passage by supporting body of infant and placing 2 fingers along sides of nose, and push away from face to facilitate an airway passage.

1.12.3.5. If unable to deliver, transport mother with hips elevated and knees to chest.

1.13. Shoulder Dystocia

1.13.1.1. Transport mother with hips elevated and knees to chest.

1.13.1.2. Insert fingers into vagina to relieve pressure on cord.

1.13.1.3. Place pressure on symphysis pubis.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1. If time, start normal saline infusion at 150 cc/hr.

2.2. Treat nausea/vomiting → ***See Nausea/Vomiting Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Perform limited trans-abdominal ultrasound; describe below to medical control MD.

3.1.1. Estimate Fetal Heart Tones (FHT).

3.1.2. Describe fetal movement (arms moving, etc.).

3.1.3. Describe fluid around the infant.

3.1.4. Presentation (head down, breech, etc.).

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. NONE

Special Recommendations/Notes

5. Special Recommendations/Notes
    - 5.1.1. Stillborn fetus should be transported with mother to hospital if born at home.
    - 5.1.2. Imminent delivery considerations:
    - 5.1.3. Document all times (delivery, contraction frequency, and length).
    - 5.1.4. After delivery, massaging the uterus (lower abdomen) will promote uterine contraction and help to control post-partum bleeding.
    - 5.1.5. Some perineal bleeding is normal with any childbirth.
    - 5.1.6. Large quantities of blood or free bleeding are abnormal.
    - 5.1.7. Prepare to deliver on scene (protecting the patient's privacy).
    - 5.1.8. If delivery becomes imminent while enroute, stop the vehicle and prepare for delivery.
    - 5.1.9. Newborns are very slippery, so be careful not to drop the baby.
    - 5.1.10. There is no need to wait on scene to deliver the placenta.
    - 5.1.11. If possible, transport between deliveries if the mother is expecting twins.
    - 5.1.12. Allow the placenta to be delivered, but DO NOT delay transport while waiting.
    - 5.1.13. DO NOT PULL ON THE UMBILICAL CORD WHILE THE PLACENTA IS DELIVERING.

Documentation

- Document response to treatments and medications.
- Document infant treatment in separate chart.

APGAR SCORING SYSTEM

	0 Points	1 Point	2 Points	Points totaled
Activity (muscle tone)	Absent	Arms and legs flexed	Active movement	
Pulse	Absent	Below 100 bpm	Over 100 bpm	
Grimace (reflex irritability)	Flaccid	Some flexion of Extremities	Active motion (sneeze, cough, pull away)	
Appearance (skin color)	Blue, pale	Body pink, Extremities blue	Completely pink	
Respiration	Absent	Slow, irregular	Vigorous cry	

Severely depressed	0-3
Moderately depressed	4-6
Excellent condition	7-10

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Pre-natal care
  - OB History- especially any other preterm labor.
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Contractions/Dilation
  - OB history
  - Vaginal fetal fibronectin (FFN) test available (positive indicates amniotic fluid is present in the vaginal vault- indication of rupture of membranes)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat hypotension (Desired MAP > 70)

2.2.1. Crystalloid fluids preferred.

2.3. Treat nausea/vomiting-→ ***See Nausea/Vomiting Protocol.***

2.4. Consider Tocolytic agent.

2.4.1.The initial recommended loading dose of magnesium is 4-6 g IV over 20 minutes

2.4.2.Contact Medical Control for additional orders.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Labs- POCT Testing
3.1.1. Review labs from OSH if available.
3.1.2. If there are no labs available or there is an abnormal finding:
3.1.3. Repeat abnormal findings.
3.1.4. Ensure that the following labs have been drawn/reviewed/documented:
3.1.5. Hb/Hct/Platelet
3.1.6. Lactate
3.1.7. INR
3.1.8. Potassium/BUN/Cr
3.1.9.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
4.1. NONE

Special Recommendations/Notes

5. Special Recommendations/Notes
5.1. Specific considerations:
5.2. Preterm labor is defined as the presence of uterine contractions of sufficient frequency and intensity to effect progressive effacement and dilation of the cervix prior to term gestation. Occurring at 20-37 weeks' gestation, preterm labor precedes almost half of preterm births and is the leading cause of neonatal mortality in the United States.
5.3. Between 24- and 33-weeks' gestation, benefits of tocolytic therapy are accepted to outweigh the risk of maternal and/or fetal complications, and these agents should be initiated provided no contraindications exist.
5.4. Criteria that indicate consideration of tocolytic therapy include more than 6 contractions per hour resulting in a demonstrated cervical change.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Pain medications given before arrival and response to medications.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Pain Control- Non-intubated patients (Choose one) *****See below for pediatric doses*****

2.2.1. Fentanyl 50mcg IV/IM q 10 minutes for pain.

2.2.2. Morphine 2-5 mg IV/IM q 10 minutes for pain.

Narcotic Selection Recommendations:

- **Fentanyl** – Preferred for renal impairment, hypotension, shock, head trauma and increased ICP

2.3. Non-Narcotic pain control

2.3.1.Toradol 60mg IM or 30mg IV can be given for non-opioid pain control.

2.3.2.Can be only given once.

2.4. Pain Control- Intubated patients with continuous $EtCO_2$ and pulse ox.

2.4.1. Fentanyl 50mcg IV/IM q 5 minutes until to 150 mcg or physiological improvement.

2.4.2. Morphine 5mg IV/IM q 5 minutes until 20 mg or physiological improvement.

2.4.3. BP should be monitored every 5 minutes during high dose pain medications.

2.4.4. Contact Medical Control for additional orders.

2.5. Consider anxiolytic combination in refractory pain control in non-intubated patients.
2.5.1. Versed is preferred 1-2.5 mg IV is preferred initial dose.
2.6. Any patient getting opioid, and anxiolytic should be on continuous EtCO2 and continuous pulse ox.
2.7. Prepare for emergency reversal for respiratory depression (Narcan 2mg IV/IM).
2.7.1. Commercially available naloxone (Narcan) intranasal products are approved (2mg or 4mg IN)
2.8. Consider opioid adjunct.
2.8.1. Ketamine 0.25 mg/kg IV for adjunct opioid therapy is helpful in patient's refractory to traditional pain medications above.
2.8.1.1. Can repeat q 10-15 minutes as needed.
2.8.2. Any patient getting opioid, and ketamine should be on continuous EtCO2 and continuous pulse ox.
2.9. Hospital Transfers:
2.9.1. If Propofol (Diprivan) is started in the hospital, paramedics can transport intubated patients with the understanding that pain control is needed and preferred as the PRN drug during transport. As with all the above sedation/pain control, these patients need to be fully monitored with cardiac, pulse ox and end-tidal CO_2 monitoring.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Consider anxiolytic combination in refractory pain control in non-intubated patients.
3.1.1. Versed is preferred 1-2.5 mg IV is preferred initial dose.
3.1.2. Any patient getting opioid, and anxiolytic should be on continuous $EtCO_2$ and continuous pulse ox.
3.2. Pain control shall continue through the maximums above for intubated patients or those with severe injuries.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Replace above doses with the below doses with the maximum being the above adult doses.
4.1.1. Fentanyl[41]
4.1.1.1. Infants 1-2 mcg/kg/dose
4.1.1.2. Children 1-2 mcg/kg/dose
4.1.1.3. Adolescents < 50 kg - 0.5-1 mcg/kg dose
> 50 kg – 25-50 mcg/dose
4.1.1.4. May repeat dose every 30 minutes for non-intubated patients.
4.1.2. Morphine
4.1.2.1. 0.1-0.2 mg/kg dose
4.1.2.2. May repeat dose every 30 minutes for non-intubated patients.
4.1.3. Anxiolysis (**Critical Care ONLY for non-intubated patients)**
4.1.3.1. Versed is preferred ONLY in patients > 6 months.

[41] Fentanyl Doses data source: Hegenbarth 2008; Nelson 1996; WHO 2012

4.1.3.1.1. Infants > 6 months to 5 years Dose- 0.05-0.1 mg/kg/dose

4.1.3.1.2. Children 5 years- 12 years dose- 0.025-0.05 mg/kg/dose

4.1.3.2. Any patient getting opioid, and anxiolytic should be on continuous $EtCO_2$ and continuous pulse ox.

4.1.4. Reversal Dose

4.1.4.1. Narcan (0.1 mg/kg)

MORPHINE IS PREFERRED for non-intubated pediatric patients < 2 years old.

Special Recommendations/Notes

5. Special Recommendations/Notes

5.1. Pain Indicators:

5.1.1. Verbal patients

5.1.2. The pain scale should be documented with vitals.

5.1.3. Non-verbal patients (includes intubated) shall be evaluated with other methods.

5.1.4. Respiratory rate.

5.1.5. Tachycardia

5.1.6. Hypertension

5.1.7. Diaphoresis

5.1.8. Facial grimace

5.2. Fentanyl is known to cause less hypotension than morphine. Onset is 30-60 seconds with bolus dosing.

5.3. Morphine causes histamine release and can induce hypotension. Onset is 5-10 minutes with bolus dosing.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Requested Labs on uncertain history or intentional OD:
    - ABG
    - Acetaminophen Level (4 hours or greater after ingestion)
    - Salicylate Level, if clinically indicated by patient history and/or labs
    - Alcohol Level, if clinically indicated
  - Treatments and response to treatments
  - 12 lead findings (Specifically QT and QRS measurements)
  - Has Decontamination been completed (if exposed) and how patient was decontaminated?
  - Detailed history is vital to document from the sending provider and any bystanders.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Decontamination

1.3.1. Topical exposures: Copious irrigation of the area with normal saline or sterile water.

1.3.2. Ingestions: Consider Activated Charcoal

1.3.2.1. See below for contraindications and special precautions.

1.3.2.2. 50 grams Activated Charcoal PO (if able to tolerate PO).

1.3.2.3. Of note if ingestion is > 1 hour, then charcoal is useless and should not be given.

1.3.2.3.1. Exception: aspirin – can be given if < 2 hours

1.4. Reassure the patient and provide comfort.

1.5. Place patient in a position of comfort.

1.6. NPO- besides the above medications.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Initial Screening:
- 2.1.1. Vital signs
- 2.1.2. Mental status
- 2.1.3. Pupil size
- 2.1.4. Skin temperature and moisture
- 2.1.5. Pulse Ox
- 2.1.6. Capillary blood glucose

2.2. Treat life threatening conditions first

2.3. Any AMS or COMA and with unknown reason→ ***See COMA/AMS protocol.***

2.4. Ensure IV Access

2.5. Suspect opiate overdose →Give Narcan 2mg IV or add with 3ml of NS and nebulize.

2.6. Treat hypotension (Desired MAP > 70)
- 2.6.1. Crystalloid fluids preferred.
- 2.6.2. Norepinephrine is preferred in adults.

2.7. Patients with intentional OD or unknown history:
- 2.7.1. Perform 12 lead EKG.

2.8. Evaluation of EKG
- 2.8.1. Evaluate QT and QRS
  - 2.8.1.1. Sodium Bicarb should be considered for wide QRS, known as Tricyclic OD or. ventricular arrhythmia
  - 2.8.1.2. QRS interval >100 msec or a ventricular arrhythmia.
  - 2.8.1.3. Bicarbonate: 1mEq/kg IV.
  - 2.8.1.4. May Repeat every 5-7 minutes.
  - 2.8.1.5. Monitoring of 12 leads should be done frequently.
- 2.8.2. Bradycardia
  - 2.8.2.1. Initial treatment standard ACLS/PALS Protocols.
  - 2.8.2.2. Refractory bradycardia with suspected Beta Blocker/Calcium Channel Blocker OD.
  - 2.8.2.3. 5mg Glucagon given slow IV push (See pediatric dose below).
    - 2.8.2.3.1. 5mg is the ideal dose, 2mg is acceptable for ALS units.
    - 2.8.2.3.2. Be prepared for nausea and vomiting.
  - 2.8.2.4. If there is no increase in blood pressure or pulse, repeat bolus.
  - 2.8.2.5. Consider Calcium Gluconate (evaluate size of IV before bolus) if CCA OD.
    - 2.8.2.5.1. 30 mL of a 10 percent solution should be administered as an initial dose. (See peds dose below).

2.9. Treat nausea/vomiting →***See Nausea/Vomiting Protocol.***

2.10. Drug Induced agitated behavior→ ***See specific protocol.***

2.11. Monitor for seizures- drug induced.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Airway protection- Consider RSI to maintain airway in the altered patient.

3.2. If ingestion was < 2 hours ago and no contraindications to NG/OG tube and charcoal

3.2.1. NG/OG tube should be placed, and 50 grams of activated charcoal should be given.
3.2.2. Only give charcoal if the patient can protect their own airway.

3.3. Treat Blood Pressure:
3.3.1. Place arterial line and monitor pressures invasively.
3.3.2. Hypotension:
3.3.2.1. Ensure adequate fluid resuscitation then add pressors if needed.
3.3.2.1.1. Norepinephrine is preferred in adults (Epinephrine in peds).
3.3.3. Hypertension
3.3.3.1. Initially treat with benzodiazepines.
3.3.3.2. Avoid beta blockers in suspected cocaine/amphetamine intoxication.
3.3.3.3. Labetalol or nitroprusside should be considered to reduce BP by 25%.
3.3.3.4. Contact medical control for orders to decrease beyond 25%.

3.4. Labs- POCT Testing
3.4.1. Review labs from OSH if available.
3.4.2. If no labs available or there is an abnormal finding:
3.4.2.1. Repeat abnormal findings.
3.4.2.2. Ensure that the following labs have been drawn/reviewed/documented:
3.4.2.2.1. Hb/Hct
3.4.2.2.2. Lactate
3.4.2.2.3. INR
3.4.2.2.4. Potassium/BUN/Cr

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.
4.1.1. Provide 20cc/kg bolus and repeat if necessary.
4.1.2. Start maintenance fluids for transfers → ***See Pediatric Infusion Protocol.***

4.2. Activated Charcoal Dose (without sorbitol)
4.2.1. Children up to one year of age: 10 to 25 g or 0.5 to 1.0 mg/kg.
4.2.2. Children 1 to 12 years of age: 25 to 50 g or 0.5 to 1.0 mg/kg.
4.2.3. Age > 12 years old: 50 grams

4.3. Sodium Bicarbonate
4.3.1. Children <2 years of age should receive 4.2% (0.5 mEq/mL) solution.
4.3.2. Standard dose for either concentration is 1mEq/kg.

4.4. Glucagon Antidote (Pediatric Dose)
4.4.1. 50 mcg/kg slow IV push (Max 5 mg)
4.4.2. An effect should be observed within one to three minutes.
4.4.3. Repeat dose as above.

4.5. Calcium Gluconate
4.5.1. Give 60 mg/kg per dose (maximum dose is 3g).

Special Recommendations/Notes

5. Poisoning

5.1. Eye drops can cause systemic poisoning (beta-blockers).
5.2. Consider Narcan for suspected clonidine overdose. (IM, IV)
5.2.1.Commercially available naloxone (Narcan) intranasal products are approved (2mg or 4mg IN)
5.3. Activated Charcoal (AC):
5.3.1. Depressed mental status without airway protection (risk of aspiration).
5.3.1.1. The decision to intubate a poisoned patient is often complicated, but it should be made independently of the decision to give AC. Tracheal intubation should not be performed for the sole purpose of giving AC.
5.3.2. Late presentation.
5.3.3. Increased risk and severity of aspiration associated with AC use (e.g., hydrocarbon ingestion)
5.3.4. Need for endoscopy (e.g., significant caustic ingestion)
5.3.5. Toxins poorly adsorbed by AC (e.g., metals including iron and lithium, alkali, mineral acids, alcohols) (table 1)
5.3.6. Presence of intestinal obstruction (absolute contraindication) or concern for decreased peristalsis (relative contraindication).
5.4. The presence of any of eight clinical criteria predicted a complicated hospital course that could be best managed in an ICU[42] :
5.4.1. PaCO2 >45 mmHg
5.4.2. Need for emergency intubation.
5.4.3. Post-ingestion seizures
5.4.4. Unresponsiveness to verbal stimuli
5.4.5. Non-sinus cardiac rhythm
5.4.6. Second- or third-degree atrioventricular block
5.4.7. Systolic blood pressure less than 80 mmHg
5.4.8. QRS duration ≥0.12 seconds

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

[42] Predicting the clinical course in intentional drug overdose. Implications for use of the intensive care unit. Brett AS, Rothschild N, Gray R, Perry M. Arch Intern Med. 1987 Jan;147(1):133-7

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Medical History/Medications
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific lab data obtained.
  - o Medical History/Medications

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Evaluate advanced airway needs.

2.2. Ensure IV Access

2.3. Determine category of respiratory distress:

2.3.1. Respiratory System Dyspnea- difficulty in gas exchange to include.

2.3.1.1. Neuromuscular disorders

2.3.1.2. Interstitial fibrosis

2.3.1.3. Emphysema

2.3.1.4. COPD

2.3.1.5. Asthma

2.3.2. Cardiovascular System Dyspnea- difficulty in pump/cardiac causes to include:

2.3.2.1. Congestive Heart Failure

2.3.2.2. Anemia

2.3.2.3. Deconditioning

2.4. Monitor end-tidal carbon dioxide continuously on ALL Respiratory patients.

2.5. Perform 12 lead EKG.

2.6. Suspected <u>Respiratory System Dyspnea</u>

2.6.1. Administer Albuterol 2.5mL/3ml nebulizer; may repeat up to three times.

2.6.1.1. First nebulizer solution should contain Ipratropium bromide. (CAN BE MIXED with albuterol)

2.6.1.2. 500 mcg of ipratropium

2.6.2. Consider CPAP

2.6.3. No improvement in asthma patients with above treatment → ***See Status Asthmaticus Protocol***

2.7. Suspected <u>Cardiovascular Dyspnea</u>

2.7.1. Nitroglycerin 0.4 mg SL- repeat every 2 minutes x 3 doses (SBP must be > 100mmHg).

2.7.1.1. Monitor blood pressure during administration, hold if hypotensive.

2.7.1.2. If effective or if hypertensive, continue 0.4mg SL every 5 minutes.

2.7.2. Consider CPAP.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Advanced Airway/Ventilation Management- consider advanced airway management.

