Region 4 EMS Guidelines

(Except for Southwestern Illinois EMS System)

Adult Protocol Manual

2023 Version 1.0

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Preface

The following medical treatment protocols were developed for use by credentialed providers within the Alton Memorial Hospital EMS System, Anderson Hospital EMS System, HSHS St. Elizabeth's Hospital EMS System and OSF St. Anthony's Health Center EMS System. Optimal prehospital care results from a combination of careful patient assessment, essential prehospital emergency medical services and appropriate medical consultation. The purpose of this manual is to provide guidance for prehospital care providers within the four respective EMS systems. These protocols were adapted based on the NASEMSO National Model EMS Guidelines Version 3.0 AHA guidelines, as well as other evidence-based information from local and national standards.

The medical protocols are divided into different sections. The upper section includes three boxes (History, Signs and Symptoms and Differential) which serve as a guide to assist in obtaining pertinent patient information and exam findings as well as considering multiple potential causes of the patient's complaint. It is not expected that every historical element or sign / symptom be recorded for every patient, however the pertinent aspects shall be included in the patient evaluation. The protocol section describes the essentials of patient care. Virtually every patient should receive the care outlined in this section. However, each medical emergency must be dealt with individually and appropriate care determined accordingly. Professional judgment is mandatory in determining treatment modalities within the parameters of these protocols. Circumstances will arise where treatment may move from one protocol to another. The *'Pearls'* section provides key points and educational pearls regarding the protocol. The *'Key Documentation Elements'* and the *'Pertinent Assessment Findings'* sections serve to help the prehospital provider in appropriate documentation of the patient encounter. The final section, *'Quality Metrics'*, was added in an effort for continuous quality improvement. These metrics were based on the NASEMSO National Model EMS Guidelines Version 3.0 as well as metrics specific to the respective EMS systems.

From time to time, protocols may be added or revised. Additional recommendations are welcome and appreciated at any time. They may be submitted to any of the EMS offices listed below for consideration.

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Preface

Introductory Letter to our EMS Providers,

First, we are extremely grateful for the willingness of Dr. Kurt Bloomstrand MD and his team at OSF Healthcare to allow us to utilize their protocols as the foundation for what follows. The vision shared by all of us is to facilitate an integrative, high performance EMS systems by aligning with our partnered EMS agencies and providers to meet community-centered needs through clinical excellence, education, access and advocacy. These new protocols are one example of the multifaceted strategy we continue to take in order to achieve that vision. These protocols are intended to be the guidelines and framework of a team-based approach to prehospital care provided through the statutory authority of our EMS medical directors.

These protocols are a “living document” and are subject to continuous review for the sake of providing providers with the most current evidence-based treatment. Updates to these protocols will be made as needed to maintain a current standard of care. We welcome your input and encourage suggestions in an effort to deliver the highest quality of prehospital health care possible.

Sincerely,

Alex Zozula MD
EMS Medical Director
Alton Memorial Hospital EMS System

Andrew Russell MD
EMS Medical Director
Anderson Hospital EMS System

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Preface

The protocol section is divided and color coded based on the level of prehospital provider licensure.

Legend	Definition
	Emergency Medical Responder (EMR)
	Emergency Medical Technician (EMT)
	Paramedic/PHRN Only
	Medical Control

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Universal Patient Care

All Levels

Scene Size-Up

1. Ensure scene safety – identify any hazards.
2. Use appropriate personal protective equipment (PPE).
    a. Wear high-visibility, reflective apparel when deemed appropriate (e.g. operations at night or in darkness, on or near roadways).
3. Determine the number of patients.
4. Identify the mechanism of injury / nature of illness.
5. Call for additional resources if needed.
6. Consider declaration of Mass Casualty Incident (MCI), if needed.

Initial Assessment / Primary Survey

*(**A**irway, **B**reathing, **C**irculation is cited below; although there are specific circumstances where **C**irculation, **A**irway, **B**reathing may be indicated such as cardiac arrest or major arterial bleeding)*

1. Obtain a general impression of the patient's condition.
2. **A**irway
    a. Assess airway patency and open the airway as indicated (e.g. head-tilt chin-lift or jaw thrust).
    b. Establish patent airway with cervical spine precautions, per the AIRWAY MANAGEMENT and SPINAL MOTION RESTRICTION Protocol.
    c. For patients with laryngectomies or tracheostomies, remove all objects or clothing that may obstruct the opening of these devices, maintain the flow of prescribed oxygen and reposition the head and/or neck.
    d. Evaluate mental status for ability to protect airway (patients with a GCS less than or equal to 8 are likely to require airway protection).
3. **B**reathing
    a. Evaluate rate, breath sounds, accessory muscle use, retractions, patient positioning.
    b. Monitor oxygen saturation and, if indicated, provide supplemental **OXYGEN** with a target of achieving 94-98% saturation for most acutely ill patients. ****Exception**: ACS and CARDIAC ARREST Protocol.
    c. Apnea (not breathing) - go to the AIRWAY MANAGEMENT Protocol.
4. **C**irculation
    a. Control any major external bleeding. Refer to EXTREMITY TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol.
    b. Evaluate carotid and radial pulses. If no pulse go to CARDIAC ARREST Protocol
    c. Evaluate perfusion by assessing skin color, temperature, condition and capillary refill.
    d. Establish IV access and administer isotonic **IV FLUID** to a target of SBP = 90 mmHg or MAP = 65 mmHg. . **(ALS ONLY)**
5. **D**isability
    a. Asses Level of Consciousness:
        A – Alert; **V** – Responds to verbal; **P** – Responds to pain; **U** – Unresponsive
    b. Evaluate gross motor and sensory function in all extremities.
    c. Check blood glucose in patients with altered level of consciousness and refer to ALTERED MENTAL STATUS protocol as appropriate.
    d. If acute stroke suspected, refer to STROKE Protocol.
6. **E**xposure
    a. Rapid evaluation of entire body to identify injuries. Be considerate of patient modesty.
    b. Prevent hypothermia (remove wet clothing and cover patient to prevent further heat loss).
7. **Critical Transport Decision -** Refer to INTERCEPT CRITERIA Protocol.

Universal Patient Care

All Levels

Secondary Survey

The performance of the secondary survey should not delay transport in critical patients. Secondary surveys should be tailored to patient presentation and chief complaint.

A. Focused History

SAMPLE History
Signs and **S**ymptoms
Allergies
Medications
Past medical history, injuries, illnesses
Last meal/intake
Events leading up to the injury and/or illness

OPQRST History
Onset of symptoms
Provocation / Palliation
Quality of pain
Radiation of pain
Severity of symptoms - pain scale
Time of onset and circumstances around onset

B. Physical Assessment

1. Head
   a. Pupils
   b. Naso-oropharynx
   c. Skull and scalp
2. Neck
   a. Jugular venous distension
   b. Tracheal position
   c. Palpate the c-spine for tenderness. Refer to SPINAL MOTION RESTRICTION Protocol.
3. Chest
   a. Breath sounds
   b. Retractions
   c. Chest wall deformity
4. Abdomen / Back
   a. Flank / abdominal tenderness or bruising
   b. Abdominal distension
5. Extremities
   a. Edema
   b. Pulses / capillary refill
   c. Deformity
6. Neurologic status assessment
   a. Mental status / orientation
   b. Gross exam of motor strength and sensation in all four extremities

C. Baseline Vital Signs

(An initial full set of vital signs is required: pulse, blood pressure (manual preferred), respiratory rate, neuro status assessment, glucose if altered).

1. Neurologic status assessment involves establishing a baseline and then trending any change in patient neurologic status.
    a. GCS and/or AVPU
2. Patients with cardiac or respiratory complaints:
    a. Pulse oximetry
    b. 12-lead ECG should be obtained within 10-minutes of patient contact with cardiac or suspected cardiac complaints. **(EMT-** If available**) (ALS)**
    c. Continuous cardiac monitoring **(ALS ONLY)**
    d. Consider waveform capnography (essential for patients who require invasive airway management. **(EMT-** If available**) (ALS)**
3. Patients with altered mental status:
    a. Check blood glucose and refer to ALTERED MENTAL STATUS protocol as appropriate.
    b. Consider waveform capnography (essential for patients who require invasive airway management). **(EMT-** If available**) (ALS)**
4. Stable patients should have at least two sets of pertinent vital signs. Ideally, one set should be taken shortly before arrival at receiving facility.
5. Critical patients should have pertinent vital signs frequently monitored.

Universal Patient Care

PEARLS

- Routine use of lights and sirens is not warranted.
- Even when lights and sirens are in use, always limit speeds to a level that is safe for the emergency vehicle being driven and for the road conditions on which it is being operated.
- Be aware of legal issues and patient rights as they pertain to and impact patient care (e.g. patients with functional needs or children with special healthcare needs).
- Be aware of potential need to adjust management based on patient age and comorbidities, including medication dosages.
- Direct medical oversight should be contacted when mandated or as needed.
- Critical Patients: proactive patient management should occur simultaneously with assessment
    a. Ideally, one provider should be assigned to exclusively monitor and facilitate patient-focused care.
    b. Treatment and Interventions should be initiated as soon as practical, but should not impede extrication or delay transport to definitive care

Airway Management

Transport to the closest appropriate hospital for airway stabilization when respiratory failure cannot be successfully managed in the prehospital setting.

EMR & EMT

1. **UNIVERSAL PATIENT CARE**
   a. Assess ABC's (Respiratory Rate, Effort, Adequacy)
   b. Pulse Oximetry; $EtCO_2$ (if available)
2. Establish airway patency
   a. Open and maintain airway (i.e. head-tilt chin-lift or jaw thrust) with cervical spine precautions, per the SPINAL MOTION RESTRICTION Protocol
   b. Suction as needed
   c. Clear foreign body obstructions per the FOREIGN BODY AIRWAY OBSTRUCTION Protocol
3. Administer **OXYGEN** with a target of achieving 94-98% saturation for most acutely ill patients.
4. Consider inserting an oropharyngeal (OPA) or nasopharyngeal (NPA) airway adjunct as indicated.
   a. OPA contraindicated with intact gag reflex.
   b. NPA contraindicated in patients with a head injury involving a suspected basilar skull fracture.
5. Assist ventilations with a bag-valve-mask (BVM) and supplemental oxygen as needed.
   a. Two-person, two-thumbs-up BVM ventilation is more effective than one-person technique and should be used when additional providers are available.

If patient has a tracheostomy tube, refer to TRACHEOSTOMY TUBE COMPLICATIONS-RESPIRATORY DISTRESS / VENTILATOR

1. For apnea / respiratory failure or impending respiratory failure with impaired or absent gag reflex consider a system approved BLIND INSERTION AIRWAY DEVICE (BIAD) (i.e. i-gel®).

EMT

1. For adults in severe respiratory distress secondary to pulmonary edema / CHF, COPD, asthma, pneumonia, near drowning or undifferentiated respiratory distress, consider use of CPAP or BRONCOSPASM / ASTHMA / COPD protocol.

Paramedic/PHRN

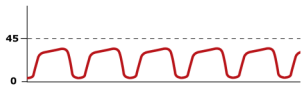
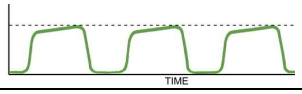
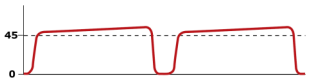
1. Continue **EMR / EMT TREATMENT.**
2. When less-invasive methods (BVM, BIAD) are ineffective, consider OROTRACHEAL INTUBATION.
   a. $EtCO_2$ / waveform capnography is mandatory for all intubations.
   b. Video laryngoscopy may enhance intubation success rates and should be used when available.
   c. Limit of 2 total intubation attempts per patient.
      i. Evaluate reason for failure and change technique or person attempting to increase chance of success.
3. If managing a breathing patient's airway, determine if the patient is relaxed / flaccid enough for intubation. If not, consider employing the ASSISTED (MEDICATION) INTUBATION Protocol.
4. If successful intubation, perform post-intubation management procedures including:
   a. Verification of proper placement with waveform capnography, absent gastric sounds, and bilateral breath sounds.
   b. Note the centimeter marking of the ET tube adjacent to the teeth or lips.
   c. Secure the ET tube with a commercial device or tape.

Protocol Continues

Airway Management

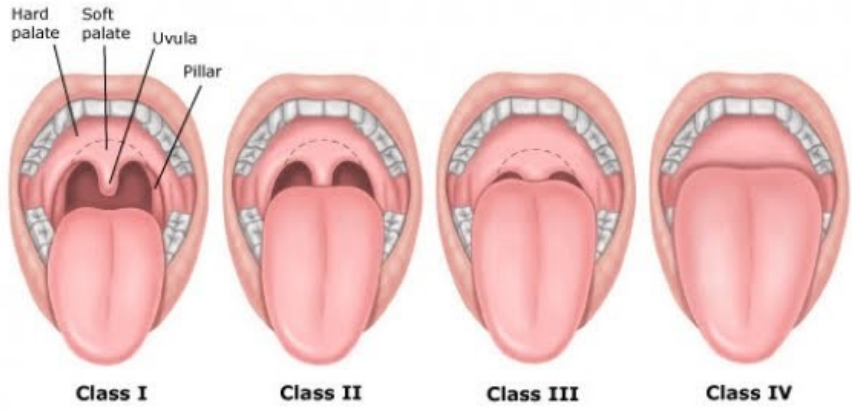
Paramedic/PHRN

5. Ventilate with minimal volume in order to see chest rise, approximately 6-7 mL/kg Ideal Body Weight.
   a. Avoid hyperventilation. Maintain $EtCO_2$ of 35-45 mmHg
6. Continuously monitor placement with waveform capnography during treatment and transport.
7. When a "can't ventilate, can't intubate" situation occurs and ALL attempts to manage the airway and ventilate the patient have failed, the paramedic should utilize a surgical airway device. Only providers that are trained to do so should perform a cricothyroidotomy using an EMS System approved cricothyroidotomy device or technique. Refer to CRICOTHRYOIDTOMY Procedure.
8. Once the device is successfully inserted follow the post intubation management procedure above and secure the 6.0 mm endotracheal tube. Ventilate with 100% oxygen.

$EtCO_2$		
Value	**Waveform**	**State of ventilation**
Less than 35 mmHg Hypocapnia		Hyperventilation. Consider slowing ventilator rate
35 - 45 mmHg Normal		Usually indicates adequate ventilation
Greater than 45 mmHg Hypercapnia		Hypoventilation. Consider increasing ventilator rate, assess adjunct for occlusion

Mallampati Classification

- **Class 1:** Full visibility of tonsils, uvula and soft palate
- **Class 2:** Visibility of hard and soft palate, upper portion of tonsils and uvula
- **Class 3:** Soft and hard palate and base of the uvula are visible *(predicted difficult)*
- **Class 4:** Only Hard Palate visible *(predicted difficult)*



Airway Management

PEARLS

- Avoid excessive pressures or volumes during BVM. Ventilate with minimal volume to see chest rise, approximately 6-7 mL/kg ideal body weight
- Endotracheal intubation remains the "golden standard" for airway control. However, since it can also be associated with aspiration, oral trauma, worsening of cervical spine injury, malposition of the ET tube (right mainstem intubation, esophageal intubation), or adverse effects of sedation, especially in children, less experienced providers should consider less invasive methods such as a BAID *(unconscious only).*
- An *Intubation Attempt* is defined as passing the laryngoscope blade past the teeth.
- **Bag-Valve-Mask (BVM)**: Appropriately-sized masks should completely cover the nose and mouth and maintain an effective seal around the cheeks and chin
    a. Ventilation should be delivered with only sufficient volume to achieve chest rise
    b. Ventilation rate:
        i. During CPR with an advanced airway, ventilation rate should be 10 breaths per minute, one breath every 10 compressions (or one breath every 6 seconds). Ideally ventilations should be on the upstroke between two chest compressions.
        ii. In adults who are not in cardiac arrest, ventilate at rate of 12 breaths per minute.
        iii. In children who are not in cardiac arrest, ventilating breaths should be delivered over one second, with a two second pause between breaths (20 breaths/minute).
- **Orotracheal intubation**:
    a. Approximate depth of insertion = (3) x (endotracheal tube size).
    b. In addition to pre-oxygenation, apneic oxygenation (high-flow oxygen @ 15 LPM by nasal cannula) may prolong the period before hypoxia during an intubation attempt.
    c. Appropriate attention should be paid to adequate pre-oxygenation to avoid peri-intubation hypoxia and subsequent cardiac arrest.
    d. Prompt suctioning of soiled airways before intubation attempt may improve first pass success.
    e. Confirm successful placement with waveform capnography. Less optimal methods of confirmation include bilateral chest rise, bilateral breath sounds, and maintenance of adequate oxygenation. Color change on $EtCO_2$ is less accurate than clinical assessment, and wave-form capnography is superior. Misting observed in the tube is not a reliable method of confirmation. Visualization with video laryngoscopy, when available, may assist in confirming placement when unclear due to capnography failure or conflicting information.

KEY DOCUMENTATION ELEMENTS

- Initial vitals signs and physical exam
- Size of equipment used
- Number of intubation attempts
- Reassessment with repeat vital signs
- Document $EtCO_2$ value and record capnography wave initially after intubation, with each set of vital signs, when patient is moved and at the time of patient transfer in the ED

PERTINENT ASSESSMENT FINDINGS

- Complete respiratory and airway assessment
- Ongoing assessment is critical when an airway device is in place
- Acute worsening of respiratory status or evidence of hypoxemia can be secondary to displacement or obstruction of the airway device, pneumothorax or equipment failure

QUALITY METRICS

- Definitive airway sans hypoxia/hypotension on the first intubation attempt.
- Documentation of post-intubation confirmation ($EtCO_2$, absent gastric sounds, bilateral breath sounds)
- Waveform capnography used for initial confirmation and continuous monitoring during transport with advanced airway

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Assisted (Medication) Intubation

Criteria

- Imminent respiratory arrest
- Patient unable to protect their own airway
- Impending airway compromise due to severe edema secondary to trauma, allergic process, or burns.
- Glasgow Coma Score <8

Paramedic/PHRN

Pre-Intubation

1. Refer to the AIRWAY MANAGEMENT Protocol.
2. Pre-oxygenate with 100% oxygen via Bag-Valve Mask (BVM).
3. Make sure all intubation equipment is prepared and medication is ready.
4. Prepare suction equipment.
5. Have BIAD and surgical airway equipment available for back-up.

Intubation

1. Refer to the AIRWAY MANAGEMENT Protocol and OROTRACHEAL INTUBATION procedure.
2. Continue to assist ventilations with 100% oxygen during this procedure.
3. Administer medications as below:
   - **ETOMIDATE 0.3 mg/kg rapid IV/IO.**

     (or)
   - **KETAMINE 2 mg/kg IV/IO (**maximum 200mg).(*Preferred if signs of hypoperfusion or bronchial constriction are present*)
4. Attempt oral or in-line intubation per AIRWAY MANAGEMENT Protocol.

Post Intubation

1. If after intubation patient exhibits movement that might lead to extubation, administer **FENTANYL** as long as BP allows (SBP > 90 mmHg or MAP > 65 mmHg). If the initial medication is not effective, then use **MIDAZOLAM** at the appropriate dose:
   a. **FENTANYL 1 mcg/kg IV/IO** (maximum initial dose 100 mcg); may repeat as needed every 3-5 minutes at 0.5 mcg/kg (maximum repeat doses of 50 mcg)
   b. **MIDAZOLAM 0.05mg/kg IV/IO every 3-5 minutes** as needed (total maximum dose 10mg)

   (or)
2. **KETAMINE 1 mg/kg IV/IO (**maximum 200mg).(*Preferred if signs of hypoperfusion or bronchial constriction are present*). *After* **15 min.** *may repeat dose x1 from either route for a maximum combined dose of* **200 mg**.
3. Continuous monitoring of patient with cardiac monitor, continuous SpO2 and capnography is required.
4. If more sedation or analgesia is needed, contact **Medical Control** for additional orders.

Assisted (Medication) Intubation

PEARLS

- Endotracheal intubation remains the "golden standard" for airway control. However, since it can also be associated with aspiration, oral trauma, worsening of cervical spine injury, malposition of the ET tube (right mainstem intubation, esophageal intubation), or adverse effects of sedation, <u>especially in children</u>, less experienced providers should consider less invasive methods such as a BAID *(unconscious only).*
- Once a successful intubation has been performed, obstruction or displacement of the tube can have further deleterious effects on patient outcome
    a. Tubes should be secured with either a commercial tube holder or tape.
- Use continuous waveform capnography to detect end-tidal carbon dioxide ($EtCO_2$). This is an important adjunct in the monitoring of patients with respiratory distress, respiratory failure, and those treated with positive pressure ventilation. It should be used as the standard to confirm SGA, EGD, and endotracheal tube placement.
- Avoid excessive pressures or volumes while utilizing a BVM, especially during states of hypoperfusion.
- An intubation attempt is defined as passing the laryngoscope blade past the teeth.

KEY DOCUMENTATION ELEMENTS

- Initial vitals signs and physical exam
- Approximate patient weight
- Drug allergies
- Medication administered and dose
- Size of equipment used
- Number of intubation attempts
- Reassessment with repeat vital signs
- Document $EtCO_2$ value and record capnograph wave initially after intubation, with each set of vital signs, when patient is moved and at the time of patient transfer in the ED

PERTINENT ASSESSMENT FINDINGS

- Complete respiratory and airway assessment
- Ongoing assessment is critical when an airway device is in place
- Acute worsening of respiratory status or evidence of hypoxemia can be secondary to displacement or obstruction of the airway device, pneumothorax or equipment failure

QUALITY METRICS

- Automatic review by EMS Medical Director
- Definitive airway sans hypoxia/hypotension on the first intubation attempt.
- End-tidal CO2 / Capnography performed on any endotracheal intubation
- Appropriate weight-based dosing of medications

Human Trafficking

Definitions

SEX TRAFFICKING-The recruitment, harboring, transportation, provision, or obtaining of a person for a commercial sex act, in which a commercial sex act is induced by force, fraud, or coercion.

LABOR TRAFFICKING -The recruitment, harboring, transportation, provision, or obtaining of a person for labor or services, through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery.

Indicators

SEX TRAFFICKING

- Physical - Signs of physical trauma, trauma to vagina or rectum, suspicious tattoos or branding, somatization symptoms (recurring headaches, abdominal pain, etc.)
- Behavioral - Depressed mood/flat affect, anxiety/hyper-vigilance/panic attacks/signs of drug or alcohol abuse, frequent calls for service, unexplained/conflicting stories, affect dysregulation/irritability.

LABOR TRAFFICKING

- Physical - Musculoskeletal and ergonomic injuries, malnutrition/dehydration/no preventive care, poor dental hygiene, untreated skin infections/inflammations, injuries or illness from harmful substances, complaints of poor vision, somatization.
- Behavioral - anxiety/panic attacks, unexplained or conflicting stories, hyper vigilant or paranoid behavior, aversion/inability to make a decision independent of employer, aversion/inability to speak without an interpreter, dysregulation/irritability affect.

All Levels

1. UNIVERSAL PATIENT CARE.
2. Assessment and history; note any discrepancies, environment or interaction. Consider these “RED FLAGS”
   - Is someone else speaking for the patient?
   - Patient is not aware of their location.
   - Patient exhibits fear, anxiety, PTSD, submission or tension.
   - Patient shows signs of physical/sexual abuse, medical neglect or torture
   - Is someone holding their passport or identification documents?
   - Is the patient being threatened to be harmed if they leave the scene?
3. Address and treat any obvious injuries or life-threatening issues per the appropriate protocol.
4. If no medical emergency exists, the next priority is safe patient disposition / removal from the potentially abusive situation. Call law enforcement for assistance.
5. For patients transported, report concerns to receiving facility and to the appropriate agency / hotline.

Only with documentation of received patient consent can a provider share HIPAA protected information with the National Human Trafficking Hotline 1-888-373-7888. Without consent, EMS provider may only provide non-HIPAA protected information when reporting the event to the NHTH hotline. Elder Abuse hotline at 1-866-800-1409. Trafficking of a child, call the Child Abuse hotline at 1-800-25-ABUSE

Intercept Criteria

EMT

The appropriate ALS vehicle will be dispatched to intercept with a BLS team when:

1. The BLS team requests intercept or;
2. The ECRN or MD at the receiving hospital deems it necessary based upon the condition of the patient or;
3. The patient meets one or more of the following (including but not limited to):

BLS Intercept Criteria:

a. Active seizures
b. Anaphylaxis
c. Cardiopulmonary Arrest
d. Chest Pain (Acute Coronary Syndrome)
e. Diabetic Emergencies
f. Drowning / Near drowning
g. Electrical injuries (High or Low)
h. Obstetrical emergencies (i.e. prolapsed cord, abnormal presentations)
i. Obstructed airways that cannot be cleared
j. Respiratory Arrest / Distress
k. Severe traumatic injuries
l. Signs/symptoms of shock (i.e. tachycardia, tachypnea, abnormal skin signs, hypotension)
m. Symptomatic overdose or poisoning
n. Any patient situation that higher level of care may benefit the patient

4. The decision to utilize an intercept may be influenced by various factors such as:
   a. Geographical location
   b. Improvement of patient condition
   c. Refusal of higher level of care by patient with appropriate documentation
   d. Decision to request intercept may be done by the responding crew based on information reported by the dispatching agency.

Maltreatment/Abuse

Definitions

Abuse/Maltreatment: Any act or series of acts of commission or omission by a caregiver or person in a position of power over the patient that results in harm, potential for harm, or threat of harm to a patient.

Human Trafficking: When people are abducted or coerced into service and often transported across international borders. Signs may include, but are not limited to: patient with branding / tattoos and environmental clues such as padlocks and/or doorknobs removed on interior doors, and intact windows that are boarded up.

***Per NASEMSO EMS Clinical Guidelines V 3.0*

All Levels

1. **UNIVERSAL PATIENT CARE.**
2. Assessment and history; note any discrepancies in history, environment or interaction.
3. Address and treat any obvious injuries or life-threatening issues per the appropriate protocol.
4. Attempt to preserve evidence whenever possible; however, the overriding concern should be providing appropriate emergency care to the patient.
5. If no medical emergency exists, the next priority is safe patient disposition / removal from the potentially abusive situation. Call law enforcement for assistance.
6. Do not confront suspected perpetrators of abuse / maltreatment. This can create an unsafe situation for EMS and for the patient.
7. For patients transported, report concerns to receiving facility and to the appropriate agency / hotline.

The Illinois EMS Act (210 ILCS 50/3.230) and The Illinois Elder Abuse and Neglect Act (320 ILCS 20/4) requires all licensed EMS providers to report suspected cases of elder abuse or neglect. To report, call the Elder Abuse hotline at 1-866-800-1409. For Nursing Home abuse/neglect, call 1-800-252-4343.

Maltreatment/Abuse

PEARLS

- Clues to abuse or maltreatment can vary with age group of the patient and type of abuse.
- Not all abuse or maltreatment is physical.
- EMS role is to:
    a. Document concerns.
    b. Assess potentially serious injuries.
    c. Disclose concerns to appropriate authorities.
    d. Initiate help to get the patient into a safe situation.
    e. Not to investigate or intervene beyond the steps above.
    f. Leave further intervention to law enforcement personnel.
- Potential clues to abuse / maltreatment from caregivers or general environment:
    a. Caregiver apathy about patient's current situation.
    b. Caregiver overreaction to questions about situation.
    c. Inconsistent histories from caregivers or bystanders regarding what happened.
    d. Information provided by caregivers or patient that is not consistent with injury patterns.
    e. Injuries not appropriate for patient's age or physical abilities (e.g. infants with injuries usually associated with ambulatory children, elders who have limited mobility with injury mechanisms inconsistent with their capabilities).
    f. Caregiver not allowing adult patient to speak for themselves, or who appears controlling – pay special attention to patients who cannot communicate due to young age or language and/or cultural barriers.
    g. Inadequate safety precautions or facilities where the patient lives and/or evidence of security measures that appear to confine the patient inappropriately.
- Potential clues to abuse / maltreatment that can be obtained from the patient:
    a. Multiple bruises in various stages of healing.
    b. Age-inappropriate behavior (e.g. adults who are submissive or fearful, children who act in a sexually inappropriate way).
    c. Pattern burns, bruises, or scars suggestive of specific weaponry used.
    d. Evidence of medical neglect secondary to injuries or infections.
    e. Unexplained trauma to genitourinary systems or frequent infections to this system.
    f. Evidence of malnourishment and/or serious dental problems.

KEY DOCUMENTATION ELEMENTS

- Meticulous documentation of any statements by the patient and/or parent / caregiver and any physical findings on the patient or the surroundings.
- Document findings by describing what you see ("2cm round burn to back") and not ascribing possible causes ("burn consistent with cigarette").
- Documentation of reporting suspected abuse to appropriate hotline.

PERTINENT ASSESSMENT FINDINGS

- Identify potential life-threatening issues.
- Document thorough secondary survey to identify clues of potential abuse / maltreatment *(See above)*

QUALITY METRICS

- Documentation of reporting suspected abuse.

Pain Management

History
- Age
- Location
- Duration
- Severity (1-10)
- Past medical history
- Medications
- Drug allergies

Signs and Symptoms
- Severity (pain scale)
- Quality (sharp, dull, etc.)
- Radiation
- Relation to movement / respiration
- Increased with palpation to area

Differential
- Per the specified protocol
- Musculoskeletal
- Visceral (abdominal)
- Cardiac
- Pleural / Respiratory
- Neurogenic
- Renal (colic)

EMR

1. UNIVERSAL PATIENT CARE.
2. Determine pain score and continue to monitor / trend score.
3. Place patient in a position of comfort.
4. Apply ice packs and/or splints for pain secondary to trauma.
5. Verbally reassure patient to control anxiety.
6. Relay information to incoming ambulance.

EMT

1. Continue **EMR TREATMENT**.
2. For *Mild* or *Moderate* pain consider: **ACETAMINOPHEN 15 mg/kg PO (max 1000 mg)** or **IBUPROFEN 10mg/kg PO (max 800 mg)**
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

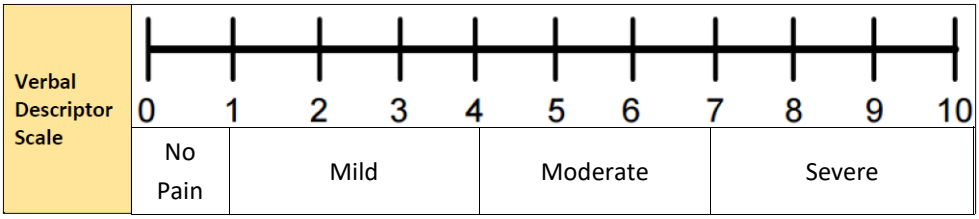
Paramedic/PHRN

1. Continue **BLS TREATMENT.**
2. For *Moderate or Severe* pain consider: **KETOROLAC 30 mg IM or 15 mg IV (**no repeat dose)
   a. *Contraindicated* in patients with hypersensitivity to ketorolac or other NSAIDS, Aspirin-sensitive asthma, acute heart failure, renal insufficiency, pregnancy, GI bleeding, known peptic ulcer disease (or) for patients experiencing a source of pain that is suspect for requiring a surgical intervention.
3. For *Severe* pain consider:
   MORPHINE SULFATE 0.1 mg/kg slow IV/IO or IM/SQ. May repeat IV/IO dose x 1 after 10-15 minutes if needed. Elderly patients over 75 years of age **0.05 mg/kg slow IV/IO or IM/SQ; *(Max single dose of 8 mg)***
   -OR-
   FENTANYL 1 mcg/kg IV/IO/IM/IN (max initial dose 100 mcg)**.** May repeat x 1 after 10-15 minutes at 0.5 mcg/kg (maximum second dose 50 mcg). (Elderly patients over 75 years of age, **0.5 mcg/kg IV/IO/IM/IN** (max initial **50 mcg,** max repeat dose **25 mcg)**. IV/IO is a slow push over 2-3 minutes.
   -OR-
4. **KETAMINE 0.2 mg/kg slow IV/IO/IM or 0.5 mg/kg IN, max single dose 20 mg, If necessary, may** *repeat dose every 10-15 minute x3 via either route for a maximum combined dose of* **50 mg**. Continuous monitoring of patient with cardiac monitor, continuous SpO2 and capnography is **required**
5. Continuous SpO2 and capnography is **required** for patients who suffer from decreased level of consciousness secondary to pain management**.**

Pain Management

PEARLS

- All patients should have drug allergies identified prior to administration of pain medication.
- Pain severity (0 - 10) should be recorded before and after analgesic medication administration and upon arrival at destination.
- Opioids or dissociative medications are to be used with extreme caution in patients with GCS less than 14, hypotension, identified medication allergy, hypoxia (oxygen saturation less than 90%) after maximal supplemental oxygen therapy, or signs of hypoventilation.
- Use of splinting techniques and application of ice should be done to reduce the total amount of medication used to keep the patient comfortable.
- Patients with acute abdominal pain should receive analgesic interventions – Use of analgesics for acute abdominal pain does not mask clinical findings or delay diagnosis.



Descriptive Scale	Alert Smiling	No Humor Serious, Flat	Furrowed Brow Pursed Lips Breath Holding	Wrinkled Nose Raised Upper Lip Rapid Breathing	Slow Blink Open Mouth	Eyes Closed Moaning Crying
Activity Tolerance Scale	No Pain	Can be Ignored	Interferes with Tasks	Interferes with Concentration	Interferes with Basic Needs	Bed Rest Required

KEY DOCUMENTATION ELEMENTS

- Vitals signs
- Drug allergies
- Initial pain scale
- Medication administered and dose
- Reassessment with repeat vital signs and pain scale

PERTINENT ASSESSMENT FINDINGS

- Mental status (GCS and pain level)
- Respiratory system (chest rigidity)
- Gastrointestinal (assess for tenderness, rebound, guarding and nausea)

QUALITY METRICS

- Correct dose of pain medication
- Pain assessment documented

Patient Refusal

Criteria

- Patient refuses treatment, transport or requests transport to facility other than closest, most appropriate facility.
- Patient is > 18 years old, or an emancipated minor.
- Patient is < 18 years old, and one of the following:
    a. Legal guardian is present.
    b. Legal guardian contacted from the scene and consents to refusal.
- Patient or legal guardian is competent and has the mental capacity to make an informed decision.
    a. Patient is alert, oriented and has the ability to understand the circumstances surrounding his / her illness or impairment, as well as the possible risks associated with refusing treatment and/or transport.
    b. The individual's judgement must also not be significantly impaired by illness, injury or drugs / alcohol intoxication.
- Individuals who have attempted suicide, verbalized suicidal intent, or have other factors that lead EMS providers to suspect suicidal intent, should not be regarded as having decision-making capacity and may not decline transport to a medical facility.

All Levels

1. Ensure all refusal criteria are met in accordance with your *EMS System Patient Refusal Policy.*
2. Obtain a complete set of vital signs and complete an initial assessment, paying particular attention to the individual's neurologic and mental status.
3. Determine the individual's capacity to make a valid judgement concerning the extent of his / her illness or injury. If the EMS provider has doubts about whether the individual has the mental capacity to refuse or if the patient lacks capacity, the EMS provider should contact Medical Control
4. Ask patient or guardian to explain reasons for refusal.
5. Clearly explain to the individual and all responsible parties the possible risks and overall concerns with regards to refusing care.
6. If patient or guardian does not demonstrate understanding risks of refusal, initiate care under implied consent.
7. If refusal represents a significant risk to the patient, based upon mechanism of injury or severity of illness, contact Medical Control for advice.
8. Perform appropriate medical care with consent of the individual.
9. If all criteria are met for refusal and risks of refusal have been explained, with reasonable understanding demonstrated by patient or guardian, refusal can be accepted and patient or guardian should sign refusal form.
10. If patient or guardian is unable or unwilling to sign, document circumstances.
11. Contact Medical Control as necessary.
12. Complete the patient care report clearly documenting the initial assessment findings and the discussions with all involved individuals regarding the possible consequences of refusing additional prehospital care and/or transportation.

Patient Refusal

PEARLS

- Refer to your *EMS System Patient Refusal Policy.*
- An adult or emancipated minor who has demonstrated possessing sufficient mental capacity for making decisions has the right to determine the course of his / her medical care, including the refusal of care. These individuals must be advised of the risks and consequences resulting from refusal of medical care.
- An individual identified as someone who potentially lacks the decision-making capacity by EMS providers, should not be allowed to refuse care without first contacting medical control. Physicians have the legal authority to determine an individual's mental capacity. Because of the physician's reliance on personnel in the field to accurately convey their assessment findings while making a determination of capacity, it is recommended to collaborate such findings with on scene mental health workers or law enforcement personnel.
- Mental illness, drugs, alcohol intoxication, or physical / mental impairment may significantly impair an individual's decision-making capacity. Individuals who have attempted suicide, verbalized suicidal intent, or have other factors that lead EMS providers to suspect suicidal intent, should not be regarded as having demonstrated sufficient decision-making capacity.
- The determination of decision-making capacity may be challenged by communication barriers or cultural differences.

KEY DOCUMENTATION ELEMENTS

- Document patient capacity with:
  - Any and all barriers to patient care
  - Physical Exam
  - Mental Status / Neuro Exam (AVPU & GCS)
  - Quick Confusion Scale
  - Alcohol and drug use indicators
  - Blood glucose level
- Any assessments and treatments performed
- Patient age
- Patient was advised of risks / benefits of refusal / treatment
- Patient voices understanding of risks of refusal
- Patient was advised that they can change their mind and re-contact EMS at anytime
- Reason for patient refusing care. A quotation of the patient's actual words is best.
- Medical Control Contact

PERTINENT ASSESSMENT FINDINGS

- Decision-Making Capacity
  a. An individual who is alert, oriented, and has the ability to understand the circumstances surrounding his / her illness or impairment, as well as the possible risks associated with refusing treatment and/or transport, typically is considered to have decision-making capacity.
  b. The individual's judgment must also not be significantly impaired by illness, injury or drugs / alcohol intoxication. Individuals who have attempted suicide, verbalized suicidal intent, or have other factors that lead EMS providers to suspect suicidal intent, should not be regarded as having decision-making capacity and may not decline transport to a medical facility.

QUALITY METRICS

- Patient decision-making capacity was determined and documented
- Documentation that the patient was provided with adequate information regarding the potential risks associated with not seeking medical treatment for their presenting condition.
- Documentation that the patient understands and has acknowledged the risk for refusing medical treatment.

Radio Report

All Levels

1. Unit must identify call letters, level of service and city of origin.
    a. Transport and non-transport agencies may use MERCI, StarCom21, local radio frequency or cellular phone to communicate with Medical Control. All methods of communication utilized for medical control must be capable of being recorded by those facilities providing it. Providers are not to utilize other non-recorded lines of communication to contact medial control unless an unplanned event has rendered normal lines of communication as inoperable.
    b. Report should be called to receiving facility on all transports.
2. Standard report:
    a. ETA
    b. Age and sex
    c. Mechanism of injury / Nature of illness
    d. Pertinent findings
    e. Vital Signs
    f. Patient care / interventions
3. Orders must be confirmed when received from Medical Control by repeating them verbatim back to Medical Control for verification and clearly documented in the patient care report.
4. In the event of communications system failure, protocols may be used as listed, including Medical Control considerations. Protocol usage secondary to a communication outage must be documented by an EMS system approved incident report and submitted to the EMS system office within 24 hours.

Radio Report

PEARLS

- Radio communications is a vital component of prehospital care. Information reported should be concise and provide an accurate description of the patient's condition as well as treatment rendered.
- Early and timely notification of Medical Control or the receiving facility is essential for prompt care to be delivered by all involved.
- Whenever possible, the EMS provider responsible for the highest level of direct patient care should call in the report.

KEY DOCUMENTATION ELEMENTS

- Document report given to receiving hospital
- Document any orders given verbatim as well as name of ordering physician

PERTINENT ASSESSMENT FINDINGS

QUALITY METRICS

Special Needs Populations/ Functional Needs

Criteria

Patients who are identified by the World Health Organization's International Classification of Functioning, Disability, and Health that have experienced a decrement in health resulting in some degree of disability. According to the U.S. Department of Health and Human Services, this includes, but is not limited to, individuals with physical, sensory, mental health, and cognitive and/or intellectual disabilities affecting their ability to function independently without assistance.

All Levels

1. Identify the functional need by means of information from the patient, the patient's family, bystanders, medic alert bracelets or documents, or the patient's adjunct assistance devices.
2. The physical examination should not be intentionally abbreviated, although the manner in which the exam is performed may need to be modified to accommodate the specific needs of the patient.
3. Medical care should not intentionally be reduced or abbreviated during the triage, treatment, and transport of patients with functional needs, although the manner in which the care is provided may need to be modified to accommodate the specific needs of the patient.
4. For patients with communication barriers (language or sensory), it may be desirable to obtain secondary confirmation of pertinent data (e.g. allergies) from the patient's family, interpreters, or written or electronic medical records. The family members can be an excellent source of information and the presence of a family member can have a calming influence on some of these patients.

Assistance Adjuncts. Examples of devices that facilitate the activities of daily living for the patient with functional needs include, but are not limited to:

a. Extremity prostheses
b. Hearing aids
c. Magnifiers
d. Tracheostomy speaking valves
e. White or sensory canes
f. Wheelchairs or motorized scooters

Service Animals - As defined by the American Disabilities Act, "any guide dog, signal dog, or other animal individually trained to do work or perform tasks for the benefit of an individual with a disability, including, but not limited to guiding individuals with impaired vision, alerting individuals with impaired hearing to intruders or sounds, providing minimal protection or rescue work, pulling a wheelchair, or fetching dropped items."

a. Services animals are not classified as a pet and should, by law, always be permitted to accompany the patient.
b. Service animals are not required to wear a vest or a leash. It is illegal to make a request for special identification or documentation from the service animal's partner. EMS providers may only ask the patient if the service animal is required because of a disability and the form of assistance the animal has been trained to perform.
c. *Animals that solely provide emotional support, comfort, or companionship do not qualify as service animals.*

Special Needs Populations/ Functional Needs

PEARLS

- Communication Barriers:
  a. Language Barriers:
     i. Expressive and/or receptive aphasia
     ii. Nonverbal
     iii. Fluency in a different language than that of the EMS professional
     iv. Examples of tools to overcome language barriers include:
        1. Transport of an individual who is fluent in the patient's language along with the patient to the hospital
        2. Medical translation cards
        3. Telephone-accessible services with live language interpreters
        4. Methods through which the patient augments his / her communication skills (e.g. eye blinking, nodding) should be noted, utilized as able, and communicated to the receiving facility
        5. Electronic applications for translation
  b. Sensory Barriers:
     i. Visual impairment
     ii. Auditory impairment
     iii. Examples of tools to overcome sensory barriers include:
        1. Braille communication card
        2. Sign language
        3. Lip reading
        4. Hearing aids
        5. Written communication
- Physical Barriers:
  a. Ambulatory impairment (e.g. limb amputation, bariatric)
  b. Neuromuscular impairment
- Cognitive Barriers:
  a. Mental illness
  b. Developmental challenge or delay

KEY DOCUMENTATION ELEMENTS

- Document all barriers of care
- Document specific physical barriers in the appropriate exam elements
- Document any language or sensory barriers and assistance adjuncts

PERTINENT ASSESSMENT FINDINGS

- Barriers (*see above*)

QUALITY METRICS

- Documentation of barriers of care.

Termination of Resuscitation

Paramedic/PHRN

1. Contact **MEDICAL CONTROL** to consider Termination of Resuscitation for any of the following:

MEDICAL

- Patient is at least 18 years of age.
- Patient is in cardiac arrest at the time of arrival of advanced life support.
    i. No pulse (carotid and femoral confirmed by two EMS providers)
    ii. No respirations
    iii. No evidence of meaningful cardiac activity (e.g. asystole or wide complex PEA less than 60 bpm, no heart sounds)
- All three of the following are true:
    i. Arrest not witnessed by EMS personnel.
    ii. No Return of Spontaneous Circulation (ROSC) after at least 20 minutes of high quality CPR / ACLS with a patent airway and $EtCO_2$ < 10 mmHg.
    iii. No defibrillation delivered / non-shockable rhythm.
- No evidence or suspicion of hypothermia.
- All EMS personnel involved in the patient's care agree that discontinuation of the resuscitation is appropriate.
- Contact **MEDICAL CONTROL** to consider termination of resuscitation if patient meets above criteria.
- For patients with narrow complex PEA with a rate above 40 or refractory and recurrent ventricular fibrillation / ventricular tachycardia, consider continuation of resuscitation and transport.

TRAUMA

- Patient is at least 18 years of age.
- Resuscitation efforts may be terminated in any blunt trauma patient who, upon EMS arrival, is found to be pulseless, apneic and without organized ECG activity.
- Resuscitation efforts may be terminated in any penetrating trauma patient who, upon EMS arrival, is found to be pulseless, apneic and without other signs of life, including spontaneous movement, ECG activity and pupillary response
- Cardiopulmonary arrest patients in whom mechanism of injury does not correlate with clinical condition, suggesting a non-traumatic cause of arrest, should have standard ALS resuscitation initiated. Refer to CARDIAC ARREST Protocol.
- All EMS personnel involved in the patient's care agree that discontinuation of the resuscitation is appropriate.
- Contact **MEDICAL CONTROL** to consider termination of resuscitation if patient meets above criteria or transport to the nearest hospital will be greater than 15 minutes for a traumatic arrest patient.

2. If transport is initiated, resuscitation should be continued until arrival at the receiving hospital.
3. Once termination of resuscitation orders have been received and death confirmation has been made by medical control:
    a. Immediately notify the coroner or medical examiners office.
    b. Do NOT leave a body unattended. EMS should remain on scene until the coroner arrives or law enforcement is on scene.
    c. Do NOT remove any property from the body or the scene.

Termination of Resuscitation

PEARLS

- When there is no response to prehospital cardiac arrest treatment, it is acceptable and often preferable to cease futile resuscitation efforts in the field.
- Recent evidence has shown that, in order to capture over 99% of potential survivors from medical cardiac arrest (especially VF and pulseless VT arrests), resuscitation should be continued for approximately **40 minutes**. This does not imply, however, that all resuscitations should continue this long (e.g. asystolic rhythms)
- Logistical factors should be considered, such as collapse in a public place, family wishes, and safety of the crew and public.
- Survival and functional neurologic outcomes are unlikely if ROSC is not obtained by EMS. It is dangerous to crew, pedestrians, and other motorists to attempt to resuscitate a patient during ambulance transport.
- Quantitative end-tidal carbon dioxide measurements of less than 10 mmHg or falling greater than 25% despite resuscitation indicates a poor prognosis and provide additional support for termination
- In patients with cardiac arrest, prehospital resuscitation is initiated with the goal of returning spontaneous circulation before permanent neurologic damage occurs. In most situations, ALS providers are capable of performing an initial resuscitation that is equivalent to an in-hospital resuscitation attempt, and there is usually no additional benefit to emergency department resuscitation in most cases.
- CPR that is performed during patient packaging and transport is much less effective than CPR done at the scene. Additionally, EMS providers risk physical injury while attempting to perform CPR in a moving ambulance while unrestrained. In addition, 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. Lastly, return of spontaneous circulation is dependent on a focused, timely resuscitation. The patient in arrest should be treated as expeditiously as possible, including quality, uninterrupted CPR and timely defibrillation as indicated.
- When cardiac arrest resuscitation becomes futile, the patient's family should become the focus of the EMS providers. Families need to be informed of what is being done, and transporting all cardiac arrest patients to the hospital is not supported by evidence and inconveniences the family by requiring a trip to the hospital where they must begin grieving in an unfamiliar setting. Most families understand the futility of the situation and are accepting of ceasing resuscitation efforts in the field.

KEY DOCUMENTATION ELEMENTS

- Documentation of all details / criteria surrounding decision to terminate resuscitation
  - Signs / Factors of death
  - Time of contact with Medical Control
  - Time of death confirmation
  - Name of Physician giving death confirmation

PERTINENT ASSESSMENT FINDINGS

- Pulse
- Respirations
- Neuro status
- ECG activity
- $EtCO_2$

QUALITY METRICS

- Time to CPR
- Time to AED / Defibrillator application if applicable and/or defibrillation
- Review of CPR quality
- Duration of resuscitative efforts
- Review of biometric data / CPR quality if available
- Appropriateness of termination

Withholding Resuscitative Efforts/ Determination of Death

All clinically dead patients will receive all available resuscitative efforts including cardiopulmonary resuscitation (CPR) unless contraindicated by one of the exceptions defined below.

All Levels

1. A person is presumed *Dead on Arrival* (DOA) when all "signs of death" listed below are present and at least one associated "factor of death" is present.

SIGNS OF DEATH (ALL must be present)	FACTORS OF DEATH (At least ONE must be present)
• Unresponsiveness • Apnea • Pulseless (carotid & femoral by 2 providers) • No obvious signs of life *(spontaneous movement, respirations or pupillary response)*	• Lividity • Rigor mortis • Decapitation • Decomposition • Transection of the torso • Incineration • Injuries incompatible with life: - massive crush injury - complete exsanguination - severe displacement of brain matter • Penetrating or blunt trauma with no breathing, pulse, pupillary reflexes, spontaneous movement or the absence of an organized rhythm. (ALS only)

2. Do not initiate resuscitation in the following:

   Do Not Resuscitate orders: No resuscitation efforts should be initiated when the person or family has evidence of a valid state issued Do Not Resuscitate (DNR) order in hand.

   Scene safety: The physical environment is not safe for the EMS providers to enter.

3. If any of the findings are different than those described above or if any of the above criteria are uncertain, clinical death is not confirmed and resuscitative measures should be immediately initiated or continued. Contact **MEDICAL CONTROL** when able for further guidance.
4. Once death confirmation has been established and resuscitation has been withheld:
   a. Immediately notify the coroner or medical examiner's office.
   b. Do NOT leave a body unattended. EMS should remain on scene until the coroner arrives or law enforcement is on scene.
   c. Do NOT remove any property from the body or the scene.
   d. Never transport / move a body without permission from the coroner's office except for assessment or its protection.

Withholding Resuscitative Efforts/ Determination of Death

PEARLS

- In cases where the patient's status is unclear and the appropriateness of withholding resuscitation efforts is questioned, EMS personnel should initiate CPR immediately and then contact direct medical oversight.
- For scene safety and/or family wishes, provider may decide to implement CPR even if all the criteria for death are met.
- At a likely crime scene, disturb as little potential evidence as possible.
- Medical cause or traumatic injury or body condition clearly indicating biological death (irreversible brain death), limited to:
    a. Decapitation: the complete severing of the head from the remainder of the patient's body.
    b. Decomposition or putrefaction: the skin is bloated or ruptured, with or without soft tissue sloughed off. The presence of at least one of these signs indicated death occurred at least 24 hours previously.
    c. Transection of the torso: the body is completely cut across below the shoulders and above the hips through all major organs and vessels. The spinal column may or may not be severed.
    d. Incineration: 90% of body surface area with full thickness burns as exhibited by ash rather than clothing and complete absence of body hair with charred skin.
    e. Injuries incompatible with life (such as massive crush injury, complete exsanguination, severe displacement of brain matter).
    f. In blunt and penetrating trauma, if the patient is apneic, pulseless, and without other signs of life upon EMS arrival including, but not limited to spontaneous movement, ECG activity, or pupillary response.

KEY DOCUMENTATION ELEMENTS

- Clinical / situational details that may be available from bystanders / caregivers
- Documentation of details surrounding decision to determine death
    - Signs / Factors of death
    - Time of contact with Medical Control
    - Time of death confirmation
    - Name of Physician giving death confirmation

PERTINENT ASSESSMENT FINDINGS

- Signs of death
- Factors of death

QUALITY METRICS

- Documentation of details surrounding determination of death and time of death confirmation.

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Abdominal Pain

History

- Age
- Past Medical / Surgical History
- Medications
- Onset
- Palliation / Provocation
- Quality (crampy, constant, sharp, dull, etc.)
- Region / Radiation / Referred
- Severity (0-10)
- Time (duration / repetition)
- Fever
- Last oral intake
- Last bowel movement / Emesis
- Menstrual history (pregnancy)

Signs and Symptoms

- Pain (location / migration)
- Tenderness
- Nausea
- Vomiting
- Diarrhea
- Dysuria
- Constipation
- Vaginal bleeding / discharge
- Pregnancy

Differential

- Pneumonia or pulmonary embolus
- Liver (hepatitis, CHF)
- Peptic Ulcer Disease / Gastritis
- Gallbladder
- Myocardial Infarction
- Pancreatitis
- Kidney stone
- Abdominal Aortic Aneurysm
- Appendicitis
- Bladder / Prostate disorder
- Pelvic (PID, PCOS, Ectopic pregnancy, Ovarian cyst)
- Splenomegaly
- Diverticulitis
- Bowel obstruction
- Gastroenteritis (infectious)

EMR

1. UNIVERSAL PATIENT CARE.
2. Restrict oral intake
3. Relay information to incoming ambulance.

EMT

1. Continue **EMR TREATMENT**.
2. Consider management of nausea/vomiting per the NAUSEA / VOMITING Protocol.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue EMR / EMT TREATMENT.
2. Establish IV access.
3. Consider management of nausea/vomiting per the NAUSEA / VOMITING Protocol.
4. Consider management of pain per the PAIN MANAGEMENT Protocol.
5. If signs of shock refer to SHOCK Protocol.

Abdominal Pain

PEARLS

- Abdominal pain / nausea / vomiting is a common finding associated with acute coronary syndrome. Consider obtaining a 12-lead ECG when appropriate.
- Assess for life-threatening causes of abdominal pain, which may include:

Ischemic, necrotic, or perforated bowel
- ◊ Ischemic bowel classically produces pain out of proportion (i.e. patient states "it really hurts", but they're not actually super tender)
- ◊ Severe tenderness
- ◊ Abdominal pain with motion or "jiggling" of abdomen
- ◊ Fever
- ◊ Bloody stool
- ◊ Nausea and vomiting
- ◊ Possible absence of passage of stool or gas
- ◊ Abdominal distention, with possible tympany to percussion

Dissecting or Ruptured Abdominal Aortic Aneurysm
- ◊ Unequal femoral or distal lower extremity pulses
- ◊ "Pulsatile" abdominal mass
- ◊ Associated back pain and/or chest pain
- ◊ Known history of AAA

Ruptured ectopic pregnancy
- ◊ Vaginal bleeding
- ◊ Recently diagnosed pregnancy

Appendicitis
- ◊ Focal right lower quadrant tenderness (McBurney's Point)
- ◊ RLQ tenderness during palpation of LLQ (Rovsing's sign)
- ◊ Peri-umbilical or diffuse abdominal tenderness with palpation or "jiggling" of the abdomen/pelvis
- ◊ Fever
- ◊ Nausea, vomiting
- ◊ Lack of appetite

Acute Cholecystitis
- ◊ Right upper quadrant or epigastric tenderness
- ◊ Fever
- ◊ Nausea, vomiting
- ◊ Possible history of gallstones

Pyelonephritis
- ◊ Fever
- ◊ Nausea, vomiting
- ◊ Urinary frequency / urgency
- ◊ Dysuria
- ◊ Hematuria
- ◊ Back / Flank pain
- ◊ Costovertebral angle tenderness to percussion

KEY DOCUMENTATION ELEMENTS

- Assessment of abdomen to include findings on palpation / percussion including presence or absence of masses and presence and nature of tenderness / pain
- Treatment and response to treatment

PERTINENT ASSESSMENT FINDINGS

- Rebound tenderness or guarding
- Abdominal distension
- Tenderness focal to a specific abdominal quadrant
- Presence of "pulsatile" abdominal mass
- Rectal bleeding, hematemesis, vaginal bleeding

QUALITY METRICS

- Assessment for life-threatening etiology
- Treatment of pain per the Pain Management Protocol

Agitated or Violent Patient / Behavioral Emergencies

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

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

Differential
- *See Altered Mental Status differentials*
- Alcohol intoxication
- Toxin / Substance abuse
- Medication effect / overdose
- Withdrawal syndromes
- Anxiety disorder/Schizophrenia
- Bipolar (manic-depressive)
- Seizure / Postictal

EMR & EMT

1. UNIVERSAL PATIENT CARE.
   a. Maintain and support airway.
   b. Note respiratory status—monitor pulse oximetry. Capnography should also be used if available.
   c. When safe to do so, consider empiric oxygen via NRB mask pre-vitals signs if being restrained
   d. Check baseline vital signs and blood glucose level when safe to do so.
2. Note medications / substances on scene that may contribute to the agitation or may be relevant to the treatment of a contributing medical condition.
3. If a medical or traumatic condition is suspected as the cause of the behavior, refer to the appropriate protocol.
4. Establish patient rapport
   a. Attempt verbal reassurance and calm patient prior to use of pharmacologic and/or physical management devices.
   b. Engage family members / loved ones to encourage patient cooperation if their presence does not exacerbate the patient's agitation.
   c. Continued verbal reassurance and calming of patient following use of chemical / physical management devices.
5. Physical Management Devices (*See PHYSICAL RESTRAINTS Procedure*)
   a. When it is safe to do so, await arrival of (ALS) before applying restraints.
   b. Patient must be out of control and a threat to themselves and/or others.
   c. If physical restraint is required, make sure adequate personnel are present. This generally means four people, one for each of the patient's extremities.
   d. Stretcher straps should be applied as the standard procedure for all patients during transport.
   e. Secure all four extremities to the stationary frame of the stretcher if needed.
   f. Physical management devices, including stretcher straps, should never restrict the patient's chest wall motion.
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**
2. Administer medication per protocol if the patient presents as an **IMMEDIATE** threat to themselves or others. Otherwise, contact medical control based on the patient's presentation and potential for self-harm to obtain orders for administration of antipsychotic/sedation medications.

Protocol Continues

Medical Control

Agitated or Violent Patient / Behavioral Emergencies

Paramedic/PHRN

3. Administer **MIDAZOLAM/HALOPERIDOL** or **KETAMINE** **as per the Richmond Agitation-Sedation Scale below.
    - **MIDAZOLAM /HALOPERIDOL** *(May be given seperately or together based on the patient presentation and the level of agitation).*
        - **MIDAZOLAM IV/IM: 5 mg**; May repeat after max onset time up to a maximum total dose of 10 mg. *Onset: IV: 3-5 min; IM: 10-15 min;*
        - **HALOPERIDOL 5 mg IV; 10mg IM.** *Onset: IV: 5-10 min; IM: 10-20 min;*
        - **LORAZEPAM 2 mg IV/IM** *(May be given in lieuof **MIDAZOLAM** within this protocol, but IM route is the least preferred)*
    - **KETAMINE: 4 mg/kg IM** *Onset: 3-5 minutes (multiple IM sites may be required, max **5 ml/ per** IM site*) Max dose 400 mg
4. If sedation is used, continuous cardiac, pulse oximetry and $EtCO_2$ monitoring and vital signs every 5 minutes are required.

    ** If Ketamine is used per this guideline, the EMS system office shall be notified within 24 hours for QA.

Richmond Agitation-Sedation Scale

Score	Term	Description	ECIEMS Treatment
+4	Combative	Overtly combative, violent, immediate danger to staff	MIDAZOLAM/HALOPERIDOL or KETAMINE**
+3	Very agitated	Pulls or removes tubes and catheters, aggressive	MIDAZOLAM/HALOPERIDOL
+2	Agitated	Frequent, non-purposeful movements, fights interventions	MIDAZOLAM/HALOPERIDOL
+1	Restless	Anxious but movements are not aggressive or vigorous	Verbal reassurance and calm patient
0	**Alert and Calm**		
-1	Drowsy	Not fully alert but has sustained awakening and eye contact to voice (> 10 seconds)	
-2	Light Sedation	Briefly awakens with eye contact to voice (< 10 seconds)	
-3	Moderate Sedation	Movement or eye opening to voice (no eye contact)	
-4	Deep Sedation	No response to voice but movement or eye opening to physical stimulation	
-5	Unarousable	No response to voice or physical stimulation	

Agitated or Violent Patient / Behavioral Emergencies

Patient Safety Considerations

The management of violent patients requires a constant reevaluation of the risk / benefit balance for the patient and bystanders in order to provide the safest care for all involved. These are complex and high-risk encounters. There is no one size fits all solution for addressing these patients.

1. Don PPE.
2. Do not attempt to enter or control a scene where physical violence or weapons are present.
3. Dispatch law enforcement immediately to secure and maintain scene safety.
4. Urgent de-escalation of patient agitation is imperative in the interest of patient safety as well as for EMS personnel and others on scene.
5. Uncontrolled or poorly controlled patient agitation and physical violence can place the patient at risk for sudden cardiopulmonary arrest due to the following etiologies:
    a. Excited delirium / exhaustive mania: A postmortem diagnosis of exclusion for sudden death thought to result from metabolic acidosis (most likely from lactate) stemming from physical agitation or physical control measures and potentially exacerbated by stimulant drugs (e.g. cocaine) or alcohol withdrawal.
    b. Positional asphyxia: Sudden death from restriction of chest wall movement and/or obstruction of the airway secondary to restricted head or neck positioning resulting in hypercarbia and/or hypoxia.
6. Apply a cardiac monitor as soon as possible, particularly when pharmacologic management medications have been administered.
7. All patients who have received pharmacologic management medications must be monitored closely for the development of hypoventilation and oversedation.
    a. Must utilize **CAPNOGRAPHY**.
8. Placement of stretcher in sitting position prevents aspiration and reduces the patient's physical strength by placing the abdominal muscles in the flexed position.
9. Patients who are more physically uncooperative should be physically secured with one arm above the head and the other arm below the waist, and both lower extremities individually secured.
10. The following techniques should be expressly **PROHIBITED** by EMS providers:
    a. Secure or transport in a prone position with or without hands and feet behind the back (hobbling or "hog-tying").
    b. "Sandwiching" patients between backboards.
    c. Techniques that constrict the neck or compromise the airway.
    d. EMS provider use of weapons as adjuncts in managing a patient.

Agitated or Violent Patient / Behavioral Emergencies

PEARLS

- Direct medical oversight should be contacted at any time for advice, especially when patient's level of agitation is such that transport may place all parties at risk.
- Stretchers with adequate foam padding, particularly around the head, facilitates patient's ability to self-position the head and neck to maintain airway patency.
- For patients with key-locking devices, applied by another agency, consider the following options:
    a. Remove device and replace it with a device that does not require a key.
    b. Administer pharmacologic management medication then remove and replace device with another non-key-locking device after patient has become more cooperative.
    c. Transport patient, accompanied in patient compartment by person who has device key.

Use SAFER model:

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

Assess and acknowledge crisis by validating patient's feelings and not minimizing them.

Facilitate resources (Friends, family, police, chaplain).

Encourage patient to use resources available and take actions in their best interest.**(988 Crises Hotline)**

Recovery or referral: Leave patient in care of responsible person, professional or transport to medical

KEY DOCUMENTATION ELEMENTS

- Etiology of agitated or violent behavior if known
- Patient's medications,/substances found on scene
- Patients medical history
- Physical evidence or history of trauma
- Adequate oxygenation/ventilation by pulse oximetry/capnography
- Blood glucose measurement
- Measures taken to establish patient rapport
- Dose, route, number of doses and response of medications administered
- Number and physical sites of placement of restraints
- Duration of placement of restraints
- Repeated assessment of ABC's

PERTINENT ASSESSMENT FINDINGS

- Continuous monitoring of:
    a. Airway patency
    b. Respiratory status with pulse oximetery and capnography
    c. Circulatory status with frequent blood pressure measurements
    d. Mental status and trends in level of patient cooperation
    e. Cardiac status, especially if the patient has received pharmacologic management medication
    f. Extremity perfusion with capillary refill in patients in physical management device

QUALITY METRICS

- Documented use of capnography with medication administration
- Incident of injuries to patient, EMS personnel or others on scene or during transport
- Medical or physical complications (including sudden death) in patients
- Use of Ketamine per this protocol triggers an EMS System review

Allergic Reaction / Anaphylaxis

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

Signs and Symptoms
- Itching or urticaria
- Coughing, wheezing, or respiratory distress
- Chest tightness or throat constriction
- Hypotension or shock
- Persistent gastrointestinal symptoms (nausea, vomiting, and diarrhea)
- Altered mental status

Differential
- Angioedema (drug induced)
- Aspiration / Airway obstruction
- Vasovagal event
- Asthma or COPD
- CHF

EMR

1. UNIVERSAL PATIENT CARE.
2. If signs of **ANAPHYLAXIS,** administer and/or assist patient with **EPINEPHRINE AUTOINJECTOR (0.3mg > 30kg),**
3. If respiratory distress with wheezing is present administer **ALBUTEROL (5 mg) or Pre-mix IPRATROPIUM BROMIDE/ALBUTEROL (0.5 mg/3 mg)** via nebulizer.
4. Relay information to incoming ambulance.

EMT

1. Continue **EMR TREATMENT**.
2. If signs of **ANAPHYLAXIS,** , administer **EPINEPHRINE (1:1,000) (0.3-0.5) mg IM** (may repeat x1 after 5-15 minutes).
3. May repeat **ALBUTEROL (5 mg) or Pre-mix IPRATROPIUM BROMIDE/ALBUTEROL (0.5 mg/3 mg)** via nebulizer x 2, if needed for continued symptomatic relief.
4. For non-anaphylactic allergic reactions, consider **DIPHENHYDRAMINE 50 mg PO**.
5. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **BLS TREATMENT**.
2. If signs of **ANAPHYLAXIS,** persist, repeat **EPINEPHRINE (1:1,000) (0.3-0.5) mg IM** every 5-15 minutes. (Max 3 doses)
3. Establish IV access.
4. Administer Isotonic solution **500 mL bolus** to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP ≥ 90mmHg or MAP ≥ 65 mmHg; maximum **2 liters**.
5. **DIPHENHYDRAMINE 50 mg IM/IV/IO/PO**. (Not to be repeated if already given by BLS provider) *May be given without epinephrine for incidents involving isolated urticaria, hives or angioedema that does not involve the mouth, lips or airway*
6. **METHYLPREDNISOLONE 125 mg IV/IM/IO or DEXAMETHASONE 10 mg IV/IO** .
7. Closely monitor respiratory status with waveform capnography and reassess need for intubation if respiratory symptoms worsen or do not improve with treatment. See AIRWAY MANAGEMENT Protocol.

Allergic Reaction / Anaphylaxis

PEARLS

- Allergic reactions and anaphylaxis are serious and potentially life-threatening medical emergencies.
- The shorter the onset from exposure to symptoms, the more severe the reaction.
- Localized allergic reactions (e.g. urticarial or angioedema *that does not involve the mouth, lips or airway,* may be treated with antihistamine therapy.
- Anaphylaxis should always be treated with Epinephrine as first-line treatment.
- Cardiovascular collapse may occur abruptly, without the prior development of skin or respiratory symptoms.
- Always perform cardiac monitoring when administering Epinephrine
  -Cardiac monitoring should not delay administration of Epinephrine

Definitions

- **Anaphylaxis**—More severe and characterized by an acute onset involving:
  1) Skin (urticaria) and/or mucosa with either respiratory compromise or hypotension (SBP < 90 mmHg) or signs of end-organ dysfunction

  -OR-

  1) Hypotension (SBP < 90 mmHg) for that patient after exposure to a **known** allergen

  -OR-

  1) Two or more of the following occurring rapidly after exposure to a likely allergen:
     i. Skin and/or mucosal involvement (urticaria, itchy, swollen tongue / lips)
     ii. Respiratory compromise (dyspnea, wheeze, stridor, hypoxemia)
     iii. Persistent gastrointestinal symptoms (vomiting, abdominal pain, diarrhea)
     iv. Hypotension or associated symptoms (syncope, hypotonia, incontinence)

- **Non-Anaphylactic Allergic Reaction**—Signs involving only **one** organ system (e.g. localized angioedema that does not compromise the airway or not associated with vomiting; urticaria alone).

KEY DOCUMENTATION ELEMENTS

- Medications given
- Dose and concentration of Epinephrine given
- Route of Epinephrine administration
- Time of Epinephrine administration
- Signs and symptoms of the patient
- Waveform capnography for anaphylaxis

PERTINENT ASSESSMENT FINDINGS

- Presence or absence of angioedema
- Presence or absence of respiratory compromise
- Presence or absence of circulatory compromise
- Localized or generalized urticaria
- Response to therapy

QUALITY METRICS

- Percentage of patients with anaphylaxis that receive Epinephrine
- Airway assessment documented

Altered Mental Status

History
- History from bystanders
- Environment where patient found
- Recent complaints
- Medical alert tags. Accessory medical devices
- Diabetes
- History of trauma
- Drugs, drug paraphernalia
- Past medical history
- Medications

Signs and Symptoms
- Decreased mental status or lethargy
- Change in baseline mental status
- Bizarre behavior
- Hypoglycemia
- Hyperglycemia
- Irritability

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

EMR & EMT

1. **UNIVERSAL PATIENT CARE**.
2. Immobilize cervical spine if suspected spinal injury.
3. Check blood glucose level.
4. If blood glucose < 60 mg/dL (or suspected) and patient is conscious or has altered mental status, refer to DIABETIC EMERGENCIES-HYPOGLYVEMIA protocol.
5. Perform FAST-ED exam.
6. If opioid overdose suspected and airway compromise or inadequate respiratory effort present refer to POISONING AND OVERDOSE Protocol.
7. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. If blood glucose < 60 mg/dL, administer **DEXTROSE 10% (D10) 25 g**; administer in **50 mL (5g)** IV aliquots.

   Alternative medication: **DEXTROSE 50% (D50) 25 g IV**.
4. Repeat blood glucose. Consider repeating the dose if blood glucose < 60 mg/dL, with symptoms of hypoglycemia. DIABETIC EMERGENCIES-HYPOGLYVEMIA protocol.
5. If no IV access available, administer **GLUCAGON 1 mg IM/IN**.
6. Consider **THIAMINE 100 mg IV/IM** if Alcohol Syndrome is suspected.
7. If opioid overdose suspected and airway compromise or inadequate respiratory effort present refer to POISONING AND OVERDOSE Protocol.
8. Reassess need for Orotracheal Intubation. Refer to the AIRWAY MANAGEMENT Protocol.

Altered Mental Status

PEARLS

- Altered mental status may be caused by many factors including the following: stroke, drug overdose, infection, hypoglycemia, hyperglycemia or trauma.
- Be aware of AMS as presenting sign of an environmental toxin or Haz-Mat exposure, and protect personal safety and that of other responders.
- A careful assessment of the patient, the scene and the circumstances should be undertaken.
- Pay careful attention to the head exam for signs of trauma / injury.
- DO NOT assume recreational drug use and/or alcohol are the sole reasons for Altered Mental Status.
- DO NOT assume Altered Mental Status is the result solely of an underlying psychiatric etiology.
  - Underlying medical or trauma conditions can precipitate a deterioration of a patient's underlying mental health disease.

GLASGOW COMA SCALE (GCS)

Behavior	Response	Score
Eye Opening	Spontaneous	4
	To Verbal	3
	To Pain	2
	None	1
Verbal Response	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Sounds	2
	None	1
Best Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraws from Pain	4
	Flexion to Pain	3
	Extension to Pain	2
	None	1

KEY DOCUMENTATION ELEMENTS

- GCS or AVPU description
- Pupil, neck and head exam were done
- Glucose was documented
- Temperature was taken when able
- Patient and medic safety were considered

PERTINENT ASSESSMENT FINDINGS

- Track marks
- Breath odor
- Skin temperature
- Location

QUALITY METRICS

- Hypoglycemia considered and treated appropriately
  - Blood glucose level obtained
- Naloxone is used as therapeutic intervention, not a diagnostic tool

Bronchospasm / Asthma / COPD

History

- Asthma, COPD, Chronic Bronchitis, Emphysema history
- Onset of symptoms
- Concurrent symptoms (fever, cough, rhinorrhea, tongue/lip swelling, rash, labored breathing, FBAO)
- Usual triggers of symptoms (cigarette smoke, change in weather, URI)
- Home treatment (oxygen, nebulizers)
- Sick contacts
- Previously intubated

Signs and Symptoms

- Shortness of breath (inability to speak full sentences)
- Wheezing, rhonchi
- Fever, cough, congestion
- Respiratory distress (hypoxia, retractions, nasal flaring, pursed lip breathing, tripoding, cyanosis, tachypnea, etc)

Differential

- Asthma
- Anaphylaxis
- Aspiration
- COPD
- Pleural effusion
- Pneumonia
- Pulmonary embolus
- Pneumothorax
- Cardiac (MI or CHF)
- Pericardial tamponade
- Hyperventilation
- Inhaled toxin

EMR

1. UNIVERSAL PATIENT CARE.
2. **ALBUTEROL (5 mg) or Pre-mix IPRATROPIUM BROMIDE/ALBUTEROL (0.5 mg/3 mg)** via nebulizer. May repeat x2 if needed for continued symptomatic relief.
3. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT

1. Continue **EMR TREATMENT**.
2. Consider CPAP application
3. If in severe distress with impending respiratory failure, consider **EPINEPHRINE (1:1,000)** at **(0.3-0.5) mg IM**.

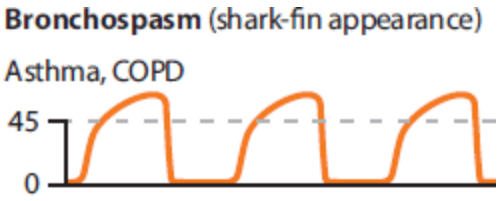
Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. In patients with persistent respiratory distress despite the above treatment, consider **MAGNESIUM SULFATE 2 grams IV** in 50 mL NS or premix bag, infused over 10 minutes
4. **METHYLPREDNISOLONE 125 mg IV/IM/IO or DEXAMETHASONE 10 mg IV/IO/PO** .
5. Consider CPAP application.
6. Assist ventilations with in-line nebulizer kit and BVM if necessary.
7. Reassess need for Orotracheal Intubation if respiratory symptoms worsen or do not improve with treatment.
8. If in severe distress with impending respiratory failure, consider **EPINEPHRINE (1:1,000)** at **0.3-0.5 mg IM**.
9. Continue to monitor need for Orotracheal Intubation if respiratory symptoms worsen or do not improve with treatment. See AIRWAY MANAGEMENT Protocol.

Bronchospasm / Asthma / COPD

PEARLS

- Pulse oximetry and end-tidal CO2 ($EtCO_2$) should be routinely used as an adjunct to other forms of respiratory monitoring.



- Beware of patients with a “silent chest” (absent breath sounds) as this may indicate severe bronchospasm and impending respiratory failure.
- Remember that not all wheezing is caused by asthma and that not all asthmatics wheeze.
  - Patients with congestive heart failure may present with lung sounds that mimic asthma (“cardiac wheeze”)
- Consider cardiac etiology for shortness of breath and/or chest pain and refer to CHEST PAIN protocol.
- In the asthmatic patient, pharmacologic intervention should take priority over CPAP and be given in line with CPAP.
- CPAP should not be initiated on patients with a systolic BP < 90mmHg. CPAP increases intrathoracic pres-sure and can decrease venous return to the heart (compromising the patient’s perfusion). Contact Medical Control and use CPAP cautiously if the systolic BP is between 90-100 mmHg for the same reason.
- Giving positive pressure in the setting of bronchoconstriction, either via a Blind Insertion Airway Device (BIAD) or intubation, increases the risk of air trapping which can lead to pneumothorax and cardiovascular collapse. These interventions should be reserved for situations of respiratory failure.

KEY DOCUMENTATION ELEMENTS

- Reparatory rate
- Oxygen saturation and $EtCO_2$
- Use of accessory muscles
- Breath sounds
- Air entry
- Mental status
- Color
- Response to interventions

PERTINENT ASSESSMENT FINDINGS

- In the setting of severe bronchoconstriction, wheezing might not be heard. Patients with known asthma who complain of chest pain or shortness of breath should be empirically treated, even if wheezing is absent.

QUALITY METRICS

- CPAP utilization
- Utilization of continuous pulse oximetry and $EtCO_2$

Diabetic Emergencies- Hyperglycemia

History
- Past medical history
- Medications (insulin, etc.)
- Recent blood glucose check
- Last meal

Signs and Symptoms
- Altered mental status
- Lethargy
- Nausea / Vomiting
- Polyuria
- Polydipsia
- Dehydration
- Weakness
- Signs of DKA (abdominal pain, fruity breath, Kussmaul respirations)

Differential
- Alcohol / Drug use
- Toxic ingestion
- Trauma; head injury
- Seizure
- Stroke
- Altered mental status
- Diabetic Ketoacidosis

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Check a blood glucose level.
3. If patient is symptomatic and blood glucose **> 250 mg/dL** call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. If blood glucose > 300 mg/dL with signs and symptoms of shock/dehydration, administer **ISOTONIC FLUID (500 ml) bolus** for signs of dehydration. Repeat fluid bolus as needed as long as lung sounds remain clear; maximum **2 liters**.
4. Initiate cardiac monitoring and assess for hyperkalemia (Wide QRS, Peaked T waved or flattened / absent P waves). Acquire and transmit 12-lead ECG and administer the following medications if hyperkalemia is suspected:

    - **CALCIUM CHLORIDE 10% (1g/10 ml) 1g IV/IO SLOWLY** over 10 minutes for:

        (If ECG is suggestive of hyperkalemia after administration of sodium bicarbonate, calcium chloride should be administered)

        (or)

    - **CALCIUM GLUCONATE10% (1g/10 ml) 3g IV/IO SLOWLY** over 10 minutes for:

        (If ECG is suggestive of hyperkalemia after administration of sodium bicarbonate, calcium gluconate should be administered)

    - **ALBUTEROL SULFATE 10 mg via** small volume nebulizer
    - **SODIUM BICARBONATE 1 mEq/Kg (max dose of 50 mEq) IV/IO**

Diabetic Emergencies- Hyperglycemia

PEARLS

Hyperglycemia

- Consider causes for hyperglycemia by thinking about the 3 I's:
    a. Insulin – this refers to any medication changes for insulin or oral medications including poor compliance or malfunctioning insulin pump.
    b. Ischemia – this refers to hyperglycemia sometimes being an indication of physiologic stress in a patient and can be a clue to myocardial ischemia in particular.
    c. Infection – underlying infection can cause derangements in glucose control
- Diabetic ketoacidosis (DKA) is a life-threatening emergency defined as uncontrolled hyperglycemia and the signs and symptoms of ketoacidosis.
    Signs and symptoms of DKA include uncontrolled blood glucose usually greater than 250 mg/dL, weakness, altered mental status, abdominal pain, nausea, vomiting, polyuria (excessive urination), polydipsia (excessive thirst), fruity odor on the breath (from ketones), or tachypnea (Kussmaul respirations—low $EtCO_2$).
- Hyperglycemic Hyperosmolar Nonketotic State (HHNS) is characterized by blood glucose levels usually greater than 600 mg/dL and profound dehydration with significant neurologic deficits (e.g. coma, AMS).
- Overly aggressive administration of fluid in hyperglycemic patients may cause cerebral edema
    a. Closely monitor for signs of altered mental status, increased intracranial pressure and immediately discontinue IV fluid and elevate head of bed if signs of increased ICP develop.
    b. Reassess and manage airway as needed
- Asymptomatic hyperglycemia poses minimal risk to the patient while inappropriate aggressive interventions to manage blood sugar can harm patients.

KEY DOCUMENTATION ELEMENTS

- Document glucose level
- Document reassessment of vital signs and mental status after treatment
- Document patient capacity and contacting Medical Control for all diabetic refusals

PERTINENT ASSESSMENT FINDINGS

- Altered level of consciousness
- Signs of dehydration
- Abdominal pain, "fruity breath," and Kussmaul breathing may be associated with DKA
- Polyuria, polydipsia
- ECG with "peaked" T-waves suggestive of hyper-kalemia
- Concomitant trauma

QUALITY METRICS

- Glucose level checked when appropriate.
- If patient released at scene, criteria documented for safe release.
- Hyperglycemia considered and treated appropriately

Diabetic Emergencies-Hypoglycemia

History
- Past medical history
- Medications (insulin, etc.)
- Recent blood glucose check
- Last meal

Signs and Symptoms
- Altered mental status
- Combative / Irritable
- Seizures
- Nausea / Vomiting
- Diaphoresis
- Weakness

Differential
- Alcohol / Drug use
- Toxic ingestion
- Trauma; head injury
- Seizure
- Stroke
- Altered mental status

EMR

1. UNIVERSAL PATIENT CARE.
2. Check a blood glucose level.
3. If blood glucose < 60 mg/dL (or suspected) **and** patient is conscious with an intact gag reflex, administer **ORAL GLUCOSE one tube (15g) PO**.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT

1. Continue **EMR TREATMENT**.
4. If available, administer **GLUCAGON 1 mg (IN/M)**. May repeat in 5 minutes if no change in LOC.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. If blood glucose < 60 mg/dL, administer **DEXTROSE 10% (D10) 25 g**; administer in **50 mL (5g)** IV aliquots.

   Alternative medication: **DEXTROSE 50% (D50) 25 g IV**.
4. Repeat blood glucose. Consider repeating the dose if blood glucose < 60 mg/dL, with symptoms of hypoglycemia.
5. Patients suspected to be intoxicated or suffering from the effects of alcohol abuse consider THIAMINE **100mg IV/IM)**

Hypoglycemia Refusal Criteria

****Must contact Medical Control****

- Repeat glucose is greater than 80 mg/dL.
- Patient is a known diabetic.
- Patient returns to normal mental status, with no focal neurologic signs / symptoms after receiving glucose / dextrose.
- Patient can promptly obtain and will eat a carbohydrate meal.
- Patient or legal guardian refuses transport and EMS providers agree transport not indicated.
- A reliable adult will be staying with patient.
- No major co-morbid symptoms exist, like chest pain, shortness of breath, seizures, intoxication.