3.1.1. BiPAP should be considered (especially in CHF/COPD).

3.1.2. Before proceeding with RSI, note contraindications to non-invasive technique.

3.2. Undifferentiated patients with dyspnea <u>perform rapid emergency screening exam.</u>

3.2.1. Tension pneumothorax (clinical, ultrasound and/or radiographic evaluation).

3.2.2. Pericardial tamponade (brief eFAST exam and/or clinical evaluation).

3.2.3. Upper airway foreign body.

3.3. Suspected Respiratory System Dyspnea

3.3.1. Refractory asthma→ ***See Status Asthmaticus Protocol.***

3.3.2. Ensure steroids have been given 60 mg prednisone PO or methylprednisolone 125mg IV (COPD).

3.4. For known or highly suspected CHF exacerbation-

3.4.1. Consider Lasix IV (80mg)

3.4.2. Consider placing Foley.

3.4.3. Consider nitroglycerin infusion (Initiate 5mcg/min- titrate to by 10mcgs/min to clinical response)

3.5. Labs- POCT Testing

3.5.1. Review labs from OSH if available.

3.5.2. If no labs available or there is an abnormal finding:

3.5.3. Repeat abnormal findings.

3.5.3.1. Ensure that the following labs have been drawn/reviewed/documented:

3.5.3.2. Hb/Hct

3.5.3.3. Lactate

3.5.3.4. INR

3.5.3.5. Potassium/BUN/Cr

3.6. Suspected Pulmonary Embolus

3.6.1. Sub-massive

3.6.1.1. Start Heparin infusion.

3.6.1.2. 80 units/kg IV bolus

3.6.1.3. 18 U/kg/hr.

3.6.2. Massive (hypotensive and unstable)

3.6.2.1. Contact Medical Control for Alteplase (tPA) orders.
3.6.2.2. 100 mg over two hours
3.6.3.Massive PE that evolves into cardiac arrest
3.6.3.1. 50mg Alteplase (tPA) IV Bolus

Pediatric Specific Protocols

4. Pediatric Specific Protocol
   4.1. See specific protocol.

Special Recommendations/Notes

5. Special Recommendations/Notes
   5.1. Respiratory Distress:
      5.1.1. Most patients with chronic dyspnea of unclear origin have one of five diagnoses:
         5.1.1.1. Asthma
         5.1.1.2. Chronic obstructive pulmonary disease (COPD)
         5.1.1.3. Interstitial lung disease
         5.1.1.4. Myocardial dysfunction
         5.1.1.5. Obesity/deconditioning
   5.2. BiPAP
      5.2.1. Absolute contraindications
         5.2.1.1. Respiratory arrest or unstable cardiorespiratory status
         5.2.1.2. Uncooperative patients
         5.2.1.3. Inability to protect airway (impaired swallowing and cough)
         5.2.1.4. Trauma or burns involving the face.
         5.2.1.5. Facial, esophageal, or gastric surgery
         5.2.1.6. Apnea (poor respiratory drive)
         5.2.1.7. Reduced consciousness
         5.2.1.8. Air leak syndrome
      5.2.2. Relative contraindications
         5.2.2.1. Extreme anxiety
         5.2.2.2. Morbid obesity
         5.2.2.3. Copious secretions
         5.2.2.4. Need for continuous or continuous ventilatory assistance.
         5.2.2.5. Lack of respiratory drive
         5.2.2.6. Nausea/vomiting (not controlled with medications or profuse)
   5.3. Chronic Respiratory Disorders
      5.3.1. Attempt to determine underlying condition and if possible, their normal oxygen saturation.
      5.3.2. Never withhold oxygen from chronic respiratory patients.
      5.3.3. Goal Pulse Ox is 90-94% with treatment.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Vital directed questions:
    - Trauma
    - Change in voice.
    - Onset and duration of symptoms
    - Associated symptoms.
    - Exposures
    - Previous similar episodes
      - Specifically, if a patient has been intubated or in the ICU for this condition before.
    - Underlying medical conditions
    - Family history
    - Under 2 years
      - Immunizations up to date?
      - Prematurity? If so, was there a NICU stay or intubation.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Respiratory assessment with special attention to the patient's:

2.1.1. Appearance

2.1.2. Breathing (position, breath sounds, accessory muscle use)

2.1.2.1. Fatigue or irregular patterns are ominous signs.

2.1.3. Circulatory status (skin color both peripherally and centrally)

2.2. Continuous end-tidal carbon dioxide monitoring.

2.3. Specialty Care Patient? (See Below)

2.4. Evaluate patient for IV Access

2.4.1. Perform risk/benefit analysis about stress of IV sticks vs need for IV access; defer multiple IV sticks in the pre-hospital environment if emergency access can be achieved quickly (IO or additional IV attempts). If no IV, then prepare for quick access via IO route.

2.5. Determine presence of wheezes

2.5.1. Wheeze auscultated- See below differential.

2.5.2. If considered asthma,→***See Asthma Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Advanced Airway Evaluation and Management

3.1.1. Close attention to impending airway collapse or failure should be treated aggressively and early during evaluation of a patient in respiratory distress.

3.1.2. Review chest x-ray after intubation or as part of clinical assessment.

3.2. Undifferentiated patients with dyspnea- perform rapid emergency screening exam.

3.2.1. Tension pneumothorax (clinical, ultrasound and/or radiographic evaluation)

3.2.2. Pericardial tamponade (brief eFAST exam and/or clinical evaluation)

3.2.3. Upper airway foreign body

3.3. Ensure IV access.

3.4. POCT (Repeat Critical Labs or labs of importance below):

3.4.1. ABG

3.4.2. Chemistry

3.4.3. Hb/Hct

3.4.4. Lactate

3.5. Antibiotics

3.5.1. Contact Medical Control for antibiotics.

3.5.2. Blood cultures should be drawn before antibiotics are administered (can be done by transferring hospital- need confirmation).

3.6. Asthma Exacerbation→ ***See Status Asthmaticus Protocol.***

3.7. Treatment of anxiety can be of benefit during the transport of a pediatric patient.

3.7.1. Initially start with distractions (TV, games, and parental assistance).

3.7.2. If refractory, can attempt a mild anxiolytic → ***See Pain Protocol.***

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. See above.

Special Recommendations/Notes

5. Special Recommendations/Notes

5.1. Pediatric Respiratory Distress

5.1.1. Tachypnea in neonates, children and adolescents are the hallmarks of respiratory distress.
5.1.2. Throughout the exam, every reasonable effort must be made to keep the child calm and comfortable, since anxiety and crying can increase the work of breathing in young children by decreasing upper airway diameter and increasing metabolic demand for oxygen.

5.2. **Wheezes and/or rales with fever** – The presence of wheezes and/or rales with fever is consistent with infectious processes, including:
5.2.1. Pneumonia
5.2.2. Bronchiolitis
5.2.3. Asthma with a febrile illness
5.2.4. Myocarditis with heart failure
5.2.5. Foreign body

5.3. **Wheezes and/or rales without fever** – Etiology of respiratory distress in afebrile children with wheezes and/or rales may be infectious or noninfectious, and while most commonly intrapulmonary, may be cardiac or mediastinal.
5.3.1. Atypical pneumonia
5.3.2. Atelectasis
5.3.3. Bronchiolitis
5.3.4. Asthma
5.3.5. Anaphylaxis
5.3.6. Pulmonary edema
5.3.7. Chronic pulmonary disease exacerbation
5.3.8. Foreign body
5.3.9. Heart failure
5.3.10. Mediastinal mass

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

RESPIRATORY DISTRESS IN THE CHILD ON VENTILATORY SUPPORT

For a patient receiving invasive ventilation via a ventilator, assess the patient to determine possible cause of respiratory distress by removing the patient from the ventilator and assisting ventilations with a bag-valve-mask via the tracheostomy tube.

1. If unable to ventilate the patient, there is significant resistance or there is poor air entry with bag-valve-mask ventilation, the problem is likely due to the tracheostomy tube, refer to the ***Respiratory Distress in a Child with a Tracheostomy Protocol*** below.
2. If able to ventilate through the tracheostomy tube and the patient improves or the respiratory distress is still present, the problem is likely due to a medical problem; treat as above based on your assessment.
3. If patient improves and is easy to ventilate with bag-valve-mask assisted ventilation, the problem is likely due to the ventilator. In this situation, perform the following actions:
    3.1. Assure that the ventilator is set to the correct settings given to you by the parents or other caregivers, the oxygen supply is not empty, and that the power supply is connected to the ventilator.
    3.2. Confirm that the circuit is securely connected.
    3.3. Re-connect patient to ventilator circuit. Assure that connection between circuit and tracheostomy tube is secure.
4. If the tracheostomy tube has a cuff, assure that it is inflated by checking the pilot balloon. If the pilot balloon is deflated, re-inflate the cuff by attaching a syringe to the pilot balloon valve and inflating with air until the pilot balloon is inflated.
5. Ask the parents or other caregivers to perform any procedure they have been taught to correct ventilator problems.
6. If the patient remains in distress, disconnect from ventilator, and assist ventilations with a bag-valve-mask via the tracheostomy tube and prepare for transport.
7. **Ensure the transport crew obtains the "GO BAG" from the family.**

RESPIRATORY DISTRESS IN THE CHILD WITH A TRACHEOSTOMY

The following protocol applies to a patient with a tracheostomy who is experiencing respiratory distress:

1. Assess the tracheostomy to make sure that:
   1.1. Tracheostomy tube is in place.
   1.2. Obturator has been removed.
   1.3. If it is a double lumen, that the inner cannula is in place.
   1.4. For fenestrated tracheostomy tube, that the decannulation plug or talk valve has been removed.
2. Assess the patient's breathing, including rate, auscultation, inspection, effort, and adequacy of ventilation as indicated by chest rise. Assess for signs of respiratory distress, failure, or arrest.
3. If signs of respiratory arrest or respiratory failure with inadequate breathing are present, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen via the tracheostomy. If unsuccessful, reposition airway and attempt bag-valve-mask assisted ventilation again. If tracheostomy tube is a double lumen tube, the inner cannula must be in place to attach bag-valve-mask device.
4. If unable to ventilate via the tracheostomy or respiratory distress persists with poor or noisy (Gurgling, rhonchi) breath sounds, attempt to suction through the tracheostomy using the following procedure:
   4.1. Ask family and caregivers for patient's suctioning supplies and for assistance as they are more familiar with suctioning of patient. If patient's supplies are not available, use a suction catheter of the same size as normally used for patient. If knowledge of size of catheter is not available, the size can be estimated by doubling the inner diameter of the tracheostomy tube and rounding down to an available size catheter.
   4.2. For double cannula catheters, inner cannula may be removed, suctioned directly and then re-inserted.
   4.3. Determine suction depth by comparing suction catheter to either obturator or patient's spare tracheostomy tube. If these are not available, then maximum suction depth for catheter should be 3-6 cm.
   4.4. Pre-oxygenate the patient via either non-rebreather mask over face (partial tracheostomy) or tracheostomy tube or via assisted ventilations with bag-valve mask if patient has ineffective ventilations. If unable to ventilate, then proceed immediately to the next step.
   4.5. Instill 2 to 3 ml of sterile normal saline into the tracheostomy tube.
   4.6. Insert suction catheter into tracheostomy to pre-determined depth with suction off. Never force catheter while inserting. Apply suction while withdrawing catheter. Limit suctioning to no more than 10 seconds.
   4.7. Suctioning following steps 4.4-4.6 may be repeated up to two times if significant secretions are removed and patient tolerates procedure.
5. Ensure the transport crew obtains the "GO BAG" from the family.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Treatment attempted/response.
  - Suspected Source (Chest XR, Urine, Skin Ulcers, Recent Surgery, etc.)
  - Antibiotics given.
  - Cultures drawn (Urine, Blood, Respiratory or CSF if indicated)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat hypotension (Desired MAP > 65)

2.2.1. Crystalloid fluids preferred. **Lactate Ringers is preferred if available.**

2.2.1.1. 30cc/kg is recommended for SEPSIS.

2.2.1.2. If you evaluate and note a reason why this CAN'T be done or at least started, please document that reason (fluid buildup, CHF history, elderly, etc.)

2.3. If vasopressors are needed, Levophed is preferred.

2.3.1.Preferred dose 8-12 mcg/min IV infusion

2.4. Treat nausea/vomiting→ ***See Nausea/Vomiting Protocol.***

2.5. Treat pain- moderate/severe → ***See Pain Management Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Ensure broad spectrum antibiotics given.
  3.1.1. Review hospital records and ensure blood and urine cultures obtained and medications given match below. Contact medical control with questions.
  3.1.2. Antibiotic administration shall not interfere with assessment or management of life-threatening conditions.
  3.1.3. Early administration of antibiotics is preferred.
3.2. Adult Primary Regiment
  3.2.1. Cefepime 2 grams IV x 1
  3.2.2. Levofloxacin (Levaquin) 750 mg IV x 1
  3.2.3. Vancomycin 25mg/kg IV x 1 (Max 2.5 grams)
3.3. Pediatric Primary Regiment (> 1 month old)
  3.3.1. Ceftriaxone 100mg/kg (max 2 grams) IV/IO/IM
  3.3.2. Vancomycin 15mg/kg (max 1 gram) IV/IO
3.4. Neonatal Primary Regiment (> 2 kg)
  3.4.1. Ampicillin 50mg/kg IV/IM/IO (Meningitis 100mg/kg)
  3.4.2. Gentamicin [20mg/2mL vial] 5mg/kg IV x 1
    ** Please note the different concentration for neonatal patients**
3.5. Supportive Treatment
  3.5.1. Hypoxia
    3.5.1.1.1. Correct hypoxia to oxygen saturation > 96%
    3.5.1.1.2. Obtain POCT ABG (if intubated)
  3.5.2. Hypotension
    3.5.2.1. Correct hypotension to a MAP > 65
      3.5.2.1.1. Pediatric: 20cc/kg bolus of crystalloids as needed
    3.5.2.2. Consider fluid resuscitation.
    3.5.2.3. Obtain serial lactate levels (either venous or arterial stay consistent)
      3.5.2.3.1. 15-20 minutes after changes to therapy as time permits.
    3.5.2.4. Consider vasopressor therapy.
      3.5.2.4.1. Levophed is preferred.
      3.5.2.4.2. Vasopressin .04 units/min is preferred second line pressor.
      3.5.2.4.3. Epinephrine 2-10 mg/kg/min
    3.5.2.5. Monitor for myocardial ischemia (Adults)
      3.5.2.5.1. Continuous monitoring- 12 lead EKG if indicated.
    3.5.2.6. Monitor urinary output, heart rate and/or lactate as indicators of improved fluid status.
      3.5.2.6.1. UOP lower than 30-50 mL/hr. should prompt further fluid resuscitation. Pediatric 1 ml/kg/hr.
    3.5.2.7. Check Hb/Hct
      3.5.2.7.1. If Hb is < 7 consider PRBC infusion
      3.5.2.7.2. Adult 2 units PRBC
      3.5.2.7.3. Pediatric 20cc/kg PRBC bolus x 2

Pediatric Specific Protocols

4. Pediatric Specific Protocols
  4.1. Monitor glucose closely and correct-
    4.1.1. Consider adding glucose to the maintenance fluids.
  4.2. Febrile Neutropenia (Pediatrics)

4.2.1. Cefepime 50mg/kg is the preferred dose.

4.3. Refractory Shock

4.3.1. Consider administering corticosteroids to patients in persistent shock who had received 60 mL/kg of fluid and were on two or more vasoactive medications.

4.3.1.1. Hydrocortisone 1-2 mg/kg IV

Special Recommendations/Notes

5. Special Recommendations/Precautions

5.1. Sepsis and Septic Shock:

5.1.1. Sepsis or septic shock is systemic inflammatory response syndrome (SIRS) secondary to a documented infection.

5.1.2. Patients with sepsis may present in a myriad of ways, and a high index of clinical suspicion is necessary to identify subtle presentations. The hallmarks of severe sepsis and septic shock are changes that occur at the microvascular and cellular level and may not be clearly manifested in the vital signs or clinical examination.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Underlying medical conditions
  - Treatment provided.
  - Has the highest level of swelling been marked? Is it progressing?
  - Does the sending hospital have anti-venom?
  - HPI should contact the transport team as early as possible and advise them of a snake bite that is progressing AND the sending hospital has no anti-venom.
  - **An isolated snake bite with anti-venom SHOULD NOT justify a critical care team.**

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol*.**

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Keep extremity that has been bitten at the level of the heart- DO NOT elevate.

1.4. Reassure the patient and provide comfort.

1.5. Place patient in a position of comfort.

1.6. Mark the bite site and the highest level of swelling/erythema with the time.

1.7. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat hypotension (Desired MAP > 70).

2.2.1. Crystalloid fluids preferred.

2.3. Treat nausea/vomiting→***See Nausea/Vomiting Protocol.***

2.4. Treat pain- moderate/severe → ***See Pain Management Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Evaluate the need for CroFab.

3.1.1. Categorize the envenomation.

3.1.2. Discuss with Medical Control.

3.2. Labs- POCT Testing

3.2.1. Review labs from OSH if available.

3.2.2. If no labs available or there is an abnormal finding-

3.2.3. Repeat abnormal findings.

3.2.3.1. Ensure that the following labs have been drawn/reviewed/documented:

3.2.3.2. Hb/Hct

3.2.3.3. Lactate

3.2.3.4. INR

3.2.3.5. Potassium/BUN/Cr

3.2.4. Verbal Order for administration of CroFab.

3.2.4.1. Administer 5 vials of CroFab IV.

3.2.4.2. Infuse over 60 minutes, proceeding slowly over the first 10 minutes at a 25- to 50-mL/hour rate with careful observation for any allergic reaction.

3.2.4.3. If no allergic reaction occurs, increase infusion rate to the full 250 mL/hour until completion.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Dosing for CroFab is initially the same as adult.

4.1.1. Contact medical control for verbal orders to administer.

4.2. Evaluate for dehydration.

4.2.1. Provide 20cc/kg bolus and repeat if necessary.

4.2.2. Start maintenance fluids for transfers→ ***See Pediatric Infusion Protocol.***

Special Recommendations/Notes

5. Snakebite/envenomation

5.1. Most snakebites are innocuous and are delivered by nonpoisonous species.

5.2. Classifications of envenomation.

5.2.1. <u>Mild envenomation</u> is characterized by local pain, edema, no signs of systemic toxicity, and normal laboratory values.

5.2.2. <u>Moderate envenomation</u> is characterized by severe local pain; edema larger than 12 inches surrounding the wound and systemic toxicity including nausea, vomiting, and alterations in laboratory values (e.g., decreased hematocrit or platelet count).

5.2.2.1. Is characterized by generalized petechiae, ecchymosis, blood-tinged sputum, hypotension, hypoperfusion, renal dysfunction, changes in prothrombin time and activated partial thromboplastin time, and other abnormal test results defining consumptive coagulopathy.

5.3. CroFab is made specifically from venom of the eastern and western diamondback snakes, Mohave rattlesnakes, and the cottonmouth/water moccasin snakes. The purpose of any antivenin is to bind the toxins in the venom and prevent both local and systemic results.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Treatments attempted and response.
  - High risk features:
    - History of increased use of home bronchodilator treatment without improvement or effect
    - History of previous intensive care unit (ICU) admissions, with or without intubation
    - Asthma exacerbation despite recent or current use of corticosteroids
    - Frequent emergency department visits and/or hospitalization (implies poor control)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Ensure adequate IV fluid rate (recommended 150mL/hr. - estimated).

2.2.1. Consider 20cc/kg in pediatrics for insensible losses.

2.2.2. Normal Saline is preferred.

2.3. Administer Albuterol (SEE CHART BELOW)

2.4. Administer Ipratropium bromide (SEE CHART BELOW)

2.5. Administer Steroids

2.5.1. Methylprednisolone 125mg IV (ADULT)

2.5.2. 1-2 mg/kg IV up to 60mg (PEDS)

2.6. Severe Refractory Asthma

2.6.1. Consider Magnesium sulfate 2 grams in 100ml normal saline over 20 minutes (Adult)
2.6.2. Pediatric: 50mg/kg (max 2 grams) over 20 minutes
2.6.3. Important to check and document vitals every 10 minutes during infusion.
2.7. Continuous Albuterol Nebulization (SEE CHART BELOW)
2.8. Consider Terbutaline
2.8.1. Loading Dose .25 mg SQ x 1 (repeat x 1 in 15-30 minutes)
2.8.2. Consider Advanced Airway Management
2.8.3. Consider CPAP with in-line nebulization early.
2.8.4. Consider mechanical ventilation as a last resort in patients with status asthmaticus.
2.8.5. Slow, controlled ventilation with heavy sedation, often with muscle relaxation, has been used to ventilate patients with status asthmaticus.
2.8.6. Elevated ventilator pressures might require manual gentle chest compressions with ventilator disconnected to assist exhalation.
2.9. Treat nausea/vomiting → **See *Nausea/Vomiting Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols
3.1. Labs- POCT Testing
3.1.1. Review labs from OSH if available.
3.1.2. If no labs available or there is an abnormal finding-
3.1.2.1. Repeat abnormal findings.
3.1.2.2. Ensure that the following labs have been drawn/reviewed/documented:
3.1.2.2.1. Arterial Blood Gas (Only if intubated)
3.1.2.2.2. Potassium/BUN/Cr
3.1.3. Cardiac Arrest or impending cardiac arrest from suspected asthma:
3.1.3.1. Manual compression shall be started with ventilator disconnected.
3.1.3.2. Bilateral chest tubes should be placed in cardiac arrest.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
4.1. Consider Epi 0.01mg/kg IM (max 0.3 mg)
4.1.1. May repeat x 2 to a max dose of 0.5 mg.
4.2. Terbutaline Infusion IV
4.2.1. Up to 10 mcg/kg IV
4.2.2. Infusion: 0.2-4 mcg/kg/min

Special Recommendations/Notes

5. Special Recommendations/Notes
5.1. Status asthmaticus:
5.1.1. Status asthmaticus is an acute exacerbation of asthma that remains unresponsive to initial treatment with bronchodilators.
5.2. Management goals for status asthmaticus:
5.2.1. To reverse airway obstruction rapidly through the aggressive use of beta2-agonist agents and early use of corticosteroids.

5.2.2. Correct hypoxemia by monitoring and administering supplemental oxygen.
5.2.3. To prevent or treat complications such as pneumothorax and respiratory arrest.

5.3. Pneumothorax may complicate acute asthma because of increased airway pressure or because of mechanical ventilation.

5.4. Determine whether the patient has a severe asthma exacerbation without wheezing (i.e., the silent chest). Such patients may have such severe airway obstruction or be so fatigued that they are unable to generate enough airflow to wheeze. This is an ominous sign of impending respiratory failure.

5.5. Positive pressure ventilation in a patient with asthma is complicated by severe airway obstruction and air trapping, which results in hyperinflated lungs that may resist further inflation and places the patient at high risk of barotrauma.

5.6. Cardiac output may be decreased because of decreased preload that results from air trapping and auto-PEEP.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

Albuterol Weight/Dose Chart

Weight	Albuterol Dose
< 20 kg	2.5 mg in 3 ml nebulized x three doses back-to-back
> 20 kg	5 mg in 3 ml nebulized x three doses back-to-back
Continuous Infusion	
< 20 kg	15 mg / hour
> 20 kg	25 mg / hour (Adult patients with CV disease should use 15 mg/ hour)

Ipratropium Weight/Dose Chart

Weight	Ipratropium Dose
< 20 kg	250 mcg mixed with albuterol above
> 20 kg	500 mcg mixed with albuterol above

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset and Medical Conditions; any Loss of consciousness?
  - Events leading up to the event.
  - No recollection of the events is particularly important to note and communicate.
  - Exertional syncope in young athletes is a BIG risk factor.
  - History obtained by EMS providers is pivotal to the patient's evaluation in the field and in the emergency department.
  - **NOTE: any non-transient loss of consciousness, by definition, is not syncope**

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. IV Access

2.1.1. Not required, however an assessment of available sites and plan for emergency access is required if no IV attempt is made based on the clinical exam.

2.2. Perform Risk Stratification for stroke patient (See below)

2.3. Treat hypotension (Desired MAP > 70).

2.3.1. Crystalloid fluids preferred.

2.4. Check blood sugar and treat if indicated → **See *Critical Electrolyte Protocol*.**

2.5. Patients > 30 years of age

2.5.1. Preform 12 lead EKG.

2.6. Treat nausea/vomiting→**See *Nausea/Vomiting Protocol.***

2.7. Treat pain- moderate/severe → **See *Pain Management Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Labs- POCT Testing

3.1.1. Ensure that the following labs have been drawn/reviewed/documented:

3.1.1.1. Hb/Hct

3.1.1.2. Lactate

3.1.1.3. INR

3.1.1.4. Potassium/BUN/Cr

3.1.2. Elevated INR→ **See *Supratherauptic INR protocol***.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. See above protocols.

Special Recommendations/Notes

5. Syncope specific considerations:

5.1. Cardiac syncope is due to a transient lack of adequate cardiac output causing inadequate cerebral perfusion and subsequent loss of consciousness.

5.2. Dysrhythmia is a common cardiac etiology and is one of great clinical importance. The most common dysrhythmia associated with syncope is transient ventricular tachycardia (VT).

5.3. Reflex-mediated syncope is the most common cause. Reflex-mediated syncope occurs when the body has an inappropriate autonomic response to a change in posture.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

Field Syncope Assessment (based on OESIL Risk Score)[43]

The below factors are considered high risk and should be noted in chart that these risk factors were evaluated and ruled out. Any more than one factor will require peer medical control discussion and refusal.

- Age > 65
- Males
- Hypertension (History of uncontrolled HTN or current HTN)
- Cardiovascular history
- Diabetes
- Previous syncope
- Syncope and no prodrome
- Syncope related traumatic injuries.
- Abnormal ECG

[43]Eur Heart J. 2003 May;24(9):811-9

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Time of amputation/mechanism of amputation
  - Location of amputation (based on above/below joints)
  - Amputated upper extremity the dominant hand?
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Antibiotics given? Tetanus given?
  - Do not reassure the sending provider that the amputated part will be re-implanted.
  - Amputated parts should be placed in plastic bag- on ICE.
  - Bleeding controlled?
  - If re-implantation is desired, has the sending provider contacted other facilities about re-implantation?

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Control hemorrhage with direct pressure then tourniquet if needed.

1.2.1. Commercial tourniquet is preferred → **See *Hemorrhage Control Protocol.***

1.2.2. Do not apply bulky dressings until bleeding has stopped.

1.3. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.4. Reassure the patient and provide comfort.

1.5. Place patient in a position of comfort.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1. Treat hypotension (Desired MAP > 70).

2.2. Resuscitate and treat other more urgent injuries- high mechanism injury pattern.

2.2.1. Quick and aggressive bleeding control should be the priority.

2.3. Hemorrhage Control → **See *Hemorrhage Control Protocol.***

2.4. Treat nausea/vomiting-→ **See *Nausea/Vomiting Protocol.***

2.5. Treat pain- moderate/severe→ **See *Pain Management Protocol.***

2.6. Reduction of Warm Ischemic Time

2.6.1. To transport the amputated part, wrap it in sterile gauze and place in a plastic Ziploc or similar bag. Place the bag in a cool place and transport ideally in a cooler of ice with the patient. Do not allow part to come in direct contact with ice.

2.6.2. Ensure medical control is involved with destination decisions based on your evaluation of a patient that suffered an isolated amputation with stable vitals and re-implantation candidate.

2.7. Wound Care

2.7.1. Wound should be cleaned and limited debridement as able with sterile water (if able) and dressed with sterile dressing.

2.7.2. Stump should be rinsed with sterile water and covered.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Refractory Hypotension

3.1.1. Evaluate for potential blood loss (Clinical or laboratory evidence) **See *Blood Transfusion Protocol.***

3.1.2. Preform FAST exam and communicate findings to receiving hospital.

3.1.3. Repeat clinical or ultrasound exams should be performed with hypotension or pain.

3.2. Elevated INR→ **See *Supratherapeutic INR protocol***.

3.3. Antibiotics/Wound Care

3.3.1. As time permits, systemic prophylactic antibiotics should be given.

3.3.1.1.1. Ceftriaxone IV 2 grams IV

3.3.1.1.2. Pediatric Dose 50mg/kg (max 2 grams)

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Provide 20cc/kg bolus and repeat if necessary.

4.2. See above doses for antibiotics.

4.3. Start maintenance fluids for transfers → **See *Pediatric Infusion Protocol.***

Special Recommendations/Notes

5. Extremity Amputation specific considerations:

5.1. Documentation of dominant hand is important to communicate to receiving hospital and document.

5.1.1. Excessive bleeding, amount of blood loss at scene.

5.1.2. Note structural attachments in partial amputations.

5.1.3. Other associated injuries.

5.2. Upper extremity amputation (Proximal to Elbow).

5.2.1. Considered a high velocity injury associated with additional injuries.

5.2.2. Traumatic amputations proximal to the elbow are considered Alpha Trauma Activation (Mississippi).

5.3. Upper Extremity Amputation (Distal to Elbow)
    5.3.1. Candidate for re-implantation.
    5.3.2. Re-implantation is more likely in upper extremity amputations.
5.4. Hand Digit Amputation
    5.4.1. Amputations to include a proximal digit to distal digit could be candidates for re-implantation.
5.5. Lower Extremity Amputation (Proximal to Knee)
    5.5.1. Considered a high velocity injury associated with additional injuries.
    5.5.2. Traumatic amputations proximal to the knee are considered Alpha Trauma Activation (Mississippi).
5.6. Lower Extremity Amputation (Distal to Knee)
    5.6.1. Possible candidate for re-implantation.
5.7. Foot Digit Amputation
    5.7.1. Possible candidate for re-implantation.
5.8. Many factors enter the decision to attempt replantation (age, location, underlying health of patient, condition of tissue). Try to help the family and patient understand this and do not encourage false hope.
5.9. Partial amputations should be dressed and splinted in alignment with extremity to assure optimum blood flow. Avoid unnecessary manipulation of amputated part(s).
5.10. Do not use dry ice to preserve severed parts.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Type of explosive (if known)
    - High-Order Explosives (See below for examples)
    - Low-Order Explosives (See Below for examples)
  - Scene Safety-
    - Unless known accidental- which in the immediate term is very difficult- all patient rendezvous should be done at an off-site location.
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Type of explosive
  - Location of patient (enclosed place, distance from blast)
  - Body Armor or Bomb Suit worn? (If law enforcement)
  - Has DECON been performed?

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. All victims should be screened for secondary devices- All responders should expect secondary devices (explosives).

1.4. All victims should be assessed for the need to DECON the patient.

1.5. Rapid Blood Sweep- placing tourniquets as required.

1.6. If blast victims are ambulatory, it is critical to minimize physical activity.

1.7. Specific Questions:

1.7.1. Can you hear?

1.7.2. Are you short of breath?

1.7.3. Do you have pain in your chest?

1.7.4. Do you have nausea/vomiting/urge to defecate or blood in your stools?

1.8. Reassure the patient and provide comfort.

1.9. Place patient in a position of comfort.

1.10. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Perform aggressive hemorrhage control → **See *Hemorrhage Control Protocol.***

2.3. Treat hypotension (Desired MAP > 70).

2.3.1. Crystalloid fluids should be used- only to maintain a MAP > 70.

2.4. Patients > 30 years of age

2.4.1. Preform 12 lead EKG.

2.4.2. Arrhythmias are common after thorax blast trauma, bradycardia most common.

2.5. Treat nausea/vomiting-→ **See *Nausea/Vomiting Protocol.***

2.6. Treat pain- moderate/severe→ **See *Pain Management Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Evaluation of pulmonary injury and special attention to altitude and method of transport should be evaluated by the CCT. Avoid high altitude flight.

3.1.1. If able, bilateral chest tubes should be placed before anticipated helicopter evacuation.

3.1.2. Especially important after initiating PPV in association of blast injuries.

3.1.3. Lung protective ventilation should be used (Assumption of ARDS) - TV 6cc/kg.

3.1.4. Aggressive management of the airway early is indicated.

3.2. If able, a chest XR should be performed before transport and/or upright or semi upright chest film (evaluation for air under diaphragm).

3.3. Hypotension

3.3.1. Limit crystalloid infusion in hypotension, use PRBC as alternative.

3.3.2. Stop hemorrhage→ **See *Hemorrhage Control Protocol.***

3.4. Labs- POCT Testing

3.4.1. Review labs from OSH if available.

3.4.2. If no labs available or there is an abnormal finding-

3.4.3. Repeat abnormal findings.

3.4.4. Ensure that the following labs have been drawn/reviewed/documented:

3.4.4.1. Hb/Hct

3.4.4.2. Lactate

3.4.4.3. INR

3.4.4.4. Potassium/BUN/Cr

3.5. Elevated INR? → **See *Supratherapeutic INR protocol.***

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. No specific recommendations

Special Recommendations/Notes

5. Explosives:

5.1. **High-Order Explosives**: Upon detonation- converted to gas at very high pressure and temperature.

5.1.1. Examples: nitroglycerine, dynamite, C-4, picric acid, Semtex, ammonium nitrate fuel oil mixture (ANFO), TNT, Pentaerythritol Tetranitrate (PETN) and Triacetone triperoxide non-nitrate high explosive (TATP).

5.2. **Low-Order Explosives**: designed to burn and release energy slowly.

5.2.1. Propellants

5.2.1.1. Pipe Bombs, gunpowder, black powder, petroleum based (Molotov cocktails or gasoline tankers).

5.3. Injury Patterns Divisions:

5.3.1. Primary injuries- direct effects on body from primary blast wave.

5.3.2. Secondary injuries- injuries caused by objects accelerated by explosive wave.

5.3.2.1. Most common cause of death in blast injuries.

5.4. Tertiary injuries- effects caused by movement of the victim (victim vs object).

5.5. Quaternary injuries- miscellaneous blast effects.

5.5.1. Burns, crush injuries, carbon dioxide or other toxic product inhalation.

5.6. System Based Injury Patterns:

5.7. Ear:

5.7.1. Auditory barotrauma is common with blast injuries. Rupture of the ear drum is universal at pressures 100kPa; lesser pressures cause hemorrhage into the drum. Symptoms include hearing loss and dizziness.

5.8. Pulmonary:

5.8.1. Blast lung is a direct consequence of the supersonic pressure wave generated by high explosives.

5.8.2. Lung injuries may not be apparent externally or immediately.

5.8.3. Overpressures of 40KPa will cause lung injuries.

5.8.4. Pulmonary contusion with or without laceration.

5.8.5. Pneumothorax, pulmonary interstitial emphysema, subcutaneous emphysema.

5.8.6. Wheezing after primary blast should be considered pulmonary contusions.

5.8.7. Blast injuries are usually present at the time of injury but have been reported as late as 48 hours.

5.8.8. Blast lung is clinically characterized by the triad of dyspnea, bradycardia, and hypotension. Chest pain is also a common complaint.