Diabetic Emergencies

PEARLS

Hypoglycemia

- Dextrose 10% is the preferred formulation for administration for hypoglycemia.
  - There are no statistically significant differences in the median recovery time following administration of D10% versus D50%.
- Dextrose 50% can cause local tissue damage if it extravasates from vein, and may cause overshoot hyperglycemia.
- Patients taking oral diabetic medications (particularly Sulfonylureas, i.e. glyburide, glipizide) and/or long acting insulin, should be encouraged to allow transportation to a medical facility as they are at risk of recurrent hypoglycemia that can be delayed for hours and require close monitoring even after normal blood glucose is established.
- Patients who meet criteria to refuse care after a hypoglycemic event should be instructed to contact their physician and consume a meal.
- If possible, have family / patient turn off insulin pumps.
- Consider potential for intentional overdose of hypoglycemic agents.

KEY DOCUMENTATION ELEMENTS

- Document glucose level
- Document reassessment of vital signs and mental status after treatment
- Document patient capacity and contacting Medical Control for all diabetic refusals

PERTINENT ASSESSMENT FINDINGS

- Diaphoresis or hypothermia may be associated with hypoglycemia
- Altered level of consciousness
- Concomitant trauma
- Sluggish pupillary response

QUALITY METRICS

- Glucose level checked when appropriate.
- If patient released at scene, criteria documented for safe release.
- Hypoglycemia considered and treated appropriately

Foreign Body Airway Obstruction

History
- Time of onset of symptoms
- Associated symptoms
- Choking or other evidence of upper airway obstruction
- History of trauma

Signs and Symptoms
Sudden onset of respiratory distress:
- Coughing
- Wheezing
- Gagging
- Stridor
- Shortness of breath
- Abnormal color (cyanosis or pallor)

Differential
- Cardiac arrest
- Respiratory arrest
- Anaphylaxis
- Esophageal obstruction

EMR & EMT

Conscious Patient – Able To Speak:

1. UNIVERSAL PATIENT CARE.
2. Leave patient alone; offer reassurance.
3. Encourage coughing.

Conscious Patient – Unable To Speak:

1. Administer abdominal thrusts / Heimlich maneuver until the foreign body is expelled or until the patient becomes unconscious.
2. After the obstruction is relieved, reassess the airway, lung sounds, skin color and vital signs.
3. UNIVERSAL PATIENT CARE.

Unconscious Patient:

1. Place patient in a supine position and begin chest compressions.
2. Open the airway and check for Foreign Body Airway Obstruction. If object is visible, perform finger sweep to remove.
3. If object is not visible, continue chest compressions until object dislodged.

Paramedic/PHRN

Unconscious Patient:

1. Continue above treatment.
2. Perform advanced airway control measures as available, using the AIRWAY MANAGEMENT Protocol. Utilize Magill forceps as necessary.
3. If unable to clear obstruction, consider surgical airway placement, as outlined in the AIRWAY MANAGEMENT Protocol.

Foreign Body Airway Obstruction

PEARLS

- If air exchange is adequate with a partial airway obstruction, do not interfere; instead, encourage the patient to cough up the obstruction. Continue to monitor the patient for adequacy of air exchange. If air exchange becomes inadequate, continue with the protocol.
- Do not perform blind finger sweeps in the mouth and posterior pharynx. This may push the object farther into the airway.

KEY DOCUMENTATION ELEMENTS

- Initial vital signs and physical exam
- Interventions attempted and the number of attempts to achieve a successful result
- Subsequent vital signs and physical exam to assess for change after interventions

PERTINENT ASSESSMENT FINDINGS

- Acute worsening of respiratory status or evidence of hypoxemia

QUALITY METRICS

- Successful removal of the foreign body from the airway.

Nausea / Vomiting

History

- Appearance of emesis (bloody, etc)
- Time of last meal
- Last bowel movement / emesis
- Improvement or worsening with food or activity
- Duration of symptoms
- Sick contacts
- Past medical history
- Past surgical history
- Medications
- Last Menstrual Period / Pregnancy
- Travel history
- Suspected food poisoning

Signs and Symptoms

- Fever
- Pain
- Constipation
- Diarrhea
- Anorexia
- Hematemesis

Differential

- CNS (increased pressure, headache, stroke, CNS lesions, trauma or hemorrhage, vestibular)
- Myocardial infarction
- Drugs (NSAID's, antibiotics, narcotics, chemotherapy)
- GI or Renal disorders
- Diabetic Ketoacidosis (DKA)
- Gynecologic disease (ovarian cyst, PID)
- Infections
- Electrolyte abnormalities
- Food or toxin induced
- Substance abuse
- Pregnancy
- Psychological

EMR

1. UNIVERSAL PATIENT CARE.
2. Consider trial of inhalation from an isopropyl alcohol prep pad.
3. Relay information to incoming ambulance.

EMT

1. Continue **EMR TREATMENT**.
2. Administer **ONDANSETRON ODT 8 mg PO**.
    a. Contraindicated for suspected or known diagnosis of prolonged QT syndrome.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT.**
2. Establish IV access.
3. Consider **ISOTONIC FLUID (500 ml) bolus** for signs of dehydration. Repeat fluid bolus as needed as long as lung sounds remain clear; maximum **2 liters**.
4. Administer **ONDANSETRON 4 mg IV** or **ONDANSETRON ODT 8 mg PO**. May repeat 4mg dose x1 after 15 minutes (max total dose 8mg).
    a. Contraindicated for suspected or known diagnosis of prolonged QT syndrome, or noted prolonged QT interval on ECG.

Nausea / Vomiting

PEARLS

- Nausea and vomiting are symptoms of illness – in addition to treating the patient's nausea and vomiting a thorough history and physical are key to identifying what may be a disease in need of emergent treatment (e.g. bowel obstruction, myocardial infarction, pregnancy).
- Nausea / vomiting is a common finding associated with acute coronary syndrome. Consider obtaining a 12-lead ECG when appropriate.
- While ondansetron has not been adequately studied in pregnancy to determine safety, it remains a treatment option for hyperemesis gravidum in pregnant patient.
- Inhaled isopropyl alcohol has shown promise as an antiemetic and may be superior to oral ondansetron. The mechanism of isopropyl alcohol's antiemetic effect remains unclear.

  April MD, Oliver JJ, Davis WT, et al. Aromatherapy versus oral ondansetron for antiemetic therapy among adult emergency department patients: a randomized controlled trial. *Ann Emerg Med*, 2018 Aug; 72(2): 184-93.

KEY DOCUMENTATION ELEMENTS

- Patient age
- Medications given, including time, provider level, dose, dose units, route, response and complications
- Vital signs before and after medication administration
- History and physical with regard to etiology of nausea/vomiting
- ECG performed and interpretation documented if cardiac risk factors are present

PERTINENT ASSESSMENT FINDINGS

- Vital signs
- Risk factors for heart disease / ECG if applicable
- Pregnancy status
- Abdominal exam

QUALITY METRICS

- In patients with nausea and vomiting, appropriate medication(s) was / were administered (including proper dosage) and the patient's response to treatment is documented

Seizure / Status Epilepticus

History
- Reported / witnessed seizure activity
- Previous seizure history
- Medical alert tag history
- Seizure medications (recent changes, compliance)
- Medications administered prior to arrival
- History of trauma
- History of diabetes
- History of pregnancy
- Time of seizure onset
- Number of seizures
- Alcohol use, abuse or abrupt cessation
- Fever

Signs and Symptoms
- Decreased mental status
- Sleepiness
- Incontinence
- Observed seizure activity
- Evidence of trauma
- Unconscious

Differential
- CNS (head) trauma
- Tumor
- Metabolic, Hepatic, or Renal failure
- Hypoxia
- Electrolyte abnormality
- Drugs, Medications, Non-compliance
- Infection / Fever
- Alcohol withdrawal
- Eclampsia
- Stroke
- Hyperthermia
- Hypoglycemia

EMR & EMT

1. UNIVERSAL PATIENT CARE.
    a. Check blood glucose level.
2. If blood glucose < 60 mg/dL, refer to DIABETIC EMERGENCIES-HYPOGLYCEMIA Protocol.
3. Immobilize cervical spine if indicated.
4. Position patient to prevent injury.
5. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. If a patient is actively seizing with no IV access, administer;

(*may repeat x 1 after 5 minutes if seizure persists)*

MIDAZOLAM IM/IN 0.2 mg/kg (maximum dose 10mg) (**5mg/1ml concentration**)

- OR -

LORAZEPAM IM 0.1 mg/kg (maximum dose of 4mg)*(least desirable route)*

3. Establish IV access or if IV access has been already established prior to seizure activity, administer:

(may repeat x 1 after 5 minutes if seizure persists).

MIDAZOLAM IV/IO 0.1 mg/kg (maximum dose 5mg)

- OR -

DIAZEPAM 0.1 mg/kg IV/IO (maximum dose 5 mg);

-OR-

LORAZEPAM IV/IO 0.1 mg/kg (maximum dose of 4mg)

Protocol Continues

Medical Control

Adult Medical

Seizure / Status Epilepticus

Paramedic/PHRN

4. If blood glucose < 60 mg/dL, refer to DIABETIC EMERGENCIES–HYPOGLYCEMIA Protocol.
5. Seizure in a pregnant patient, refer to the ECLAMPSIA/PRE-ECLAMPSIA Protocol.
6. Seizures secondary to hyperthermia should be treated with simultaneous medication management of the seizure activity and rapid cooling measures.
7. Capnography should accompany the administration and post administration of any seizure medication(s).

PEARLS

- **Status Epilepticus** is defined as two or more successive seizures without a period of consciousness or recovery. This is a true emergency requiring rapid airway control, treatment, and transport.
- **Grand Mal Seizures (generalized)** are associated with loss of consciousness, incontinence, and tongue trauma.
- **Focal Seizures** affect only a part of the body and are not usually associated with a loss of consciousness, but can propagate to generalized seizures with loss of consciousness.
- Benzodiazepines are effective in terminating seizures; **do not delay IM/IN administration while initiating an IV**.
- Many airway / breathing issues in seizing patients can be managed without intubation or placement of an advanced airway. Reserve these measures for patients that fail less invasive maneuvers as noted above.
- For new onset seizures or seizures that are refractory to treatment, consider other potential causes including, but not limited to, trauma, stroke, electrolyte abnormality, toxic ingestion, pregnancy with eclampsia, hyperthermia.
- For any seizure in a pregnant patient, follow the ECLAMPSIA / PRE-ECLAMPSIA Protocol.

KEY DOCUMENTATION ELEMENTS

- Actively seizing during transport and time of seizure onset / cessation
- Concurrent symptoms of apnea, cyanosis, vomiting, bowel/bladder incontinence or fever
- Medication amounts/routes given by bystanders or prehospital providers
- Neurologic status (GCS, nystagmus, pupil size, focal neurologic deficit or signs of stroke)
- Blood glucose level
- Capnography readings

PERTINENT ASSESSMENT FINDINGS

- Acute worsening of respiratory status or evidence of hypoxemia
- Neurologic status
- Blood glucose level
- Be alert for concurrent traumatic injuries in seizure patients

QUALITY METRICS

- Time to administration of anticonvulsant medication
- Blood glucose level obtained

Sepsis

History

- Duration and severity of fever
- Altered mental status
- Past medical history
- Medications / Recent antibiotics
- Immunocompromised (Transplant, HIV, Diabetes, Cancer)
- Recent hospitalization / Healthcare facility
- Prosthetic device / Indwelling device
- Last antipyretic (acetaminophen, ibuprofen)

Signs and Symptoms

- Hyperthermia > 100.4°F (38°C)
- Hypothermia < 96.8°F (36°C)
- Tachycardia (HR > 90)
- Tachypnea (RR > 22)
- Hypotension (SBP < 100)
- Altered mental status
- Hyperglycemia / Hypoglycemia

Differential

- Infections (UTI, pneumonia, skin/soft tissue, etc)
- Cancer / Tumors / Lymphomas
- Medication or drug reaction
- Hyperthyroidism
- Heat Stroke
- Meningitis
- Hypoglycemia / Hypothermia
- MI
- Stroke
- Pulmonary embolism

Criteria

Obvious or suspected source of infection

↓

≥ 2 Criteria

- Temperature > 100.4°F or < 96.8°F
- Heart Rate > 90/min
- Respiratory Rate > 22/min

↓

+1 Criteria

- Hypotension, SBP < 90 mmHg or MAP < 65 mmHg
- Altered Mental Status
- $EtCO_2$ < 25 mmHg

↓

SEPSIS ALERT

Protocol Continues

Sepsis

EMR

1. UNIVERSAL PATIENT CARE.
    a. Check blood glucose level. If blood glucose < 60 mg/dL refer to DIABETIC EMERGENCIES-HYPOGLYCEMIA protocol for treatment.
2. Reassess patient and vital signs every 5 minutes.
3. Relay information to incoming ambulance.

EMT

1. Continue **EMR TREATMENT**.
2. If not practical for an intercept, notify receiving hospital of **"SEPSIS ALERT".**
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMT TREATMENT.**
2. Notify receiving hospital of **"SEPSIS ALERT".**
3. Consider 12-Lead ECG.
4. Establish at least one large bore IV.
    a. Administer **ISOTONIC SOLUTION (500 ml)** fluid bolus **(Document TOTAL amount of IVF given).**
        i. Reassess after each 500 mL increment and STOP fluids if signs of pulmonary edema (increasing shortness of breath or rales / crackles on lung exam).
        ii. May repeat to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg as long as pulmonary edema is not suspected.
        iii. Total amount of IVF should not exceed 2000 mL
5. For hypotension not responsive to fluid boluses, consider **NOREPINEPHRINE 2-30 mcg/min** (if available, with IV pump) titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.

    Alternative medication**:**

    PUSH DOSE EPINEPHRINE 1 mL (10 mcg) IV/IO every 2-5 minutes to maintain SBP of 90-100 mmHg or MAP > 65 mmHg.

    a. Mix 1 mL of Epinephrine 1:10,000 with 9 mL of Normal Saline in a 10 mL syringe resulting in a concentration of 10 mcg/mL.

    -OR-

    DOPAMINE (**5 - 20) mcg/kg/min** titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.

5. Continue to reassess patient including vital signs (manual BP), breath sounds, capnography, pulse oximetry, cardiac monitor.

Sepsis

PEARLS

- **Sepsis** is defined as a life-threatening organ dysfunction caused by a dysregulated host response to infection.
  - In lay terms, sepsis is a life-threatening condition that arises when the body's response to an infection injures its own tissues and organs.
- **Septic Shock** is a subset of sepsis in which underlying circulatory and cellular / metabolic abnormalities resulting in hypotension that require vasopressors to maintain a MAP of ≥ 65 mmHg and having a serum lactate level of ≥ 2 mmol/L despite adequate volume resuscitation, resulting in a higher risk of mortality.
- Early recognition of Sepsis allows for attentive care and early administration of antibiotics.
- Quantitative waveform capnography can be a reliable surrogate for lactate monitoring in detecting metabolic distress in sepsis patients. $EtCO_2$ < 25 mm Hg are associated with serum lactate levels > 4 mmol/L.
- Aggressive IV fluid therapy is the most important prehospital treatment for septic shock. Suspected septic patients should receive repeated fluid boluses while being checked frequently for signs of pulmonary edema, especially patients with known history of CHF or ESRD on dialysis. STOP fluid infusion in the setting of pulmonary edema.
- ECG should be obtained with suspected sepsis, but should not delay care in order to obtain.

Ideal Body Weight (kg)

Height	Male	Female		Height	Male	Female
5'	50	46		5'9"	71	66
5'1"	52	49		5'10"	73	69
5'2"	55	50		5'11"	75	71
5'3"	57	52		6'	78	73
5'4"	59	55		6'1"	80	75
5'5"	62	57		6'2"	82	78
5'6"	64	59		6'3"	85	80
5'7"	66	62		6'4"	87	82
5'8"	68	64		6'5"	89	85

KEY DOCUMENTATION ELEMENTS

- Sepsis criteria that patient met
- Full vital signs with reassessment every 15 minutes
- Neurologic status assessment
- Amount of IV fluid given

PERTINENT ASSESSMENT FINDINGS

- Full vital signs
- Criteria for Sepsis
- Findings of hypoperfusion: AMS, hypotension, $EtCO_2$ < 25 mmHg

QUALITY METRICS

- Advance hospital notification for suspected sepsis patients
- Administration of IV fluid to suspected sepsis patients unless contraindicated

Sepsis

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Shock

History
- Blood loss (GI, vaginal, AAA, etc.)
- Fluid loss (vomiting, diarrhea, fever)
- Infection
- Cardiac problems (MI, CHF)
- Medications
- Allergic reaction

Signs and Symptoms
- Altered mental status
- Syncope
- Tachycardia
- Diaphoresis
- Hypotension (SBP < 90 mmHg or MAP < 65 mmHg)
- Pale, cool, clammy skin
- Delayed capillary refill (> 2 sec)

Differential
- Infection / Sepsis
- Dehydration (Vomiting, Diarrhea)
- Medication / Overdose
- Vasovagal
- Physiologic (pregnancy)
- Pulmonary embolus
- Tension pneumothorax
- Trauma

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Keep patient warm and elevate feet.
3. Control bleeding as necessary. Refer to EXTREMITY TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. Consider **ISOTONIC SOLUTION (500 ml)** fluid bolus to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. May repeat fluid bolus x4 as needed to maintain SBP ≥ 90 mmHg as long as lungs remain clear.
    a. If signs of cardiogenic shock, limit fluid boluses and refer to CHF / PULMONARY EDEMA Protocol.
4. If tension pneumothorax suspected, perform NEEDLE DECOMPRESSION.
5. For hypotension not responsive to fluid boluses, consider **NOREPINEPHRINE 2-30 mcg/min** (if available, with IV pump) titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.

    Alternative medication**:**

    PUSH DOSE EPINEPHRINE 1 mL (10 mcg) IV/IO every 2-5 minutes to maintain SBP of 90-100 mmHg or MAP > 65 mmHg.

    a. Mix 1 mL of Epinephrine 1:10,000 with 9 mL of Normal Saline in a 10 mL syringe resulting in a concentration of 10 mcg/mL.

    -OR-

    DOPAMINE (**5 - 20) mcg/kg/min** titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.

Shock

PEARLS

- Early, aggressive IV fluid administration is essential in the treatment of most suspected shock conditions
- Patients predisposed to shock:
    a. Immunocompromised (patients undergoing chemotherapy or with a primary or acquired immunodeficiency)
    b. Adrenal insufficiency (Addison's disease, congenital adrenal hyperplasia, chronic or recent steroid use)
    c. History of a solid organ or bone marrow transplant
    d. Infants
    e. Elderly
- In most adults, tachycardia is the first sign of compensated shock, and may persist for hours. Tachycardia can be a late sign of shock in children and a tachycardic child may be close to cardiovascular collapse.
- Hypotension indicates uncompensated shock, which may progress to cardiopulmonary failure within minutes

Hypovolemic Shock: Hemorrhage, Trauma, GI bleeding, Ruptured aortic aneurysm or Pregnancy related bleeding.

- Signs / Symptoms: Tachycardia, Weak thready pulse, Hypotension, Diaphoresis, Cool Skin, Pallor, Flat Neck Veins

Cardiogenic Shock: Heart failure, MI, Cardiomyopathy, Myocardial contusion, Ruptured ventrical / septum / valve, toxins.

- Signs / Symptoms: Chest pain, Shortness of breath, Rales, JVD, Hypotension, Tachycardia, Diaphoresis

Distributive Shock: Sepsis, Anaphylactic, Neurogenic (hallmark is warm, dry, pink skin with normal capillary refill time and typically alert), Toxins.

- Signs / Symptoms Neurogenic Shock: Sensory and/or motor loss, Hypotension, Bradycardia vs Normal heart rate, Warm, dry skin

Obstructive Shock: Pericardial tamponade, Pulmonary embolus, Tension pneumothorax. Signs may include hypotension with distended neck veins, tachycardia, unilateral decreased breath sounds or muffled heart sounds.

- Signs / Symptoms Tension Pneumothorax: Asymmetric or absent breath sounds, Respiratory distress or hypoxia, signs of shock including tachycardia and hypotension, JVD, tracheal deviation (late sign)

Acute Adrenal Insufficiency: State where body cannot produce enough steroids (glucocorticoids / mineralocorticoids). May have primary or secondary adrenal disease or more commonly have stopped a steroid like prednisone.

KEY DOCUMENTATION ELEMENTS

- Full vital signs with reassessment every 15 minutes
- Neurologic status assessment
- Amount of IV fluid given
- Medications given

PERTINENT ASSESSMENT FINDINGS

- Full vital signs
- Decreased perfusion manifested by altered mental status, or abnormalities in capillary refill or pulses.

QUALITY METRICS

- Percentage of patients who receive pressors for ongoing hypotension after receiving appropriate IV fluid

Stroke

History
- Previous stroke / TIA's
- "Last Known Well" Time
- Previous cardiac / vascular surgery
- Associated diseases: diabetes, hypertension CAD
- Atrial fibrillation
- Medications (blood thinners)
- History of trauma
- Sickle Cell Disease
- Seizure activity
- Immune disorders
- Congenital heart defects
- Maternal infection / hypertension

Signs and Symptoms
- Altered mental status
- Weakness / Paralysis
- Blindness or other sensory loss
- Aphasia / Dysarthria
- Syncope
- Vertigo / Dizziness
- Vomiting
- Headache
- Seizures
- Respiratory pattern change
- Hypertension / hypotension

Differential
- TIA
- Seizure
- Todd's Paralysis
- Hypoglycemia
- Stroke Thrombotic or Embolic Hemorrhagic 15%
- Sepsis
- Migraine
- Tumor
- Trauma
- Intoxication

**see AMS differentials

Stroke Alert Criteria

- Positive FAST-ED stroke scale
- Blood glucose is or has been corrected to > 60 mg/dL
- Classify patient in one of these three last known well intervals:
  a. Last known well **< 4 hours**
  b. Last known well **4—24 hours**
  c. Last known well **> 24 hours**

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Perform prehospital stroke scale (FAST-ED).
3. Check blood glucose level.
4. If blood glucose < 60mg/dL, refer to the DIABETIC EMERGENCIES-HYPOGLYCEMIA Protocol.
5. Obtain and transmit 12 Lead ECG if available (*EMT ONLY*)
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.
7. If not practical for an intercept, may transport (BLS) and may activate a "Stroke Alert"

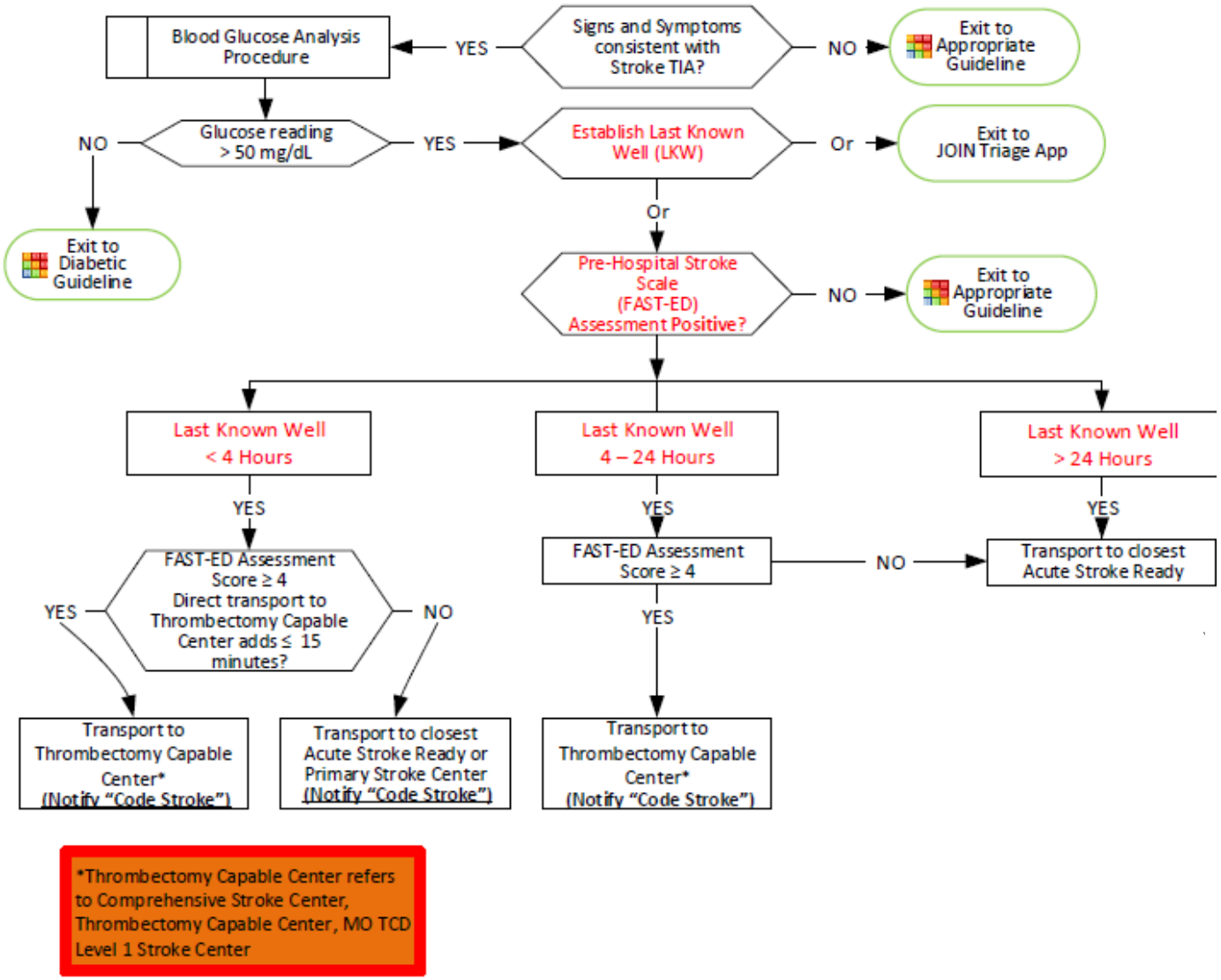
Paramedic/PHRN

1. Continue **EMR /EMT TREATMENT**.
2. Establish IV access.
3. Continuous monitoring of patient with cardiac monitor, continuous SpO2 and capnography.
   a. Consider 12-lead ECG
4. Notify receiving facility of "Stroke Alert" as soon as possible and/or possibility of LVO if applicable.
5. IF SBP > 220mm and DBP > 120 after three reading performed 5 minutes apart., ***contact medical control to discuss hypertension treatment options.***

Stroke FAST-ED

Item	FAST-ED Score
Facial palsy	
Normal or minor paralysis	0
Partial or complete paralysis	1
Arm Weakness	
No drift	0
Drift or some effort against gravity	1
No effort against gravity or no movement	2
Speech changes	
Absent	0
Mild to moderate	1
Severe, global aphasia, or mute	2
Eye deviation	
Absent	0
Partial	1
Forced deviation	2
Denial/Neglect	
Absent	0
Extinction to bilateral simultaneous stimulationin only 1 sensory modality	1
Does not recognize own hand or orients only to one side of the body	2

Stroke Transport Algorithm



Stroke

PEARLS

- Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro
- Acute Stroke care is evolving rapidly. Last known normal may be changed at any time depending on the capabilities and resources of your hospital based on Stroke Destination Plan.
- "Last Known Well" Time or Last Seen Normal is one of the most important items that EMS can obtain, of which all treatment decisions are based.
    a. One of the most important items the pre-hospital provider can obtain, of which all treatment decisions are based. Be very precise in gathering data to establish the time of onset and report as an actual time (i.e. 13:47 NOT about 45 minutes ago. Without this information, patient, may not be able to receive thrombolytics at facility.
    Wake up stroke: Time starts when patient last awake or symptom free.
    b. You are often in the best position to determine the actual last known well time, while you have family, friends or caretakers available (obtain cell phone number if at all possible). Often these sources of information may arrive well after you have delivered the patient to the hospital. Delays in decisions due to lack of information may prevent an eligible patient from receiving thrombolytics.

- The Reperfusion Checklist should be completed for any suspected stroke patient. With a duration of symptoms of less than, scene times should be limited to minutes, early notification / activation of receiving facility should be performed and transport times should be minimized.
- If possible, place 2 IV sites
- Blood draw:.
    a. Many systems utilize EMS venous blood samples. Follow system approved labeling if applicable
- The differential listed on the ALTERED MENTAL STATUS Protocol should also be considered.
- Be alert for airway problems (swallowing difficulty, vomiting/aspiration).
- Hypoglycemia can present as a localized neurologic deficit, especially in the elderly.
- Document the Stroke Screen results in the PCR
- Consider posterior stroke for patients presenting with dizziness / vertigo, vomiting, loss of balance.

KEY DOCUMENTATION ELEMENTS

- "Last Known Well" Time or Last Seen Normal
- Blood glucose level
- Stroke screen used and findings
- Time of notification to receiving hospital

PERTINENT ASSESSMENT FINDINGS

- Prehospital Stroke Scale
- LVO Screening Tool

QUALITY METRICS

- Suspected stroke patient receiving prehospital screening
- Documentation of "Last Known Well" Time
- Glucose testing for suspected stroke patients
- Advance hospital notification for suspected stroke patients
- Scene time for suspected stroke patients

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Tracheostomy Tube Complications Respiratory Distress / Ventilator

History

- Birth defect (tracheal atresia, tracheomalacia, craniofacial abnormalities)
- Past medical history (bronchopulmonary dysplasia, muscular dystrophy, post-traumatic brain or spinal cord injury, etc.)
- History of tracheostomy
- Possibility of foreign body
- Concurrent symptoms (fever, cough, rhinorrhea, rash, labored breathing)
- Usual triggers of symptoms (cigarette smoke, change in weather, URI)
- Sick contacts

Signs and Symptoms

- Power or equipment failure at residence
- Wheezing, rhonchi, stridor
- Respiratory distress (hypoxia, retractions, nasal flaring, tripoding, cyanosis, tachypnea, etc)
- Shortness of breath (inability to speak full sentences)
- Copious secretions coming from tracheostomy tube
- Anxious appearing
- Fever, cough, congestion
- Tachycardia

Differential

- Disruption of oxygen source
- Dislodged or obstructed tracheostomy tube
- Detached or disrupted ventilator circuit
- Ventilator failure
- Asthma / Reactive Airway Disease
- Allergic Reaction / Anaphylaxis
- Aspiration
- Foreign body
- Pneumonia
- Congenital heart disease
- Medication or toxin
- Trauma

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Place patient in position of comfort.
3. Administer 100% **OXYGEN** via non-rebreather mask placed over tracheostomy collar.
4. Auscultate for bilateral breath sounds, assess for potential spontaneous pneumothorax.
5. If tracheostomy tube is obstructed with secretions, suction tracheostomy tube.
    a. Remove inner cannula (if applicable) of tracheostomy tube and re-suction.
    b. Suction for no more than 10-15 seconds while withdrawing the suction catheter.
    c. 2-3 mL saline may be used to help loosen secretions.
5. If tracheostomy tube still remains obstructed have caregiver / family assist in changing tracheostomy tube if there is a spare tube available. *Contact medical control if recent (less than seven days) tracheostomy placement.*
6. If tracheostomy tube still remains obstructed, ventilate with 100% **OXYGEN** via **Bag Valve Mask (BVM)**.
7. Consider **ALBUTEROL (5 mg) or Pre-mix IPRATROPIUM BROMIDE/ALBUTEROL (0.5 mg/3 mg)** via nebulizer. May repeat x2 if needed for continued symptomatic relief.
8. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Reassess patency of tracheostomy tube. If needed, replace tracheostomy tube with spare tracheostomy tube or appropriately sized ET tube into stoma.
3. If suspected tension pneumothorax refer to NEEDLE CHEST DECOMPRESSION

Tracheostomy Tube Complications
Uncontrolled Bleeding

History
- Recent placement of tracheostomy
- Vigorous suctioning of tracheostomy
- Recent manipulation of the tracheostomy tube
- Bleeding from a nearby surgical site near the tracheostomy
- Recent operative procedure near the tracheostomy site.
- Recent anticoagulation therapy

Signs and Symptoms
- Aspiration of blood
- Bleeding beside the tracheal cannula
- Bleeding from the tracheostomy lumen
- Hemorrhage may follow small , apparent insignificant bleeding
- Bleeding may present from the nasal-oropharyngeal region

Differential
- Erosion of an adjacent vessel
- Misplaced tracheostomy tube
- Tissue granulation
- Infection at the stoma site
- Tracheal-innominate fistula

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Place patient in position of comfort.
3. Administer 100% **OXYGEN** per **tracheostomy collar**.
4. Auscultate for bilateral breath sounds.
5. If tracheostomy tube is being obstructed by bleeding, suction tracheostomy tube.
    a. Remove inner cannula (if applicable) of tracheostomy tube and re-suction.
    b. Suction for no more than 10-15 seconds while withdrawing the suction catheter.
    c. 2-3 mL saline may be used to help loosen secretions.
5. Bleeding from the tracheostomy tube my require frequent suctioning to maintain airway patency.
6. If tracheostomy tube still remains obstructed, ventilate with 100% **OXYGEN** via **Bag Valve Mask (BVM)**.
7. If bleeding continues, apply pressure with fingers to the root of the patient's neck into the sternal notch. If bleeding is noted between the walls of the stoma and the tracheostomy tube, apply dressing with light pressure.
8. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access
3. If necessary, administer **Isotonic IV fluid bolus (500ml)** to maintain SBP = 90 mmHg or MAP = 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP =90mmHg or MAP = 65 mmHg; maximum **2 liters** per EXTREMITY TRAUMA/EXTERNAL HEMORRHAGE MANAGEMENT

Medical Control

4. If tracheostomy tube cuff is present, slowly inflate the balloon to a maximum volume, usually an additional **10 to 35 ml** of air.

Adult Medical

Tracheostomy Tube Complications

PEARLS

- Pulse oximetry and end-tidal CO2 (EtCO2) should be routinely used as an adjunct to other forms of respiratory monitoring.
- Always talk to family / caregivers as they have specific knowledge and skills.
- Use patients equipment if available and functioning properly.
- Estimate suction catheter size by doubling the inner tracheostomy tube diameter and rounding down.
- Suction depth: ask family / caregiver. No more than 3 to 6 cm typically.
- Do NOT force suction catheter. If unable to pass, then tracheostomy tube should be changed.
- Always deflate tracheal tube cuff before removal.
- ETT size should be same as tracheostomy tube size. Also have a 0.5 size smaller available.
- **DOPE: D**isplaced tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment Failure.

KEY DOCUMENTATION ELEMENTS

- Respiratory assessment
- Tracheostomy tube assessment (obstruction, etc)
- Tracheostomy tube size
- Documentation of replacement trach / ETT size

PERTINENT ASSESSMENT FINDINGS

- Tracheostomy tube assessment
- **DOPE**

QUALITY METRICS

- Utilization of continuous pulse oximetry and EtCO2
- Maintained patent airway

Bradycardia

History

- Past medical history
- Medications (Beta-Blockers, Calcium Channel Blockers, Clonidine, Digoxin)
- Pacemaker

Signs and Symptoms

- **HR < 60/min** with:
  - Chest pain
  - Respiratory distress
  - Hypotension or Shock
  - Altered mental status
  - Syncope

Differential

- Acute Myocardial Infarction (MI)
- Hypoxia / Hypothermia
- Pacemaker failure
- Sinus bradycardia
- Athletic
- Head injury (elevated ICP) / Trauma
- Stroke/Spinal cord lesion
- Sick Sinus Syndrome
- AV blocks (1°, 2° or 3°)
- Overdose
- Hypoglycemia

EMR

1. UNIVERSAL PATIENT CARE.
2. Relay information to incoming ambulance.

EMT

1. Continue **EMR TREATMENT**.
2. Obtain 12-lead ECG within 10 minutes of patient contact and transmit to receiving facility (if available).
3. Consider possible underlying causes of bradycardia (*see differentials above*).
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMT TREATMENT**.
2. Establish IV access.
3. Consider **Isotonic IV fluid (500 ml)** bolus to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Reassess after every 500 ml bolus and as long as lungs remain clear, you may repeat the bolus to maintain SBP ≥ 90mmHg or MAP ≥ 65 mmHg; maximum **2 liters**.
4. **ATROPINE 1.0 mg IV/IO every 3-5 minutes**, as long as symptomatic bradycardia persists, to a **total dose of 3mg**.
5. If no response to ATROPINE or signs of impending hemodynamic collapse, consider TRANSCUTANEOUS PACING.
   a. If hemodynamically unstable consider analgesia with **KETAMINE 0.2 mg/kg slow IV/IO/IM or 0.5 mg/kg IN, max single dose 20 mg,** *After* **10 min.** *may repeat dose x1 from either route for a maximum combined dose of* **50 mg**.

   (or)

   a. If hemodynamically stable (systolic BP ≥ 90 mm), **MIDAZOLAM 2 mg IV/IN/IO**; repeat every 5 minutes as needed to maintain sedation throughout procedure
6. If inadequate response to ATROPINE or TRANCUTANEOUS PACING, consider **PUSH DOSE EPINEPHRINE 1ml (10mcg) IV/IO** every 2-5 minutes to maintain SBP of 90-100 mmHg or MAP>65 mmHg
   a. Mix 1 mL of Epinephrine **1mg/10mL** (1:10,000) with 9 ml of Normal Saline in a 10 mL syringe resulting in a concentration of 10 mcg/mL.

Bradycardia

PEARLS

- Bradycardia should be managed via the least invasive manner possible, escalating care as needed
    a. Third-degree heart block or the denervated heart (as in cardiac transplant) may not respond to atropine and in these cases, proceed quickly to chronotropic agents (such as epinephrine), or transcutaneous pacing.
    b. In cases of impending hemodynamic collapse, proceed directly to transcutaneous pacing
- The major ECG rhythms classified as bradycardia include:
    a. Sinus bradycardia
    b. Second-degree AV block
        i. Type I - Wenckebach / Mobitz I
        ii. Type II - Mobitz II
    c. Third-degree AV block (Complete Heart Block)
    d. Ventricular escape rhythms (Idioventricular Rhythms)
- Observe for signs of decreased end-organ perfusion: chest pain (CP), shortness of breath (SOB), decreased level of consciousness, syncope or other signs of shock/hypotension.
- Consider potential culprit medications including beta-blockers, calcium channel blockers, sodium channel blockers / anti-depressants, digoxin, and clonidine.
- Consider hyperkalemia in the patient with wide complex bradycardia.
- Hypoxemia is a common cause of bradycardia; be sure to oxygenate the patient.
- Be aware of acute coronary syndrome as a cause of bradycardia in adult patients.

KEY DOCUMENTATION ELEMENTS

- Cardiac rhythm / rate
- Time, dose and response of medications given
- Pacing: Time started or stopped, rate, joules, capture and response
- History of event supporting treatment of underlying causes

PERTINENT ASSESSMENT FINDINGS

- 12-Lead ECG

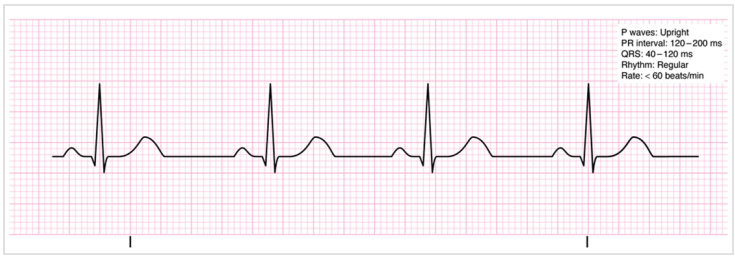
QUALITY METRICS

- Correct medication and dose given for patient condition
- Correct application and use of cardiac pacing
- Use of sedation with cardiac pacing

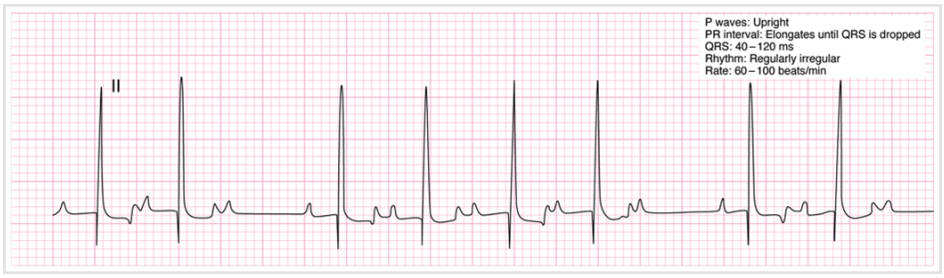
Bradycardia

Rhythms

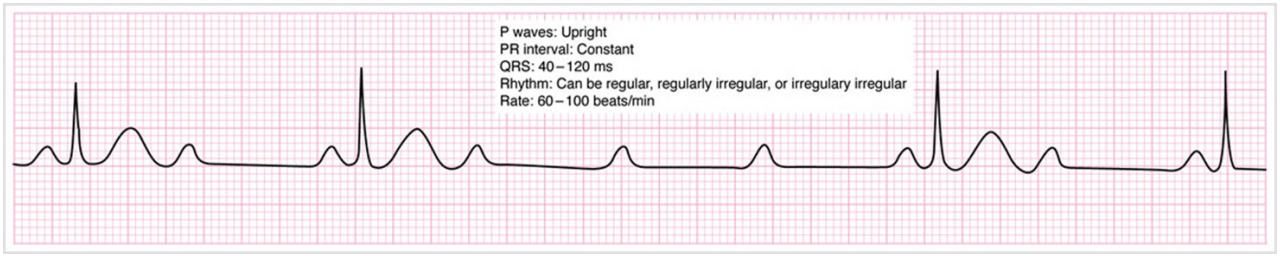
- Sinus Bradycardia



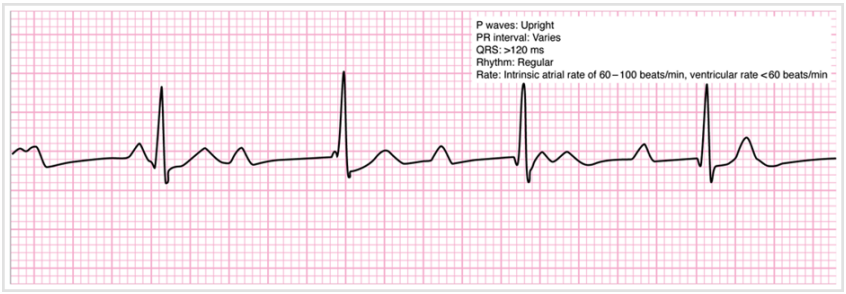
- Second-Degree AV Block— Type I - Wenckebach / Mobitz I



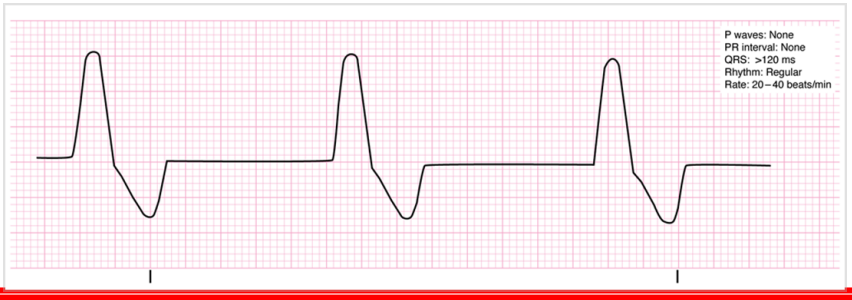
- Second-Degree AV Block—Type II - Mobitz II



- Third-Degree AV Block—Complete Heart Block



- Ventricular escape rhythms (Idioventricular Rhythms)



Bradycardia

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Cardiac Arrest

History
- DNR form
- Signs of lividity, rigor mortis
- Events leading to arrest
- Estimated downtime
- Past medical history/renal dialysis
- Existence of terminal illness
- Medication

Signs and Symptoms
- Unresponsive
- Apneic
- Pulseless

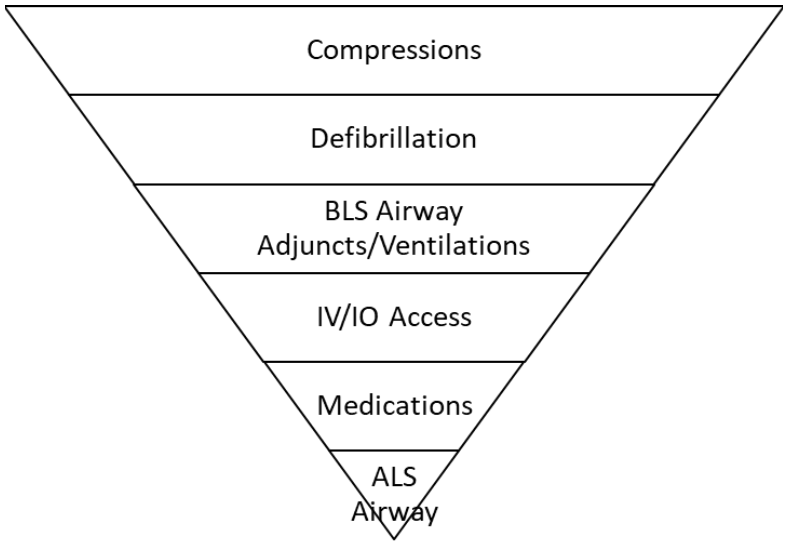
Differential
- Medical vs. Trauma
- V. fib vs Pulseless V. tach
- Asystole
- Pulseless Electrical Activity (PEA)

High Performance CPR

- Chest Compressions at a depth of at least 2 inches
- Rate of compressions between 100-120 per minute
- Allowing for complete chest recoil
- Minimizing interruptions between cycles to less than 10 seconds (Compression fraction >80%)
- Switching providers frequently, about every 2 minutes or sooner if fatigued

Code Resource Management

- Crews should coordinate their duties keeping the call priorities in mind. Intervention priorities are listed below in a general format (in order of highest to lowest). ** Suspected or known pre-existing conditions such as (opioid poisoning, obstructed airway, etc.) should alter the order of listed priorities:



Cardiac Arrest

EMR & EMT

1. Check airway, breathing and circulation.
2. If pulseless, begin high quality CPR, apply AED and follow the prompts.
    a. If the AED indicates “SHOCK ADVISED”, call out “CLEAR!”, check for the safety of others and follow the prompts on the AED to deliver the defibrillation.
    b. Immediately resume CPR after defibrillation.
3. Ventilate with 100% oxygen.
4. Manage airway with appropriate adjunct. Refer to AIRWAY MANAGEMENT Protocol.
5. Follow current AHA BLS guidelines.
6. Relay information to incoming ambulance and/or initiate transport and call for intercept per INTERCEPT CRITERIA.
7. If return of pulses, refer to RETURN OF SPONTANEUS CIRCULATION Protocol.

Paramedic/PHRN

1. Continue **EMR / BLS TREATMENT.**
2. Ensure high quality CPR at all times.
3. Refer to appropriate dysrhythmia protocol:
    a. ASYSTOLE / PEA
    b. V-FIB / PULSELESS V-TACH
4. Keep the following in mind:
    a. Rhythm checks, defibrillation and medications are completed at the top of the 2 minute cycle.
    b. Compression fraction should be greater than 80% and $EtCO_2$ greater than 10-20 mmHg.
5. Consider placement of advanced airway per the AIRWAY MANAGEMENT Protocol.
6. If return of pulses, refer to RETURN OF SPONTANEOUS CIRCULATION Protocol.

Cardiac Arrest

PEARLS

- **Early and effective CPR and defibrillation are the most important therapies for cardiac arrest care.**
- **Team Focused Approach / Pit-Crew Approach recommended; assign responders to predetermined tasks.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
- **Consider early IO placement if available and/or difficult IV access anticipated.**

Compressions

- Minimize interruptions in chest compression, as pauses rapidly return the blood pressure to zero and stop perfusion to the heart and brain.
- Chest compressions should be reinitiated immediately after defibrillation as pulses, if present, are often difficult to detect and rhythm and pulse checks interrupt compressions.
- Continue chest compressions between completion of AED analysis and AED charging.
- Effectiveness of chest compressions decreases with any movements and thus patients should be resuscitated as close to the point at which they are first encountered and should only be moved if the conditions on scene are unsafe or do not operationally allow for resuscitation.
- Performing manual chest compressions in a moving vehicle may pose a provider safety concern.

Ventilation

- Avoid excessive ventilation. If no advanced airway (BIAD or ETT) compression to ventilation ratio is 30:2. If advanced airway is in place, ventilate 10 breaths per minute (1 ventilation every 6 seconds) with continuous, uninterrupted compressions.
- Do not interrupt compression to place endotracheal tube. Consider BIAD first to limit interruptions.
- Reassess and document BIAD and/or endotracheal tube placement and $EtCO_2$ frequently, after every move, and at transfer of care.

$EtCO_2$

- Quantitative end-tidal CO_2 ($EtCO_2$) should be used to monitor effectiveness of chest compressions.
    a. $EtCO_2$ > 10-20 mmHg is indicative of quality CPR.
    b. Abrupt sustained increase in $EtCO_2$ is indicative of potential ROSC.

Defibrillation

- Follow manufacture's recommendations concerning defibrillation energy. If the manufacturer's recommendation is unknown, use the highest setting possible. For refractory VF/pulseless VT, if allowable per the manufacture's recommendations, different pad placement (e.g. anterior/lateral versus anterior/posterior) may be attempted.

Mechanical CPR, Heads-up CPR, Hand-held Chest Pumping and Impedance Threshold Devices

- Devices should be used in accordance with the devices specific instructions.
- Mechanical CPR should not delay the initiation of high quality manual CPR.
- Interruptions in CPR to apply device should be limited to 10 seconds or less.

Cardiac Arrest
- Asystole / PEA -

History
- DNR form
- Signs of lividity, rigor mortis
- Events leading to arrest
- Estimated downtime
- Past medical history/renal dialysis
- Existence of terminal illness
- Medication
- Pre-arrest S1Q3T3 12-lead

Signs and Symptoms
- Unresponsive
- Apneic
- Pulseless

Differential
H's and T's
- Hypovolemia
- Hypoxia
- Massive Myocardial Infarction
- Tension Pneumothorax
- Acidosis / Hyperkalemia
- Toxins - Drug Overdose
- Hypothermia
- Pericardial Tamponade
- Massive Pulmonary Embolism

Management of H's and T's
- **H**ypovolemia – Volume infusion
- **H**ypoxia – Oxygenation & ventilation, CPR
- **H**ydrogen ion (acidosis) – Ventilation, CPR
- **H**ypo/**H**yperkalemia
- **H**ypothermia - Warming
- **T**ension pneumothorax – Needle decompression
- **T**amponade, cardiac – Volume infusion
- **T**oxins – Agent specific antidote
- **T**hrombosis, pulmonary – Volume infusion, Ventilation
- **T**hrombosis, coronary – Emergent PCI

Paramedic/PHRN
1. Initiate HIGH QUALITY CPR
2. Establish vascular access if it can be performed within 2 attempts, otherwise intra-osseous(I/O) access.
3. **NORMAL SALINE or LACTATED RINGERS** at **Wide Open** rate, unless suspected volume overload.
4. **EPINEPHRINE 1mg/10mL(1:10,000) 1.0 mg IV/IO every 3-5 minutes** follow each dose with 20 ml flush, if given in arm via IV, elevated for 10-20 seconds after dose is given.
5. Consider possible causes and treatments (H's and T's).
6. **SODIUM BICARBONATE 1 mEq/Kg IV/IO (max dose 50 mEq)** for:
    a. Dialysis patient or suspected pre-existing hyperkalemia, overdose of sodium channel blocker (e.g. Quinidine), tricyclic antidepressants (e.g. Elavil) phenothiazines (e.g. Compazine), cocaine, ASA
7. **CALCIUM CHLORIDE 10% (1g/10 ml) 1g IV/IO** for:
    a. Dialysis patient or suspected pre-existing hyperkalemia. Pregnant patient recently treated with Magnesium Sulfate.

(or)

8. **CALCIUM GLUCONATE10% (1g/10 ml) 3g IV/IO** for:
    a. Dialysis patient or suspected pre-existing hyperkalemia. Pregnant patient recently treated with Magnesium Sulfate.
8. If return of pulses, refer to the RETURN OF SPONTANEOUS CIRCULATION Protocol.

Cardiac Arrest

- Asystole / PEA -

Cardiac Arrest
- V-Fib / Pulseless V-Tach -

History
- DNR form
- Signs of lividity, rigor mortis
- Events leading to arrest
- Estimated downtime
- Past medical history/renal dialysis
- Existence of terminal illness
- Medication

Signs and Symptoms
- Unresponsive
- Apneic
- Pulseless

Differential
- Asystole
- Artifact / Device failure
- Cardiac
- Endocrine / Metabolic
- Drugs
- Pulmonary

Management of H's and T's
- **H**ypovolemia – Volume infusion
- **H**ypoxia – Oxygenation & ventilation, CPR
- **H**ydrogen ion (acidosis) – Ventilation, CPR
- **H**ypo/**H**yperkalemia
- **H**ypothermia - Warming
- **T**ension pneumothorax – Needle decompression
- **T**amponade, cardiac – Volume infusion
- **T**oxins – Agent specific antidote
- **T**hrombosis, pulmonary – Volume infusion, Ventilation
- **T**hrombosis, coronary – Emergent PCI

Paramedic/PHRN
1. Continue high quality CPR per CARDIAC ARREST Protocol pausing for rhythm checks every 2 minutes for no more than 10 seconds.
2. **DEFIBRILLATE** every 2 minutes as needed at manufacturers recommendations (e.g.**120-200J** biphasic or **360J** monophasic). Resume CPR immediately after defibrillation for 2 minutes.
3. Establish vascular access if it can be performed within 2 attempts, otherwise intra-osseous(I/O) access.
4. **EPINEPHRINE 1mg/10mL(1:10,000) 1.0 mg IV/IO every 3-5 minutes** follow each dose with 20 ml flush, if given in arm via IV, elevated for 10-20 seconds after dose is given.
5. For V-fib/pulseless V-tach refractory to third defibrillation administer **AMIODARONE 300 mg IV/IO**; may repeat at 150 mg IV/IO in 5 minutes if needed.
6. For V-fib/pulseless V-tach refractory to third defibrillation attempt, if additional equipment if available, consider delivering Double Sequential Defibrillation (DSD at the manufacturer's maximum setting.
7. If V-Fib or V-Tach persists or for patients with an allergy to AMIODARONE, consider **LIDOCAINE 1.0-1.5 mg/kg IV/IO**. May **repeat every 3-5 minutes x 2** at **0.75 mg/kg** to a maximum total dose of **3 mg/kg**.
8. If V-fib or V-tach is resolved with LIDOCAINE bolus, administer **LIDOCAINE infusion at 2-4 mg/min**.
9. Consider possible causes and treatments (H's and T's).
10. Consider **MAGNESIUM SULFATE 2 grams IV/IO** for Torsades de Pointes.
11. Continue cycles of 2 minutes of CPR followed by defibrillation as needed.

Cardiac Arrest

Aystole / PEA / V-Fib / Pulseless V-Tach

PEARLS

Special Circumstances

- **Maternal Arrest**:
  i. The best hope for fetal survival is maternal survival.
  ii. Position the patient in the supine position with a second rescuer performing manual uterine displacement to the left in an effort to displace the gravid uterus and increase venous return by avoiding aorto-caval compression.
  iii. If manual displacement is unsuccessful, the patient may be placed in the left lateral tilt position at 30°. This position is less desirable than the manual uterine displacement as chest compressions are more difficult to perform in this position.
  iv. Chest compressions should be performed slightly higher on the sternum than in the non-pregnant patient to account for elevation of the diaphragm and abdominal contents in the obviously gravid patient.
  v. Defibrillation should be performed as in non-pregnant patients.
- **Respiratory Arrests** (Drowning / Suffocation / Asphyxiation / Hanging)
  i. Prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Asystole / PEA**
  i. Survival from PEA or Asystole is based on identifying and correcting the CAUSE. Consider a broad differential diagnosis, with early and aggressive treatment of possible causes.

KEY DOCUMENTATION ELEMENTS

- Resuscitation attempted and all interventions performed
- Arrest witnessed
- Location of arrest
- First monitored rhythm
- CPR before EMS arrival
- Outcome
- Any ROSC
- Presumed etiology (Presumed cardiac, Trauma, Submersion, Respiratory, Other non-cardiac, Unknown)

PERTINENT ASSESSMENT FINDINGS

- The patient in cardiac arrest requires a prompt balance of treatment and assessment
- In cases of cardiac arrest, assessments should be focused and limited to obtaining enough information to reveal the patient is pulseless
- Once pulselessness is discovered, treatment should be initiated immediately

QUALITY METRICS

- Neuro-intact survival rate
- Survival to discharge rate
- Time to scene; Time to first CPR; Time to first intervention (shock/epi); Resuscitation Time; Time of ROSC
- Review of CPR Quality (Compression Fraction, Average and longest peri-shock pause, Rate and depth of compressions)
- Waveform capnography used for resuscitation, initial confirmation of advanced airway placement and continuous monitoring during transport

Chest Pain - Suspected Cardiac Event / Acute Coronary Syndrome / STEMI

History

- Age
- Medications (cardiac, erectile dysfunction medications)
- Past medical history (MI, Angina, Diabetes)
- Recent physical exertion
- **P**alliation / **P**rovocation
- **Q**uality (heaviness, tightness, pressure, constant, sharp, dull, etc.)
- **R**egion / **R**adiation / **R**eferred
- **S**everity (0-10)
- **T**ime (onset / duration / repetition)

Signs and Symptoms

- Chest Pain (pain, pressure, aching)
- Location (substernal, epigastric, arm, jaw, neck, shoulder)
- Radiation of pain
- Pale, diaphoresis
- Shortness of breath
- Nausea / Vomiting
- Dizziness
- Syncope

Differential

- Trauma vs. Medical
- Angina vs. Myocardial Infarction (MI)
- Pericarditis
- Pulmonary Embolism (PE)
- Asthma / COPD
- Pneumothorax
- Aortic dissection or aneurysm
- GERD or Hiatal hernia
- Esophageal spasm
- Chest wall injury or pain
- Pleural pain
- Overdose (Cocaine or Meth)

EMR

1. UNIVERSAL PATIENT CARE.
2. Administer **ASPIRIN 325 mg PO** or **81 mg x 4 PO**; chewable, non-enteric-coated aspirin preferred.
3. If oxygen saturation is below 90%, provide supplement oxygen to a target of 90%.

EMT

1. Continue **EMR TREATMENT**.
2. Obtain 12-lead ECG within 10 minutes of patient contact and transmit to receiving facility (if available).

STEMI ☎ **Activation** ☎ **Medical Control**

3. For apparent cardiac related chest pain with SBP>90 mmHg, administer **NITROGLYCERIN 0.4 mg SL**.
4. Repeat **NITROGLYCERIN (0.4mg) SL every 3-5 minutes** as long as chest pain persists and **SBP > 100 mmHg or MAP > 70 mmHg**.
5. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT**..**12 Lead ECG transmission is discretionary, transmit when appropriate.
2. If dysrhythmia or ectopy present, proceed to appropriate protocol.
3. When an inferior wall infarction is confirmed by right precordial leads, vasodilator drugs are **contraindicated**.
4. Establish IV access.
5. After the administration of sub-lingual Nitroglycerin, in lieu of additional SL doses, the provider may, if **SBP > 100 mmHg**, apply **NITROGLYCERIN PASTE**, **1 inch**, to patient's chest (*remove if SBP < 100 mmHg*).
6. If chest pain remains, administer **FENTANYL 1 mcg/kg slow IV/IO over 2-3 minutes** (maximum initial dose 100 mcg) *For Elderly patients> 75 years of age, **0.5 mcg/kg slow IV/IO push**. Max 50 mcg*
   a. Alternate medication: **MORPHINE SULFATE 2-4 mg slow IV/IO over 1 min**.
   b. If hemodynamically unstable consider analgesia with **KETAMINE 0.2 mg/kg slow IV/IO/IM or 0.5 mg/kg IN, max single dose 20 mg,** *After* **10 min.** *may repeat dose x1 from either route for a maximum combined dose of* **50 mg**

Protocol Continues

Medical Control ☎

Chest Pain / Acute Coronary Syndrome / STEMI

Paramedic/PHRN

7. Medical control may consider additional **FENTANYL 0.5-1.0 mcg/kg slow IV/IO** *For Elderly patients> 75 years of age,* ***0.5 mcg/kg slow IV/IO push****. Max 25 mcg* or **MORPHINE SULFATE 2-4 mg as needed.**

8. For chest pains in the presence of the following stimulants or hallucinogenic drugs (Cocaine, Amphetamine, PCP, MDMA/Ecstasy, bath salts, spice, K2, synthetic THC)

Administer:

- **MIDAZOLAM 2 mg IN/IV**, may repeat once in 5 minutes

(or)

- **DIAZEPAM 0.1 mg/kg IV/IO** (maximum dose 5 mg); may repeat once if needed after 5 minutes.

STEMI Criteria

1. Age > 18 years
2. Chest pain or equivalent symptoms consistent with cardiac ischemia or myocardial infarction.
   a. i.e. "heartburn"/epigastric pain, palpitations, syncope, fatigue, shortness of breath, diaphoresis, ROSC post cardiac arrest.
3. ECG Criteria (12-lead ECG) may include one or more of the following:
   a. Interpretation of the 12-lead indicates a STEMI (i.e. ***ACUTE MI***).
   b. ST segment elevation of ≥ 1 mm in 2 contiguous leads, posterior ST segment elevation of ≥ 0.5 mm in 2 continuous leads.
   c. Interpretation of ECG transmitted and reviewed by a physician confirmed to be diagnostic of STEMI.

***If initial ECG is not diagnostic but suspicion remains high for ACS (acute coronary syndrome) and symptoms persist, obtain serial ECG's at 5-10 minute intervals*

Goal: First medical contact to ECG ≤ 10 min; Scene time ≤ 15 min.

STEMI Destination Determination

Transport time estimated to be ***≤ 60 minutes***

1. Transport patient to the nearest PCI Capable Receiving Hospital via the most expedient method available.
   a. Consider patient preference in deciding nearest PCI Capable Receiving Hospital.
   b. Consider Air Transport when appropriate.
2. Activate **"STEMI ALERT"** at receiving facility and transmit 12-lead ECG for provider confirmation.
3. If patient demonstrates respiratory or hemodynamic instability that may require immediate ED evaluation and treatment by a physician, proceed to the nearest appropriate hospital.

Transport time estimated to be ***≥ 60 minutes***

1. Notify medical control and consider transport to the closest appropriate non-PCI capable referring hospital and subsequent urgent transfer to a PCI Capable Receiving Facility.
2. Activate "**STEMI ALERT"** at receiving facility and transmit 12-lead ECG for provider confirmation.

Chest Pain / Acute Coronary Syndrome / STEMI

PEARLS

- Acute coronary syndrome may present with atypical pain, vague or only generalized complaints.
- Observe for signs of clinical deterioration: dysrhythmias, CP, SOB, decreased LOC / syncope, or other signs of shock / hypotension.
- Perform serial 12-lead ECGs (especially any time clinical changes noted).
- The use of nitrates should be avoided in any patient who has used erectile dysfunction medications within the past 48 hours due to possible severe hypotension.
  -Examples: Viagra® / sildenafil, Levitra® / vardenafil, Cialias® / tadalafil
- Nitroglycerin and vasodilators (ie. morphine) are contraindicated upon confirmation of a RV infarction (ST-elevation) noted in the right-sided precordial leads.

KEY DOCUMENTATION ELEMENTS

- The time of symptom onset
- The time of patient contact by EMS to the time of 12-lead ECG acquisition
- The time ASA administered, or reason why not given
- The time of STEMI notification

PERTINENT ASSESSMENT FINDINGS

- A complete medication list should be obtained from each patient. It is especially important for the treating physician to be informed if the patient is taking beta-blockers, calcium channel blockers, clonidine, digoxin, blood thinners (anticoagulants), and medications for the treatment of erectile dysfunction or pulmonary hypertension.

QUALITY METRICS

- 12-Lead ECG in ≤ 10 minutes and transmitted
- Aspirin administration for chest pain / discomfort
- Scene time for STEMI patients
- Advance hospital notification for suspected STEMI
- Direct transport to PCI capable receiving hospital for suspected STEMI patients meeting criteria

CHF / Pulmonary Edema

History

- Congestive Heart Failure (CHF)
  - Use of diuretics and compliance
  - Weight gain
  - Leg swelling
  - Orthopnea
- Past Medical History
- Medications (Digoxin, Lasix)
- Erectile Dysfunction Medication
- Cardiac History (prior MI)

Signs and Symptoms

- Respiratory distress (crackles / rales)
- Lower extremity edema
- Orthopnea
- Jugular Vein Distention (JVD)
- Pink, frothy sputum
- Diaphoresis
- Hypotension, shock
- Chest pain

Differential

- Myocardial Infarction (MI)
- CHF
- Asthma / COPD
- Anaphylaxis
- Aspiration
- Pleural effusion
- Pneumonia
- Pulmonary Embolus (PE)
- Pericardial tamponade
- Toxic exposure

EMR

1. UNIVERSAL PATIENT CARE.

EMT

1. Continue **EMR TREATMENT.**
2. Obtain 12-Lead ECG and transmit to receiving facility (if available).
3. If dyspnea is present, apply **CPAP@ 5-10cm H2O**. Contact medical control if CPAP setting >10cm H2O is required.
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. **EMR/EMT TREATEMENT**.**12 Lead ECG transmission is discretionary, transmit when appropriate.
2. Establish IV access.
3. If SBP > 90 mmHg or MAP > 65 mmHg:
   a. Administer **NITROGLYCERIN 0.4 mg SL x1**.(*If SBP >180mmHg* **NITROGLYCERIN 0.4 mg SL x2**)
   b. Consider additional **NITROGLYCERIN 0.4 mg SL every 3-5 minutes**.
      - If CPAP is already applied, do not remove CPAP to administer NITRO.
   c. In lieu of additional SL doses, the provider may apply **NITROGLYCERIN PASTE**, **1 inch**, to patient's chest (*remove if SBP < 100 mmHg or MAP < 70 mmHg*).
4. If wheezing is present and if $EtCO_2$ waveform supports concurrent bronchospasm refer to BRONCHOSPASM / ASTHMA / COPD Protocol.
5. If signs of Cardiogenic Shock, consider **NOREPINEPHRINE 2-30 mcg/min** (if available, with IV pump) titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg

   Alternative medication:

   PUSH DOSE EPINEPHRINE 1 mL (10 mcg) IV/IO every 2-5 minutes to maintain SBP of 90-100 mmHg or MAP > 65 mmHg.

   a. Mix 1 mL of Epinephrine **1mg/10mL**(1:10,000) with 9 mL of Normal Saline in a 10 mL syringe resulting in a concentration of 10 mcg/mL.

   DOPAMINE at **5-20 mcg/kg/min** titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.

CHF / Pulmonary Edema

PEARLS

- Consider Myocardial Infarction (MI) in all these patients.
- Allow patient to remain in position of comfort - patients may decompensate if forced to lie down.
- The use of nitrates should be avoided in any patient who has used erectile dysfunction medications within the past 48 hours due to possible severe hypotension.
  -Examples: Viagra® / sildenafil, Levitra® / vardenafil, Cialias® / tadalafil
- Administer nitrates with extreme caution, if at all, to patients with inferior-wall STEMI or suspected right ventricular (RV) involvement because these patients require adequate RV preload.
- Use of Furosemide (Lasix®) is not recommended in the prehospital setting. Pulmonary edema is more commonly a problem of volume distribution than overload, so administration of Furosemide provides no immediate benefit for most patients. Misdiagnosis of CHF and subsequent inducement of inappropriate diuresis can lead to increased morbidity and mortality in patients.
- **Cardiogenic Shock**: Heart failure, MI, Cardiomyopathy, Myocardial contusion, Ruptured ventrical/ septum/valve, Toxins.

KEY DOCUMENTATION ELEMENTS

- Vital signs
- Oxygen saturation
- Time of intervention
- Response to interventions

PERTINENT ASSESSMENT FINDINGS

- Full vital signs
- Respiratory distress
- Breath sounds (crackles / rales)
- Edema
- JVD

QUALITY METRICS

- Time to initiation of CPAP
- Assessment / auscultation of lung sounds before and after each intervention

Return of Spontaneous Circulation

History
- Respiratory arrest
- Cardiac arrest

Signs and Symptoms
- Return of Spontaneous Circulation (ROSC) post cardiac arrest

Differential
- Continue to address rhythm specific differentials

EMR

1. Reassess Airway, Breathing and Circulation.
    a. If ventilation assistance is required, ventilate at 10-12 breaths per minute.
    b. Do not hyperventilate.
    c. Titrate to maintain oxygen saturation 94-98%.
2. Provide **UNIVERSAL PATIENT CARE**.
3. Relay information to incoming ambulance.
4. Reassess patient. If patient becomes pulseless, begin CPR and follow CARDIAC ARREST Protocol.

EMT

1. Continue **EMR TREATMENT.**
2. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.
3. Obtain 12-Lead ECG and transmit to receiving facility (if available).

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT.**
2. Treat hypotension (SBP < 90 mmHg or MAP < 65 mmHg) according to SHOCK Protocol.
3. Monitor $EtCO_2$. Target 35-40 mmHg.
4. If no advanced airway, consider placement of advanced airway per the AIRWAY MANAGEMENT Protocol.
5. Obtain 12 Lead ECG and positive for STEMI, transmit to the receiving facility, **ACTIVATE STEMI ALERT**
6. Initiate transport, elevate head of stretcher 30 degrees if hemodynamically stable.
7. For hypotension not responsive to fluid boluses, consider **NOREPINEPHRINE 2-30 mcg/min** (if available, with IV pump) titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.

    Alternative medication**:**

    PUSH DOSE EPINEPHRINE 1 mL (10 mcg) IV/IO every 2-5 minutes to maintain SBP of 90-100 mmHg or MAP > 65 mmHg.

        a. Mix 1 mL of Epinephrine **1mg/10mL**(1:10,000) with 9 mL of Normal Saline in a 10 mL syringe resulting in a concentration of 10 mcg/mL.

    DOPAMINE at **5-20 mcg/kg/min** titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.

Return of Spontaneous Circulation

PEARLS

- Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the post resuscitation phase and must be avoided.
- Most patients immediately post resuscitation will require ventilatory assistance.
- The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring. A significant percentage of post-ROSC patients will re-arrest.
- A moderate number of post-ROSC patients may have evidence of initial ST elevation MI on a 12-lead ECG which is best managed by obtaining serial ECGs.
- Common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, and pneumothorax.

KEY DOCUMENTATION ELEMENTS

- Immediate post-arrest rhythms
- Vitals Signs
- Neurologic assessment
- Post-ROSC 12-lead ECG

PERTINENT ASSESSMENT FINDINGS

- Asses post-ROSC rhythm, lung sounds and for signs of hypoperfusion

QUALITY METRICS

- Percent of patient receiving a post-ROSC 12-lead ECG
- Percent of ROSC patients transported to appropriate facility as defined by the EMS system

Syncope / Pre-Syncope

History

- History of prior syncopal episodes
- Cardiac history (CAD, CHF, Dysrhythmias)
- Stroke history
- Seizure history
- Recent trauma
- Occult blood loss (GI/GU)
- Fluid losses (Nausea, Vomiting, Diarrhea)
- Past medical history
- Medications

Signs and Symptoms

- Loss of consciousness with recovery
- Lightheadedness / Dizziness
- Palpitations, slow or rapid pulse
- Pulse irregularity
- Decreased blood pressure

Differential

- Vasovagal
- Orthostatic hypotension
- Cardiac syncope
- Micturition / Defecation syncope
- Psychiatric
- Stroke
- Hypoglycemia
- Seizure
- Shock (see Shock Protocol)
- Toxicological (Alcohol)
- Medication effect (hypotension)
- Ascending Aortic Aneurysm (AAA)
- Pulmonary Embolism (PE)

Definitions

Syncope: Loss of consciousness and postural tone that resolves spontaneously without medical interventions.

Pre-Syncope: Prodromal symptoms of syncope. Usually lasts for seconds to minutes and may be described by the patient as “nearly blacking out” or “nearly fainting”.

EMR

1. UNIVERSAL PATIENT CARE.
2. If blood glucose < 60 mg/dL (or suspected), refer to DIABETIC EMERGENCIES-HYPOGLYCEMIA Protocol.
3. Evaluate for hemorrhage and treat for shock if indicated. Refer to SHOCK Protocol.
4. Relay information to incoming ambulance.

EMT

1. Continue **EMR TREATMENT**.
2. Obtain 12-lead ECG within 10 minutes of patient contact and transmit to receiving facility (if available).
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT**.**12 Lead ECG transmission is discretionary, transmit when appropriate.
3. Establish IV access.
4. Monitor for dysrhythmias closely. If present, follow the appropriate dysrhythmia protocol.

Syncope / Pre-Syncope

PEARLS

- Patients suffering syncope due to arrhythmia may suffer recurrent arrhythmia and should therefore be placed on a cardiac monitor.
- Geriatric patients suffering falls from standing may sustain significant injury and should be diligently screened for trauma.
- By being most proximate to the scene and to the patient's presentation, EMS providers are commonly in a unique position to identify the cause of syncope. Consideration of potential causes, ongoing monitoring of vitals and cardiac rhythm as well as detailed exam and history are essential pieces of information to pass onto hospital providers.
- All patients suffering from syncope deserve hospital level evaluation, even if they appear normal with few complaints on scene.
- High risk causes of syncope include the following:
    a. Cardiovascular
        i. Myocardial infarction
        ii. Aortic stenosis
        iii. Hypertrophic cardiomyopathy
        iv. Pulmonary embolus
        v. Thoracic aortic dissection
        vi. Lethal dysrhythmia
    b. Neurovascular
        i. Intracranial hemorrhage
        ii. Transient ischemic attack or stroke
- Consider high risk 12-lead ECG features including, but not limited to:
    a. Evidence of QT prolongation (generally over 500ms).
    b. Delta waves.
    c. Brugada syndrome (incomplete RBBB pattern in V1/V2 with ST segment elevation).
    d. Hypertrophic obstructive cardiomyopathy

KEY DOCUMENTATION ELEMENTS

- Presenting cardiac rhythm
- Cardiac rhythm present when patient is symptomatic
- Any cardiac rhythm changes
- Full vital signs, including blood glucose

PERTINENT ASSESSMENT FINDINGS

- Evidence of trauma
- Evidence of cardiac dysfunction (e.g. evidence of CHF, arrhythmia)
- Evidence of hemorrhage
- Evidence of neurologic compromise
- Evidence of alternate etiology, including seizure
- Initial and ongoing cardiac rhythm
- 12-lead ECG findings

QUALITY METRICS

- Acquisition of 12-lead ECG
- Application of cardiac monitor
- Blood glucose obtained

Tachycardia (Symptomatic with a Pulse)
Narrow Complex (< 0.12 sec) - REGULAR Rhythm

History
- Medications (Aminophylline, Diet pills, Thyroid supplements, Decongestants, Digoxin)
- Diet (caffeine, chocolate)
- Drugs (nicotine, cocaine)
- Past medical history
- History of palpitations / heart racing
- Syncope / Near syncope

Signs and Symptoms
- Heart rate > 150
- Dizziness
- Chest pain
- Palpitations
- Shortness of breath
- AMS
- Diaphoresis
- CHF

Differential
- Heart disease (WPW, Valvular)
- Myocardial infarction
- Electrolyte imbalance
- Fever, pain, emotional stress
- Hypoxia, Hypovolemia or Anemia
- Drug effect / Overdose (see HX)
- Hyperthyroidism
- Pulmonary embolus
- Sepsis

EMR

1. UNIVERSAL PATIENT CARE.

EMT

1. **Continue EMR Treatment**
2. Obtain 12-lead ECG within 10 minutes of patient contact and transmit to receiving facility (if available).
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. UNIVERSAL PATIENT CARE
   a. Obtain 12-lead ECG within 10 minutes of patient contact and transmit to receiving facility.
2. Establish IV access - preferably large bore in the antecubital vein.
3. Consider **Isotonic IV fluid (500 ml)** bolus to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Reassess after every 500 ml bolus and as long as lungs remain clear, you may repeat the bolus to maintain SBP ≥ 90mmHg or MAP ≥ 65 mmHg; maximum **2 liters**. If rhythm is **sinus tachycardia**, stop here.

STABLE (SBP>100 mm.)

1. Perform vagal maneuvers.
2. **ADENOSINE 6 mg rapid IV/IO** followed by a 10 mL NS flush.
3. If no change in rhythm after 1-2 minutes, **ADENOSINE 12 mg rapid IV/IO** followed by a 10 mL NS flush.

Medical Control

4. **DILTIAZEM 0.25 mg/kg, max dose 25 mg over 2-5 min if SBP>100 mm.** ***Adults older than 65 0.10 mg/kg,*** **max dose 10 mg over 2-5 min**. Contact medical control if necessary to administer additional **DILTIAZEM** after 15 minutes (or)
5. **METOPROLOL 5 mg IV over 1-2 min**. Repeat as needed every 5 min if SBP>100mm (**Max 3 doses**).

UNSTABLE *(Hypotension, Chest Pain with evidence of ischemia, AMS, signs of shock, acute CHF)*

1. Immediate SYNCHRONIZED CARDIOVERSION based on the manufacturer's recommendations.
   a. If normal LOC, consider sedation with **MIDAZOLAM 2 mg IV/IN/IO. (**If systolic BP ≥ 90mm)
   b. If normal LOC, but hemodynamically unstable, consider sedation with **ETOMIDATE 0.1 mg/kg IV/IO (Max 10mg)**
2. If no response to initial energy dose, repeat SYNCHRONIZED CARDIOVERSION in a stepwise fashion based on the manufacturer's recommendations. Obtain 12-Lead ECG if cardioversion is successful.

Tachycardia (Symptomatic with a Pulse)
Narrow Complex (< 0.12 sec) - IRREGULAR

History
- Medications (Aminophylline, Diet pills, Thyroid supplements, Decongestants, Digoxin)
- Diet (caffeine, chocolate)
- Drugs (nicotine, cocaine)
- Past medical history
- History of palpitations / heart racing
- Syncope / Near syncope

Signs and Symptoms
- Heart rate > 150
- Dizziness
- Chest pain
- Palpitations
- Shortness of breath
- AMS
- Diaphoresis
- CHF

Differential
- Heart disease (WPW, Valvular)
- Myocardial infarction
- Electrolyte imbalance
- Fever, pain, emotional stress
- Hypoxia, Hypovolemia or Anemia
- Drug effect / Overdose (see HX)
- Hyperthyroidism
- Pulmonary embolus
- Sepsis

EMR

1. UNIVERSAL PATIENT CARE

EMT-Basic

1. **Continue EMR Treatment**
2. Obtain 12-lead ECG within 10 minutes of patient contact and transmit to receiving facility (if available).
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. **EMR/EMT CARE**
2. Establish IV access - preferably large bore in AC.
3. Consider **Isotonic IV fluid (500 ml)** bolus to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Reassess after every 500 ml bolus and as long as lungs remain clear, you may repeat the bolus to maintain SBP ≥ 90mmHg or MAP ≥ 65 mmHg; maximum **2 liters**. .

UNSTABLE *(Hypotension, Chest Pain with evidence of ischemia, AMS, signs of shock, acute CHF)*

1. Immediate SYNCHRONIZED CARDIOVERSION based on the manufacturer's recommendations.
   a. If normal LOC, consider sedation with **MIDAZOLAM 2 mg IV/IN/IO.**
   b. If normal LOC, but hemodynamically unstable, consider sedation with **ETOMIDATE 0.1 mg/kg IV/IO (Max 10mg)**
2. If no response to initial energy dose, repeat SYNCHRONIZED CARDIOVERSION in a stepwise fashion based on the manufacturer's recommendations.
3. If Cardioversion is successful, obtain a 12-Lead ECG.

Medical Control

STABLE: (SBP>100 mm.) Note: Stable atrial-fibrillation rarely needs pharmacological treatment in the field.

4. **DILTIAZEM 0.25 mg/kg, max dose 25 mg over 2-5 min if *Adults older than 65* *0.10 mg/kg,* max dose 10 mg over 2-5 min**. Contact medical control if necessary to administer additional **DILTIAZEM** after 15 minutes

   a. DILTIAZEM infusion: mix DILTIAZEM 100 mg in 100 mL 0.9% Normal Saline to give you 1 mg/ml concentration. Use 60 drop IV set, 10-15 drops/minute equivalent to10-15 mg/hr. **(or)**

3. **METOPROLOL 5 mg IV over 1-2 min**. Repeat as needed every 5 min if SBP>100mm (**Max 3 doses**).