5.9. Gastrointestinal:

5.9.1. Greater risk for GI injury when exposed to an underwater blast.

5.9.2. GI injuries are inconsistent and include hemorrhage and perforation.

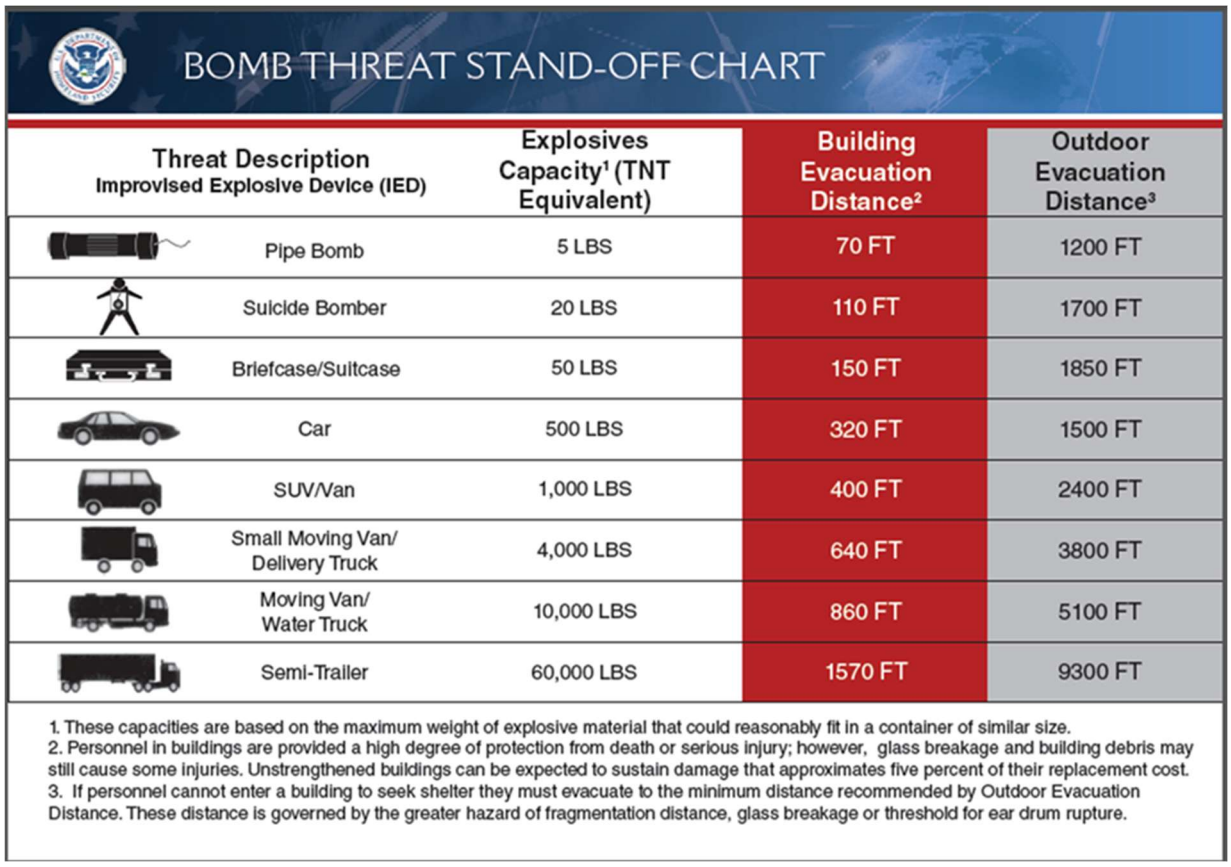
5.10. Exertion after blast injury can markedly increase the severity of the primary blast injury.

5.11. Body armor increases the chance and severity of primary blast injury but provides significant protection against fragment injuries.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- Document known explosive type, distance from blast, and location (inside or outside) if known.

Bomb Threat Stand-Off Chart[44]



BOMB THREAT STAND-OFF CHART

Threat Description Improvised Explosive Device (IED)	Explosives Capacity[1] (TNT Equivalent)	Building Evacuation Distance[2]	Outdoor Evacuation Distance[3]
Pipe Bomb	5 LBS	70 FT	1200 FT
Suicide Bomber	20 LBS	110 FT	1700 FT
Briefcase/Suitcase	50 LBS	150 FT	1850 FT
Car	500 LBS	320 FT	1500 FT
SUV/Van	1,000 LBS	400 FT	2400 FT
Small Moving Van/ Delivery Truck	4,000 LBS	640 FT	3800 FT
Moving Van/ Water Truck	10,000 LBS	860 FT	5100 FT
Semi-Trailer	60,000 LBS	1570 FT	9300 FT

1. These capacities are based on the maximum weight of explosive material that could reasonably fit in a container of similar size.
2. Personnel in buildings are provided a high degree of protection from death or serious injury; however, glass breakage and building debris may still cause some injuries. Unstrengthened buildings can be expected to sustain damage that approximates five percent of their replacement cost.
3. If personnel cannot enter a building to seek shelter they must evacuate to the minimum distance recommended by Outdoor Evacuation Distance. These distance is governed by the greater hazard of fragmentation distance, glass breakage or threshold for ear drum rupture.

[44] Source: US Department of Homeland Security (2016)

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Specific imaging data obtained/resulted.
  - Type of Burn (Degree and estimated body area)
  - Co-morbid conditions (CAD, DM, HTN, Renal Disease, etc.)
  - Trauma associated with burns.
  - Destination→ **Refer to Burn Destination Guidelines**
- Interfacility Transports/HPI Documentation:
  - Suspicious Burns to pediatrics- has DHS been notified?
  - Request Lactate/ABG w/ Carboxy Hb drawn if patient was in burned in an enclosed structure. (If available)
  - Attempt to determine how the patient was decontaminated/initially cooled and document (Hose, Sterile Saline, unknown, etc.)

Level I Protocol (Basic Life Support)

1. **Level I Protocols**
   - 1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***
   - ***1.2.*** Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***
     - 1.2.1. High flow until such time that CN or CO poisoning has been ruled out or clinical condition improves.
     - 1.2.2. Humidified oxygen shall be considered for inhalation burns.
   - 1.3. Reassure the patient and provide comfort.
   - 1.4. Stop the burning process.
     - 1.4.1. Remove clothing, which is smoldering, or which is not adhered to the patient.
     - 1.4.2. Attempt to use sterile fluids if possible (if not available, document the source of water used).
   - 1.5. All patients should have a primary trauma assessment to rule out trauma.
     - 1.5.1. If unsure or unknown mechanism, all patients should be considered trauma patients and treated appropriately.
   - 1.6. Remove constrictive items (rings, bracelets, belts, etc.)
     - 1.6.1. Secure valuables per company policy and document appropriately in chart.
   - 1.7. Wound Management
     - 1.7.1. Cover burns with clean dry sheets.

1.8. Ensure patient's temperature is maintained during transport.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Early intubation if inhalation burns are expected is appropriate and should be considered.

2.3. Ventilation/Airway Management (if intubated)

2.3.1. Ventilator: Low tidal volumes should be used (6cc/kg) increasing only to provide adequate ventilation (based on ideal weight).

2.3.2. If significant airway/respiratory burns, careful monitoring of clinical exam of lungs observing for worsening pulmonary edema.

2.3.3. EtCO2 shall be monitored closely and documented every day as per protocol.

2.4. Early IV access is critical to patients.

2.5. Fluid Resuscitation

2.5.1. All patients with TBSA of 15% or higher should receive formal fluid resuscitation:

2.5.1.1. Patients < 5 years 125 cc/hr. of Lactated Ringers

2.5.1.2. Patients 6-13 years 250 cc/hr. of Lactated Ringers

2.5.1.3. Patients > 14 years 500 cc/hr. of Lactated Ringers

2.5.2. If the patient is or remains hypotensive, additional infusions of LR should be initiated until hypotension resolves or urinary output returns to desired output.

2.5.3. Careful monitoring of patients with extensive pulmonary burns or airway burns should be considered and careful use of IV fluids should be initiated.

2.6. Treat pain- moderate/severe→ **See *Pain Management Protocol.***

2.6.1. Morphine/Fentanyl IV as tolerated by mental status and blood pressure.

2.6.2. Extremely large doses of opioids are often required, especially if intubated. Use clinical indicators (Hypertension or tachycardia in patients that are intubated to guide treatment).

2.7. Sedation/Anxiety (Intubated patients)

2.7.1. Can be a contributor to elevated blood pressure and heart rate.

2.7.2. Benzodiazepines can be considered mild sedation. (Can have additive effect).

2.8. Consider Cyanokit© (hydroxocobalamin only)

2.8.1. There are several drugs and blood products that are incompatible with Cyanokit, thus Cyanokit requires a separate intravenous line for administration (See Figure 1.2).

2.8.2. ALS ambulances can elect to carry this or can be administered from a pharmaceutical stockpile in the event of an accidental or terrorist event.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Ventilation/Airway Management (if intubated)

3.1.1. Medications: Normal RSI medications, caution with succinylcholine after 72 hours of burn.

3.2. Consider escharotomy.

3.2.1. If circumferential burns are present and circulation is compromised- See Advanced Procedures.

3.3. Calculate Fluids provided based on the Parkland Burn formula and correct deficits.

3.4. Labs- POCT Testing

3.4.1. Review labs from OSH if available.
3.4.2. If no labs available or there is an abnormal finding
3.4.3. Repeat abnormal findings.
3.4.4. Ensure that the following labs have been drawn/reviewed/documented:
3.4.4.1. Hb/Hct
3.4.4.2. Lactate
3.4.4.3. INR
3.4.4.4. Potassium/BUN/Cr

3.5. Hypotension despite fluid resuscitation.
3.5.1. Consider medical causes of hypotension (underlying diseases).
3.5.2. Perform 12 lead EKG.
3.5.3. Consider vasopressors to maintain MAP > 65.
3.5.4. Consider blood products.

3.6. Supporting Treatment
3.6.1. Place NG/OG tube on all intubated patients; evacuate stomach contents.
3.6.2. Place Foley catheter as soon as possible.
3.6.2.1. Urinary output should be 0.5mg/kg/hr. in adults.
3.6.3. Temperature should be monitored with rectal or esophageal temperature probe in intubated patients. Temperatures below 95°F (35°C) should be avoided. Use warmed IV fluids to increase core body temperature.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
4.1. No specific protocols → See above for weight-based fluid resuscitation.
4.2. Pediatric urinary output- 1ml/kg/hr.
4.3. Consider adding dextrose in addition to burn resuscitation fluids.
4.4. Glucose should be checked frequently during transport.

Special Recommendations/Notes

5. Burn Specific Considerations
5.1. Classification of burns
5.1.1. Superficial/epidermal (1st degree)
5.1.2. Partial thickness (2nd degree) - Blisters can be painful or painless (Superficial partial thickness-painful; deep partial thickness burns are painful to touch).
5.1.3. Full thickness (3rd degree).
5.1.4. Burns to muscle, bone, joint (4th degree).

5.2. Extent of burned surface area (excluding 1st degree burns).
5.2.1. Lund-Browder chart (Adults/Children) or
5.2.2. “Rule of 9’s” (Adults) or
5.2.3. Palm method if burn is irregular or patchy.
5.2.4. Lund-Browder chart is preferred (See Figure 1.1).

5.3. Evidence of respiratory burns:
5.3.1. Crew members should have low threshold for airway/respiratory burns.

5.3.2. Flash burns provide less airway involvement than burns or injury from prolonged exposure to heat and smoke.

5.3.3. Persistent cough, stridor or wheezing, hoarseness, deep or circumferential neck burns, singed nares, carbonaceous sputum, blisters, respiratory distress, or hypoxia.

5.4. Evidence of associated injury/illness:

5.4.1. Carbon Monoxide Poisoning: Risk factors include electrical fire in enclosed areas, chemical fires in enclosed areas or prolonged exposure to smoke. Clinical signs/symptoms- loss of consciousness, confusion, hypoxemia, headache, nausea/vomiting. Extra caution in pregnant patients.

5.4.2. Cyanide Poisoning: Risk factors include fires with large number of plastic products or prolonged smoke inhalation. Clinical signs/symptoms- altered mental status, headache, seizures, tachypnea then bradypnea, pulmonary edema, flushing red skin. Flight crew should maintain a low threshold for considering treatment.

5.4.3. Blast Injury: Should be considered in all explosions or unknown burn mechanism. See ***Blast Injuries Protocol***

5.4.4. Electrical Injury: Should be considered if the mechanism is unknown or electrical injury is suspected.

5.5. Aggressive fluid resuscitation is required to maintain end-organ perfusion due to a large fluid shift in the first 24 hours.

5.6. Complications/Systemic Concerns: (CO and CN Poisoning)

5.6.1. After prolonged smoke inhalation, consider concomitant carbon monoxide and cyanide toxicity.

5.6.2. Carbon Monoxide Poisoning: SaO2 will be falsely elevated; classic "cherry red lips" is insensitive indicator of CO poisoning. Treatment: High flow- high FiO2 concentration oxygen administration.

5.6.3. Cyanide Toxicity: severe lactic acidosis is the systemic mechanism if chemistries are known, and an elevated anion gap is suggestive of cyanide toxicity. Treatment with Amyl Nitrate or sodium nitrate is contraindicated in concurrent carbon monoxide. Consult medical control/toxicology for additional orders.

5.6.3.1. Cyanokit © (hydroxocobalamin only)

5.6.3.1.1. There are several drugs and blood products that are incompatible with Cyanokit, thus Cyanokit requires a separate intravenous line for administration (See Figure 1.2).

5.6.3.2. The starting dose of Cyanokit for adults is 5 g, administered by intravenous infusion over 15 minutes. One 5 g vial is a complete starting dose.

5.6.3.3. Depending upon the severity of the poisoning and the clinical response, a second dose of 5 g may be administered by intravenous infusion for a total dose of 10 g.

5.6.3.4. The rate of infusion for the second 5 g dose may range from 15 minutes (for patients in extremis) to 2 hours based on patient condition.

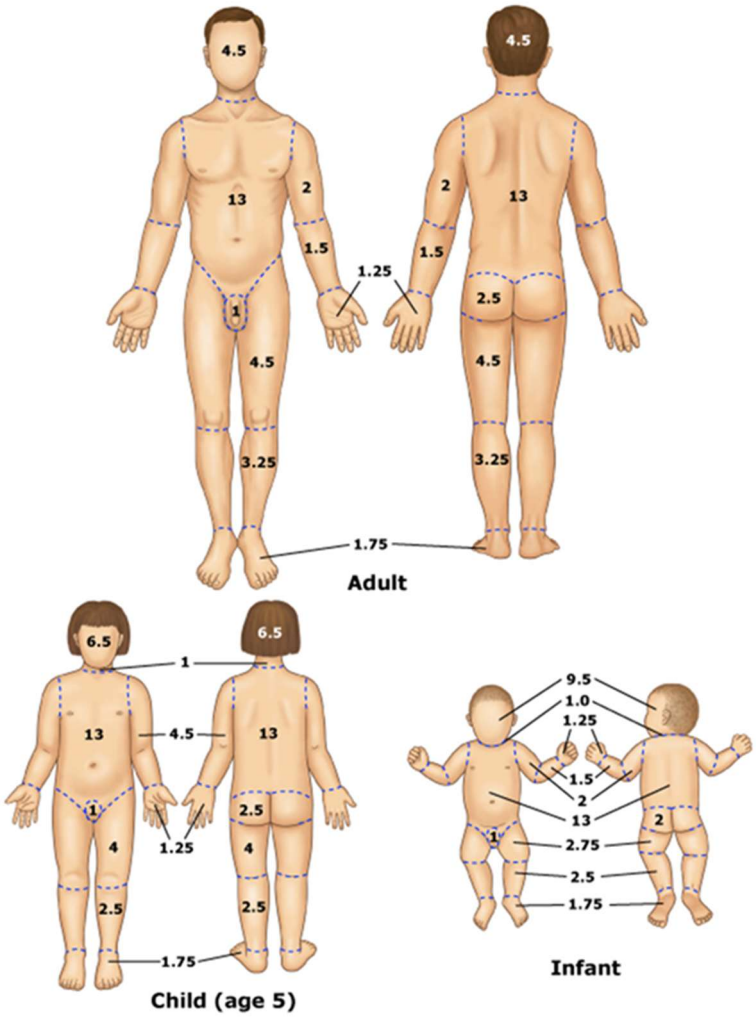
5.6.3.5. The recommended diluent is 0.9% Sodium Chloride injection.

5.6.3.6. No safety and efficacy studies have been performed in pediatric patients.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

Modified Lund-Browder Chart



HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Mechanism
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Mechanism
  - Treatment Provided

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Wound Care

1.4.1. Place occlusive dressing over sucking chest wounds.

1.4.2. Remove one corner if the patient deteriorates to relieve tension (burping chest).

1.5. Place patient in a position of comfort.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1. Two Large bore if possible.

2.2. Treat hypotension (Desired MAP > 70).

2.2.1. Crystalloid fluids preferred (See below for pediatric bolus and infusion).

2.3. Evaluate for tension pneumothorax.

2.3.1. Perform needle thoracostomy if indicated.

2.4. Impaled Objects

2.4.1. Should remain in place unless compromising the positioning of the patient in the vehicle then shall be cut to allow safe transport.

2.5. Treat pain- moderate/severe → **See *Pain Management Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Perform eFAST exam for possible pneumothorax before transport or review CXR if at hospital before transport.

3.2. If pneumothorax is found, consider chest thoracostomy in the following situations:

3.2.1. Following a needle decompression attempt by EMS, emergently by you or your partner or by another healthcare provider.

3.2.2. Traumatic cardiac arrest or pending arrest/patient extremis where chest trauma is suspected.

3.2.3. Known pneumothorax, intubated patients with anticipated air transport (Contact Medical Control for verbal orders).

3.2.4. Decompensation of known chest trauma in flight.

3.2.5. Trauma pneumothorax (Contact Medical Control for orders).

3.2.6. Awake patients with known pneumothorax (Contact Medical Control for orders).

3.3. Preferred Chest Tube Size

3.3.1. 28 French- adult pneumothorax only (i.e., medical causes)

3.3.2. 36 French- adult traumatic causes of pneumothorax/hemothorax

3.4. Refractory Hypotension

3.4.1. Evaluate for potential blood loss (Clinical or laboratory evidence) → **See *Hemorrhage Control Protocol.***

3.4.2. Repeat clinical or ultrasound exams should be performed with hypotension or pain.

3.5. Elevated INR→ **See *Supratherauptic INR protocol.***

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Pneumothorax is found, chest thoracostomy is indicated in the following situations:

4.1.1. Following a needle decompression attempt by EMS, emergently by you or your partner or by another healthcare provider.

4.1.2. Traumatic cardiac arrest or pending arrest/patient extremis where chest trauma is suspected.

4.1.3. Known substantial pneumothorax, intubated patients with anticipated transport (Contact Medical Control for verbal orders).

4.1.4. Decompensation of known chest trauma in flight.

4.1.5. Traditional tube placement should be for primarily > 13 years of age, if hemothorax is indicated or strongly suspected, contact Medical Control for orders for tube thoracostomy.