Adult Cardiac

Tachycardia (Symptomatic with a Pulse)
Wide Complex (> 0.12 sec)

History
- Past medical history (pacemaker)
- Medications
- Diet
- Drugs
- Syncope / Near syncope
- CHF
- Palpitations

Signs and Symptoms
- Wide complex tachycardia on ECG (QRS > 0.12 sec)
- Conscious, rapid pulse
- Chest pain
- Shortness of breath
- Dizziness
- AMS
- Diaphoresis

Differential
- Artifact / Device failure
- Cardiac
- Endocrine / Metabolic
- Drugs
- Pulmonary

EMR

1. UNIVERSAL PATIENT CARE

EMT

1. Perform 12-lead ECG within 10 minutes of patient contact and transmit to receiving facility (if available).
2. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT**.
2. Establish IV access - preferably large bore in AC.
3. Consider **Isotonic IV fluid (500 ml)** bolus to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Reassess after every 500 ml bolus and as long as lungs remain clear, you may repeat the bolus to maintain SBP ≥ 90mmHg or MAP ≥ 65 mmHg; maximum **2 liters**. (If **sinus tachycardia** with LBB, RBB, etc. stop here) STOP

STABLE

1. Administer **AMIODARONE 150 mg IV/IO over 10 minutes**. May repeat **AMIODARONE every 10 minutes** until wide complex tachycardia resolves to a maximum dose of **450 mg**. **(Avoid if prolonged QT or CHF)**
2. For patients with allergy or no response to AMIODARONE, consider **LIDOCAINE 1.0-1.5 mg/kg IV/IO**. May **repeat every 3-5 minutes x 2** at **0.75 mg/kg** to maximum total dose of **3 mg/kg**.
3. If tachycardia resolves with LIDOCAINE bolus, administer **LIDOCAINE** infusion at **2-4 mg/min**.

UNSTABLE

1. If altered LOC, immediate SYNCHRONIZED CARDIOVERSION based on the manufacturer's recommendations.
   a. If normal LOC, consider sedation with **MIDAZOLAM 2 mg IV/IO.**
   b. If normal LOC, but hemodynamically unstable, consider sedation with **ETOMIDATE 0.1 mg/kg IV/IO (Max 10mg)**
2. If no response to initial energy dose, repeat SYNCHRONIZED CARDIOVERSION in stepwise fashion (based on the manufacturer's recommendations).
3. If cardioversion is successful obtain 12-Lead ECG.
4. If the patient becomes pulseless at any time, refer to the CARDIAC ARREST and/or V-FIB/PULSELESS V-TACH Protocol.
5. For Polymorphic V-Tach / Torsades de Pointes, consider **MAGNESIUM SULFATE 2 grams IV** over **2-3 minutes**.

Tachycardia (Symptomatic with a Pulse)

PEARLS

Unstable: Hypotension, Chest Pain with evidence of ischemia, AMS, signs of shock, acute CHF

Regular Narrow Complex Tachycardia - SVT

Irregular Narrow Complex Tachycardia - Atrial fibrillation, atrial flutter, multifocal atrial tachycardia

Regular Wide Complex Tachycardia - Ventricular tachycardia, supraventricular tachycardia, atrial fibrillation/flutter with aberrancy, accelerated idioventricular rhythms, pre-excited tachycardias with accessory pathways

Irregular Wide Complex Tachycardia - atrial fibrillation with aberrancy, pre-excited atrial fibrillation (i.e. atrial fibrillation using an accessory pathway), polymorphic VT / torsades de pointes (treat with Mag Sulfate)

- Consider causes for tachycardia (hypovolemia, hypoxia, hydrogen (acidosis), myocardial infarction, hypokalemia / hyperkalemia, hypoglycemia, hypothermia, toxins / overdose, tamponade, tension, pneumothorax , thrombus – central or peripheral, trauma, hyperthyroidism).
- Atrial fibrillation rarely requires cardioversion in the field. As it is difficult to ascertain onset of rhythm, risk of stroke needs to be considered prior to cardioversion
- A wide-complex irregular rhythm should be considered pre-excited atrial fibrillation; extreme care must be taken in these patients
    a. Characteristic ECG findings include a short PR interval and, in some cases, a delta wave
    b. Avoid AV nodal blocking agents such as Adenosine, calcium channel blockers, Digoxin, and possibly beta-blockers in patients with pre-excitation atrial fibrillation (e.g. Wolff-Parkinson-White Syndrome, Lown-Ganong-Levine Syndrome) because these drugs may cause a paradoxical increase in the ventricular response.
    c. Blocking the AV node in some of these patients may lead to impulses that are transmitted exclusively down the accessory pathway, which can result in ventricular fibrillation.
- Calcium Channel Blocker administered ONLY with narrow complex tachydysrhythmia.
- Adenosine may not be effective in identifiable atrial flutter/fibrillation, yet is not harmful.
- Consider administration of lidocaine over amiodarone for sodium channel blocker overdose that is not responsive to sodium bicarbonate.

**MODIFIED VALSALVA MANEUVER

1. Have patient blow through a 10 cc syringe in a semi recumbent position for 15 seconds
2. Lay patient flat and lift their legs to 45 degrees for 15 seconds
3. Return patient to the semi recumbent position for 45 seconds before reassessing cardiac rhythm

KEY DOCUMENTATION ELEMENTS

- Initial rhythm and all rhythm changes
- Time, dose and response to meds given
- Cardioversion times, attempts, joules and response
- Obtain monitor strips after each intervention

PERTINENT ASSESSMENT FINDINGS

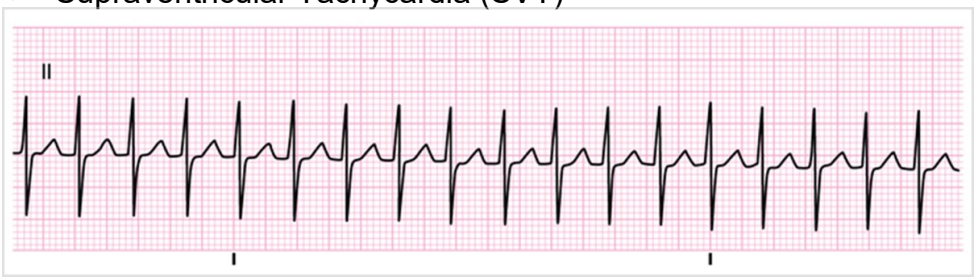
QUALITY METRICS

- Correct medication and dose given
- Correct cardioversion joules delivered

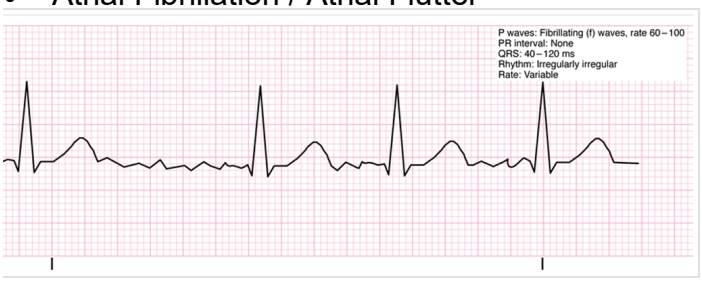
Tachycardia (with a Pulse)

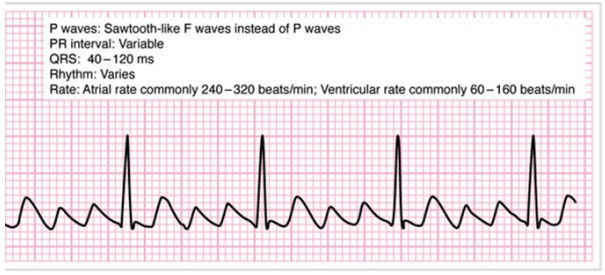
Rhythms

- Supraventricular Tachycardia (SVT)

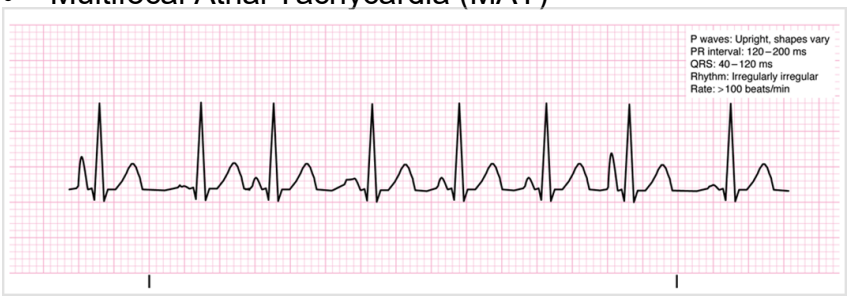


- Atrial Fibrillation / Atrial Flutter

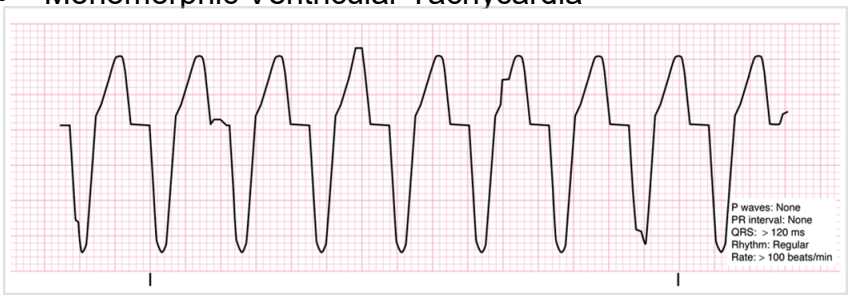




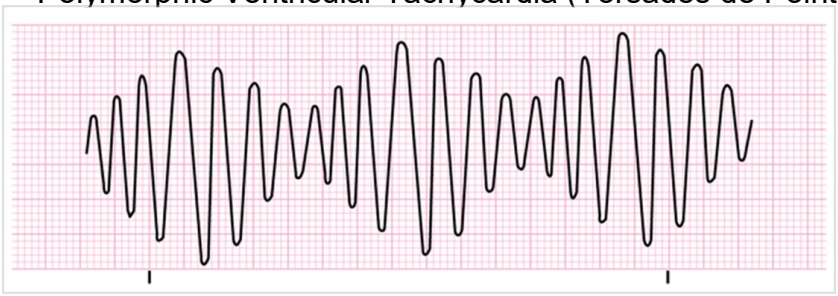
- Multifocal Atrial Tachycardia (MAT)



- Monomorphic Ventricular Tachycardia



- Polymorphic Ventricular Tachycardia (Torsades de Pointes)



Tachycardia (with a Pulse)

Intentionally Left Blank

Ventricular Assist Device (VAD)

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Inspect VAD control for model name and alarms.
3. Asses for possible pump malfunction.
    a. Assess for alarms.
    b. Auscultate for pump sound “hum”.
    c. Signs of hypoperfusion including pallor, diaphoresis, ALTERED MENTAL STATUS.
4. If the VAD pump has malfunctioned:
    a. Utilize available resources to troubleshoot potential VAD malfunctions and to determine appropriate corrective actions to restore normal VAD function.
        i. Contact the patient’s VAD-trained companion, if available.
        ii. Contact the patient’s VAD coordinator, using the phone number on the device.
        iii. Check all the connections to system controller.
        iv. Change VAD batteries, and/or change system controller if indicated
        v. Have patient stop all activity and assess for patient tolerance.
        vi. Follow appropriate cardiovascular condition-specific protocol(s) as indicated.
5. If patient is in full cardiac arrest:
    a. CPR should not be performed if there is any evidence the pump is still functioning, the decision whether to perform CPR should be made based upon best clinical judgment in consultation with the patient’s VAD-trained companion and the VAD coordinator (or direct medical oversight if VAD coordinator unavailable).
    b. CPR may be initiated only where:
        i. You have confirmed the pump has stopped and troubleshooting efforts to restart it have failed, and
        ii. The patient is unresponsive and has no detectable signs of life
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.
7. Be sure patient brings back up power sources (batteries, charger, etc.), and hand pump (if applicable).

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT.**
2. Monitor ECG. If there is a pulse, the rhythm may not correlate with it.
3. Obtain 12-lead ECG. Follow appropriate protocol if STEMI or dysrhythmia present.
4. Establish IV access
5. If VAD is functioning and signs of hypoperfusion are present, administer **IV isotonic fluid (500ml),** over less than 15 minutes using a push-pull method of drawing up the fluid in a syringe and pushing it through the IV or utilizing a commercial rapid infuser, up to a total of 2-liters or until MAP > 65 mmHg.

Ventricular Assist Device (VAD)

PEARLS

MyLVAD EMS Guide: https://www.mylvad.com/medical-professionals/resource-library/ems-field-guides

- Deciding when to initiate Chest Compressions is very difficult. Consider that chest compressions **may cause death by exsanguination** if the device becomes dislodged. However, if the pump has stopped the heart will not be able to maintain perfusion and the patient will likely die. Ideally, plan the decision in advance with a responsive patient and the VAD coordinator. IF a VAD patient is unresponsive and pulseless with a non-functioning pump and has previously indicated a desire for resuscitative efforts, begin compression. Contact the VAD coordinator and Medical Control.
- You do not need to disconnect the controller or batteries in order to:
    a. Defibrillate or cardiovert
    b. Acquire a 12-lead ECG
- Automatic non-invasive cuff blood pressures may be difficult to obtain due to the narrow pulse pressure created by the continuous flow pump.
- Flow though many VAD devices is not pulsatile and patients may not have a palpable pulse or accurate pulse oximetry.
- The blood pressure, if measurable, may not be an accurate measure of perfusion.
- Ventricular fibrillation, ventricular tachycardia, or PEA may be the patient's "normal" underlying rhythm. Evaluate clinical condition and provide care in consultation with VAD coordinator
- The patient's travel bag should accompany them at all times with back-up controller and spare batteries
- If feasible, bring the patient's power module, cable, and display module to the hospital
- All patients should carry a spare pump controller with them
- The most common cause for VAD alarms are low batteries or battery failures
- Although automatic non-invasive blood pressure cuffs are often ineffective in measuring systolic and diastolic pressure, if they do obtain a measurement, the MAP is usually accurate
- Other VAD complications:
    a. Infection
    b. Stroke/TIA
    c. Bleeding
    d. Arrhythmias
    e. Cardiac tamponade
    f. CHF
    g. Aortic insufficiency

KEY DOCUMENTATION ELEMENTS

- Information gained from the VAD control box indicating any specific device malfunctions
- Interventions performed to restore a malfunctioning VAD to normal function
- Time of notification to and instructions from VAD-trained companion and/or VAD coordinator

PERTINENT ASSESSMENT FINDINGS

- Assess for possible pump malfunction by assess for alarms, auscultating for pump sound and looking for signs of hypoperfusion

QUALITY METRICS

- Identify and mitigate any correctable VAD malfunctions
- Perform CPR for patients in cardiac arrest when indicated

Childbirth / Labor

History
- Due date
- Time contractions started / how often
- Rupture of membranes
- Time / amount of any vaginal bleeding
- Sensation of fetal activity
- Past medical and delivery history
- Medications
- Gravida / Para Status
- High risk pregnancy

Signs and Symptoms
- Spasmodic pain
- Vaginal discharge or bleeding
- Contractions
- Crowning or urge to push
- Membrane rupture
- Meconium

Differential
- Abnormal presentation
  - Buttock
  - Foot
  - Hand
- Prolapsed cord
- Placenta previa
- Abruptio placenta

All Levels

1. **UNIVERSAL PATIENT CARE**.
2. Examine perineum for crowning.
3. If crowning is not present:
   a. Prepare for transport. Consider transporting patient in left lateral recumbent position if able.
   b. Frequently reassess for crowning.
4. If crowning present, prepare for delivery.
   a. Encourage the patient to perform slow steady pushes with contractions.
   b. Support the head with gentle pressure as it presents. Delivery should be controlled in order to allow a slow controlled delivery of infant to prevent injury to mother.
   c. Check for and reduce a nuchal cord if present. If unable to free the cord from the neck, double clamp the cord and cut between the clamps.
   d. Grasping the head with hand over the ears, gently guide head down to allow delivery of the anterior shoulder.
   e. Gently guide the head up to allow delivery of the posterior shoulder.
   f. Slowly deliver the remainder of the infant.
   g. After 1-3 minutes, clamp cord about 6 inches from the abdomen with 2 clamps; cut the cord between the clamps.
   h. Keep baby positioned level with mother's heart until cord is cut.
5. Record APGAR scores at 1 and 5 minutes.
6. Provide routine neonatal care (dry, warm, position, stimulate, suction only if needed to clear the airway). Refer to NEWBORN CARE / NEONATAL RESUSCITATION Protocol
7. Wrap baby to preserve warmth, and place on mother's abdomen or chest.
8. The placenta will deliver spontaneously, often within 5-15 minutes of the infant.
   a. Never pull on cord in an attempt to hasten delivery.
9. After delivery, massaging the uterus and allowing the infant to nurse will promote uterine contraction and help control bleeding.
10. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Protocol Continues

Childbirth / Labor

EMR & EMT

1. If complications of delivery occur, the following are recommended:
    a. **Shoulder dystocia** - If delivery fails to progress after head delivers, quickly attempt the following
        i. Hyperflex mother's hips to severe supine knee-chest position.
        ii. Apply firm suprapubic pressure to attempt to dislodge shoulder.
        iii. Apply high-flow oxygen to mother.
    b. **Prolapsed Umbilical Cord**
        i. The EMS provider inserts two fingers from a gloved hand into the vaginal cavity to prevent the presenting fetal body part from compressing the umbilical cord. One finger should be placed on either side of the cord to release pressure and allow blood to continue to flow through the cord.
            - Do not remove your fingers. Maintain until relieved by hospital staff.
            - Assess for pulsation in cord.
        i. Consider placing mother in prone knee-chest position or extreme Trendelenburg.
        ii. Apply high-flow oxygen to mother.
        iii. Transport as soon as possible.
    c. **Breech Birth**
        i. Place mother supine, allow the buttocks and trunk to deliver spontaneously, then support the body while the head is delivered.
        ii. If head fails to deliver, place gloved hand into vagina with fingers between infant's face and uterine wall to create an open airway.
        iii. Apply high-flow oxygen to mother.
        iv. Transport as soon as possible.
        v. The presentation of an arm or leg through the vagina is an indication for immediate transport to hospital.
        vi. Assess for presence of prolapsed cord and treat as above.
    d. Excessive bleeding during active labor may occur with placenta previa.
        i. Obtain history from patient.
        ii. Placenta previa may prevent delivery of infant vaginally.
        iii. C-section needed—transport urgently.
    e. Maternal Cardiac Arrest
        i. Apply manual pressure to displace uterus from right to left.
        ii. Treat per CARDIAC ARREST Protocol.
        iii. Transport as soon as possible.
2. Contact Medical Control for direct medical oversight and make the receiving facility aware of your arrival.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Protocol Continues

Childbirth / Labor

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT.**
2. Consider **Isotonic solution 500 mL bolus** to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP ≥ 90mmHg or MAP ≥ 65 mmHg; maximum **2 liters**.

Childbirth / Labor / APGAR

PEARLS

- Some bleeding is normal with any childbirth. Large quantities of blood or free bleeding are abnormal.
- Supine Hypotension Syndrome:
  a. If mother has hypotension before delivery, place patient in left lateral recumbent position or manually displace gravid uterus to the left is supine position necessary.
  b. Knee-chest position may create safety issues during rapid ambulance transport

APGAR Score			
Sign	**0**	**1**	**2**
Appearance	Blue, Pale	Body pink, Extremities blue	Completely pink
Pulse	Absent	< 100	> 100
Grimace	No response	Grimace	Cough or Sneeze
Activity	Limp	Some flexion	Active motion of extremities
Respirations	Absent	Slow, Irregular	Good, Crying

KEY DOCUMENTATION ELEMENTS

- Document all times (delivery, contraction frequency and length)
- Document any complication with delivery

PERTINENT ASSESSMENT FINDINGS

- Signs of imminent delivery:
  a. Contractions
  b. Crowning
  c. Urge to push
  d. Urge to move bowels
  e. Membrane rupture
  f. Bloody show

QUALITY METRICS

- Documentation of APGAR scores
- Recognition of complications

Eclampsia / Pre-Eclampsia

History
- Past medical history
- Hypertension medications
- Prenatal care
- Prior pregnancies / births
- Gravida / Para

Signs and Symptoms
- Hypertension
- Seizures
- Severe headaches
- Visual changes
- Edema of hands and face
- Abdominal pain

Differential
- Pre-eclampsia
- Eclampsia
- Seizures
- Hypertension

Definitions

Female patients > 20 weeks gestation and < 4 weeks post-partum

Pre-Eclampsia: In the setting of pregnancy, hypertension defined as a SBP > 140 or DBP > 90 mmHg in previously normotensive patient. Symptoms of headache, vision changes, confusion, abdominal pain, pulmonary edema.

Eclampsia: Pre-Eclampsia with the development of seizures.

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Obtain history and vital signs.
   a. Gestational age or recent post-partum.
   b. Symptoms suggestive of end organ involvement such as headache, confusion, visual disturbances, seizure, epigastric pain, right upper quadrant pain, nausea and vomiting.
   c. Previous history of hypertension or known pre-eclampsia.
3. Place patient in left lateral recumbent position.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT.**
2. Establish IV access.
3. If pregnant patient is experiencing pertinent signs and symptoms with severe hypertension defined as a SBP > 160 or DBP > 110 mmHg in previously normotensive patient, administer:

   • **LABETALOL 20 mg IV over 2 minutes.** May repeat every 10 min X2 with a goal to reduce MAP by 20-25%. *Do not administer initial dose or repeat dose if heart rate is less than* **60 bpm.**

   (or)

   • **HYDRALAZINE 5 mg IV**. May repeat **10 mg** after 20 min for persistent hypertension if MAP has not been reduced by 20-25% after the initial dose.

Protocol Continues

Eclampsia / Pre-Eclampsia

Paramedic/PHRN

4. If pregnant patient develops seizures, administer **MAGNESIUM SULFATE 10g** (5g/10mL x 2 (one dose per buttock)) **IM or 4g IV infusion over 2 minutes (***See below):*

   • For IV/IO administration, Pre-mixed **MAGNESIUM SULFATE 4g** , 50 mL or100mL

   (or)

   • For IV/IO administration, draw 8 mL of 50% **MAGNESIUM SULFATE** (**4g/8mL**) in a 30 mL syringe and then draw 22 mL of Normal Saline

5. Seizures not responsive to magnesium, contact medical control and refer to SEIZURE / STATUS EPILEPTICUS

Medical Control

6. If pregnant patient is experiencing pertinent signs and symptoms pre-eclampsia with severe hypertension defined as a SBP > 160 or DBP > 110 mmHg in previously normotensive patient, contact medical control for guidance regarding the administering of **MAGNESIUM SULFATE** .

PEARLS

- Delivery of the placenta is the only definitive management for pre-eclampsia and eclampsia.
- Early treatment of severe pre-eclampsia with magnesium and anti-hypertensive significantly reduces the rate of eclampsia - use of magnesium encouraged if signs of severe pre-eclampsia present to prevent seizure.
- Seizure activity secondary to eclampsia may present greater than 20-weeks post-partum. History of pre-eclampsia during pregnancy with no prior history of seizure activity, is a strong indicator of a post-partum presentation of an eclamptic seizure.
- Magnesium toxicity (progression)
  a. Hypotension followed by
  b. Loss of deep tendon reflexes followed by
  c. Somnolence, slurred speech followed by
  d. Respiratory paralysis followed by
  e. Cardiac arrest
- Treatment of magnesium toxicity

KEY DOCUMENTATION ELEMENTS

- Document full vital signs and physical findings
- Document neurologic exam

PERTINENT ASSESSMENT FINDINGS

- Vital signs assessment with repeat blood pressure monitoring before and after treatment
- Assessment of deep tendon reflexes after magnesium therapy
- Examination for end organ involvement

QUALITY METRICS

- Patients with signs of hypertension and great than 20-weeks gestation or recent post-partum should be assess for signs of pre-eclampsia
- Recognition and appropriate treatment of eclampsia

Newborn Care / Neonatal Resuscitation

History

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

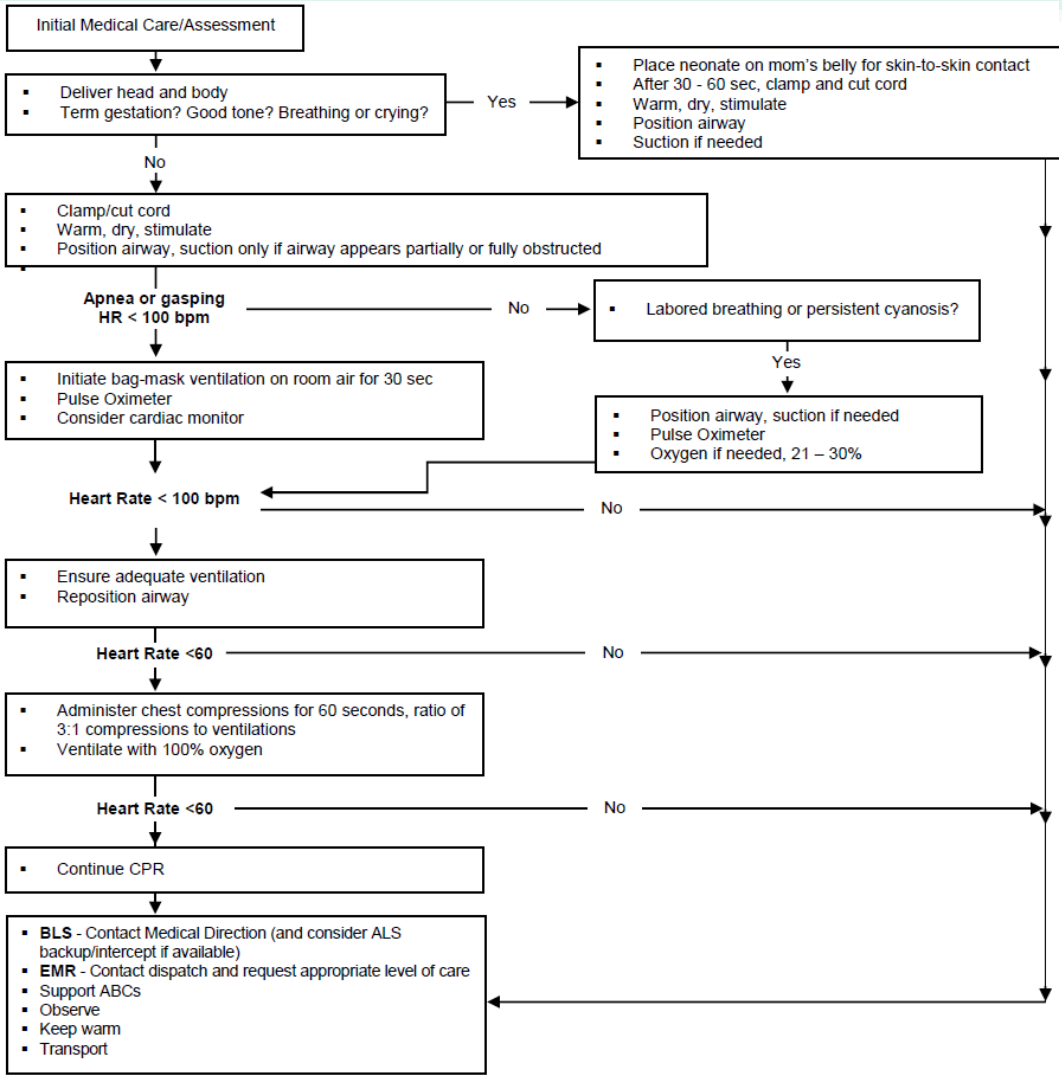
Signs and Symptoms

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

Differential

- Airway failure
  - -Secretions
  - -Respiratory drive
- Infection
- Maternal medication effect
- Hypovolemia, hypoglycemia, hypothermia
- Congenital heart disease

EMR & EMT



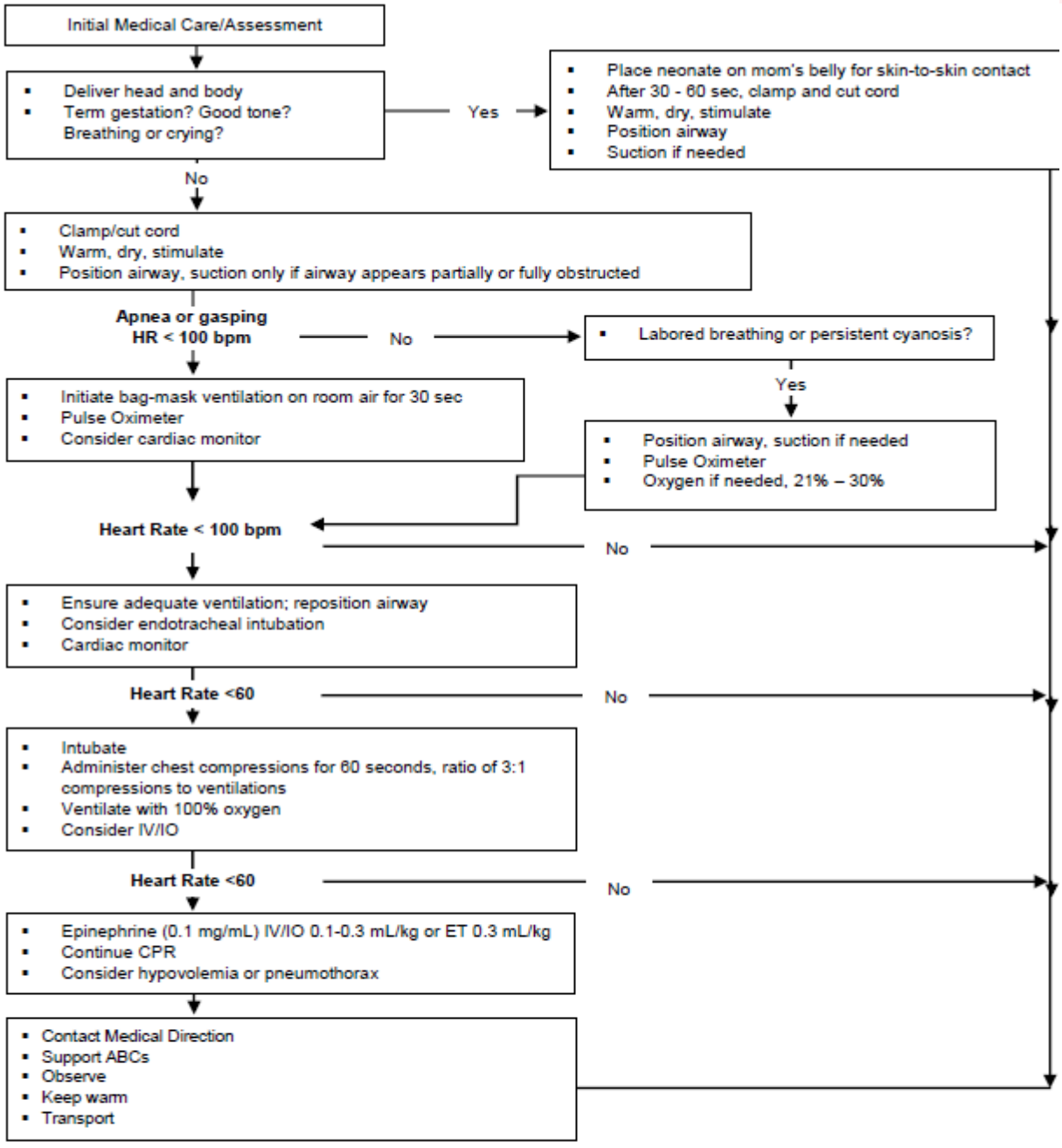
Special Considerations:

- Focus should be on neonate appearance (tone, breathing, crying).
- Consider APGAR at 1 min, repeat every 5 mins. Do not interrupt resuscitation efforts to obtain APGAR.
- Consider checking a blood glucose for ongoing resuscitation, maternal history of diabetes, ill appearing or unable to feed.
- Relay information to incoming ambulance or call intercept per INTERCEPT CRITERIA

Protocol Continues

Newborn Care / Neonatal Resuscitation

Paramedic/PHRN



Special Considerations:

- Focus should be on neonate appearance (tone, breathing, crying).
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- Consider checking blood glucose for an ongoing resuscitation, maternal history of diabetes, ill appearing. or unable to feed.

The Illinois EMSC Prehospital Committee has exercised extreme caution that all information and drug dosages presented are accurate and in accordance with professional standards in effect at the time of publication. This prehospital care guideline may be modified at the discretion of the EMS Medical Director. It is recommended that care must be based on the child's clinical presentation, and on authorized policies and protocols.

Newborn Care / Neonatal Resuscitation

PEARLS

- Because of the increased potential to induce bradycardia, routine suctioning of newborn infants is no longer recommended. However, obvious signs of airway compromise from secretions is still an indication to perform suctioning of the airway.
- Newborn infants are prone to hypothermia which may lead to hypoglycemia, hypoxia and lethargy. Aggressive warming techniques should be initiated including drying, swaddling and warm blankets covering body and head.
- Raise temperature in ambulance patient compartment.
- Approximately 10% of newly born infants require some assistance to begin breathing.
- Deliveries complicated by maternal bleeding (placenta previa, vas previa, or placental abruption) place the infant at risk for hypovolemia secondary to blood loss.
- Low birth weight infants are at high risk for hypothermia due to heat loss.
- If pulse oximetry is used as an adjunct, the preferred placement of the probe is the right arm, preferably wrist or medial surface of the palm. Normalization of blood oxygen levels (SaO2 85-95%) will not be achieved until approximately 10 minutes following birth.
- Both hypoxia and excess oxygen administration can result in harm to the infant. If prolonged oxygen use is required, titrate to maintain an oxygen saturation of 85-95%.
- While not ideal, a larger facemask than indicated for patient size may be used to provide bag-valve-mask ventilation if an appropriately sized mask is not available - avoid pressure over the eyes as this may result in bradycardia.
- Increase in heart rate is the most reliable indicator of effective resuscitative efforts.
- A multiple gestation delivery may require additional resources and/or providers.
- During transport, neonate and the mother appropriately secured.

KEY DOCUMENTATION ELEMENTS

- Document full vital signs and physical findings
- APGAR score
- Historical elements
  - -Prenatal complications
  - -Delivery complications
  - -Date and time of birth
  - -Estimated gestational age

PERTINENT ASSESSMENT FINDINGS

- If there is any doubt as to viability, resuscitation efforts should be initiated
- Acrocyanosis, a blue discoloration of the distal extremities, is a common finding in the newly born infant transitioning to extrauterine life—this must be differentiated from central cyanosis

QUALITY METRICS

- Time to initiation of interventions
- Use of oxygen during resuscitation
- Number of advanced airway attempts

Placenta previa, Abruptio placenta, Ectopic pregnancy (ruptured), Spontaneous abortion (miscarriage)

History
- Past medical history
- Hypertension medications
- Prenatal care
- Prior pregnancies / births
- Gravida / Para

Signs and Symptoms
- Vaginal bleeding
- Abdominal pain
- Nausea / Vomiting
- Syncope
- Lightheadedness / Dizziness

Differential
- Placenta previa
- Abruptio placenta
- Spontaneous abortion
- Ectopic pregnancy

Definitions

Abruptio placenta: Occurs in third trimester of pregnancy; placenta prematurely separates from the uterus causing intrauterine bleeding

a. Lower abdominal pain and uterine rigidity.
b. Shock, with minimal or no vaginal bleeding.

Placenta previa: placenta covers part or all of the cervical opening

a. Generally, late second or third trimester.
b. Painless vaginal bleeding, unless in active labor.

Ectopic pregnancy (ruptured)

a. First trimester.
b. Abdominal/pelvic pain with or without minimal bleeding.

Spontaneous abortion (miscarriage)

a. Generally first trimester.
b. Intermittent pelvic pain (uterine contractions) with vaginal bleeding.

EMR & EMT

1. **UNIVERSAL PATIENT CARE.**
2. Exam perineum.
3. Obtain history of pregnancy and pre-natal care.
4. Massage uterus if bleeding is post-delivery.
5. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT.**
2. Establish IV access.
3. If signs of shock, refer to SHOCK Protocol.

Placenta previa, Abruptio placenta, Ectopic pregnancy (ruptured), Spontaneous abortion (miscarriage)

PEARLS

- Patients in third trimester of pregnancy should be transported on left side or with uterus manually displaced to left if hypotensive.
- Do not place hand/fingers into vagina of bleeding patient except in cases of prolapsed cord or breech birth that is not progressing.
- Syncope can be a presenting symptom of hemorrhage from ectopic pregnancy or causes of vaginal bleeding.

KEY DOCUMENTATION ELEMENTS

- Document full vital signs and physical findings

PERTINENT ASSESSMENT FINDINGS

- Vital signs to assess for signs of shock (e.g. tachycardia, hypotension)
- Abdominal exam (e.g. distension, rigidity, guarding)

QUALITY METRICS

- Recognition and appropriate treatment of shock
- Utilization of Tranexamic Acid

Initial Trauma Care

All Levels

PRIMARY SURVEY:

Scene Size-Up

1. Ensure scene safety – identify any hazards.
2. Determine the number of patients.
3. Identify the mechanism of injury (MOI).
4. Call for additional resources if needed.

Initial Assessment

1. Obtain a general impression of patient's age, sex, weight, appearance, position, movements, obvious injuries and skin color.
2. Assess for and stop severe hemorrhage. Refer to EXTREMITY TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol
4. LOC/Disability
    a. Asses Level of Consciousness:
        A – Alert; **V** – Responds to verbal; **P** – Responds to pain; **U** – Unresponsive
5. Airway
    a. Assess airway patency, assess for silence, snoring, stridor and ease of air movement.
    b. Establish patent airway with cervical spine precautions as needed, per the AIRWAY MANAGEMENT and SPINAL MOTION RESTRICTION Protocol.
    c. Look for injuries that may lead to airway obstruction including unstable facial fractures, expanding neck hematoma, blood or vomitus in the airway, facial burns / inhalation injury.
    d. Correlate with mental status for the patient's ability to protect their airway (patients with GCS ≤ 8 are likely to require airway protection).
6. Breathing
    a. If breathing is absent and without a pulse, begin CPR
    b. If ventilation is inadequate, assist ventilations at 10-12 breaths per minute with oxygen
    c. If labored or rapid, delegate oxygen administration from an appropriate device.
    d. Assess respiratory pattern, effort, depth, rate and symmetry of chest wall movement
7. Circulation
    a. Assess heart rate, quality of central /peripheral pulses
    b. Evaluate skin for: color, moisture, temperature, and capillary refill *greater* than 2 seconds
    c. Evaluate the effectiveness of any prior hemorrhage control measures.
    d. If no pulse is present, initiate CPR per system policy
    e. If circulation is inadequate and additional (**ALS**) personnel are available, delegate IV/IO access utilizing an IV catheter **size 18** gauge or larger when possible. IV access takes priority, if unable to quickly establish IV, proceed with establishing IO access. If needed, delegate infusion of **Isotonic IV Fluid bolus (500 ml)** to a target of SBP = 90 mmHg or MAP = 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP = 90mmHg or MAP = 65 mmHg; maximum **2 liters**. **(ALS ONLY)**
    f. In patients with head injury, hypotension should be avoided to maintain cerebral perfusion and target SBP should be 110-120 mmHg. **(ALS ONLY)**

♦ **PRIMARY SURVEY** assessment should only be interrupted for four events:
    a. The scene becomes unsafe
    b. Exsanguinating hemorrhage needs to be controlled
    c. Airway obstruction needs to be managed
    d. Pt. found in respiratory and/or cardiac compromise requiring ventilations /or compressions.

⇒ **Critical Transport Decision -** Refer to REGION 4 TRAUMA TRIAGE ALGORITHM
    a. Limit scene time to 10 minutes or less if the patient meets trauma center transport criteria.
    b. If localized (MOI), consider completing a **Focused Exam** in lieu of **Rapid Trauma Survey**

All Levels

RAPID TRAUMA SURVEY:

Rapid Head to Toe Physical Exam

(Evaluate for: DCAP-BLS TIC—Deformities, Contusions, Abrasions, Puncture/Penetration/Paradoxical movement - Burns, Laceration, Swelling - Tenderness, Instability, Crepitus)

1. Head
    a. Major facial injuries consider Orotracheal Intubation.
2. Neck
    a. Neck vein distention may indicate tension pneumothorax pericardial tamponade. Flat neck veins may indicate severe hemorrhage internally or externally [see Extremity Trauma / External Hemorrhage Management protocol
    b. Tracheal deviation can be indicative (late sign) of a tension pneumothorax. Deviation is away from the effected side.
    c. Cervical spine should be assessed for deformity and precautions utilized per the Spinal Care guidelines. Refer to SPINAL MOTION RESTRICTION Protocol.
3. Chest
    a. Assess for asymmetry, paradoxical motion, contusion, penetrations, tenderness, instability, crepitation
    b. Open chest wounds should be treated with an application of a commercial chest seal or an occlusive dressing sealed on all four sides. *(Defibrillator pad may be used as an alternative)*
    c. Assess for abnormal breath sounds, may percuss chest to identify hyper-resonance (tension pneumothorax) or hyporesonance (massive hemothorax). Refer to MANAGEMENT OF TENSION PNEUMOTHORAX
    d. Assess heart tones, muffled heart tones in the presence of any of the following may indicate cardiac tamponade
        I. Presentation of hypotension with narrowed pulse pressure
        II. Distended neck veins
        III. Pulsus paradoxus-weak or no radial pulse upon inspiration
4. Abdomen
    a. Assess/palpate for (**T**enderness, **E**visceration, **R**igidity, **D**istention)
5. Pelvis
    a. Palpate once for instability by applying medial pressure on the iliac crests bilaterally, if unstable ,do not reassess for instability.
    b. If available, arrange to splint an unstable pelvis while utilizing a bed sheet or a commercial pelvic splint during the log roll maneuver while completing the assessment of the patient's posterior.
6. Extremities
    a. Assess for fracture / deformity.
    b. Assess peripheral pulses / capillary refill.
    c. Gross exam of motor, strength and sensation in all extremities.
7. Posterior
    a. Maintain spinal alignment and log roll with a minimum of 2 rescuers.
    b. Immobilize if applicable per the SPINAL MOTION RESTRICTION Protocol.
8. If critical patient-transfer to ambulance to complete the exam while during transport
    a. If radial pulse is present: obtain vital signs (BP, HR, RR)
    b. Pupils –Size?, Reactive?, Equal?

All Levels

REASSESSMENT EXAM: *Performed when the patient is moved, condition of the patient changes or after completing any interventions. Should be performed every 5 minutes for all critical patients.*

SAMPLE History *(If not already obtained)*

- Signs and Symptoms
- Allergies
- Medications
- Past medical history, injuries, illnesses
- Last meal / intake
- Events leading up to the injury and/or illness

1. **LOC (**level of consciousness)/**D**isability
    a. Reassess - Level of Consciousness:
        A – Alert; **V** – Responds to verbal; **P** – Responds to pain; **U** – Unresponsive
        GCS if not already performed
        Blood **Gl**ucose level if altered mental status
2. **A**irway, **B**reathing, **C**irculation
    a. Reassess patency of the airway, secure as appropriate.
    b. Reassess breathing rate and quality, assist as appropriate.
    c. Reassess central/peripheral pulses, skin color/condition, capillary refill and control of bleeding
3. Neck
    a. Reassess for developing neck vein distension, tracheal deviation or flat neck veins.
4. Chest
    a. Reassess breath sounds, may percuss chest to identify hyper-resonance (tension pneumothorax) or hyporesonance (massive hemothorax). Refer to MANAGEMENT OF TENSION PNEUMOTHORAX
    b. Reassess heart tones.
5. Abdomen
    a. Reassess for (**T**enderness, **E**visceration, **R**igidity, **D**istention)
    b. Inspect for penetrating or soft tissue injuries.
6. Recheck Identified **INJURIES**
    a. If circulation is inadequate, delegate IV or IO access utilizing an IV catheter **size 18** gauge or larger when possible.. If needed, delegate infusion of administer **Isotonic IV Fluid (500 ml)** bolus to a target of SBP = 90 mmHg or MAP = 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP = 90mmHg or MAP = 65 mmHg; maximum **2 liters**. **(ALS ONLY)**
    b. In patients with head injury, hypotension should be avoided to maintain cerebral perfusion and target SBP should be 110-120 mmHg. **(ALS ONLY)**
7. Check **INTERVENTIONS**
    a. Airway adjuncts, Oxygen, IVs, chest wound seals, decompression needle
    b. Splints and dressings, impaled objects
    c. Position of pregnant patients
8. Recheck **MONITORS**
    a. BP, HR, RR, ECG, Capnography, Pulse Oximeter

Initial Trauma Care

All Levels

SECONDARY SURVEY: *To be completed following the Primary Survey/Initial Assessment in the event that the patients condition is stable or becomes stable which will allow for a detailed head to toe exam.*

Patient History

- Complete SAMPLE history if not already done

Vital Signs

- Pulse-rate/quality, Respiratory-rate/quality, NiBP, Pulse Oximetry, Capnography, Blood sugar, Temp, ECG

Glascow Coma Score

- Eyes, Voice, Movement
- Emotional state

DETAILED EXAM-Head to toe

(Evaluate for: DCAP-BLS TIC—Deformities, Contusions, Abrasions, Puncture/Penetration/Paradoxical movement - Burns, Laceration, Swelling - Tenderness, Instability, Crepitus)

1. Head
    a. Pupils, Battles Sign, Raccoon Eyes, Drainage from ears or nose.
2. Neck
    a. JVD, tracheal deviation may indicate a tension pneumothorax. Flat neck veins may indicate severe hemorrhage.
3. Chest
    a. Palpate for instability / crepitus and look for flail segments or paradoxical movements.
    b. Assess breath sounds, may percuss chest to identify hyper-resonance (tension pneumothorax) or hyporesonance (massive hemothorax). Refer to MANAGEMENT OF TENSION PNEUMOTHORAX
4. Abdomen
    a. Assess for (**T**enderness, **E**visceration, **Ri**gidity, **D**istention).
    b. Inspect for penetrating or soft tissue injuries.
5. Pelvis
    a. Palpate once for instability by applying medial pressure on the iliac crests bilaterally.
6. Extremities
    a. Assess peripheral pulses / capillary refill.
    b. Gross exam of motor, strength and sensation in all four extremities.
7. Posterior
    a. Perform only if not done in the Primary Survey.
    b. Immobilize if applicable per the SPINAL MOTION RESTRICTION Protocol.
8. Neurologic status assessment
    a. Calculate Glasgow Coma Scale (GCS).
    b. Serial assessment of mental status.
    c. Gross exam of motor, strength and sensation in all four extremities.

All Levels

FOCUSED EXAM: *An exam to be used when there is a localized injury or an isolated injury.*

1. Verify that the mechanism of injury (MOI) is consistent with the exam of the isolated injury.
2. If mental status is altered or diminished, perform a RAPID Trauma Survey then a Reassessment Exam or Secondary Survey as appropriate.
3. Manage the isolated injury utilizing appropriate treatment (Bleeding control, irrigation, dressings, splinting, ice packs, etc.).
4. Follow the **UNIVERSAL PATIENT CARE** Protocol.

ADDITIONAL TREATMENT CONSIDERATIONS:

1. Maintain spine precautions per the SPINAL MOTION RESTRICTION Protocol.
2. Splint obvious extremity fractures per the EXTREMITY TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol.
3. Provide pain medication per the PAIN MANAGEMENT Protocol.
4. Consider management of nausea/vomiting per the NAUSEA / VOMITING Protocol

GLASGOW COMA SCALE (GCS)

Behavior	Response	Score
Eye Opening	Spontaneous	4
	To Verbal	3
	To Pain	2
	None	1
Verbal Response	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Sounds	2
	None	1
Best Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraws from Pain	4
	Flexion to Pain	3
	Extension to Pain	2
	None	1

Initial Trauma Care

PEARLS

- Optimal trauma care requires a structured approach to the patient emphasizing ABCDE (Airway, Breathing, Circulation, Disability, Exposure).
- Target scene time less than 10 minutes for unstable patients or those likely to need surgical intervention.
- Transport destination is based on the REGION 4 TRAUMA TRIAGE ALGORITHM Protocol.
- Transport should not be delayed for procedures; ideally procedures should be performed enroute when possible.
- Frequent reassessment of the patient is important. Monitor patient for deterioration over time with serial vital signs and repeat neurologic status assessment.
    a. If patient develops difficulty with ventilation, reassess breath sounds for development of tension pneumothorax.
    b. If extremity hemorrhage is controlled with pressure dressing or tourniquet, reassess for evidence of continued hemorrhage.
    c. If mental status declines, reassess ABCs and repeat neurologic status assessment.
    d. Patients with compensated shock may not manifest hypotension until severe blood loss has occurred.
- Life-threatening injuries identified on primary survey should be managed immediately with rapid transport to a trauma center, while the secondary survey is performed enroute.
- Patients with traumatic brain injury may deteriorate as intracranial swelling and hemorrhage increase.
- Anticipate potential for progressive airway compromise in patients with trauma to head and neck.

KEY DOCUMENTATION ELEMENTS

- Mechanism of injury
- Primary and secondary survey
- Serial vital signs and neurologic assessments
- Scene time
- Procedures performed and patient response

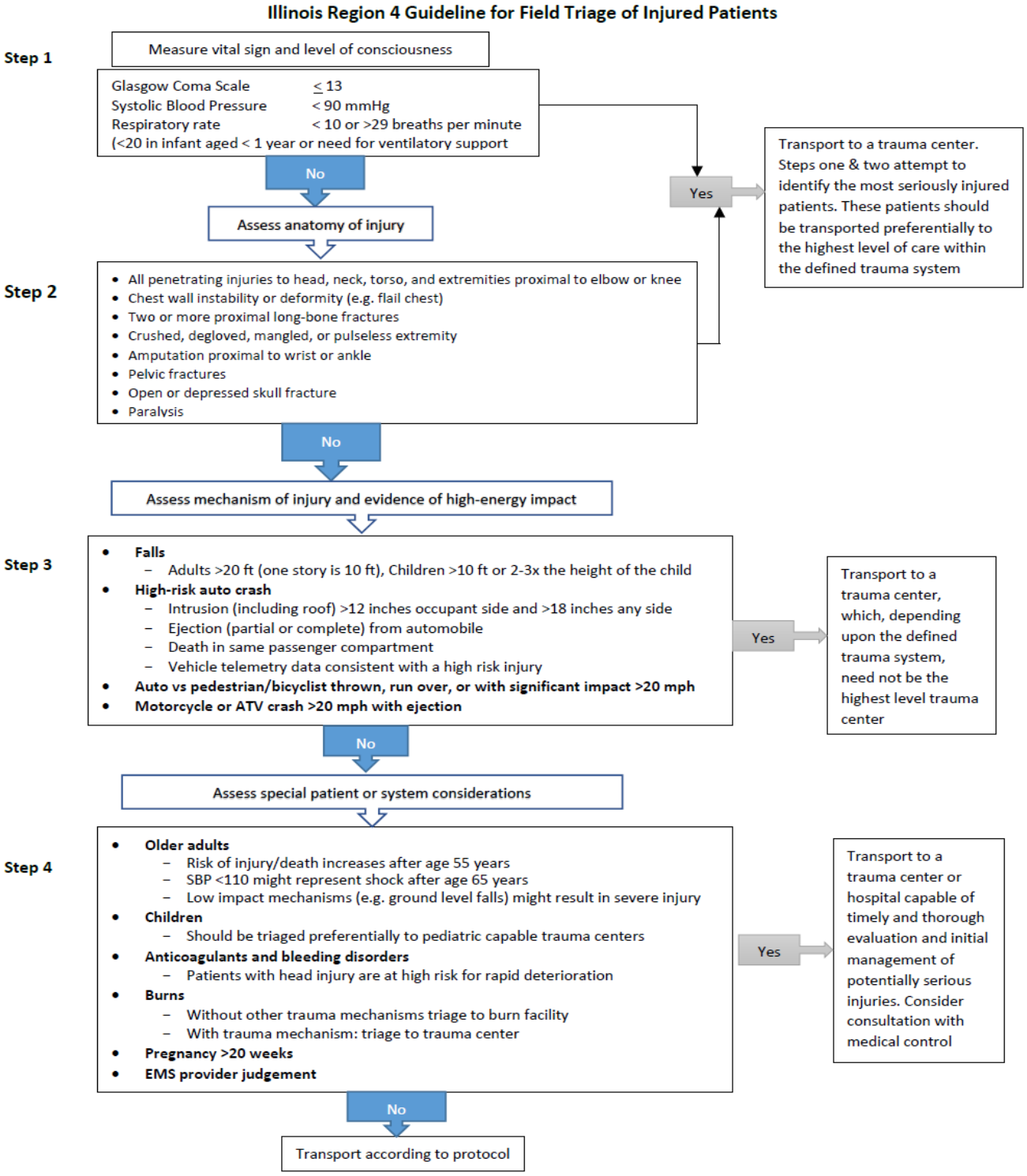
PERTINENT ASSESSMENT FINDINGS

- Primary Survey
- Secondary Survey
- Ongoing Assessment

QUALITY METRICS

- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center

Region 4 Trauma Triage Algorithm



If a trauma center is within 60 minutes of the injury, consider taking directly to a trauma center

Source: Adapted from American College of Surgeons. Resources for the optimal care of the injured patient. Chicago, IL: American College of Surgeons.

Illinois Region 4 Trauma Plan 2020

Abdominal Injuries

History
- Time of injury
- Mechanism (blunt vs penetrating)
- Bleeding
- Evidence for multi-trauma
- Past medical history
- Medications

Signs and Symptoms
- Pain
- Nausea / Vomiting
- Bruising and/or bleeding
- Distention
- Evisceration
- Altered mental status or unconscious
- Hypotension or shock
- Arrest

Differential
- Blunt vs penetrating trauma
- Intra-abdominal bleeding
- Evisceration
- Pelvis / Femur fracture

EMR & EMT-Basic

1. **INITIAL TRAUMA CARE**.
2. Control bleeding.
3. Treat any obvious abdominal injuries as indicated:
    a. **Evisceration:** Cover the organs with a saline-soaked sterile dressing. Do not attempt to put the organs back into the abdomen.
    b. **Impaled Objects:** Stabilize object with a bulky dressing. Do not attempt to remove an impaled object.
    c. **Penetrating Wounds:** Cover with saline-soaked sterile dressing. Look for potential wounds.
    d. **Blunt Trauma:** Continue to asses for clinical change (pain, distension, bruising, etc.)
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR & EMT TREATMENT.**
2. Establish IV access.
3. Administer **Isotonic IV Fluid (500 ml)** bolus to maintain SBP =90 mmHg or MAP = 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP =90 mmHg; maximum 2 liters.
4. Consider TRANEXAMIC ACID (TXA) protocol if administration criteria is present.
5. Consider management of pain per the PAIN MANAGEMENT Protocol.

Abdominal Injuries

PEARLS

- Trauma to the abdomen is either blunt or penetrating.
- Blunt injuries are harder to detect and diagnose and have a higher mortality rate.
- Key signs and symptoms of blunt trauma include a patient in shock with no obvious injuries.
- Distention of the abdomen is an indication of internal hemorrhage. (Pain may not be a significant factor)
- Many abdominal trauma injuries are Load & Go cases.
- Target scene time less than 10 minutes.
- Transport destination is based on the REGION 4 TRAUMA TRIAGE ALGORITHM Protocol.
- Transport should not be delayed for procedures; ideally procedures should be performed enroute when possible.
- Frequent reassessment of the patient is important. Monitor patient for deterioration over time with serial vital signs and repeat abdominal exams.

KEY DOCUMENTATION ELEMENTS

- Mechanism of injury
- Primary and secondary survey
- Serial vital signs and abdominal assessments
- Procedures performed and patient response

PERTINENT ASSESSMENT FINDINGS

- Repeat abdominal exams
- Evaluate for exit wounds with penetrating injuries

QUALITY METRICS

- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center

Blast Injuries

History
- Type of exposure (heat, gas, chemical)
- Inhalation injury
- Time of injury
- Past medical history
- Medications
- Other trauma
- Loss of consciousness

Signs and Symptoms
- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension / Shock
- Airway compromise / Respiratory distress

Differential
- Superficial (1st Degree) red and painful
- Partial Thickness (2nd Degree) blisters
- Full Thickness (3rd Degree) painless/ charred or leathery skin
- Thermal injury
- Chemical injury
- Electrical injury
- Radiation injury

All Levels

1. Hemorrhage control
    a. Assess for and stop severe hemorrhage. Refer to EXTREMITY TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol.
2. Airway
    a. Assess airway patency and consider possible thermal or chemical airway burns.
    b. Establish patent airway with cervical spine precautions per the AIRWAY MANAGEMENT and SPINAL MOTION RESTRICTION Protocol.
    c. If thermal or chemical burns to airway are suspected, early airway control is vital.
3. Breathing
    a. Evaluate adequacy of respiratory effort, oxygenation, quality of lung sounds and chest wall integrity.
    b. Listen bilaterally for breath sounds. Consider possible pneumothorax or tension pneumothorax (as a result of penetrating / blunt trauma or barotrauma).
    c. If absent or diminished breath sounds consider tension pneumothorax and perform NEEDLE DECOMPRESSION **(ALS ONLY)**
    d. For open chest wound, place occlusive dressing.
    e. Monitor oxygen saturation and $EtCO_2$. If indicated, provide supplemental **Oxygen**.
4. Circulation
    a. Assess blood pressure and pulses noting rate, rhythm and quality.
    b. Assess skin color, temperature and condition.
    c. Establish IV access and administer **Isotonic IV fluid (500 ml)** bolus to maintain SBP = 90 mmHg or MAP = 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP = 90mmHg or MAP = 65 mmHg; maximum **2 liters**. **(ALS ONLY)**
    d. In patients with head injury, hypotension should be avoided to maintain cerebral perfusion and target SBP should be 110-120 mmHg. **(ALS ONLY)**
5. Disability
    a. Assess level of consciousness (AVPU).
    b. If evidence of head injury, treat per the HEAD INJURY Protocol.
    c. Apply spinal precautions, per the SPINAL MOTION RESTRICTION Protocol.
6. Exposure
    a. Rapid evaluation of entire body to identify sites of penetrating wounds, blunt injuries or burns. Be sure to roll patient and examine the back.
    b. Keep patient warm to prevent hypothermia.
    c. If patient has burns, refer to BURNS Protocol.

Blast Injuries

PEARLS

- Ensuring scene safety is especially important at the scene of an explosion.
    a. Consider possibility of subsequent explosions, structural safety, possible toxic chemical contamination, the presence of noxious gasses, and other hazards.
    b. In a possible terrorist event, consider the possibility of secondary explosive devices
- Remove patient from the scene as soon as is practical and safe.
- Patients sustaining blast injury may sustain complex, multi-system injuries including: blunt and penetrating trauma, shrapnel, barotrauma, burns, and toxic chemical exposure.
- Consideration of airway injury, particularly airway burns, should prompt early and aggressive airway management.
- Minimize IV fluid resuscitation in patients without signs of shock.
- Consider injuries due to barotrauma:
    a. Tension pneumothorax
        i. Hypotension or other signs of shock associated with decreased or absent breath sounds, jugular venous distension, and/or tracheal deviation.
    b. Tympanic membrane perforation resulting in deafness which may complicate the evaluation of their mental status and their ability to follow commands.
- **Types of Blast Injury:**
    a. Primary Blast Injury: From pressure wave.
    b. Secondary Blast Injury: Impaled objects. Debris which becomes missiles / shrapnel. (Most common cause of death)
    c. Tertiary Blast Injury: Patient falling or being thrown / pinned by debris.

KEY DOCUMENTATION ELEMENTS

- Airway status and intervention
- Breathing status (Oxygenation, respiratory effort)
- Documentation of burns, including TBSA
- Documentation of possible toxic chemical contamination

PERTINENT ASSESSMENT FINDINGS

- Evidence of multi-system trauma, especially:
    a. Airway injury / burn
    b. Barotrauma to lungs
    c. Toxic chemical contamination

QUALITY METRICS

- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center
- Airway assessment and early and aggressive management

Burns
(Thermal, Chemical, Electrical, Inhalation)

History
- Type of exposure (heat, gas, chemical)
- Inhalation injury
- Time of injury
- Past medical history
- Medications
- Other trauma
- Loss of consciousness

Signs and Symptoms
- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension / Shock
- Airway compromise / distress
- Singed facial or nasal hair
- Hoarseness / Wheezing

Differential
- Superficial (1st Degree) red and painful
- Partial Thickness (2nd Degree) blisters
- Full Thickness (3rd Degree) painless/ charred or leathery skin
- Thermal burns
- Chemical burns
- Electrical burns
- Radiation injury

EMR & EMT

General Treatment:

1. Assure scene and rescuer safety.
2. **INITIAL TRAUMA CARE**.
3. Expose the burned area and remove any rings, bracelets or other constricting items.
4. Estimate Total Body Surface Area (TBSA) and depth of burn.
    a. Use “Rule of 9’s”.
    b. First-degree (superficial) burns (skin erythema only) are not included in TBSA calculations.
    c. The patient’s palm is roughly equal to **1%** body surface area which can also be used in estimating the percent of the body surface that is burned.
5. If evidence of possible airway burn (burns around face, nares or pharynx), consider aggressive airway management per the AIRWAY MANAGEMENT Protocol.
6. Evaluate distal circulation in circumferentially burned extremities.
7. Prevent systemic heat loss and keep the patient warm.
8. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Thermal Burns:

1. Stop the burning process with sterile water or normal saline.
    a. Remove non-adherent clothing and jewelry.
    b. Leave blisters intact.
2. Minimize burn wound contamination.
    a. Cover burns with dry dressing or clean sheet.
    b. Do not apply gels or ointments.
3. Consider Carbon Monoxide and/or Cyanide poisoning in patients with smoke inhalation. Refer to CARBON MONOXIDE / SMOKE INHALATION and CYANIDE POISONING Protocols.

Chemical Burns:

1. If dry chemical contamination, carefully brush off solid chemical prior to flushing the site.
2. If wet chemical contamination, flush the patient’s skin (and eyes, if involved) with copious amounts of water or normal saline.
3. For eye exposure, administer continuous flushing of Normal Saline fluid to eye.

Electrical Burns:

1. Verify scene safety and ensure that the electrical source is disabled prior to assessment.
2. Assess for visible entrance and exit wounds and treat as thermal burns.

Protocol Continues

Burns
(Thermal, Chemical, Electrical, Inhalation)

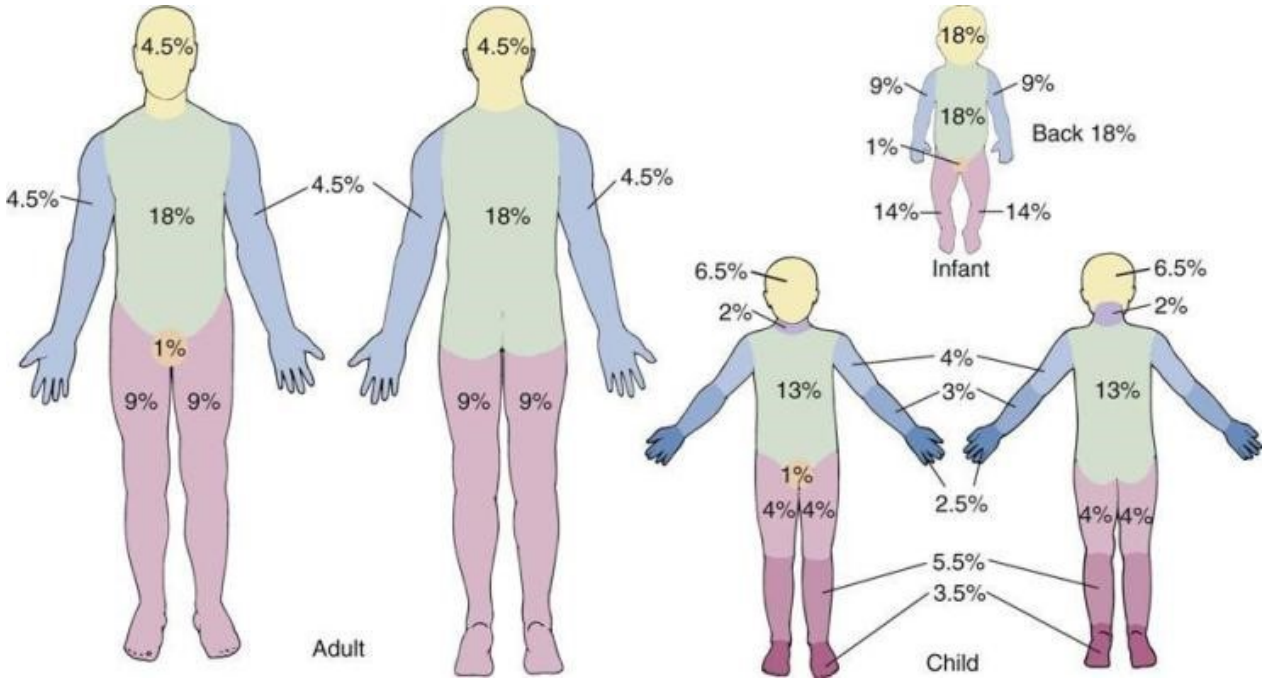
Paramedic/PHRN

1. Continue **EMR & BLS TREATMENT.**
2. Apply cardiac monitor and assess for dysrhythmias, especially in electrical injuries.
3. Establish IV access. Avoid placement through burned skin.
4. Administer **Isotonic IV Fluid (500 mL bolus or 1-2mL/kg x %BSA burn over 8 hours)** Example: (((2mLx100kg) x 30%))/8)=750 ml/hr. Lactated Ringers is preferred over normal saline.
5. Consider the need for an advanced airway if signs of inhalation injury (burns around face, nares or pharynx) are present per the AIRWAY MANAGEMENT Protocol.

Consider early management of pain per the PAIN MANAGEMENT Protocol

Rule of Nine's

% Partial Thickness + % Full Thickness = % Total Burn Surface Area (TBSA)



Burns
(Thermal, Chemical, Electrical, Inhalation)

PEARLS

- Onset of stridor and change in voice are sentinel signs of potentially significant airway burns, which may rapidly lead to airway obstruction or respiratory failure. Early intubation is required in significant inhalation injuries.
- $EtCO_2$ monitoring may be particularly useful to monitor respiratory status in patients receiving significant doses of narcotic pain medication.
- Particularly in enclosed-space fires, carbon monoxide toxicity is a consideration and pulse oximetry may not be accurate.
- Cardiac monitor is important in electrical burns and chemical inhalations.
- Have a high index of suspicion for cyanide poisoning in a patient with depressed GCS, respiratory difficulty and cardiovascular collapse in the setting of an enclosed-space fire. Give the antidote (hydroxocobalamin), if available, in this circumstance.
- Pain management is critical in acute burns.
- TBSA is calculated only based on percent of second (partial thickness) and third degree (full thickness) burns – First degree (superficial) burns are not included in this calculation.
- Burn patients are prone to hypothermia—never apply ice or cool burns that involve > 10% TBSA.
- Burn patients are trauma patients; evaluate for multisystem trauma.
- Anticipate atrial and/or ventricular dysrhythmias as well as cardiac arrest with electrical injuries.
- The mortality related to electrical injuries is impacted by several factors:
    a. Route current takes through the body – current traversing the heart has higher mortality.
    b. Type of current – AC vs. DC
        i. AC is more likely to cause cardiac dysrhythmias while DC is more likely to cause deep tissue burns however either type of current can cause any injury.
        ii. DC typically causes one muscle contraction while AC can cause repeated contractions.
        iii. Both types of current can cause involuntary muscle contractions that do not allow the victim to let go of the electrical source.
        iv. AC is more likely to cause ventricular fibrillation while DC is more likely to cause asystole.
- For chemical burns: Normal Saline or Sterile Water is preferred, however if not available, do not delay irrigation and use tap water. Other water sources may be used based on availability. Flush the area as soon as possible with the cleanest readily available water or saline solution using copious amounts of fluids.

KEY DOCUMENTATION ELEMENTS

- Initial airway status
- Total volume of fluid administered
- TBSA of second and third degree burns
- Pulse and capillary refill exam distally on any circumferentially burned extremity
- Pain management

PERTINENT ASSESSMENT FINDINGS

- Consider related trauma in addition to burns
- Consider inhalation exposures such as CO and CN
- If evidence of possible airway burn, consider aggressive airway management
- Estimate TBSA burned and depth of burn

QUALITY METRICS

- Patient transported to most appropriate hospital
- Pain appropriately managed
- Airway assessment and early and aggressive management, especially with burns to face, nares or pharynx

Burns
(Thermal, Chemical, Electrical, Inhalation)

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Chest Injuries

History
- Time of injury
- Mechanism (blunt vs penetrating)
- Bleeding
- Evidence for multi-trauma
- Past medical history
- Medications

Signs and Symptoms
- Shortness of breath / Dyspnea
- Chest pain
- Cyanosis
- Absent / Diminished breath sounds
- Hypotension / Shock
- Paradoxical chest wall movement
- Bruising over sternum

Differential
- Simple pneumothorax
- Tension pneumothorax
- Flail chest
- Open chest wound
- Hemothorax
- Traumatic asphyxia
- Cardiac tamponade

EMR & EMT

1. **INITIAL TRAUMA CARE**.
2. Control bleeding.
3. Treat any obvious chest injuries as indicated:
    a. **Open Chest Wound:** Apply commercial chest seal or an occlusive dressing, Monitor for developing tension pneumothorax and vent occlusive dressing when necessary.
    b. **Impaled Objects:** Stabilize object with a bulky dressing. Do not attempt to remove an impaled object.
    c. **Flail Chest:** Stabilize with a bulky dressing,
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR & EMT TREATMENT.**
2. Establish IV access and administer **Isotonic IV Fluid bolus (500 ml)** to maintain SBP = 90 mmHg or MAP = 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP =90mmHg or MAP = 65 mmHg; maximum **2 liters**.
3. Treat any obvious chest injuries as indicated (including above):
    a. **Tension Pneumothorax:** Perform NEEDLE DECOMPRESSION.
        i. Signs and symptoms: Hypotension or other signs of shock associated with decreased or absent breath sounds, JVD and/or tracheal deviation.
    b. **Flail Chest:** For massive flail chest with severe respiratory compromise, consider the use of CPAP or advanced airway per the AIRWAY MANAGEMENT Protocol.

****CAUTION**: With the addition of positive airway pressure via BVM, CPAP, ETT or Supraglottic Airway, a simple pneumothorax can quickly develop into a tension pneumothorax, Diminishing waveform capnography and breath sounds (unilaterally) with increased resistance to ventilation are indicative to perform or repeat a NEEDLE DECOMPRESSION.

Protocol Continues

Chest Injuries

Paramedic/PHRN

c. **Massive Hemothorax:** Consider TRANEXAMIC ACID (TXA) protocol if administration criteria is present.

   i. Signs and symptoms: Diminished breath sounds, dullness upon percussion, tunneled or flat neck veins, hypotension, dyspnea,

d. **Cardiac Tamponade:** Arrange for rapid air or ground transport to a receiving facility capable of performing pericardiocentesis.

   i. Signs and symptoms: Narrowing pulse pressure, JVD, pulsus paradoxus, electrical alternans, hypotension

4. Apply cardiac monitor and perform 12-lead ECG. In the presence of JVD and muffled heart tones, placement of an ECG lead rV4 can detect electrical alternans if present, is highly suggestive for a pericardial tamponade. Diffuse ST elevation may also be indicative of a cardiac contusion secondary to blunt force trauma.
5. Consider management of pain per the PAIN MANAGEMENT Protocol.

PEARLS

- Chest pain due to blunt trauma may be an indication of underlying injury.
- Blunt injuries such as pulmonary contusion and cardiac contusion may cause respiratory insufficiency and/or myocardial infarction. Acquire and transmit 12-lead ECG.
- If tension pneumothorax develops in a patient with a sealed sucking chest wound, attempt to resolve by releasing air from the seal prior to decompressing chest.
- Chest decompression is indicated for a tension pneumothorax. It is not appropriate to needle decompress a simple pneumothorax.
- Target scene time less than 10 minutes.
- Transport destination is based on the REGION 4 TRAUMA TRIAGE ALGORITHM Protocol.
- Transport should not be delayed for procedures; ideally procedures should be performed enroute when possible.
- Frequent reassessment of the patient is important. Monitor patient for deterioration over time with serial vital signs and repeat neurologic status assessment.

KEY DOCUMENTATION ELEMENTS

- Mechanism of injury
- Primary and secondary survey
- Serial vital signs and neurologic assessments
- Procedures performed and patient response

PERTINENT ASSESSMENT FINDINGS

- Signs and symptoms of tension pneumothorax
- Airway and respiratory assessment
- Consider underlying cardiac injury and apply cardiac monitor

QUALITY METRICS

- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center
- Airway assessment and management appropriately documented

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Conducted Electrical Weapon Injury (Taser®)

History
- Time of injury
- Bleeding
- Evidence for multi-trauma
- Past medical history
- Cardiac history
- Psychiatric history

Signs and Symptoms
- External signs of trauma
- Palpitations
- Intoxication / Substance Abuse

Differential
- Excited Delirium
- Traumatic injury
- Closed head injury
- Cardiac dysrhytmia

EMR & EMT

1. **INITIAL TRAUMA CARE.**
2. Ensure Scene Safety prior to providing patient care.
    a. Make sure patient is appropriately secured with assistance of law enforcement to protect the patient and staff.
    b. Once the patient has been appropriately secured or restrained with assistance from law enforcement, assessment of patient should also include pulse oximetry.
3. Confirm device has been turned off and that the barb cartridge has been disconnected from the electrical weapon.
4. Obtain vital signs and for onset of secondary SOB/chest pain/palpitations consider 12-lead ECG if available for BLS.
5. Patients with conducted electrical weapon (Taser®) barb penetration in vulnerable areas of body as mentioned below should be transported to the hospital for further evaluation and probe removal.
    a. Barbs embedded in skin above level of the clavicles, genitalia or female breasts.
    b. Suspicion that probe might be embedded in bone, blood vessel or other sensitive structure.
6. Barb(s) can be removed if NOT in a vulnerable area listed above, by stabilizing the skin surrounding the barb and grasping the barb shaft and pulling straight out with a gentle but quick motion.
    a. Once extracted, visually inspect barb to make sure it is intact and that nothing remains in patient.
7. Document the removal location and time of removal in the patient care report.
8. Apply bandage to the area where the barb was removed.
9. Inform the patient that they may need a tetanus shot if they have not received one in the last five years.

Paramedic/PHRN

1. Continue **EMR & EMT TREATMENT.**

2. Once the patient has been appropriately secured or restrained with assistance from law enforcement, if patient appears in distress an assessment of should also include pulse oximetry, capnography, ECG and 12-lead ECG.

3. Consider psychologic management medications if patient is struggling against physical devices and may harm themselves or other. Refer to BEHAVIORIAL EMERGENCIES Protocol

Conducted Electrical Weapon Injury (Taser®)

PEARLS

- Before removal of the barbed dart, make sure the cartridge has been removed from the conducted electrical weapon.
- Patient should not be restrained in the prone, face down, or hog-tied position as respiratory compromise is a significant risk.
- The patient may have underlying pathology before being tased (refer to appropriate guidelines for managing the underlying medical/traumatic pathology).
- Perform a comprehensive assessment with special attention looking for signs and symptoms that may indicate excited delirium.
- Transport the patient to the hospital if they have concerning signs or symptoms.
- EMS providers who respond for a conducted electrical weapon patient should not perform a “medical clearance” for law enforcement.
- Conducted electrical weapon can be discharged in three fashions:
    a. Direct contact without the use of the darts
    b. A single dart with additional contact by direct contact of weapon
    c. From a distance up to 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, and trauma may precipitate arrhythmias, thus consider ECG monitoring and 12-lead ECG assessment.
- Drive Stun is a direct two-point contact weapon which is designed to generate pain and not incapacitate the subject. Only local muscle groups are stimulated with the Drive Stun technique.

KEY DOCUMENTATION ELEMENTS

- If darts removed, document the removal location in the patient care report
- Physical exam trauma findings
- Cardiac rhythm and changes
- Neurologic status assessment findings

PERTINENT ASSESSMENT FINDINGS

- Thoroughly assess the patient for trauma as the patient may have fallen
- Ascertain if more than one taser cartridge was used

QUALITY METRICS

- Abnormal findings or vital signs were addressed
- Patient received ECG or 12-lead ECG evaluation

Crush Injuries

History
- Entrapped and crushed under heavy load > 60 minutes
- Extremity / body crushed
- Building collapse, trench collapse, industrial accident, pinned under heavy equipment

Signs and Symptoms
- Hypotension / Shock
- Altered mental status
- **Compartment Syndrome**:
  - Pain
  - Paresthesia
  - Paralysis
  - Pallor
  - Pulselessness
  - Poikilothermia (cool to touch)

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

EMR & EMT

1. Ensure scene and rescuer safety.
2. **INITIAL TRAUMA CARE**.
3. Place approved tourniquet on the affected extremity (-ies) just proximal, but as close as possible to the crushed area.
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR & EMT TREATMENT.**
2. Establish 2 large bore IVs (not in the injured extremity).
3. Treat pain based on PAIN MANAGEMENT Protocol.
4. Administer **Lactated Ringers 1000 mL** bolus prior to release of crushed extremity.
   a. Use with caution in patient with history of CHF. STOP fluids if signs of pulmonary edema (increasing shortness of breath or rales/crackles on lung exam).
5. Initiate cardiac monitoring and assess for hyperkalemia (Wide QRS, Peaked T waved or flattened / absent P waves). Acquire and transmit 12-lead ECG.
6. **ALBUTEROLSULFATE 10 mg via** small volume nebulizer:
7. **SODIUM BICARBONATE 1 mEq/Kg (max dose of 50 mEq) IV/IO**
   a. Should be given for significant crush injuries or prolonged entrapment of an extremity.
   b. Should be given over 5 minute just PRIOR to the release of the crushed body part.
8. **CALCIUM CHLORIDE 10% (1g/10 ml) 1g IV/IO SLOWLY** over 10 minutes for:
   a. If ECG is suggestive of hyperkalemia after administration of sodium bicarbonate, calcium chloride should be administered

   (or)
9. **CALCIUM GLUCONATE10% (1g/10 ml) 3g IV/IO SLOWLY** over 10 minutes for:
   a. If ECG is suggestive of hyperkalemia after administration of sodium bicarbonate, calcium gluconate should be administered
10. Lift object **SLOWLY** off of the patient.
11. Continue **Lactated Ringers 500 mL/hr.**
12. Transport to appropriate Trauma Facility.

Crush Injuries

PEARLS

- A patient with a crush injury may initially present with very few signs and symptoms. Therefore, maintain a high index of suspicion for any patient with a compressive mechanism of injury.
- A fatal medical complication of crush syndrome is hyperkalemia. Suspect hyperkalemia if T-waves become peaked, QRS becomes prolonged (greater than 0.12 seconds), absent P wave, or prolonged QTc.
- Continue fluid resuscitation through extrication and transfer to hospital.
- Patient may become hypothermic even in warm environments.

KEY DOCUMENTATION ELEMENTS

- Time of tourniquet application, if applied
- Neurovascular status of any crushed extremity
- ECG findings consistent with hyperkalemia
- Amount of IV fluid administered

PERTINENT ASSESSMENT FINDINGS

- Monitor for development of compartment syndrome
- Mental status / GCS
- Evidence of additional trauma, potentially masked by other painful injuries

QUALITY METRICS

- Initiation of fluid resuscitation prior to extrication
- ECG / monitor to monitor for dysrhythmias or changes related to hyperkalemia
- Appropriate transport of trauma patients to Trauma Center

Extremity Trauma / External Hemorrhage Management

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

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

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

All Levels

1. INITIAL TRAUMA CARE.
2. Manage bleeding.
    a. Apply direct pressure to bleeding site followed by pressure dressing.
    b. If direct pressure / pressure dressing is ineffective or impractical:
        i. Apply TOURNIQUET to extremity if the bleeding site is amenable to tourniquet placement.
            1. Tourniquet should be placed 2-3 inches proximal to wound, not over a joint or fracture, and tightened until bleeding stops and distal pulse is eliminated.
            2. If bleeding continues, place a second tourniquet proximal to the first.
            3. For thigh wounds, consider placement of two tourniquets, side-by-side, and tighten sequentially to eliminate distal pulse.
            4. Document time of application and location of tourniquet and ensure that receiving facility is aware of time of placement.
        ii. If the bleeding site is not amenable to tourniquet placement (i.e. groin, axillary, trunk, head, etc.), pack wound tightly with HEMOSTATIC GAUZE and apply direct pressure.
            1. Consider using a JUNCTIONAL HEMOSTATIC DEVICE if available.
3. Stabilize suspected fractures / dislocations.
    a. Strongly consider pain management before attempting to move a suspected fracture.
    b. If distal vascular function is compromised, gently attempt to restore normal anatomic position.
    c. Use splints as appropriate to limit movement of suspected fracture.
    d. Elevate extremity fractures above heart level whenever possible to limit swelling.
    e. Apply ice packs to limit swelling in suspected fractures or soft tissue injury (DO NOT apply ice directly to skin).
    f. Reassess distal neurovascular status after any manipulation or splinting of fractures / dislocations.
4. Amputations
    a. Rinse amputated part gently with normal saline if gross contamination.
    b. Wrap part in moist sterile gauze and place in water tight plastic bag and seal.
    c. Place sealed bag on ice. **(DO NOT place tissue directly on ice).**

Protocol Continues

Extremity Trauma / External Hemorrhage Management

Paramedic/PHRN

1. Continue **EMR & EMT TREATMENT.**
2. Establish IV access.
3. Administer **Isotonic IV Fluid** to maintain SBP = 90 mmHg or MAP = 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP =90 mmHg; maximum 2 liters.
4. Consider TRANEXAMIC ACID (TXA) protocol if administration criteria is present.
5. Manage pain.
    a. Refer to PAIN MANAGEMENT Protocol.
    b. Pain management should be strongly considered for patients with suspected fractures.
    c. If tourniquet is placed, an alert patient will likely require pain medication to manage pain.