Preferred Chest Tube Size- Pediatrics

Category/Weight	Suggested Tube Size
Small Infant (6-7 kg)	10-12 French tube
Infant (8-9 kg)	10-12 French Tube
Toddler (10-11kg)	16-20 French Tube
Small Child (12-14kg)	20-24 French Tube
Child (15-18 kg)	20-24 French Tube
Child (19-23kg)	24-32 French Tube
Large Child (24-29kg)	28-32 French Tube

Special Recommendations/Notes

5. Special Recommendations/Notes
   5.1. Blunt Chest Trauma:
      5.1.1. A **flail chest**, by definition, involves 3 or more consecutive rib fractures in 2 or more places, which produces a free-floating, unstable segment. Respiratory distress or insufficiency can ensue in some patients with flailed chest because of severe pain secondary to the multiple rib fractures, the increased work of breathing, and the associated pulmonary contusion. This may necessitate endotracheal intubation and positive pressure mechanical ventilation. Intravenous fluids are administered judiciously because fluid overloading can precipitate respiratory failure, especially in patients with significant pulmonary contusions.
      5.1.2. **First and second rib fractures** are considered a separate entity from other rib fractures because of the excessive energy transfer required to injure these sturdy and well-protected structures. Providers should be extra vigilant for other injuries.
      5.1.3. **Traumatic asphyxia** is the result of thoracic injury due to a strong crushing mechanism, as might occur when an individual is pinned under a very heavy object. Some effects of the injury are compounded if the glottis is closed during application of the crushing force. Patients present with cyanosis of the head and neck, subconjunctival hemorrhage, periorbital ecchymosis, and petechiae of the head and neck. The face frequently appears very edematous or moonlike. Treatment includes:
         5.1.3.1. The elevation of the head is 30 degrees.
         5.1.3.2. Frequent neurological exams.
         5.1.3.3. Ensuring adequate ventilation and early intubation if suspected swelling is observed.
   5.2. **Open Pneumothorax** with industrial injuries or MVC's, it is imperative to check the back of the torso for missed wounds or injuries that might be complicate ventilation and resuscitation.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- Document procedures in the procedures section.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Length of time pinned/crushed.
  - Any co-morbid conditions known.
  - Mental status
- Interfacility Transports/HPI Documentation:
  - Demographic Data
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - History of injury: Length of time pinned; object or material causing entrapment or pinning.
  - Determine if any co-morbid conditions are present (if able) DM, HTN, ESRD, etc.
  - Communicate to transport crew of indication for crush injury or syndrome EARLY.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.1.1. Make a quick assessment if patient is in extremis (vitals/mental status) and with rapid decompensation. If a patient is pinned and stable, PROVIDE support to patient and alert ALS crew of pinned/crushed patient.

1.1.2. If the patient has been pinned for a lengthy period, rapid extrication can create complications that at times can be fatal.

1.1.3. If rapid extrication is needed, place tourniquets tight and above the level that the patient is pinned on extremities.

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Provide Hemorrhage Control → **See *Hemorrhage Control Protocol.***

1.4. Reassure the patient and provide comfort.

1.5. Place patient in a position of comfort.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Before extrication if possible.

2.3. Humeral IO's are a good access point if no IV access is found.
2.3.1. Remember arm position is key to maintaining patency of the IO.
2.3.2. Bilateral large bore if possible is desired.
2.4. End-tidal carbon dioxide measurement shall be started early.
2.5. Aggressive fluid resuscitation should be started with normal saline (NS), preferably BEFORE extrication has begun or as soon after extrication as possible.
2.5.1. Adults: 1 liter/hr. for the first two liters then 500cc/hr.
2.5.2. Pediatrics: 20cc/kg x 3 then 1.5 maintenance fluids.
2.6. 12 lead EKG should be performed (if able to access) before extrication.
2.6.1. Continuous EKG monitoring should be started and monitored during resuscitation.
2.6.2. If clinical evidence of hyperkalemia is present during extrication or immediately after extrication, → **See Specific Protocol.**
2.6.3. Perform frequent 12 lead EKG per protocol.
2.7. Post Extrication Care:
2.7.1. Monitor EKG, EtCO2 and mental status.
2.7.2. Treat hyperkalemia
2.7.2.1. Bicarb as per hyperkalemia protocol
2.7.2.2. Calcium should be only given in cases of impending CV collapse or widening QRS.
2.7.3. Provide adequate pain relief.
2.7.4. During and after extrication, pain may increase as perfusion increases.
2.8. Treat nausea/vomiting-→**See *Nausea/Vomiting Protocol.***
2.9. Treat pain- moderate/severe →**See *Pain Management Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols
3.1. Refractory Hypotension
3.1.1. Evaluate for potential blood loss (Clinical or laboratory evidence) See ***Blood Transfusion Protocol.***
3.1.2. Perform FAST exam and communicate findings to receiving hospital.
3.2. POCT Labs (Repeat Critical labs or obtain labs not reported)
3.2.1. Chemistry
3.2.2. Hb/Hct
3.2.3. Lactate
3.3. Electrolyte Management → **See specific protocol.**
3.4. Foley should be placed if not placed by transferring hospital.
3.4.1. Defer to receiving hospital for scene flights.
3.5. Consider Lasix or Mannitol for increased renal clearance; use is controversial, contact medical control for orders.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
4.1. See above comments.

Special Recommendations/Notes

5. Specific Recommendations/Notes
    5.1. The Crush Injury Continuum
        5.1.1. Acute Compartment Syndrome
            5.1.1.1. Begins when tissue pressure inside a muscle compartment is increased (primary trauma) and increases venous pressure, which decreases blood flow. After blood flow is reduced, waste products accumulate in tissues which increases edema and continues to decrease blood flow.
            5.1.1.2. Absence of a distal pulse, hypoesthesia, and extremity paresis because the cycle of elevating tissue pressure eventually compromises arterial blood flow. Loss of a distal pulse is a LATE sign of compartment syndrome. Often the most ominous sign is pain out of proportion to the obvious injury.
            5.1.1.3. Tibia fractures are the most common precipitating event.
        5.1.2. Crush Injury
            5.1.2.1. Crush injury is an injury to the body from an object or mechanism that limits blood flow to an injury. Crush injury can also be caused by direct injury to the tissues by a compressing object.
        5.1.3. Crush Syndrome (Traumatic Rhabdomyolysis)
            5.1.3.1. Treatment of the reperfusion syndrome associated with crush Injury is aimed at:
            5.1.3.2. Decreasing the change in critical electrolytes influx into the systemic circulation.
            5.1.3.3. Low and directed extrication is associated with aggressive fluid resuscitation.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - If Exposure- when, what type and decontamination method
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Time of injury
  - Visual Acuity (Gross or formal)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Globe trauma suspected.

1.4.1. A rigid shield should be placed on injured eye.

1.4.2. Impaled foreign bodies should be left undisturbed.

1.5. Chemical Exposure

1.5.1. Immediately copious irrigation should be started (Normal Saline Preferred).

1.6. Place patient in a position of comfort.

1.7. Cover both eyes with same patch; hard eye shield is preferred.

1.8. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat nausea/vomiting → **See *Nausea/Vomiting Protocol***

2.2.1. Every patient should receive Zofran 4mg as a prophylaxis dose before transport.

2.3. Treat pain- moderate/severe → **See *Pain Management Protocol.***

2.4. Mild anxiolytic can be given if needed for improved patient comfort and transport.

2.4.1. Ativan 1-2 mg IV/IM is a recommended initial medication.

2.4.2. Versed 3-5 mg IV is an alternative.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Chemical Irritation

3.1.1. Apply tetracaine to the effected eye- two drops to the eye.

3.1.2. Place Morgan's Lens on the eye.

3.1.3. Continuous irrigation up to 2 liters should be started (Normal saline).

3.1.4. Irrigation should continue until pH on the ocular surface is neutralized (7.0-7.3).

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. See above.

Special Recommendations/Notes

5. Special Recommendations/Notes

5.1. Eye Injuries

5.1.1. Globe Rupture

5.1.1.1. Globe rupture is sometimes obvious with an eye being misshapen with uveal tissue prolapsing out of the anterior scleral or corneal wound. Often, a globe rupture is an occult finding.

5.1.1.2. It is critical to avoid putting pressure on a ruptured globe.

5.2. Chemical Irritation

5.2.1. Strongly basic (Alkaline) compounds or acidic compounds. Alkali injuries are more common and can be more deleterious.

5.2.2. Acids: damages the ocular (corneal) surface by altering the ph. Most acid exposures are limited by the denaturing of proteins and thus don't penetrate deeper into the eye. Hydrofluoric acid is the EXCEPTION and can penetrate deeper into the eye.

5.2.3. Alkali: Basic substances saponifies cell membranes and penetrates deep into the eye causing extensive damage.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs)
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene Transports:
  - Demographic Data
  - Mechanism of Injury Considerations
  - Injuries reported.
  - Medical history of patient

This protocol is intended for Scene Transports*

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.1.1. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.2. Hemorrhage Control → **See *Hemorrhage Control Protocol***

1.3. Spinal Immobilization:

1.3.1. Select Spinal Immobilization Criteria Evaluation (SEE BELOW).

1.4. Reassure the patient and provide comfort.

1.5. Place patient in a position of comfort.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.1.1. Treat hypotension (Desired MAP > 65 or based on patient's condition).

2.1.2. Crystalloid fluids preferred to maintain Balanced Resuscitation Concept (See Below).

2.2. Treat nausea/vomiting-→ **See *Nausea/Vomiting Protocol.***

2.3. Treat pain- moderate/severe → **See *Pain Management Protocol***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Refractory Hypotension

3.1.1. Evaluate for potential blood loss (Clinical or laboratory evidence) → See *Hemorrhage Control Protocol.*

3.2. POCT Labs → **Refer to specific protocol.**

3.3. Preform FAST exam and communicate findings to receiving hospital.

3.3.1. Repeat clinical or ultrasound exams should be performed with hypotension or pain.

3.4. Elevated INR → **See *Supratherauptic INR Protocol***.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. 20cc/kg of crystalloid fluids should be given to evaluate fluid responsiveness.

4.2. Continued fluid resuscitation is based on the Balanced Resuscitation model below.

Special Recommendations/Notes

5. Specific Recommendations/Precautions

Balanced Resuscitation Concept:

5.1.1. The concept of balanced resuscitation is further emphasized in the 9th addition of Advanced Trauma Life Support (ATLS), and the term aggressive resuscitation has been eliminated. The standard use of 2 liters of crystalloid resuscitation as the starting point for all resuscitation has been modified to initiation of 1 liter of crystalloid.

5.1.2. If blood pressure is raised rapidly before the hemorrhage has been controlled, increased bleeding may occur.

5.1.3. A careful balanced approach with frequent reevaluation is required. Balancing the goal of organ perfusion with the risks of rebleeding by accepting a lower-than-normal blood pressure has been called Controlled Resuscitation, Balanced Resuscitation, Hypotensive Resuscitation and Permissive Hypotension." The goal is balance, not hypotension. Such a resuscitation strategy may be a bridge too but is also not a substitute for definitive surgical control of bleeding.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.
- If Balanced Resuscitation is used, the providers should document all the factors that were used in determining and guided the resuscitation methods.
- If select spinal immobilization protocol is used it should be referenced as being used and the protocol should be completed in its entirety.

Selective Spinal Immobilization Protocol (Patients > 16 years of age)

- **Inclusion Criteria:**
  - Traumatic Mechanism of Injury
- **Exclusion Criteria:**
  - Penetrating Trauma with no evidence of neurologic deficits
- **Assessment**:
  - All non-ambulatory patients should be log rolled with spinal precautions to evaluate tenderness of the spine or deformities
  - Assess for mental status, neurological deficits, spinal pain or tenderness, any evidence of intoxication or other severe injuries
- **Management:**
  - Immobilize patients with cervical collar if:
    - Patient complains of neck or spine pain
    - Any neck or spinal tenderness
    - Any abnormal mental status or GCS<15
    - Any evidence of alcohol or drug intoxication
    - There are other severe or painful injuries present.
- **Comments:**
  - Ambulatory patients can be immobilized with cervical collar and in-line stabilization on the stretcher and do not necessarily need a spinal board
  - Children have disproportionately larger heads- the body should be elevated 1-2 cm to accommodate the larger head size.
  - Long spine board should be reserved for patient movement in non-ambulatory patients who meet immobilization criteria above and should be removed from the board as soon as practical.
  - Penetrating trauma to the neck doesn't require immobilization unless there are signs of neurological deficits.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific laboratory information obtained/resulted.
  - Patients > 55 years →Perform Anticoagulation Screen
  - Sending providers reason for critical care transport request
  - Was protective head gear worn (if applicable)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Airway Management

2.1.1. Evaluate airway and patient's condition for emergency airway intervention.

2.2. Manage patient based on ***General Trauma Protocol*** or other relevant protocol.

2.3. Prior to non-crash airway management, a neurological exam shall perform to focus on the following:

2.3.1. Mental status

2.3.2. Extremity movement- response to stimuli

2.3.3. GCS

2.3.4. Pupil exam

2.3.5. Ensure IV Access

2.4. Stop active bleeding- evaluate scalp/head wounds.

2.5. Maintain spinal precautions-→ See **Spinal Precautions Procedure.**

2.6. Isolated head trauma- consider elevation of the HOB < 30 degrees with in-line spinal precautions.

2.6.1. Do not elevate HOB if patient is suspected of being hypovolemic.

2.7. Initiate intravenous access and maintenance fluids.
2.7.1. Unless hypotensive, then provide fluid resuscitation.
2.7.2. MAP should be >90mmHg in adults.
2.7.3. See below for pediatric specifications.
2.7.4. Crystalloid fluids preferred. **(Normal Saline Preferred)**
2.8. Elevate the head of bed 30° if possible.
2.8.1. Place cervical collar to maintain in-line neck immobilization (drainage of CSF).
2.9. For Traumatic Brain Injuries (TBI) with a GCS < 12 within three hours of onset or confirmed ICH from trauma given 1000mg TXA over 10 mins[45]
2.10. Treat nausea/vomiting-→ **See *Nausea/Vomiting Protocol***
2.11. Treat pain- moderate/severe → **See *Pain Management Protocol.***
2.12. Clinical evidence of impending herniation (change in pupil, etc, GCS < 8).
2.12.1.1. Consider intravenous Hypertonic Saline (3%) 2.5-5 mL/kg IV bolus over 15 minutes

Level III Protocols (Critical Care)

3. Level III Protocols[46]

3.1. Airway Management:
3.1.1. Advanced airway management shall be considered for airway protection or as needed to provide adequate sedation to decrease ICP.
3.1.2. Consider Lidocaine (1mg/kg) shall be used as pre-medication for RSI.
3.2. Insert and monitor arterial line invasive blood pressure.
3.2.1. This procedure shall be done on the transport vehicle, not delaying on-scene treatment time.
3.3. Insert foley (if time) and monitor urinary output if already in place (excludes scene).
3.3.1. POCT labs (Repeat Critical labs or perform needed labs)
3.3.1.1. INR (Adults only)
3.3.1.2. Hb/Hct
3.3.1.3. Chemistry
3.3.1.4. Lactate
3.3.2. Provide continuous ICP monitoring if available or closely monitor for signs/symptoms:
3.3.2.1. If ICP is measured, calculate and document Cerebral Perfusion Pressure (CPP), CPP= MAP-ICP.
3.3.2.2. CPP shall be kept between 60-75 mmHg.
3.3.2.3. If elevated ICP is suspected, provide the following treatments:
3.4. Elevate the head of bed 30° if possible.
3.4.1. Place cervical collar to maintain in-line neck immobilization (drainage of CSF).
3.5. Minimize positive pressure ventilation to ensure adequate oxygenation and ventilation.
3.5.1. Increase sedation and paralytics if needed.
3.6. Clinical evidence of impending herniation (change in pupil, etc.).
3.6.1. Consider intravenous Mannitol (1.5 grams/kg) **First Line therapy.**
3.6.2. Consider intravenous Hypertonic Saline (3%) 2.5-5 mL/kg IV bolus over 15 minutes (x 1)

[45] CRASH-3: CRASH-3 Intracranial Bleeding Mechanistic Study Collaborators. Tranexamic acid in traumatic brain injury: an explanatory study nested within the CRASH-3 trial. Eur J Trauma Emerg Surg. 2021 Feb;47(1):261-268. doi: 10.1007/s00068-020-01316-1. Epub 2020 Feb 19. PMID: 32076783; PMCID: PMC7851008.
[46] Guidelines for the Management of Severe Traumatic Brain Injury: 4th edition (2016)

3.6.3. Hyperventilation to a EtCO2 of 35-40 mmHg

3.7. Elevated INR→ **See *Supratherapeutic INR Protocol.***

3.7.1. INR on elderly trauma patients or AMS patients should be considered a PIRORITY after stabilization of airway and BP as the definitive care is provided on the helicopter.

Pediatric Specific Protocols

4. Pediatric Specific Recommendations

4.1. Mean Arterial Pressure (MAP)

4.1.1. The maintenance of MAP is vital in pediatric head trauma.

4.1.2. MAP for children at the 50th percentile for height can be estimated using the formula MAP = (1.5 X age in years) + 55).

4.2. Intracranial Pressure (ICP)

4.2.1. A threshold of 20 mm Hg is typically used to guide medical management in pediatrics.

4.3. Prophylactic treatment with Fosphenytoin may be considered to reduce the incidence of early posttraumatic seizures in pediatric patients with severe TBI.

4.3.1. Contact Medical Control for orders.

4.4. Start maintenance fluids for transfers→ See **General Patient Transport Protocol.**

Special Recommendations/Notes

5. Pathophysiology of Head Trauma Patients

5.1. Cerebral Perfusion Pressure (CPP)

5.1.1. CPP is defined as the difference between the mean arterial pressure (MAP) and the ICP.

5.1.2. MAP falls below 50 mm Hg; the brain is at risk of ischemia due to insufficient blood flow while a MAP greater than 160 mm Hg causes excess CBF that may result in increased ICP.

5.2. Categories of Brain Injury (Traumatic Brain Injury)

5.2.1. Primary brain injury is defined as the initial injury to the brain as a direct result of the trauma.

5.2.2. Secondary brain injury is defined as any subsequent injury to the brain after the initial insult. Secondary brain injury can result from systemic hypotension, hypoxia, elevated ICP, or as the biochemical result of a series of physiologic changes initiated by the original trauma.

5.3. Intracranial Pressure (ICP)

5.3.1. Elevated ICP may result from the initial brain trauma or from secondary injury to the brain.

5.3.2. In adults, normal ICP is considered 0-15 mm Hg. In young children, the upper limit of normal ICP is lower, and this limit may be considered 10 mm Hg.

5.4. Herniation

5.4.1. Cushing triad (i.e., bradycardia, hypertension, and alteration of respiration)

5.4.2. Hypotension and bradycardia in a trauma patient should be suggestive of spinal cord injury.

5.5. Diffuse Axonal Injury (DAI)

5.5.1. A marked discrepancy between the highly abnormal neurologic examination findings and the lack of findings on computed tomography is observed.

5.6. Penetrating Head Injuries

5.6.1. They should be considered neurosurgical emergencies because rapid deterioration and fatal hemorrhages may ensue.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Compressible location or hemorrhage?
  - Bleeding controlled?
  - Inquire about amount of fluids/blood that has been administered.
    - If more than two units of Packed Red Blood Cells (PRBC) have been transfused, request emergency release FFP or matched FFP and platelets to be available for the flight crew.
  - Important labs calcium (iCa), INR and lactate

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Blood Sweep/External hemorrhage control

1.3.1. Extremity Hemorrhage

1.3.1.1. Direct pressure on wound and cover if controlled, evaluate frequently.

1.3.1.2. Quickly apply tourniquet above the wound if not controlled with direct pressure.

1.3.2. Torso Hemorrhage

1.3.2.1. Direct pressure on wound.

1.3.2.2. Coverage of abdominal evisceration with sterile water and sterile dressing.

1.3.3. Scalp Hemorrhage

1.3.3.1. Direct Pressure on wound.

1.4. Reassure the patient and provide comfort.

1.5. Place patient in a position of comfort.

1.6. NPO

Hemorrhage Control Methods (BLS)

- Achieving hemorrhage control is key and should be considered as a component of the initial evaluation. The following mechanisms are approved for BLS personnel.
    - Direct Pressure
    - Elevation
    - Wound packing
    - Tourniquets (extremity)

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat hypotension (Desired MAP > 60) →See *Balanced Resuscitation in General Trauma Protocol*

2.2.1. Lactate Ringer is preferred but should be limited to maintain clinical perfusion. < 1.5 liters total

2.3. Limit fluids to maintain a MAP >60 or with signs of good perfusion.

2.4. Treat nausea/vomiting-→**See *Nausea/Vomiting Protocol***

2.5. Treat Pain- moderate/severe →**See *Pain Management Protocol***

2.6. Evaluate for TXA Administration

2.6.1. Criteria for administration (All three must be met):

2.6.1.1. Adult trauma patients (Age > 16 years of age)

2.6.1.2. Systolic BP < 90 or Heart Rate > 110

2.6.1.3. Within three hours from injury (Must be administered within three hours of injury)

2.6.2. If criteria are met, administer TXA.

2.6.2.1. **Mix 2 gm TXA** in 100 cc NS and infuse IV or IO over 10 minutes.

2.6.3.Postpartum hemorrhage[47]

2.6.3.1. TXA 2 grams over 10 minutes may repeat dose x 1 if bleeding continues after thirty minutes.

2.7. Refractory Hypotension

2.7.1. If the patient is hemorrhaging, blood is needed.

2.7.2. Lactated ringers are preferred fluid. Limit fluids once blood is available. Ideal < 1.5 liters total

2.7.3. There is **no need to start with fluids** before blood if there is evidence of active hemorrhage (if available).

2.7.4. If blood transfusion has started at the referring facility, request emergency released (or matched if available) Fresh Frozen Plasma (FFP) and Platelets.

2.7.5. Desired blood resuscitation is a 2-1-1 model of transfusion. 2 units of Packed Red Blood Cells (PRBC), 1 unit of Fresh Frozen Plasma. Whole Blood is preferred if available over above mention component therapy.

2.7.6. Paramedics initiate blood transfusion[48]. (if service carries blood or blood products)

2.7.6.1. Indication for blood usage is identical to the criteria for TXA administration or evidence of significant blood loss and impending decompensation. All blood orders should be given by medical control order when feasible.

2.7.7. To conserve valuable resources, all blood will need to be transported in an approved cooler or package and any unused blood is to be returned to the sending hospital.

2.7.8. Calcium Supplementation during transfusion

[47] As per WOMEN trial

[48] ALL PARAMEDICS will require in-service on documentation and common blood reactions.

2.7.9. Calcium-Chloride 1 gram IV after the first unit of blood and after every 4 units of blood products

Hemorrhage Control Methods (ALS)

- Achieving hemorrhage control is key and should be considered as a component of the initial evaluation. The following mechanisms are approved for ALS use in addition to above BLS measures:
  - TXA soaked gauze – wound packing (See Non-Compressible hemorrhage special
  - Commercially available hemostatic gauze (if available)
  - Junctional Tourniquet or improvised junctional tourniquet (Manual BP Cuff) (If available)

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Elevated INR or known use of Xa inhibitor oral anticoagulation → **See *Anticoagulation Reversal Protocol.***

3.2. Consider addition of vasopressin to maintain MAP of 60 in patient receiving blood products within 12 hours of injury.

3.2.1.1. Push Dose Vasopressin + Bolus for Hemorrhagic Shock

3.2.1.2. Draw up 20 units/1 mL (whole vial) in 10 mL syringe.

3.2.1.3. Add all vasopressin to 100 mL bag of normal saline – final concentration 0.2 units/mL.

3.2.1.4. With 10 mL syringe still in bag, draw back 10 mLs in syringe – syringe contains 2 units/10 mLs.

3.2.1.5. Administer 2-unit bolus via IV push (central access preferred if available)

3.2.1.6. Infusion contains 18 units/90 mL, program IV pump to give 12 mL/hr which is 0.04 units/minute.

3.2.1.7. Vasopressin infusion Y-site compatible with Lactated Ringer's; will last 6 – 7.5 hours depending on volume used to prime line.

3.3. If two units of plasma is given and patient is actively bleeding without additional blood product- 4f-PCC (KCentra®) should be considered at a dose of 1000 U IV Push

3.4. Calcium Supplementation during transfusion

3.4.1.1. Calcium-Chloride 1 gram IV after the first unit of blood and after every 4 units of blood products

3.4.1.2. Goal iCa^{2+} 1.2 – 1.25 mmol/L

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. See above.

Special Recommendations/Notes

5. Specific considerations:

5.1. Initiating TXA greater than 3 hours after injury may increase morbidity and mortality.

5.2. Hypersensitivity to TXA is the only contraindication.

5.3. In the elderly or those on anticoagulation with an elevated INR and traumatic bleeding, giving KCentra should take priority over TXA.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).

- Document response to treatments and medications.

Identification of Hemorrhage to cause hypotension.

Identification of Hemorrhage to cause hypotension.

The importance of identification of hemorrhage location is key BEFORE and DURING continued blood resuscitation. Bleeding in the chest, ABD (retroperitoneal, peritoneal) thigh and street are the only places blood can accumulate causing clinical hypotension. The location of bleeding should be established or at least ruled out and guide continued blood resuscitation.

Non-Compressible Hemorrhage Wound Packing

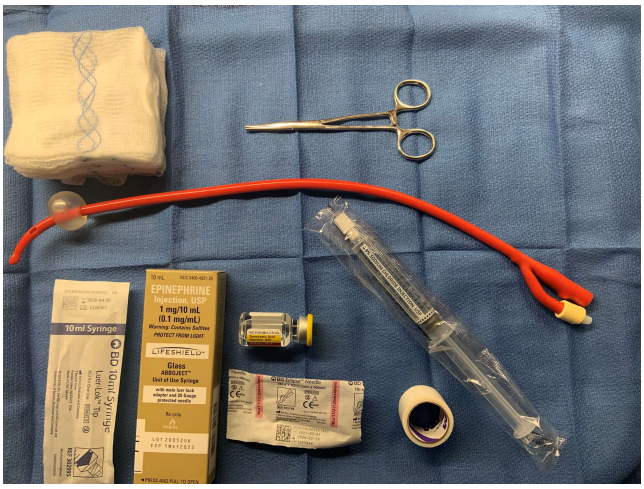
The importance of bleeding cannot be understated. Uncompressible sites like groin, neck, supraclavicular or sites where there is an isolated wound (GSW) can benefit from localized wound packing and targeted pressure. The use of tourniquets in these areas often presents little benefit and increases the risk of limb ischemia. The non-compressible hemorrhage kits (NCHK) include the following items:

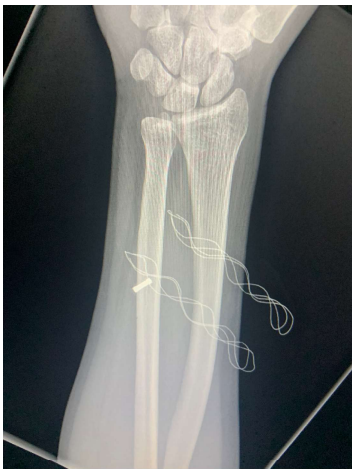
- 18 French coude catheter
- X-ray detectable gauze (See picture) x 10.
- Hemostats
- 10cc Normal Saline Flush
- TXA and 1:10;000 EPI (in medication bag)

*Sterility is important- but time to pack and complete this is more important thus this procedure should be done with infection control procedures

Procedure:

- Identify the bleeding area with gloved finger or by sight.
- Place the catheter into the wound and inflate balloon with 5cc of saline.
- Pack wound with x-ray detectable gauze- can soak with 500mg of TXA prior to insertion.
- Tape the catheter to the skin with the hemostat clamped on the tube. If bleeding continues, paramedics can inject 5cc of Epinephrine (1:10,000) down foley (IM injection) or 500mg of TXA down foley followed by a flush of 10cc of normal saline.
- Localized bleeding control is much preferred than systemic or limb ischemia methods with tourniquets.
- On arrival at the hospital, an x-ray will identify the foley and gauze packed into the wound. (see below)





Tourniquet Take-Down

There will be occasions when tourniquets are placed and can take down due to ineffective placement or improved clinical conditions. The chart should reflect the reason for take down, time and assessment after taking down. (ALS Procedure)

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Document OSH/Treating provider contact of local law enforcement (Name/Phone number)
  - Document which OSH/treatment provider has contacted Department of Human Services (Name, Phone number of case worker and case number)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to **the *Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Place patient in a position of comfort.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Treat underlying conditions/injuries according to relevant protocol.

2.2. Report findings and suspicions to accepting physician and nurse taking over primary care.

2.2.1. Document those findings in your clinical record.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. No additional treatment or exam needed → treat patient based on relevant protocol(s).

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. The perpetrator of the trauma might be family members.

4.2. It is especially important to have a high index of suspicion for abuse in children presenting with an Apparent Life-Threatening Event (ALTE). Of the serious cases of ALTE, child abuse has been found in as many as 11% of cases. One retrospective review noted that a call to 911 for ALTE was associated

with almost five times greater odds of abusive head trauma being diagnosed as the cause of the ALTE, clearly emphasizing the high index of suspicion EM providers must have when responding/transporting these patients.

Special Recommendations/Notes

5. Nothing specific

Documentation

- Document in the patient's own words what happened or what was reported by family/bystanders. If the pattern is not known, do not speculate in your assessment and documentation.
- Document name of physician and primary person in the receiving ED that you reported the concern to on the patient care report.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Injury Mechanism?
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Reasons for transfer

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Manage the patient based on the ***General Trauma Protocol***.

1.4. Reassure the patient and provide comfort.

1.5. Place patient in a position of comfort.

1.6. Assess injured extremity for pulse, motor, and sensation.

1.6.1. Splint the joint above and below the injury site.

1.6.2. Splint in position found unless there is a loss of pulse.

1.6.2.1. In the case of loss of pulse, make one movement to anatomical position and splint.

1.7. Open Fracture?

1.7.1. Provide copious sterile water or saline flush to the injury area and cover with sterile moist dressing.

1.8. Suspected Pelvic Fracture

1.8.1. Bind pelvis with commercial device (preferred) or sheets.

1.8.2. Monitor blood pressure closely.

1.9. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. IV Fluid Administration

2.2.1. At minimum, maintenance rate of normal saline.

2.3. Treat nausea/vomiting-→ **See *Nausea/Vomiting Protocol.***

2.4. Treat pain- moderate/severe → **See *Pain Management Protocol.***

2.5. Open Fractures:

2.5.1. Provide area cleaning and gross decontamination/wash out with sterile water/saline with 1:10 dilute betadine for at least 500cc. Suggested using IV tubing or NG tube to provide steady wash out flow.

2.5.2. Once stabilized, provide additional care for open fractures: antibiotic coverage.

2.5.2.1. Ceftriaxone 2 grams IV push over 5 minutes x 1 (only patients > 12 y/o)

2.5.2.1.1. Pediatric: Ceftriaxone 50 mg/kg max 1 gram IV x 1

2.5.2.2. Any patients receiving antibiotics should receive an armband indicating dose and time.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1.1. None-specific to pediatrics

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.

4.1.1. Provide 20cc/kg bolus and repeat if necessary.

4.1.2. Start maintenance fluids for transfers → see Pediatric Information on *General Patient Transport Protocol.*

Special Recommendations/Notes

5. Extremity Trauma:

5.1. Patients with hard signs of a vascular injury (e.g., pulsatile bleeding, expanding hematoma, distal ischemia) should be taken directly to the operating room for further examination and management.

5.2. For extremity hemorrhage that is not adequately controlled with direct pressure, place an extremity tourniquet.

5.3. Systemic antibiotics should be started at the time of the diagnosis of open fracture. Antibiotics should be given within six hours of trauma. Transport crews should evaluate the chart for correct doses and ensure that the correct antibiotics were given.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - Specific fracture or injury (to include level and type fracture)
  - Other injuries?
  - Neurological dysfunction? If so, what level? Has it changed?

****This protocol is intended for known spinal injuries after evaluation in an Emergency Department****

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Provide cervical precautions.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat hypotension (Desired MAP 85-90 mmHg).

2.2.1. Crystalloid fluids preferred (no more than 2 liters of crystalloid).

2.2.2. Refractory to fluid administration → Consider vasopressors.

2.3. Patients in transfer (after fracture has been determined)-

2.3.1. Shall always remain in cervical collar and in-line spinal precautions.

2.3.2. The head of bed can be elevated to no greater than 30 degrees.

2.3.3. Spinal immobilization can be achieved without the need for long spine board immobilization in transfer. This is the recommended transfer method.

2.3.4. If the transport crew is uncomfortable with transporting without the spinal board, the board should be padded, and patient should be secured to the board.

2.4. Treatment goals focus on the following:

2.4.1. Prevent hypotension.

2.4.1.1. Hemodynamically significant bradycardia— Follow ACLS/PALS guidelines.

2.4.1.2. Vasopressors are rarely indicated but can be used in fluid refractory hypotension.

2.4.1.3. Epinephrine should be a pressor of choice.

2.4.2. Prevent hypoxia.

2.4.3. Prevent hypothermia.

2.5. Treat nausea/vomiting-→**See *Nausea/Vomiting Protocol.***

2.6. Treat pain- moderate/severe →**See *Pain Management Protocol.***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Determine stability of fracture (see below)

3.1.1. High cervical fractures that are mechanically unstable, consider risk/benefits of advanced airway management.

3.2. Monitor Blood Pressure

3.2.1. MAP should be 85-90 mmHg.

3.2.2. Consider an arterial line if hypotensive or variable readings from non-invasive BP.

3.2.3. Perform eFAST exam.

3.2.4. Search for other causes of hypotension.

3.3. Prevent hypotension and bradycardia – both are indications of high cervical disruption.

3.4. Labs- POCT Testing

3.4.1. Review labs from OSH if available.

3.4.2. If there are no labs available or there is an abnormal finding-

3.4.3. Repeat abnormal findings:

3.4.3.1. Ensure that the following labs have been drawn/reviewed/documented:

3.4.3.1.1. Hb/Hct

3.4.3.1.2. Lactate

3.4.3.1.3. INR

3.4.3.1.4. Potassium/BUN/Cr

3.5. Suspect Neurogenic Shock

3.5.1. Once occult sources of hemorrhage have been excluded, continue with evaluation and treatment of neurogenic shock.

3.5.2. Treat neurogenic problems

3.5.2.1. Urine output should be more than 30 mL/h; placement of a Foley catheter to monitor urine output and to decompress the neurogenic bladder is essential.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Evaluate for dehydration.

4.2. Provide 20cc/kg bolus and repeat if necessary.

4.3. Start maintenance fluids for transfers→ **See *Pediatric Infusion Protocol***

Special Recommendations/Notes

5. Spinal Trauma:

American Spinal Injury Association (ASIA) Classifications

5.1. Complete: Absence of sensory and motor functions in the lowest sacral segments.

5.2. Incomplete: Preservation of sensory or motor function below the level of injury, including the lowest sacral segments.

5.2.1. Incomplete cord lesions may evolve into more complete lesions.

5.3. Spinal cord injury can be sustained through different mechanisms:

5.3.1. Destruction from direct trauma.
5.3.2. Compression by bone fragments, hematoma, or disk material.
5.3.3. Ischemia from damage or impingement on the spinal arteries.

5.4. Primary spinal cord injuries arise from mechanical disruption, transection, or distraction of neural elements. This injury usually occurs with a fracture and/or dislocation of the spine.

5.5. Secondary spinal cord injuries occur from hypotension and edema. Vascular injury to the spinal cord caused by arterial disruption, arterial thrombosis, or hypoperfusion due to shock are the major causes of secondary spinal cord injury. Anoxic or hypoxic effects compound the extent of spinal cord injury.

5.6. 5-10% of unconscious patients who present to the ED as the result of a motor vehicle accident or fall have a major injury to the cervical spine.