Extremity Trauma / External Hemorrhage Management

PEARLS

- If tourniquet use:
    a. Ensure that it is sufficiently tight to occlude the distal pulse, in order to avoid compartment syndrome.
    b. Ensure that it is well marked and visible and that all subsequent providers are aware of the presence of the tourniquet.
    c. DO NOT cover with clothing or dressings.
    d. Mark time of tourniquet placement prominently on the patient.
- If pressure dressing or tourniquet used, frequently re-check to determine if bleeding has restarted. Check for blood soaking through the dressing or continued bleeding distal to the tourniquet. Do not remove tourniquet or dressing in order to assess bleeding.
- Survival is markedly improved when a tourniquet is placed *before* shock ensues.
- Commercial / properly tested tourniquets are preferred over improvised tourniquets.
- If hemostatic gauze is not available, plain gauze packed into a wound has been shown to be effective.
- DO NOT take time to splint injured extremities in major trauma patients unless it does not delay the scene time or if it prevents you from performing more pertinent patient care.
- Splint the joint above and below for all suspected fractures.
- Splint the bone above and below for all suspected joint injuries.
- Hip dislocations and knee and elbow fracture / dislocations have a high incidence of vascular compromise.
- Urgently transport any injury with vascular compromise.
- DO NOT manipulate pelvis once fracture is suspected. Repeated manipulation can increase internal hemorrhage.

KEY DOCUMENTATION ELEMENTS

- Vital signs and vascular status of extremity after placement of tourniquet, pressure dressing, or splint
- Documentation of elimination of distal pulse after tourniquet placement
- Time of tourniquet placement

PERTINENT ASSESSMENT FINDINGS

- Evaluate for obvious deformity, shortening, rotation, or instability
- Neurologic status of extremity
    a. Sensation to light touch
    b. Distal movement of extremity
- Vascular status of extremity
    a. Pallor
    b. Pulse
    c. Capillary refill
    d. Degree of bleeding / blood loss with assessment of the color of the blood (venous or arterial) and whether it is pulsatile or not

QUALITY METRICS

- Proper placement of tourniquet (location, elimination of distal pulse)
- Proper marking and timing of tourniquet placement and notification of subsequent providers of tourniquet placement
- Appropriate splinting of fractures
- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center

Facial Injury

History
- Time of injury
- Mechanism (blunt vs penetrating)
- Verify no loss of consciousness
- Bleeding (controlled vs uncontrolled
- Past medical history
- Medications (Blood thinners)
- No evidence for multi-trauma

Signs and Symptoms
- Pain, swelling, bleeding
- Altered mental status
- Airway compromised
- Aspiration risk (teeth, blood)

Differential
- Facial fracture (LeForte I, II, III)
- Mandible fracture
- Eye globe rupture

EMR & EMT

1. INITIAL TRAUMA CARE.
2. Treat specific facial injuries as indicated:
    a. **Lacerations, & Avulsions**: Apply direct pressure /dressing is usually all that is needed to control bleeding. If bleeding remains uncontrolled, if available, apply a hemostatic agent/dressing directly to the source of bleeding and compress wound(s) for a minimum of **2 minutes**. If bleeding continues, may remove the dressing and apply additional hemostatic agent/dressing.
    b. **Unstable Mandible**: Have suction readily available as patient may not be able to spit /swallow effectively. Preferably transport patient sitting upright if no suspected spinal injury.
    c. **Eye Trauma**: Place eye shield or cover both eyes with dressing for any significant eye trauma . If globe is avulsed, cover with moist saline dressing. Penetrating objects to the eye should be stabilized with a moist dressing, cover both eyes with eye shield or dressing to minimize tandem eye-movement.
    d. **Eye Trauma**: Splash injuries to eyes should be treated in accordance with the first aid measures contained within the Material Data Safety Sheet for the known substance. Contact medical control if substance is unknown for further guidance. Irrigation can be accomplished by positioning the prongs of a nasal cannula prongs to each side of the bridge of the patient's nose. Use isotonic IV solution or sterile water to irrigate for at least 30 minutes. If only one eye is involved, position the patient on their side, with the injured eye below the uninjured one to reduce the potential for cross-contamination of the unaffected eye..
    e. **Avulsed Tooth**: Avoid touching the root of the avulsed tooth. Do not wipe off tooth. Pick up at crown end and rinse off with cool saline or water, if dirty. Place in milk or saline as the storage medium.
    f. **Epistaxis**: Squeeze nose for 10-15 minutes continuously. May use commercial nose clamp
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR & EMT Treatment**
2. Facial tissue can be highly vascularized. Severe avulsions and lacerations may cause significant blood loss and a subsequent presentation of shock. Utilize pressure/hemostatic dressings for bleeding control. If needed, initiate an infusion of administer **Isotonic IV Fluid (500 ml)** bolus to a target of SBP = 90 mmHg or MAP = 65 mmHg.
4. Patient airways that are unmanageable, should immediately be secured via ARIWAY MANAGEMENT protocol.
5. **Epistaxis: (ALS) Tranexamic Acid (TXA) 500 mg** saturated gauze inserted to pack nostril(s) or may give (5) **100mg/1 mL** doses via atomizer applied to the nostril(s) **500 mg** total given intranasal **(IN).**

Facial Injury

PEARLS

- During management of facial injuries that have the potential to compromise a patient's airway, procedures (positioning, suction, bleeding control, intubation) should be performed while minimizing unnecessary manipulations of the spine.
- Patients with isolated injuries to the eye globe should be transported to a facility capable of providing treatment specific to such injuries. Patients should be transported in a calm and gentle manner. (*Irrigation is contraindicated when there is a penetrating injury or rupture to the eye globe.)*
- Facial injuries can bleed briskly when lacerated, which may cause the patient to suffer from prolonged and significant blood loss. Though uncommon, an adult may develop shock from these injuries.
- Swallowed blood secondary to a nose bleed has been known to trigger episodes of nausea, refer to NAUSEA/ VOMITING guideline
- Facial injuries tend to be "distracting" by nature and unless actively the wound is hemorrhaging or airway is compromised, management should not interrupt the primary or rapid trauma assessment.

KEY DOCUMENTATION ELEMENTS

- Adequate oxygenation
- Airway status and management
- $EtCO_2$ monitored and documented if respiratory status is in question
- Neurological and mental status assessment
- Eye injuries Irrigated for at least 30 minutes

PERTINENT ASSESSMENT FINDINGS

- Neurologic status assessment findings
- Trauma findings on physical exam
- Active bleeding
- Eye assessment for intact eye globe
- Pupils assessment (*except for penetrating injury or rupture to the eye globe)*

QUALITY METRICS

- Airway patency was maintained
- Appropriate bleeding control measures
- Both eyes covered secondary to globe injury

Head Injury

History
- Time of injury
- Mechanism (blunt vs penetrating)
- Loss of consciousness
- Bleeding
- Past medical history
- Medications
- Evidence for multi-trauma
- Helmet use or damage to helmet

Signs and Symptoms
- Pain, swelling, bleeding
- Altered mental status
- Unconscious
- Respiratory distress / failure
- Vomiting
- Major traumatic mechanism of injury
- Seizure

Differential
- Skull fracture
- Brain injury (concussion, contusion, hemorrhage or laceration)
- Epidural hematoma
- Subdural hematoma
- Subarachnoid hemorrhage
- Spinal injury
- Abuse

EMR & EMT

1. **INITIAL TRAUMA CARE**.
2. Maintain cervical stabilization per the SPINAL MOTION RESTRICTION Protocol.
3. Airway:
    a. If patient unable to maintain airway, consider oral airway (nasal airway should not be used with significant facial injury or possible basilar skull fracture).
4. Breathing:
    a. Administer **Oxygen** as appropriate with a target of achieving 92-98% saturation.
5. Circulation:
    a. Wound care
        i. Control bleeding with direct pressure dressing if no suspected open skull injury.
        ii. Moist sterile dressing to any potential open skull wound, then cover with dry dressing.
6. Disability:
    a. Evaluate for other causes of ALTERED MENTAL STATUS—check blood glucose.
    b. Spinal assessment and management per SPINAL MOTION RESTRICTION Protocol.
    c. Perform and trend neurologic status assessment (moderate / severe: GCS 3-13, P or U on AVPU)
        i. Early signs of deterioration: Confusion, Agitation, Drowsiness, Vomiting, Severe Headache.
        ii. Monitor for signs of herniation.
8. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR & EMT TREATMENT**.
2. For patients with moderate / severe head injury:
    a. If unable to maintain their airway, use continuous waveform capnography and $EtCO_2$ measurement, with a target $EtCO_2$ of 35-40 mmHg.
    b. Administer **Normal Saline IV Fluid (500 ml)** bolus to maintain SBP = 110 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP = 110mmHg; maximum **2 liters**. Hypotension should be avoided to maintain cerebral perfusion and target SBP should be 110-120 mmHg.
3. For patients with a severe head injury with *signs of herniation* that are unconscious or semi-conscious:
    a. Manage airway according to the AIRWAY MANAGEMENT Protocol; ventilate to a target $EtCO_2$ of 35 mmHg as a short-term option.
    b. Consider 250 mL infusion of **3% Hypertonic Saline** if signs of herniation are present. (If available)

Head Injury

PEARLS

- Head injury severity guideline:
  a. Mild: GCS 13-15 / AVPU = (A)
  b. Moderate: GCS 9-12 / AVPU = (V)
  c. Severe: GCS 3-8 / AVPU = (P) or (U)
- The most important item to monitor and document is a change in the level of consciousness.
- If endotracheal intubation or invasive airways are used, continuous waveform capnography is required to document proper tube placement and assure proper ventilation rate.
- Signs of herniation:
  a. Decreasing mental status
  b. Abnormal respiratory pattern
  c. Asymmetric / unreactive pupils
  d. Decorticate posturing
  e. Cushing's response (bradycardia and hypertension)
  f. Decerebrate posturing
- DO NOT ventilate to a target $EtCO_2$ of 35 mmHg unless signs of herniation are present.
- Assume concomitant cervical spine injury in patients with moderate / severe head injury.

KEY DOCUMENTATION ELEMENTS

- Adequate oxygenation
- Airway status and management
- $EtCO_2$ monitored and documented for moderate / severe head injury (avoidance of inappropriate hyperventilation)
- Neurological and mental status assessment

PERTINENT ASSESSMENT FINDINGS

- Neurologic status assessment findings
- Pupils
- Trauma findings on physical exam

QUALITY METRICS

- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center

GLASGOW COMA SCALE (GCS)		
Behavior	**Response**	**Score**
Eye Opening	Spontaneous	4
	To Verbal	3
	To Pain	2
	None	1
Verbal Response	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Sounds	2
	None	1
Best Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraws from Pain	4
	Flexion to Pain	3
	Extension to Pain	2
	None	1

Neck Injury/Deformity

History
- Time of injury
- Mechanism (blunt vs penetrating)
- Loss of consciousness
- Bleeding (controlled vs uncontrolled)
- Past medical history
- Medications (Blood thinners)
- Evidence for multi-trauma

Signs and Symptoms
- Pain, swelling, deformity, bleeding
- Subcutaneous air
- Tracheal deviation
- Jugular neck vein distention
- Flat neck veins
- Stridor
- Open or sucking neck wound
- Paralysis or numbness

Differential
- Cervical spine fracture
- Tracheal Injury
- Possibly indicative for pneumothorax
- Possibly indicative for hemothorax/ major internal bleeding
- Carotid artery or jugular vein disruption

EMR & EMT

1. INITIAL TRAUMA CARE.
2. Treat specific neck injuries as indicated:
    a. **Penetrating neck wounds**: If penetrating object remains in place, seal and stabilize the object as needed with gauze. Penetrating open wounds should be sealed with an occlusive dressing and covered with gauze. In the case of a tracheal disruption, sealing of the open neck wound may direct bleeding into the airway. Rigorous suction of the airway may be required to maintain patency.
    b. **Neck vein distention and tracheal deviation**: Typically a late indicator for a tension pneumothorax, Provider should assess for dyspnea, diminished breath sounds and hyperresonance which will typically present on the side of the chest opposite of the development of tracheal deviation. Neck vein distention found with the presence of hypotension can also be suggestive of a tension pneumothorax or pericardial tamponade.
    c. **Tunneled (Flat) Neck Veins**: In the presence of hypotension, may be indicative of severe hemorrhage internally or externally. Verify that all external bleeding is controlled,
    d. **Cervical Spine Deformity**: Assess for “step-offs” which can be a sign of an improper alignment of the spine do to fractures and/or dislocations . Signs of paralysis, paraesthesia and priapism may be present.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic

1. Continue **EMR & EMT Treatment**
2. Treat specific neck injuries as indicated:
    a. **Penetrating neck wounds**: Orotracheal Intubation and placement of an endotracheal tube may be required to isolate the lower airway from bleeding. During placement of the endotracheal tube, the tube should be advanced beyond the suspected area of disruption. In the event resistance is detected while advancing the ETT, no further attempt should be made to advance the ETT as this may lead to a complete trachea dissection which has been associated with very poor patient outcomes.
    b. **Neck vein distention and tracheal deviation**: Anticipate the need to perform a NEEDLE DECOMPRESSION after assessing the chest.
    c. **Tunneled (Flat) Neck Veins**: In the presence of hypotension, may be indicative of severe hemorrhage internally or externally. Verify that all external bleeding is controlled. Treat for SHOCK
    d. **Cervical Spine Deformity**: Assess for “step-offs” which can be a sign of an improper alignment of the spine do to fractures and/or dislocations . Signs of paralysis, paraesthesia and priapism may be present. If needed, treat for spinal SHOCK.

Neck Injury/Deformity

PEARLS

- Because of the potential for an introduction of air and the creation of an air embolism, open neck wounds should be covered with an occlusive dressing. C-collar should be applied over the dressing to minimize movement based on mechanism of injury and presentation of symptoms.
- Objects that have penetrated the neck should not be removed, but instead stabilized in place with an occlusive and bulking dressings.
- Neck vein distention while in the presence hypotension or narrowing pulse pressures should create a high index of suspicion for a tension pneumothorax or pericardial tamponade.
- Although tracheal deviation will occur opposite of the affected side of a tension pneumothorax, the point of deviation is located deeply within the neck which then poses a challenge when attempting to visualize or feel for deformity. Looking for deviation alone can be difficult and challenging for determining the presence of a tension pneumothorax.
- Tunneled (flat) neck veins in the presence of hypotension can indicate significant loss of blood volume. IV fluids should be infused up to a rate that just maintains perfusion (*systolic BP=90mm, MAP=65mm*)
- A“ Step-off” may be detectable when assessing the posterior neck. It typically indicates that the patient has suffered a severe fracture/dislocation of the cervical spine. Often times, it is associated with significant weakness , numbness or paralysis to arms and/or legs.

KEY DOCUMENTATION ELEMENTS

- Airway status and management
- Mechanism of injury
- Pertinent assessment findings indicative of other life threatening conditions
- Use and/or type of spinal motion restriction device
- Actions taken secondary to findings related to neck injury/deformity.

PERTINENT ASSESSMENT FINDINGS

- Airway status
- PMS status assessment findings
- Asses for presence of “step-offs” or other deformities to the cervical spine
- “Open” neck wound involving airway or vasculature structures.
- Tracheal deviation, JVD, tunneled (flat) neck veins

QUALITY METRICS

- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center
- Appropriate interventions performed

Spinal Motion Restriction

Spinal Motion Restriction is defined as application of a cervical collar and maintenance of the spine in neutral alignment (long backboard, a scoop stretcher, a vacuum mattress, or an ambulance cot).

Determination of spinal motion restriction should be made by the highest level EMS provider.

All Levels

1. **Spinal Motion Restriction** is **required** when ANY of the following conditions apply following blunt trauma: *(When in doubt, apply spinal motion restriction).*
    a. **Acutely altered level of consciousness** (e.g., GCS <15, evidence of intoxication)
    b. **Midline neck or back pain and/or tenderness**.
    c. **Focal neurologic signs and/or symptoms** (e.g., numbness or motor weakness).
    d. **Anatomic deformity of the spine**.
    e. **Distracting circumstances or injury** (e.g., long bone fracture, degloving, or crush injuries, large burns, etc.) or any similar injury that impairs the patient's ability to contribute to a reliable examination.
    f. **Communication barrier** (emotional / language / cognitive impairment)
2. Spinal Motion Restriction is NOT utilized in penetrating trauma to the head and/or neck without evidence of spinal injury.
3. Patient's should be allowed to self extricate, if able, from a vehicle after placing a cervical collar, if indicated.
4. Keep the head, neck, and torso in alignment by placing the patient on a long backboard, a scoop stretcher, a vacuum mattress, or an ambulance cot. **SMR cannot be properly performed with a patient placed in a sitting position**
5. Helmet removal:
    a. If a football helmet needs to be removed, it is recommended to remove the face mask followed by manual removal (rather than the use of automated devices) of the helmet while keeping the neck manually immobilized - occipital and shoulder padding should be applied, as needed, with the patient in a supine position, in order to maintain neutral cervical spine positioning.

Peter E. Fischer, Debra G. Perina, Theodore R. Delbridge, Mary E. Fallat, Jeffrey P. Salomone, Jimm Dodd, Eileen M. Bulger & Mark L. Gestring (2018): Spinal Motion Restriction in the Trauma Patient – A Joint Position Statement, Prehospital Emergency Care, DOI: 10.1080/10903127.2018.1481476

Spinal Motion Restriction

PEARLS

- When SMR is indicated in adults, apply it to the entire spine due to the risk of noncontiguous injuries
- A critical component of SMR is the application of an appropriate size cervical collar.
- Consider removal of extrication devices during transport only if an adequate number of trained personnel are present to minimize unnecessary movement during the removal process.
- The risks of patient manipulation must be weighed against the benefits of device removal.
- If transport time is expected to be short, it may be better to transport a patient on the device and remove it on arrival at the hospital.
- Be aware of potential airway compromise or aspiration in immobilized patient with nausea / vomiting, or with facial / oral bleeding.
- Excessively tight immobilization straps can limit chest excursion and cause hypoventilation.
- Prolonged immobilization on spine board can lead to ischemic pressure injuries to skin. Pad areas that become painful or are prone to tissue breakdown as appropriate while minimizing any unnecessary movement.
- In an uncooperative patient, avoid interventions that may promote increased spinal movement.
- The preferred position for all patients with spine management is flat and supine. There are three circumstances under which raising the head of the bed to 30 degrees should be considered:
    a. Respiratory distress
    b. Suspected severe head trauma
    c. Promotion of patient compliance
- Age alone should not be a factor in decision-making for prehospital spine care, yet the patient's ability to reliably be assessed at the extremes of age should be considered. Communication barriers with infants/ toddlers or elderly patients with dementia may prevent the provider from accurately assessing the patient.

References: American College of Surgeons. Trauma Quality Programs/ Best Practice Guidelines/Spinal Injury/Pre-hospital Spinal Motion Restriction/-March 20221. Fischer PE, Perina DG, Delbridge TR, et al. Spinal motion restriction in the trauma patient - A joint position statement. Prehosp Emerg Care. 2018 Nov-Dec; 22(6): 659-661. doi: 10.1080/10903127.2018.1481476. Epub 2018 Aug 9. PMID: 30091939 2. National Association of EMS Physicians. EMS spinal precautions and the use of the long backboard – A joint position statement of the National Association of EMS Physicians and the American College of

KEY DOCUMENTATION ELEMENTS

- Patient complaint of neck or spine pain
- Spinal tenderness
- Mental status / GCS
- Neurologic examination
- Evidence of intoxication
- Documentation of multiple trauma
- Documentation of mechanism of injury

PERTINENT ASSESSMENT FINDINGS

- Mental status
- Neurologic examination
- Evidence of intoxication
- Evidence of multiple trauma with distracting injuries

QUALITY METRICS

- Percentage of patients with high risk mechanisms of injury and/or signs or symptoms of cervical spine injury who are placed in a cervical collar
- Percentage of trauma patients who are transported on a long backboard

Tranexamic Acid (TXA)

Patients who meet the administration criteria for TXA (Epistaxis withstanding) will also meet the REGION 4 TRAUMA TRIAGE ALGORITHYM criteria for patients who are designated to be transported to the closest Level 1 Trauma Center. Consider air medical services as a means to reduce transport times to the closest trauma center.

Criteria

1. Age > 18.
2. Blunt or penetrating trauma
3. Time of injury **less than 3 hours (180 minutes)**. Prefer < 60 minutes from initial traumatic injury.
4. **All trauma patients with ongoing significant hemorrhage or who are considered at risk for significant hemorrhage when either or both of the following criteria are present**:
    a. **SBP <90 mmHg**
    b. **Pulse Rate ≥ 110 bpm**

Paramedic/PHRN

1. **INITIAL TRAUMA CARE**
2. Refer to SHOCK and EXTREMITY TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol.
3. Ideally, obtain at least 1 dedicated IV/IO line for TXA, and a second large bore IV/IO for continuous IV fluid administration. If unable to establish two lines, TXA may be administered via a secondary infusion (piggy-back) while infusing isotonic solution for the treatment of shock.
4. Administer **TXA 1 gram IV/IO over 10 minutes**.

    According to the manufacturer, TXA should be given via a dedicated line.

    a. Mix **1 gram/10mL vial in 100mL NS and administer over 10 minutes IV** at a wide open rate.
    b. If unable to be given IV/IO, **TXA 1 gram/10mL** may given deep **IM** utilizing two injection sites by splitting the standard dose into two **(500mg/5mL) doses.**
5. During initial report to the receiving facility, and at transition of care, report the time of injury and time of **TXA** loading dose.

Tranexamic Acid (TXA)

PEARLS

- Tranexamic acid is an antifibrinolytic drug that is used for the management of severe hemorrhage (external/ internal)
- Tranexamic acid mechanism of action is to slow the clot breakdown process
- Consideration should be given to the administration of (TXA) so that it occurs during the early stages of treatment and transport.
- Do not delay more urgent critical resuscitation interventions when administering (TXA.)
- Hypotension has been associated with an infusion rate greater than 100mg/min
- Should not be used for any patient with a known hypersensitivity to (TXA)
- Should not be used for patients with known severe renal failure
- Should not be used for patents with a history of thromboembolism disorder.
- Patients receiving (TXA) ideally should be transported to trauma centers which are capable of administering additional doses of (TXA).

KEY DOCUMENTATION ELEMENTS

- Criteria for (TXA) administration
- Administration of (TXA) dose over 10 minutes
- No known history of (TXA) sensitivity
- Documentation of adverse reaction

PERTINENT ASSESSMENT FINDINGS

- Blunt or penetrating trauma findings on physical exam
- Assessment for adverse reaction (hypotension, anaphylaxis) secondary to administration of (TXA)

QUALITY METRICS

- Scene time for trauma patients
- Appropriate transport of trauma patients to Trauma Center
- Criteria for TXA administration were met

Traumatic Arrest

History
- Events leading to compromised airway
- Events leading to inadequate or absent respiratory effort
- Events leading to circulatory collapse (killer bleeds, aortic dissection, tension pneumothorax, pericardial tamponade, myocardial contusion, STEMI, electrical shock)
- Blunt or penetrating trauma

Signs and Symptoms
- Evidence of gross hemorrhage
- Pallor/Cyanosis
- Flat neck veins
- Unresponsive
- Apnea/agonal respiratory effort
- Tracheal deviation/JVD
- Diminished or absent breath sounds

Differential
- Tension pneumothorax
- Exsanguination
- Open pneumothorax
- Pericardial tamponade
- Aortic dissection
- Altered mental status
- Trauma secondary to cardiac arrest

EMR & EMT

1. Ensure scene and rescuer safety.
2. Refer to WITHOLDING RESUSCITATIVE EFFORS / DETERMINAITION OF DEATH protocol
3. Initiate HEMORRHAGE CONTROL techniques as required and provide INITIAL TRAUMA CARE
4. Transport from the scene should be performed as soon as possible.
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR & EMT TREATMENT.**
2. If suspected thoracic trauma, perform ***bilateral*** NEEDLE CHEST DECOMPRESSION.
3. Establish 2 large bore IVs or IO (not in the injured extremity).
6. Rapidly administer **Isotonic IV Fluid bolus** until pulse is detected, then target SBP = 90 mmHg or MAP = 65 mmHg.
10. Follow CARDIAC ARREST treatment guideline
11. Transport to a Level 1 Trauma Center if transport time is **15 minutes or less**. Otherwise, patient suffering from a traumatic arrest should be transported to the closest hospital.
12. Termination of resuscitation efforts should be considered:

Medical Control

- With EMS-witnessed cardiopulmonary arrest and 15 minutes of unsuccessful resuscitation.
- When transport time to the hospital emergency department is greater than 15 minutes.

***Exception**: Patients who are victims of drowning, lightning strike and hypothermia may warrant special consideration for extending resuscitation time interval.*

Traumatic Arrest

PEARLS

Causes of Prehospital Traumatic Cardiopulmonary Arrest

Compromised or failure to maintain an patent airway

- Foreign body or tongue obstruction
- Swelling of the airway
- Tracheal damage or transection
- Copious amounts of blood or emesis

Inadequate of absent respiratory effort

- Simple/open/tension pneumothorax
- Massive flail chest
- Diaphragmatic rupture
- High level spinal cord injury
- Inhalation/ingestion of toxins (byproducts of combustion, CO, drugs, alcohol)
- Aspiration
- Near-fatal drowning
- Apnea secondary to electrical shock

Circulatory compromised or collapse

- Empty Heart Syndrome –from blood loss secondary to massive vascular injuries to include traumatic aortic dissection.
- Tension pneumothorax
- Pericardial tamponade
- Myocardial contusion/STEMI
- Cardiac Arrest secondary to an electrical shock

KEY DOCUMENTATION ELEMENTS

- Mechanism of Injury
- Time of tourniquet application, if applied
- Time resuscitation initiated and or discontinued
- Contact/orders from medical control
- Amount of IV fluid administered
- Documented capnography readings

PERTINENT ASSESSMENT FINDINGS

- Mental status / GCS
- Airway Patency (Interventions required)
- Respiratory status (Interventions required)
- Circulation status (Interventions required
- Evidence of trauma

QUALITY METRICS

- Bleeding control measures
- Initiation of hemorrhage control prior to fluid resuscitation
- Cardiac arrest guidelines utilized
- Appropriate transport of trauma patients to Trauma Center

Acetylcholinesterase Inhibitors (Carbamates, Nerve Agents, Organophosphates) Exposure

History

- Substance
- Time of ingestion or exposure
- Route of exposure
- Quantity of medication or toxin taken
- Alcohol or other intoxicant taken
- Past medical history
- Medications
- Decontamination performed
- Treatment prior to arrival

Signs and Symptoms

DUMBELLS

- **D**efecation / **D**iarrhea
- **U**rination; increase, loss of control
- **Mi**osis (pupils constrict)/Muscle weakness/fasciculations
- **B**ronchospasm, Bronchorrhea, , Bradycardia (killer B's)
- **E**mesis
- **L**acrimation
- **S**alivation/Sweating

Differential

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

Estimated Level of Exposure

	Signs & Symptoms
Mild	Salivation; Lacrimation; Miosis
Mild to Moderate	Localized swelling; Muscle fasciculations; Nausea and vomiting; Weakness; Shortness of breath
Severe	Unconsciousness; Convulsions; Apnea or severe respiratory distress requiring assisted ventilation; Flaccid, paralysis

EMR & EMT

1. Assure scene is safe and the patient has been decontaminated if needed.
2. **UNIVERSAL PATIENT CARE**.
3. Save all bottles, containers or labels for information without exposing rescuers.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.
5. Contact **Resource Hospital Medical Control** for any multiple victim response so that CHEMPACK activation may be initiated.
6. If available, administer via **AUTOINJECTOR ATROPINE/PRALIDOXIME** (Ex. Duodote, Mark 1). Repeat every 3-5 minutes until symptoms of SLUDGE subside, most importantly secretions

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. If symptomatic, administer **ATROPINE 2 mg IV or IM**.
3. Repeat **ATROPINE 2-4 mg IV** every 3-5 minutes until symptoms of SLUDGE subside, most importantly secretions.
4. Establish IV access. Administer **Isotonic IV Fluid** to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Repeat fluid bolus as needed as long as lungs remain clear to maintain SBP ≥ 90 mmHg; maximum 2 liters.
5. Apply cardiac monitor
6. If seizures occur, refer to SEIZURE / STATUS EPILEPTICUS protocol.

Acetylcholinesterase Inhibitors (Carbamates, Nerve Agents, Organophosphates) Exposure

PEARLS

- Continuous and ongoing patient reassessment is critical.
- Clinical response to treatment is demonstrated by the drying of secretion and the easing of respiratory effort.
- Initiation of and ongoing treatment should not be based upon heart rate or pupillary response.
- Atropine is the primary antidote for organophosphate, carbamate, or nerve agent exposures, and repeated doses should be administered liberally to patients who exhibit signs and symptoms of exposure or toxicity.
- Clinical effects of acetylcholinesterase inhibitor agents
    a. The clinical effects are caused by the inhibition of the enzyme acetylcholinesterase which allows excess acetylcholine to accumulate in the nervous system.
    b. The excess accumulated acetylcholine causes hyperactivity in muscles, glands, and nerves.
- Organophosphates (certain Insecticides)
    a. Can be legally purchased by the general public.
    b. Organophosphates (e.g. pesticides) penetrate tissues and bind to the patient's body fat producing a prolonged period of illness and ongoing toxicity even during aggressive treatment.
- Nerve agents
    a. Traditionally classified as weapons of mass destruction (WMD).
    b. Not readily accessible to the general public.
    c. Extremely toxic and rapidly fatal with any route of exposure.
    d. GA (tabun), GB (sarin), GD (soman), GF, and VX are types of nerve agents and are WMDs.
    e. Nerve agents can persist in the environment and remain chemically toxic for a prolonged period of time.

KEY DOCUMENTATION ELEMENTS

- Time to recognize initial signs and symptoms
- Number of repeated doses of atropine required for the secretions diminish and respirations to improve
- Patient reassessments
- Patient responses to therapeutic interventions
- Measures taken to decontaminate the patient
- Measures taken to protect clean environments from contamination

PERTINENT ASSESSMENT FINDINGS

- Signs and symptoms exhibited with the toxidromes of **DUMBBELS**

QUALITY METRICS

- Recognition and appropriate treatment of patients

Altitude Illness

History

- Past medical history
- Prior history of altitude illness
- Patient's itinerary
  - Starting altitude
  - Highest altitude gained
  - Rate of ascent
- Presence of prophylaxis against altitude (i.e. acetazolamide, sildenafil)
- Total altitude descended

Signs and Symptoms

- (See definitions below)

Differential

- Carbon monoxide poisoning
- Hypo-/hyperthermia
- Stroke
- Drugs / Alcohol
- Hypoglycemia
- Trauma
- Exhaustion

Definitions

- **Acute mountain sickness**: Headache plus one or more of the following: anorexia, nausea or vomiting, fatigue or weakness, dizziness or lightheadedness or difficulty sleeping. These symptoms must occur in the setting of recent arrival to high altitude (generally considered greater than 5000 – 7000 feet).
- **High altitude pulmonary edema (HAPE)**: Progressive dyspnea, cough, hypoxia, and weakness in high altitude environments (considered greater than 8000 feet). Patients may or may not exhibit symptoms if acute mountain sickness precedes symptoms of HAPE .
- **High altitude cerebral edema (HACE)**: Heralded by mental status changes in patients with symptoms of acute mountain sickness including altered mentation, ataxia, or stupor and progressing to coma. Typically seen in high altitude environments (greater than 8000 feet).

EMR & EMT

1. Ensure scene and rescuer safety.
2. UNIVERSAL PATIENT CARE.
3. Perform ABCs and manage airway as necessary.
4. Administer supplemental oxygen to keep oxygen saturations ≥ 90%, CPAP or assist ventilations as necessary.
5. Descend to lower altitude as soon as scene conditions permit. Descent is the mainstay of therapy and the definitive treatment for all altitude related illnesses.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access and perform fluid bolus if required to maintain systolic BP> 90 mmHg.
3. **Acute Mountain Sickness**
   a. **IBUPROFEN 10mg/kg PO (max 800 mg)** or **ACETAMINOPHEN 15 mg/kg PO (max 1000 mg) f**or pain.
   b. **ONDANSETRON 4mg IM.IV or PO** be every 6 hours, until symptoms resolve.
   c. **DEXAMETHASONE 8m IM. IV or PO** (administered adjunctively with descent). Followed by **4mg** every 6 hours.
4. **High Altitude Cerebral Edema (HACE)**.
   a. **DEXAMETHASONE 8m IM. IV or PO** (administered adjunctively with descent). Followed by **4mg** every 6 hours.

Altitude Illness

PEARLS

- Patients suffering from altitude illness have exposed themselves to a dangerous environment. By entering the same environment, providers are exposing themselves to the same altitude exposure. Be vigilant in looking for symptoms of altitude illness amongst rescuers.
- Descent of 500-1000 feet is often enough to see improvements in patient conditions.
- Patients with HAPE are suffering from non-cardiogenic pulmonary edema and may benefit from positive pressure ventilation via either bag assisted ventilation, CPAP, or other means of positive pressure ventilation.
- Patients suffering from altitude illness are commonly dehydrated and require IV fluids.
- HAPE is the most lethal of all altitude illnesses.
- Consider alternate causes of symptoms of AMS - the symptoms of AMS may be caused by alternate etiologies such as carbon monoxide poisoning (in patients cooking within enclosed areas), dehydration, exhaustion, hypoglycemia, hyponatremia.

KEY DOCUMENTATION ELEMENTS

- Patient's itinerary, including starting altitude, highest altitude gained and rate of ascent
- Presence (or absence) of prophylaxis against altitude (including medications such as acetazolamide, sildenafil)
- Total altitude descended

PERTINENT ASSESSMENT FINDINGS

- Consider airway management needs in the patient with severe alteration in mental status
- HAPE will present with increasing respiratory distress and rales on exam
- HACE will present with mental status changes, ataxia and progressing to coma

QUALITY METRICS

- Recognition and appropriate treatment of patients

Bites and Envenomation

History
- Type of bite / sting
- Description of creature or bring photo with patient for identification
- Time, location, size of bite / sting
- Previous reaction to bite / sting
- Domestic vs. Wild
- Tetanus and Rabies risk
- Immunocompromised patient

Signs and Symptoms
- Rash, skin break, wound
- Pain, soft tissue swelling, redness
- Blood oozing from the bite wound
- Evidence of infection
- Shortness of breath, wheezing
- Allergic reaction, hives, itching
- Hypotension or shock

Differential
- Animal bite
- Human bite
- Snake bite (poisonous)
- Spider bite (poisonous)
- Insect sting / bite (bee, wasp, ant, tick)
- Infection risk
- Rabies risk
- Tetanus risk

EMR & EMT-Basic

1. **UNIVERSAL PATIENT CARE**.
2. If signs of allergic reaction refer to ALLERGIC REACTION / ANAPHYLAXIS Protocol.
3. For Insect Bite:
    a. Remove stinger if appropriate.
    b. Remove constricting items.
    c. Apply ice pack.
    d. Minimize movement.
4. For Snake Bite:
    a. Splint limb, bandage and place at level below the heart.
    b. Minimize movement.
    c. Remove constricting items.
    d. Do **NOT** apply ice.
5. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access, as needed.
3. Consider management of pain per the PAIN MANAGEMENT Protocol.

Bites and Envenomation

PEARLS

- **Evidence of infection:** Swelling, redness, drainage, fever, red streaks proximal to wound.
- Immunocompromised patients are at an increased risk for infection: Diabetes, chemotherapy, transplant patients.
- Patient may still have an imbedded stinger, tooth, nematocyst, or barb which may continue to deliver toxin if left imbedded. Consider safe removal without squeezing the toxin delivery apparatus.
- **Human bites:** Human bites have higher infection rates than animal bites due to normal mouth bacteria.
- **Dog / Cat / Carnivore bites:** Carnivore bites are much more likely to become infected and all have risk of Rabies exposure. Cat bites may progress to infection rapidly due to a specific bacteria (Pasteurella multicoda).
- **Snake bites:** Coral snake bites are rare: very little pain but very toxic. "Red on yellow - kill a fellow, red on black - venom lack." Amount of envenomation is variable, generally worse with larger snakes and early in spring.
- **Spider bites:** Black Widow spider bites tend to be minimally painful, but over a few hours, muscular pain and severe abdominal pain may develop (spider is black with red hourglass on belly). Brown Recluse spider bites are minimally painful to painless. Little reaction is noted initially but tissue necrosis at the site of the bite develops over the next few days (brown spider with fiddle shape on back).

KEY DOCUMENTATION ELEMENTS

- Describe the suspect bite or sting source without risking patient or EMS provider
- Repeat evaluation and documentation of signs and symptoms as patient clinical conditions may deteriorate rapidly
- Time of symptoms onset
- Therapy and response to therapy

PERTINENT ASSESSMENT FINDINGS

- Assess for signs and symptoms of local and systematic impact of the suspected toxin
- Patient may still have an imbedded stinger, tooth, nematocysts or barb which may continue to deliver toxin if left imbedded

QUALITY METRICS

- Offending organism was managed appropriately without secondary exposure
- Appropriate pain management

Carbon Monoxide / Smoke Inhalation

History
- Exposure to Carbon Monoxide
- Time / Duration of exposure
- Smoke inhalation
- Reason: Suicide, criminal, accidental
- Past medical history

Signs and Symptoms
- Facial burns
- Singed nasal hairs or facial hair
- Shortness of breath
- Facial edema
- Stridor

Carbon Monoxide
- Mild: Nausea, Fatigue, Headache, Vertigo, Lightheadedness
- Moderate to severe: AMS, Tachypnea, Tachycardia, Convulsion, Cardiopulmonary arrest

Differential
- Diabetes
- Cardiac (ACS / MI)
- Infection
- Anaphylaxis
- Head injury / Trauma
- Co-ingestant or exposure

EMR

1. Assure scene is safe.
2. **UNIVERSAL PATIENT CARE**.
    a. Check blood glucose level.
    b. Apply **OXYGEN 15 LPM** via **NRB**
3. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT

1. **Continue EMR Treatment**
2. Patients that are experiencing dyspnea and/or diminished LOC, apply CPAP **ONLY** if patient is able to follow commands and maintain their own airway.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access, as needed.
3. Consider the need for early advanced airway if signs of inhalation injury are present. Refer to the AIRWAY MANAGEMENT Protocol.
4. Consider cyanide toxicity in smoke inhalation patients. Refer to the CYANIDE POISONING Protocol.
5. Continue to monitor the patient.

Carbon Monoxide / Smoke Inhalation

PEARLS

- Remove patient and response personnel from potentially hazardous environment as soon as possible.
- Provide instruction to the patient, the patient's family, and other appropriate bystanders to not enter the environment (e.g. building, car) where the carbon monoxide exposure occurred until the source of the poisoning has been eliminated.
- CO oximeter devices may yield inaccurate low / normal results for patients with CO poisoning. All patients with probable or suspected CO poisoning should be transported to the nearest appropriate hospital based on their presenting signs and symptoms.
- Pulse oximetry is inaccurate due to the carbon monoxide binding with hemoglobin.
- Consider cyanide toxicity if carbon monoxide poisoning is from a fire.
- Smoke is a dangerous mixture of toxic gases and suspended chemical resulting from combustion. Smoke inhalation is the result of inhaling these heated components. While it may be impossible to predict exactly what components of combustion are inhaled, cyanide (CN) and carbon monoxide (CO) are common elements found in smoke and should be suspected in all smoke inhalation victims.

KEY DOCUMENTATION ELEMENTS

- If using a carbon monoxide detector, record the level detected
- Evidence of soot or burns around the face, nares or pharynx
- Early and repeat assessment of respiratory status and neuro exam
- Accurate exposure history

PERTINENT ASSESSMENT FINDINGS

- Early and repeat assessment of patient's mental status and motor function are extremely useful in determining response to therapy and the need for hyperbaric therapy
- Identification of possible etiology of poisoning
- Time of symptom onset and time of initiation of exposure-specific treatment
- Response to therapy

QUALITY METRICS

- Appropriate protocol selection and management
- Multiple frequent documented reassessments
- Early airway management in the rapidly deteriorating patient

Cyanide Poisoning

History
- Exposure to Cyanide (inhalation, ingestion or absorption through skin)
- Time / Duration of exposure
- Smoke inhalation
- Industrial exposure
- Reason: Suicide, criminal, accidental
- Past medical history

Signs and Symptoms
- CNS (Headache, Anxiety, Weakness, Vertigo)
- Tachycardia / Tachypnea
- Nausea / Vomiting
- Flushed “cherry red” skin

SEVERE:
- Marked altered LOC
- Seizures
- Respiratory depression or arrest
- Cardiac dysrhythmias

Differential
- Diabetes
- Cardiac (ACS / MI)
- Infection
- Anaphylaxis
- Head injury / trauma
- Co-ingestant or exposure

Note

This protocol assumes a Cyanokit is available.

EMR & EMT

1. Assure scene is safe and the patient has been decontaminated if needed.
2. **UNIVERSAL PATIENT CARE**.
3. Medical control should be contacted upon initial suspicion of cyanide poisoning so that the most appropriate receiving facility can be identified.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. *If available*-**HYDROXOCOBALAMIN (Cyanokit) 5 grams** over 15 minutes.
    a. Reconstitute: Place the vial of hydroxocobalamin in an upright position; add 200 mL of 0.9% NaCl to the using the transfer spike. Fill to the line.
    b. Mix: The vial should be repeatedly inverted or rocked, NOT shaken, for at least 60 seconds prior to infusion.
    c. Infuse Vial: Use vented IV tubing, hang and infuse over 15 minutes.

Cyanide Poisoning

PEARLS

- Scene safety is priority!
- Cyanide is a colorless, “bitter almond smell” (genetically only 40% of population can smell) gas or white crystal which binds to the ferric ion in cells, blocking the enzyme cytochrome oxidase, thus preventing the use of oxygen by the cell’s mitochondria, leading to cellular hypoxia.
- There is no widely available, rapid, confirmatory cyanide blood test. Many hospitals will not be able to rapidly assess cyanide levels. Therefore, treatment decisions must be made on the basis of clinical history and signs and symptoms of cyanide intoxication.
- Pulse oximetry accurately reflects serum levels of oxygen but does not accurately reflect tissue oxygen levels therefore should not be relied upon in possible cyanide and/or carbon monoxide toxicity.
- After hydroxocobalamin has been administered, pulse oximetry levels are no longer accurate.
- If the patient ingests cyanide, it will react with the acids in the stomach generating hydrogen cyanide gas. Be sure to maximize air circulation in closed spaces (ambulance) as the patient’s gastric contents may contain hydrogen cyanide gases when released with vomiting or belching.
- If smoke inhalation, always consider carbon monoxide poisoning.
- Smoke is a dangerous mixture of toxic gases and suspended chemical resulting from combustion. Smoke inhalation is the result of inhaling these heated components. While it may be impossible to predict exactly what components of combustion are inhaled, cyanide (CN) and carbon monoxide (CO) are common elements found in smoke and should be suspected in all smoke inhalation victims.

KEY DOCUMENTATION ELEMENTS

- Repeat evaluation and documentation of signs and symptoms as the patient’s clinical condition may deteriorate rapidly
- Identification of possible etiology of poisoning
- Time of symptoms onset
- Time of treatment
- Therapy and response to therapy

PERTINENT ASSESSMENT FINDINGS

- Early and repeated assessment is essential

QUALITY METRICS

- Appropriate protocol selection and management
- Multiple frequent documented reassessments
- Early airway management in the rapidly deteriorating patient

Dive (SCUBA) Injury / Accidents

History
- Recent (within 48 hrs) SCUBA diving activity
- Circumstances leading to the dive injury / accident
- Submersion in water regardless of depth
- Duration of submersion / immersion
- Temperature of water (possibility of hypothermia)
- Details of mechanism of injury (c-spine injury?)

Signs and Symptoms
Decompression Sickness:
- Joint pain
- Mental status changes
- Paralysis
- Pulmonary (cough, hemoptysis, SOB)

Nitrogen Narcosis:
- Mental status changes
- Signs of intoxication

Differential
- Trauma
- Pre-existing medical problem
  - Hypoglycemia
  - Cardiac Dysrhythmias
- Pressure injury (SCUBA diving)
  - Barotrauma
  - Decompression sickness

EMR
1. UNIVERSAL PATIENT CARE.
2. If a SCUBA accident includes associated drowning/near-drowning, refer to DROWNING / SUBMERSION INJURY Protocol.
3. If air embolism suspected, place in left lateral recumbent position (patient lying with the left side down, knees drawn upward, and flat)
4. Apply high flow **OXYGEN** to a target oxygen saturation of 100%.
   a. Patients with symptoms suspicious for decompression illness should be placed on supplemental oxygen regardless of saturations to enhance washout of inert gas.
5. If patient presents with hypothermia, refer to ENVIRONMENTAL HYPOTHERMIA Protocol.
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT
1. **Continue EMR Treatment**
2. Patients that are experiencing dyspnea and/or diminished LOC, apply CPAP **ONLY** if patient is able to follow commands and maintain their own airway.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN
1. Continue **EMR / EMT TREATMENT**.
2. Consider CPAP to supplement the awake patient's own spontaneous respiratory effort in patients with signs or symptoms of respiratory difficulty.
   a. Do NOT use CPAP in patients for whom pulmonary barotrauma is a consideration.
3. Establish IV access.
4. Advanced airway management as indicated. Refer to the AIRWAY MANAGEMENT Protocol.

Dive (SCUBA) Injury / Accidents

PEARLS

- If the patient is still in the water, seek safest and most rapid means of safe removal (within your scope of training) while minimizing risk of further injury.
- Seek assistance early for special rescue/extrication and transportation needs.
- Check for multiple patients (e.g. group dive, table calculation error(s) or contaminated dive gases).
- Rescue efforts should be coordinated between all responding agencies to ensure that the patient is rapidly accessed and safely removed from the water if diver unable to do so themselves.
- Decompression illness may have a variety of presentations depending on system affected (e.g. skin, joint(s), pulmonary, neurologic).
- SCUBA accidents/incidents can result in a variety of issues, including barotrauma, air embolism and decompression illness.

KEY DOCUMENTATION ELEMENTS

- Water temperature, if available
- Dive history
  - Number of dives in recent days
  - "Bottom time" in dives
  - Maximum depth
  - Rate of ascent
  - Dive gas (e.g. air vs. mixed gases such as Nitrox, Heliox or Trimix)
- Timing of onset of symptoms
- History of altitude exposure after diving (air travel)
- Any associated injuries or exposures

PERTINENT ASSESSMENT FINDINGS

- Vital signs findings
- Neurologic status assessment findings
- Respiratory assessment findings (e.g. oxygen saturation, respiratory rate)
- Subcutaneous emphysema

QUALITY METRICS

- Recognition and appropriate care of pulmonary/respiratory complaints
- Cervical spine management when appropriate
- Patient transported to the most appropriate facility

Drowning / Submersion Injury

History
- Circumstances leading to the submersion
- Submersion in water regardless of depth
- Duration of submersion / immersion
- Temperature of water (possibility of hypothermia)
- Details of mechanism of injury (c-spine injury?)

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

Differential
- Trauma
- Pre-existing medical problem
  - Hypoglycemia
  - Cardiac Dysrhythmias
- Pressure injury (diving)
  - Barotrauma
  - Decompression sickness

EMR

1. Approach scene with due caution for rescuer safety.
2. Remove patient from water with spinal motion restriction precautions. Refer to SPINAL MOTION RESTRICTION Protocol.
3. **UNIVERSAL PATIENT CARE.**
4. Apply **OXYGEN** as needed with a target oxygen saturation of 92-98%.
5. If patient becomes pulseless and apneic, refer to CARDIAC ARREST Protocol.
6. If patient presents with hypothermia, refer to ENVIRONMENTAL HYPOTHERMIA Protocol.
7. If patient was involved in SCUBA diving accident, refer to DIVE (SCUBA) INJURY / ACCIDENT Protocol.
8. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT

1. **Continue EMR Treatment**
2. Patients that are experiencing dyspnea and/or diminished LOC, apply CPAP **ONLY** if patient is able to follow commands and maintain their own airway.
3. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR /EMT TREATMENT**.
2. Establish IV access.
3. Advanced airway management as indicated. Refer to the AIRWAY MANAGEMENT Protocol.

Drowning / Submersion Injury

PEARLS

- The World Health Organization definition of drowning is “the process of experiencing respiratory impairment from submersion / immersion in liquid”.
- Drowning is further defined in the following categories:
    a. Non-fatal drowning – patients rescued from drowning.
    b. Fatal drowning – any death, acutely or subacutely, resultant from drowning.
- Submersion refers to situations in which the patient’s airway is underwater. Immersion refers to situations in which the patient’s body is in water but the patient’s airway remains out of the water.
- Rescue efforts should be coordinated between all responding agencies to ensure patient is rapidly accessed and removed from the water.
- Initiation of in-water ventilations may increase survival – In-water chest compressions are futile.
- Long-standing teaching has suggested that rescuers should always assume c-spine injury in victims of drowning.
    a. Rescuers should maintain a high index of suspicion for a spinal injury based on mechanisms listed below.
    b. Mechanisms of injury highly suggestive of cervical spine injury include diving, water skiing, surfing or watercraft accidents.
- Patients may develop subacute respiratory difficulty after drowning and therefore all victims of drowning should be transported for observation.
- Consider CPAP early if respiratory distress in awake patients, if adequate mask seal can be established.
- Hypothermia is often associated with drowning and submersion injuries even with warm ambient conditions.
- Patients who suffer a cardiac arrest from drowning require an “ABC” approach with prompt airway management and supplemental breathing.

KEY DOCUMENTATION ELEMENTS

- Mechanism of injury or history suggesting cervical spine injury
- Submersion time
- Water temperature
- Activities leading to drowning

PERTINENT ASSESSMENT FINDINGS

- Cardiac arrest in drowning is caused by hypoxia, airway and ventilation are equally important to CPR
- Assess for other associated injuries such as injuries to the head / neck or dive-related emergencies

QUALITY METRICS

- Recognition and appropriate care of pulmonary / respiratory complaints
- Cervical spine management when appropriate

Environmental Hyperthermia

History
- Age
- Oral intake
- Past medial history / Medications
- Alcohol or Illicit drug use
- Ambient temperature and humidity
- Exertion level
- Duration of exposure
- Fatigue and/or muscle cramping

Signs and Symptoms
- Altered mental status / Coma
- Hot, dry or sweaty skin
- Hypotension or shock
- Seizures
- Nausea / Vomiting
- Headache
- Cramps

Differential
- Fever (infection)
- Dehydration
- Medication induced (neuroleptic malignant syndrome, malignant hyperthermia)
- Hyperthyroidism (Thyroid Storm)
- Delirium Tremens (DT's)
- Heat cramps, exhaustion, stroke
- CNS lesions or tumors

Definitions

Heat Cramps: are minor muscle cramps usually in the legs and abdominal wall. Patient temperature is normal.

Heat Exhaustion: has both salt and water depletion usually of a gradual onset. As it progresses tachycardia, hypotension, elevated temperature, and very painful cramps occur. Symptoms of headache, nausea and vomiting occur. Heat exhaustion can progress to heat stroke. Skin usually cool and moist.

Heat Stroke: occurs when the cooling mechanism of the body (sweating) ceases due to temperature overload and/or electrolyte imbalances. Patient temperature is usually *greater than* 104°F. When no thermometer is available, it is distinguished from heat exhaustion by altered level of consciousness. Skin usually hot and dry.

Heat Cramps

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Remove patient to a cool environment.
3. If nausea and vomiting not present, have patient drink oral fluids, preferably electrolyte solutions.
4. DO NOT massage cramping muscles.
5. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMTTREATMENT**.
2. If no response to electrolyte solution or none is available, establish IV access and administer **NORMAL SALINE** or LACTATED RINGERS **500 mL bolus**.
3. If patient remains symptomatic, repeat fluid bolus as long as lungs remain clear; maximum **2 liters**.

Protocol Continues

Environmental Hyperthermia

Heat Exhaustion / Stroke

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Remove patient to a cool environment.
3. Manage airway as needed per the AIRWAY MANAGEMENT Protocol.
4. Check blood glucose level. If glucose < 60 mg/dL refer to DIABETIC EMERGENCIES –HYPOGLYCEMIA Protocol.
5. Initiate active cooling:
    a. Remove patient's clothing; protect privacy.
    b. Cool patient with water and fans.
    c. Apply cold packs to neck, groin and armpits.
    d. Cover patient with cool, wet sheets and fan.
    e. Ice bath immersion provides the most rapid cooling mechanism, may be improvised by placing patient in a body bag (human remains pouch HRP) filled with ice water. Ensure that an open airway is maintained at all times.
    f. DO NOT induce shivering. Stop cooling if shivering occurs.
6. Avoid fluids by mouth, especially if patient is nauseated.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.

    If shivering occurs administer **MIDAZOLAM 2 mg IN/IV**, may repeat once in 5 minutes or **DIAZEPAM IV/IO 0.1 mg/kg** (maximum dose 5 mg); may repeat dose once after 5 minutes if needed.
2. Upon cessation of shivering following medication administration, if patient s temperature remains above 102.2 F(39 C), resume cooling measures until patient's temperature is below 102.2 F (39 C) or the patient responds appropriately to stimuli.
3. Establish IV access.
4. Administer **NORMAL SALINE or LACTATED RINGERS** *(chilled if available)* **500 mL bolus** , repeat additional boluses to achieve maintain systolic BP> 120mm or MAP >80mm. Reassess lung sounds between boluses, discontinue boluses if "wet" sounds consistent with fluid overload in noted.
5. If patient remains symptomatic, repeat fluid bolus as long as lungs remain clear; maximum **2 liters**.
6. Be prepared to treat seizures per SEIZURE / STATUS EPILEPTICUS Protocol.

Environmental Hyperthermia

PEARLS

- Extremes of age are more prone to heat emergencies (i.e. young and old).
- Heat exposure can occur either due to increased environmental temperatures or prolonged exercise or a combination of both.
    a. Environments with temperature *greater than 90°F* and humidity *greater than 60%* present the most risk.
- Contributory risk factors may come from:
    a. Prescription and over-the-counter herbal supplements
    b. Cold medications
    c. Heart medications
    d. Diuretics
    e. Psychiatric medications
    f. Drug abuse (i.e. cocaine, amphetamines and salicylates)
    g. Accidental or intentional drug overdose
- Heat stroke is associated with cardiac arrhythmias independent of drug ingestion / overdose.
- Sweating *generally* disappears as body temperatures rise over 104°F although sweating (or lack of sweating) can be an unreliable indicator of the severity of heat illness.
- Do not forget to look for other causes of altered mental status such as low blood glucose level, or, in the proper circumstances (e.g. endurance exercise events), consider exercise associated hyponatremia (EAH), especially in the patient with altered mental status, normal blood glucose, and normal temperature.

KEY DOCUMENTATION ELEMENTS

- Patient assessment includes medication / drug use and detailed past medical history
- Patient temperature and physical exam
- Environmental assessment performed
- Cooling interventions considered and implemented

PERTINENT ASSESSMENT FINDINGS

- Warning signs: fever, altered mental status
- Blood glucose level for altered mental status

QUALITY METRICS

- Blood glucose level obtained
- Fluids given for hypotension
- Attempts to reduce core temperature

Environmental Hyperthermia

Intentionally Left Blank

Environmental Hypothermia / Frostbite

History
- Age
- Ambient temperature
- Exposure to wind / water
- Duration of exposure
- Past medical history / Medications
- Alcohol or illicit drug use

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

Differential
- Metabolic disorders (hypoglycemia, hypothyroidism)
- Sepsis
- Environmental exposure
- Shock
- CNS dysfunction (stroke, brain injury, spinal cord injury)

Hypothermia

Classification

	Temperature	Signs & Symptoms
Mild	89.6°-95°F (32°-35°C)	Normal Vitals; Normal mental status; shivering is preserved; body maintains ability to control temperature.
Moderate	82.4°-89.6°F (28°-32°C)	Progressive bradycardia, hypotension, and decreased respirations, alterations in mental status with eventual coma, shivering will be lost in moderate hypothermia (generally between 31-30° C), and general slowing of bodily functions; the body loses ability to thermoregulate.
Severe	< 82.4°F (< 28°C)	

EMR & EMT

1. UNIVERSAL PATIENT CARE.
2. Cautiously assess pulse for one full minute; unnecessary CPR could precipitate ventricular fibrillation. If patient has a pulse go to step #5.
3. If patient is pulseless and apneic after one full minute, refer to HYPOTHERMIC CARDIAC ARREST section.
4. Manage airway per the AIRWAY MANAGEMENT Protocol; assist ventilations with BVM but do not hyperventilate as hypocarbia may reduce the threshold for V-Fib in the cold patient.
5. Handle patient gently; DO NOT massage cold extremities.
6. Move patient to a warm environment; remove any wet clothing and replace with dry sheets and blankets.
7. Hot packs may be applied to arm pits, groin and abdominal areas.
8. Assess and treat for other injuries as necessary.
9. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. Administer **NORMAL SALINE or Lactated Ringers 500 mL** fluid bolus and reassess patient. Use warmed (102°-106°F) fluid if available.
4. May repeat fluid bolus as needed as long as lungs remain clear; maximum **2 liters**.

Frostbite

Patient Presentation

Patients with frostbite will develop numbness involving the affected body part along with a “clumsy” feeling and areas of blanched skin - later findings include decreased or loss of sensation, bruising or blister formation, white and waxy appearance to affected tissue, or feeling like a block of wood.

All Levels

1. Remove from cold.
2. UNIVERSAL PATIENT CARE.
3. Do NOT massage frostbitten extremities.
4. Cover frostbitten nose or ears with a warm hand
5. Elevate the effected extremity when possible..
6. Have patient place frostbitten hand in his / her armpit.
7. If ETA is greater than 60 minutes, begin active rewarming:
    a. Immerse extremity in circulating water maintained at a temperature of 100-105 F.
    b. Rewarming should take 30-60 minutes.
    c. Rewarming is complete when frozen area is warm to touch and deep red or bluish in color.
    d. After rewarming, dry gently and cover part with dry sterile dressing and elevate on pillow.

Environmental Hypothermia / Frostbite

Hypothermic Cardiac Arrest

EMR & EMT

1. Cautiously assess pulse for one full minute; unnecessary CPR could precipitate ventricular fibrillation.
2. Begin CPR and apply AED. Follow CARDIAC ARREST Protocol.
3. Manage airway per AIRWAY MANAGEMENT.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Follow appropriate dysrhythmia protocol.
3. Establish IV access.
4. **NORMAL SALINE or LACTATED RINGERS** at wide open rate; use warm solution (102°-106°F) if available. Max 2 liters.

PEARLS

Hypothermic Cardiac Arrest

- The following are contraindications for initiation of resuscitation in the hypothermic patient:
  a. Obvious fatal injuries (such as decapitation).
  b. The patient exhibits signs of being frozen (such as ice formation in the airway).
  c. Chest wall rigidity such that compressions are impossible.
  d. Danger to rescuers or rescuer exhaustion
- Fixed and dilated pupils, apparent rigor mortis, and dependent lividity may not be contraindication for resuscitation in the severely hypothermic patient.
- The mainstay of therapy in severe hypothermia and cardiac arrest should be effective chest compressions and attempts at rewarming. Chest compressions should be provided at the same rate as in normothermic patients.
- The temperature at which defibrillation should first be attempted in the severely hypothermic cardiac arrest victim and the number of defibrillation attempts is unclear. There are different approaches regarding resuscitation of the hypothermic arrest patient.
  a. Per the American Heart Association (AHA), if the patient has a shockable rhythm (VF/VT), defibrillation should be attempted – it is reasonable to continue defibrillation attempts per AHA protocols concurrently with rewarming strategies.
- There is little evidence to guide use of medications in severe hypothermia with cardiac arrest, however 2020 AHA updates to advanced cardiac life support recommends the use of vasopressors but does not support the use of antiarrhythmic drug therapy for hypothermic patients in cardiac arrest.
- Patients with severe hypothermia and arrest may benefit from resuscitation even after prolonged downtime, and survival with intact neurologic function has been observed even after prolonged resuscitation.

Environmental Hypothermia / Frostbite

PEARLS

- Extremes of age are more susceptible (i.e. young and old).
- If the temperature is unable to be measured, treat the patient based on the suspected temperature.
- Given the additive effects of additional cold stress, the patient should be removed from the cold environment as soon as operationally feasible.
- In patients suffering from moderate to severe hypothermia, it is critical to not allow these patients to stand or exercise as this may cause circulatory collapse.
- Devices that self-generate heat (e.g. heat packs) that are being utilized during the rewarming process should be wrapped in a barrier to avoid direct contact with the skin and to prevent burns. In patients who are unresponsive, or unable to recognize a developing injury, please check the area in which the heating pad is placed regularly to ensure no tissue damage occurs.

KEY DOCUMENTATION ELEMENTS

- Duration of cold exposure
- Ambient temperature
- Rewarming attempts or other therapies performed by EMS and prior to EMS arrival
- Patient use of alcohol and/or drugs

PERTINENT ASSESSMENT FINDINGS

- Identification of associated traumatic injuries (when present)
- Identification of localized freezing injuries
- Patient core temperature (when available)

QUALITY METRICS

- Patient core temperature and means of measurement (when available)
- Presence of cardiac dysrhythmias
- Documentation of associated trauma (when present)
- Blood glucose level obtained

Lightning / Lightning Strike Injury

History
- Time of injury
- Past medical history
- Medications
- Other trauma
- Loss of consciousness

Signs and Symptoms
- Respiratory distress / Apnea
- Dysrhythmias
- Seizures
- Dizziness / Vertigo
- Loss of consciousness
- Paralysis
- Burns, pain, swelling
- Cardiopulmonary arrest

Differential
- Burns—Superficial (1st Degree), Partial Thickness (2nd Degree), Full Thickness (3rd Degree)
- Cardiopulmonary arrest
- Altered mental status
- Seizures
- Dysrhythmias

EMR & EMT

1. Ensure scene and rescuer safety. Recognize that repeat strike is a risk.
2. **UNIVERSAL PATIENT CARE**.
3. Assure patent airway. Refer to AIRWAY MANAGEMENT Protocol.
4. If in cardiopulmonary arrest, treat per CARDIAC ARREST Protocol.
5. Treat burns per BURNS Protocol.
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Advanced airway management as indicated. Refer to AIRWAY MANAGEMENT Protocol.
3. Establish IV access.
4. Acquire 12-lead ECG. Monitor ECG for potential arrhythmias.
5. Consider early management of pain per the PAIN MANAGEMENT Protocol.

Lightning / Lightning Strike Injury

PEARLS

- Recognize that repeat strike is a risk. Patient and rescuer safety is paramount.
- Victims do not carry or discharge a current, so the patient is safe to touch and treat.
- Lightning strike cardiopulmonary arrest patients have a high rate of successful resuscitation, if initiated early, in contrast to general cardiac arrest statistics.
- There may be multiple victims.
- If multiple victims, cardiac arrest patients whose injury was witnessed or thought to be recent should be treated first and aggressively (reverse from traditional triage practices).
    a. Patients suffering cardiac arrest from lightning strike initially suffer a combined cardiac and respiratory arrest.
    b. Return of spontaneous circulation may precede resolution of respiratory arrest.
    c. Patients may be successfully resuscitated if provided proper cardiac and respiratory support, highlighting the value of “reverse triage”.
- It may not be immediately apparent that the patient is a lightning strike victim.
- Injury pattern and secondary physical exam findings may be key in identifying patient as a victim of lightning strike.
- Fixed / dilated pupils may be a sign of neurologic insult, rather than a sign of death / impending death – Should not be used as a solitary, independent sign of death for the purpose of discontinuing resuscitation in this patient population.
- Lightning strike is a result of very high voltage, very short duration DC current exposure.

KEY DOCUMENTATION ELEMENTS

- Initial airway status
- Initial cardiac rhythm
- Neurologic exam (initial and repeat)
- Associated / Secondary injuries
- Pain scale documentation / Pain management

PERTINENT ASSESSMENT FINDINGS

- Presence of thermal or non-thermal burns
- Evidence of trauma
- Evidence of focal neurologic deficits

QUALITY METRICS

- Patient transported to most appropriate hospital.
- Pain appropriately managed.
- Airway assessment and early and aggressive management

Poisoning and Overdose

History

- Ingestion or suspected ingestion of a potentially toxic substance
- Substance ingested, route, quantity
- Alcohol or other intoxicant ingested
- Time of ingestion
- Reason of ingestion (suicidal, accidental, criminal)
- Available medications at home
- Past medical history
- Medications

Signs and Symptoms

- Mental status changes
- Hypotension / Hypertension
- Decreased respiratory rate
- Tachycardia, dysrhythmias
- Seizures
- SLUDGE / DUMBBELS

**See TOXIDROME section*

Differential

- Tricyclic antidepressants (TCAs)
- Acetaminophen (Tylenol)
- Aspirin
- Depressants
- Stimulants
- Anticholinergic
- Cardiac medications
- Solvents, Alcohols, Cleaning agents
- Insecticides (organophosphates)

Toxidromes

Anticholinergic

- Red as a beet (Flushed skin)
- Dry as a bone (Dry skin)
- Mad as a hatter (Altered mental status)
- Blind as a bat (Mydriasis)
- Hot as a hare (Hyperthermia)
- Full as a flask (urinary retention)
- "Tachy" like a pink flamingo (tachycardia and hypertension)

Cholinergic

DUMBELS is a mnemonic used to describe the signs and symptoms of acetylcholinesterase inhibitor agent poisoning. SLUDGEM is an alternative mnemonic.

- **D**efecation / **D**iarrhea
- **U**rination; increase, loss of control
- **Mi**osis (pupils constrict)/Muscle weakness/fasciculations
- **B**ronchospasm, **B**ronchorrhea, , Bradycardia (killer B's)
- **E**mesis
- **L**acrimation
- **S**alivation/Sweating

Opioids

- Respiratory depression
- Miosis (pinpoint pupils)
- Altered mental status
- Decreased bowel sounds

Sedative Hypnotic

- Central nervous system depression
- Ataxia (unstable gait or balance)
- Slurred speech
- Normal or depressed vital signs (pulse, respirations, blood pressure)

Stimulants / Hallucinogenics (Sympathomimetic)

- Tachycardia, tachydysrhythmias
- Hypertension
- Diaphoresis
- Delusions/paranoia
- Seizures
- Hyperthermia
- Mydriasis (dilated pupils)

Serotonin Syndrome (presentation with at least three of the following)

- Agitation
- Ataxia
- Diaphoresis
- Diarrhea
- Hyperreflexia
- Mental status changes
- Myoclonus
- Shivering
- Tremor
- Hyperthermia
- Tachycardia

Protocol Continues

Poisoning and Overdose

EMR & EMT

1. Assure scene is safe and the patient has been decontaminated if needed.
2. **UNIVERSAL PATIENT CARE**.
3. Save all bottles, containers and labels for information. **DO NOT EXPOSE RESCUERS TO POISONOUS SUBSTANCES.**
4. If blood glucose < 60 mg/dL, refer to DIABETIC EMERGENCIES-HYPOGLYCEMIA Protocol.
5. If the patient has inadequate respiratory effort from a confirmed or suspected opioid overdose, administer **NALOXONE**
    a. **IN – 1 mg/mL per nostril** via atomizer* (1 mL per nostril maximum; **2 mg total dose**). May repeat in3 -5 minutes to a maximum dose of 4 mg if no response.
    b. Not given to restore consciousness.
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Protocol Continues

Paramedic/PHRN

1. Continue **EMR/EMT TREATMENT**.

Overdose Agent	Treatment
Acetylcholinesterase Inhibitors (Carbamates, Nerve Agents, Organophosphates) Exposure	1. Refer to ACETYLCHOLINESTERASE INHIBITORS (CARBAMATES, NERVE AGENTS, ORGANOPHOSPHATES) EXPOSURE Protocol.
Beta Blocker and **Calcium Channel Blocker**	1. For symptomatic bradycardia, refer to BRADYCARDIA Protocol. 2. Obtain 12-lead ECG 3. **Beta Blocker** overdose-for symptomatic patients with cardiac effects (i.e. hypotension, bradycardia) administer: • **ONDANSETRON 4mg IV/IM/** (prophylactically) **8 mg PO** • **GLUCAGON 2mg IV/IM** 4. **Calcium Channel Blocker** overdose-for symptomatic patients with cardiac effects (i.e. hypotension, bradycardia) administer: • **CALCIUM GLUCONATE 10% (1g/10 ml) 3g IV/IO** (SLOW over 10 min) **(or)** • **CALCIUM CHLORIDE 10% (1g/10 ml) 1g IV/IO** (SLOW over 10 min)
Opioid	1. If airway compromise or inadequate respiratory effort present from a confirmed or suspected opioid overdose, administer **NALOXONE:** 2. ****Supplemental oxygenation / ventilatory management are the highest priorities.** . See AIRWAY MANAGEMENT Protocol. **Management utilizing medication should be secondary.**** **IN – 0.4 - 2 mg (1ml MAX) per nostril** (via atomizer, may repeat every 3-5 minutes until respiratory depression is reversed. **IV or IM – 0.4-2.0 mg**; may repeat every 3-5 minutes until respiratory depression is reversed.
Stimulant and **Hallucinogenic** *(Cocaine, Amphetamines, PCP, MDMA/Ecstasy, bath salts, spice, K2, Synthetic THC)*	1. Treat chest pain as ACS and follow CHEST PAIN Protocol. 2. Obtain 12-lead ECG. 3. To reduce agitation for patient and provider safety, refer to AGITATED OR VIOLENT PATIENT BEHAVIORAL EMERGENCIES Protocol. 4. If hyperthermia suspected, begin external cooling.
Tricyclic Antidepressant **Sodium Channel Blocker**	1. If widened QRS (> 100 msec), administer **SODIUM BICARBONATE** **1 mEq/kg IV**.

Poisoning and Overdose

PEARLS

- Each toxin or overdose has unique characteristics which must be considered in individual protocol.
- If possible, bring container / bottles, and/or contents with the patient to the Emergency Department.
- Monitor patient airway, breathing, pulse oximetry, $EtCO_2$ for adequate ventilation as they may change over time. Supportive care.
- Repeat vital signs often.
- Monitor level of consciousness.
- Monitor ECG with special attention to rate, rhythm, QRS and QT duration.
- Maintain or normalize patient temperature.
- Do not rely on patient history of ingestion, especially in suicide attempts.

Specific Signs / Symptoms

- **Tricyclic:** 4 major areas of toxicity: seizures, dysrhythmias, hypotension, decreased mental status or coma; rapid progression from alert mental status to death.
- **Acetaminophen:** Initially asymptomatic or nausea / vomiting. If not detected and treated, causes irreversible liver failure.
- **Aspirin**: Early signs consist of abdominal pain and vomiting. Tachypnea and altered mental status may occur later. Renal dysfunction, liver failure, and or cerebral edema can take place later.
- **Depressants:** Bradycardia, hypotension, decreased temperature, decreased respirations, non-specific pupils.
- **Stimulants:** Tachycardia, hypertension, increased temperature, dilated pupils, seizures.
- **Anticholinergic:** Tachycardia, increased temperature, dilated pupils, mental status changes.
- **Cardiac Medications:** Dysrhythmias and mental status changes.
- **Solvents:** Nausea, coughing, vomiting, and mental status changes.
- **Insecticides:** Increased or decreased HR, increased secretions, nausea, vomiting, diarrhea, pinpoint pupils.

KEY DOCUMENTATION ELEMENTS

- Repeat evaluation and documentation of signs and symptoms, as patient's clinical condition may deteriorate rapidly
- Identification of possible etiology of poisoning
- Initiating measures on scene to prevent exposure of bystanders when appropriate / indicated
- Time of symptoms onset and time of initiation of exposure-specific treatment

PERTINENT ASSESSMENT FINDINGS

- Frequent reassessment is essential as patient deterioration can be rapid and catastrophic

QUALITY METRICS

- Early airway management in the rapidly deteriorating patient
- Accurate exposure history (Time, Route, Quantity, Alcohol or other intoxicants taken)
- Multiple frequent documented reassessments

Radiation Exposure

History
- Type of exposure
- Inhalation injury
- Time of injury
- Time of GI symptom onset
- Past medical history
- Medications
- Other trauma
- Loss of consciousness

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

Differential
- Superficial (1st Degree) red and painful
- Partial Thickness (2nd Degree) blisters
- Full Thickness (3rd Degree) painless/ charred or leathery skin
- Thermal burns
- Chemical burns
- Electrical burns
- Blast injury

EMR & EMT

1. Ensure scene and rescuer safety.
    a. Don standard PPE capable of preventing skin exposure to liquids and solids (gown and gloves), mucous membrane exposure to liquids and particles (face mask and eye protection), and inhalational exposure to particles (N95 face mask or respirator).
2. **UNIVERSAL PATIENT CARE**.
    a. Identification and treatment of life-threatening injuries and medical problems takes priority over decontamination.
3. Treat burns per BURNS Protocol.
4. Treat nausea and vomiting per NAUSEA / VOMITING Protocol.
    a. Document the time of GI symptom onset.
5. Treat seizures per SEIZURE / STATUS EPILEPTICUS Protocol.
6. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic/PHRN

1. Continue **EMR / EMT TREATMENT**.
2. Establish IV access.
3. Treat nausea and vomiting per NAUSEA / VOMITING Protocol.
4. Treat seizures per SEIZURE / STATUS EPILEPTICUS Protocol.

Pertinent Assessment Findings

- Time to nausea and vomiting is a reliable indicator of the received dose of ionizing radiation. The more rapid the onset of vomiting, the higher the whole-body dose of radiation.
- Tissue burns are a late finding (weeks following exposure) of ionizing radiation injury. If burns are present acutely, they are from a thermal or chemical mechanism.
- Seizures may suggest acute radiation syndrome if accompanied by early vomiting. If other clinical indicators do not suggest a whole-body dose of greater than 20Gy, consider other causes of seizure.

Radiation Exposure

PEARLS

- Contaminated patients pose very little threat to medical providers who use appropriate PPE including N95 masks or respirators, gloves, gowns, and face and eye protection.
- Sources of radiation
    a. Legal
        i. Industrial plants
        ii. Healthcare facilities that provide radiologic services
        iii. Nuclear power plants
        iv. Mobile engineering sources (e.g. construction sites that are installing cement)
    b. Illegal
        i. Weapons of mass destruction
        ii. “Dirty bomb” design to contaminate widespread areas
- Physiology of radiation poisoning
    a. Contamination – Poisoning from direct exposure to a radioactive source, contaminated debris, liquids, or clothing where radiation continues to be emitted from particles on surface.
    b. Exposure – Poisoning from radioactivity, in the form of ionizing rays, penetrating through the bodily tissues of the patient.
- Common types of radioactivity that cause poisoning
    a. Gamma rays
        i. Highest frequency of ionizing rays
        ii. Penetrates the skin deeply
        iii. Causes the most severe radiation toxicity
    b. Beta rays - Can penetrate up to 1 cm of the skin’s thickness
    c. Alpha rays
        i. Lowest frequency of ionizing rays
        ii. Short range of absorption
        iii. Dangerous only if ingested or inhaled
    d. Radioactive daughters
        i. Products of decay of the original radioactive substance
        ii. Can produce gamma and beta rays (e.g. uranium decays into a series of radon daughters)
- In general, trauma patients who have been exposed to or contaminated by radiation should be triaged and treated on the basis of the severity of their conventional injuries.
- A patient who is contaminated with radioactive material (e.g. flecks of radioactive material embedded in their clothing and skin) generally poses a minimal exposure risk to medical personnel.

KEY DOCUMENTATION ELEMENTS

- Duration of exposure to the radioactive source or environment
- Distance (if able to be determined) from the radioactive source (if known)
- Time of onset of vomiting

PERTINENT ASSESSMENT FINDINGS

- Treatment of life-threatening injuries or medical conditions takes priority over assessment for contamination or initiation of decontamination

QUALITY METRICS

- Use of appropriate Personal Protective Equipment (PPE)

Illinois Emergency Medical Services for Children

Pediatric Prehospital Protocols

2021 Edition

IDPH
Illinois Department of Public Health

Emergency Medical Services for Children
www.luriechildrens.org/emsc

Ann & Robert H. Lurie Children's Hospital of Chicago

Illinois Emergency Medical Services for Children
Pediatric Prehospital Protocol Manual
2021

This manual was developed by the EMSC Pediatric Prehospital Committee and completed under the direction of the Illinois EMSC Advisory Board

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PEDIATRIC PREHOSPITAL PROTOCOLS

Table of Contents

Acknowledgements

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This document contains protocols and related resources originally developed by Illinois EMSC in 1997. Since that time, this document has undergone multiple revisions. An extensive review and revision of this document was undertaken by the current EMSC Prehospital Committee, culminating in this 2021 Edition.

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ILLINOIS EMERGENCY MEDICAL SERVICES FOR CHILDREN
POSITION STATEMENT
PEDIATRIC PREHOSPITAL PROTOCOLS

Several key prehospital elements in local Emergency Medical Services systems facilitate the delivery of quality field care to children:

- Appropriate education of prehospital providers in the assessment and treatment of acute pediatric illness and injury.
- Standardized and appropriate equipment and medications for the delivery of care to the pediatric population.
- Uniform pediatric-specific treatment protocols.

Prehospital treatment protocols for adult patients are frequently used in EMS systems. Within the State of Illinois there exists considerable variation in treatment protocols based upon local EMT scope of practice, availability of regional resources and differences in medical opinion regarding the delivery of Emergency Medical Responder (EMR), BLS, AEMT, ILS and ALS care in the prehospital environment. In 1997, the Emergency Medical Services and Trauma Center Code, adopted by the Illinois Department of Public Health, was revised to mandate pediatric specific treatment protocols.

Illinois EMSC strongly endorses the concept of standardized prehospital patient care for the pediatric population at the Emergency Medical Responder (EMR), BLS, AEMT, ILS, and ALS levels. While most BLS and Emergency Medical Responder field interventions are considered relatively uncomplicated and straightforward, guidelines improve the continuity, quality and consistency of patient care.

Treatment Protocol Guidelines:

1. Within the context of all federally funded EMSC projects, the pediatric population is defined as inclusive of all patients up to the age of 21 years. In this document, pediatric patients are defined as age 15 years and younger, consistent with the Emergency Medical Services and Trauma Center Code adopted by the Illinois Department of Public Health. Other terms commonly applied to the pediatric population include: "newly born" (under 24 hours), "neonates" (1-28 days) and "infant" (1-12 months).

2. Emergency Medical Responder, BLS, AEMT, ILS, and ALS interventions should be clearly identified within each protocol.

3. Special considerations for pediatric care should be identified within each protocol where appropriate.

4. Drug dosages should be weight-based and given per kilogram. Inconsistencies exist within the prehospital environment secondary to the relatively low volume and exposure to pediatric patients resulting in inaccuracies and possible under- or over-treatment. Therefore, a validated "length-based" or color-coded resuscitation tool is highly recommended. Providers should ensure availability of precalculated drug dosing forms based on drug concentrations carried in the EMS system. Also, standardized weight charts should be readily available to the prehospital provider identifying age adjusted vital sign parameters and appropriate sizing of endotracheal tubes.

5. Intravenous fluids administered in the prehospital environment should be a balanced crystalloid solution.

6. A triage mechanism for the rapid and appropriate treatment and transport of "critical patients" (i.e., multiple trauma) to the "most" appropriate facility must be identified.

7. The Pediatric Glasgow Coma Scale should be utilized by all prehospital personnel for children under the age of 2 years.

Protocol Recommendations:

Protocols for the treatment and transport of the critically ill and/or injured child should exist in a "freestanding" format isolated from adult protocols or clearly identified in a general protocol, i.e., using the EMSC teddy bear logo to highlight pediatric considerations.

The following areas have been identified as requiring specific treatment protocols:

1. **PEDIATRIC INITIAL ASSESSMENT** - A foundation for all pediatric patient interactions, this guideline should reinforce the need for consistent, methodical patient assessment. The guideline should reinforce the following:
   - Importance of rapid BLS interventions such as airway support and high quality CPR.
   - Age appropriate signs and symptoms of pediatric respiratory distress.
   - Age appropriate airway interventions including the use of "blow-by" oxygen administration.
   - Indicators of adequate ventilation and perfusion.
   - Age appropriate immobilization of the pediatric trauma patient.
   - Recognition of and monitoring for imminent life-threats.
   - Unique assessment considerations and emergent care requirements of children with special health care needs (CSHCN), including those who are technologically dependent. Emphasize the appropriate inclusion of parents/primary caregivers.
2. **INITIAL MEDICAL CARE/ASSESSMENT** – Address the initial assessment and medical care provided to the pediatric patient, including an assessment of scene safety and ensuring body substance isolation. Commonly referred to as "routine medical care" in adult protocols.
3. **INITIAL TRAUMA CARE/ASSESSMENT** – Address the initial assessment and trauma care provided to the pediatric patient, including an assessment of scene safety and ensuring body substance isolation.
4. **BRIEF RESOLVED UNEXPLAINED EVENT (BRUE)** – The protocol should assist with the recognition of patient characteristics and symptoms consistent with a Brief Resolved Unexplained Event (BRUE), and outline appropriate interventions and transport recommendations.
5. **NEONATAL RESUSCITATION** - Must incorporate the specific heart rate parameters and requisite interventions according to the American Heart Association (AHA) and American Academy of Pediatrics (AAP) recommendations.
6. **PEDIATRIC AED** – Treatment must be in accordance with the Illinois Department of Public Health approved Pediatric AED protocol and in accordance with American Heart Association guidelines. AED's can be used in any age infant or child. Use of pediatric pads and cables are preferable; however adult pads can be used in an anterior/posterior application.
7. **PEDIATRIC ALLERGIC REACTION/ANAPHYLAXIS** – Protocol should assure differentiation between local reaction (hives), respiratory distress and cardio-respiratory compromise.
8. **PEDIATRIC ALTERED MENTAL STATUS** - Emphasize the importance of recognizing etiology, aggressive airway maintenance, glucose monitoring and naloxone administration.
9. **PEDIATRIC BRADYCARDIA** - Treatment in accordance with the current American Heart Association recommendations.
10. **PEDIATRIC BURNS** - Special emphasis on the pediatric "rule of nines" for burn size estimation, aggressive airway management and triage to the appropriate facility. Differentiation should be made between thermal, chemical and electrical injuries.

11. **PEDIATRIC DROWNING** - Emphasize aggressive airway management and the potential for associated cervical spine injury and hypothermia.

12. **PEDIATRIC ENVIRONMENTAL HYPERTHERMIA** – Emphasize appropriate assessment, cooling techniques and fluid replacement considerations of children presenting with environmental hyperthermia.

13. **PEDIATRIC HYPOTHERMIA** - Emphasize the pediatric population at highest risk for hypothermia: neonates and infants. Address aggressive airway management, warming techniques and recognition of frostbite injury. Interventions for arrhythmias in accordance with the American Heart Association recommendations.

14. **PEDIATRIC NERVE AGENT/ORGANOPHOSPHATE ANTIDOTE GUIDELINES** – Define specific antidote dosing based on mild, moderate or severe exposure and patient age/weight.

15. **PEDIATRIC PULSELESS ARREST –** Treatment modalities/algorithms should be consistent with the current guidelines set forth by the current American Heart Association "Pediatric Advanced Life Support" algorithms. Include specific pathway management for VF/VT and Asystole/PEA.

16. **PEDIATRIC RESPIRATORY DISTRESS** - Differentiation should be made between "upper airway obstruction" (i.e., croup, epiglottitis and foreign body) and lower airway disease (i.e., asthma, bronchiolitis, pneumonia). The potential for invasive airway interventions must also be identified.

17. **PEDIATRIC RESPIRATORY DISTRESS WITH A TRACHEOSTOMY TUBE** – Differentiate between an obstructed and patent tracheostomy tube. Identify appropriate assessment and management of the child presenting with respiratory distress with a tracheostomy tube.

18. **PEDIATRIC RESPIRATORY DISTRESS WITH A VENTILATOR** – Address steps in managing a pediatric patient that requires ventilator support. Emphasize to utilize the parents, caregivers and home health nurses as medical resources, and arrange to bring the ventilator to the hospital.

19. **PEDIATRIC RESPIRATORY FAILURE** - Treatment must be in accordance with the current American Heart Association "Pediatric Advanced Life Support" guidelines.

20. **PEDIATRIC SEIZURES** - Must include the identification of rapid blood glucose monitoring in the field, considerations for febrile seizures and administration of intranasal/rectal benzodiazepines.

21. **PEDIATRIC SHOCK** - Differentiation should be made between "hypovolemic" (dehydration, hemorrhagic), cardiogenic, "distributive" (sepsis) and obstructive shock.

22. **PEDIATRIC TACHYCARDIA** - Interventions for both wide and narrow complex tachycardias must be in accordance with the American Heart Association recommendations.

23. **PEDIATRIC TOXIC EXPOSURES/INGESTIONS** - Incorporate accidental /environmental toxic exposure or ingestion events commonly encountered in the pediatric population.

24. **PEDIATRIC TRAUMA** - Emphasis should be made on mechanism of injury, limited on-scene time, aggressive airway maintenance, field triage to the appropriate facility and addressing the unique needs of the head-injured child. Additional information or an addendum specific to initial assessment and management of head trauma should also be included.

25. **SUSPECTED CHILD ABUSE AND NEGLECT** - Special emphasis should be made on careful documentation of physical findings, discrepancy between history of injury and physical findings, interaction between child and parent/caregiver, and characteristics of the environment. Utilize current validated bruising clinical decision rule(s). Discuss the prehospital provider's responsibility as a mandated reporter, and to report suspicions to the emergency room staff. Include directions for responding to parent/caregiver refusal to allow transport.

ILLINOIS EMERGENCY MEDICAL SERVICES FOR CHILDREN
PEDIATRIC INITIAL ASSESSMENT
ALS/ILS/AEMT/BLS/EMR GUIDELINE

I. Scene size up

- Identify possible hazards.
- Assure safety for patient and responder.
- Observe for mechanism of injury/nature of illness.
- Note anything suspicious at the scene, i.e., medications, household chemicals, other ill family members.
- Assess any discrepancies between the history and the patient presentation, i.e., infant fell on hardwood floor; however floor is carpeted.
- Initiate appropriate body substance isolation (BSI) precautions.
- Determine the number of patients.

II. General Approach to the Stable/Conscious Pediatric Patient

A. Assessments and interventions must be tailored to each child in terms of age, size and development.
- Keep voice at even quiet tone, don't yell.
- Speak slowly; use simple, age appropriate terms.
- Use toys or penlight as distractors; make a game of assessment.
- Keep small children with their caregiver(s); encourage assessment while caregiver is holding child.
- Kneel down to the level of the child if possible.
- Be cautious in use of touch. In the stable child, make as many observations as possible before touching (and potentially upsetting) the child.
- Be aware that young children may display negative behaviors such as kicking due to fear of the situation. This may be age appropriate behavior.
- Adolescents may need to be interviewed without their caregivers present if accurate information is to be obtained regarding drug use, alcohol use, LMP, sexual activity, child abuse.

B. While walking up to the patient, observe/inspect the following:
- General appearance, age appropriate behavior. Does child have a malnourished appearance? Is child looking around, responding with curiosity or fear, playing, sucking on a pacifier or bottle, quiet, eyes open but not moving much or uninterested in environment?
- Obvious respiratory distress/increased work of breathing: retractions, nasal flaring, accessory muscle use, head bobbing, grunting.
- Color: pink, pale, flushed, cyanotic, mottled.
- Position of the child. Are the head, neck or arms being held in a position suggestive of spinal injury? Is the patient sitting up or tripoding?
- Level of consciousness, i.e., awake vs asleep or unresponsive.
- Muscle tone: good vs limp.
- Movement: spontaneous, purposeful, symmetrical.
- Obvious injuries, bleeding, bruising, impaled objects or gross deformities.
- Assess for pain.
- Determine weight - ask child or caretakers or use length/weight tape.

III. Initial Assessment

A. Airway Access/Maintenance with Spinal Motion Restriction
- Maintainable with assistance: positioning.
- Maintainable with adjuncts: oral airway, nasal airway.
- Maintainable with endotracheal tube/supraglottic airway
- Listen for any audible airway noises, i.e., stridor, snoring, gurgling, wheezing.
- Patency: suction secretions as necessary.

B. Breathing
- Rate and rhythm of respirations. Compare to normal rate for age and situation.
- Chest expansion: symmetrical.

- Breath sounds: compare both sides and listen for sounds (present, absent, normal, abnormal).
- Positioning: sniffing position, tripod position.
- Work of breathing: retractions, nasal flaring, accessory muscle use, head bobbing, grunting.

C. Circulation
- Heart rate: compare to normal rate for age and situation.
- Central/truncal pulses (brachial,femoral, carotid): strong, weak or absent.
- Distal/peripheral pulses: present/absent, thready, weak, strong.
- Color: pink, pale, flushed, cyanotic, mottled.
- Skin temperature: hot, warm, cool.
- Blood pressure: compare to normal for age of child. Must use appropriately sized cuff.
- Hydration status: anterior fontanel in infants, mucous membranes, skin turgor, crying tears, urine output history.
- Assess for and control external bleeding.

D. Disability - Brief Neuro Examination
- Assess Responsiveness
  - **A** Alert
  - **V** Responds to verbal stimuli
  - **P** Responds to painful stimuli
  - **U** Unresponsive
- Assess pupils.
- Assess for numbness/tingling of extremities.

E. Expose and Examine
- Expose the patient as appropriate based on age and severity of illness.
- Initiate measures to prevent heat loss and keep the child from becoming hypothermic.

IV. Focused History/Physical Assessment

Tailor assessment to the needs of the patient. Rapidly examine areas specific to the chief complaint.

A. Patient History - Acquire during/incorporate into physical exam.
- **S** **Signs & Symptoms** as they relate to the chief complaint.
- **A** **Allergies** to medications, foods, environment
- **M** **Medications:** prescribed, over-the-counter, adherence to prescribed dosing regimen, time, date and amount of last dose
- **P** **Past Pertinent Medical History**
  - Pertinent medical or surgical problems
  - Preexisting diseases/chronic illness
  - Previous hospitalizations
  - Currently under medical care
  - For infants, obtain a neonatal history (gestation, prematurity, congenital anomalies, was infant discharged home at the same time as the mother)
- **L** **Last oral intake** of liquid/food ingested.
- **E** **Events surrounding current problem**
  - Onset, duration and precipitating factors
  - Associated factors such as toxic inhalants, drugs, alcohol
  - Injury scenario and mechanism of injury
  - Treatment given by caregiver

B. Responsive Medical Patients
- Perform rapid assessment based on chief complaint. A full review of systems may not be necessary. If chief complaint is vague, examine all systems. Consider head-to-toe approach.

C. Unresponsive Medical Patients
- Perform rapid assessment: ABC's, quick head-to-toe exam.
- Emergency care is based on signs and symptoms, initial impressions and standard operating procedures.

D. Trauma patient with **NO** significant mechanism of injury.
   - Focused assessment is based on specific injury site.

E. Trauma patient **WITH** significant mechanism of injury
   - Perform rapid assessment of all body systems.

V. Detailed Assessment

A. Performed to detect non-life threatening conditions and to provide care for those conditions/injuries. Usually performed enroute. May be performed on scene if transport is delayed.

- Inspect and palpate each of the major body systems for the following:
  - **D**eformities
  - **C**ontusions
  - **A**brasions
  - **P**enetrations/punctures
  - **B**urns
  - **L**acerations
  - **S**welling/edema
  - **T**enderness
  - **I**nstability
  - **C**repitus
- Auscultation of breath and heart sounds as well as blood pressure readings may be required in the field.

VI. Ongoing Assessment

To effectively maintain awareness of changes in the patient's condition, repeated assessments are essential and should be performed **at least every 5 minutes on the unstable patient**, and **at least every 15 minutes on the stable patient.**

VII. Considerations for Children with Special HealthCare Needs (CSHCN)

- Track CSHCN in your service community and become familiar with both the child as well as their anticipated emergency care needs.
- Refer to child's emergency care plan formulated by their medical providers, if available. Understanding the child's baseline will assist in determining the significance of altered physical findings. Parents/caregivers are the best source of information regarding medications, baseline vital signs, functional level/normal mentation, potential medical complications, equipment operation and troubleshooting, emergency procedures.
- Regardless of underlying condition, assess in a systematic and thorough manner.
- Use parents/caregivers/home health nurses as medical resources at home and enroute. Transport patient's "go-bag" and any other essential medical equipment. For example, if the patient is ventilator dependent, bring the ventilator (with power cord) with the patient.
- Be prepared for differences in airway anatomy, physical development, cognitive development and possibly existing surgical alterations or mechanical adjuncts. Common home therapies include: respiratory support (oxygen, apnea monitors, pulse oximeters, tracheostomies, mechanical ventilators), nutrition therapy (nasogastric or gastrostomy feeding tubes), intravenous therapy (central venous catheters), urinary catheterization or dialysis (continuous ambulatory peritoneal dialysis), ostomy care, orthotic devices, communication or mobility devices, or hospice care.
- Communicate with the child in an age appropriate manner. Maintain communication with and remain sensitive to the parents/caregivers and the child.
- The most common emergency encountered with these patients is respiratory related and so familiarity with respiratory emergency interventions/adjuncts/treatment is appropriate.

ILLINOIS EMSC
INITIAL MEDICAL CARE/ASSESSMENT
BLS/EMERGENCY MEDICAL RESPONDER CARE GUIDELINE

- Assess scene safety
- Ensure Standard Precautions and utilize appropriate PPE
- Assess and support Airway, Breathing, Circulation (ABC's)
- Assess level of consciousness
- Administer 0_2 per appropriate method as indicated
- Support with bag mask ventilation as indicated
- Test blood glucose as indicated and **if available**
- Apply Pulse Oximetry as indicated and **if available**

ILLINOIS EMSC
INITIAL MEDICAL CARE/ASSESSMENT
ALS/ILS/AEMT CARE GUIDELINE

- Assess scene safety
- Ensure Standard Precautions and utilize appropriate PPE
- Assess Airway, Breathing, and Circulation (ABC's)
- Assess level of consciousness
- Administer 0_2 per appropriate method as indicated
- Support with bag mask ventilation as indicated
- Test blood glucose as indicated
- Apply Cardiac monitor as indicated
- Apply Pulse Oximetry as indicated
- Apply End Tidal CO_2 as indicated

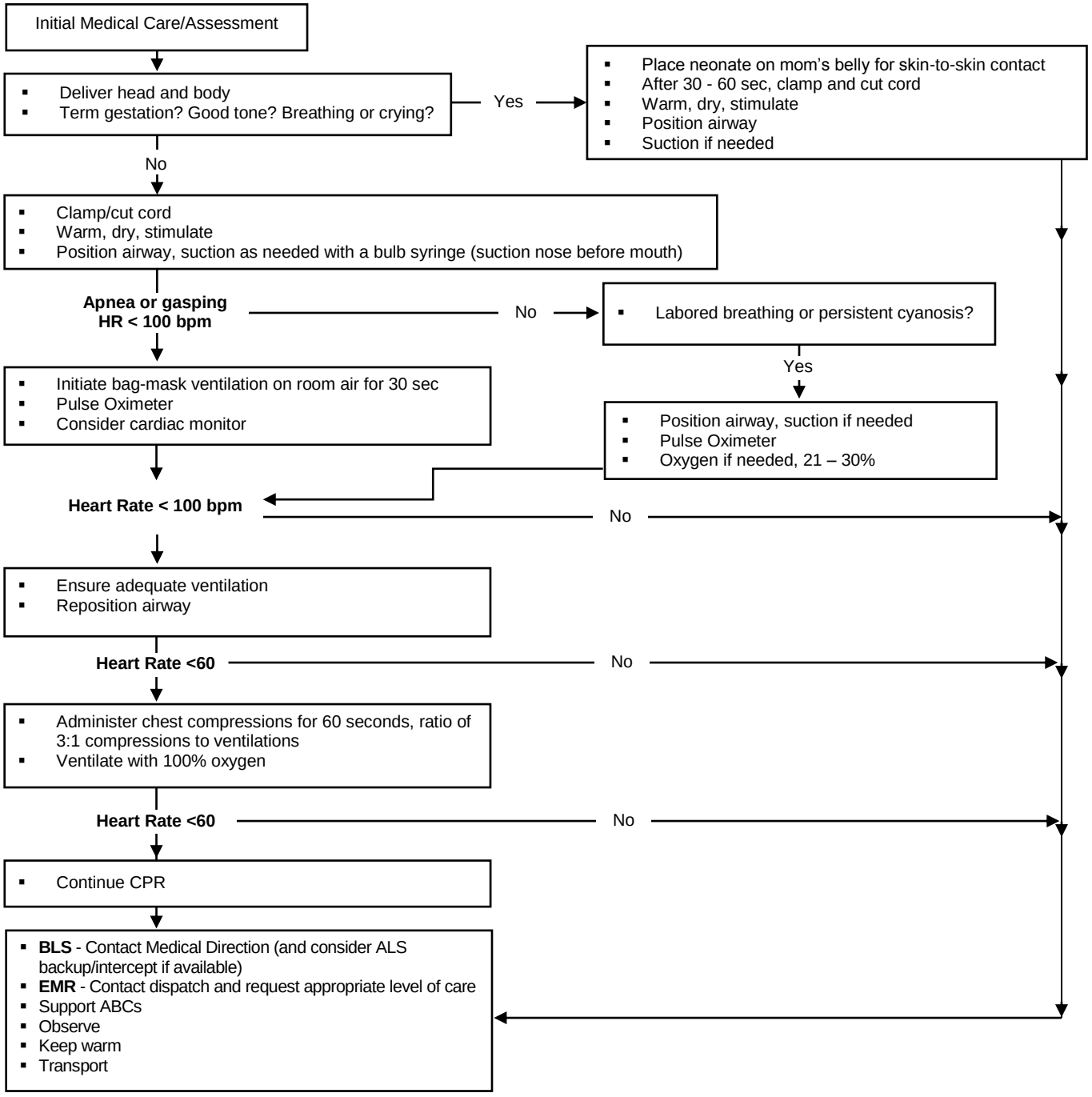
ILLINOIS EMSC
INITIAL TRAUMA CARE/ASSESSMENT
BLS/EMERGENCY MEDICAL RESPONDER CARE GUIDELINE

- Assess scene safety
- Ensure Standard Precautions and utilize appropriate PPE
- Assess for external bleeding
- Assess and support Airway, Breathing, Circulation (ABC's)
- Consider spinal motion restriction
- Perform rapid trauma assessment
- Assess level of consciousness (AVPU)
- Administer 0_2 per appropriate method
- Support with bag mask ventilation as indicated
- Apply Pulse Oximetry as indicated and **if available**

ILLINOIS EMSC
INITIAL TRAUMA CARE/ASSESSMENT
ALS/ILS/AEMT CARE GUIDELINE

- Assess scene safety
- Ensure Standard Precautions and utilize appropriate PPE
- Assess for external bleeding
- Assess Airway, Breathing, and Circulation (ABC's)
- Consider spinal motion restriction
- Perform rapid trauma assessment
- Assess level of consciousness (AVPU)
- Administer 0_2 per appropriate method
- Support with bag mask ventilation as indicated
- Apply Cardiac monitor as indicated
- Apply Pulse Oximetry as indicated
- Apply End Tidal CO_2 as indicated

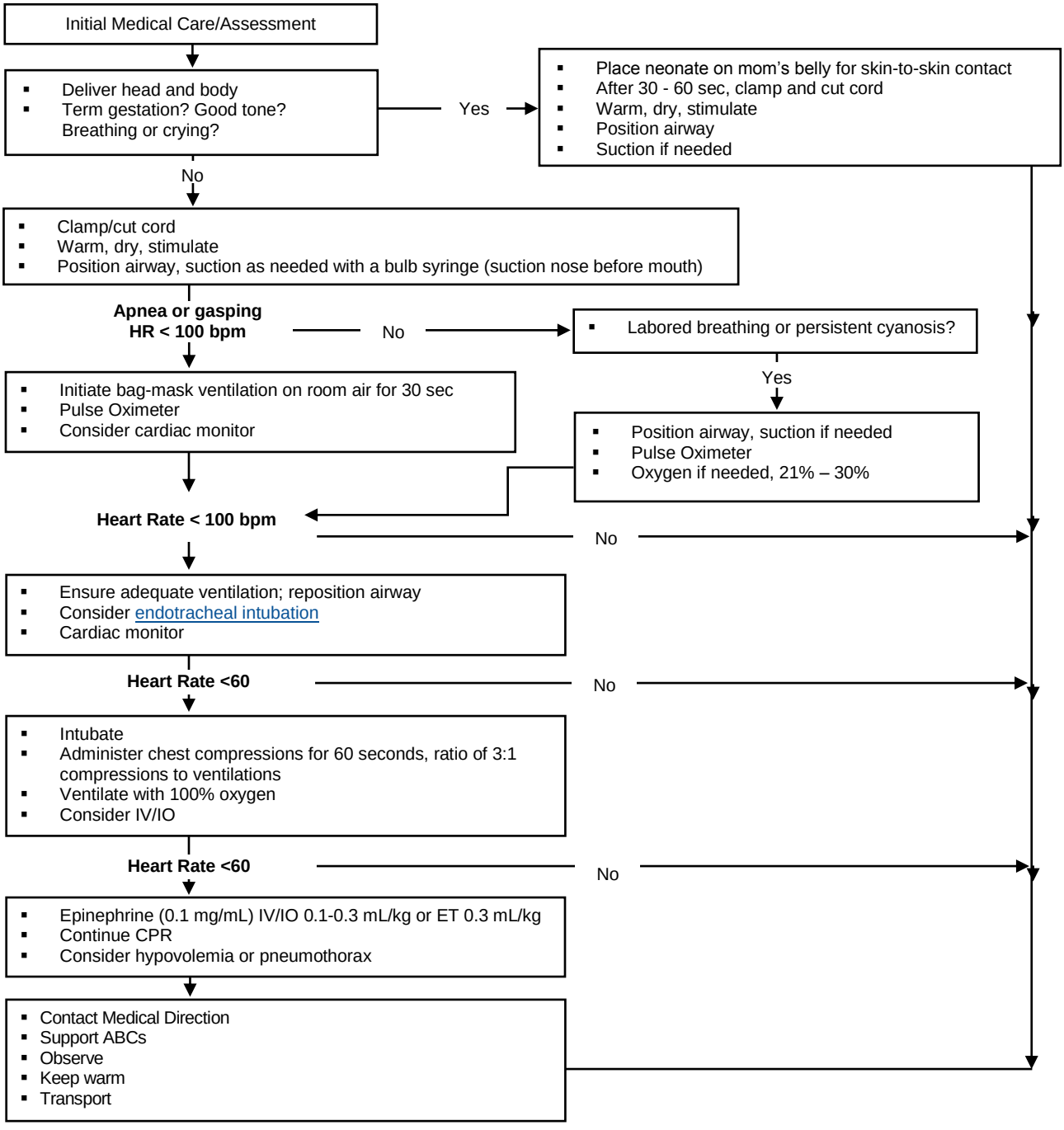
ILLINOIS EMSC
NEONATAL RESUSCITATION
BLS/EMR CARE GUIDELINE



Special Considerations:

- Focus should be on neonate appearance (tone, breathing, crying).
- Consider APGAR at 1 min, repeat every 5 mins. Do not interrupt resuscitation efforts to obtain APGAR.

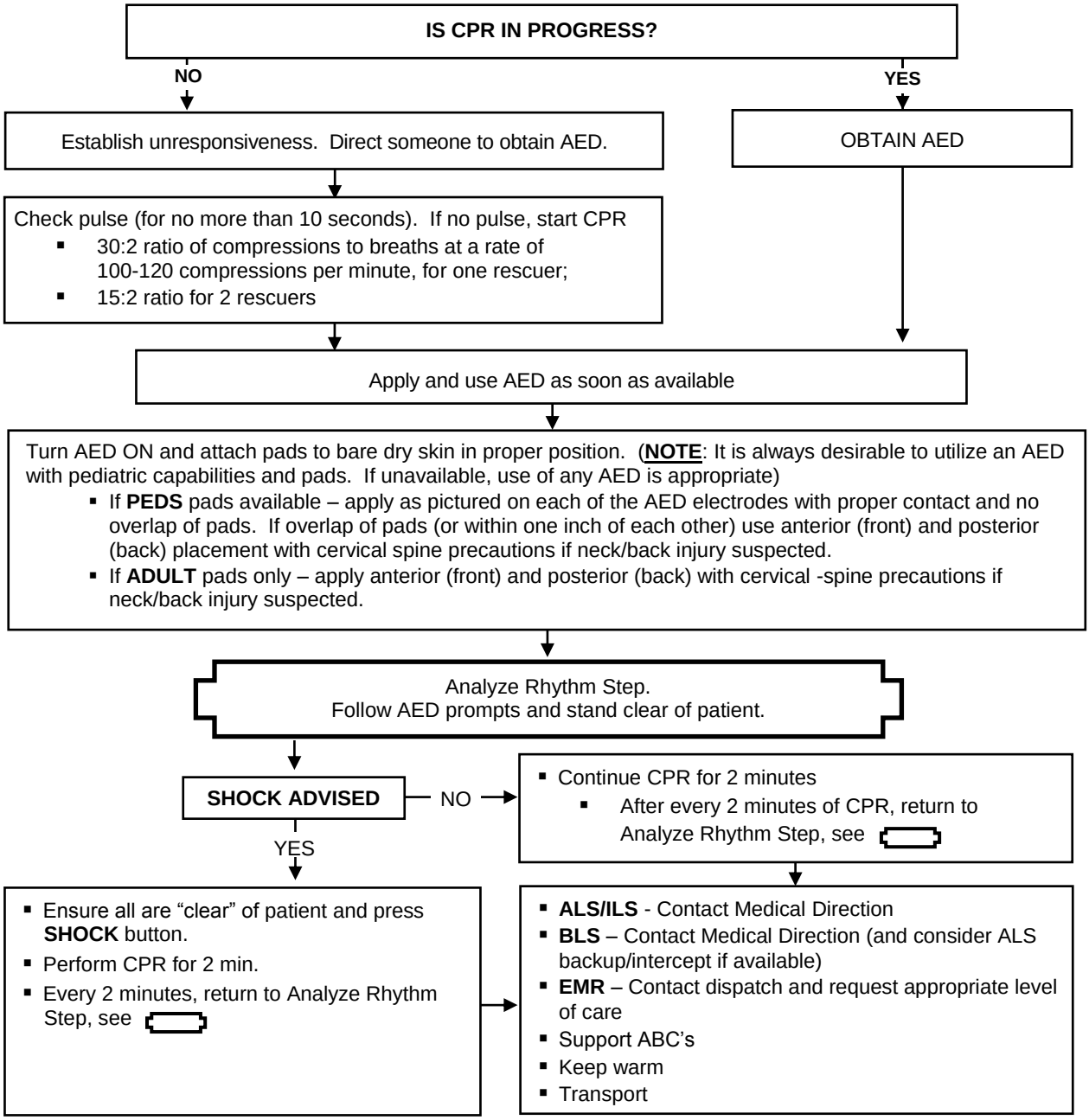
ILLINOIS EMSC
NEONATAL RESUSCITATION
ALS/ILS/AEMT CARE GUIDELINE



Special Considerations:

- Focus should be on neonate appearance (tone, breathing, crying).
- Consider APGAR at 1 min, repeat every 5 mins. Do not interrupt resuscitation efforts to obtain APGAR.

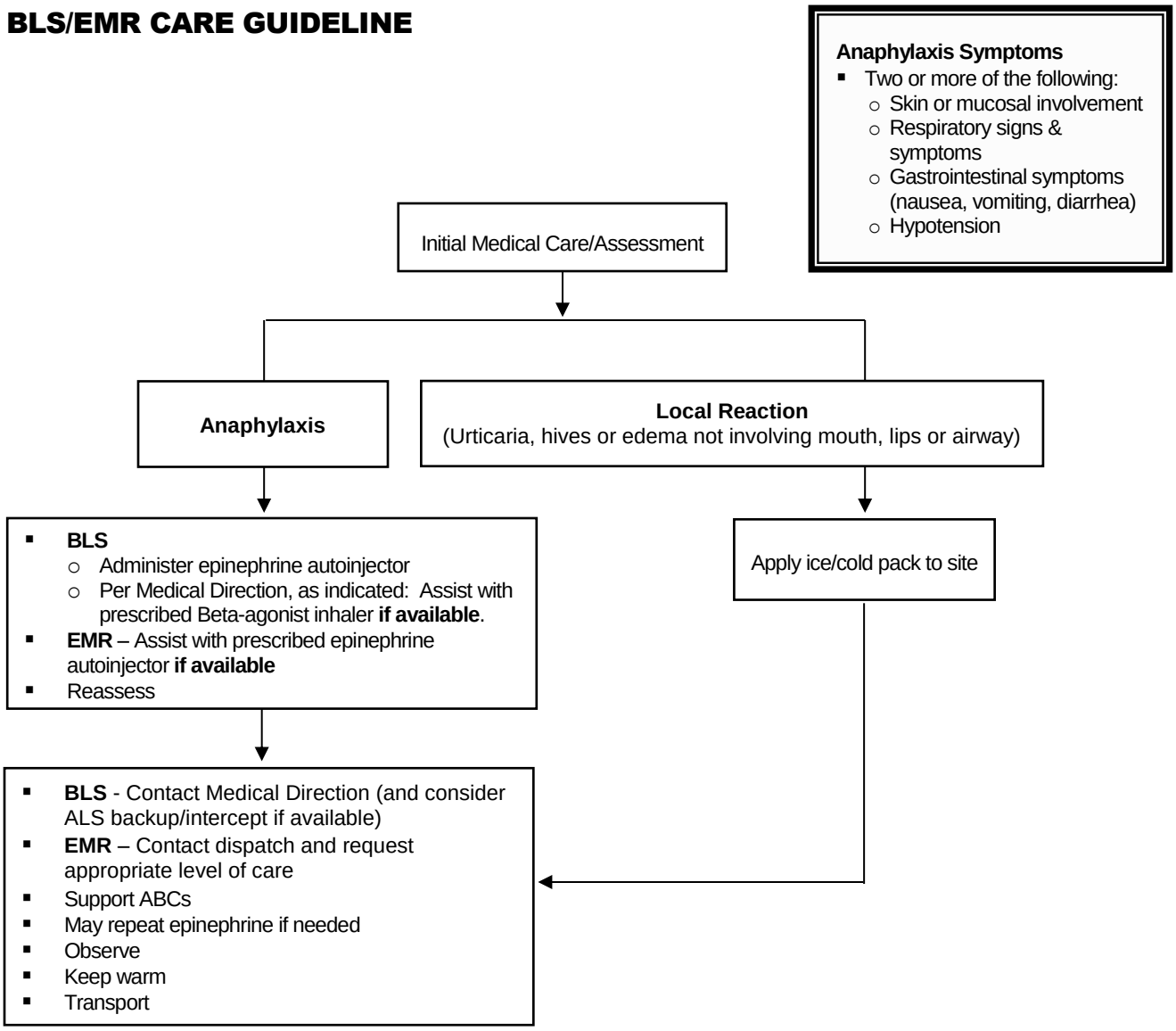
ILLINOIS EMSC
PEDIATRIC AED PROTOCOL
ALS, ILS, AEMT, BLS, EMR GUIDELINE



Special Considerations:

- If injury or neck/back trauma suspected, maintain spinal motion restriction.
- Remove patient from hazardous environment or standing water prior to use of AED.
- If AED in place, EMS personnel should let AED complete rhythm analysis prior to switching to manual defibrillator.

ILLINOIS EMSC
PEDIATRIC ALLERGIC REACTION/ANAPHYLAXIS
BLS/EMR CARE GUIDELINE

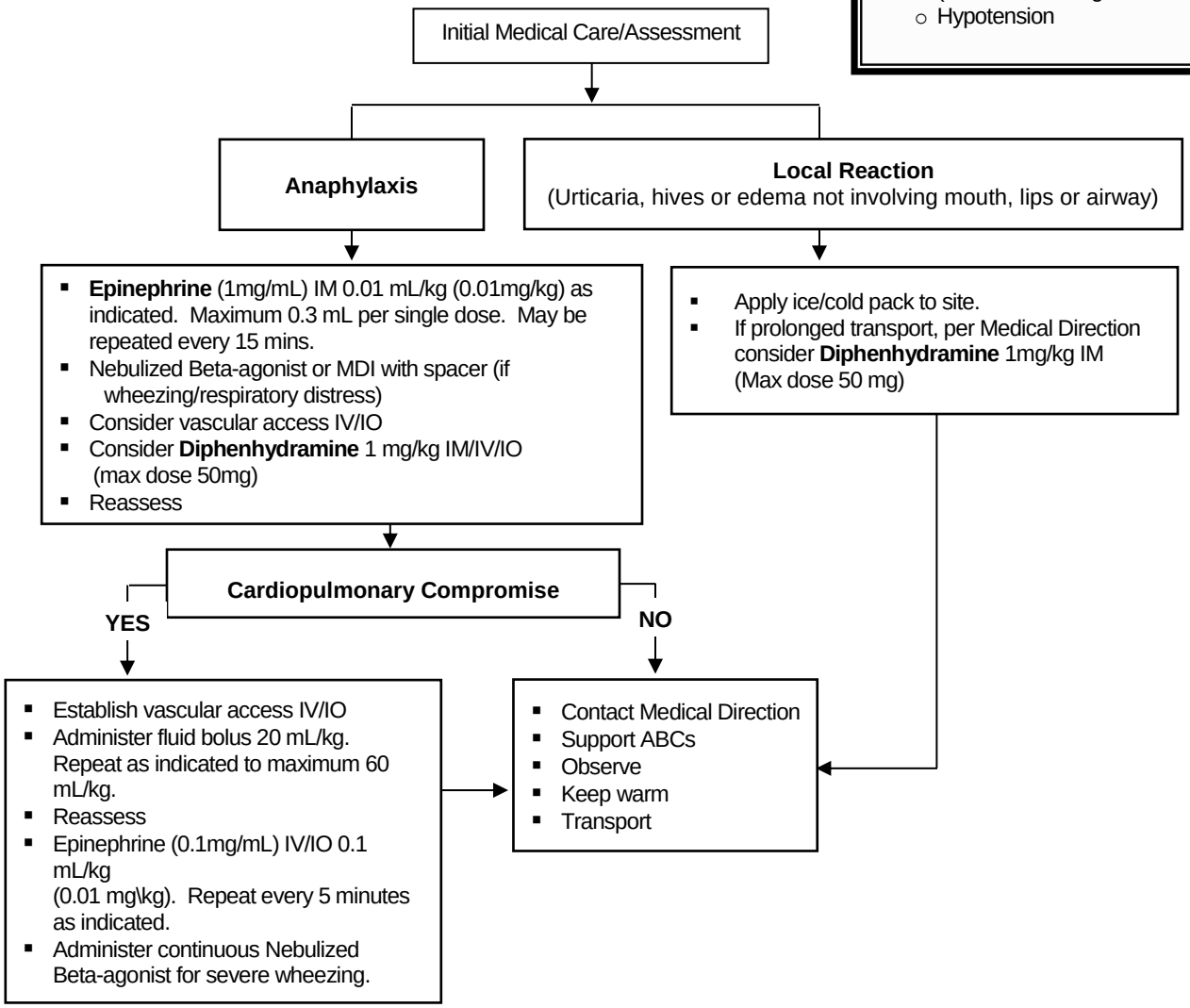


Special Considerations:

- **Epinephrine autoinjector (for example)**
  - **Epi-Pen/Epi-Pen Jr -** use a 0.3mg auto-injector for children over 30kg and 0.15mg auto-injector for children less than 30kg.
  - **Auvi-Q** – use a 0.3mg auto-injector for children over 30kg and 0.15mg auto-injector for children 15- to 30kg.
  - **Auvi-q** – use a 0.1 mg auto-injector for children 7 to 15kg
- Consider use of patient's personal epinephrine autoinjector if additional doses needed.
- **Beta-agonist MDI** inhalers include, among others, **Albuterol (Proventil, Ventolin)** and **Levalbuterol (Xopenex).** An inhaler should be administered through a holding chamber or spacer device **if available**.
- Combination Beta-agonist/corticosteroid inhaler can be used per medical direction.

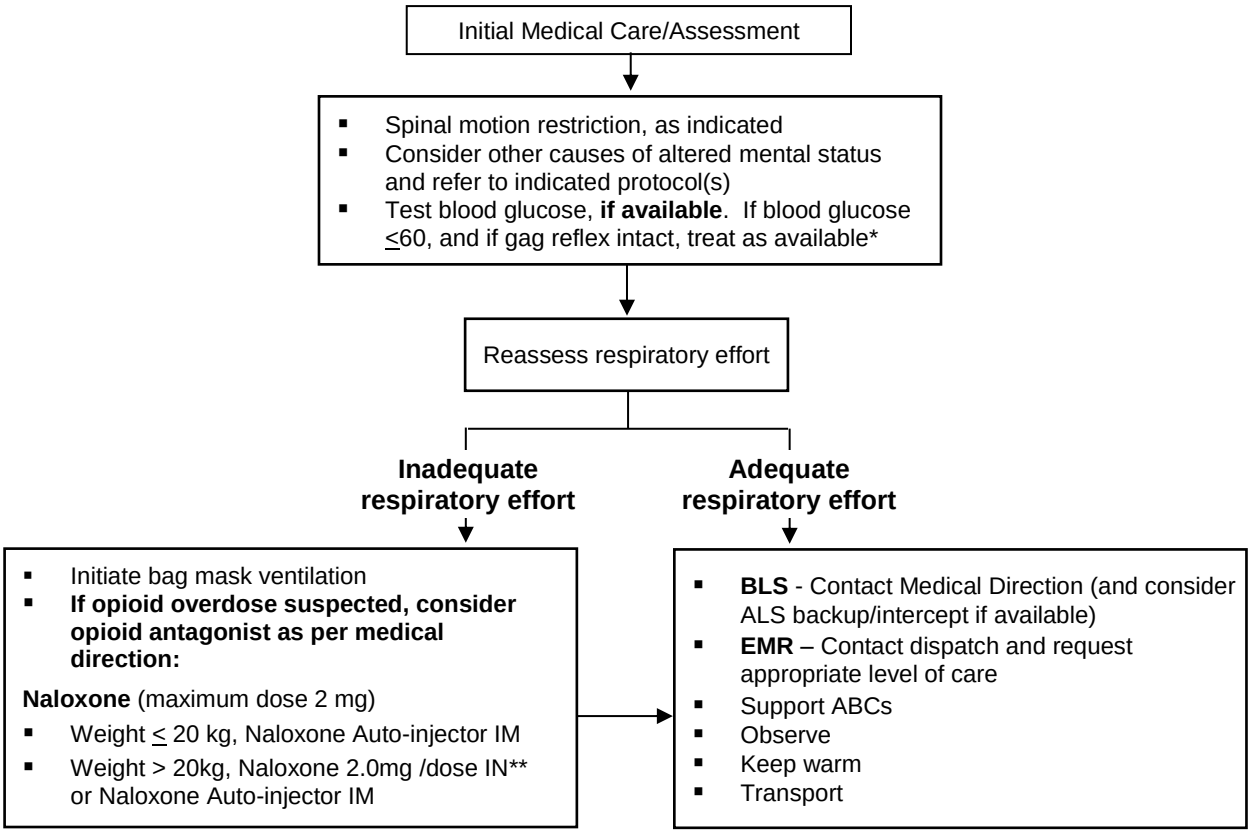
ILLINOIS EMSC
PEDIATRIC ALLERGIC REACTION/ANAPHYLAXIS
ALS/ILS/AEMT CARE GUIDELINE

Anaphylaxis Symptoms
- Two or more of the following:
  - Skin or mucosal involvement
  - Respiratory signs & symptoms
  - Gastrointestinal symptoms (nausea, vomiting, diarrhea)
  - Hypotension



Special Considerations:
- **Epinephrine autoinjector (for example)**
  - **Epi-Pen/Epi-Pen Jr -** use a 0.3mg auto-injector for children over 30kg and 0.15mg auto-injector for children less than 30kg.
  - **Auvi-Q** – use a 0.3mg auto-injector for children over 30kg; and 0.15mg auto-injector for children 15- to 30kg.
  - **Auvi-q** – use a 0.1 mg auto-injector for children 7 to 15kg
- Consider use of patient's personal epinephrine autoinjector if additional doses needed.
- **Beta-agonist MDI** inhalers include, among others, **Albuterol (Proventil, Ventolin)** and **Levalbuterol (Xopenex).** An inhaler should be administered through a holding chamber or spacer device **if available**.
- Combination Beta-agonist/corticosteroid inhaler can be used per medical direction.
- Consider IV steroids per Medical Direction if available.

ILLINOIS EMSC
PEDIATRIC ALTERED MENTAL STATUS
BLS/EMR CARE GUIDELINE



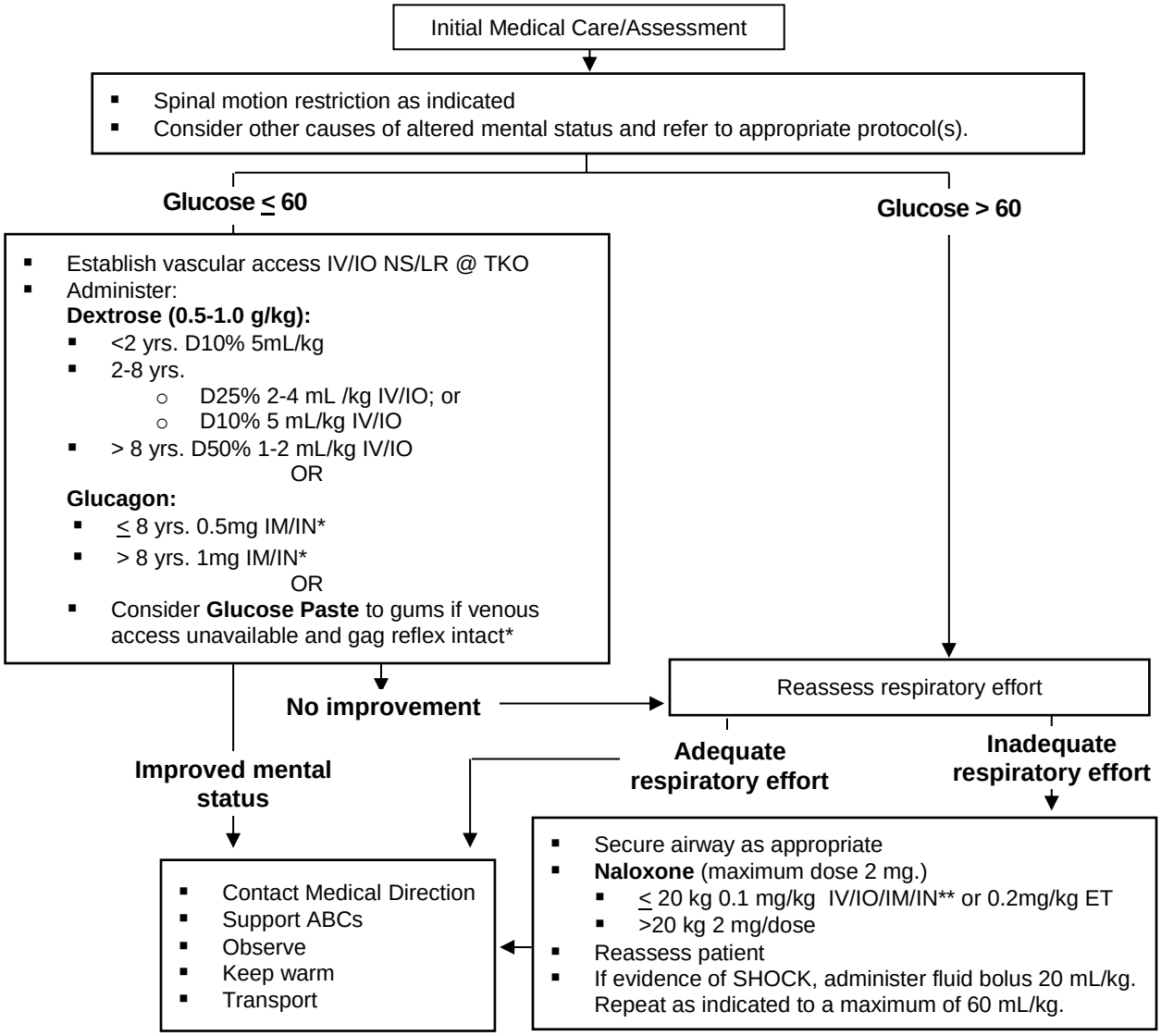
Special Considerations:
Consider causes:

A	Alcohol, abuse	**T**	Trauma (including non-accidental), temperature
E	Epilepsy, electrolytes, encephalopathy	**I**	Infection, intussusception, inborn errors
I	Insulin	**P**	Psychogenic
O	Opiates, overdose	**P**	Poison
U	Uremia	**S**	Shock, seizures, stroke, space-occupying lesion, subarachnoid hemorrhage, shunt

*Examples of treatment for hypoglycemia if gag reflex intact: glucose paste, sugar, cake icing.

**For intranasal administration, use nasal atomizer and administer no more than 1 mL per nostril.

ILLINOIS EMSC
PEDIATRIC ALTERED MENTAL STATUS
ALS/ILS/AEMT CARE GUIDELINE



Special Considerations:
Consider causes:

A	Alcohol, abuse	**T**	Trauma (including non-accidental), temperature
E	Epilepsy, electrolytes, encephalopathy	**I**	Infection, intussusception, inborn errors
I	Insulin	**P**	Psychogenic
O	Opiates, overdose	**P**	Poison
U	Uremia	**S**	Shock, seizures, stroke, space-occupying lesion, subarachnoid hemorrhage, shunt

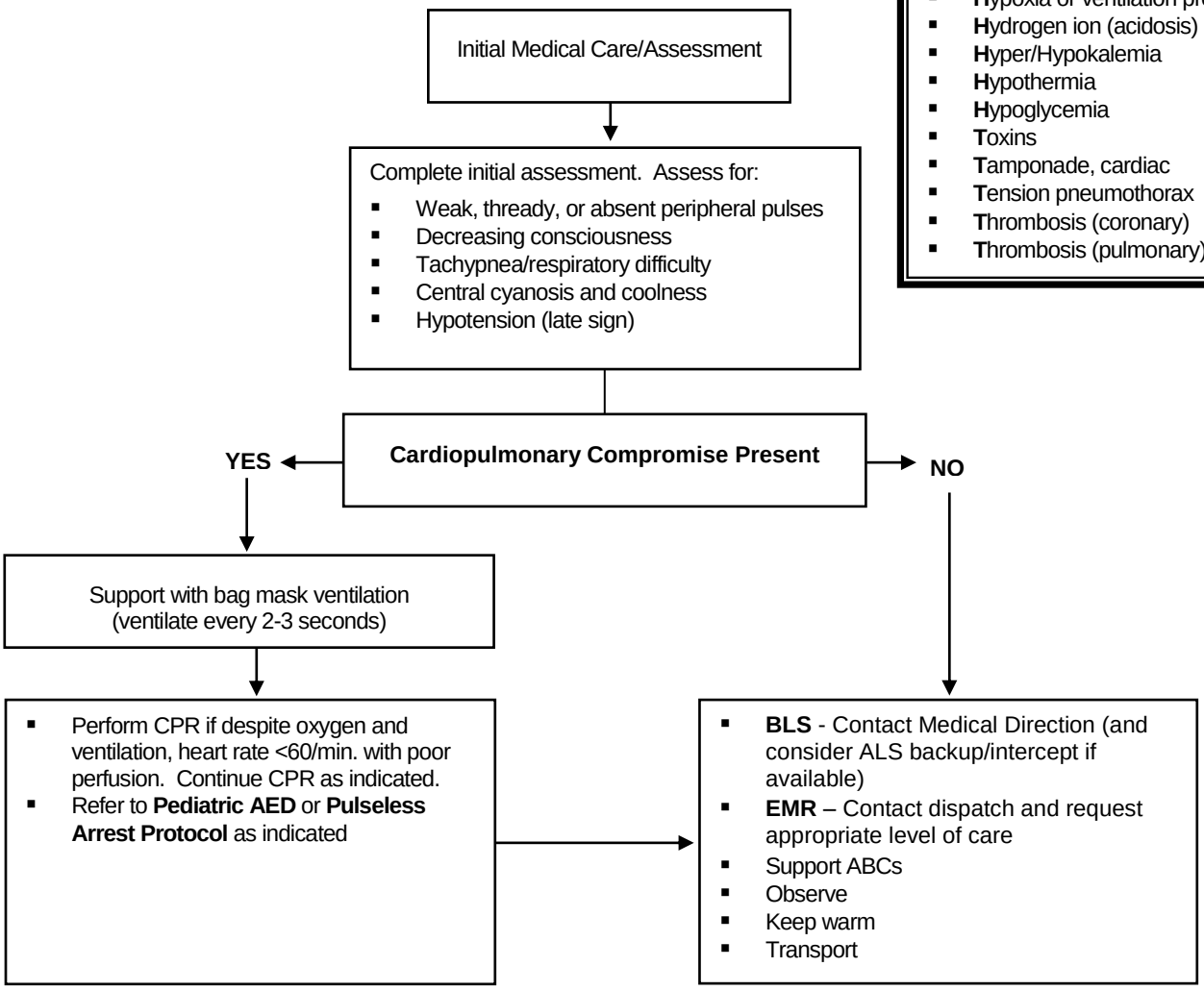
*Examples of treatment for hypoglycemia if gag reflex intact: glucose paste, sugar, cake icing.
**For intranasal administration use nasal atomizer and administer no more than 1 mL per nostril.

ILLINOIS EMSC
BRADYCARDIA PROTOCOL
BLS/EMR CARE GUIDELINE

REVERSIBLE CAUSES

Search for and treat possible reversible cause(s) in the prehospital setting:

- **H**ypovolemia
- **H**ypoxia or ventilation problems
- **H**ydrogen ion (acidosis)
- **H**yper/Hypokalemia
- **H**ypothermia
- **H**ypoglycemia
- **T**oxins
- **T**amponade, cardiac
- **T**ension pneumothorax
- **T**hrombosis (coronary)
- **T**hrombosis (pulmonary)



Special Considerations:

- Hypoglycemia has been known to cause bradycardia in infants and children.
- Special conditions may apply in the presence of severe hypothermia. Refer to **Hypothermia Protocol** as indicated.
- If toxins suspected or known, contact Poison Control 1-800-222-1222

ILLINOIS EMSC
BRADYCARDIA PROTOCOL
ALS/ILS/AEMT CARE GLUIDELINE

REVERSIBLE CAUSES

Search for and treat possible reversible cause(s) in the prehospital setting:

- **H**ypovolemia
- **H**ypoxia or ventilation problems
- **H**ydrogen ion (acidosis)
- **H**yper/Hypokalemia
- **H**ypothermia
- **H**ypoglycemia
- **T**oxins
- **T**amponade, cardiac
- **T**ension pneumothorax
- **T**hrombosis (coronary)
- **T**hrombosis (pulmonary)

Initial Medical Care/Assessment

Complete initial assessment. Assess for:

- Weak, thready, or absent peripheral pulses
- Decreasing consciousness
- Tachypnea/Respiratory difficulty
- Central cyanosis and coolness
- Hypotension (late sign)

Cardiopulmonary Compromise Present

YES

- Support with bag mask ventilation (ventilate every 2-3 seconds)
- Perform CPR if despite oxygen and ventilation, heart rate <60/min. with poor perfusion.
- Continue CPR as indicated.

Does bradycardia persist?

YES

- Establish vascular access IV/IO NS/LR

Epinephrine (0.1 mg/mL)

- IV/IO 0.1 mL/kg (0.01mg/kg)
- Repeat every 3-5 min. if no response

If increased vagal tone or primary AV block:

Atropine 0.02 mg/kg

- Maximum single dose: 0.5 mg for child; 1 mg for adolescent
- May be repeated once

If hypotensive:

- Administer 20mL/kg bolus x1 and then contact medical control for an IV rate

Continued Cardiopulmonary Compromise

YES

- Per medical orders, consider **external pacing if available**
- Treat reversible cause(s) (refer to Reversible Causes box)
- Refer to **Pulseless Arrest Protocol** as indicated

NO

NO

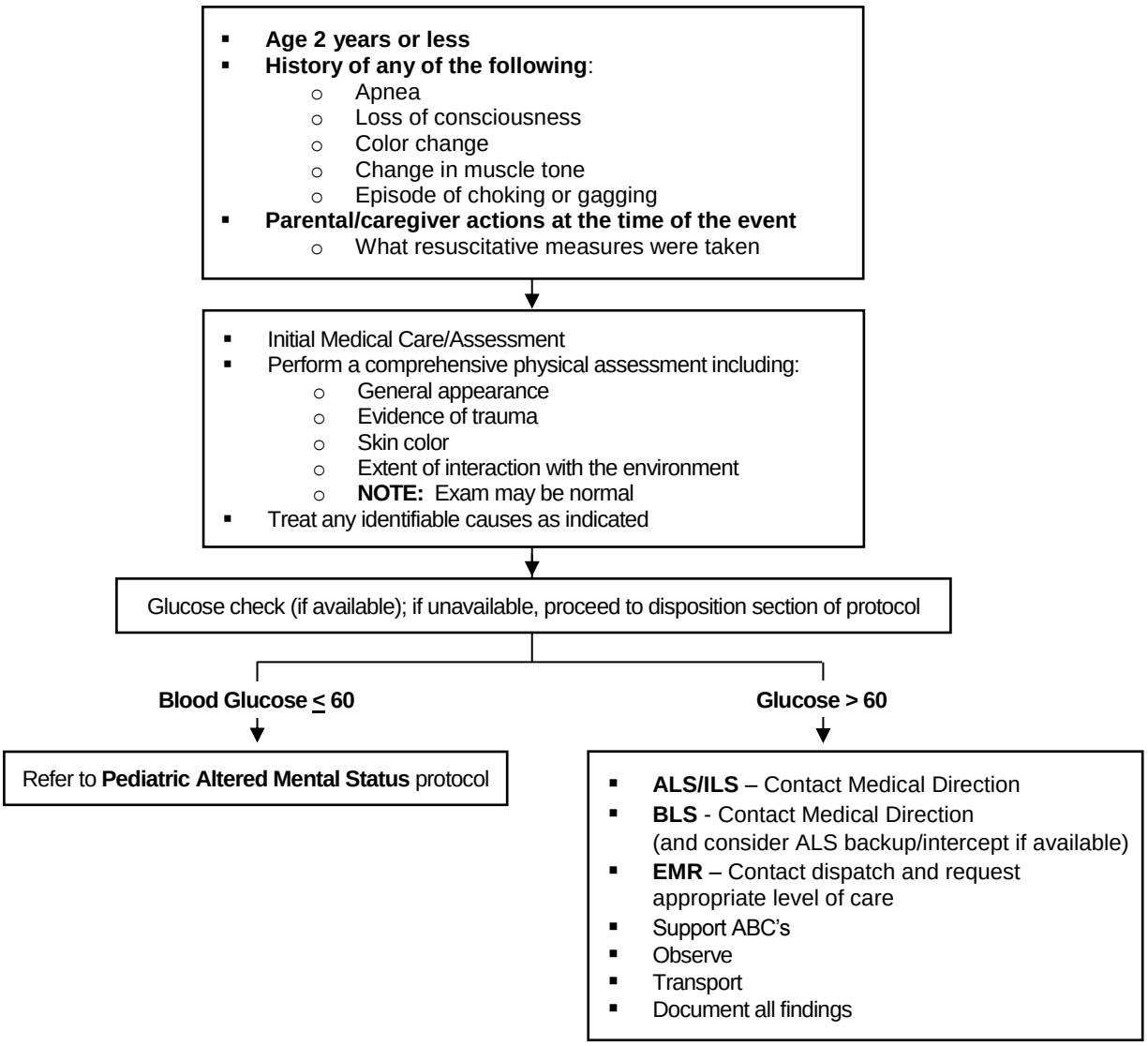
NO

- Contact Medical Direction
- Support ABCs
- Observe
- Keep warm
- Transport

Special Considerations:

- Special conditions may apply in the presence of severe hypothermia. Refer to **Hypothermia Protocol** as indicated.
- If IV/IO access not available, consider ET drug administration (Epinephrine (1 mg/mL concentration) 0.1mL/kg (0.1mg/kg)
- Monitor IO site closely during fluid administration
- If toxins suspected or known, contact Poison Control at 1-800-222-1222

ILLINOIS EMSC
BRIEF RESOLVED UNEXPLAINED EVENT (BRUE)
ALS/ILS/AEMT/BLS/EMERGENCY MEDICAL RESPONDER CARE GUIDELINE

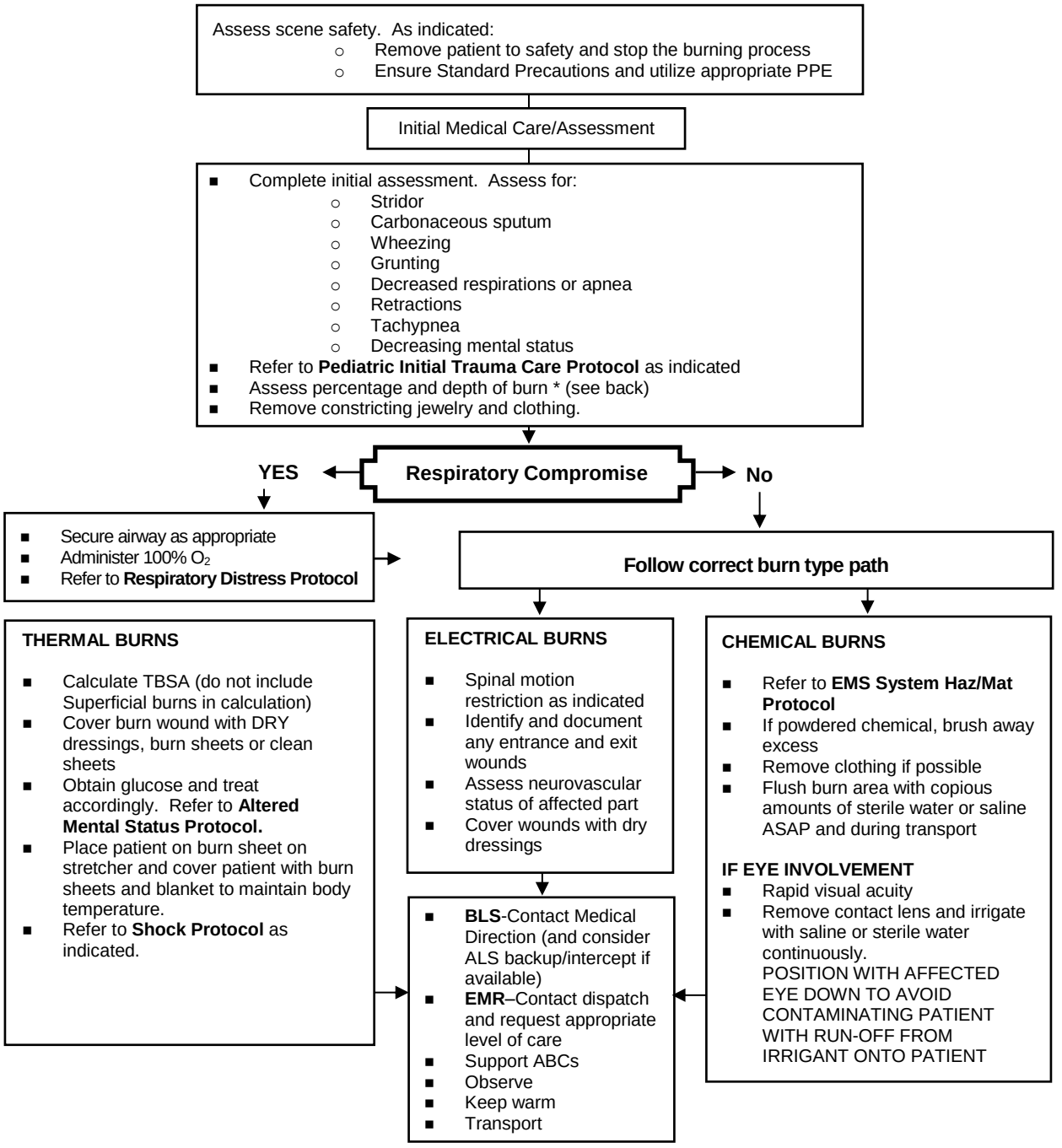


SPECIAL CONSIDERATIONS:

- **All BRUE patients should be transported for medical evaluation, even the well appearing child.**
- Assume the history given is accurate.

DEFINITION: A Brief Resolved Unexplained Event (BRUE) is an episode that is frightening to the observer and involves some combination of apnea, color change, marked change in tone, choking or gagging. It may be a presentation for a variety of different pediatric conditions including seizures, upper airway obstruction, gastroesophageal reflux, metabolic problems, anemia and cardiac disease. BRUEs usually occur in infants under 12 months however any child less than 2 years of age who exhibits any of the above symptoms should be considered a BRUE.

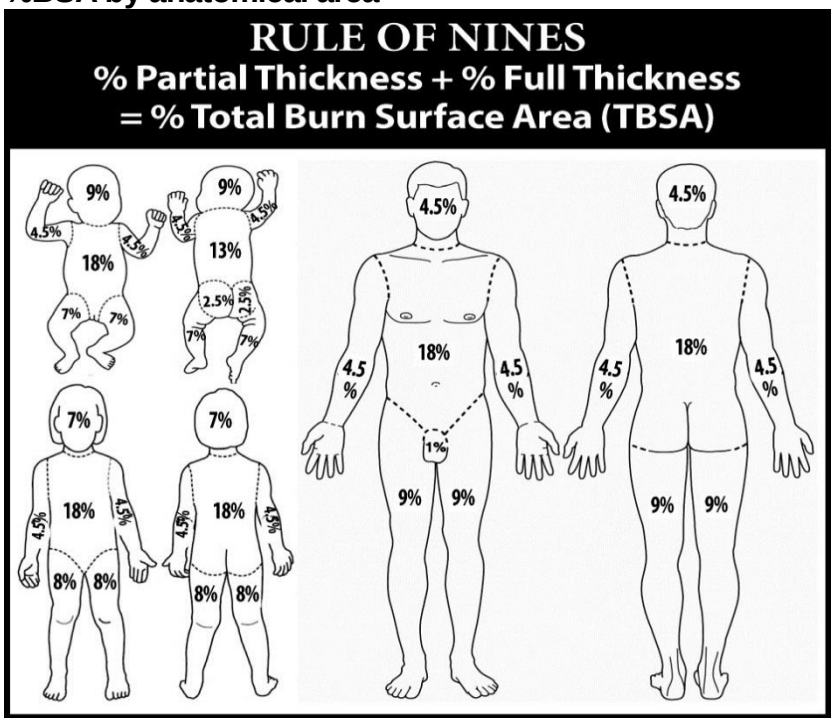
ILLINOIS EMSC
PEDIATRIC BURNS (THERMAL, ELECTRICAL, CHEMICAL)
BLS/EMR CARE GUIDELINE



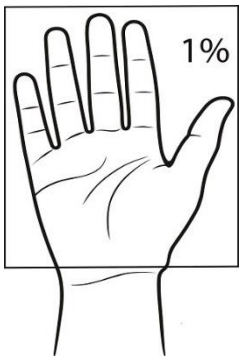
SPECIAL CONSIDERATIONS:
- Assess for potential child abuse and follow appropriate reporting mechanism
- Keep the child warm and protect from hypothermia. Be cautious with cool dressings.
- Consider transport to a Burn Center * (see back)

The Illinois EMSC Prehospital Committee has exercised extreme caution that all information and drug dosages presented are accurate and in accordance with professional standards in effect at the time of publication. This prehospital care guideline may be modified at the discretion of the EMS Medical Director. It is recommended that care must be based on the child's clinical presentation, and on authorized policies and protocols.

%BSA by anatomical area



Palm-and-hand calculation[a]



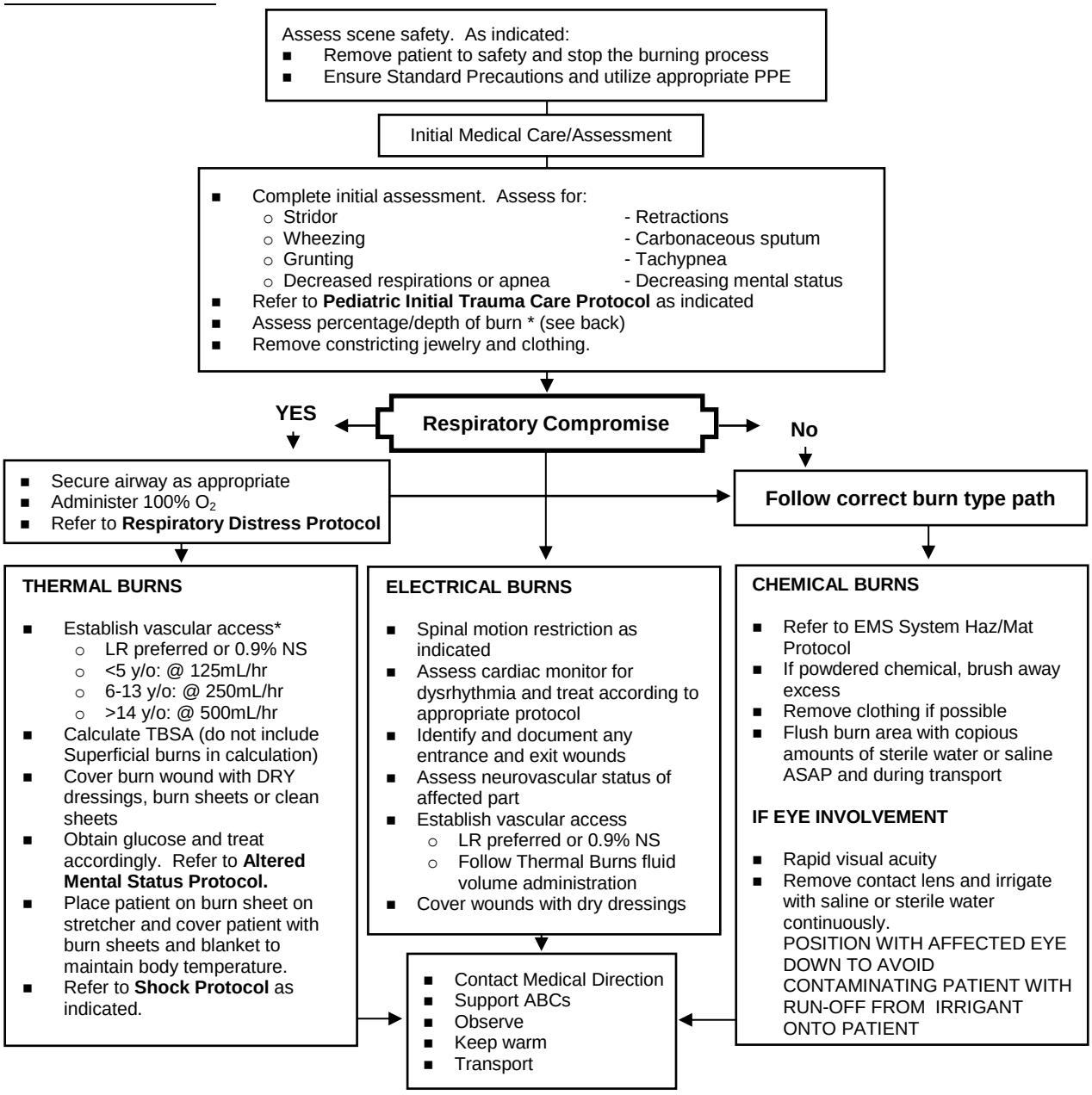
[a] Palm of hand (including fingers) of infant or child = 1% of the total body surface

Burn Center Referral Criteria

Any patient with a life threatening condition should be treated until stable at the nearest appropriate facility before being transferred to a burn center. According to the American Burn Association, burn injuries that should be referred to a burn center include:

1. Partial thickness burns greater than 10% total body surface area (TBSA)
2. Burns that involve the face, hands, feet, genitalia, perineum, or major joints
3. Third-degree burns in any age group
4. Electrical burns, including lightning injury
5. Chemical burns
6. Inhalation injury
7. Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
8. Any patients with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in concert with the regional medical direction plan and triage protocols
9. Burned children in hospitals without qualified personnel or equipment for the care of children
10. Burn injury in patients who will require special social, emotional, or rehabilitative intervention

ILLINOIS EMSC
PEDIATRIC BURNS (THERMAL, ELECTRICAL, CHEMICAL)
ALS/ILS/AEMT CARE GUIDELINE



SPECIAL CONSIDERATIONS:

- Assess for potential child abuse and follow appropriate reporting mechanism
- Keep the child warm and protect from hypothermia. Be cautious with cool dressings.
- **Consider pain management**
- Consider transport to a Burn Center * (see back)
- NOTE: Initial IV fluid management in above protocol provides appropriate fluid volume until more definitive fluid management is calculated in the Emergency Department

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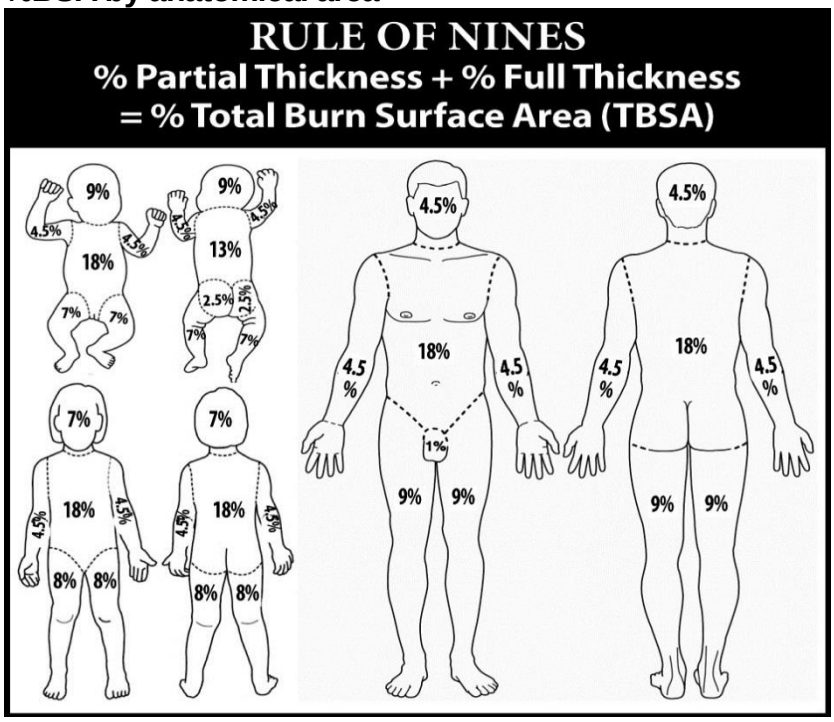
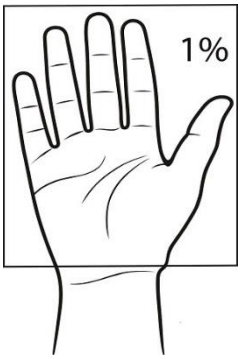
%BSA by anatomical area



Palm-and-hand calculation[a]



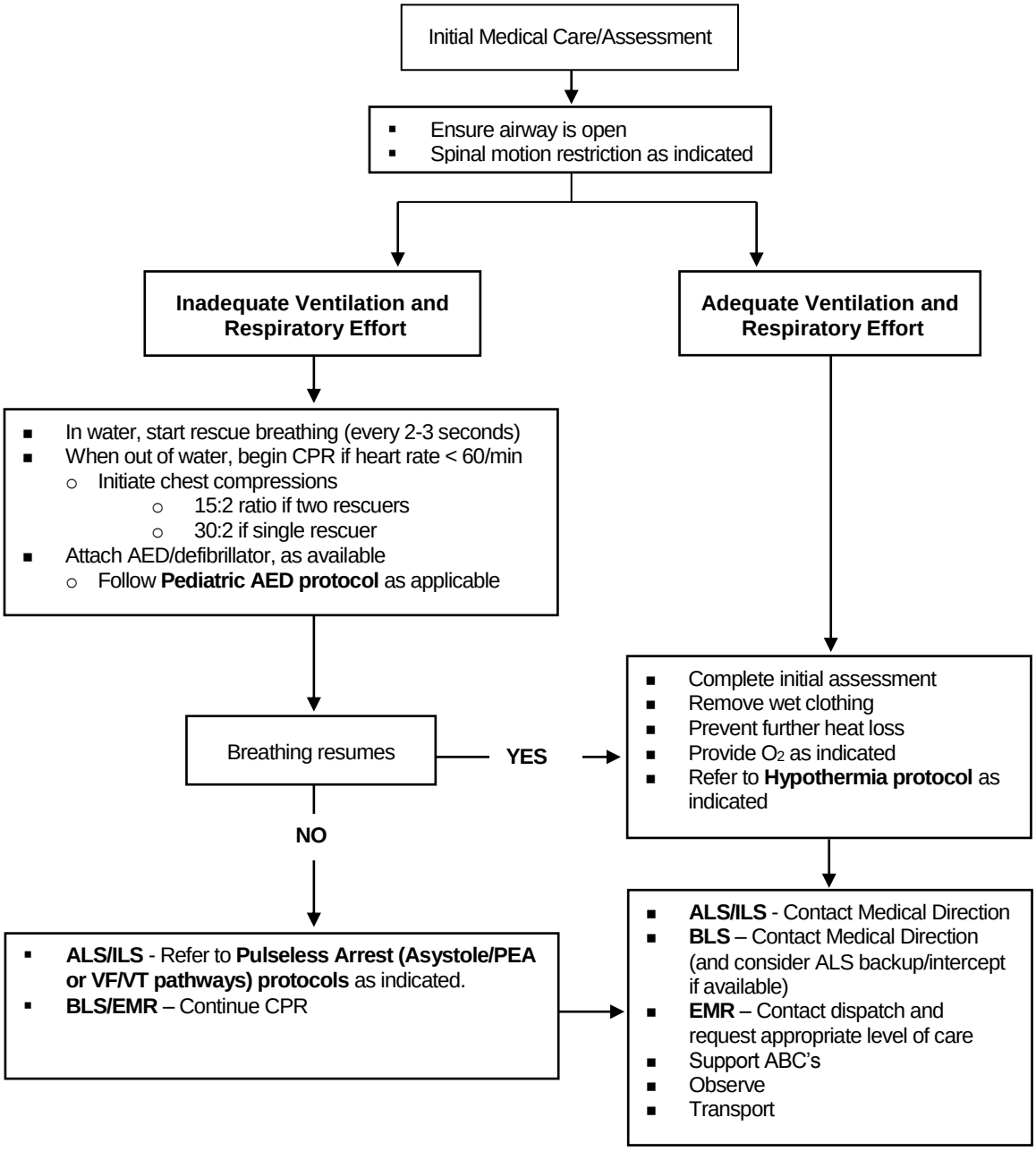
[a] Palm of hand (including fingers) of infant or child = 1% of the total body surface

Burn Center Referral Criteria

Any patient with a life threatening condition should be treated until stable at the nearest appropriate facility before being transferred to a burn center. According to the American Burn Association, burn injuries that should be referred to a burn center include:

1. Partial thickness burns greater than 10% total body surface area (TBSA)
2. Burns that involve the face, hands, feet, genitalia, perineum, or major joints
3. Third-degree burns in any age group
4. Electrical burns, including lightning injury
5. Chemical burns
6. Inhalation injury
7. Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
8. Any patients with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in concert with the regional medical direction plan and triage protocols
9. Burned children in hospitals without qualified personnel or equipment for the care of children
10. Burn injury in patients who will require special social, emotional, or rehabilitative intervention

ILLINOIS EMSC
PEDIATRIC DROWNING
ALS/ILS/AEMT/BLS/EMR CARE GUIDELINE



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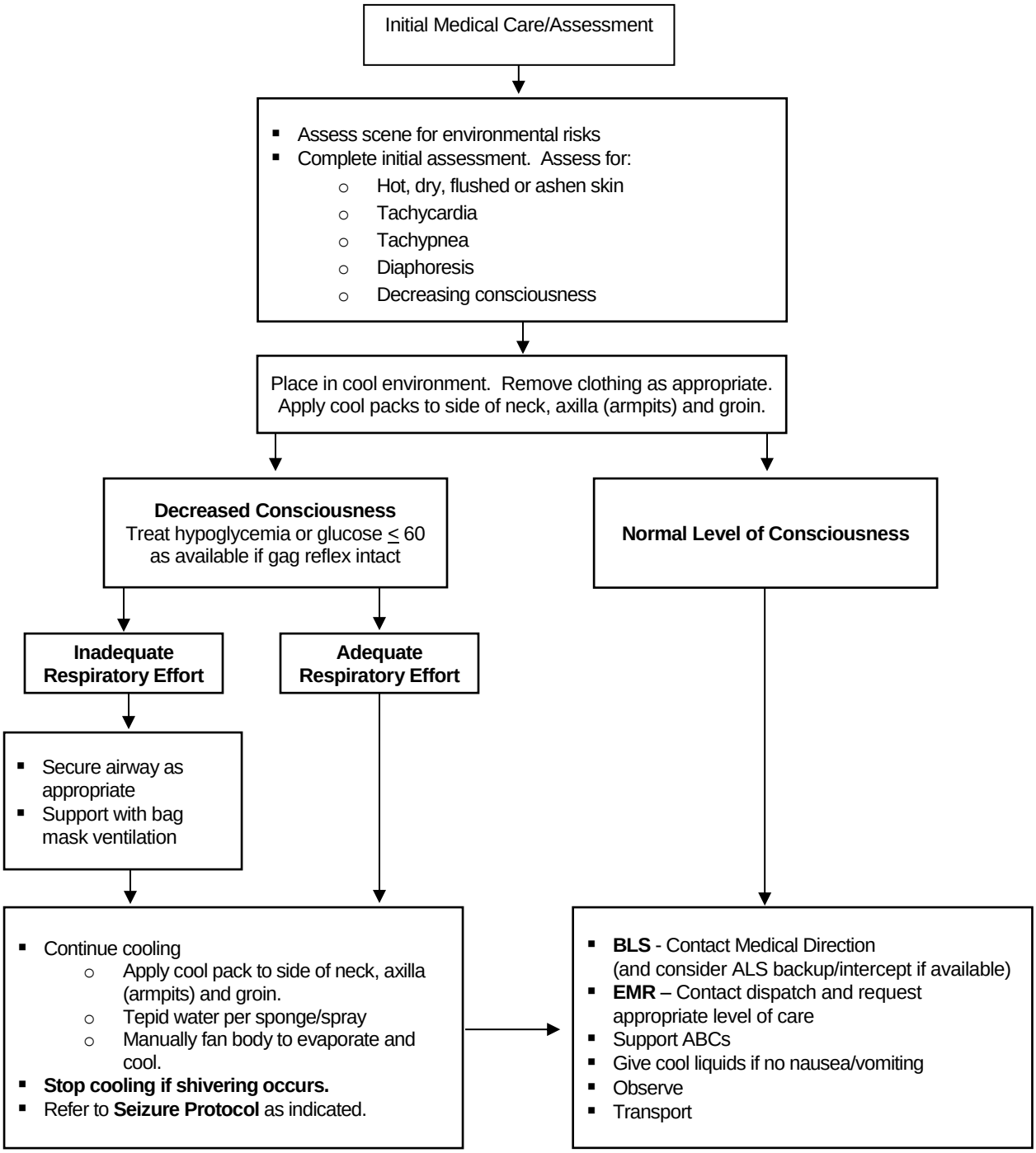
ILLINOIS EMSC
PEDIATRIC ENVIRONMENTAL HYPERTHERMIA
BLS/EMR CARE GUIDELINE



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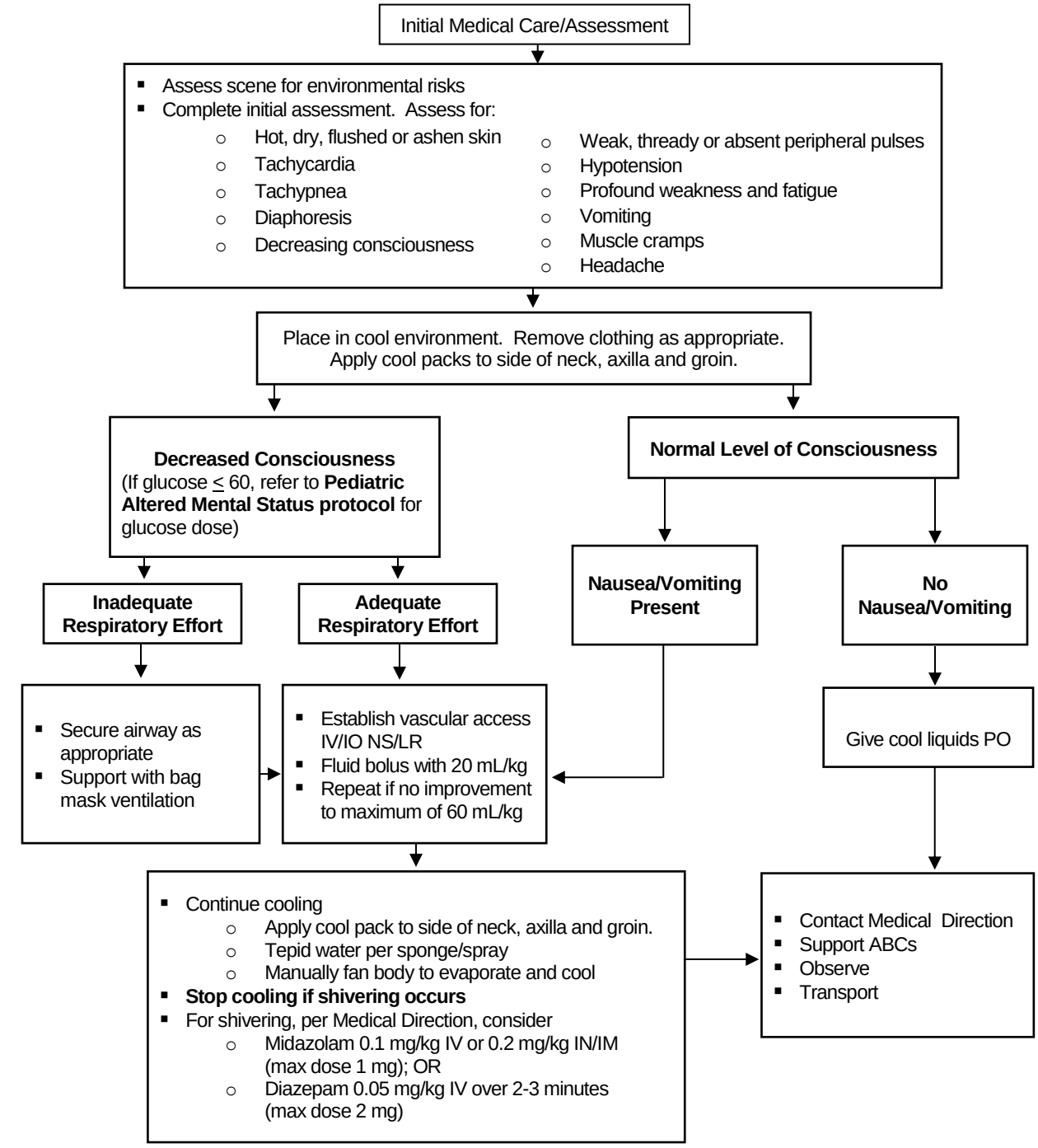
ILLINOIS EMSC
PEDIATRIC ENVIRONMENTAL HYPERTHERMIA
ALS/ILS/AEMT CARE GUIDELINE