5.7. Specific cervical injuries based on their degree of mechanical instability[49]:

5.7.1. Rupture of the transverse ligament of the atlas
5.7.2. Fracture of the dens (odontoid fracture)
5.7.3. Burst fracture with posterior ligamentous disruption (flexion teardrop fracture)
5.7.4. Bilateral facet dislocation
5.7.5. Burst fracture without posterior ligamentous disruption.
5.7.6. Hyperextension fracture dislocation
5.7.7. Hangman fracture
5.7.8. Extension teardrop (stable in flexion)
5.7.9. Jefferson fracture (burst fracture of the ring of C1)
5.7.10. Unilateral facet dislocation
5.7.11. Anterior subluxation
5.7.12. Simple wedge compression fracture without posterior disruption
5.7.13. Pillar fracture
5.7.14. Fracture of the posterior arch of C1
5.7.15. Spinous process fracture (clay shoveler fracture)

6. Penetrating neck trauma- careful consideration should be used before giving a paralytic as the medication can paralyze the neck muscles and lead to rapid expansion of hematomas causing rapid airway failure.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

[49] Trafton PG. Spinal cord injuries. Surg Clin North Am. Feb 1982;62(1):61-72.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
- Interfacility Transports/HPI Documentation:
  - Specific imaging data obtained/resulted.
  - How long was the patient submerged?
  - Time to effective BLS? (Estimated)
  - Time of resuscitation on scene/in hospital
  - Diving accident water depth
  - Water/ambient temperature (Estimated)
  - Drugs/alcohol involved?

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Reassure the patient and provide comfort.

1.4. Consider cervical spinal cord injury IF concerning or unknown mechanism.

1.5. If the known mechanism doesn't include trauma, no spinal immobilization is required.

1.6. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. Treat hypotension (Desired MAP > 70).

2.2.1. Volume resuscitation (Vasodilation secondary to acidosis).

2.2.2. A fluid bolus of 1 liter for adults (20cc/kg pediatrics) may be needed.

2.2.3. Inotropic support may be required.

2.3. Capillary blood sugar should be obtained → **See *Critical Electrolyte Protocol***.

2.4. Continued AMS → **See *Altered Mental Status Protocol.***

2.5. Patients > 30 years of age

2.5.1. Perform 12 lead EKG.

2.6. Temperature Management

2.6.1. Wet clothes should be removed.
2.6.2. Core/Axillary temperature should be measured.
2.6.3. Refer to *Hypothermia Protocol* if hypothermic.

2.7. Treat nausea/vomiting→ See *Nausea/Vomiting Protocol.*

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Advanced Airway Management
3.1.1. Elective intubation shall have a low threshold.
3.1.2. PEEP may be needed to improve oxygenation due to poor lung compliance.

3.2. POCT Labs (Repeat critical labs or ensure complete labs documented).
3.2.1. Chemistry
3.2.2. Hb/Hct
3.2.3. Lactate

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. See above.

Special Recommendations/Notes

5. Special Considerations/Precautions

5.1. Prepare for vomiting on all submersion injury patients.

5.2. Following factors at presentation have been associated with poor prognosis:
5.2.1. Duration of submersion > 10 minutes
5.2.2. Time to effective BLS > 10 minutes
5.2.3. Resuscitation duration >25 minutes
5.2.4. Water Temperature <10°C (50°F)
5.2.5. Age < 3 years
5.2.6. Glasgow Coma Scale < 5
5.2.7. Arterial blood pH <7.1

5.3. Pathophysiology/Disease Process

5.4. Type of Submersion Injury
5.4.1. Cold water: cold-water drowning occurs at water temperatures of less than 20°C. (68°F) Although ice-cold water has been reported to be protective, especially in young children, prolonged immersions can nullify the effect of temperature on survivability.
5.4.2. Warm water drowning occurs at water temperatures of 20°C or higher.

5.5. Pathophysiology Process
5.5.1. Hypoxia and acidosis are the result of hypoxia and decreased gas-exchange leading to multiple organ failure.

5.6. Pulmonary Injury:
5.6.1. As little as 1-3 mL/kg of fluid leads to significantly impaired gas exchange, bronchoconstriction, pulmonary edema which continues to decrease air exchange and oxygenation.

Documentation

- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset of symptoms/injury/illness
  - Situation surrounding insult.
- Interfacility Transports/HPI Documentation:
  - Time of presentation
  - Specific imaging data obtained/resulted.
    - Labs requested be obtained, if possible, Glucose, Sodium, Lactate
  - Time of Intubation?

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess patient and treat according to the **Patient Preparation and General Transport Protocol**

1.2. Provide supplemental oxygen as needed according to the **Oxygen Administration and Management Protocol**

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Obtain capillary blood glucose.

2.2. Ensure IV Access

2.3. Monitor EKG

2.4. Administer 20 cc/kg bolus up to 1.5 liters for suspected dehydration.

2.4.1. Call Medical Control if the patient remains dehydrated for additional bolus.

2.5. Continue isotonic saline solution administration at 1 – 1.5 times maintenance rate.

2.6. Supportive care as applicable

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Advanced Airway Management

3.1.1. Elective intubation shall have a low threshold in patients with altered mental status.

3.2. POCT Labs (Repeat critical labs or ensure complete labs documented)

3.2.1. Sodium

3.2.2. Glucose, ABG or VBG, BUN, Cr

3.2.3. Lactate, serum osmolality if available.

3.3. Acute or Chronic symptomatic adult patients (Sodium <130 mEq)

3.3.1. If actively symptomatic (altered mental status and/or seizures) and unresponsive to traditional seizure management with known hyponatremia administer 100 ml 3 % hypertonic saline over 10 minutes.

3.3.2. If seizures do not resolve up to 2 additional bolus doses can be administered for a total of 300 ml, serum sodium must be re-checked between administration of additional bolus doses.
3.3.3. If seizures continue contact medical control
3.3.4. Once seizures cease, contact medical control for orders for additional sodium replacement.
3.3.4.1. See Sodium Correction Calculation for additional guidance with medical control orders.

3.4. Asymptomatic adults (Sodium <130 mEq/L)
3.4.1. Monitor sodium with checks every hour.
3.4.2. Provide 100 ml/hr. 0.9% saline or contact medical control.
3.4.3. Continue to monitor patients for signs and symptoms of further decrease in sodium.

3.5. Visualize CXR or CT imaging results if available.

3.6. Obtain best history with co-morbidities possible.
3.6.1. Including medications as they can be a contributing factor.

3.7. Assess underlying disease process and situation surrounding insult and injury.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. Acute symptomatic patients with seizures and altered mental status should have sodium replacement therapy.

4.1.1. Contact Medical Control

4.1.1.1. Typical dose is 3 – 5 mL/kg bolus over 10 minutes.

4.2. All other patients with hyponatremia contact medical control for any sodium replacement therapy if desired and clinically indicated.
4.2.1.See sodium correction calculation below if applicable.

Special Recommendations/Notes

5. Special Considerations/Precautions

5.1. The goal in acute patients is to raise the sodium 4 – 6 mEq/L to prevent herniation and resolve any seizures if present.

5.2. Osmotic demyelination syndrome (ODS)
5.2.1.Can occur from prolonged periods of hyponatremia or overcorrection of sodium within a short time (over 10 mEq/L increase in 24 hours has been seen)
5.2.2.Can present itself quickly or up to several days after (coma, dysarthria, confusion)
5.2.3.Patients with chronic hyponatremia are more susceptible and it is recommended to only have a correction of 4 to 6 mEq/L over 24 hours.

6. Sodium Correction Calculation

6.1. Correction Factor
6.1.1.Men = 0.6
6.1.2.Women = 0.5
6.1.3.Elderly women = 0.45

6.2. Sodium Concentration of IV Fluids
6.2.1.0.9 % Saline – 154 mEq/L
6.2.2.3% Hypertonic Saline – 513 mEq/L

6.3. $Expected\ Change\ in\ Na = \frac{(Fluid\ Na\ Content - Seru\quad Na)}{(Correction\ Factor \times Weight\ (kg) + 1)}$

6.4. $Liters\ Infusate = \frac{Serum\ Na - Goal\ Na}{Expected\ Chang\ \ in\ Na}$

6.5. $Hours\ to\ Correct = \frac{Serum\ Na - Goal\ Na}{0.5}$

6.6. $Infusion\ Rate = {Liters\ Infusate}/{Hours\ to\ Correct}$

Additional resources and information obtained from the following:

https://www.uptodate.com/contents/overview-of-the-treatment-of-hyponatremia-in-adults?csi=560444dd-114b-4bd9-ac09-13320ce38879&source=contentShare

https://www.uptodate.com/contents/overview-of-the-treatment-of-hyponatremia-in-adults?csi=560444dd-114b-4bd9-ac09-13320ce38879&source=contentShare

https://www.uptodate.com/contents/hyponatremia-in-children-evaluation-and-management?csi=22d73051-afe0-41c2-a041-85c9cf2c6a4c&source=contentShare

https://www.uptodate.com/contents/overview-of-the-treatment-of-hyponatremia-in-adults?search=sodium%20correction%20calculator&sectionRank=2&usage_type=default&anchor=H25&source=machineLearning&selectedTitle=2~150&display_rank=2#H3149766981

Bhan, Ishir. (2014). Nephromatic intelligent renal calculator. http://www.nephromatic.com/sodium_correction.php

Special Operations Protocols

HPI/Pre-arrival Information

This protocol is intended for use on public safety incident scenes and any other event approved by the medical director.

- Important Information
  - Type of incident
  - Equipment used (personal protective, law enforcement, etc.)
  - Temperature (to include heat index or wind chill)
- Rehabilitation Site Location
  - Choose a site for rehab that is preferably out of the environmental conditions, away from the psychological stressors of the event/incident and is in contact with incident command.
- Public Safety Screening Exam
  - Consist of two components
    - BLS evaluation (Vitals)
    - ALS evaluation (symptoms, signs or referred professionals from BLS)
  - Should be performed on all participates on scene (including command staff)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Patient without complaints→ **Public Safety SCREENING Exam (BLS)**

1.1.1. Evaluate patient's pulse rate.

1.1.1.1. Is the pulse rate > 85% of upper limit of HR for age (See below)

1.1.1.1.1. If yes, then have the patient sit out for 2 minutes.

1.1.1.1.2. Then check orthostatic vital signs; if positive (pulse > 20bpm or systolic BP < by 20mmHg) refer for IV hydration, removal from environment.

1.1.1.2. If pulse is normal, check blood pressure, if SBP > 200 or DBP >110 → **refer to ALS evaluation- Remove from environment.**

1.1.2. If BP and Pulse are normal- evaluate RR

1.1.2.1. If RR <8 or > 40 → removal from environment for 10 minutes, then re-evaluation by ALS provider.

1.1.3. If all other vitals are normal, check temperature (oral or axillary).

1.1.3.1. Temperature > 101 (two minutes after oral fluids), remove from environment and refer to ALS care.

1.1.4. If all the vitals above are within parameters, the public safety professional shall be allowed to return to full duty.

1.1.5. Professionals shall be encouraged to drink fluids, remove him/herself from the scene and cool down/warm up for a period of 10 minutes before returning to full duty.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. IV Hydration Required:

2.1.1. Public safety professionals with an elevated HR > 85% of the maximum (below) should be removed from the fire scene and provided IV hydration. Up to 2 liters of NS should be given.

2.1.1.1. If anytime during evaluation of the patient a complaint of anything other than fast HR should be transported to the ED.

2.1.1.2. After the two liters reevaluate patient through Public Safety Screening Exam.

2.1.1.3. If normal, the patient may return to the scene but not in an active role. Incident Commander/Safety Officer should be notified as appropriate.

2.1.1.4. If abnormal, the patient is transported to ED.

2.2. Cooling Protocol

2.2.1.1. Removal from environment

2.2.1.2. Location of rehab center in shade

2.2.1.3. Removal of protective gear (Bunker gear, SWAT gear, Bomb Suit)

2.2.1.4. Immersion of forearms in water

2.2.1.5. Cool misting and evaporative cooling with fan

2.2.1.6. DO NOT place wet towels on your face, head, or neck- RISK of steam burns are increased.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. CCT providers providing Medical Support Team (MST) support have approval to give additional fluids or prophylaxis fluids for longer operations.

3.2. Daily communications with the medical director about hydration and team health are required.

Pediatric Specific Protocols

4. Pediatric Specific Protocols

4.1. This protocol is not intended for pediatric populations.

Special Recommendations/Notes

5. Rehabilitation specific considerations:

5.1. On fire scenes, HAZMAT operations and EOD missions, the minimum recommended time between rehab personnel evaluation is 45 minutes (2 30-minute cylinders or 1 60-minute cylinder). This is the minimum. Rehab rotation times should be considered on a case-by-case method.

5.2. Public safety professionals can be discharged from rehab and IV can be discontinued.

5.3. This is ONLY for public safety- other events are up the medical director.

5.4. Any patient complaining of a headache, nausea and vomiting, or shortness of breath shall be given 100% oxygen and have a low threshold for transport to the hospital, especially in smoke exposure.

Documentation

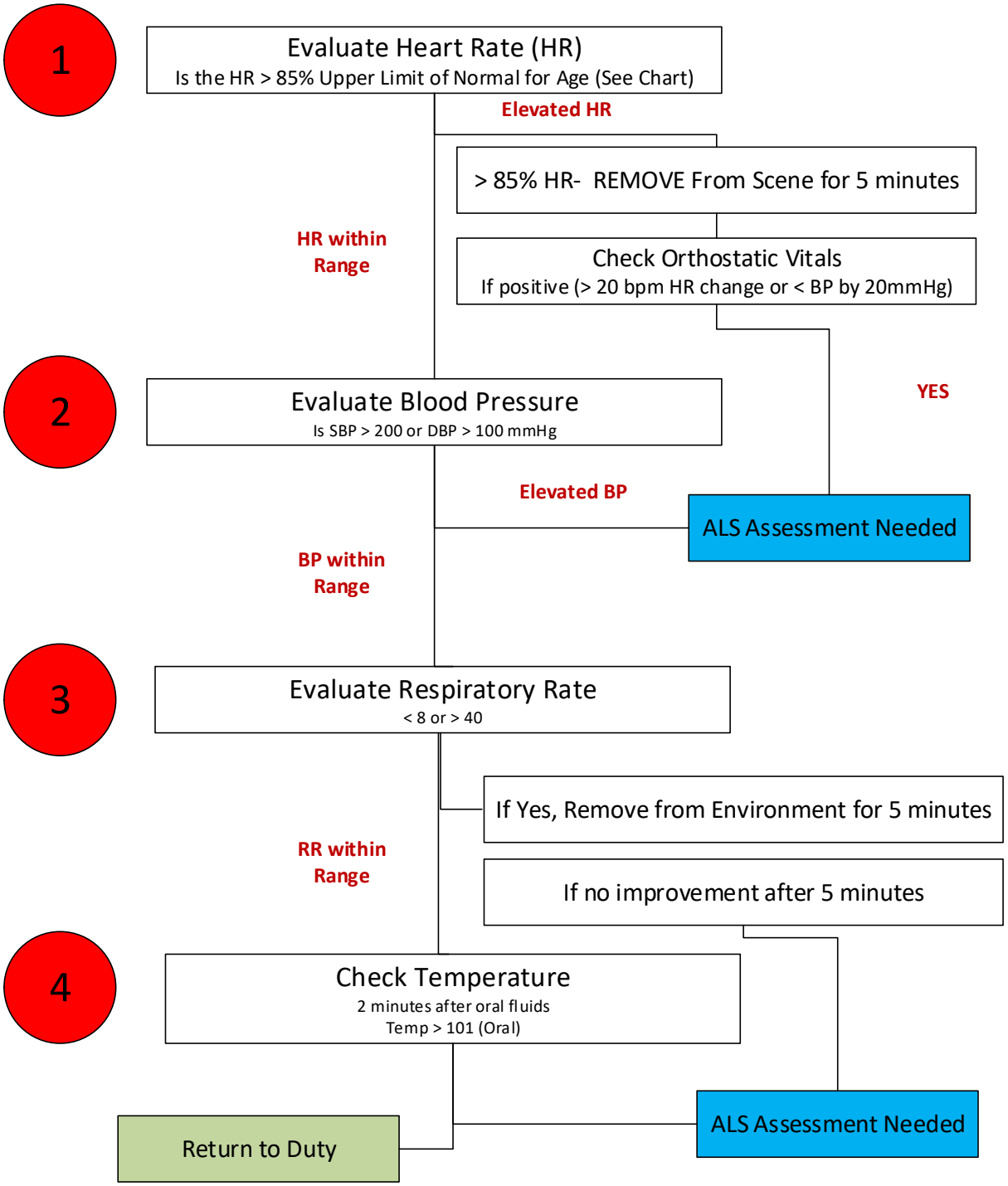
- Document abnormal or relevant normal labs in the chart (Point of Care or Transfer Labs).
- Document response to treatments and medications.

Age-Predicted 85% Maximum Heart Rate[50]	
Age	**Heart Rate**
20-25	**170**
25-30	**165**
30-35	**160**
40-45	**152**
45-50	**148**
50-55	**140**
55-60	**136**
60-65	**132**

[50] NFPA

Public Safety Screening Exam

Public Safety SCREENING Exam



HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Incident Data
  - Scene safety for incoming transport crews
- Interfacility Transports/HPI Documentation (MCI Response to Hospitals)
  - Who is the incident commander?
  - How many patients?
  - What resources are limited?

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Most experienced EMT-Basic or designee should be assigned scene triage.

1.2. If no scene triage has been completed on arrival of transport asset (Helicopter, Ambulance or Specialty Ambulance), triage should be briefly accomplished by one team member. Preference should be given to that crew member that has the most pre-hospital experience.

1.3. Perform SALT triage (See below).

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Advanced clinicians shall remain in the treatment area (or a transport crew member).