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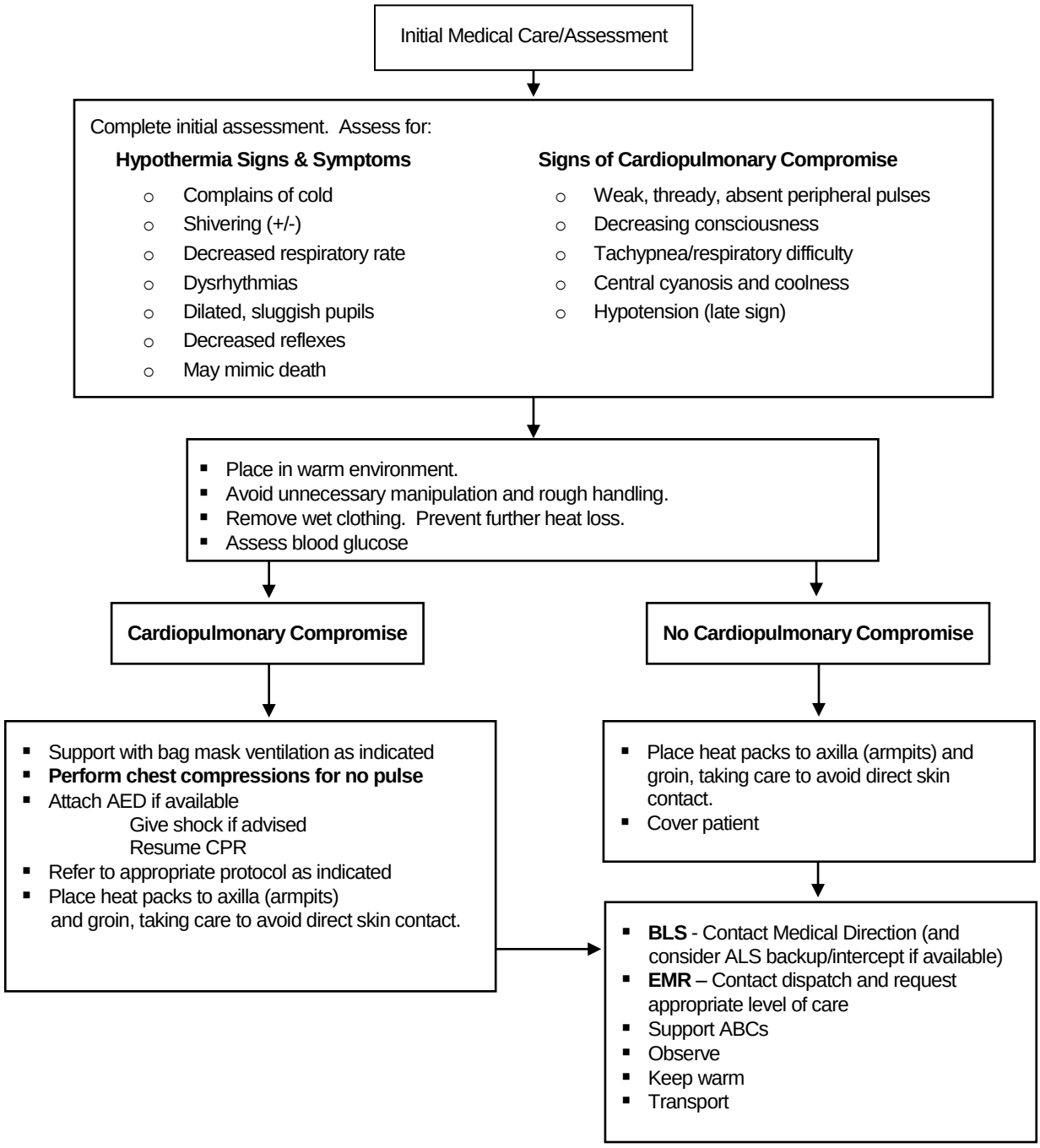
ILLINOIS EMSC
PEDIATRIC HYPOTHERMIA
BLS/EMR CARE GUIDELINE



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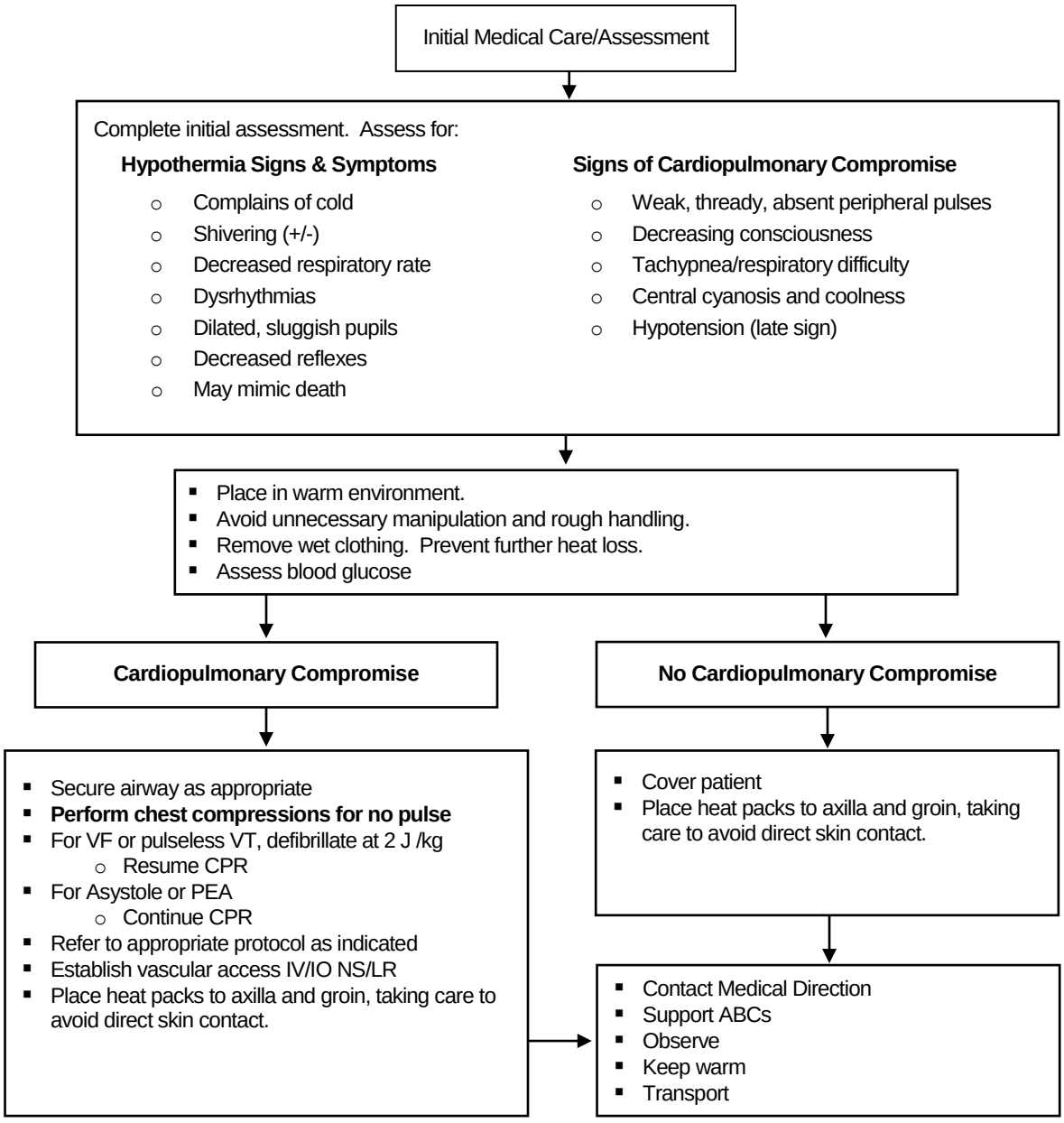
ILLINOIS EMSC
PEDIATRIC HYPOTHERMIA
ALS/ILS/AEMT CARE GUIDELINE



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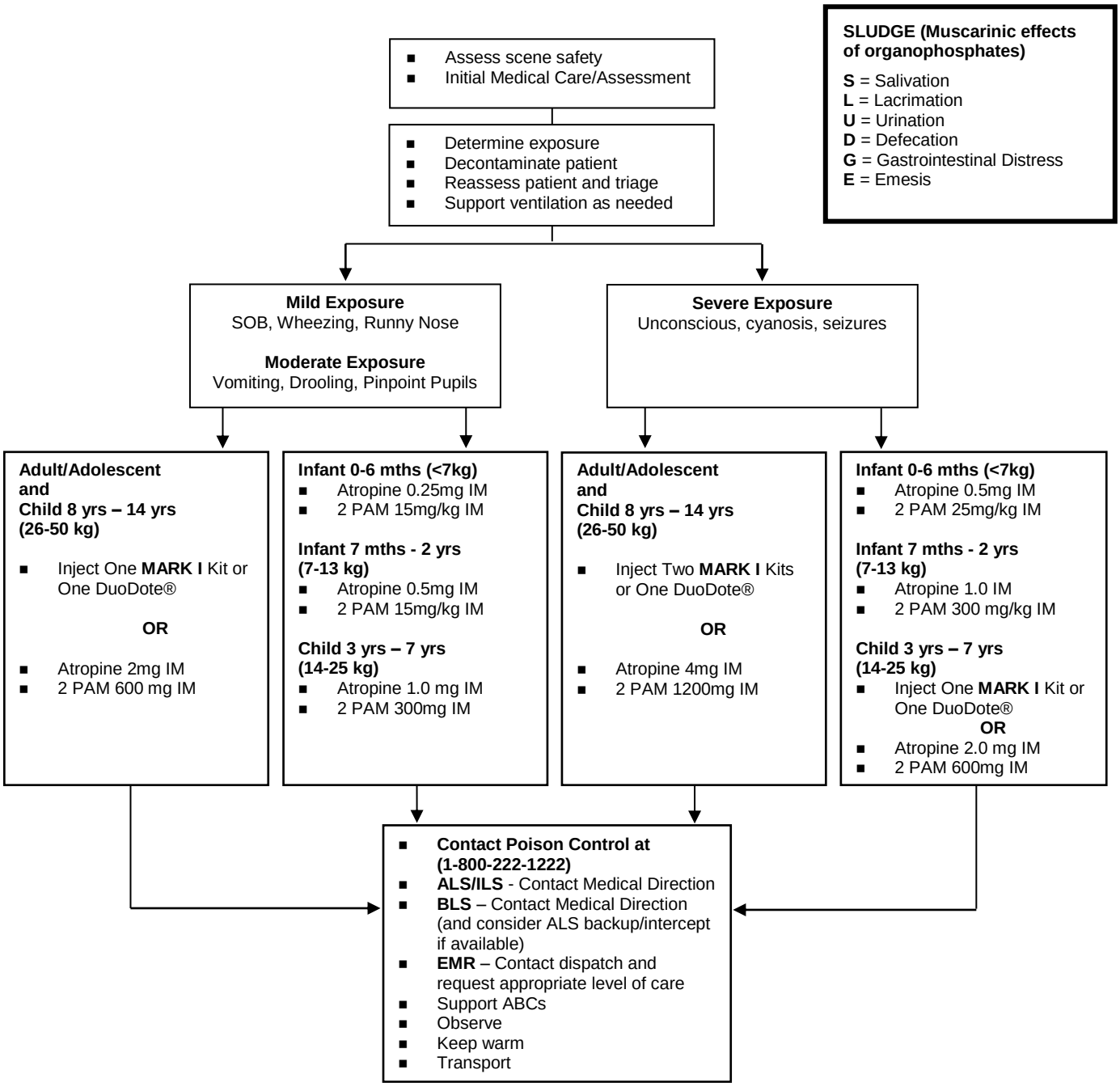
ILLINOIS EMSC
PEDIATRIC NERVE AGENT/ORGANOPHOSPHATE ANTIDOTE GUIDELINES
ALS/ILS/AEMT/BLS/EMR CARE GUIDELINE



SPECIAL CONSIDERATIONS:

- Repeat Atropine at 5-10 minute intervals to control excess secretions.

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PEDIATRIC NERVE AGENT/ORGANOPHOSPHATE ANTIDOTE GUIDELINE

Mild Exposure	Moderate Exposure	Severe Exposure
SOB, Wheezing, Runny Nose	Vomiting, Drooling, Pinpoint Pupils	Unconscious, cyanosis, seizures

	PATIENT AGE	ANTIDOTES (IM)	
		MILD/MODERATE	SEVERE
INFANT	0-6 months (< 7 kg)	Atropine 0.25mg 2 PAM† 15 mg/kg	Atropine* 0.5mg 2 PAM† 25 mg/kg
INFANT	7 months-2 years (7-13 kg)	Atropine* 0.5mg 2 PAM† 15 mg/kg	Atropine* 1mg 2 PAM† 300 mg
CHILD	3-7yrs (14-25kg)	Atropine* 1mg 2 PAM† 300mg	Atropine 2mg 2 PAM† 600 mg
CHILD	8-14 yrs (26-50kg)	Atropine 2mg 2 PAM† 600 mg	Atropine 4mg 2 PAM† 1200 mg
ADOLESCENT	> 14 yrs (> 51 kg)	Atropine 2mg 2 PAM† 600 mg	Atropine 4mg 2 PAM† 1200 mg

* Appropriate dose atropine auto injector can be used **if available**

† 2 PAM=Pralidoxime

DENOTES ONE MARK I KIT or ONE DuoDote®

Atropine 2mg
2 PAM† 600mg

DENOTES TWO MARK I KITS or TWO DuoDote®

Atropine 4mg
2 PAM† 1200 mg

NOTES:

For nerve agents the doses are:

Atropine dose 0.05 mg/kg

2 PAM† dose 25 mg/kg

For children > 3 yrs with severe symptoms:

1 Mark I Kit (or one Duodote®) will give Atropine 0.08 — 0.13 mg/kg

2 PAM† 24-46 mg/kg

2 PAM† solution can be prepared from the vial containing 1 gram of dessicated 2 PAM†. Inject 3 mL of NS or sterile water into the vial and shake well. This results in 3.3mL (1 mL = 300mg 2 PAM).

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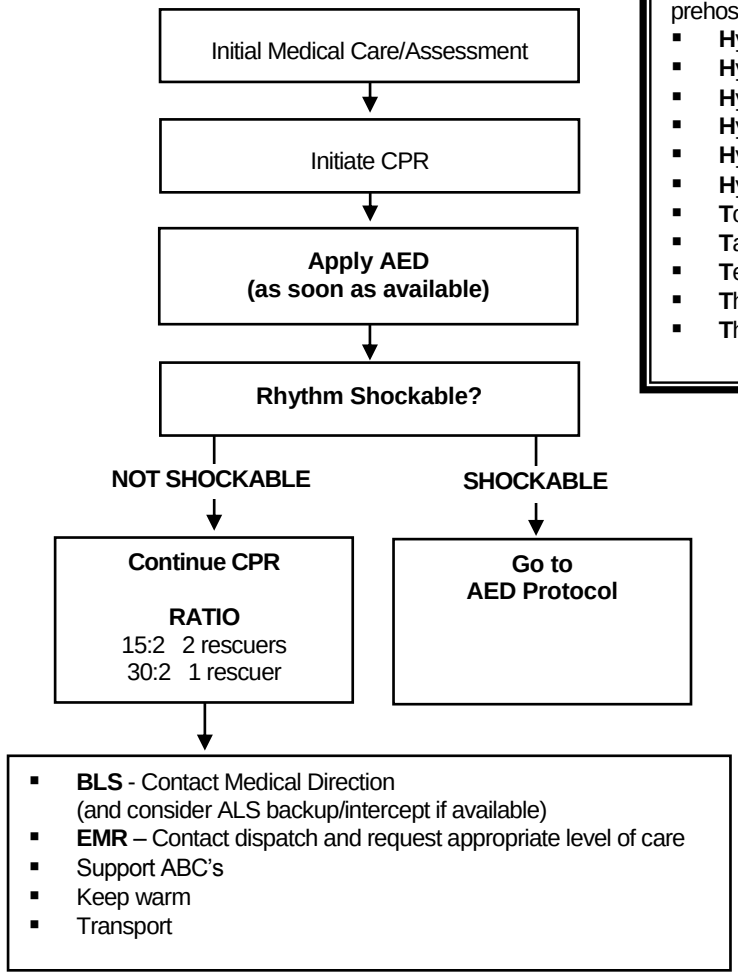
ILLINOIS EMSC
PULSELESS ARREST
BLS/EMR CARE GUIDELINE



REVERSIBLE CAUSES

Search for and treat possible reversible cause(s) in the prehospital setting:

- **H**ypovolemia
- **H**ypoxia or ventilation problems
- **H**ydrogen ion (acidosis)
- **H**yper/Hypokalemia
- **H**ypothermia
- **H**ypoglycemia
- **T**oxins
- **T**amponade, cardiac
- **T**ension pneumothorax
- **T**hrombosis (coronary)
- **T**hrombosis (pulmonary)

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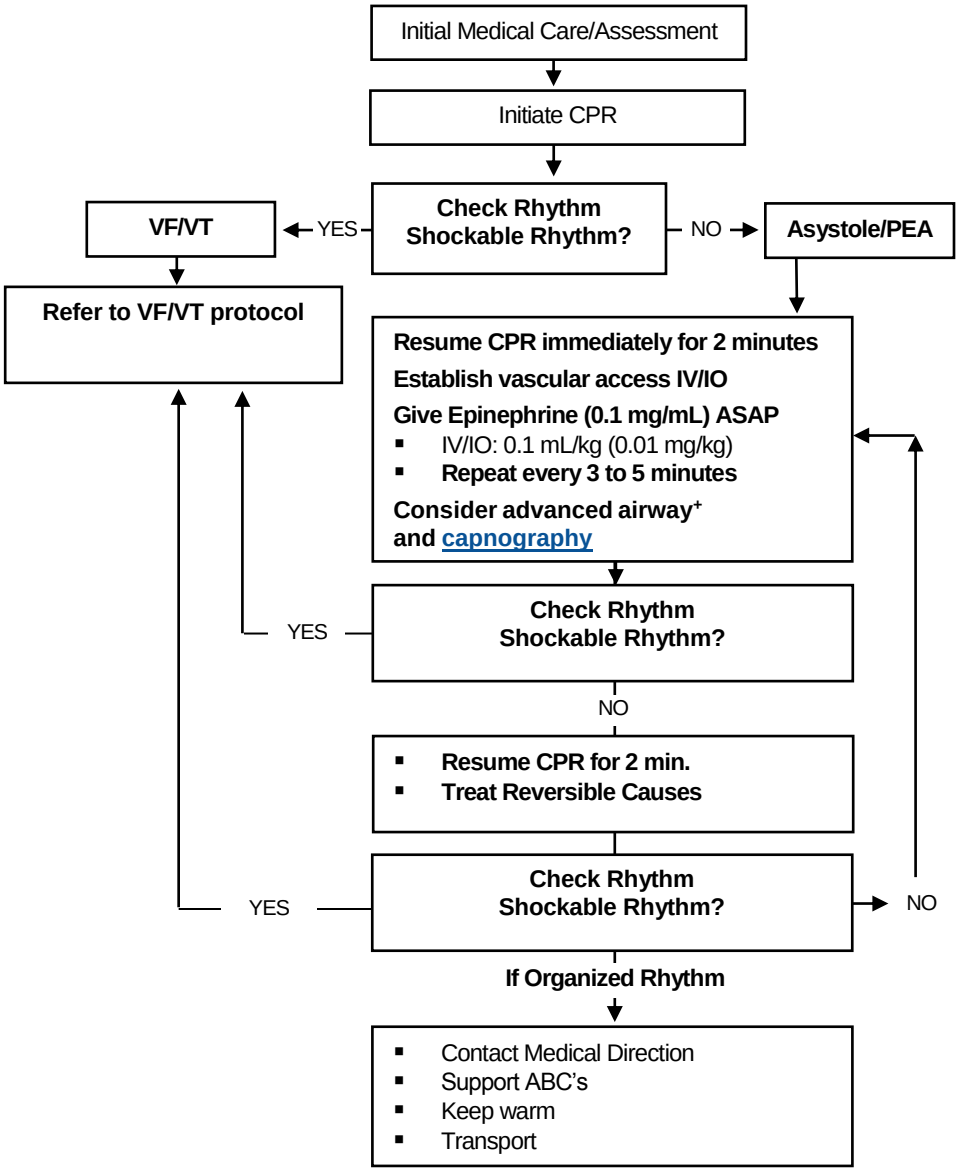
ILLINOIS EMSC
PULSELESS ARREST (*ASYSTOLE/PEA PATHWAY*)
ALS/ILS/AEMT CARE GUIDELINE



REVERSIBLE CAUSES

Search for and treat possible reversible cause(s) in the prehospital setting:

- **H**ypovolemia
- **H**ypoxia or ventilation problems
- **H**ydrogen ion (acidosis)
- **H**yper/Hypokalemia
- **H**ypothermia
- **H**ypoglycemia
- **T**oxins
- **T**amponade, cardiac
- **T**ension pneumothorax
- **T**hrombosis (coronary)
- **T**hrombosis (pulmonary)

Special Considerations:

+ If advanced airway is placed, give continuous chest compressions without pauses for breaths. Give breaths every 2-3 seconds per current AHA/ARC guidelines. Check rhythm every 2 minutes.

- Contact medical direction or refer to system protocol for termination of resuscitation
- If IV/IO access not available consider ET drug administration [Epinephrine (1 mg/mL) 0.1 mL/kg (0.1mg/kg)]
- Refer to length/weight based tool to identify specific dosages (if available)

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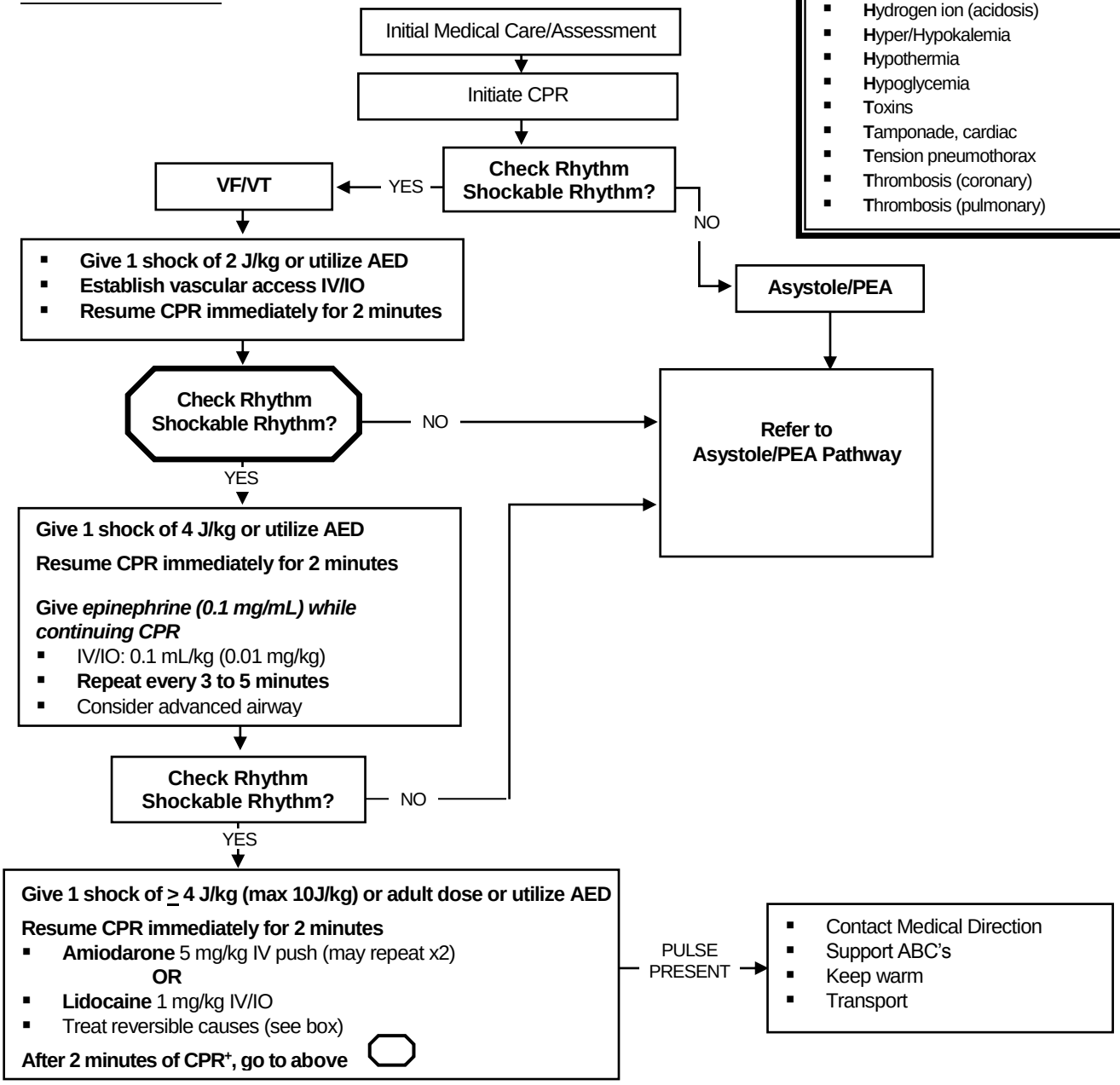
ILLINOIS EMSC
PULSELESS ARREST (*VF/VT PATHWAY*)
ALS/ILS/AEMT CARE GUIDELINE



REVERSIBLE CAUSES

Search for and treat possible reversible cause(s) in the prehospital setting:

- **H**ypovolemia
- **H**ypoxia or ventilation problems
- **H**ydrogen ion (acidosis)
- **H**yper/Hypokalemia
- **H**ypothermia
- **H**ypoglycemia
- **T**oxins
- **T**amponade, cardiac
- **T**ension pneumothorax
- **T**hrombosis (coronary)
- **T**hrombosis (pulmonary)

Special Considerations:

+If advanced airway is placed, give continuous chest compressions without pauses for breaths. Give breaths every 2-3 seconds per current AHA/ARC guidelines. Check rhythm every 2 minutes.

- If IV/IO access not available, consider ET administration of Epinephrine (1 mg/mL) 0.1mL/kg (0.1mg/kg)
- Consider therapeutic hypothermia if system protocol exists
- Consider **magnesium** 25 to 50 mg/kg IV/IO, max 2 g for torsades de pointes

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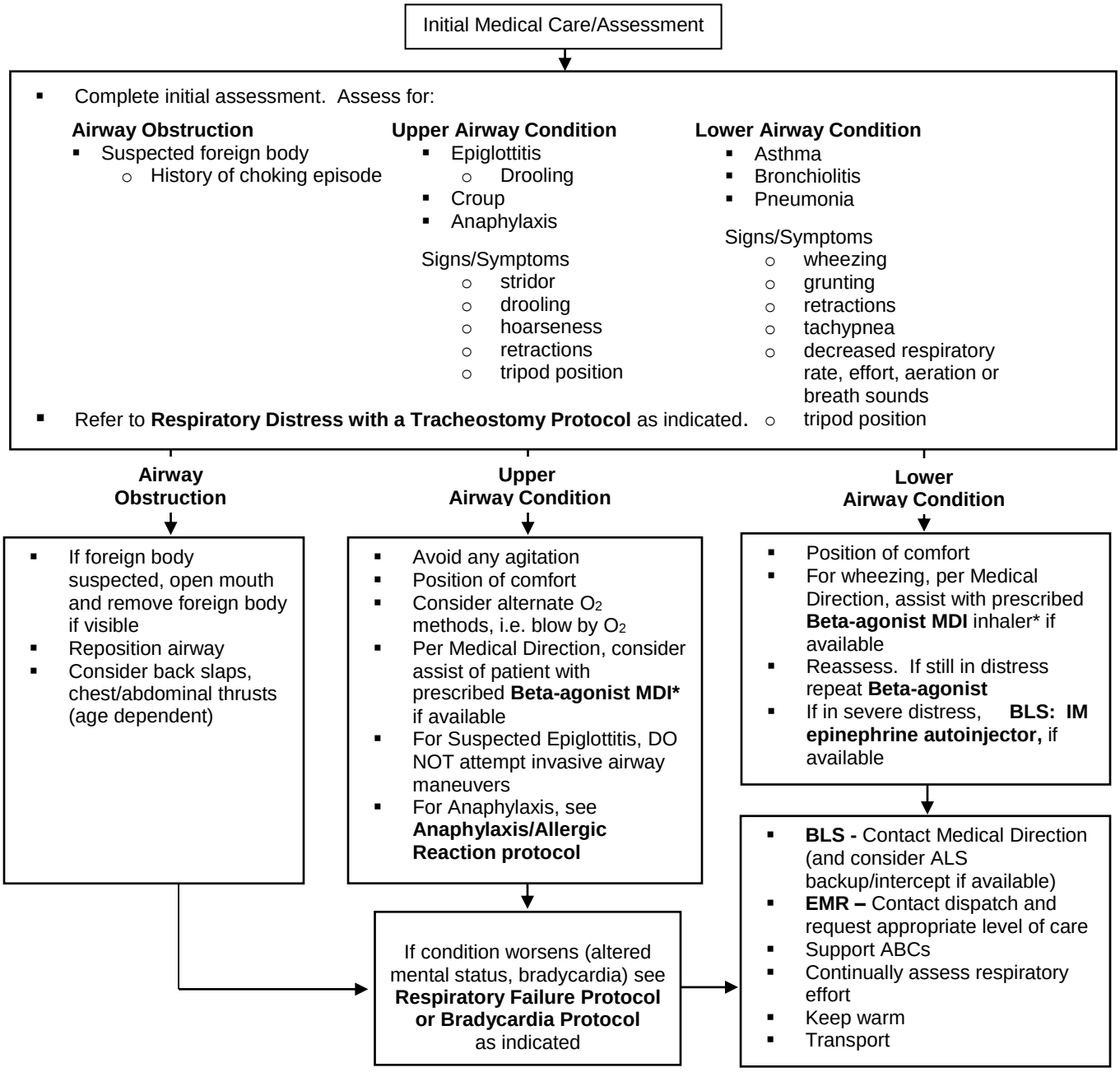
ILLINOIS EMSC
PEDIATRIC RESPIRATORY DISTRESS
BLS/EMR CARE GUIDELINE

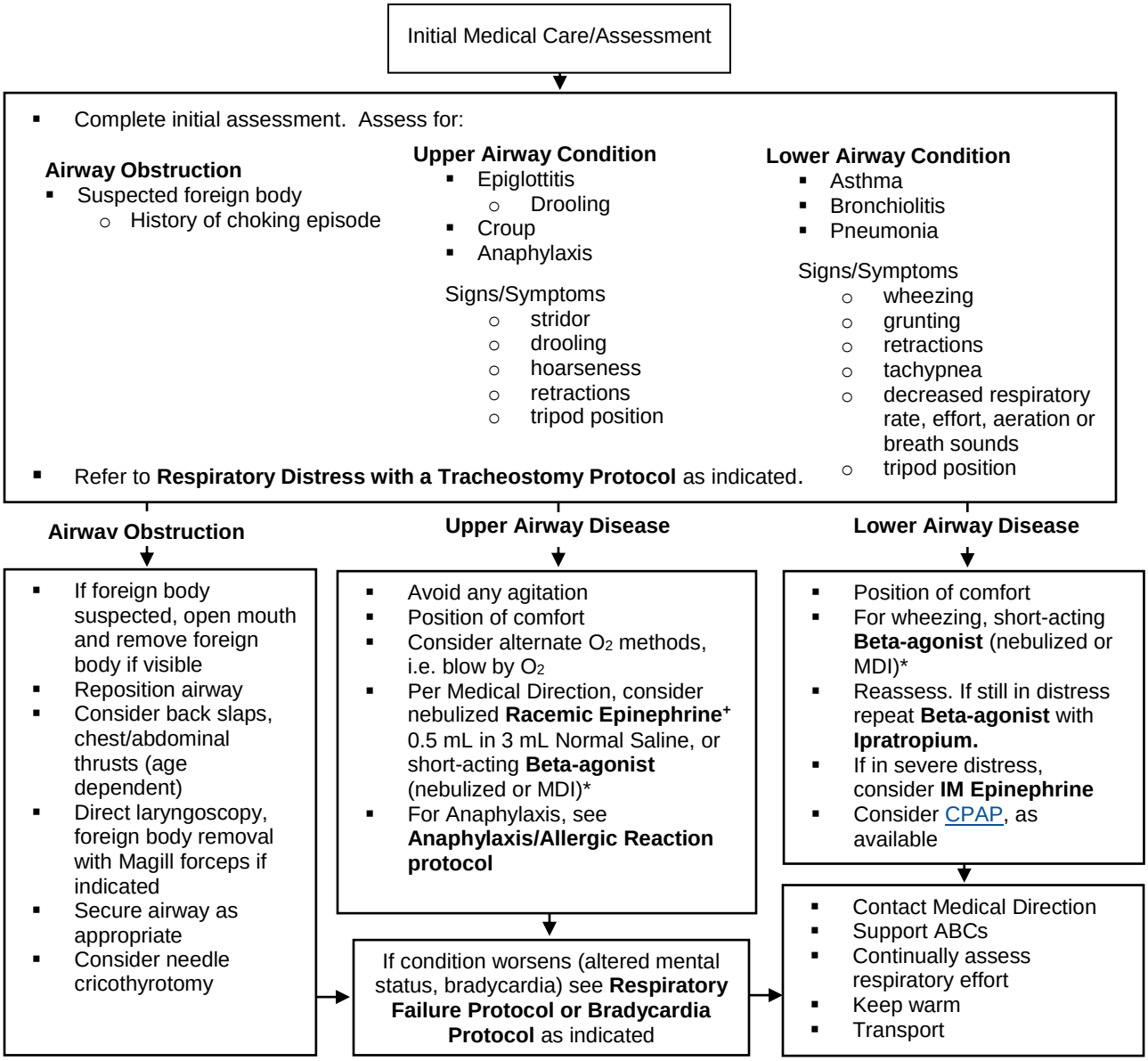


Special Considerations:

* Per Medical Direction, severe upper airway obstruction secondary to croup may be relieved with **Beta-agonists**.

* **Beta-agonist MDI** inhalers include, among others, **Albuterol (Proventil, Ventolin)** and **Levalbuterol (Xopenex).**
* An inhaler should be administered through a holding chamber or spacer device, if available.

ILLINOIS EMSC
PEDIATRIC RESPIRATORY DISTRESS
ALS/ILS/AEMT CARE GUIDELINE



Special Considerations:
- For Suspected Epiglottitis, DO NOT attempt intubation, invasive glottic visualization, or IV access

+ If Racemic Epinephrine is not available, consider: Epinephrine (1.0 mg/mL concentration) 3 mL in 3 mL Normal Saline and administer by inhalation
* **Beta-agonist MDI** inhalers include, among others, **Albuterol (Proventil, Ventolin)** and **Levalbuterol (Xopenex).**
* An inhaler should be administered through a holding chamber or spacer device, if available.

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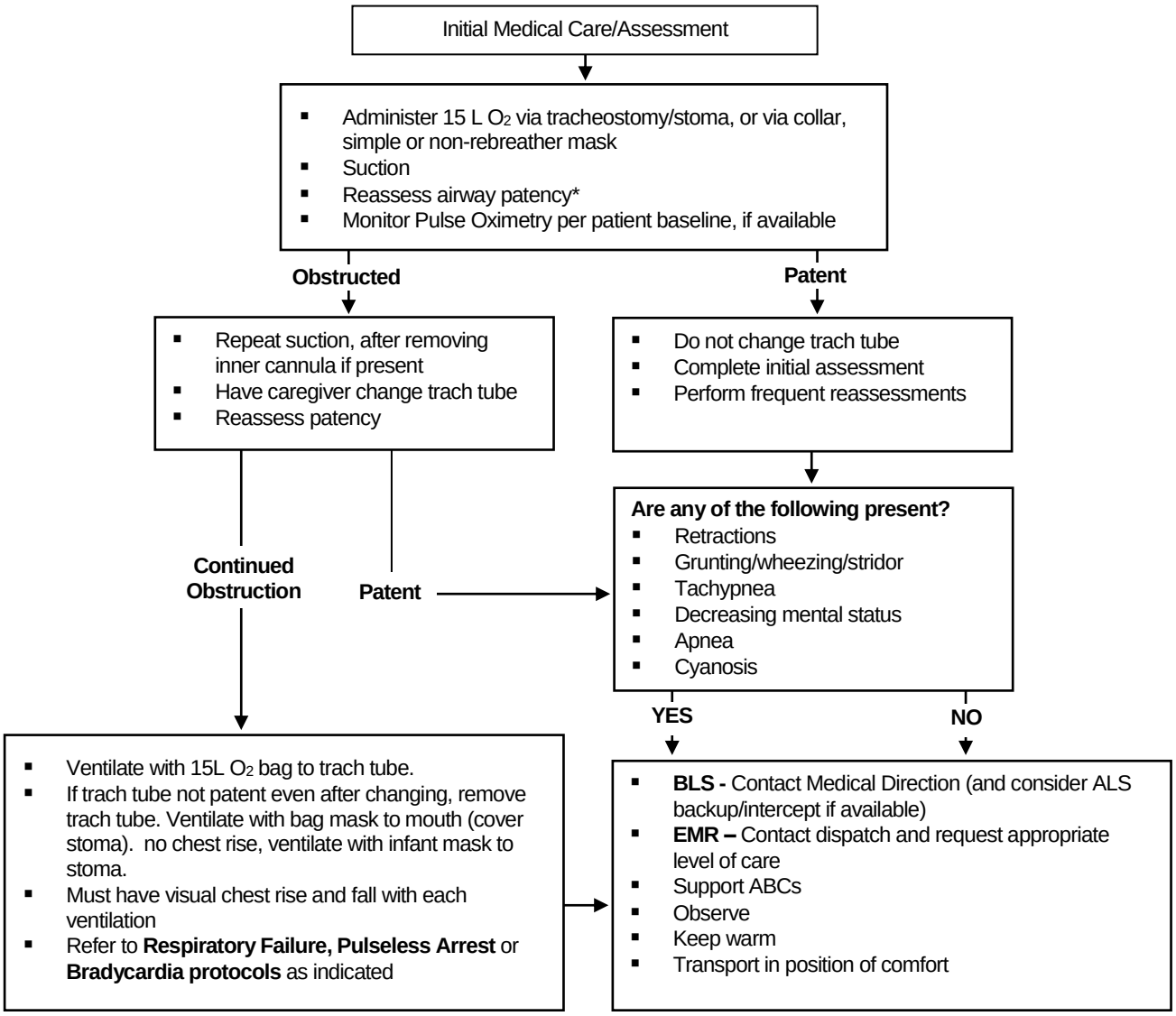
ILLINOIS EMSC
PEDIATRIC RESPIRATORY DISTRESS WITH A TRACHEOSTOMY TUBE
BLS/EMR CARE GUIDELINE

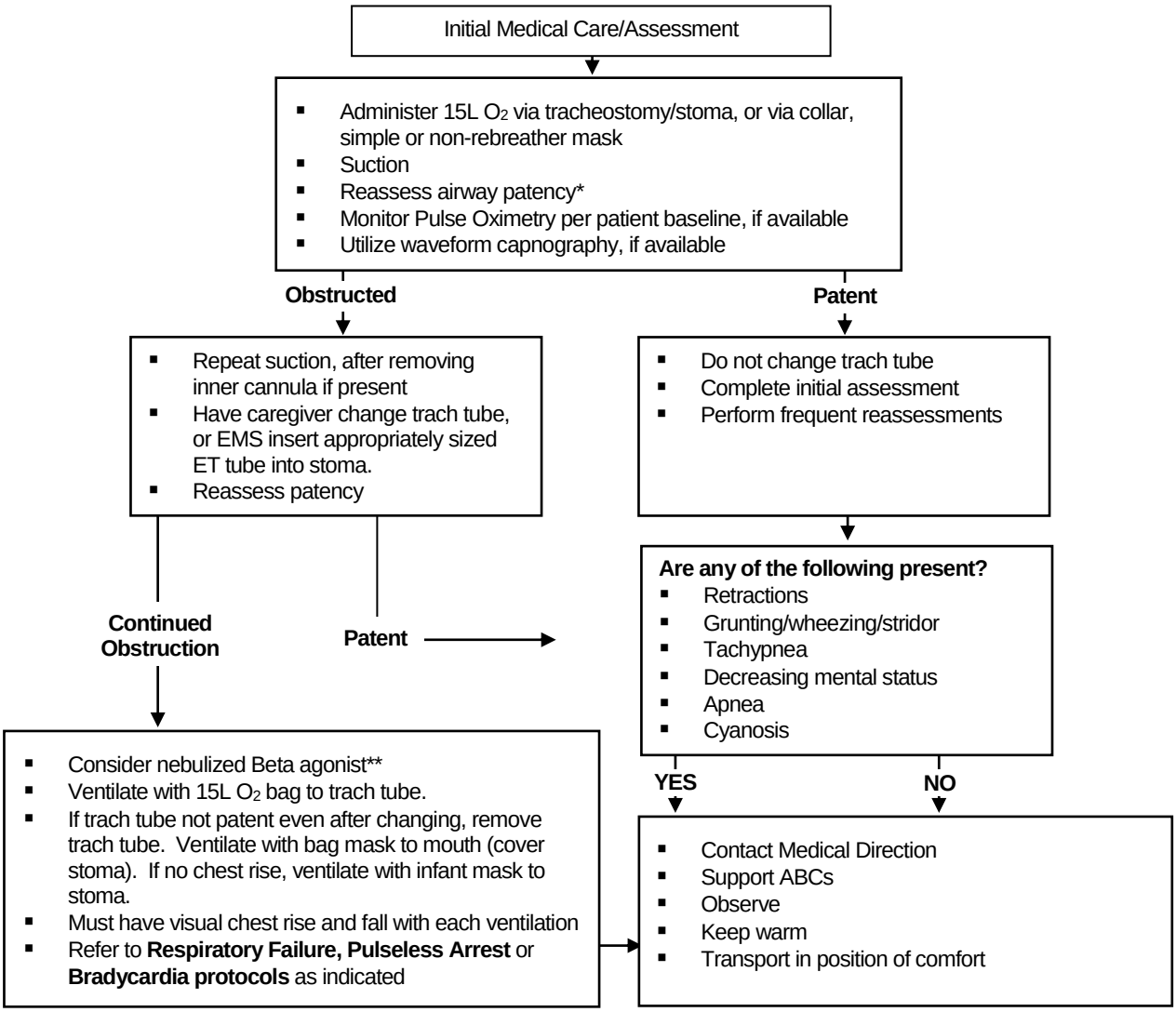


Special Considerations:

*If chest rise inadequate:
- Reposition the airway.
- When using mask to stoma, there may not be a good seal and additional volume may need to be delivered. Compress bag further and/or depress pop-off valve.

- Utilize child's medical equipment/supplies for optimum results
- Use parents/caregivers/homehealth nurses as medical resources at home and enroute
- Alert Medical Direction of parent/caregiver participation in care
- Allow caregiver to remain with child regardless of child's level of responsiveness.

ILLINOIS EMSC
PEDIATRIC RESPIRATORY DISTRESS WITH A TRACHEOSTOMY TUBE
ALS/ILS/AEMT CARE GUIDELINE



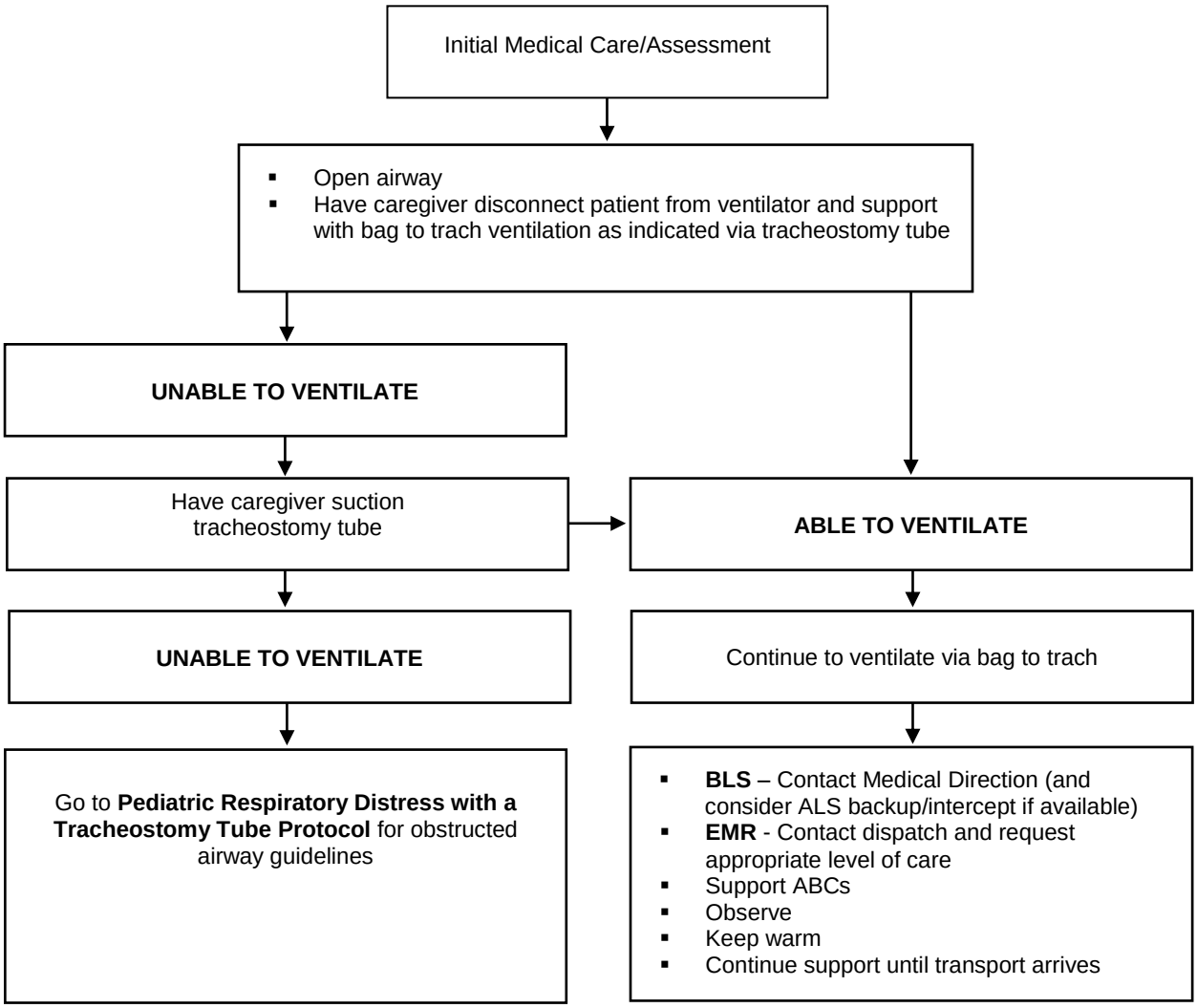
Special Considerations:

* If chest rise inadequate,
  - Reposition the airway.
  - When using mask to stoma, there may not be a good seal and additional volume may need to be delivered. Compress bag further and/or depress pop-off valve.

** Only nebulized bronchodilator (Beta-agonist) should be administered. **Beta-agonists** include, among others: **Albuterol (Proventil, Ventolin)** and **Levalbuterol (Xopenex)**.

- Utilize child's medical equipment/supplies for optimum results
- Use parents/caregivers/homehealth nurses as medical resources at home and enroute
- Alert Medical Direction of parent/caregiver participation in care
- Allow caregiver to remain with child regardless of child's level of responsiveness.

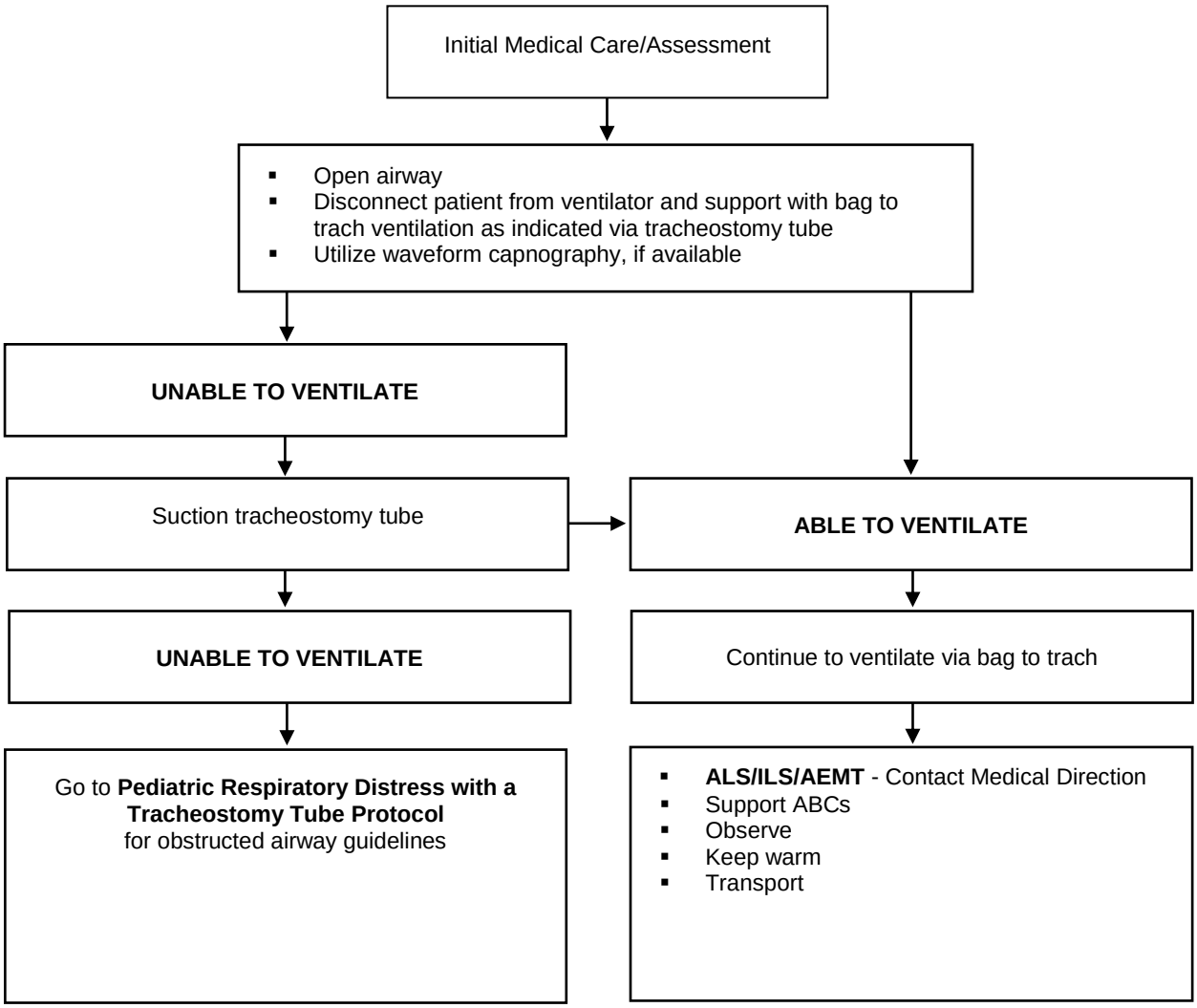
ILLINOIS EMSC
PEDIATRIC RESPIRATORY DISTRESS WITH A VENTILATOR BLS/EMR CARE GUIDELINE



Special Considerations:

- **NOTE: Ventilate via bag to trach until you achieve chest rise. Find out from parent the child's baseline ventilatory rate, and match with bag rate.**
- **Use parents/caregivers/home health nurses as medical resources at home and enroute.**
- Alert Medical Direction of parent/caregiver participation in care.
- Allow caregiver to remain with child regardless of child's level of responsiveness.
- Bring ventilator to the hospital or have parents/caregivers bring the ventilator to the hospital.

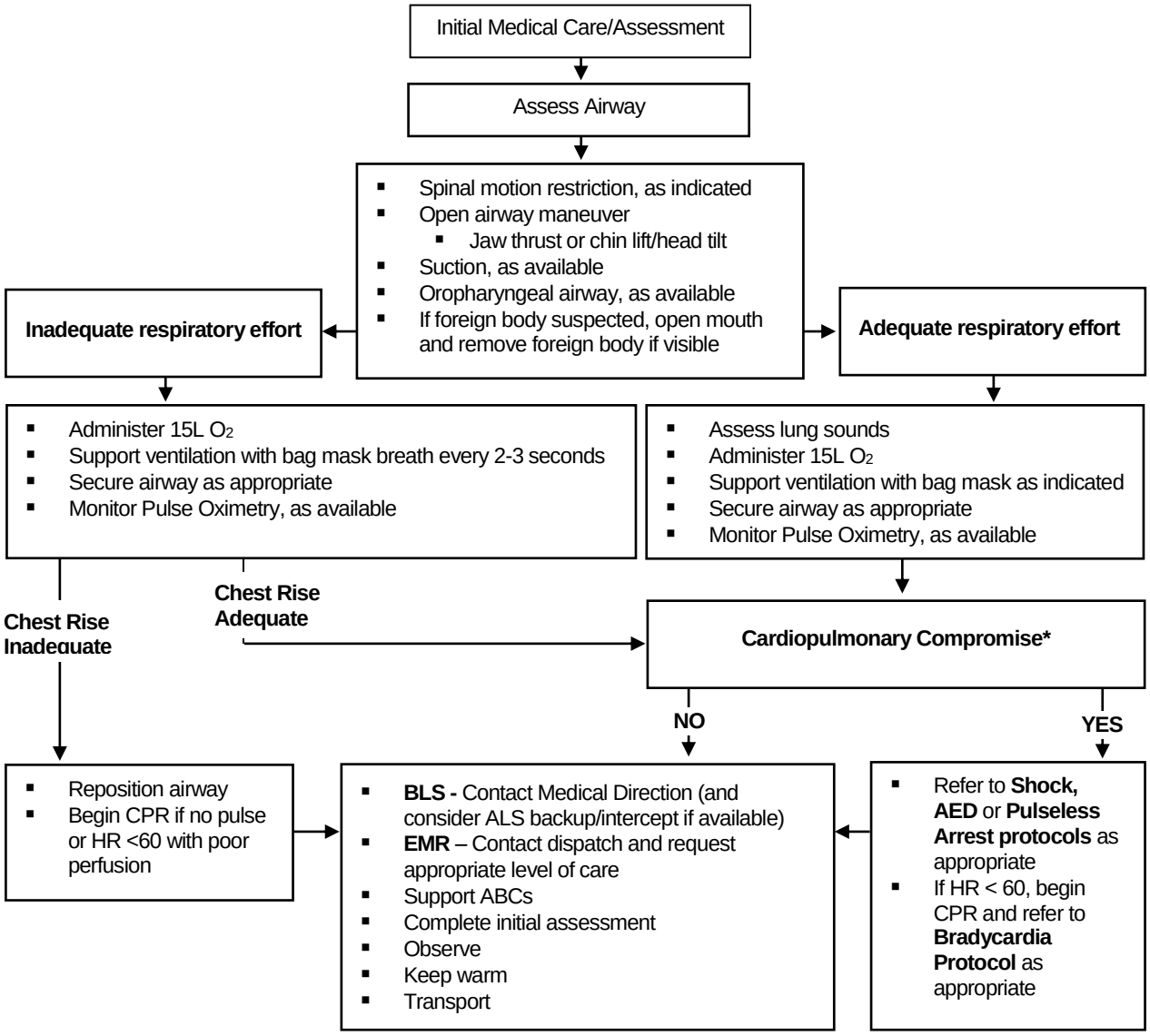
ILLINOIS EMSC
PEDIATRIC RESPIRATORY DISTRESS WITH A VENTILATOR
ALS/ILS/AEMT CARE GUIDELINE



Special Considerations:

- **NOTE: Ventilate via bag to trach until you achieve chest rise. Find out from parent the child's baseline ventilatory rate, and match with bag rate.**
- **Use parents/caregivers/home health nurses as medical resources at home and enroute.**
- Alert Medical Direction of parent/caregiver participation in care.
- Allow caregiver to remain with child regardless of child's level of responsiveness.
- Bring ventilator to the hospital or have parents/caregivers bring the ventilator to the hospital.

ILLINOIS EMSC
PEDIATRIC RESPIRATORY FAILURE
BLS/EMR CARE GUIDELINE

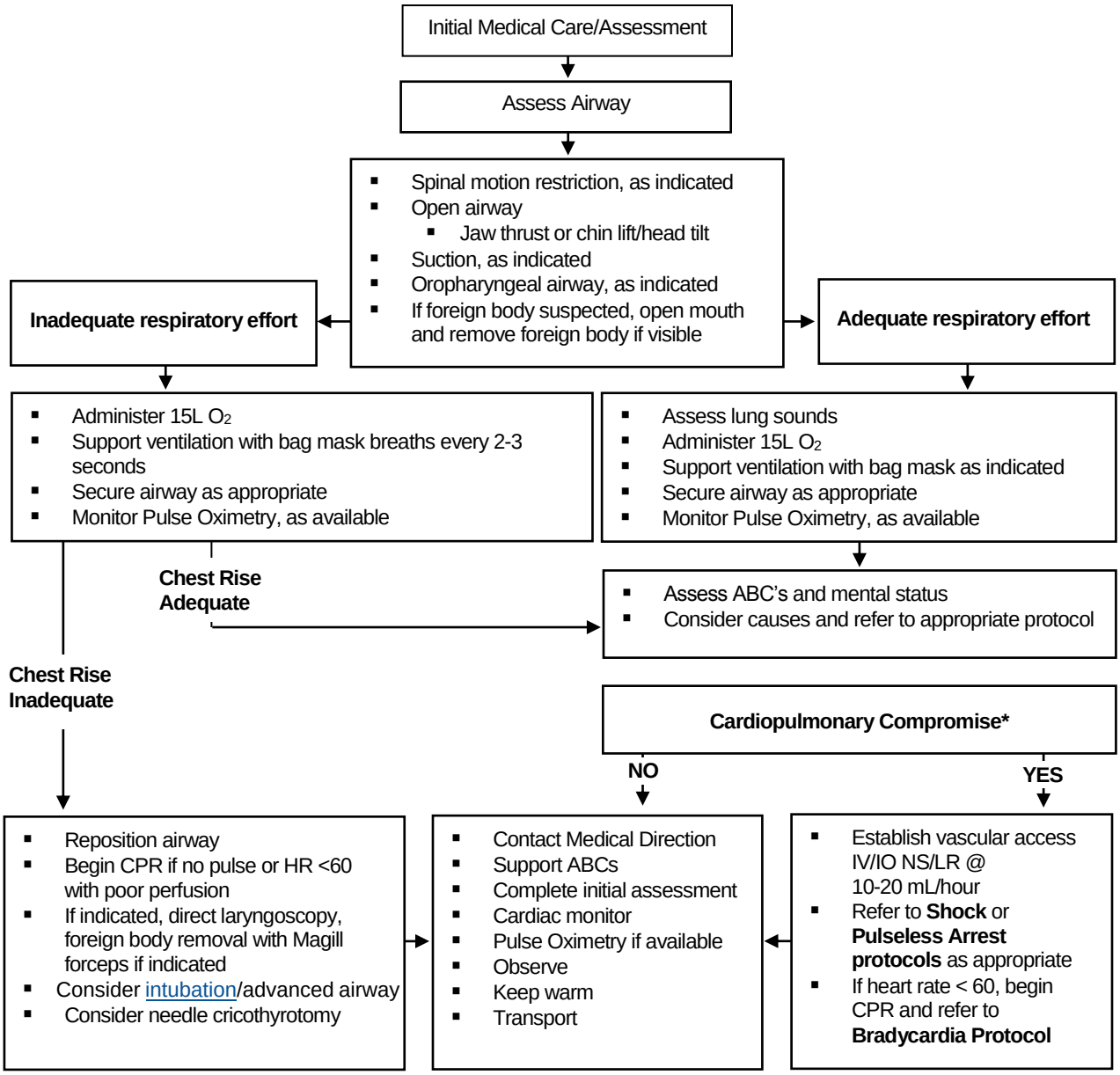


Special Considerations:

- Respiratory failure may be a presenting sign of a toxic ingestion, metabolic disorder or anaphylaxis.
- Refer to Respiratory Distress Protocol as appropriate.

*Refer to Vital Signs and Cardiopulmonary Compromise Resource for signs and symptoms of poor perfusion in children.

ILLINOIS EMSC
PEDIATRIC RESPIRATORY FAILURE
ALS/ILS/AEMT CARE GUIDELINE

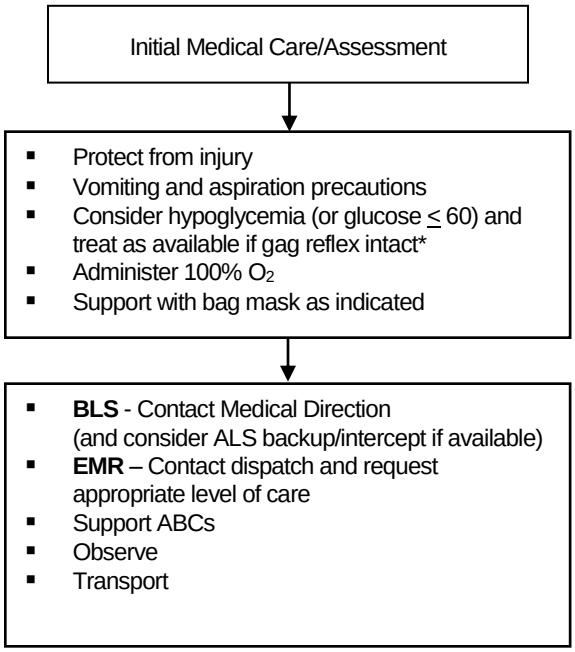


Special Considerations:

- Respiratory failure may be a presenting sign of a toxic ingestion, metabolic disorder or anaphylaxis.
- Consider **naloxone, flumazenil** or **glucose** per Medical Direction.

*Refer to Vital Signs and Cardiopulmonary Compromise Resource for signs and symptoms of poor perfusion in children.

ILLINOIS EMSC
PEDIATRIC SEIZURES
BLS/EMR CARE GUIDELINE

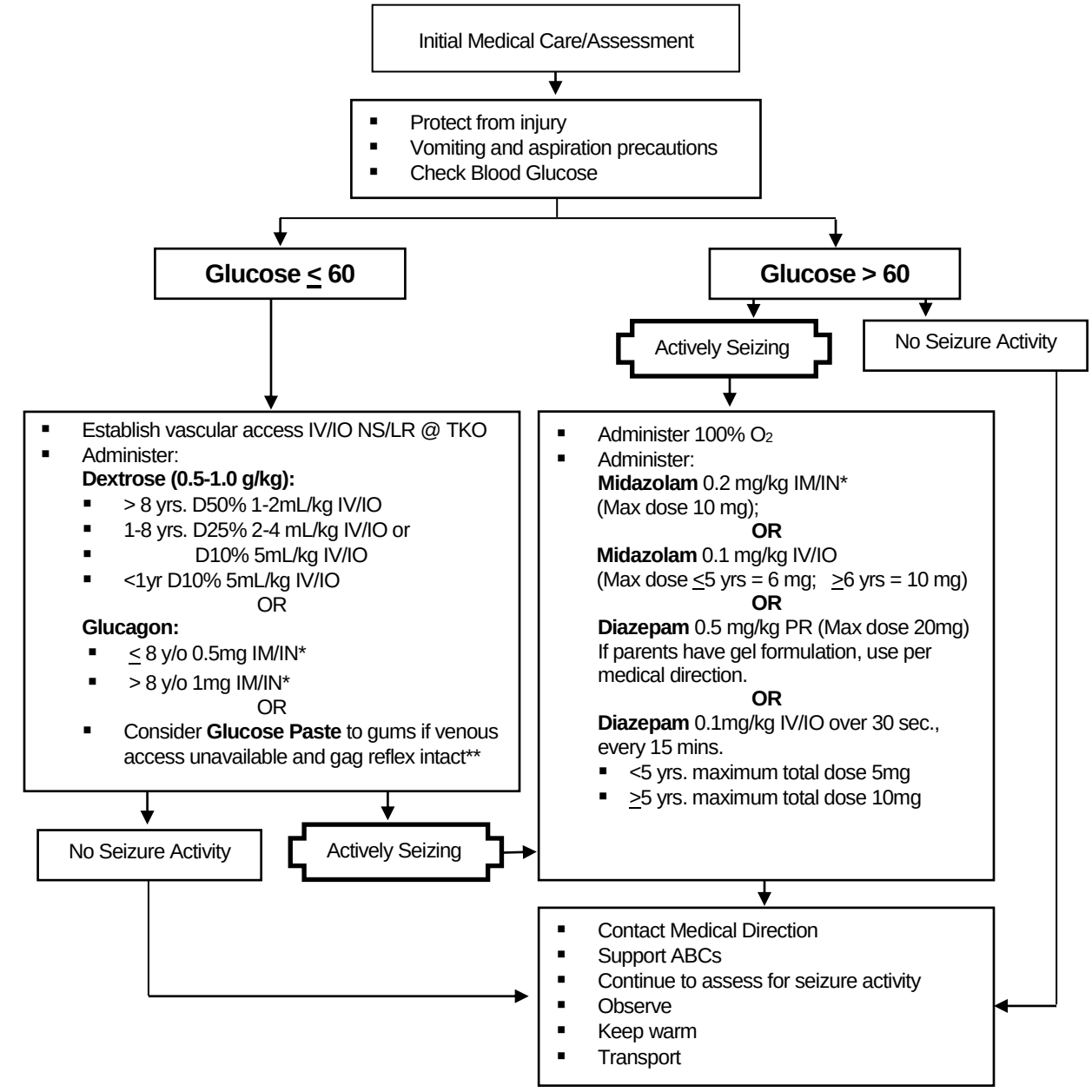


Special Considerations:

*Examples of treatment for hypoglycemia if gag reflex intact: glucose paste, sugar, cake icing.

- Refer to **Respiratory Failure Protocol** as indicated.
- Parents may have given medication prior to EMS arrival, so watch for respiratory depression.
- Document medications administered prior to transport.

ILLINOIS EMSC
PEDIATRIC SEIZURES
ALS/ILS/AEMT CARE GUIDELINE

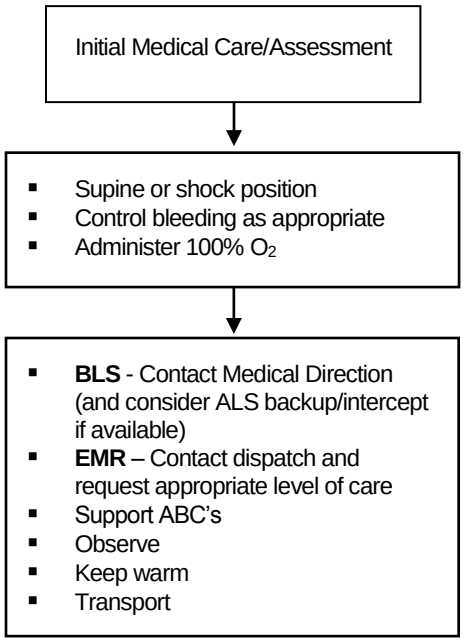


Special Considerations:

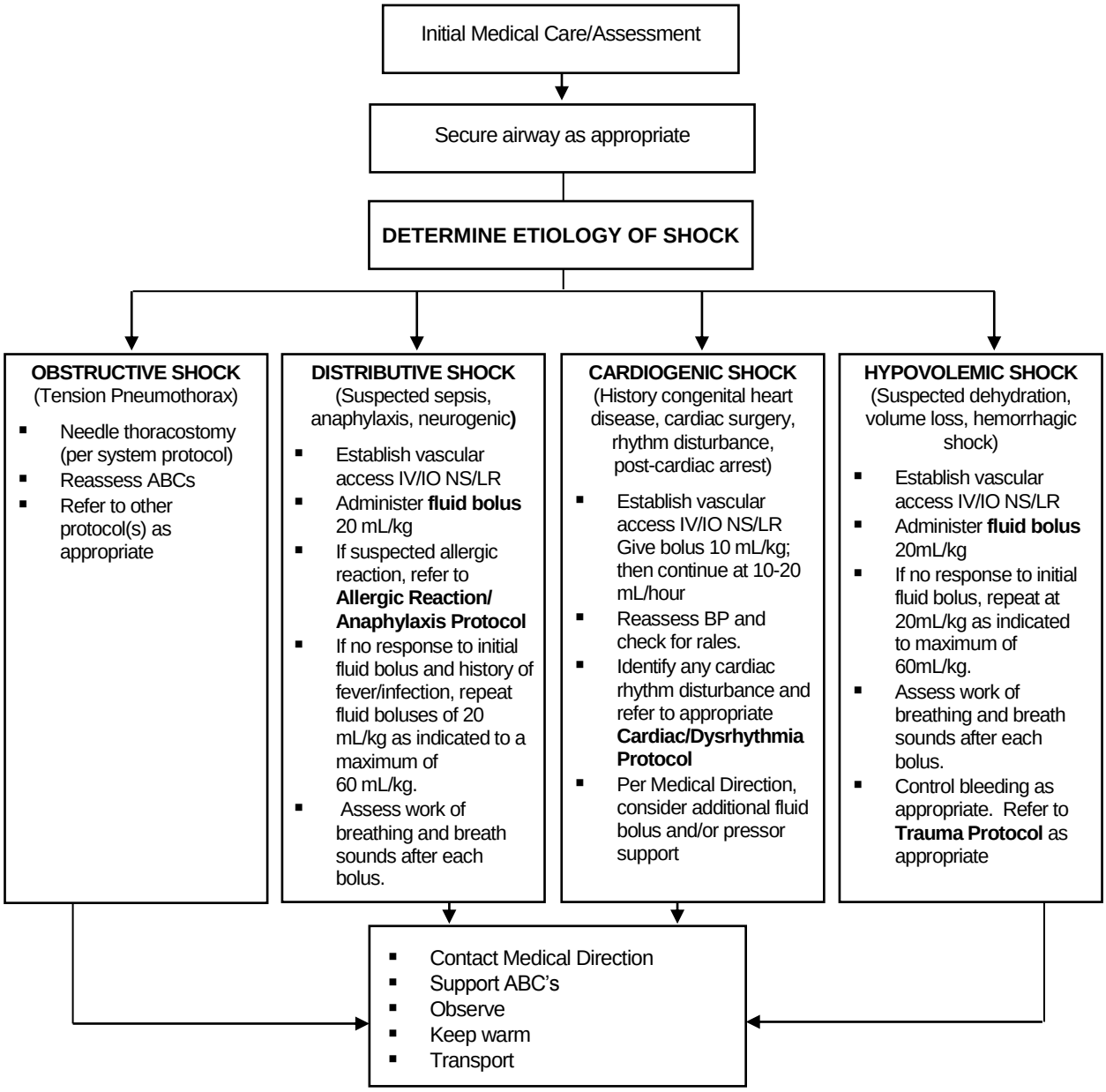
- Anticipate respiratory depression if **Diazepam** or **Midazolam** are administered
- Refer to **Respiratory Failure Protocol** as indicated
- Parents may have given medication prior to EMS arrival, so watch for respiratory depression.

* For intranasal administration use nasal atomizer and administer no more than 1.0 mL per nostril.
**Examples of treatment for Hypoglycemia if gag reflex intact: glucose paste, sugar, cake icing.

ILLINOIS EMSC
PEDIATRIC SHOCK
BLS/EMR CARE GUIDELINE



ILLINOIS EMSC
PEDIATRIC SHOCK
ALS/ILS/AEMT CARE GUIDELINE



Special Considerations:

- Caution – fluids may need to be restricted in Cardiogenic shock.

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Stroke

PEARLS

- Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro
- Acute Stroke care is evolving rapidly. Last known normal may be changed at any time depending on the capabilities and resources of your hospital based on Stroke Destination Plan.
- "Last Known Well" Time or Last Seen Normal is one of the most important items that EMS can obtain, of which all treatment decisions are based.
    a. One of the most important items the pre-hospital provider can obtain, of which all treatment decisions are based. Be very precise in gathering data to establish the time of onset and report as an actual time (i.e. 13:47 NOT about 45 minutes ago. Without this information, patient, may not be able to receive thrombolytics at facility.
    Wake up stroke: Time starts when patient last awake or symptom free.
    b. You are often in the best position to determine the actual last known well time, while you have family, friends or caretakers available (obtain cell phone number if at all possible). Often these sources of information may arrive well after you have delivered the patient to the hospital. Delays in decisions due to lack of information may prevent an eligible patient from receiving thrombolytics.
- The Reperfusion Checklist should be completed for any suspected stroke patient. With a duration of symptoms of less than, scene times should be limited to minutes, early notification / activation of receiving facility should be performed and transport times should be minimized.
- If possible, place 2 IV sites
- Blood draw:.
    a. Many systems utilize EMS venous blood samples. Follow system approved labeling if applicable
- The differential listed on the Altered Mental Status Protocol should also be considered.
- Be alert for airway problems (swallowing difficulty, vomiting/aspiration).
- Hypoglycemia can present as a localized neurologic deficit, especially in the elderly.
- Document the Stroke Screen results in the PCR
- Consider posterior stroke for patients presenting with dizziness / vertigo, vomiting, loss of balance.
- **Pediatrics**: Strokes do occur in children, they are slightly more common in ages < 2, in boys, and in African-Americans. Newborn and infant symptoms consist of seizures, extreme sleepiness, and using only one side of the body. Children and teenager's symptoms may consist of severe headaches, vomiting, sleepiness, dizziness, and/or loss of balance or coordination.

KEY DOCUMENTATION ELEMENTS

- "Last Known Well" Time or Last Seen Normal
- Blood glucose level
- Stroke screen used and findings
- Time of notification to receiving hospital

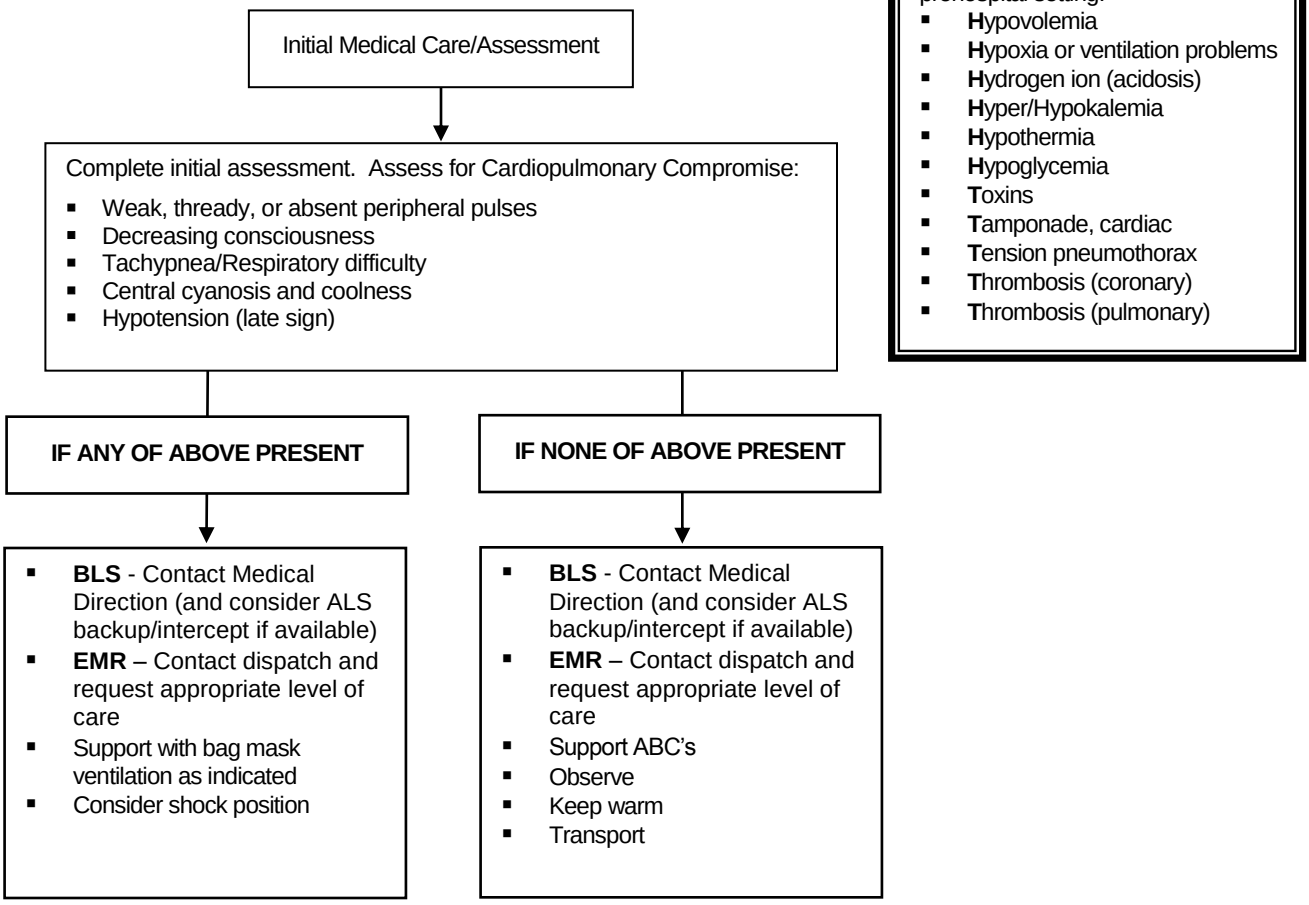
PERTINENT ASSESSMENT FINDINGS

- Prehospital Stroke Scale
- LVO Screening Tool

QUALITY METRICS

- Suspected stroke patient receiving prehospital screening
- Documentation of "Last Known Well" Time
- Glucose testing for suspected stroke patients
- Advance hospital notification for suspected stroke patients
- Scene time for suspected stroke patients

ILLINOIS EMSC
TACHYCARDIA PROTOCOL
BLS/EMR CARE GUIDELINE



REVERSIBLE CAUSES

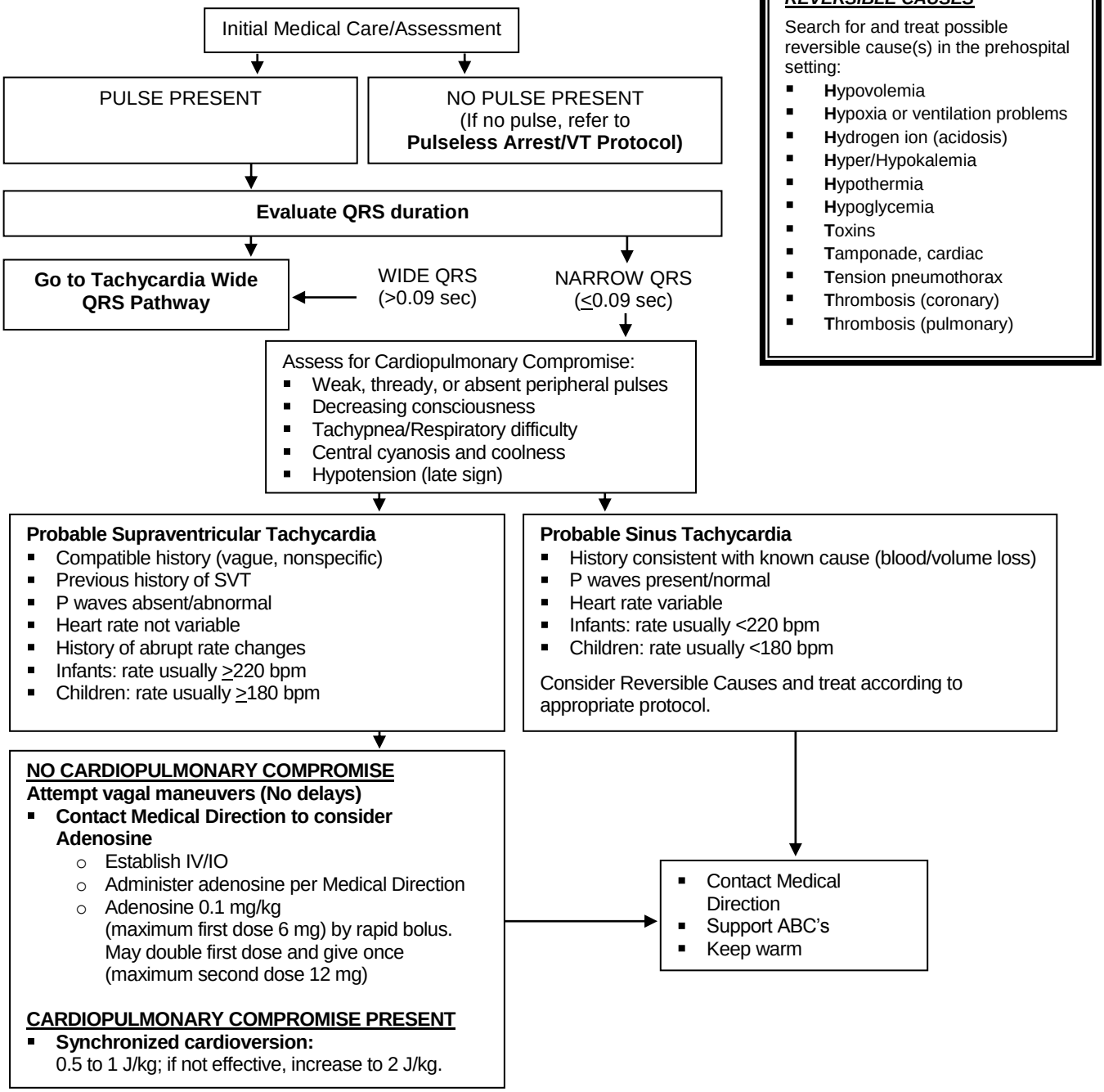
Search for and treat possible reversible cause(s) in the prehospital setting:

- **H**ypovolemia
- **H**ypoxia or ventilation problems
- **H**ydrogen ion (acidosis)
- **H**yper/Hypokalemia
- **H**ypothermia
- **H**ypoglycemia
- **T**oxins
- **T**amponade, cardiac
- **T**ension pneumothorax
- **T**hrombosis (coronary)
- **T**hrombosis (pulmonary)

Special Considerations:

Be prepared for respiratory or cardiac arrest. Consider **AED, Pulseless Arrest** or **Respiratory Arrest protocols**.