2.2. Provide advanced care as needed but limited to interventions of life-threatening conditions.

2.2.1. Control major hemorrhage (tourniquet application).

2.2.2. Open airway (2 rescue breaths for pediatric patients).

2.2.3. Chest decompression

2.2.4. Auto injectors (Chemical exposure)

2.3. Transport of critical patient shall be started after triage is complete AND there is a person remaining on scene to coordinate response. That person can be:

2.3.1. Known EMT, Paramedic or on-duty transport nurse.

2.3.2. response team or medical director(s)

2.4. At time of transport→ follow specific protocol based on patient's injuries and/or illness.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. Responding CCT assets are designed for transport assets only unless:

3.1.1. Assistance is needed in triage or determining scope of emergency.

3.1.2. Transport crew determines the patient volume and severity; they are better value to remain and assist in triage and patient sorting.

Pediatric Specific Protocols

4. Pediatric Specific Protocols
   4.1. No specific recommendations

Special Recommendations/Notes

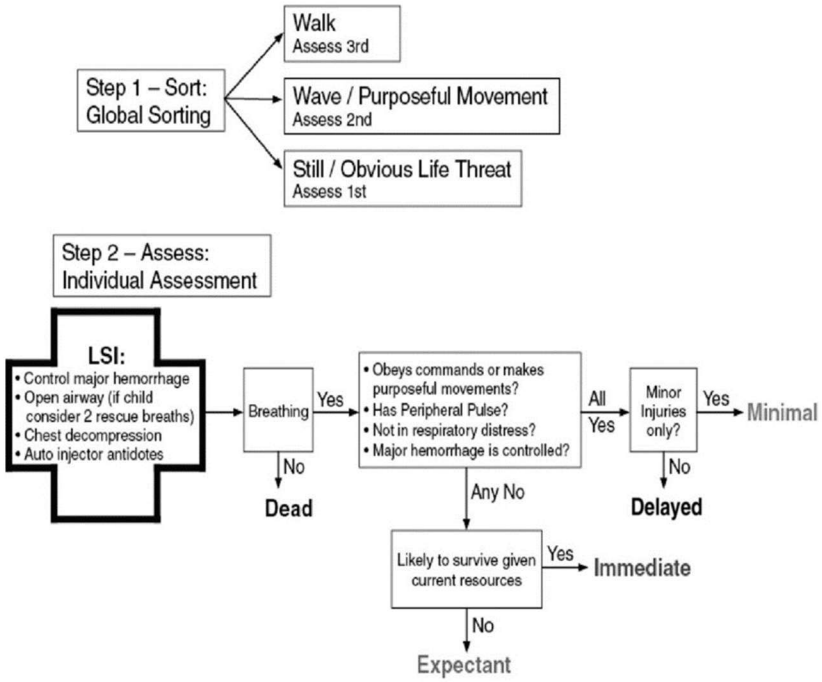
5. Special Recommendations/Notes
   5.1. MCI considerations:
   5.2. Usually most of the initial victims will be the least injured, they were more mobile and able to get out of the building.
   5.3. Keep walking patients out of the ED until you know that you have room and resources to treat them; put them at triage and in the lobby areas and get personnel out there to screen them.
   5.4. Keep them busy – have them fill out the top paper section of their patient encounter (clipboards and forms are in the triage bins) or have them assist other patients – provide support, etc.

Documentation

- Initial documentation of treatment on scene can be limited to triage tags.
- All advanced procedures or actions on scene shall be recorded to the best of the ability of the crews on scene and should be reviewed in a medical after-action review/report with the program director and medical director.

SALT Triage Method

Source: NDLSF



paladin	Vaccination (S-003)	Protocol #	S-003
		Effective Date	9/1/2014
		Revision Date	4/17/2017
		Reviewed	6/26/2024

HPI/Pre-arrival Information

- This protocol is intended for disaster response and public safety support.

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Gather demographic information and allergies.

1.2. Reassure the patient and provide comfort.

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Refer to medically approved guidance for the specific public health program under which vaccine will be administered.

2.2. Confirm patient eligibility for vaccine; assess patient for contraindications and allergies.

2.3. Administer vaccine by an appropriate route.

2.4. Complete documentation as specified in the approved guidance or operations manual.

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. No specific protocols

Pediatric Specific Protocols

4. Pediatric Specific

4.1. No Specific protocols

Special Recommendations/Notes

5. Specific considerations:

5.1. Refer to the guidance/vaccine information for details.

Documentation

- Document as described above in a patient log or chart.

HPI/Pre-arrival Information

- Scene/Interfacility Transports:
  - Demographic Data
  - Onset
  - Suspicion of intoxicants/drug use
  - Type of weapon used (Direct contact vs. barbed darts)

Level I Protocol (Basic Life Support)

1. Level I Protocols

1.1. Assess the patient and treat them according to the ***Patient Preparation and General Transport Protocol.***

1.2. Provide supplemental oxygen as needed according to the ***Oxygen Administration and Management Protocol.***

1.3. Make sure the patient is appropriately secured or restrained with the assistance of law enforcement to protect the patient and staff.

1.4. Perform medical and trauma review to ensure no medical alert tags, traumatic or other cases of excited state can be determined.

1.5. NPO

Level II Protocols (Advanced Life Support)

2. Level II Protocols

2.1. Ensure IV Access

2.2. All patients will receive a 12 lead EKG (unless combative- then document).

2.3. Ensure proper restraints→**See *Behavioral Protocol***

2.4. Treat nausea/vomiting-→**See *Nausea/Vomiting Protocol***

2.5. Treat pain- moderate/severe →**See *Pain Management Protocol***

Level III Protocols (Critical Care)

3. Level III Protocols

3.1. No specific recommendations

Pediatric Specific Protocols

4. Pediatric Specific

4.1. See above.

Special Recommendations/Notes

5. Specific considerations:
   5.1. Conducted electrical weapons can be discharged in two fashions- direct contact without the use of darts or from 35 feet with two darts. The device delivers 19 pulses per second with an average current per pulse of 2.1 milliamps which in combination with toxins/drugs, patient's underlying diseases, excessive physical exertion or trauma may precipitate arrhythmias, thus consider ECG monitoring and 12 lead assessment.
   5.2. Evaluate patient for other causes of excited delirium.
   5.3. Do not remove the barbs unless they compromise clinical care (CPR, restraints, etc.).

Documentation

- Document above in chart.

Dispatch Information

1. **Dispatch Process**
   1.1. All 911 and emergency calls will be properly screened via the established Emergency Medical Dispatch (EMD) process.
   1.2. On-duty ambulances are dispatched on all calls as per EMD process[51].

Dispatch Levels and Response			
Dispatch Code	**Initial Response**	**CODE TYPE**	**Comments**
ECHO	ALS Sprint + BLS Unit	Lights/Siren	
DELTA	ALS Sprint + BLS Unit	Lights/Siren	*Can reroute ALS Sprint to ECHO*
CHARLIE	BLS Unit (ALS Sprint Notified)	Normal Driving	
BRAVO	BLS Unit	Normal Driving	
ALPHA	BLS Unit	Normal Driving	
OMEGA	BLS Unit	Normal Driving	

Scene Response

2. **Scene Response**
   2.1. If ALS is requested or dispatched to a scene- the paramedic will perform an ALS assessment and document triage, assessment and decision on transport location, mode (Emergency/Non-Emergency) and service level (ALS/BLS). If the call is BLS or is triaged to BLS, then the BLS senior provider will provide assessment, documentation, and care during transport. At any time, the BLS provider can request ALS intercept.
   2.2. If the clinical determination on an ALS dispatched call is that the patient can be transported by BLS provider, the paramedic shall document and return to service ensuring that there is clear communication to the transporting BLS unit on how to provide intercept. Ideally, in rural settings, the paramedic is advised to follow the BLS unit to the local hospital.
      2.2.1.The Paramedic will document an assessment of all patients he/she evaluates.
   2.3. If the clinical determination is that the call needs to remain an ALS call, then the provider will continue the care to the closest appropriate hospital (CAH). Care rendered and clinical documentation shall remain consistent AND include the decision to provide ALS transport.

Call Triage

3. **Multiple Calls/Patient Triage**

[51] Certified EMDs are trained through IAED Priority Dispatch

3.1. At times, there will be multiple patients or simultaneous calls requiring the on-duty paramedic to decide on which call or patient the paramedic should respond.

3.2. Multiple Calls in different locations:

3.2.1. The paramedic in discussion with dispatch and known information shall decide on which patient/call location has the most potential for material deterioration. EMD dispatch level should provide the initial information for triage decisions, followed by on-scene personnel information and then clinical judgement. The decision information and decision should be clearly communicated over the radio and in narrative form in the patient record.

3.3. Multiple Patients on same scene

3.3.1. Historically, multiple patients on a scene can be managed under triage systems- Please refer to protocol _____ for the specific guidelines. The on-scene medical commander (most senior EMT or Paramedic) shall provide triage.

3.3.2. The paramedic shall accompany the most critical patient(s) to the hospital.

Hospital Transfers

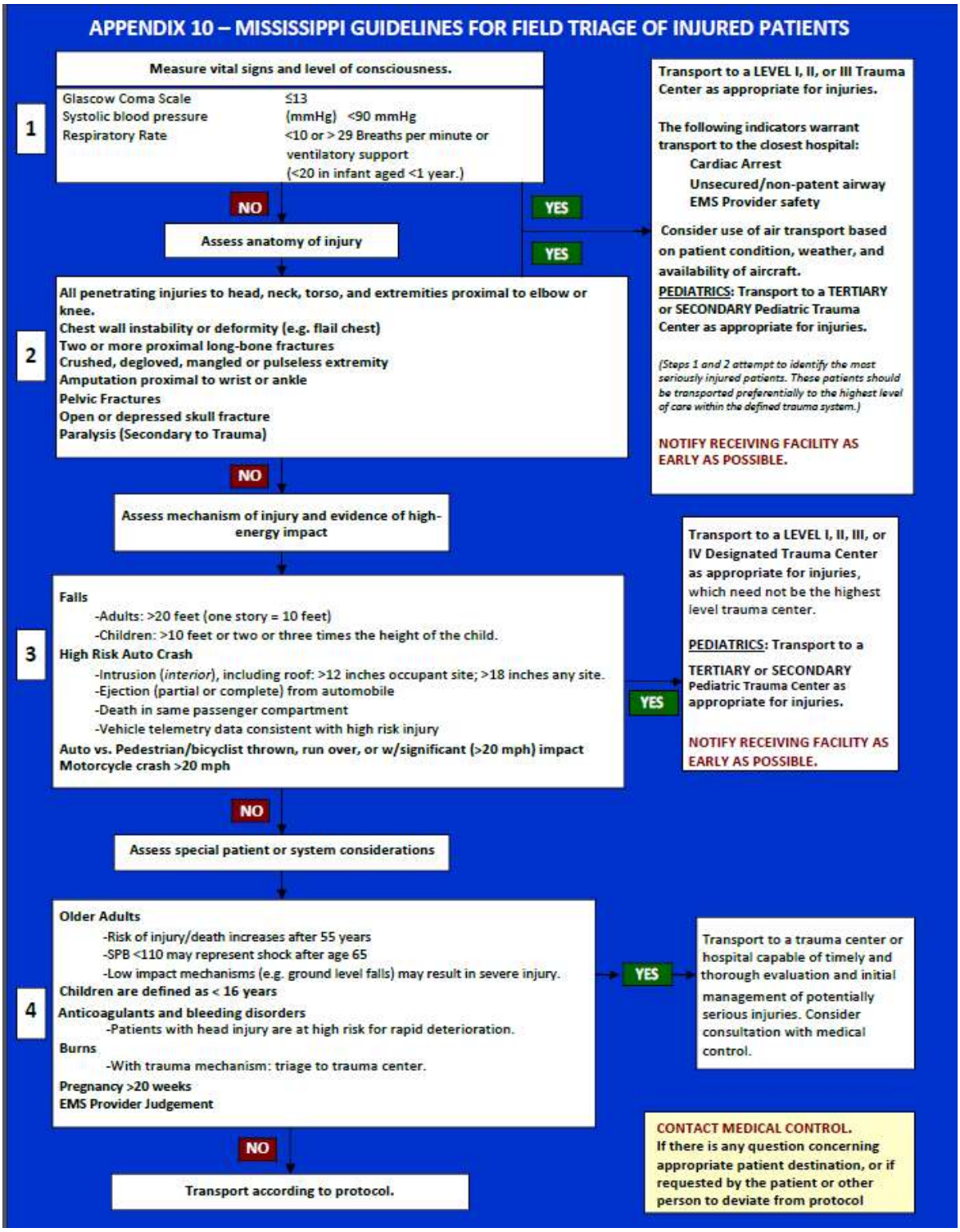
4. Hospital Transfers

4.1. Hospital transfers are to be called into the relevant dispatch center and appropriate forms completed. The sending provider will choose ALS or BLS as a mode of transfer. If ALS is determined, ALS Sprint and BLS Unit are to respond to the hospital. If after making assessment of the patient, if the on-duty paramedic believes that the transfer could go by BLS, then the paramedic will discuss with the sending provider. If there is a question, paramedics shall engage in on-line medical control.

Stand-by Events (Public Safety/Mass Gatherings)

5. Stand-by Events (Public Safety/Mass Gatherings)

Appendix A: Mississippi Trauma Destination Guidelines


APPENDIX 10 – MISSISSIPPI GUIDELINES FOR FIELD TRIAGE OF INJURED PATIENTS
Measure vital signs and level of consciousness.
1
Glascow Coma Scale ≤13
Systolic blood pressure (mmHg) <90 mmHg
Respiratory Rate <10 or > 29 Breaths per minute or ventilatory support (<20 in infant aged <1 year.)
NO
YES
Transport to a LEVEL I, II, or III Trauma Center as appropriate for injuries.
The following indicators warrant transport to the closest hospital:
Cardiac Arrest
Unsecured/non-patent airway
EMS Provider safety
Consider use of air transport based on patient condition, weather, and availability of aircraft.
PEDIATRICS: Transport to a TERTIARY or SECONDARY Pediatric Trauma Center as appropriate for injuries.
(Steps 1 and 2 attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of care within the defined trauma system.)
NOTIFY RECEIVING FACILITY AS EARLY AS POSSIBLE.
Assess anatomy of injury
YES
2
All penetrating injuries to head, neck, torso, and extremities proximal to elbow or knee.
Chest wall instability or deformity (e.g. flail chest)
Two or more proximal long-bone fractures
Crushed, degloved, mangled or pulseless extremity
Amputation proximal to wrist or ankle
Pelvic Fractures
Open or depressed skull fracture
Paralysis (Secondary to Trauma)
NO
Assess mechanism of injury and evidence of high-energy impact
3
Falls
-Adults: >20 feet (one story = 10 feet)
-Children: >10 feet or two or three times the height of the child.
High Risk Auto Crash
-Intrusion (interior), including roof: >12 inches occupant site; >18 inches any site.
-Ejection (partial or complete) from automobile
-Death in same passenger compartment
-Vehicle telemetry data consistent with high risk injury
Auto vs. Pedestrian/bicyclist thrown, run over, or w/significant (>20 mph) impact
Motorcycle crash >20 mph
YES
Transport to a LEVEL I, II, III, or IV Designated Trauma Center as appropriate for injuries, which need not be the highest level trauma center.
PEDIATRICS: Transport to a TERTIARY or SECONDARY Pediatric Trauma Center as appropriate for injuries.
NOTIFY RECEIVING FACILITY AS EARLY AS POSSIBLE.
NO
Assess special patient or system considerations
4
Older Adults
-Risk of injury/death increases after 55 years
-SPB <110 may represent shock after age 65
-Low impact mechanisms (e.g. ground level falls) may result in severe injury.
Children are defined as < 16 years
Anticoagulants and bleeding disorders
-Patients with head injury are at high risk for rapid deterioration.
Burns
-With trauma mechanism: triage to trauma center.
Pregnancy >20 weeks
EMS Provider Judgement
YES
Transport to a trauma center or hospital capable of timely and thorough evaluation and initial management of potentially serious injuries. Consider consultation with medical control.
NO
Transport according to protocol.
CONTACT MEDICAL CONTROL.
If there is any question concerning appropriate patient destination, or if requested by the patient or other person to deviate from protocol

Appendix B: Approved Procedures

Procedure	Frequency	EMT	EMT-A	Paramedic	CC Paramedic	Transport RN
Airway: Advanced Suctioning	Common			X	X	X
Airway: Basic Airway Adjuncts	Common	X	X	X	X	X
Airway: BiPAP	Common				X	X
Airway: CPAP	Common			X	X	X
Airway: Delayed Sequence Intubation	Common				X	X
Airway: High Flow Nasal Cannula	Uncommon				X	X
Airway: Nasal Intubation	Uncommon			X	X	X
Airway: Needle Cricothyrotomy	Uncommon			X	X	X
Airway: Oral Intubation	Common			X	X	X
Airway: Supraglottic Airway	Common		X	X	X	X
Airway: Surgical Cricothyrotomy	Uncommon				X	X
Airway: Video Assisted Airway	Common			X	X	X
Arterial Line Insertion: Femoral	NEW 2018				X	X
Arterial Line Insertion: Radial	Common				X	X
Arterial Line Insertion: Umbilical	Uncommon				X	X
Cardioversion	Common			X	X	X
Chest Decompression: Finger Thoracostomy	Common				X	X
Chest Decompression: Needle Thoracostomy	Common			X	X	X
Chest Decompression: Tube Thoracotomy	Common				X	X
Defibrillation	Common			X	X	X
Splinting- General	Common	X	X	X	X	X
Splinting- Traction	Common	X	X	X	X	X
Splinting: Cervical Immobilization	Common	X	X	X	X	X

Procedure	Frequency	EMT	EMT-A	Paramedic	CC Paramedic	Transport RN
Transcutaneous Pacing	Uncommon			**X**	**X**	**X**
Vascular Access: External Jugular	Common			**X**	**X**	**X**
Vascular Access: Femoral (Central)	Common				**X**	**X**
Vascular Access: Intraosseous	Common			**X**	**X**	**X**
Vascular Access: Umbilical	Uncommon			**X**	**X**	**X**
Ventilator: Critical Care (LTV)- Back-up Vent	Uncommon			**X**	**X**	**X**
Ventilator: Critical Care (Revel)	Common			**X**	**X**	**X**
Ventilator: Critical Care (Hamilton T-1)	NEW 2021			**X**	**X**	**X**
Ventilator: Transport	Common			**X**	**X**	**X**