ILLINOIS EMSC
TACHYCARDIA *(NARROW QRS PATHWAY)*
ALS/ILS/AEMT CARE GUIDELINE



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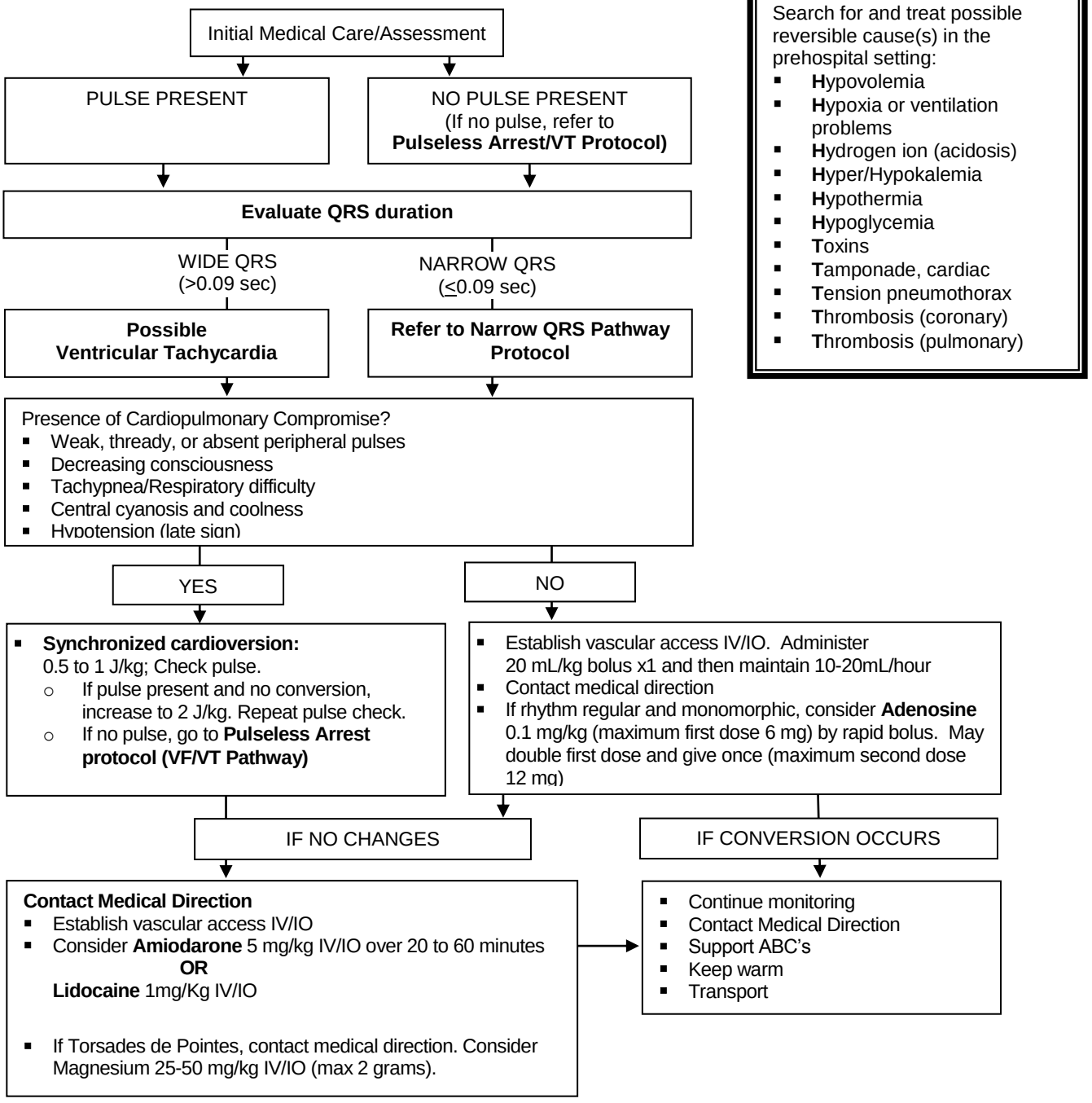
- **H**yper/Hypokalemia
- **H**ypothermia
- **H**ypoglycemia
- **T**oxins
- **T**amponade, cardiac
- **T**ension pneumothorax
- **T**hrombosis (coronary)
- **T**hrombosis (pulmonary)

Special Considerations:
Attempt vagal maneuvers first unless cardiopulmonary compromise present and it does not delay chemical or electrical cardioversion. In infants and young children, apply ice to the face without occluding the airway. In older children, Valsalva maneuvers are acceptable.

ILLINOIS EMSC
TACHYCARDIA *(WIDE QRS PATHWAY)*
ALS/ILS/AEMT CARE GUIDELINE



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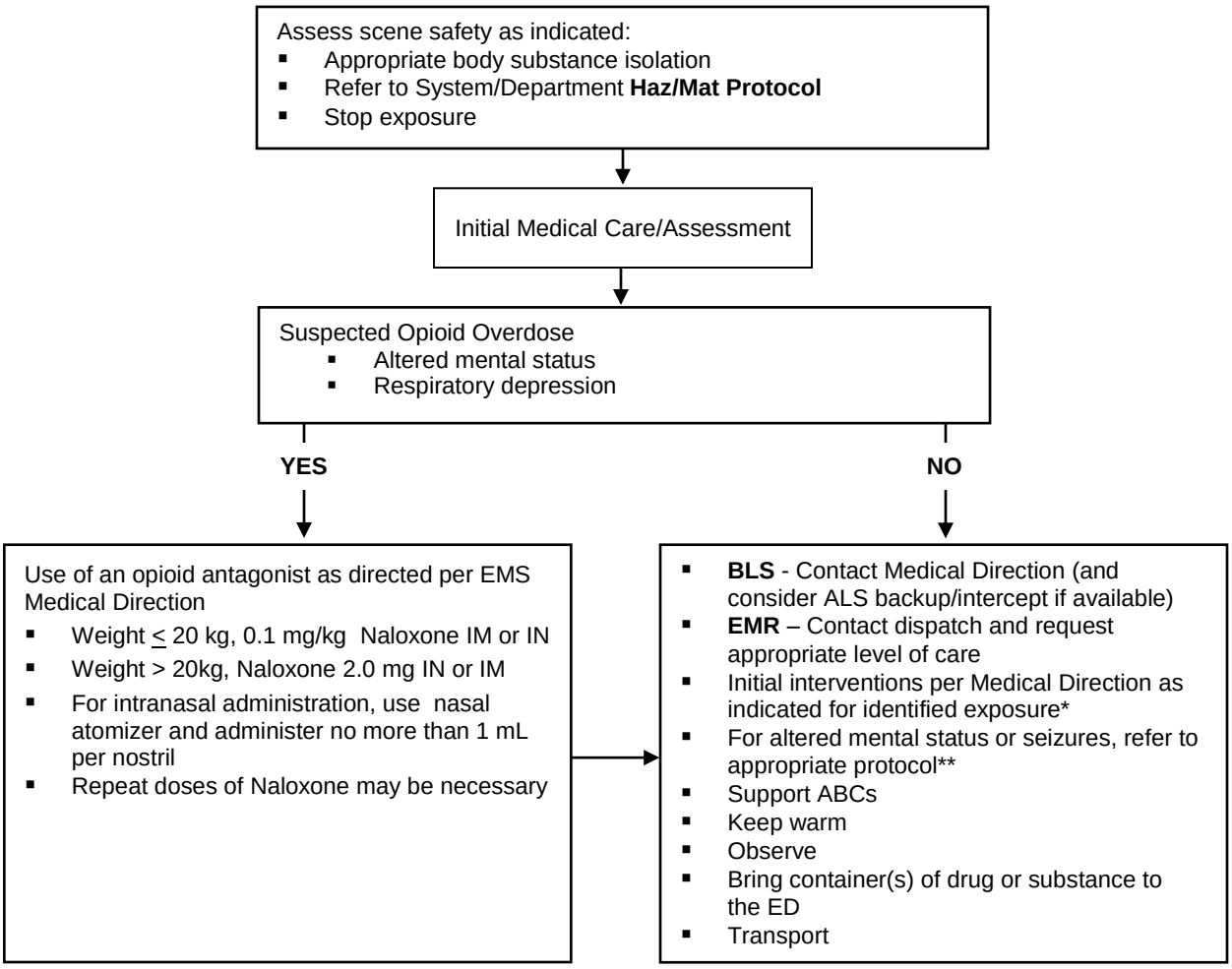
ILLINOIS EMSC
PEDIATRIC TOXIC EXPOSURES/INGESTIONS
BLS/EMR CARE GUIDELINE



Special Considerations:
- Do not induce vomiting, especially in cases where caustic substance ingestion is suspected.
- Contact law enforcement if home methamphetamine lab suspected, and also contact DCFS if children are present.
- Poison Center phone # 1-800-222-1222

***REFER TO BACK OF PAGE FOR LIST OF POTENTIAL ANTIDOTES, INGESTIONS AND EXPOSURES.**
****** Anticipate vomiting, respiratory arrest, seizure, dysrhythmias and refer to indicated protocols.

EXPOSURE TO OR INGESTION OF NARCOTICS OR UNKNOWN SUBSTANCES FOR BLS/EMR

POTENTIAL TREATMENT

- Contact direct medical oversight for specific information about individual toxic exposures and treatments.
- **DO NOT INDUCE VOMITING, ESPECIALLY IN CASES WHERE CAUSTIC SUBSTANCE INGESTION IS SUSPECTED.**

POTENTIAL EXPOSURES

- Burning overstuffed furniture = Cyanide
- Old burning buildings = Lead fumes and Carbon Monoxide
- Bismuth subsalicylate (e.g. Pepto-Bismol™)* = Aspirin
- Pesticides = Organophosphates & Carbamates
- Topical benzocaine for dental/gum pain (e.g. Orajel™) = Methemoglobinemia
- Common Plants = Treat symptoms and bring plant/flowers to ED

*Pepto-Bismol™ children's formulation is aspirin-free

SMELLS

- Almond = Cyanide
- Fruit = Alcohol
- Garlic = Arsenic, parathion, DMSO
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- Natural gas = Carbon monoxide
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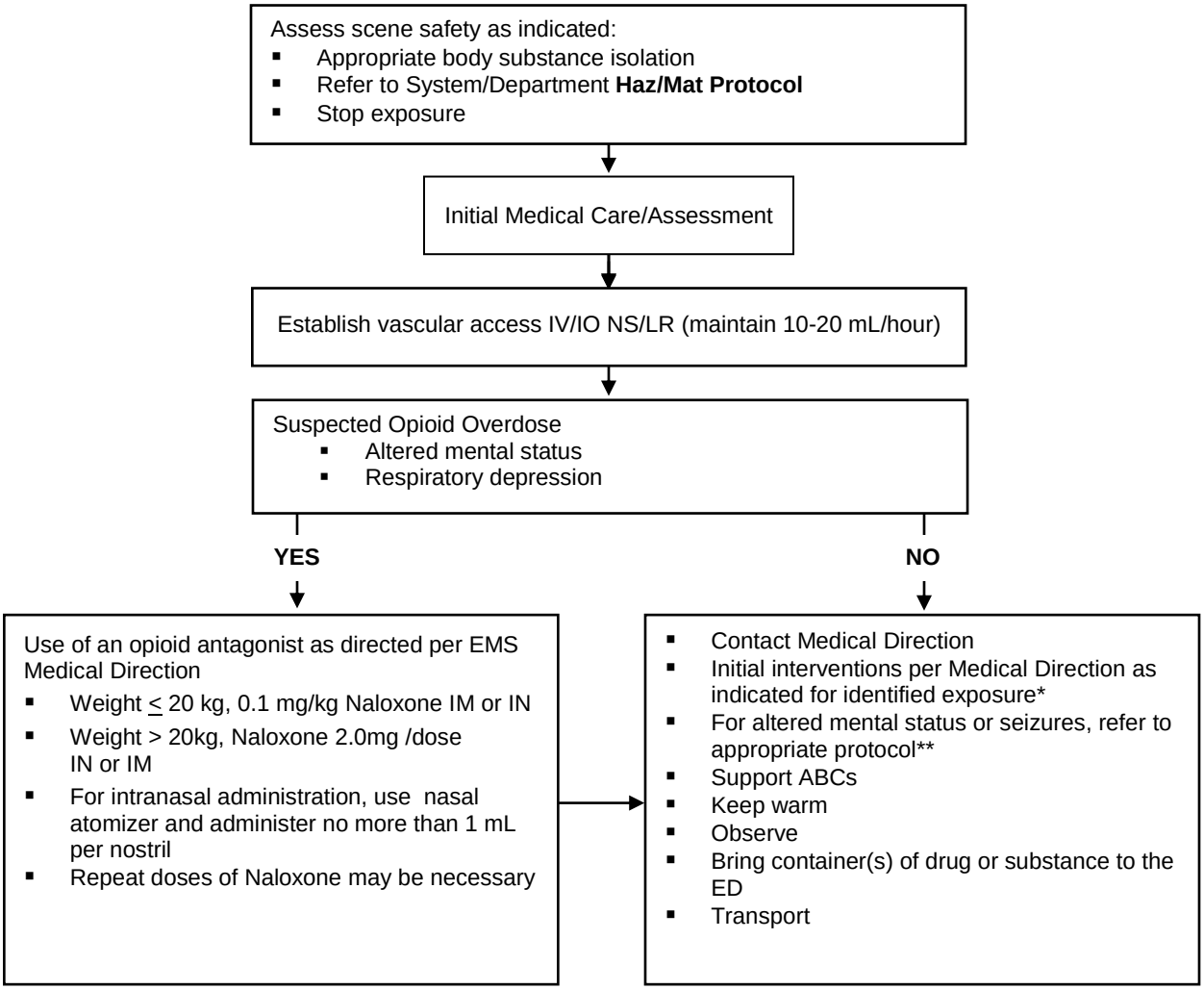
- Stove gas = Think CO (CO and methane are odorless)
- Wintergreen = Methyl salicylate

ILLINOIS EMSC
PEDIATRIC TOXIC EXPOSURES/INGESTIONS
ALS/ILS/AEMT CARE GUIDELINE



Special Considerations:
- Secure airway per protocol for GCS <8
- Do not induce vomiting, especially in cases where caustic substance ingestion is suspected.
- Contact law enforcement if home methamphetamine lab suspected, and also contact DCFS if children are present.
- Poison Center phone # 1-800-222-1222

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****** Anticipate vomiting, respiratory arrest, seizure, dysrhythmias and refer to indicated protocols.

EXPOSURE TO OR INGESTION OF NARCOTICS OR UNKNOWN SUBSTANCES FOR ALS/ILS/AEMT

POTENTIAL TREATMENT

- Contact direct medical oversight for specific information about individual toxic exposures and treatments.

- **DO NOT INDUCE VOMITING, ESPECIALLY IN CASES WHERE CAUSTIC SUBSTANCE INGESTION IS SUSPECTED.**

- Treatment for toxic exposures may be instituted as permitted by medical direction, including the following:
    - High-dose atropine for organophosphates
    - Sodium bicarbonate for tricyclic antidepressants
    - Glucagon for calcium channel blockers or beta-blockers
    - Diphenhydramine for dystonic reactions
    - Dextrose for insulin overdose

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- Rotten eggs = Hydrogen sulfide
- Silver polish = Cyanide
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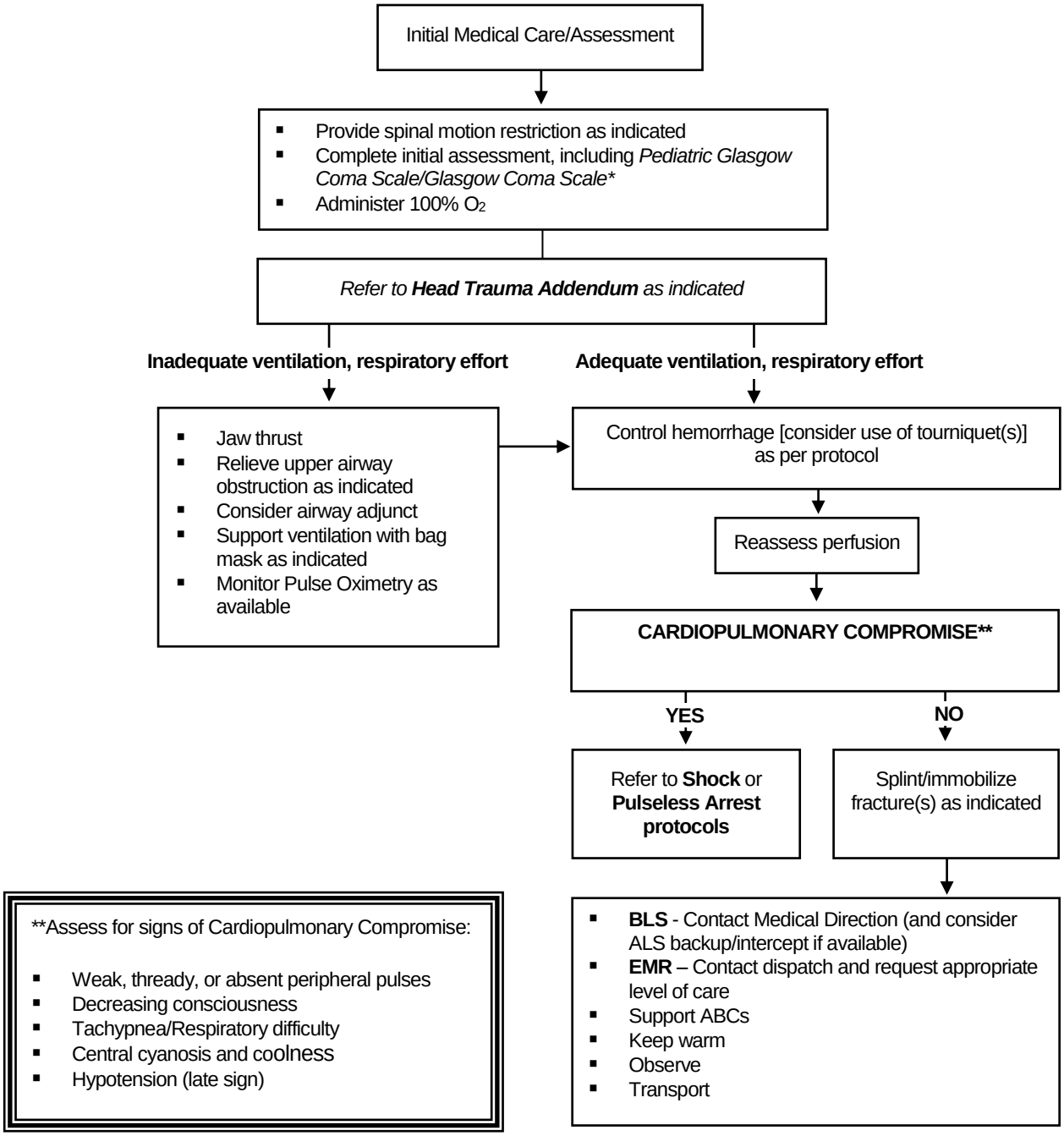
ILLINOIS EMSC
PEDIATRIC TRAUMA
BLS/EMR CARE GUIDELINE



***Refer to back of protocol for Pediatric Head Trauma Addendum and Pediatric Glasgow Coma Scale/Glasgow Coma Scale.**

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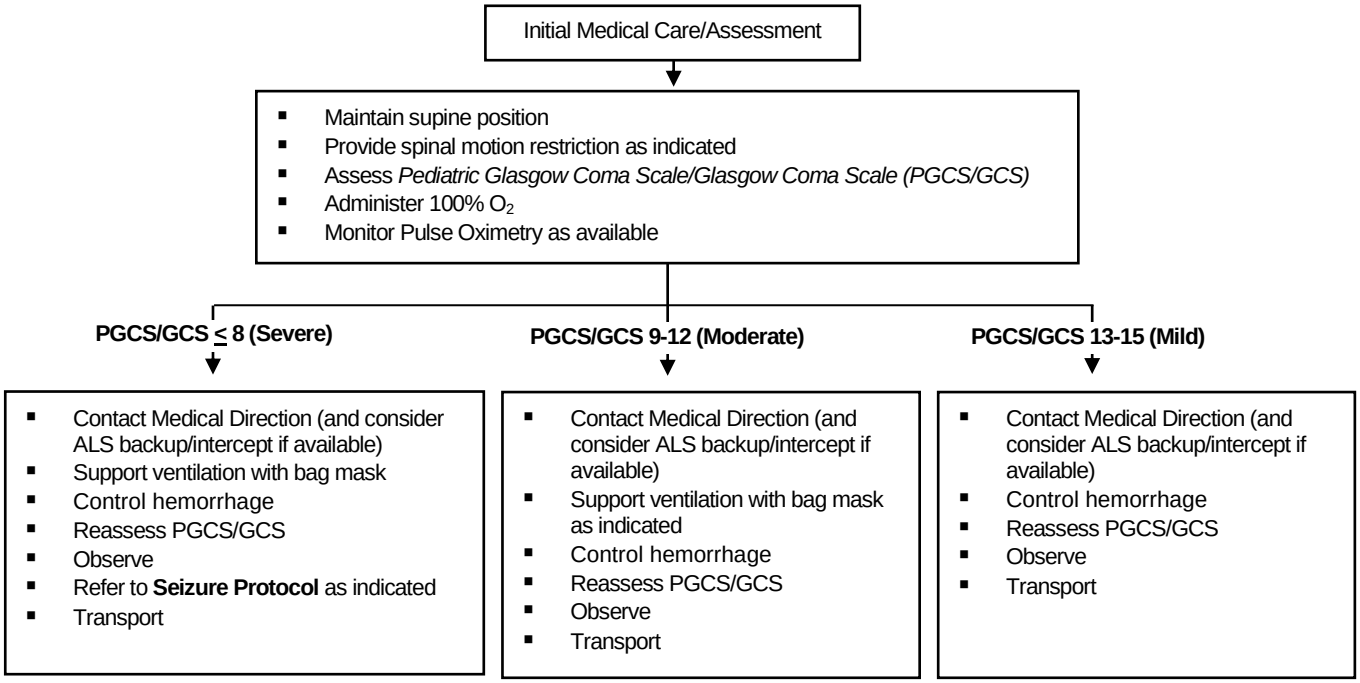
ILLINOIS EMSC
PEDIATRIC HEAD TRAUMA ADDENDUM
BLS/EMR CARE GUIDELINE



PEDIATRIC GLASGOW COMA SCALE (PGCS)		GLASGOW COMA SCALE (GCS)	
	< 2 Years	**> 2 Years**	**Score**
EYE OPENING	Spontaneous	Spontaneous	4
	To speech	To speech	3
	To pain	To pain	2
	No response	No response	1
VERBAL RESPONSE	Coos, babbles, appropriate words	Oriented/appropriate words	5
	Irritable, cries but consolable	Confused	4
	Cries to pain, inconsolable	Inappropriate words/persistent cry	3
	Moans to pain	Incomprehensible sounds	2
	No response	No response	1
MOTOR RESPONSE	Normal spontaneous movements	Obeys commands	6
	Withdraws from touch	Localizes to pain	5
	Withdraws from pain	Withdraws from pain	4
	Abnormal flexion (decorticate)	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	Abnormal extension (decerebrate)	2
	No response	No response	1
TOTAL PGCS/GCS SCORE:			**(3-15)**

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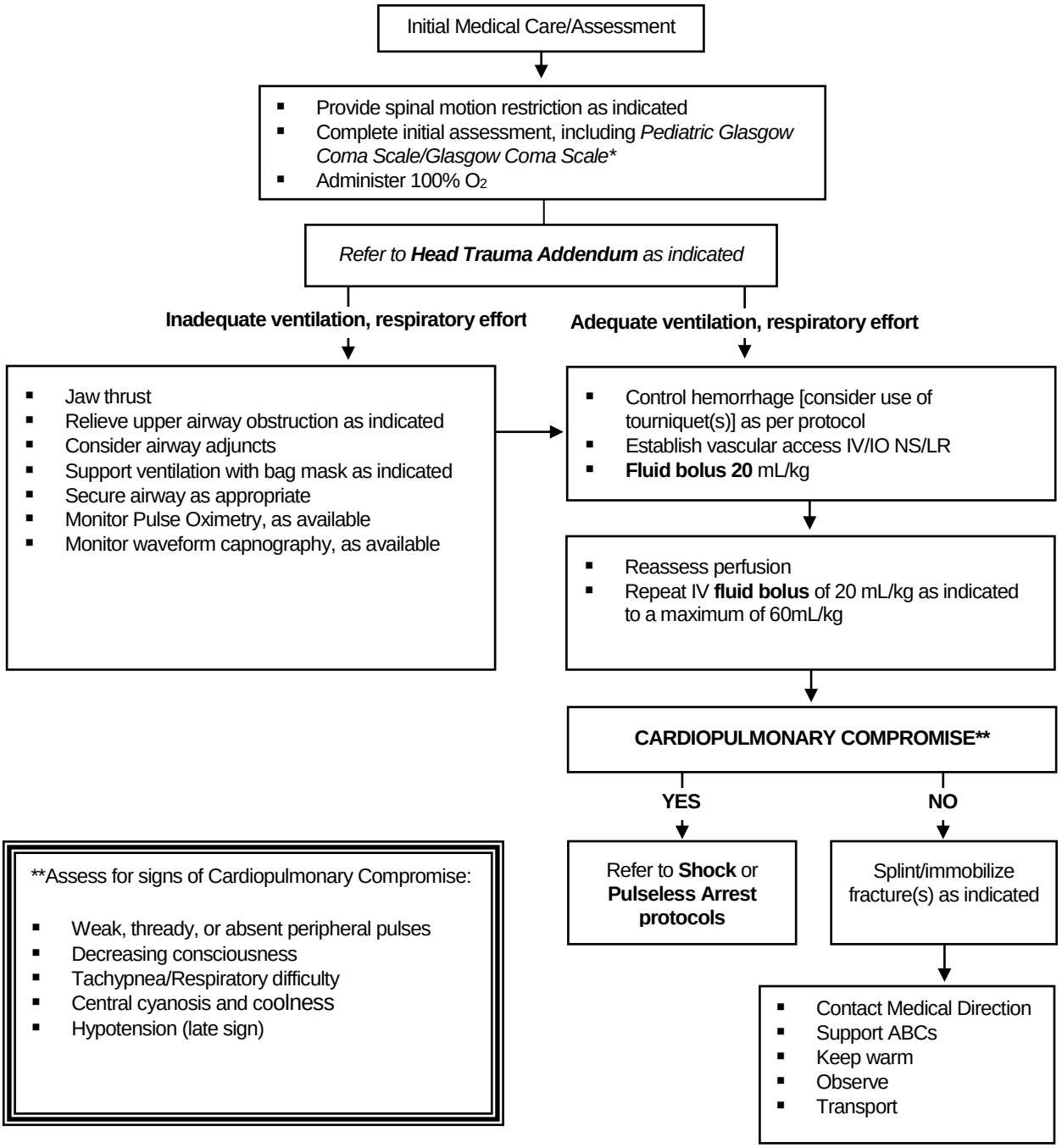
ILLINOIS EMSC
PEDIATRIC TRAUMA
ALS/ILS/AEMT CARE GUIDELINE



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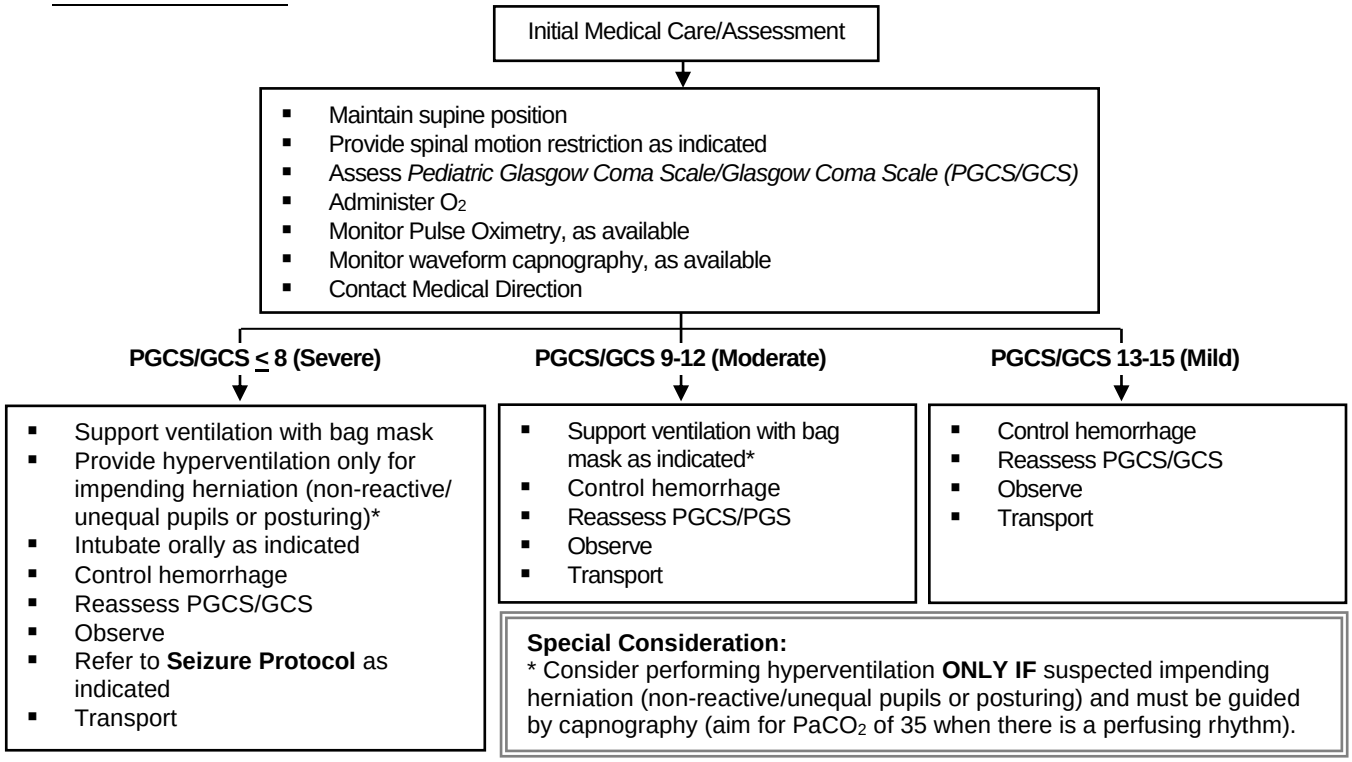

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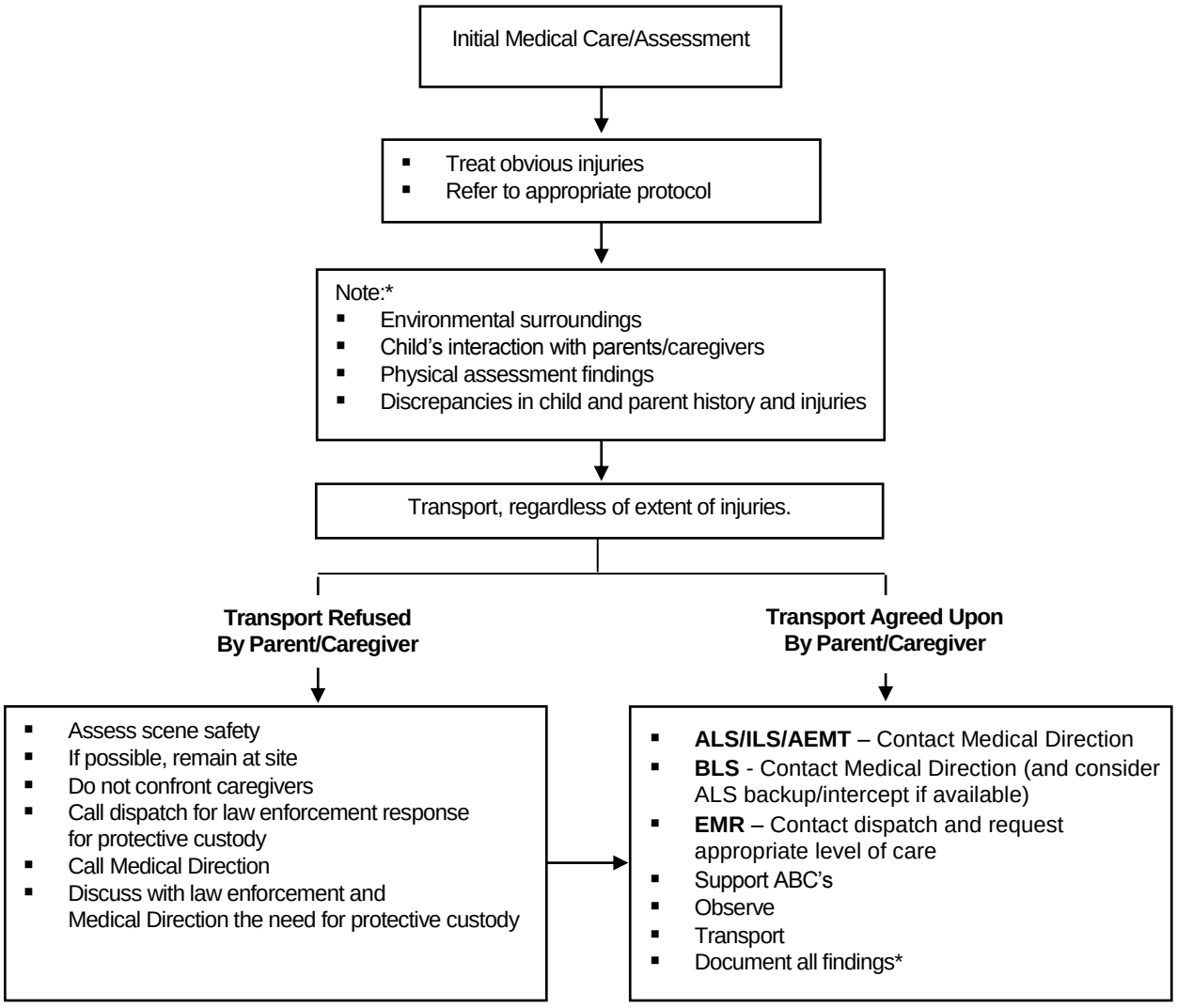
	Abnormal flexion (decorticate)	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	Abnormal extension (decerebrate)	2
	No response	No response	1
TOTAL PGCS/GCS SCORE:			**(3-15)**

ILLINOIS EMSC
SUSPECTED CHILD ABUSE AND NEGLECT
ALS/ILS/AEMT/BLS/EMERGENCY MEDICAL RESPONDER CARE GUIDELINE



REPORT TO ED PHYSICIAN, ED CHARGE NURSE AND DCFS (1-800-25-ABUSE). WHEN CONTACTING DCFS, IDENTIFY SELF AS A STATE MANDATED REPORTER TO EXPEDITE PROCESS.

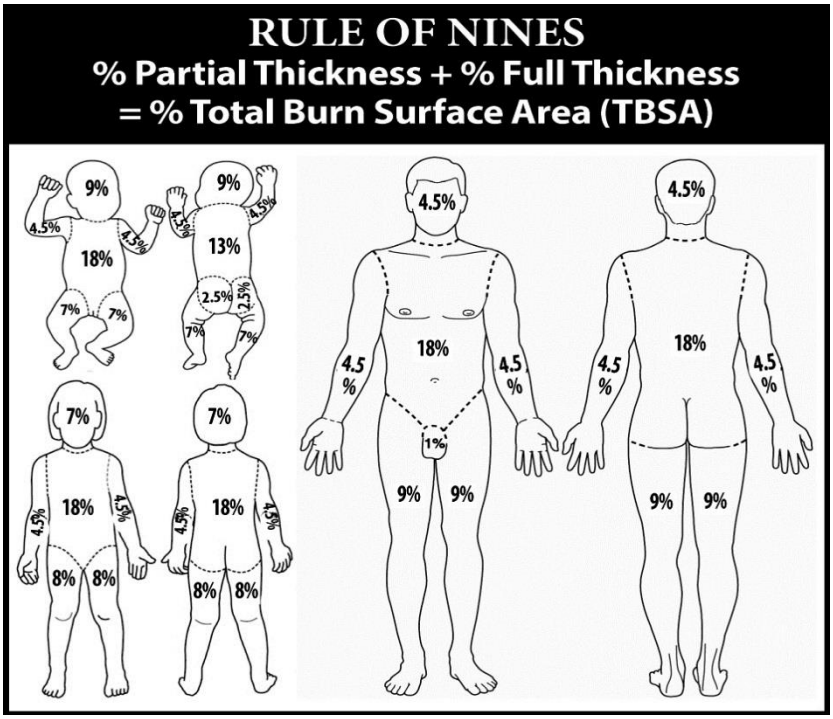
*Refer to next page for special considerations.

SPECIAL CONSIDERATIONS:

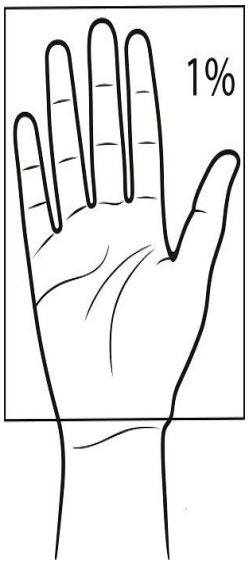
1. You are required by law to report your suspicions.
2. Document findings objectively:
    - Body location of the injury
    - Severity of the injury
    - Patterns of similar injury over time
    - Include verbatim statements offered by the child
    - Note verbatim statements from the parent/caregiver
3. Suspect battered or abused child if any of the following is found:
    - A discrepancy exists between history of injury and physical exam.
    - Caregiver provides a changing or inconsistent history.
    - There is a prolonged interval between injury and the seeking of medical help.
    - Child has a history of repeated trauma.
    - Caregiver responds inappropriately or does not comply with medical advice.
    - Suspicious injuries are present, such as:
        - any bruising in an infant 4.99 months or younger
        - For children under 4 years of age, assess using the **TEN-4-FACESp** - torso, ear, neck and body regions: frenulum, angle of the jaw, cheeks (fleshy), eyelids, subconjunctivae and patterned bruising. [Based on the 2021 revised bruising clinical decision rule (BCDR)].
        - injuries of body areas that are normally shielded, including the back and chest,
        - fractures of long bones in children under 3 years of age,
        - old scars, or injuries in different stages of healing,
        - bizarre injuries, such as bites, cigarette burns, rope marks, imprint of belt or other object,
        - trauma of genital or perianal areas,
        - sharply demarcated burns in unusual areas,
        - scalds that suggest child was dipped into hot water.
4. The following are some common forms of neglect:
    - Environment is dangerous to the child (e.g., weapons within reach, playing near open windows without screen/guards, perilously unsanitary conditions, etc.).
    - Caretaker has not provided, or refuses to permit medical treatment of child's acute or chronic life-threatening illness, or of chronic illness, or fails to seek necessary and timely medical care for child.
    - Child under the age of 10 has been left unattended or unsupervised. (Although in some situations children under 10 years of age may be left alone without endangerment, EMS personnel cannot make such determinations.) All instances should be reported for DCFS investigation.
    - Abandonment
    - Caretaker appears to be incapacitated (e.g., extreme drug/alcohol intoxication, disabling psychiatric symptoms, severe illness) and cannot meet child's care requirements.
    - Child appears inadequately fed (e.g., seriously underweight, emaciated, or dehydrated) inadequately clothed, or inadequately sheltered.
    - Child is found to be intoxicated or under the influence of an illicit substance(s).

BURN RESOURCE

%BSA by anatomical area



Palm-and-hand calculation[a]



[a] Palm of hand (including fingers) of infant or child = 1% of the total body surface

Burn Center Referral Criteria

Any patient with a life threatening condition should be treated until stable at the nearest appropriate facility before being transferred to a burn center. According to the American Burn Association, burn injuries that should be referred to a burn center include:

1. Partial thickness burns greater than 10% total body surface area (TBSA)
2. Burns that involve the face, hands, feet, genitalia, perineum, or major joints
3. Third-degree burns in any age group
4. Electrical burns, including lightning injury
5. Chemical burns
6. Inhalation injury
7. Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
8. Any patients with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols
9. Burned children in hospitals without qualified personnel or equipment for the care of children
10. Burn injury in patients who will require special social, emotional, or rehabilitative intervention

TOXIC EXPOSURES/INGESTIONS RESOURCE

EXPOSURE TO OR INGESTION OF NARCOTICS OR UNKNOWN SUBSTANCES

POTENTIAL TREATMENT

- Contact direct medical oversight for specific information about individual toxic exposures and treatments.
- **DO NOT INDUCE VOMITING, ESPECIALLY IN CASES WHERE CAUSTIC SUBSTANCE INGESTION IS SUSPECTED.**
- Treatment for toxic exposures may be instituted as permitted by medical direction, including the following:
    - High-dose atropine for organophosphates
    - Sodium bicarbonate for tricyclic antidepressants
    - Glucagon for calcium channel blockers or beta-blockers
    - Dextrose for insulin overdose, hypoglycemia
    - Diphenhydramine for dystonic reactions
    - Naloxone for opioid overdose

POTENTIAL EXPOSURES

- Burning overstuffed furniture = Cyanide
- Old burning buildings = Lead fumes and Carbon Monoxide
- Bismuth subsalicylate (e.g. Pepto-Bismol™)* = Aspirin
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- Natural gas = Carbon monoxide
- Rotten eggs = Hydrogen sulfide
- Silver polish = Cyanide
- Stove gas = Think CO (CO and methane are odorless)
- Wintergreen = Methyl salicylate

Illinois Poison Center 1-800-222-1222

VITAL SIGNS AND CARDIOPULMONARY COMPROMISE RESOURCE

Vital Sign/Age Parameters

Age	Pulse	Systolic Blood Pressure	Respiratory Rate
Newborn	100 - 180	>60	30 - 60
3 months	100 - 160	>70	30 - 60
6 months	110 - 160	>70	30 - 60
9 months	110 - 160	>70	30 - 60
12 months	110 - 160	>70	30 - 60
2 years	90 - 150	>70	24 – 40
4 years	90 - 150	>75	22 – 34
6 years	70 - 120	>80	18 – 30
8 years	70 – 120	>80	18 – 30
10 years	70 - 120	>80	18 – 30
12 years	60 - 110	>90	12 - 16

Indicators of Cardiopulmonary Compromise in Children

- Weak, thready, or absent peripheral pulses
- Decreasing consciousness
- Tachypnea/Respiratory difficulty
- Central cyanosis and coolness
- Hypotension (late sign)

REFERENCES/RESOURCES

1. Aziz K, Lee HC, Escobedo MB, et al. *Part 5: Neonatal resuscitation*. 2020 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation 2020; 142 (suppl 2); S524 – S550.

2. *Pediatric Education for Prehospital Professionals,* 4th Edition. American Academy of Pediatrics. Fuchs S, McEvoy M, ed., Burlington, MA:, Jones & Bartlett Publishers, 2020.

3. Pierce M, Kaczor K, Lorenz J, et al. *Validation of a clinical decision rule to predict abuse in young children based on bruising characteristics*. JAMA Network Open. 2021; 4(4):e215832. doi: 10.1001/jamanetworkopen.2021.5832

4. *Special Children's Outreach and Prehospital Education*. Adirim TA, Smith E, ed. Burlington, MA: Jones and Bartlett Publishers, 2006.

5. Topjian AA, Raymond TT, Atkins D, et al. *Part 4: Pediatric basic and advanced life support*. 2020 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation 2020; 142 (suppl 2); S469 – S523.

Region 4 EMS Guidelines

(Except for Southwestern Illinois EMS System)

Anderson Hospital

HSHS St. Elizabeth's Hospital

Medication Reference

2023

Table of Contents

Table of Contents

ACETAMINOPHEN (Tylenol®)

Class:	Analgesic, Antipyretic
Mechanism of Action:	May work peripherally to block pain impulse generation; may also inhibit prostaglandin synthesis in CNS.
Indications:	Pain Control, Fever Control
Contraindications:	Hypersensitivity: recent dose within 4 hours: severe liver disease
Side Effects:	
Adult Dose/Protocols:	Pain Management; Altitude Illness **1000 mg PO**
Pediatric Dose/ Protocols:	None

ADENOSINE (Adenocard®)

Class:	Antidysrhythmic
Mechanism of Action:	Slows conduction through AV node and interrupts AV reentry pathways, which restore normal sinus symptoms.
Indications:	Conversion of regular, narrow complex tachycardia – stable supraventricular tachycardia (SVT) or regular, monomorphic wide complex tachycardia.
Contraindications:	Hypersensitivity, second or third degree AV Block (except those on pacemakers), sick sinus syndrome, atrial flutter or fibrillation, ventricular tachycardia
Side Effects:	Headache, dizziness, dyspnea, bronchospasm, dysrhythmias, palpitations, hypotension, chest pain, facial flushing, cardiac arrest, nausea, metallic taste, pain in the head or neck, paresthesia, diaphoresis
Adult Dose/Protocols:	Tachycardia (with a Pulse)-Narrow Complex-Regular Rhythm **6 mg rapid IV/IO** followed by a 10 mL NS flush. If no change in rhythm after 1-2 minutes, 12 mg rapid IV/IO followed by a 10 mL NS flush. If no change in rhythm after 1-2 minutes, repeat at 12 mg rapid IV/IO followed by a 10 mL NS flush.
Pediatric Dose/ Protocols:	Tachycardia (with a Pulse)-Narrow Complex; Tachycardia (with a Pulse) - Wide Complex (regular rhythm and monomorphic) **0.1 mg/kg (max 6 mg) rapid IV/IO** followed by a rapid NS flush. If no change in rhythm, give 0.2 mg/kg rapid IV/IO followed by a rapid NS flush.

ALBUTEROL (Proventil®, Ventolin®)

Class:	**Albuterol**: Sympathomimetic; bronchodilator
Mechanism of Action:	**Albuterol**: Selective beta-2 agonist that stimulates adrenergic receptors of the sypathomimetic nervous system. Results in smooth-muscle relaxation in the bronchial tree and peripheral vasculature.
Indications:	Persistent bronchospasm, COPD exacerbation
Contraindications:	Hypersensitivity to albuterol, tachycardia secondary to heart condition.
Side Effects:	Headache, fatigue, dizziness, nervousness, tremors, tachycardia, hypertension, dysrhythmias, palpitations, chest pain, dry mouth, nausea, vomiting
Adult Dose/Protocol:	Allergic Reaction / Anaphylaxis; Bronchospasm / Asthma / COPD; Tracheostomy Tube-Respiratory Distress/Ventilator; Crush Injuries; Diabetic Emergencies-Hyperglycemia Albuterol Sulfate **5mg** nebulizer **or 10 mg** (suspected hyperkalemia) via small nebulizer. May repeat x 2.
Pediatric Dose/Protocol:	Allergic Reaction / Anaphylaxis; Pediatric Respiratory Distress; Pediatric Respiratory Distress-Tracheostomy Tube **Albuterol 2.5 mg** via nebulizer ≤ 20 kg body weight. May repeat x2 if needed for continued symptomatic relief. **Albuterol 5.0 mg** via nebulizer > 20 kg body weight. May repeat x2 if needed for continued symptomatic relief.

ALBUTEROL /IPRATROPIUM (DuoNeb®)

Class:	**Albuterol**: Sympathomimetic; bronchodilator **Ipratropium**: Anticholinergic; bronchodilator
Mechanism of Action:	**Albuterol**: Selective beta-2 agonist that stimulates adrenergic receptors of the sypathomimetic nervous system. Results in smooth-muscle relaxation in the bronchial tree and peripheral vasculature. **Ipratropium**: Inhibits interaction of acetylcholine at receptor sites of bronchial smooth muscle, resulting in decreased cyclic guanosine monophosphate and bronchodilation.
Indications:	Persistent bronchospasm, COPD exacerbation
Contraindications:	Hypersensitivity to albuterol, ipratropium, atropine, alkaloids, peanuts.
Side Effects:	Headache, fatigue, dizziness, nervousness, tremors, tachycardia, hypertension, dysrhythmias, palpitations, chest pain, dry mouth, nausea, vomiting
Adult Dose/Protocol:	Allergic Reaction / Anaphylaxis; Bronchospasm / Asthma / COPD; Tracheostomy Tube-Respiratory Distress/Ventilator; **DuoNeb** (albuterol sulfate 3.0 mg and ipratropium bromide 0.5 mg) **by nebulizer**. May repeat x2 if needed for continued symptomatic relief
Pediatric Dose/Protocol:	Respiratory Distress—Lower Airway; **DuoNeb** (albuterol sulfate 3.0 mg and ipratropium bromide 0.5 mg) **by nebulizer**. May repeat x2 if needed for continued symptomatic relief

AMIODARONE (Pacerone®, Cordarone®)

Class:	Antidysrhythmic (Class III)
Mechanism of Action:	Blocks sodium, potassium, and calcium channels; prolongs the action potential and repolarization; decreases AV conduction and sinoatrial (SA) node function.
Indications:	Management of regular wide complex tachycardia in stable patients, irregular wide complex tachycardia in stable patients, and as antidysrhythmic for the management of ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT).
Contraindications:	Hypersensitivity, severe sinus node dysfunction, second or third degree heart block or bradycardia causing syncope (except with functioning artificial pacemaker), cardiogenic shock
Side Effects:	Dizziness, fatigue, malaise, tremor, ataxia, lack of coordination, ARDS, pulmonary edema, cough, progressive dyspnea, heart failure, bradycardia, hypotension, worsening of dysrhythmias, prolonged QT interval, nausea, vomiting, burning at IV site, Stevens-Johnson syndrome
Adult Dose/Protocols:	Tachycardia (with a Pulse)-Wide Complex **150 mg IV/IO** over 10 minutes. May repeat every 10 minutes until wide complex tachycardia resolves to a maximum dose of 450 mg. Cardiac Arrest-(VFib / Pulseless V-tach) **300 mg IV/IO**; may repeat at 150 mg IV/IO in 5 minutes if needed.
Pediatric Dose/ Protocols:	Tachycardia (with a Pulse)-Wide Complex **5 mg/kg (max 150 mg) IV/IO** over 20-60 minutes. Cardiac Arrest-(VFib / Pulseless V-tach) **5 mg/kg IV/IO** (max 300mg). May repeat x2 at 5 mg/kg IV/IO every 5 minutes if needed. (Max total dose 15 mg/kg).

ASPIRIN

Class:	Platelet inhibitor, anti-inflammatory agent
Mechanism of Action:	Inhibits synthesis of prostaglandin by cyclooxygenase; inhibits platelet aggregation; has antipyretic and analgesic activity.
Indications:	Antiplatelet agent for the care of patients suspected of suffering from an acute coronary syndrome.
Contraindications:	Hypersensitivity. Relatively contraindicated in patients with active ulcer disease or asthma.
Side Effects:	Bronchospasm, anaphylaxis, wheezing in allergic patients, prolonged bleeding, GI bleeding, epigastric distress, nausea, vomiting, heartburn, Reye syndrome
Adult Dose/Protocols:	Chest Pain/Acute Coronary Syndrome/STEMI **325 mg PO or 81 mg x 4 PO**; chewable, non-enteric-coated aspirin preferred.
Pediatric Dose/ Protocols:	None

ATROPINE SULFATE

Class:	Anticholinergic agent
Mechanism of Action:	Competitively inhibits action of acetylcholinesterase on autonomic effectors innervated by postganglionic nerves . Increases heart rate in symptomatic bradydysrhythmias.
Indications:	Hemodynamically unstable bradycardia, organophosphate poisoning, nerve agent exposure, RSI in pediatrics, beta-blocker or calcium channel blocker overdose.
Contraindications:	Tachycardia, hypersensitivity, unstable cardiovascular status in acute hemorrhage with myocardial ischemia, narrow-angle glaucoma, hypothermic bradycardia
Side Effects:	Drowsiness, confusion, headache, tachycardia, palpitations, dysrhythmias, nausea, vomiting, pupil dilation, dry mouth/nose/ skin, blurred vision, urinary retention, constipation, flushed, hot, dry skin; paradoxical bradycardia when pushed too slowly or when given at low doses
Adult Dose/Protocols:	<u>Bradycardia</u> **1.0 mg IV/IO** every 3-5 minutes, as long as symptomatic bradycardia persists, to a total dose of 3 mg. <u>Acetylcholinesterase Inhibitors</u> **2 mg IV or IM**; repeat at 2-4 mg IV q 3-5 minutes until symptoms of SLUDGE subside, most importantly secretions.

Medication Continues

ATROPINE SULFATE

Pediatric Dose/ Protocols:

Bradycardia

0.02 mg/kg IV/IO for increased vagal tone or primary AV block (minimum single dose: 0.1 mg; maximum single dose: 0.5 mg for a child, 1.0 mg for an adolescent); May be repeated once in 3-5 minutes.

Acetylcholinesterase Inhibitors

	MILD / MODERATE (0.05 mg/kg IM)	**SEVERE (0.1 mg/kg IM)**
Infant 0-6 Months (< 7 kg)	0.25 mg IM	0.5 mg IM
Infant 7 mo - 2 yrs	0.5 mg IM	1 mg IM
Child 3-7 yrs (14-25 kg)	1 mg IM	2 mg IM
Child 8-14 yrs (26-50 kg)	2 mg IM	4 mg IM
Adolescent > 14 yrs (> 51 kg)	2 mg IM	4 mg IM

Calcium Chloride

Class:	Antidotes, other; calcium salts
Mechanism of Action:	Bone mineral component, cofactor in enzymatic reactions, essential for neurotransmission, muscle contraction and many signal transduction pathways.
Indications:	Cardiac protective effect in when hyperkalemia is known or suspected; suspected calcium channel blocker overdose; magnesium sulfate toxicity; topical burns from hydrofluoric acid.
Contraindications:	Hypercalcemia, documented hypersensitivity
Side Effects:	Life-threatening arrhythmias may occur in known or suspected sever hypokalemia. *Warning: There is a risk for digitalis toxicity. Be cautious of peripheral IV as significant tissue necrosis at injection site may occur.*
Adult Dose/Protocols:	Diabetic Emergencies-Hyperglycemia; Crush Injuries; Poisoning and Overdose • **CALCIUM CHLORIDE 10% (1g/10 ml) 1g IV/IO** (SLOW over 10 min) Cardiac Arrest -Asystole/PEA • **CALCIUM CHLORIDE 10% (1g/10 ml) 1g IV/IO PUSH**
Pediatric Dose/ Protocols:	None.

Calcium Gluconate (Gluconate®)

Class:	Antidotes, other; calcium salts
Mechanism of Action:	Bone mineral component, cofactor in enzymatic reactions, essential for neurotransmission, muscle contraction and many signal transduction pathways.
Indications:	Cardiac protective effect in when hyperkalemia is known or suspected; suspected calcium channel blocker overdose; magnesium sulfate toxicity; topical burns from hydrofluoric acid.
Contraindications:	Hypercalcemia, documented hypersensitivity
Side Effects:	Life-threatening arrhythmias may occur in known or suspected sever hypokalemia. *Warning: There is a risk for digitalis toxicity.*
Adult Dose/Protocols:	Diabetic Emergencies-Hyperglycemia; Crush Injuries; Poisoning and Overdose • **CALCIUM GLUCONATE10% (1g/10 ml) 3g IV/IO SLOWLY** over 10 min Cardiac Arrest-Asystole/PEA • **CALCIUM GLUCONATE10% (1g/10 ml) 3g IV/IO PUSH**
Pediatric Dose/ Protocols:	None.

DEXAMETHASONE (Decadron®)

Class:	Corticosteroid, anti-inflammatory drug
Mechanism of Action:	Potent glucocorticoid with minimal to no mineralocorticoid activity. Decreases inflammation by suppressing migration of polymorphonuclear leukocytes (PMNs) and reducing capillary permeability; stabilizes cell and lysomal membranes, increase surfactant synthesis, increase serum vitamin A concentration, and inhibits prostaglandin and pro-inflammatory cytokines; suppresses lymphocyte proliferation though direct cytolysis, inhibits mitosis, breaks down granulocyte aggregates and improves pulmonary micriocirculation
Indications:	Used in management of croup and bronchospasm, as well as the management of patients suffering from high altitude cerebral edema.
Contraindications:	Documented hypersensitivity, systemic fungal infection, cerebral malaria.
Side Effects:	Aggression, agitation, anxiety, headache, irregular pulse
Adult Dose/Protocol:	Allergic Reaction/Anaphylaxis; Bronchospasm/Asthma/COPD; **DEXAMETHASONE 10 mg IV/IO** Altitude Illness-AMS/HACE a. **DEXAMETHASONE 8m IM. IV or PO** (administered adjunctively with descent). Followed by **4mg** every 6 hours.
Pediatric Dose/Protocol:	None

DEXTROSE (D10, D50, glucose)

Class:	Carbohydrate, antihypoglycemic
Mechanism of Action:	Rapidly increases serum glucose levels. Short term osmotic diuresis.
Indications:	Hypoglycemia, altered level of consciousness, coma of unknown origin, seizure of unknown origin, status epilepticus
Contraindications:	Intracranial hemorrhage
Side Effects:	Extravasation leads to tissue necrosis. Cerebral hemorrhage, cerebral ischemia, pulmonary edema, warmth, pain, burning from IV infusion, hyperglycemia.
Adult Dose/Protocol:	Altered Mental Status; Diabetic Emergencies-Hypoglycemia; **DEXTROSE 10% (D10) 25 grams**; administer in **50 mL (5g)** IV aliquots. **DEXTROSE 50% (D50) 25 grams IV**
Pediatric Dose/Protocol:	Altered Mental Status; Pediatric Seizures **DEXTROSE 10% (D10) 5 mL/kg IV/IO** (all pediatric ages) **DEXTROSE 25% (D25) 2-4 mL/kg** (1-8 yrs.) **DEXTROSE 50% (D50) 1-2 mL/kg** (> 8 yrs. of age)

DIAZEPAM (Valium®)

Class:	Benzodiazepine, anticonvulsants, skeletal muscle relaxants, anxiolytic
Mechanism of Action:	Modulates postsynaptic effects of GABA-A transmission, resulting in an increase in presynaptic inhibition. Appears to act on part of the limbic system, as well as on the thalamus and hypothalamus, to induce a calming effect
Indications:	For use in agitated or violent patients, as well as for the management of seizures
Contraindications:	Documented hypersensitivity, severe respiratory depression
Side Effects:	CNS and respiratory depression, confusion, decrease coordination, tremors
Adult Dose/Protocols:	Seizure/Status Epilepticus; Chest Pain/Acute Coronary Syndrome/STEMI; Environmental Hyperthermia **DIAZEPAM 0.1 mg/kg IV/IO** (maximum dose 5 mg); may repeat dose once if needed after 5 minutes
Pediatric Dose/ Protocols:	Pediatric Environmental Hyperthermia; Pediatric Seizures **DIAZEPAM 0.05 mg/kg IV over 2-3 minutes** (maximum dose 2 mg); Pediatric Seizures **DIAZEPAM 0.5 mg/kg PR** (maximum dose 2 0mg); If parents have gel formulation, use per medical direction **(or)** **DIAZEPAM 0.1 mg/kg IV over 30 seconds,** every 15 minutes if needed.; • < 5 yrs. Max dose 5mg • ≥ 5 yrs. Max dose 10 mg

DILTIAZEM (Cardizem®)

Class:	Calcium channel blocker, antidysrhythmic (Class IV)
Mechanism of Action:	Inhibits extracellular calcium ion influx across membranes of myocardial cells and vascular smooth muscle cells, resulting in inhibition of cardiac and vascular smooth muscle contraction and thereby dilating main coronary and systemic arteries; no effect on serum calcium concentrations; substantial inhibitory effects on cardiac conduction system, acting principally at AV node, with some effects at sinus node
Indications:	For management of narrow complex tachycardias and to control the ventricular rate in patients with AF or atrial flutter
Contraindications:	Documented hypersensitivity, Wolff-Parkinson-White syndrome, Lown-Ganong-Levine syndrome, symptomatic severe hypotension (systolic BP < 90 mm Hg), sick sinus syndrome (if no pacemaker), second and third degree heart block (if no pacemaker present), and complete heart block ***Caution: Avoid giving patients ß blockers (Metoprolol) and Ca channel blockers (Diltiazem) together, as this may cause deleterious hemodynamic or electro-physiologic reactions.***
Side Effects:	Dizziness, weakness, headache, dyspnea, cough, dysrhythmias, heart failure, peripheral edema, bradycardia, hypotension, AV blocks, syncope, VF, VT, cardiac arrest, chest pain, nausea, vomiting, dry mouth
Adult Dose/Protocols:	<u>Tachycardia (with a Pulse)-Narrow Complex-Irregular Rhythm</u> **0.25 mg/kg slow IV/IO** over 2-5 minutes if SBP > 100 mmHg, max dose 25 mg; For patients **older than 65**, recommended initial dose of **0.10 mg/kg**, max dose of 10mg. Contact medical control if necessary to administer additional **DILTIAZEM** after 15 minutes • For a **DILTIAZEM infusion**: mix DILTIAZEM 100 mg in 100 mL 0.9% Normal Saline to give you 1 mg/ml concentration. Use 60 drop IV set, 10-15 drops/minute equivalent to10-15 mg/hr.
Pediatric Dose/ Protocols:	None

DIPHENHYDRAMINE (Benadryl®)

Class:	Antihistamine (H1 blocker)
Mechanism of Action:	Histamine H1-receptor inverse agonist of effector cells in respiratory tract, blood vessels, and GI smooth muscle.
Indications:	For urticarial and/or pruritis in the management of patients suffering from allergic reaction as well as for the management of patents suffering from dystonia/akasthesia.
Contraindications:	Documented hypersensitivity, use controversial in lower respiratory tract disease (such as acute asthma), premature infants and neonates.
Side Effects:	Drowsiness, sedation, seizures, dizziness, headache, blurred vision, wheezing, thickening of bronchial secretions, palpitations, hypotension, dysrhythmias, dry mouth, diarrhea, nausea, vomiting. Hallucinations, confusion and paradoxical CNS excitation can occur in children.
Adult Dose/Protocols:	Allergic Reaction/Anaphylaxis **50 mg IV/IM/IO/PO**
Pediatric Dose/ Protocols:	Allergic Reaction/Anaphylaxis **1 mg/kg IM/IV/IO** (max dose 50 mg)

DOPAMINE (Intropin®)

Class:	Adrenergic, vasopressor, inotropic agent
Mechanism of Action:	Endogenous catecholamine, acting on both dopaminergic and adrenergic neurons. Low dose stimulates mainly dopaminergic receptors, producing renal and mesenteric vasodilation; higher dose stimulates both beta-1-adrenergic and dopaminergic receptors, producing cardiac stimulation and renal vasodilation; large dose stimulates alpha-adrenergic receptors.
Indications:	Cardiogenic and septic shock, hypotension with low cardiac output states, distributive shock, second-line drug for symptomatic bradycardia.
Contraindications:	Hypersensitivity to dopamine, hypovolemic shock, pheochromocytoma, ventricular fibrillation, uncorrected
Side Effects:	Extravasation may cause tissue necrosis. Headache, anxiety, dyspnea, dysrhythmias, hypotension, hypertension, palpitations, chest pain, increased myocardial oxygen demand, nausea, vomiting
Adult Dose/Protocols:	CHF / Pulmonary Edema; ROSC; Shock **5-20 mcg/kg/min** titrated to a SBP of 90-100 mmHg or MAP > 65 mmHg.
Pediatric Dose/ Protocols:	None

(See Drip charts on next page)

Medication Continues

DOPAMINE (Intropin®)

Adult Dopamine Drip Chart

Dopamine is provided premixed (400mg in 250mL D5W or 800mg in 500mL D5W). This yields a concentration of 1600mcg/mL.

Dose mcg/kg/min	2	3	4	5	6	7	8	9	10	15	20
Weight Lbs/kg	**Flow rate in ml/hr (In the absence of an IV pump, use 60 drop tubing and ml/hr=drops/min)**										
90 lbs/41 kg	3	5	6	8	9	11	12	14	15	23	31
100 lbs/45 kg	3	5	7	8	10	12	14	15	17	25	34
110 lbs/50 kg	4	6	8	9	11	13	15	17	19	28	38
120 lbs/55 kg	4	6	8	10	12	14	17	19	21	31	41
130 lbs/59 kg	4	7	9	11	13	15	18	20	22	33	44
140 lbs/64 kg	5	7	10	12	14	17	19	22	24	36	48
150 lbs/68 kg	5	8	10	13	15	18	20	23	26	38	51
160 lbs/73 kg	5	8	11	14	16	19	22	25	27	41	55
170 lbs/77 kg	6	9	12	14	17	20	23	26	29	43	58
180 lbs/82 kg	6	9	12	15	18	22	25	28	31	46	62
190 lbs/86 kg	6	10	13	16	19	23	26	29	32	48	65
200 lbs/91 kg	7	10	14	17	20	24	27	31	34	51	68
210 lbs/95 kg	7	11	14	18	21	25	29	32	36	53	71
220 lbs/100 kg	8	11	15	19	23	26	30	34	38	56	75
230 lbs/105 kg	8	12	16	20	24	28	32	35	39	59	79
240 lbs/109 kg	8	12	16	20	25	29	33	37	41	61	82
250 lbs/114 kg	9	13	17	21	26	30	34	38	43	64	86
260 lbs/118 kg	9	13	18	22	27	31	35	40	44	66	89
270 lbs/123 kg	9	14	18	23	28	32	37	42	46	69	92
280 lbs/127 kg	10	14	19	24	29	33	38	43	48	71	95
290 lbs/132 kg	10	15	20	25	30	35	40	45	50	74	99
300 lbs/136 kg	10	15	20	26	31	36	41	46	51	77	102

Medication Continues

EPINEPHRINE (Adrenalin®)

Class:	Sympathomimetic
Mechanism of Action:	Strong alpha-adrenergic effects, which cause an increase in cardiac output and heart rate, a decrease in renal perfusion and peripheral vascular resistance, and a variable effect on BP, resulting in systemic vasoconstriction and increased vascular permeability. Strong beta-1- and moderate beta-2-adrenergic effects, resulting in bronchial smooth muscle relaxation. Secondary relaxation effect on smooth muscle of stomach, intestine, uterus, and urinary bladder.
Indications:	Cardiac arrest (asystole, PEA, VF and pulseless VT), symptomatic bradycardia as an alternative infusion to dopamine, hypotension from shock other than hypovolemia, allergic reaction, anaphylaxis, asthma.
Contraindications:	None in the emergency setting.
Side Effects:	Nervousness, restlessness, headache, tremor, pulmonary edema, dysrhythmias, chest pain, hypertension, tachycardia, nausea, vomiting
Adult Dose/Protocols:	Cardiac Arrest-(Asystole/PEA/V-Fib/Pulseless V-Tach) **1.0 mg (1:10,000) IV/IO or 2-2.5 mg Endotracheal** *(diluted in 10 ml NS)* every 3-5 minutes as long as patient remains pulseless **May consider higher dose of **0.2 mg/kg 1:10.000 IV/IO for** arrest secondary to ß or Ca channel-blocker overdose. Allergic Reaction / Anaphylaxis **0.3-0.5 mg (1:1,000) IM** every 5-15 minutes (max 3 doses) Bronchospasm / Asthma / COPD **0.3-0.5 mg (1:1,000) IM** Bradycardia; CHF / Pulmonary Edema; ROSC; Sepsis; Shock **PUSH DOSE EPINEPHRINE 1 mL (10 mcg) (1:100,000) IV/IO** every 2-5 minutes to maintain SBP of 90-100 mmHg or MAP > 65 mmHg (Mix 1 mL of Epinephrine 1:10,000 with 9 mL of Normal Saline in a 10 mL syringe resulting in a concentration of 10 mcg/ml)

Medication Continues

EPINEPHRINE (Adrenalin®)

Pediatric Dose/ Protocols:	**Pediatric Dose/Protocols:** Cardiac Arrest-(Asystole/PEA); Bradycardia; Neonatal Resuscitation; Cardiac Arrest-(V-Fib/Pulseless V-Tach) **0.01 mg/kg (1:10,000) IV/IO** every 3-5 minutes as long as patient remains pulseless. Allergic Reaction / Anaphylaxis EMR: Assist with administering a patient prescribed epinephrine BLS Providers: < 30 kg **0.15 mg (1:1,000) IM** ≥ 30 kg **0.3 mg (1:1,000) IM** ALS Providers: **0.01 mg/kg (1:1,000) IM** Every 5-15 minutes (max 3 doses) Pediatric Respiratory Distress **0.01 mg/kg (1:1,000) IM** (max dose 0.3 mg) If racemic epinephrine is not available for treating an upper airway disease process(stridor), nebulize **3.0 mg** ((3)x1:1000 mixed with 3mL of Normal Saline).

EPINEPHRINE RACEMIC (MicroNefrin®)

Class:	Sympathomimetic
Mechanism of Action:	Stimulates beta-2 receptors in lungs: bronchodilation with relaxation of bronchial smooth muscles. Reduces airway resistance. Useful in treating laryngeal edema; inhibits histamine
Indications:	Bronchial asthma, prevention of bronchospasm, croup, laryngeal edema
Contraindications:	Hypertension, underlying cardiovascular disease, epiglottitis
Side Effects:	Headache, anxiety, fear, nervousness, respiratory weakness, palpitations, tachycardia, dysrhythmias, nausea, vomiting
Adult Dose/Protocols:	None
Pediatric Dose/ Protocols:	Respiratory Distress—Upper Airway **0.5 mL of 2.25% solution diluted in 3 mL NS nebulized.**

Etomidate (Amidate®)

Class:	Hypnotic agent used for the induction of anesthesia and sedation.
Mechanism of Action:	Non-barbiturate hypnotic & general anesthetic. When dosed properly, has minimal effects on myocardial activity, blood pressure and respirations.
Indications:	Anesthesia for orotracheal intubation; procedural sedation (e.g. synchronized cardioversion).
Contraindications:	Use with caution in patients with sepsis, hepatic disease and renal impairment.
Side Effects:	Pain on injection, nausea, vomiting, suppression of the adrenal axis, myoclonic or involuntary muscle movements during induction and emergence.
Adult Dose/Protocols:	Assisted (Medication) Intubation; • **ETOMIDATE 0.3 mg/kg rapid IV/IO.** Tachycardia (*synchronized cardioversion*) • **ETOMIDATE 0.1 mg/kg IV/IO (Max 10mg)**
Pediatric Dose/ Protocols:	None

FENTANYL (Sublimaze®)

Class:	Opioid analgesic; schedule II drug
Mechanism of Action:	Binds to opiate receptors, producing analgesia and euphoria.
Indications:	Pain management, anesthesia adjunct
Contraindications:	Hypersensitivity. Use with caution in traumatic brain injury.
Side Effects:	Confusion, paradoxical excitation, delirium, drowsiness, CNS depression, sedation, respiratory depression, apnea, dyspnea, dysrhythmias, bradycardia, tachycardia, hypotension, syncope, nausea, vomiting, abdominal pain, dehydration, fatigue
Adult Dose/Protocols:	Pain Management **1 mcg/kg IV/IO/IM/IN** (max initial dose 100 mcg); Recommended initial dose: 50 mcg; may repeat x 1 after 10-15 minutes at 0.5 mcg/kg (max second dose 50 mcg). Elderly patients over 75 years of age, **0.5 mcg/kg IV/IO/IM/IN** *(max initial 50 mcg, max repeat 25 mcg)*. Slow IV/IO push over 2-3 min Assisted (Medication) Intubation-post intubation **1 mcg/kg IV/IO** (max initial dose 100 mcg); may repeat as needed every 3-5 minutes at 0.5 mcg/kg (max repeat dose 50 mcg). Chest Pain **1 mcg/kg slow IV/IO** over 2 minutes (max initial dose 100 mcg). *For Elderly patients> 75 years of age, **0.5 mcg/kg** slow over IV/IO push over 2-3 minutes (max 50 mcg). Medical control may consider additional FENTANYL 0.5-1.0 mcg/kg slow IV/IO (max repeat 50 mcg). For elderly patients >75 years of age, 0.5 mcg/kg slow IV/IO push with a (Max repeat dose 25 mcg)*
Pediatric Protocols:	Pain Management ***(Contact Medical Control)*** **1 mcg/kg IV/IO/IM/IN** (max initial dose 100 mcg); Recommended initial dose: 50 mcg; may repeat x 1 after 15 minutes at 0.5 mcg/kg (max second dose 50 mcg). a. IV/IO is a slow push over 2-3 minutes

GLUCAGON (GlucaGen®)

Class:	Hypoglycemia antidotes, glucose-elevating agents, other antidotes (e.g. beta-blocker or calcium channel blocker
Mechanism of Action:	Insulin antagonist. Stimulates cAMP synthesis to accelerate hepatic glycogenolysis and gluconeogenesis. Glucagon also relaxes smooth muscles of GI tract.
Indications:	For the management of hypoglycemic patients as well as patients suffering symptomatic bradycardia after beta blocker or calcium channel blocker overdose.
Contraindications:	Hypersensitivity, hyperglycemia
Side Effects:	Dizziness, headache, hypertension, tachycardia, nausea, vomiting, rebound hypoglycemia
Adult Dose/Protocols:	Altered Mental Status; Diabetic Emergencies; **1 mg IM/IN** Poisoning and Overdose (Beta Blocker and Calcium Channel Blocker) **2mg IV/IM**
Pediatric Dose/ Protocols:	Altered Mental Status; Diabetic Emergencies ≤ 8 years of age = **0.5 mg IM/IN** > 8 years of age = **1 mg IM/IN** Poisoning and Overdose **0.1 mg/kg (max 1 mg)**

HALOPERIDOL (Haldol®, Peridol®)

Class:	First generation antipsychotic
Mechanism of Action:	Antagonizes dopamine-1 and dopamine-2 receptors in brain; depresses reticular activating system and inhibits release of hypothalamic and hypophyseal hormones Indications – For the management of acute psychosis or agitated/violent behavior refractory to non- pharmacologic interventions
Indications:	For the management of acute psychosis or agitated/violent behavior refractory to non- pharmacologic interventions
Contraindications:	Documented hypersensitivity, Severe CNS depression (including coma), neuroleptic malignant syndrome, poorly controlled seizure disorder, Parkinsons disease. ***WARNING***: Risk of sudden death, torsades de pointes, and prolonged QT interval from off-label IV administration of higher than recommended dose. Continuous cardiac monitoring is required if administering IV
Side Effects:	Dizziness, lightheadedness, drowsiness, confusion, difficulty urinating, sleep disturbances, muscle stiffness and sweating.
Adult Dose/Protocol:	Agitated or Violent Patient/Behavioral Emergencies; **HALPERIDOL 5 mg IV; 10mg IM.** *Onset: IV: 5-10 min; IM: 10-20 min;*
Pediatric Dose/ Protocols:	None

HYDRALAZINE (Apresoline®)

Class:	Vasodilator
Mechanism of Action:	Direct vasodilator at the level of arterioles, with little effect on veins. Decreases systemic resistance.
Indications:	Severe hypertension with pre-eclampsia symptoms
Contraindications:	Hypersensitivity, coronary artery disease, mitral valve rheumatic heart disease. Use with **caution** in CVA, known renal disease, hypotension
Side Effects:	Rapid or abnormal heart rhythm, chest pain, headache, nausea, vomiting, diarrhea
Adult Dose/Protocols:	Eclampsia/ Pre-Eclampsia **HYDRALAZINE** **5 mg IV**. May repeat **10 mg** after 20 min for persistent hypertension if MAP has not been reduced by 20-25% after the initial dose.
Pediatric Dose/ Protocols:	None

IBUPROFEN (Advil®, Motrin®)

Class:	Non-steroidal anti-inflammatory drug (NSAID)
Mechanism of Action:	Inhibits synthesis of prostaglandins in body tissues by inhibiting at least 2 cyclo- oxygenase (COX) isoenzymes, COX-1 and COX-2. May inhibit chemotaxis, alter lymphocyte activity, decrease proinflammatory cytokine activity, and inhibit neutrophil aggregation; these effects may contribute to anti-inflammatory activity
Indications:	For the acute management of pain or as an antipyretic
Contraindications:	Recent dose within **6hrs** or known renal failure. Aspirin allergy; perioperative pain in setting of coronary artery bypass graft (CABG) surgery; preterm infants with untreated proven or suspected infection; bleeding with active intracranial hemorrhage or GI bleed; thrombocytopenia, coagulation defects, proven or necrotizing enterocolitis, significant renal impairment, congenital heart disease where patency or the patent ductus arteriosis (PDA) is necessary for pulmonary or systemic blood flow
Side Effects:	Hemorrhage, vomiting, anemia, decreased hemoglobin, eosinophilia, and hypertension
Adult Dose/Protocols:	Altitude Illness; Pain Management **IBUPROFEN 10mg/kg PO (max 800 mg) f**or pain.
Pediatric Dose/ Protocols:	None

KETAMINE (Ketalar®)

Class:	Sedative, analgesic dissociative anesthetic
Mechanism of Action:	Produces dissociative anesthesia. Blocks NMDA receptor.
Indications:	Excited delirium, pain management, procedural sedation
Contraindications:	Hypersensitivity, conditions where hypertension would be hazardous to the patient's care. Use with ***caution*** in patients that are believed to be under the influence of ETOH or CNS depressant.
Side Effects:	Hypertension, dysrhythmia, bronchodilation, respiratory depression
Adult Dose/Protocols:	Agitated or Violent Patient/Behavioral Emergencies **IM: 4 mg/kg** Onset: 3-5 minutes *(multiple IM sites may be required, max 5 mL/ per IM site)* Max dose 400mg Pain Management **IN: 0.5 mg/kg Intranasal (IN) (max single dose 20 mg)** **IV: 0.2 mg/kg IV (max single dose 20mg).** *If necessary, may repeat dose every 10-15 minute x3 via either route for a maximum combined dose of 50 mg.* Assisted (Medication) Intubation **Intubation: 2 mg/kg IV/IO (maximum 200mg).** *(Preferred if signs of hypoperfusion or bronchial constriction are present)* Post-Intubation: **1 mg/kg IV/IO (maximum 200mg).** (*Preferred if signs of hypoperfusion or bronchial constriction are present).* After 15 min. may repeat dose x1 from either route for a
Pediatric Dose/ Protocols:	None

KETOROLAC (Toradol®)

Class:	Non-steroidal anti-inflammatory drug (NSAID)
Mechanism of Action:	Potent analgesic that does not possess any sedative or anxiolytic activities by inhibiting prostaglandin synthesis.
Indications:	Short-term management of moderate to severe pain.
Contraindications:	Allergy to aspirin, ketorolac, or other NSAIDS; Pregnant females; Patients with history of asthma, bleeding disorders (especially GI related, such as peptic ulcer disease), renal failure.
Side Effects:	Drowsiness, dizziness, headache, sedation, bronchospasm, dyspnea, edema, vasodilation, hypotension, hypertension, GI bleeding, diarrhea, dyspepsia, nausea
Adult Dose/Protocols:	Pain Management **30 mg IM** or **15 mg IV** (no repeat dose)
Pediatric Dose/ Protocols:	None

LABETALOL (Tandate®)

Class:	Beta blocker, alpha-activity
Mechanism of Action:	Non-selective beta blocker with intrinsic sympathometic activity; also an alpha blocker
Indications:	Severe hypertension with pre-eclampsia symtoms
Contraindications:	Asthma or obstructive airway disease, severe bradycardia, second-degree or third- degree heart block (without pacemaker), cardiogenic shock, bronchial asthma, uncompensated cardiac failure, hypersensitivity, sinus bradycardia, sick sinus syndrome without permanent pacemaker; conditions associated with prolonged and severe hypotension. Use with caution in patients taking calcium channel blockers. Hypotension with or without syncope may occur; monitor. Consider pre- existing conditions, such as, sick sinus syndrome before initiating therapy. Use caution in patients with history of severe anaphylaxis to allergens; patients taking beta-blockers may become more sensitive to repeated challenges; treatment with epinephrine in patients taking beta-blockers may be ineffective or promote undesirable effects. Use with caution in patients with myasthenia gravis, psoriasis, or psychiatric illness (may cause or exacerbate CNS depression)
Side Effects:	Bronchospasm, congestive heart failure, orthostatic hypotension, nausea, dizziness, fatigue
Adult Dose/Protocols:	Eclampsia/Pre-Eclampsia **LABETALOL 20 mg IV over 2 minutes.** May repeat every 10 min X2 with a goal to reduce MAP by 20-25%. *Do not administer initial dose or repeat dose if heart rate is less than* **60 bpm.**
Pediatric Dose/ Protocols:	None

LIDOCAINE (Xylocaine®)

Class:	Antidysrhythmic (Class Ib), anesthetic
Mechanism of Action:	Cardiac: Decreases automaticity by slowing the rate of spontaneous phase 4 depolarization. Local anesthetic: Inhibits transport of ions across the neuronal membrane, blocking conduction of normal nerve impulses.
Indications:	Alternate to amiodarone in cardiac arrest from VT, VF, Stable wide-complex tachycardia (poly-or monomorphic) with normal baseline QT interval. Also used as a local anesthetic for various procedures, including intubation and IO infusion.
Contraindications:	Hypersensitivity to lidocaine or amide-type local anesthetic, Adams-Stokes syndrome, SA/AV/intraventricular heart block in the absence of artificial pacemaker. CHF, cardiogenic shock, second and third degree heart block (if no pacemaker is present), Wolff-Parkinson-White Syndrome
Side Effects:	Anxiety, drowsiness, confusion, seizures, slurred speech, respiratory arrest, hypotension, bradycardia, dysrhythmias, cardiac arrest, AV block, nausea, vomiting
Adult Dose/Protocols:	Tachycardia (with a Pulse)-Wide Complex; Cardiac Arrest-(VFib / Pulseless V-tach) **1.0-1.5 mg/kg IV/IO**; may repeat every 3-5 minutes x 2 at 0.75 mg/kg to maximum of 3 mg/kg. If tachycardia resolves with bolus, administer maintenance infusion at 2-4 mg/min. Intraosseous Access-Responsive to pain **40 mg IO** over 120 seconds
Pediatric Dose/ Protocols:	Tachycardia (with a Pulse)-Wide Complex **1 mg/kg IV/IO.** Cardiac Arrest-(VFib / Pulseless V-tach) **1 mg/kg IV/IO**. Maintenance infusion at 20-50 mcg/kg/min. Intraosseous Access-Responsive to pain

(See drip charts on next page)

Medication Continues

LIDOCAINE (Xylocaine®)

Lidocaine Drip Chart

Lidocaine is provided premixed (2000 mg in 250 mL D5W) which yields a concentration of 8 mg/mL or (1000 mg in 250 mL D5W) which yields a concentration of 4 mg/mL.

(In the absence of an IV pump, use 60 drop tubing and mL/hr=drops/min)

Concentration: 8 mg/mL

Order	Flow rate mL/hr
2 mg/min	15 mL/hr
3 mg/min	23 mL/hr
4 mg/min	30 mL/hr

Concentration: 4 mg/mL

Order	Flow rate mL/hr
2 mg/min	30 mL/hr
3 mg/min	45 mL/hr
4 mg/min	60 mL/hr

Medication Continues

LIDOCAINE (Xylocaine®)

Pediatric Lidocaine Drip Chart

Lidocaine is provided premixed (2000 mg in 250 mL D5W) which yields a concentration of 8 mg/mL or (1000 mg in 250 mL D5W) which yields a concentration of 4 mg/mL.

(In the absence of an IV pump, use 60 drop tubing and mL/hr=drops/min)

Concentration: 8 mg / mL

Dose mcg/kg/min	20	25	30	35	40	45	50
Weight (lbs/kg)	**Flow rate in mL/hr**						
10 lbs/5 kg	1	1	1	1	2	2	2
20 lbs/9 kg	1	2	2	2	3	3	3
25 lbs/11 kg	2	2	2	3	3	4	4
30 lbs/14 kg	2	3	3	4	4	5	5
35 lbs/16 kg	2	3	4	4	5	5	6
40 lbs/18 kg	3	3	4	5	5	6	7
45 lbs/20 kg	3	4	5	5	6	7	8
50 lbs/23 kg	3	4	5	6	7	8	9
55 lbs/25 kg	4	5	6	7	8	8	9
60 lbs/27 kg	4	5	6	7	8	9	10
65 lbs/29 kg	4	5	7	8	9	10	11
70 lbs/32 kg	5	6	7	8	10	11	12
75 lbs/34 kg	5	6	8	9	10	11	13
80 lbs/36 kg	5	7	8	9	11	12	14
85 lbs/39 kg	6	7	9	10	12	13	15
90 lbs/41 kg	6	8	9	11	12	14	15

Medication Continues

LIDOCAINE (Xylocaine®)

Pediatric Lidocaine Drip Chart

Lidocaine is provided premixed (2000 mg in 250 mL D5W) which yields a concentration of 8 mg/mL or (1000 mg in 250 mL D5W) which yields a concentration of 4 mg/mL.

(In the absence of an IV pump, use 60 drop tubing and mL/hr=drops/min)

Concentration: 4 mg / mL

Dose mcg/kg/min	20	25	30	35	40	45	50
Weight lbs/kg	**Flow rate in mL/hr**						
10 lbs/5 kg	2	2	2	3	3	3	4
20 lbs/9 kg	3	3	4	5	5	6	7
25 lbs/11 kg	3	4	5	6	7	7	8
30 lbs/14 kg	4	5	6	7	8	9	11
35 lbs/16 kg	5	6	7	8	10	11	12
40 lbs/18 kg	5	7	8	9	11	12	14
45 lbs/20 kg	6	8	9	11	12	14	15
50 lbs/23 kg	7	9	10	12	14	16	17
55 lbs/25 kg	8	9	11	13	15	17	19
60 lbs/27 kg	8	10	12	14	16	18	20
65 lbs/29 kg	9	11	13	15	17	20	22
70 lbs/32 kg	10	12	14	17	19	22	24
75 lbs/34 kg	10	13	15	18	20	23	26
80 lbs/36 kg	11	14	16	19	22	24	27
85 lbs/39 kg	12	15	18	20	23	26	29
90 lbs/41 kg	12	15	18	22	25	28	31

LORAZEPAM (Ativan®)

Class:	Anticonvulsants, other; antianxiety agent; anxiolytics; benzodiazepines
Mechanism of Action:	Sedative hypnotic with short onset of effects and relatively long half-life; by increasing the action of gamma-aminobutyric acid (GABA), which is a major inhibitory neurotransmitter in the brain, lorazepam may depress all levels of the CNS, including limbic and reticular formation
Indications:	For the management of seizures, uncontrolled shivering in hypothermia, and for the management of agitated or violent patients suffering behavioral emergencies
Contraindications:	Hypersensitivity, myocardial damage, diabetic coma, heart block, hypermagnesemia, hypercalcemia
Side Effects:	CNS and respiratory depression, may slow heart rate and lower blood pressure.
Adult Dose/Protocols:	Agitated or Violent Patient/Behavioral Emergencies; Pain Management **LORAZEPAM 2 mg IV/IM** Seizures/Status Epilepticus **LORAZEPAM IV/IO 0.1 mg/kg** (maximum dose of 4mg) **LORAZEPAM IM 0.1 mg/kg** (maximum dose of 4mg) *(least desirable route)*
Pediatric Dose/ Protocols:	None

MAGNESIUM SULFATE

Class:	Class V antidysrhythmic, electrolyte
Mechanism of Action:	Depresses CNS, blocks peripheral neuromuscular transmission, produces anticonvulsant effects; decreases amount of acetylcholine released at end-plate by motor nerve impulse. Slows rate of sino-atrial (SA) node impulse formation in myocardium and prolongs conduction time. Promotes movement of calcium, potassium, and sodium in and out of cells and stabilizes excitable membranes.
Indications:	For the management of torsades de pointes or for severe bronchoconstriction with impending respiratory failure, seizure during the third trimester of pregnancy or in the postpartum patient.
Contraindications:	Hypersensitivity, myocardial damage, diabetic coma, heart block, hypermagnesemia, hypercalcemia
Side Effects:	Drowsiness, CNS depression, respiratory depression, respiratory tract paralysis, abnormal ECG, AV block, hypotension, vasodilation, hyporeflexia
Adult Dose/Protocols:	Bronchospasm / Asthma / COPD **2 grams IV in 50 mL NS** over 10-15 minutes. Eclampsia / Pre-Eclampsia **4 grams IV in 50 mL NS** over 10-20 minutes for seizures Tachycardia (with a Pulse)-Wide Complex **2 grams IV/IO** over 10 minutes. Cardiac Arrest-(V-Fib/Pulseless V-Tach) **2 grams IV/IO** over 1-2 minutes.
Pediatric Dose/ Protocols:	Respiratory Distress-Lower Airway **50 mg/kg IV in 50 mL NS** over 10-15 minutes. Maximum dose: 2 grams. *(Medical control must authorize)* Tachycardia (with a Pulse)-Wide Complex **25-50 mg/kg IV/IO** over 10 minutes. Maximum dose: 2 grams Cardiac Arrest-(V-Fib/Pulseless V-Tach) **25-50 mg/kg IV/IO** over 1-2 minutes.

METHYLPREDNISOLONE (SoluMedrol ®)

Class:	Corticosteroid, anti-inflammatory agent
Mechanism of Action:	Highly potent synthetic glucocorticoid that suppresses acute and chronic inflammation; potentiates vascular smooth muscle relaxation by beta-adrenergic agonist.
Indications:	Anaphylaxis, bronchodilator for unresponsive asthma.
Contraindications:	Untreated serious infections, documented hypersensitivity, IM route is contraindicated in idiopathic thrombocytopenic purpura, traumatic brain injury (high doses)
Side Effects:	Depression, euphoria, headache, restlessness, seizure, increased ICP, pulmonary tuberculosis, hypertension, heart failure, nausea, vomiting, peptic ulcer, fluid retention, hypernatremia, hyperkalemia
Adult Dose/Protocols:	Allergic Reaction / Anaphylaxis; Bronchospasm / Asthma / COPD **125 mg IV/IM**.
Pediatric Dose/ Protocols:	Allergic Reaction / Anaphylaxis; Respiratory Distress-Lower Airway **2 mg/kg IV/IM** (Maximum dose 125 mg). *(Medical control must authorize).*

METOPROLOL (Lopressor®, Toprol®)

Class:	Beta blocker, beta-1 selective
Mechanism of Action:	Blocks response to beta-adrenergic stimulation; cardio selective for beta-1 receptors at low doses, with little or no effect on beta-2 receptors
Indications:	For management of **narrow** complex tachycardias
Contraindications:	Hypersensitivity. When administered for hypertension or angina: sinus bradycardia, second or third degree AV block, cardiogenic shock, sick sinus syndrome (unless permanent pacemaker in place), severe peripheral vascular disease, pheochromocytoma. When administered for myocardial infarction: Severe sinus bradycardia with heart rate < 45 beats/minute, systolic BP < 100 mmHg, significant first-degree heart block (PR interval at least 0.24 seconds), moderate-to-severe cardiac failure
Side Effects:	Blurred vision, chest pain or discomfort, dizziness, faintness, lightheadedness when getting up suddenly, slow or irregular heartbeat. ***WARNING: May cause 1st, 2nd, or 3rd degree AV block***
Adult Dose/Protocols:	Tachycardia (Symptomatic with a pulse) **METOPROLOL 5 mg IV over 1-2 min**. Repeat as needed every 5 min if SBP>100mm (**Max 3 doses**).
Pediatric Dose/ Protocols:	None

MIDAZOLAM (Versed®)

Class:	Anticonvulsants, other; antianxiety agent; anxiolytics; benzodiazepines
Mechanism of Action:	Binds receptors at several sites within the CNS, including the limbic system and reticular formation; effects may be mediated through gabba-aminobutyric acid (GABA) receptor system; increase in neuronal membrane permeability to chloride ions enhances the inhibitory effects of GABA; the shift in chloride ions causes hyperpolarization (less excitability) and stabilization of the neuronal membrane.
Indications:	For the management of seizures, uncontrolled shivering in hypothermia, and for the management of agitated or violent patients suffering behavioral emergencies.
Contraindications:	Documented hypersensitivity, severe respiratory depression, sleep apnea
Side Effects:	Headache, somnolence, respiratory depression, respiratory arrest, apnea, hypotension, cardiac arrest, nausea, vomiting, pain at the injection site
Adult Dose/Protocols:	Agitated or Violent Patient/Behavioral Emergencies **IV/IM: 5 mg**; May repeat after max onset up to a maximum total dose of 10 mg. *Onset IV: 3-5 min; IM: 10-15 min; IN: 3-5 min* Bradycardia; Tachycardia-Narrow Complex (Regular); Tachycardia-Narrow Complex (Irregular); Tachycardia-Wide Complex; Chest Pain/ASC/STEMI; Environmental Hyperthermia **2 mg IV/IN/IO repeat q 5 min as needed to maintain sedation** Assisted (Medication) Intubation; *Intubation:* **0.1 mg/kg IV/IO** (maximum 10 mg) *Post-Intubation* **0.05 mg/kg IV/IO** every 3-5 minutes as needed (total max10mg) Seizure/Status Epilepticus **IV/IO: 0.1 mg/kg** over 2 minutes (maximum dose 5 mg); may repeat x 1 after 5 minutes if seizure persists. **IM: 0.2 mg/kg** (maximum dose 10 mg) **IN: 0.2 mg/kg** (maximum dose 10 mg; max 1 ml per nostril) (**Must use 5 mg/1 ml concentration**)

Medication Continues

MIDAZOLAM (Versed®)

Pediatric Dose/ Protocols:	Pediatric Environmental Hyperthermia **0.2 mg/kg IV/IO/IN/IM** (maximum dose 1 mg). **0.1 mg/kg IV/IO** (maximum dose 1 mg). Seizure **IV/IO 0.1 mg/kg** (max dose ≤ 5 yrs. = 5mg; ≥6 yrs. =10mg) **IM: 0.2 mg/kg** (maximum dose 10 mg) **IN: 0.2 mg/kg** (maximum dose 10 mg; max 1 ml per nostril) (Must use **5mg/1ml concentration**) Agitated or Violent Patient/Behavioral Emergencies *(Medical control must authorize).* **IV/IM/IN: 0.1 mg/kg**; (maximum dose 5 mg) *Onset: IV: 3-5 min; IM: 10-15 min; IN: 3-5 min*

MORPHINE SULFATE

Class:	Opioid analgesic; schedule II drug
Mechanism of Action:	Narcotic agonist-analgesic of opiate receptors; inhibits ascending pain pathways, thus altering response to pain; produces analgesia, respiratory depression, and sedation; suppresses cough by acting centrally in medulla.
Indications:	Management of acute pain.
Contraindications:	Head injury, exacerbated COPD, depressed respiratory drive, hypotension, undiagnosed abdominal pain, decreased level of consciousness, suspected hypovolemia, patients who have taken MAOI's within 14 days
Side Effects:	Confusion, sedation, headache, CNS depression, respiratory depression, apnea, bronchospasm, dyspnea, hypotension, orthostatic hypotension, syncope, bradycardia, tachycardia, nausea, vomiting, dry mouth
Adult Dose/Protocol:	Chest Pain / Acute Coronary Syndrome / STEMI **MORPHINE SULFATE 2-4 mg slow IV/IO over 1 minute,** may repeat as directed by medical control. Pain Management (Severe) **MORPHINE SULFATE 0.1 mg/kg slow IV/IO or IM/SQ**. May repeat IV/IO dose x 1 after 10-15 minutes if needed. Elderly patients over 75 years of age **0.05 mg/kg slow IV/IO or IM/SQ;**
Pediatric Dose/Protocol:	Pain Management **0.1 mg/kg IV/IO/IM** (max 5 mg). May repeat IV/IO dose x 1 after 15 minutes if needed.

NALOXONE (Narcan®, EVZIO®)

Class:	Opioid reversal agent
Mechanism of Action:	Competitive inhibition at narcotic receptor sites. Reverses respiratory depression secondary to opiate drugs. Completely inhibits the effect of morphine.
Indications:	Opiate overdose, complete or partial reversal of CNS and respiratory depression induced by opioids, decreased level of consciousness, coma of unknown origin.
Contraindications:	Hypersensitivity . Use with caution in narcotic-dependent patients and neonates of narcotic- addicted mothers.
Side Effects:	Restlessness, seizures, dyspnea, pulmonary edema, tachycardia, hypertension, dysrhythmias, cardiac arrest, nausea, vomiting, withdrawal symptoms in opioid-addicted patients, diaphoresis
Adult Dose/Protocols:	Poisoning and Overdose **IV or IM – 0.4-2.0 mg**; may repeat every 3-5 minutes until respiratory depression is reversed. **IN – 0.4 - 2 mg (1ml MAX) per nostril (**via atomizer, may repeat every 3-5 minutes until respiratory depression is reversed.
Pediatric Dose/ Protocols:	Pediatric Toxic Exposures/Ingestions; **EMR/EMT** **Weight ≤ 20 kg, 0.1 mg/kg IM or IN via atomizer** (1 mL per nostril maximum). **Weight > 20 kg, 2.0 mg/kg IM or IN via atomizer** (1 mL per nostril maximum). . Repeat doses may be necessary Pediatric Altered Mental Status **Paramedic** **Weight ≤ 20 kg, 0.1 mg/kg IV/IO/IM or IN via atomizer** (1 mL per nostril maximum). (max 2 mg) **Weight > 20 kg, 2.0 mg/kg IM or IN via atomizer** (1 mL per nostril maximum). (2 mg)

NITROGLYCERIN (Nitrostat®)

Class:	Vasodilator
Mechanism of Action:	Smooth muscle relaxant acting on vasculature, bronchial, uterine, intestinal smooth muscle. Dilation of arterioles and veins in the periphery. Reduces preload and afterload, decreasing workload of the heart and thereby myocardial oxygen demand.
Indications:	Acute angina pectoris, ischemic chest pain, hypertension, heart failure, pulmonary edema.
Contraindications:	Hypotension, hypovolemia, intracranial bleeding or head injury, pericardial tamponade, severe bradycardia or tachycardia, RV infarction, recent use of erectile dysfunction medications (sildenafil (Viagra® – within last 24 hours), tadalafil (Cialis® – within last 48 hours), vardenafil (Levitra® – within last 48 hours).
Side Effects:	Headache, dizziness, weakness, reflex tachycardia, syncope, hypotension, nausea, vomiting, dry mouth, muscle twitching, diaphoresis
Adult Dose/Protocols:	Chest Pain / Acute Coronary Syndrome / STEMI; CHF / Pulmonary Edema *Sublingual:* **0.4 mg SL**; may repeat every 3-5 minutes to maximum of 3 doses as long as chest pain persists and SBP > 100 mmHg or MAP>70 mmHg *Topical (paste):* **1 inch** SBP must be greater than 100 mmHg ***(****remove if SBP becomes lower less than 100 mmHg*).
Pediatric Dose/ Protocols:	None

NOREPINEPHRINE (Levophed®)

Class:	Sympathomimetic, vasopressor
Mechanism of Action:	Strong beta-1 and alpha-adrenergic effects and moderate beta-2 effects, which increase cardiac output and heart rate, decrease renal perfusion and peripheral vascular resistance, and cause variable BP effects.
Indications:	Cardiogenic shock unresponsive to fluid resuscitation, significant hypotensive (<70 mm Hg) states, first-line vasopressor in septic shock; IV Pump available.
Contraindications:	Hypersensitivity, hypotension due to blood volume deficit, peripheral vascular thrombosis (except for lifesaving procedures); No IV Pump
Side Effects:	Headache, anxiety, dizziness, restlessness, dyspnea, bradycardia, hypertension, dysrhythmias, chest pain, peripheral cyanosis, cardiac arrest, nausea, vomiting, urinary retention, renal failure, decreased blood flow to the GI tract, kidneys, skeletal muscle, and skin, tissue necrosis from extravasation
Adult Dose/Protocol:	CHF / Pulmonary Edema; ROSC; Sepsis; Shock **2-30 mcg/min**
Pediatric Dose/Protocol:	None

Mixing Instructions: Mix 8mg in 250 mL D5W = 32 mcg/mL

ONDANSETRON (Zofran®, Zofran ODT®)

Class:	Serotonin receptor antagonist, antiemetic
Mechanism of Action:	Blocks action of serotonin, a natural substance that causes nausea and vomiting.
Indications:	Prevention and control of nausea and vomiting.
Contraindications:	Hypersensitivity to ondansetron or other 5-HT3 receptor antagonists. .Suspected or known diagnosis of prolonged QT syndrome, or noted prolonged QT interval on ECG.
Side Effects:	Headache, malaise, wheezing, bronchospasm, AF, abnormal ECG, prolonged QT interval, ST segment depression, second-degree AV block, constipation, diarrhea, hives, skin rash
Adult Dose/Protocol:	Nausea / Vomiting **8 mg PO**; **4 mg IV,** may repeat IV dose x1 after 15 minutes (max total dose 8 mg).
Pediatric Dose/Protocol:	Nausea / Vomiting *(Medical control must authorize).* > 6 months old: **0.15 mg/kg IV/IM** > 4 years old: **4 mg PO** Maximum total dose: 4 mg

ORAL GLUCOSE (Insta-Glucose®)

Class:	Hyperglycemic, carbohydrate
Mechanism of Action:	After absorption in the GI tract, glucose is distributed to the tissues providing an increase in circulating blood glucose levels.
Indications:	Conscious patients with suspected hypoglycemia.
Contraindications:	Decreased level of consciousness, nausea, vomiting.
Side Effects:	Nausea, vomiting
Adult Dose/Protocols:	Diabetic Emergencies-Hypoglycemia **15 grams PO**
Pediatric Dose/ Protocols:	Pediatric Altered Mental Status; Pediatric Seizures **15 grams PO**

SODIUM BICARBONATE

Class:	Systemic hydrogen ion buffer, alkalizing agent
Mechanism of Action:	Increases blood and urinary pH by releasing a bicarbonate ion, which in turn neutralizes hydrogen ion concentrations.
Indications:	Metabolic acidosis during cardiac arrest, tricyclic antidepressant, aspirin and phenobarbital overdose, hyperkalemia, crush injuries.
Contraindications:	Documented hypersensitivity, severe pulmonary edema, known alkalosis, hypernatremia, or hypocalcemia.
Side Effects:	Hypernatremia, metabolic alkalosis, tissue sloughing, cellulitis, necrosis at injection site, seizures, fluid retention, hypokalemia, electrolyte imbalance, tetany, sodium retention, peripheral edema
Adult Dose/Protocols:	Cardiac Arrest-(Asystole / PEA); Poisoning and Overdose (Tricyclic Antidepressants); Diabetic Emergencies-Hyperglycemia (Hyperkalemia) **1 mEq/Kg (max dose of 50 mEq) IV/IO** Crush Injuries **1 mEq/Kg (max dose of 50 mEq) IV/IO** a. Should be given for significant crush injuries or prolonged entrapment of an extremity. b. Should be given over 5 minute just PRIOR to the release of the crushed body part.
Pediatric Dose/ Protocols:	Crush Injuries *(Medical control must authorize).* **1 mEq/kg** (max 50 mEq) Poisoning and Overdose *(Medical control must authorize).* **1 mEq/kg IV**

THIAMINE (Vitamin B1)

Class:	Vitamin
Mechanism of Action:	Vitamin B1 is necessary to convert glucose into energy. It is not manufactured by the body and must be replaced through diet. The brain is extremely sensitive to thiamine deficiency.
Indications:	Prophylaxis and treatment of thiamine deficiency states and associated neurological and cardiovascular symptoms including coma of unknown origin, chronic alcoholism and malnutrition.
Contraindications:	None significant (use with caution during lactation).
Side Effects:	Hypertension (from rapid injection or large dose), anxiety, nausea and vomiting, diaphoresis, allergic reaction (usually from IV injection—very rare).
Adult Dose/Protocols:	Altered Mental Status **100 mg IV/IM**
Pediatric Dose/Protocol:	None

TRANEXAMIC ACID (Lysteda®)

Class:	Hemostatic agent, antifibrinolytic, plasminogen inactivator
Mechanism of Action:	Reduces plasminogen activation, mitigating conversion to plasmin.
Indications:	Blunt or penetrating trauma less than 3 hours from onset with hemodynamic compromise, bleeding.
Contraindications:	Hypersensitivity; MOI greater than 3 hours; subarachnoid hemorrhage; history of PE, DVT, or other thromboembolic disorder
Side Effects:	Fatigue, headache, abdominal pain, anemia, DVT, PE, other thromboembolic disorder. Rapid infusion may cause hypotension
Adult Dose/Protocols:	Obstetric and Gynecological Conditions; Tranexamic Acid **1 gram** over 10 minutes • Mix **1 gram/10mL vial in 100mL NS** and administer over 10 minutes IV at a wide open rate. • If unable to be given IV/IO, **TXA 1 gram/10mL** may given deep **IM** utilizing two injection sites by splitting the standard dose into two **(500mg/5mL) doses.** *According to the manufacturer, TXA should be given via a dedicated line.*
Pediatric Dose/Protocol:	None

APPROVED MEDICATIONS FOR INTERFACILITY TRANSFERS

In addition to medications/procedures included in the Advanced Life Support EMS Guidelines, the following medications and procedures are approved for ALS transfer. Medication dose change requires orders from Medical Control.

1. Alteplase
2. Aminophylline/Theophylline
3. Amiodarone
4. Antibiotics
5. Benzodiazepines
6. Beta Blockers (atenolol, metoprolol, propranolol, esmolol, labetalol)
7. Blood Products
8. Digibind
9. Diltiazem
10. GP IIb/IIIa Inhibitors (ReoPro, Integrilin, Aggrastat)
11. H1 blockers (Benadryl, promethazine) and H2 blockers (Tagamet, Zantac, Pepcid, Axid)
12. Heparin
13. Ketamine
14. Lidocaine
15. Magnesium sulfate
16. Mannitol
17. Multivitamin preparations for infusion
18. Narcotics, including Patient Controlled Analgesic (PCA) pumps
19. Nitroglycerin Infusion (Tridil)
20. Norepinephrine (Levophed)
21. Phenobarbital
22. Phenytoin/Fosphenytoin
23. Pralidoxime
24. Procainamide
25. Propofol Transfer (Critical Care EMT-P or PHRN, RN Only).
26. Steroids (mineral and glucocorticoid)

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Blind Insertion Airway - i-gel®

Clinical Indications:

- Inability to adequately ventilate a patient with a bag valve mask or longer EMS transport distances require a more advanced airway
- Inability to secure an endotracheal tube in a patient who does not have a gag reflex
- Appropriate intubation is impossible due to patient access or difficult airway anatomy

Procedure:

1. Pre-oxygenate the patient with 100% oxygen if time permits.
2. Select the appropriate tube size for the patient.
3. Remove the device from the protective cradle and inspect for any signs of damage.
4. Place water-soluble lubricant in the middle of the protective cradle.
5. Lubricate the back, sides and front of the i-gel with a thin layer of lubricant.
6. Grasp along the integral bite block and face the cuff outlet toward the patient's chin.
7. Insert the i-gel into the mouth in the direction towards the hard palate.
8. Glide the device down and back along the hard palate with continuous but gentle pressure, until resistance is met.
9. The tip of the airway should be located in the upper esophageal opening and the cuff should be located against the laryngeal framework. The incisors should be resting on the integral bite block.
10. Tape to secure or use a commercial tube holder.
11. Connect the i-gel to a BVM and assess for breath sounds and air entry.
12. Confirm tube placement (i.e. $EtCO_2$, chest rise, breath sounds, absent epigastric sounds)
13. Continue to monitor airway with continuous waveform capnography and pulse oximetry.
14. Reassess i-gel placement after every move and upon arrival in the ED.

i-gel Size	Patient Size	Patient weight guidance (kg)
1	Neonate	2-5 kg
1.5	Infant	5-12 kg
2	Small Pediatric	10-25 kg
2.5	Large Pediatric	25-35 kg
3	Small Adult	30-60 kg
4	Medium Adult	50-90 kg
5	Large Adult +	90+ kg

Blind Insertion Airway - i-gel®

The i-gel® supraglottic airway

i-gel®

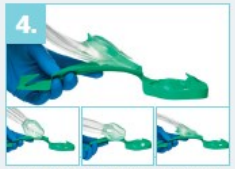
Preparations for use

Adult sizes

Open the i-gel package, and on a flat surface take out the protective cradle containing the device.

Remove the i-gel and transfer it to the palm of the same hand that is holding the protective cradle, supporting the device between the thumb and index finger.

Place a small bolus of a water-based lubricant, such as K-Y Jelly®, onto the middle of the smooth surface of the protective cradle in preparation for lubrication.



Grasp the i-gel with the opposite (free) hand along the integral bite block and lubricate the back, sides and front of the cuff with a thin layer of lubricant.

Inspect the device carefully, confirm there are no foreign bodies or a BOLUS of lubricant obstructing the distal opening. Place the i-gel back into the protective cradle in preparation for insertion.

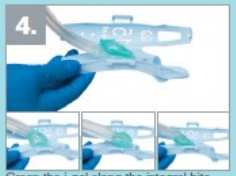
Go to step 6. for insertion technique

Paediatric sizes

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

Open the cage pack and transfer the i-gel into the lid of the cage.

Place a small bolus of a waterbased lubricant, such as K-Y Jelly®, onto the middle of the smooth surface of the cage pack ready for use.



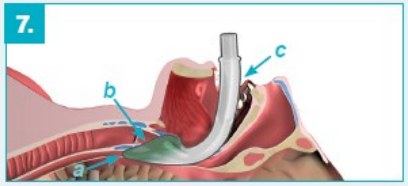
Grasp the i-gel along the integral bite block and lubricate the back, sides and front of the cuff with a thin layer of lubricant.

Inspect the device carefully, confirm there are no foreign bodies or a BOLUS of lubricant obstructing the distal opening. Place the i-gel back into the cage pack in preparation for insertion.

Go to step 6. for insertion technique

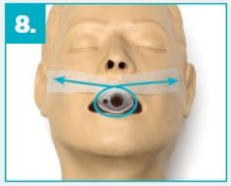
Insertion technique

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



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

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



The i-gel should be taped down from 'maxilla to maxilla'.

Patient Size	Size	Weight
Neonate	1	2-5kg
Infant	1.5	5-12kg
Small paediatric	2	10-25kg
Large paediatric	2.5	25-35kg
Small adult	3	30-60kg
Medium adult	4	50-90kg
Large adult	5	90+kg

Important notes to the recommended insertion technique

Sometimes a feel of 'give-way' is felt before the end point resistance is met. This is due to the passage of the bowl of the i-gel through the faucial pillars. It is important to continue to insert the device until a definitive resistance is felt.

Once definitive resistance is met and the teeth are located on the integral bite block, do not repeatedly push the i-gel down or apply excessive force during insertion.

It is not necessary to insert fingers or thumbs into the patient's mouth during the process of inserting the device.

Visit the i-gel website www.i-gel.com

This poster does NOT constitute a comprehensive guide to the preparation, insertion and use of the i-gel. The user should first familiarise themselves with the Instructions for Use supplied with the product before attempting to use the i-gel. Additionally, a User Guide is available by contacting Intersurgical or by visiting our website www.i-gel.com
The i-gel must always be separated from the protective cradle or cage pack prior to insertion. The cradle is not an introducer and must never be inserted into the patient's mouth. K-Y Jelly® is a registered trademark of Johnson and Johnson Inc.

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Blind Insertion Airway - King Airway

Clinical Indications:

- Inability to adequately ventilate a patient with a bag valve mask or longer EMS transport distances require a more advanced airway
- Inability to secure an endotracheal tube in a patient who does not have a gag reflex
- Appropriate intubation is impossible due to patient access or difficult airway anatomy

Contraindications:

- Responsive patients with an intact gag reflex
- Patients with known esophageal disease
- Patients who have ingested caustic substances

Procedure:

1. Pre-oxygenate the patient with 100% oxygen if time permits.
2. Select the appropriate tube size for the patient.
3. Apply a water-based lubricant to the beveled distal tip and posterior aspect of the tube.
4. Hold the King Airway Device at the connector with your dominant hand. With your non-dominant hand, hold the patient's mouth open and apply chin lift unless contraindicated by c-spine precautions.
5. Gently insert the tube rotated laterally 45-90 degrees so that the blue orientation line is touching the corner of the mouth. Once the tip is at the base of the tongue, rotate the tube back to midline.
6. Insert the airway until the base of the connector is in line with the teeth and gums.
7. Inflate the pilot balloon with air depending on the size of the device used.
8. Ventilate the patient while gently withdrawing the airway until the patient is easily ventilated.
9. Confirm tube placement (i.e. $EtCO_2$, chest rise, breath sounds, absent epigastric sounds)
10. Secure tube using tape or commercial device.
11. Reassess placement after every move and upon arrival in the ED.

Size	Patient Criteria	Cuff Volume (mL)
2	35-45 inches or 12-25 kg	25 - 35
2.5	41-51 inches or 25-35 kg	30 - 40
3	4-5 Feet	40 - 55
4	5-6 Feet	50 - 70
5	Greater than 6 Feet	60 - 80

Continuous Positive Airway Pressure (CPAP)

Clinical Indications:

- The suspected CHF, COPD, asthma or pneumonia patient
- To ease significant labored respirations and the work of breathing in patients on supplemental oxygen who may otherwise require Orotracheal Intubation.
- Exhibiting hypoxemia (O_2 saturation <94% at any time) not resolved by supplemental oxygen therapy
- Patient currently on BiPap / CPAP at referring facility with satisfactory improvement in oxygenation and ventilation
- Must have SBP ≥ 90 mmHg

Contraindications:

- Cardiac or respiratory arrest / apnea
- Unable to follow commands
- Unable to maintain their own airway
- Agitated or combative behavior and unable to tolerate mask
- Vomiting and/or active GI bleed
- Respiratory distress secondary to trauma
- Suspicion of pneumothorax
- Facial trauma or impossible face seal
- Hypotension with SBP <90 mmHg

Procedure:

1. Ensure all necessary equipment is available and assembled (follow manufacturer's directions for preparation of your particular device).
2. Choose appropriate sized device mask for patient.
3. Explain the procedure to the patient. Be prepared to coach the patient for claustrophobia or anxiety.
4. Ensure oxygen is flowing prior to placing CPAP mask on patient's face.
5. Place mask on patient's face using bridge of nose as a guide. Secure cap around patient's head and tighten Velcro straps on each side. Adjust extender on forehead to fit tightly on patient's face.
6. Apply CPAP at recommended H_20 pressure, 5-10 cm H_20, or continue current H_20 pressure if CPAP already in use. Start with 5 cm PEEP.
7. Recheck mask for leaks and adjust straps as needed to minimize air leaks.
8. Monitor vital signs and symptoms, pulse oximetry and waveform capnography.
9. If patient condition is deteriorating (decreasing LOC, decreasing O_2 sat, or any exclusion criteria become evident), remove CPAP and assist respirations with BVM ventilations.

Cricothyrotomy - Bougie® Assisted

Clinical Indications:

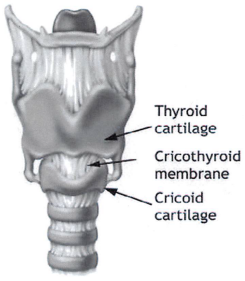
- ≥12 years of age
- Inability of adequately oxygenate and ventilate using less invasive methods
    - These methods may include securing airway by means such as oropharyngeal airway and BVM device, a blind insertion airway device or intubation by direct visualization

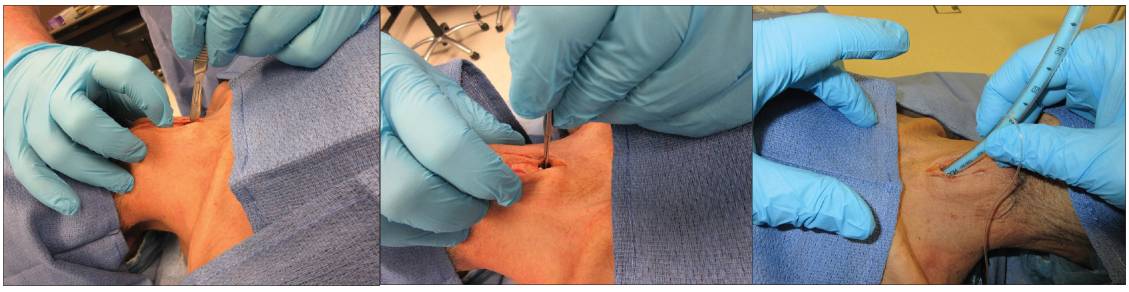
Equipment:

- Chlorhexidine
- #10 scalpe blade
- Bougie®
- 6.0mm endotracheal tube
- 10 ml syringe
- Bag Valve Mask
- Quantitative ETCO2
- Suction
- Tape to secure ETT

Procedure:

1. Position the patient supine and extend the neck as needed to improve anatomic view.
2. Prep neck with Chlorhexidine
3. Using your non-dominant hand, stabilize the larynx and locate the following landmarks: thyroid cartilage (Adam's apple) and cricoid cartilage. The cricothyroid membrane lies between these cartilages.
4. Make an approximately a 3cm vertical incision 0.5cm deep through the skin and fascia, over the cricothyroid membrane. With finger, dissect the tissue and locate the cricothyroid membrane.
5. Make approximately a 1.5cm horizontal incision through the cricothyroid membrane.
6. With your finger, bluntly dilate the opening through the cricothyroid membrane.
7. Insert the Bougie® curved-tip first through the incision and angled towards the patient's feet.
8. Advance the Bougie® into the trachea feeling for "clicks" of tracheal rings and until "hangup" when it cannot be advanced any further. This confirms tracheal position.
9. Advance a 6.0 mm endotracheal tube (ensure all air aspirated out of cuff) over the Bougie® and into the trachea.
10. Remove Bougie® while stabilizing ETT ensuring it does not become dislodged
11. Inflate the cuff with 5 – 10ml of air.
12. Confirm appropriate proper placement by symmetrical chest-wall rise, auscultation of equal breath sounds over the chest and a lack of epigastric sounds with ventilations using bag-valve-mask, condensation in the ETT, and quantitative waveform capnography.
13. Secure the ETT.
14. Reassess tube placement frequently, especially after movement of the patient.
15. Ongoing monitoring of ETT placement and ventilation status using waveform capnography is required for all patients.
16. Video link of procedure: https://vimeo.com/125228375





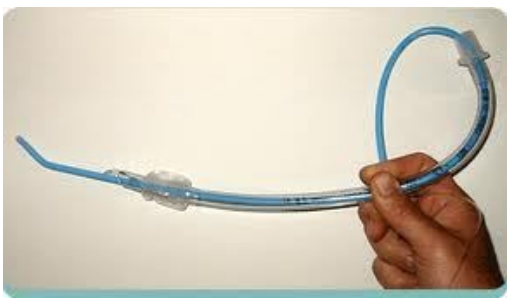
Endotracheal Tube Introducer: Bougie®

Clinical Indications:

- Patients meet clinical indications for Orotracheal Intubation
- Initial intubation attempt(s) unsuccessful
- Predicted difficult intubation

Procedure:

1. Prepare, position and oxygenate the patient with 100% oxygen.
2. Select proper ETT without stylet, test cuff and prepare suction.
3. Lubricate the tip of the Bougie® with a water-soluble lubricant.
4. Using laryngoscopic techniques, visualize the vocal cords if possible using Sellick / BURP as needed.
5. Introduce the Bougie® with curved tip anteriorly and visualize the tip passing the vocal cords or above the arytenoids if the cords cannot be visualized.
6. Once inserted, gently advance the Bougie until you meet resistance or “hold-up” (if you do not meet resistance you have a probable esophageal intubation and insertion should be reattempted or the failed airway protocol implemented as indicated).
7. Withdraw the Bougie® ONLY to a depth sufficient to allow loading of the ETT while maintaining proximal control of the Bougie® .
8. Gently advance the Bougie® and loaded ETT until you have “hold-up” again, thereby assuring tracheal placement and minimizing the risk of accidental displacement of the Bougie® .
9. While maintaining a firm grasp on the proximal Bougie® , introduce the ETT over the Bougie® passing the tube to its appropriate depth.
10. Once the ETT is correctly placed, hold the ETT securely and remove the Bougie® .
11. Inflate the cuff with 3 - 10 mL of air.
12. Confirm appropriate placement with waveform capnography, symmetrical chest-wall rise, auscultation of equal breath sounds over the chest and a lack of epigastric sounds with ventilations using a BVM.
13. Secure the tube using commercial device.
14. Document ETT size, time, result (success), and placement location by the centimeter marks either at the patient’s teeth or lips. Document all devices used to confirm initial tube placement. Also document positive or negative breath sounds before and after each movement of the patient.
15. Continuously monitor $EtCO_2$ to detect tube dislodgement or obstruction. Reconfirm correct placement after each patient movement.



Needle Chest Decompression

Clinical Indications:

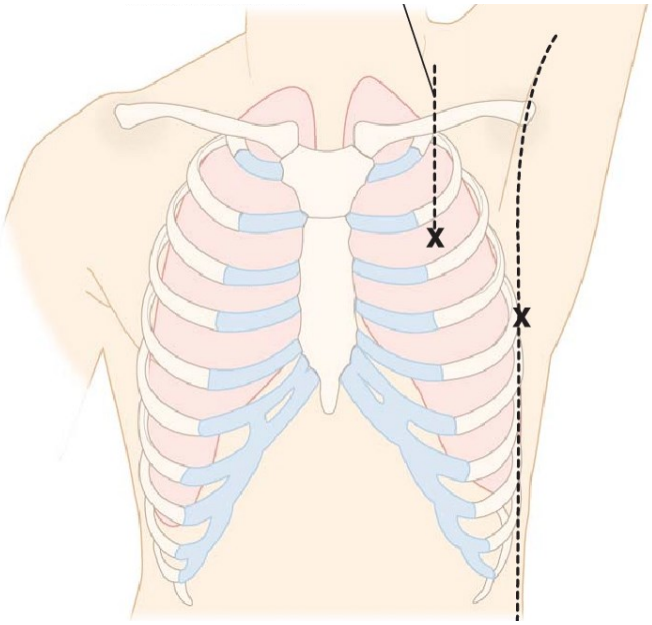
Patients with hypotension (SBP <90), clinical signs of shock, and at least one of the following signs:

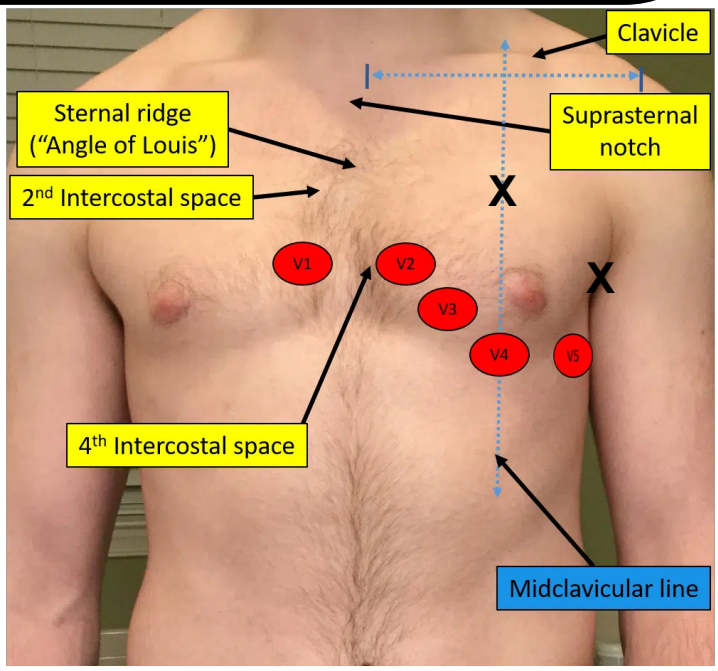
- Jugular vein distention
- Tracheal deviation away from the side of the injury (often a late sign)
- Absent or diminished breath sounds on the affected side
- Hyper-resonance to percussion on the affected side
- Increased resistance when ventilating the patient

Patients in traumatic arrest with chest or abdominal trauma for whom resuscitation is indicated. These patients may require bilateral chest decompression even in the absence of the signs above.

Procedure:

1. Administer high flow oxygen.
2. Identify the site:
    - Locate the sternal ridge "Angle of Louis", just inferior is the second intercostal space. Follow laterally until the mid-clavicular line on the same side as the pneumothorax
    - If unable to place anteriorly, lateral placement may be used at the fourth intercostal space in the mid-axillary line. *Tip: As a reference point, the 4th intercostal space coincides with the plane for placement of V1-V2 pre-cordial leads. Mid-axillary would be one intercostal space superior to lead V6.*
3. Prepare the site by cleansing with antiseptic cleansing solution.
4. Insert the appropriate catheter into the skin perpendicular to the chest wall over the appropriate rib and direct it just over the top of the rib (superior border) into the intercostal space.
5. Advance the needle-catheter through the parietal pleura until a “pop” is felt and air or blood exits under pressure through the catheter, then advance the catheter only to chest wall.
6. Remove the needle, leaving the plastic catheter in place.
7. Secure the catheter hub to the chest wall using a commercial seal with a one-way valve or create a flutter valve from the finger of an exam glove.





Orotracheal Intubation

Clinical Indications:

- Inability to adequately ventilate a patient with a bag valve mask or longer EMS transport distances require a more advanced airway
- An unconscious patient without a gag reflex who is apneic or is demonstrating inadequate respiratory effort

Procedure:

1. Prepare, position and oxygenate the patient with 100% oxygen.
2. Have suction and Bougie® ready.
3. Assess for airway difficulty and have back up plan and equipment ready.
4. Select proper ETT size. Assure that cuff is functioning.
5. Open the patient's airway and holding the laryngoscope in the left hand, insert the blade into the right side of the mouth and sweep the tongue to the left.
6. Use the blade to lift the tongue and epiglottis (either directly with the straight blade or indirectly with the curved blade).
7. Using laryngoscope, visualize vocal cords. (Use Sellick maneuver / BURP to assist you). If using video laryngoscope, follow manufacturer guidelines for use.
8. Once the glottis opening is visualized, pass the tube through the vocal cords and continue to visualize until the cuff is past the cords.
9. Limit each intubation attempt to 30 seconds with BVM ventilations between attempts.
10. Remove the laryngoscope and then the stylet from the ETT.
11. Inflate the cuff with 3 - 10 mL of air.
12. Confirm appropriate placement with waveform capnography, symmetrical chest-wall rise, auscultation of equal breath sounds over the chest and a lack of epigastric sounds with ventilations using a BVM.
13. Secure the tube using commercial device.
14. Document ETT size, time, result (success), and placement location by the centimeter marks either at the patient's teeth or lips. Document all devices used to confirm initial tube placement. Also document positive or negative breath sounds before and after each movement of the patient.
15. Continuously monitor $EtCO_2$ to detect tube dislodgement or obstruction. Reconfirm correct placement after each patient movement.
16. Providers who have received EMS system training and approval for use of a video laryngoscope must adhere to the manufacturers recommendation regarding the use of the device. Providers must submit any additional reporting regarding video laryngoscope use as may required per each EMS system's policy

Ventilator Management

Clinical Indications:

- Management of the ventilation of a patient during a prolonged or interfacility transport of an intubated patient

Procedure:

1. Transporting personnel should review the operation of the ventilator with the treating personnel (physician, nurse, or respiratory therapy) in the referring facility prior to transport if possible.
2. All ventilator settings, including respiratory rate, FiO2, mode of ventilation, and tidal volumes should be recorded prior to initiating transport. Additionally, the recent trends in oxygen saturation experienced by the patient should be noted.
3. Prior to transport, specific orders regarding any anticipated changes to ventilator settings as well as causes for significant alarm should be reviewed with the referring medical personnel as well as medical control.
4. Once in the transporting unit, confirm adequate oxygen delivery to the ventilator.
5. Frequently assess breath sounds to assess for possible tube dislodgment during transfer.
6. Frequently assess the patient's respiratory status, noting any decreases in oxygen saturation or changes in tidal volumes, peak pressures, etc.
7. It is strongly recommended that the airway be monitored continuously through capnography and pulse oximetry.
8. If any significant change in patient condition, including vital signs or oxygen saturation or there is a concern regarding ventilator performance / alarms, remove the ventilator from the endotracheal tube and use a BVM with 100% oxygen. Contact medical control immediately.

Waveform Capnography

Clinical Indications:

- Shall be used with the use of all invasive airway procedures including endotracheal, cricothyrotomy, or Blind Insertion Airway Devices (i-gel & King airway)
- Should also be used on all respiratory patients, including asthma, COPD and CHF with use of CPAP
- Should be used on all cardiac arrests

Procedure:

Tube Capnography Sensor: Attach capnography sensor to the BIAD, endotracheal tube, or oxygen delivery device.
Nasal Cannula Capnography Sensor: Place nasal prongs into patient's nose, plug sensor into monitor. Attach supplemental oxygen if needed.

1. Turn on monitor and verify $EtCO_2$ display is on and functioning.
2. Connect $EtCO_2$ tubing to monitor.
3. Note CO_2 level and waveform changes. These will be documented on each respiratory failure, cardiac arrest, or respiratory distress patient. Normal range is 35-45 mmHg.
4. Waveform capnography shall remain in place with the airway and be monitored throughout the prehospital care and transport.
5. Any loss of CO_2 detection or waveform indicates an airway problem and should be immediately evaluated for loss of airway or circulatory compromise and should be documented.
6. In all patients with a pulse an $EtCO_2$ reading > 20 mmHg is expected.
7. During cardiac arrest, good compressions will show a value of >10 mmHg. A spike in $EtCO_2$ may indicate ROSC.
    - **Futility**-patients that have end-tidal reading consistently < than 10 mmHg despite appropriate resuscitation measures may be considered for termination of resuscitative efforts if the time frame has exceeded 20 minutes. (Contact medical control)
    - **Negative trends**-patients that start with an end-tidal reading > than 10 mmHg and despite appropriate resuscitation measures, trend to ≤ than 10 mmHg may be considered for termination of resuscitative efforts if the time frame has exceeded 20 minutes.(Contact medical control)
    - **Positive trends**-patients that start with an end-tidal reading ≤ or ≥ than 10 mmHg and with appropriate resuscitation measures continue to trend to ≥ than 10 mmHg should be considered as candidates for an extended (40 - 60 minutes) resuscitative effort.

Defibrillation/DSD

Clinical Indications: Defibrillation

- Patients with pulseless ventricular tachycardia or ventricular fibrillation

Clinical Indications: Double Sequential Defibrillation

- Patients with pulseless ventricular tachycardia or ventricular fibrillation who have received three (3) unsuccessful defibrillation attempts, otherwise known as "refractory V-fib or V-tach".

Procedure: Defibrillation

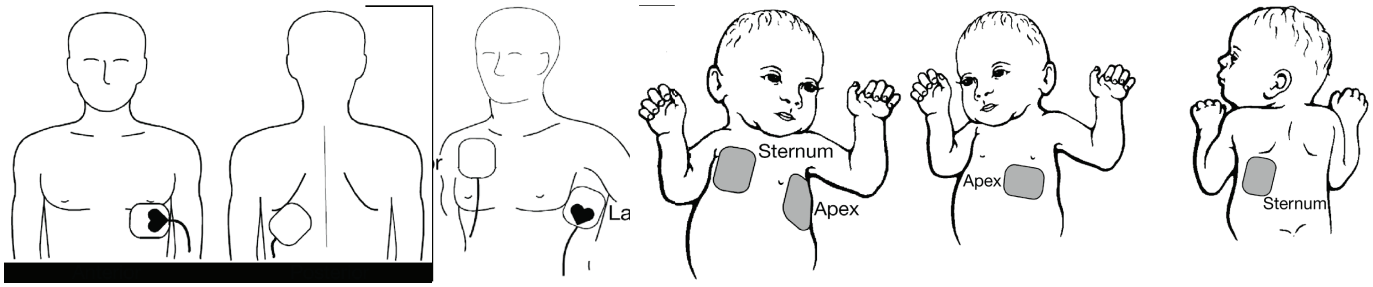
1. Determine pulselessness, have partner (if available) initiate chest compressions
2. Without interruption of partner's compressions, apply defibrillation pads to anterior and lateral positions:
    - One pad to the patient's upper right torso, lateral to the sternum and inferior to the clavicle.
    - One (+) pad lateral to patient's left nipple in the mid axillary line.
4. Charge to the corresponding joules setting as recommended by the device manufacturer.
5. Stop compression so as to assess rhythm, if ventricular fibrillation or pulseless ventricular tachycardia, clear patient head-to-toe and delivery shock.
7. Immediately resume chest compressions
8. During the next cycle of compression, recharge the defibrillator to the next recommended energy setting in anticipation of the upcoming pulse/rhythm check. Repeat as necessary.
9. To enhance operation safety, the provider performing the pulse/rhythm check should also have the responsibility for delivering the subsequent shock to the patient.

Procedure: Double Sequential Defibrillation (DSD)

1. Always follow guidance from the manufacturer as it relates to the operational recommendations and any risk that may be associated when performing Double Sequential Difibrillation (DSD)with a particular device.

2. Verify that the patient meets the above mentioned criteria for refractory v-fibrillation/pulseless v-tachycardia.
3. Apply additional defibrillation pads to the anterior and posterior positions with minimal interruptions to compressions.
Note: *Always follow the manufacturer's specific recommendations regarding pad placement.*
4. One provided should deliver **maximum** energy setting from both devices **sequentially** to avoid simultanous discharge. ***Note****: Always follow the manufacturer's specific recommendations regarding the delivered energy settings.*

- One (+) pad to left precordium as shown below. The upper edge of the pad should be below the nipple. Avoid placement over the nipple, the diaphragm or other bony prominence of the sternum if possible.
- One pad behind the heart in the infrascapular area.



Anterior-Posterior | Anterior-Lateral | Anterior-Lateral | Anterior-posterior

Combine for (DSD) | Combine for (DSD)

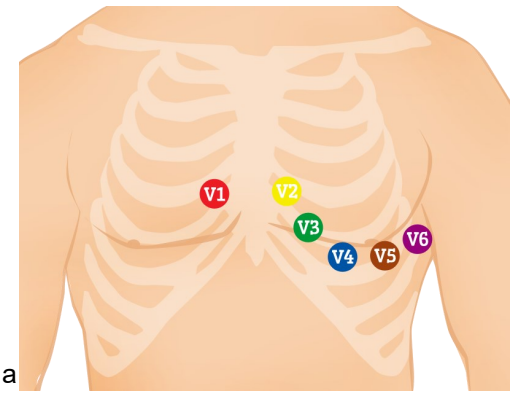
12-Lead ECG

Clinical Indications:

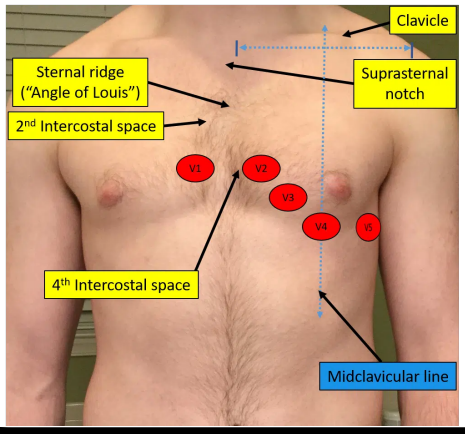
- Suspected cardiac patient (CHF, pulmonary edema, dysrhythmias, palpitations)
- Suspected Acute Coronary Syndrome (chest, jaw, arm, epigastric discomfort, etc.)
- Suspected tricyclic overdose
- Electrical injuries
- Syncope
- Shortness of breath

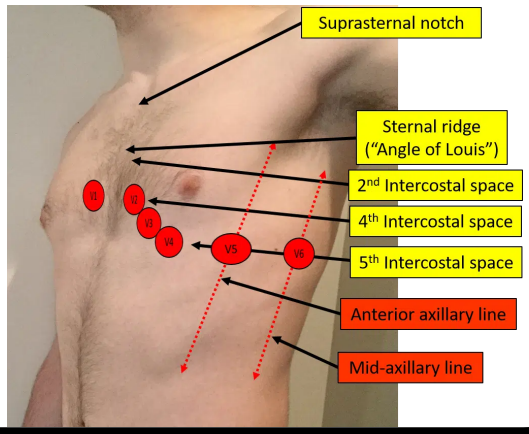
Procedure:

1. If patient is unstable, definitive treatment is the priority. If patient is stable or stabilized after treatment, perform a 12-lead ECG.
2. Prepare ECG monitor and connect patient cable with electrodes.
3. Enter the required patient information (patient name, etc.) into the 12-lead ECG device.
4. Expose chest and prep as necessary (i.e. hair removal). Modesty of the patient should be respected.
5. Apply chest leads and extremity leads using the following landmarks:
    - RA — Right arm
    - LA — Left arm
    - RL — Right leg
    - LL — Left leg
    - V1 — 4th intercostal space at right sternal border
    - V2 — 4th intercostal space at left sternal border
    - V3 — Directly between V2 and V4
    - V4 — 5th intercostal space at midclavicular line
    - V5 — Level with V4 at left anterior axillary line
    - V6 — Level with V5 at left midaxillary line



6. Instruct patient to remain still.
7. Press the appropriate button to acquire the 12-lead ECG.
8. If the monitor detects signal noise (such as patient motion or a disconnected electrode), the 12-lead acquisition will be interrupted until the noise is removed.
9. Once acquired, transmit the ECG data to the appropriate hospital.
10. Contact the receiving hospital to notify them that a 12-lead ECG has been sent and confirm they received the 12-lead.
11. Monitor the patient while continuing with the treatment protocol.





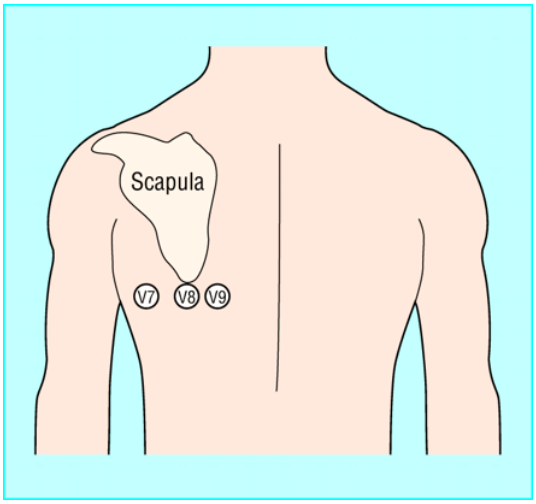
Posterior ECG

Clinical Indications:

- Suspected cardiac patient
- Reciprocal changes in leads V1-V3. Posterior MI is suggested by the following changes:
  - Horizontal ST depression
  - Tall, broad R waves (>30 ms)
  - Upright T waves
  - Dominant R wave (R/S ratio >1) in V2

Procedure:

1. Acquire and transmit normal 12-lead ECG. Continue cardiac monitoring.
2. Locate V7 position:
   - Posterior 5th intercostal space
   - Left posterior axillary line
3. Move V4 lead to V7 position
4. Locate V8 position:
   - In line with V7 the posterior 5th intercostal space
   - Tip of the left scapula
5. Move V5 lead to V8 position.
6. Locate V9 position:
   - In line with V8 position
   - Left paraspinal border
7. Move V6 lead to V9 position
8. Instruct patient to remain still.
9. Press the appropriate button to acquire the 12-lead ECG.
10. If the monitor detects signal noise (such as patient motion or a disconnected electrode), the 12-lead acquisition will be interrupted until the noise is removed.
11. Once acquired, transmit the ECG data to the appropriate hospital.
12. Re-label the 3 altered leads on the ECG strip.



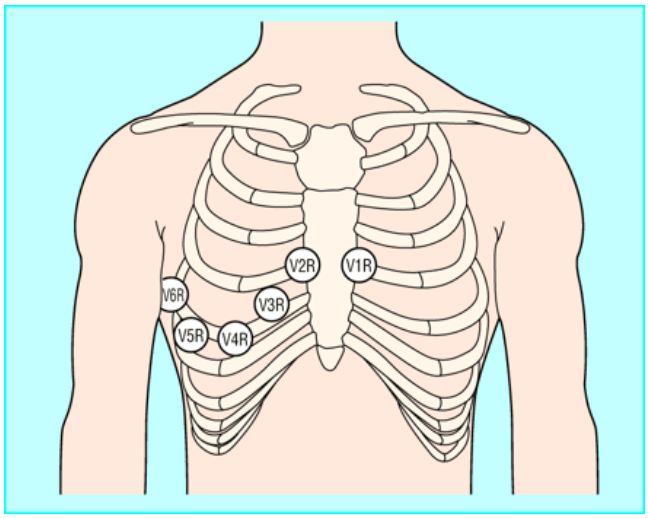
Right-Sided ECG

Clinical Indications:

- Suspected cardiac patient
- Inferior STEMI patients with ST elevation in V1 and ST elevation in lead III > lead II
    - Isoelectric ST segment in V1 with marked ST depression in V2

Procedure:

1. Acquire and transmit normal 12 lead ECG. Continue cardiac monitoring.
2. Apply limb leads V1– V6 in mirror– image position on the right side of chest.
    - V1R-4th intercostal space at left sternal border (original V2 placement)
    - V2R -4th intercostal space at right sternal border (original V1 placement)
    - V3R -Directly between V2 and V4
    - V4R -5th intercostal space at midclavicular line
    - V5R -Level with V4 at left anterior axillary line
    - V6R -Level with V5 at left midaxillary line
3. Instruct patient to remain still.
4. Press the appropriate button to acquire the 12 lead ECG.
5. If the monitor detects signal noise (such as patient motion or a disconnected electrode), the 12-lead acquisition will be interrupted until the noise is removed.
6. Once acquired, transmit the ECG data to the appropriate hospital.
7. Re-label the 3 altered leads on the ECG strip.



Synchronized Cardioversion

Clinical Indications:

- Unstable patient with a tachydysrhythmia (rapid atrial fibrillation / flutter, supraventricular tachycardia, ventricular tachycardia)
- Patient is not pulseless (the pulseless patient requires unsynchronized cardioversion, i.e., defibrillation)

Procedure:

1. Ensure the patient is attached properly to a monitor / defibrillator capable of synchronized cardioversion.
2. Have all equipment prepared for unsynchronized cardioversion / defibrillation if the patient fails synchronized cardioversion and the condition worsens and rhythm deteriorates into VF / pulseless VT.
3. Consider the use of pain or sedating medications.
4. Set monitor / defibrillator to synchronized cardioversion mode watching for R wave markers on each QRS complex.
5. Set energy selection to the appropriate setting per the appropriate protocol.
6. Make certain all personnel are clear of patient.
7. Press and hold the shock button to cardiovert. Stay clear of the patient until you are certain the energy has been delivered. NOTE: It may take the monitor / defibrillator several cardiac cycles to synchronize so there may a delay between activating the cardioversion and the actual delivery of energy.
8. Note patient response and perform immediate unsynchronized cardioversion / defibrillation if the patient's rhythm has deteriorated into pulseless VT / VF, following the procedure for Defibrillation-Manual.
9. Repeat until maximum setting or until efforts succeed. Consider discussion with medical control if cardioversion is unsuccessful after 2 attempts.

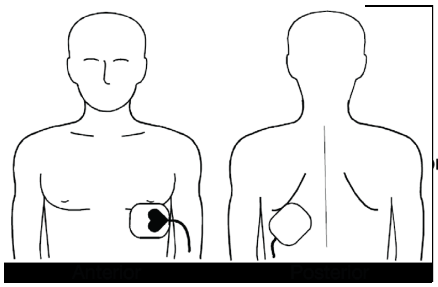
Transcutaneous Pacing

Clinical Indications:

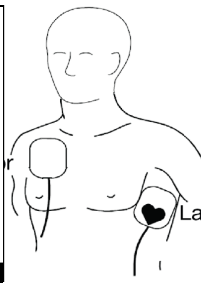
- Patients with symptomatic bradycardia (less than 60 per minute) with signs and symptoms of inadequate cerebral or cardiac perfusion such as:
  - Chest Pain
  - Hypotension
  - Pulmonary edema
  - Altered mental status, confusion, etc.
  - Ventricular ectopy

Procedure:

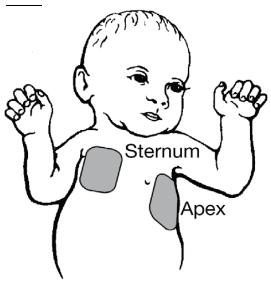
1. Attach standard four-lead monitor.
2. Apply defibrillation / pacing pads to anterior and posterior:
   - One (+) pad to left precordium as shown below. The upper edge of the pad should be below the nipple. Avoid placement over the nipple, the diaphragm or other bony prominence of the sternum if possible.
   - One pad behind the heart in the infrascapular area. For patient comfort, place the cable connection away from the spine. Do not place electrodes over the bony prominences of the spine or scapula.
3. Apply defibrillation / pacing pads to anterior and lateral:
   - One (+) pad lateral to patient's left nipple in the mid axillary line.
   - One pad to the patient's upper right torso, lateral to the sternum and inferior to the clavicle..
4. Select pacing mode on the monitor
5. Set the pacing rate to the lowest effective rate between 60-80 BPM for an adult based on clinical assessment and symptom resolution. 100 BPM for a child .
6. Note pacer spikes on ECG screen.
7. Slowly increase output until capture of electrical rhythm on the monitor.
8. If unable to capture while at maximum current output, stop pacing immediately.
9. If capture observed on monitor, check for corresponding pulse and assess vital signs.
10. Set the current (mA) output 2 mA above the dose at which consistent capture is observed (safety margin).
11. Consider the use of sedation or analgesia if patient is uncomfortable.



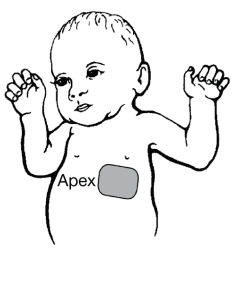
Anterior-Posterior

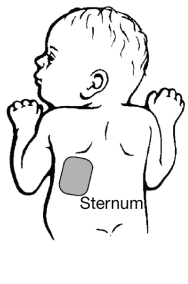


Anterior-Lateral



Anterior-Lateral





Anterior-posterior

Lifevest® Management:

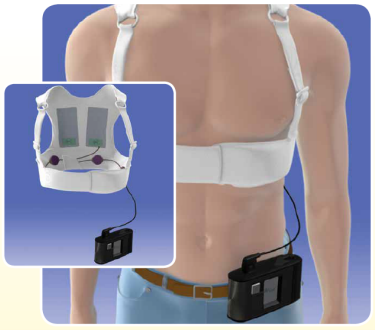
LIFEVEST® WEARABLE DEFIBRILLATOR EMERGENCY PATIENT MANAGEMENT

What **alert** sounds and **voice** prompts are being broadcast?

ALERT: • Device Silent OR Gong Alert (SINGLE TONE)	**ALERT:** • Siren Alert (TWO TONE)	**ALERT:** • Siren Alert (TWO TONE)
VOICE: • None — device silent • "Treatment has been given. Call your doctor."	**VOICE:** • "If patient is not responsive, call for help. Perform CPR."	**VOICE:** • "Press response buttons to delay treatment." • "Bystanders, do not interfere."
STATUS: • Device is monitoring the patient • Device may be alerting the patient to follow instructions on the screen	**STATUS:** • Device cannot detect ECG or the device has delivered the maximum number of treatments	**STATUS:** • Device has detected a ventricular arrhythmia • Device is preparing to treat the patient • Shock likely • Stop CPR • Only the patient should press the response buttons (patient consciousness test) • Do not touch patient • Allow device to treat the patient When siren alert stops or *"If patient is not responsive, call for help. Perform CPR."* is broadcast:
Proceed to First Responder Instructions Below	Proceed to First Responder Instructions Below	Proceed to First Responder Instructions Below

First Responder Instructions

- Proceed with standard evaluation and treatment measures.
- CPR can be performed as long as the device is not broadcasting "**Press response buttons to delay treatment,**" or "**Bystanders, do not interfere.**"
- If external defibrillation is available, a decision can be made to remove the LifeVest wearable defibrillator and monitor/treat the patient with the external equipment.
- To remove the device, first pull out the battery, then remove the garment from the patient.



Questions & Answers

1. What is LifeVest?
The LifeVest wearable cardioverter defibrillator (WCD) is worn by patients at risk for sudden cardiac arrest (SCA), providing protection during their changing condition and while permanent SCA risk has not been established.

2. What does the "Respond" message mean?
Before delivering a treatment shock, LifeVest tests to see if a patient is conscious by providing the patient an opportunity to press and hold the response buttons to prevent a treatment shock. It is important that only the patient press and hold the response buttons.

3. What if the patient has Blue™ gel on their skin?
LifeVest therapy pads release a Blue™ gel prior to a treatment shock to both improve shock conduction and mitigate burning. The gel should remain on the patient as long as the patient is wearing the LifeVest WCD in case additional treatment shocks are required. If you choose to remove the LifeVest WCD from the patient and monitor the patient with external equipment, the gel can be removed with water.

4. How long does it take for LifeVest to treat a ventricular arrhythmia?
After LifeVest detects a treatable arrhythmia, the time to treatment will be between 25 and 60 seconds depending on the type and rate of the arrhythmia and whether the patient presses the response buttons.

5. Can emergency personnel get shocked by LifeVest?
Yes. No one should touch the patient while a treatment shock is delivered. LifeVest will warn bystanders with both a siren alert and a voice command stating "Bystanders, do not interfere." before a shock is delivered.

6. Can emergency personnel use external defibrillation while the patient is wearing LifeVest?
The monitor should be disconnected from the electrode belt prior to delivering an external defibrillation shock. The garment and belt do not need to be removed.

7. What if the patient describes or feels a vibration coming from the garment?
The vibrations, along with the siren alerts and voice prompts, are part of the device's consciousness test, which requires the patient to press and hold the response buttons to avoid a shock. It is important that only the patient press and hold the response buttons.

8. What LifeVest items should the patient bring with them to the hospital?
If possible, the patient should bring the LifeVest WCD, charger or charger and hotspot, and extra battery to the hospital. This will allow the patient to download any stored event data from the monitor and charge the battery as required.

24-hour technical support, please call: 800.543.3267

External Jugular Access

Clinical Indications:

- External jugular vein cannulation is indicated in a critically ill patient ≥ 8 years of age who requires intravenous access for fluid or medication administration and in whom an extremity vein is not obtainable
- External jugular cannulation can be attempted initially in life threatening events where no obvious peripheral site is noted

Procedure:

1. Place the patient in a supine head down position. This helps distend the neck vein and prevents air embolism
2. Turn the patient's head toward the opposite side if no risk of cervical injury exists.
3. Prep the site as per peripheral IV site.
4. Align the catheter with the vein and aim toward the same side shoulder.
5. "Tourniqueting" the vein lightly with one finger above the clavicle, puncture the vein midway between the angle of the jaw and the clavicle and cannulate the vein in the usual method.
6. Attach the IV lock and secure the catheter avoiding circumferential dressing or taping.

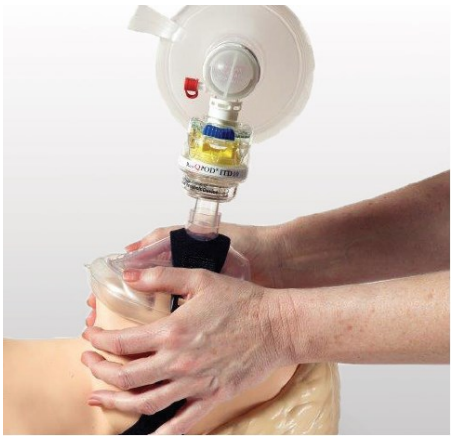
Impedance Threshold Device - ResQPOD®

Clinical Indications:

- Adult patients in cardiopulmonary arrest

Procedure (Facemask):

1. Connect the ResQPOD to facemask.
2. Open airway. Establish and maintain tight face seal with mask throughout chest compressions; a head strap or 2-handed technique is recommended.
3. Connect ventilation source to top of ResQPOD, or mouthpiece if performing mouth to mask ventilation.
4. Perform CPR at recommended compression to ventilation ratio.
5. Place $EtCO_2$ detector between ResQPOD and ventilation source (preferred).



Procedure (Advanced Airway):

1. Confirm ETT placement and secure with commercial tube holder.
2. Connect the ResQPOD to ETT or BIAD.
3. Connect ventilation source to the ResQPOD.
4. Perform continuous chest compression.
5. Turn on timing assist lights. Ventilate asynchronously at timing light flash rate of 10/min.
6. Place $EtCO_2$ detector between ResQPOD and ventilation source (preferred).

Intraosseous Access - ARROW® EZ-IO®

Clinical Indications:

- Rapid, regular IV access is unavailable with any of the following:
  - Cardiac arrest
  - Multisystem trauma with severe hypovolemia
  - Severe dehydration with vascular collapse and/or loss of consciousness
  - Respiratory failure / respiratory arrest
  - Burns

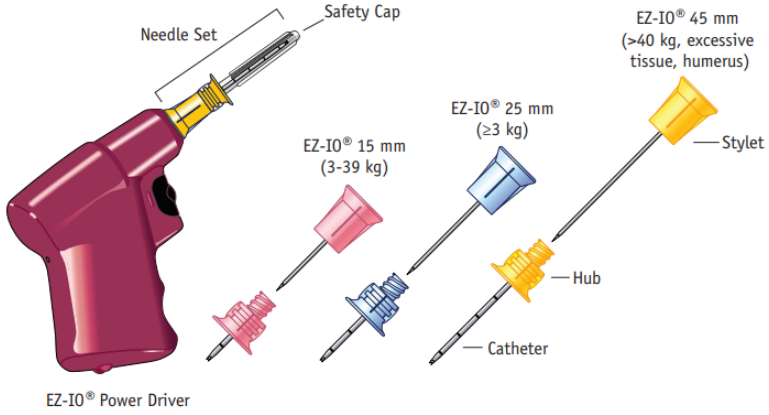
Contraindications:

1. Fracture of the targeted bone
2. Previous, significant orthopedic procedures at insertion site (i.e. prosthetic limb or joint)
3. IO in the targeted bone within the past 48 hours
4. Infection at area of insertion
5. Excessive tissue or absence of adequate anatomical landmarks

Needle Selection:

Select EZ-IO® Needle Set based on patient weight, anatomy and clinical judgment. The EZ-IO® Catheter is marked with a black line 5 mm proximal to the hub. Prior to drilling, with the EZ-IO® Needle Set inserted through the soft tissue and the needle tip touching bone, adequate needle length is determined by the ability to see the 5 mm black line above the skin.

1. EZ-IO® 45 mm Needle Set (yellow hub) should be considered for proximal humerus insertion in patients 40 kg and greater and patients with excessive tissue over any insertion site
2. EZ-IO® 25 mm Needle Set (blue hub) should be considered for patients 3 kg and greater
3. EZ-IO® 15 mm Needle Set (pink hub) should be considered for patients approximately 3-39 kg

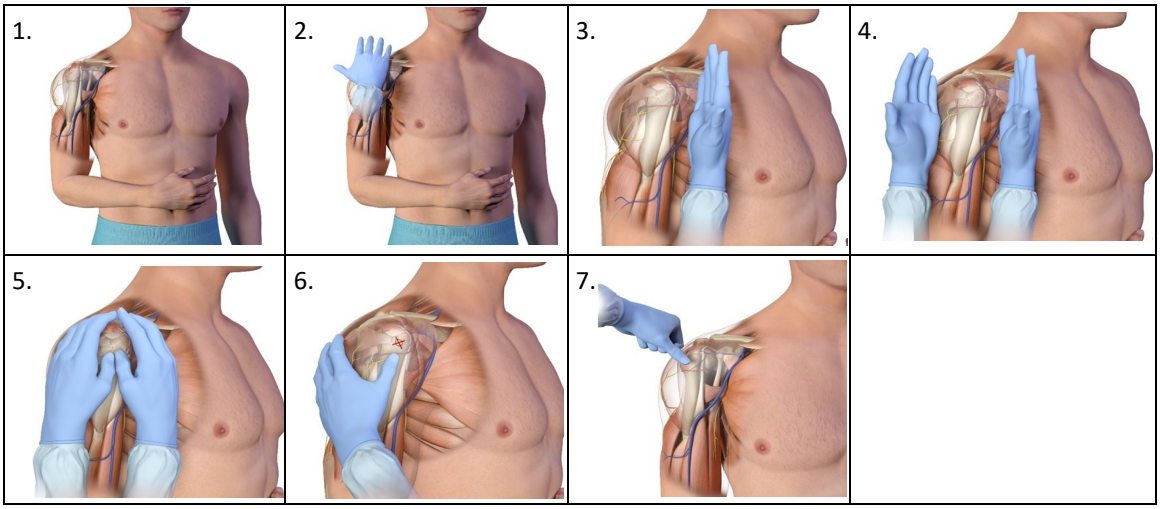


Procedure Continues

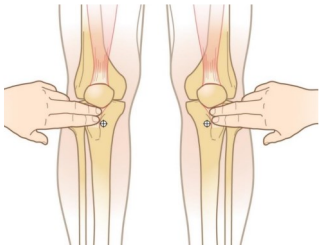
Intraosseous Access - ARROW® EZ-IO®

Proximal Humerus Identification:

1. Place the patient's hand over the abdomen (elbow adducted and humerus internally rotated).
2. Place your palm on the patient's shoulder anteriorly
   - The area that feels like a "ball" under your palm is the general target area
   - You should be able to feel this ball, even on obese patients, by pushing deeply
3. Place the ulnar aspect of one hand vertically over the axilla.
4. Place the ulnar aspect of the opposite hand along the midline of the upper arm laterally.
5. Place your thumbs together over the arm.
   - This identifies the vertical line of insertion on the proximal humerus.
6. Palpate deeply as you climb up the humerus to the surgical neck.
   - It will feel like a golf ball on a tee - the spot where the "ball" meets the "tee" is the surgical neck
7. The insertion site is on the most prominent aspect of the greater tubercle, 1 to 2 cm above the surgical neck.



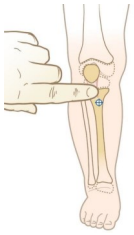
Proximal Tibia Identification:



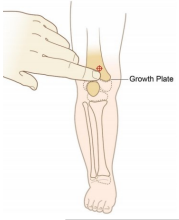
Adult:

1. Extend the leg.
2. Insertion site is approximately 2 cm medial to the tibial tuberosity, or approximately 3 cm (two finger widths below the patella and approximately 2 cm medial, along the flat aspect of the tibia.

Infant / Child:



1. Extend the leg.
2. Insertion site is approximately 1 cm medial to the tibial tuberosity, or just below the patella (approximately 1 cm or one finger widths) and slightly medial (approximately 1 cm or one finger width), along the flat aspect of the tibia.



Distal Femur (Infant/Child):

1. Secure the leg out-stretched to ensure the knee does not bend.
2. Identify the patella by palpation. The insertion site is just proximal to the patella (maximum 1 cm) and approximately 1-2 cm medial to midline.

Procedure Continues

Intraosseous Access - ARROW® EZ-IO®

Adult Insertion Technique:

1. Use a clean, “no touch” technique, maintaining asepsis.
2. Prepare supplies.
3. Prepare the site by using antiseptic of your choice; stabilize the extremity.
4. Remove the needle set cap.

Proximal Humerus

1. Aim the needle set at a 45-degree angle to the anterior plane and posteromedial.
2. Push the needle set tip through the skin until the tip rests against the bone.
   The 5 mm mark must be visible above the skin for confirmation of adequate needle set length
3. Gently drill into the humerus approximately 2 cm or until the hub is close to the skin; the hub of the needle set should be perpendicular to the skin.

Tibia

1. Aim the needle set at a 90-degree angle to the bone.
2. Push the needle set tip through the skin until the tip rests against the bone.
   The 5 mm mark must be visible above the skin for confirmation of adequate needle set length
3. Gently drill, advancing the needle set approximately 1-2 cm after entry into the medullary space or until the needle set hub is close to the skin.

Infant/Child Insertion Technique:

1. Use a clean, “no touch” technique, maintaining asepsis.
2. Prepare supplies.
3. Prepare the site by using antiseptic of your choice; stabilize the extremity.
4. Remove the needle set cap.

Proximal Humerus

1. Aim the needle set at a 45-degree angle to the anterior plane and posteromedial.
2. Push the needle set tip through the skin until the tip rests against the bone.
   The 5 mm mark must be visible above the skin for confirmation of adequate needle set length
3. Gently drill into the humerus approximately 2 cm or until the hub is close to the skin; the hub of the needle set should be perpendicular to the skin.

Tibia and Distal Femur

1. Aim the needle set at a 90-degree angle to the bone.
2. Push the needle set tip through the skin until the tip rests against the bone.
   The 5 mm mark must be visible above the skin for confirmation of adequate needle set length
3. Gently drill, advancing the needle set approximately 1-2 cm after entry into the medullary space or until the needle set hub is close to the skin.

Procedure Continues

Insertion Completion:

1. Hold the hub in place and pull the driver straight off; continue to hold the hub while twisting the stylet off the hub with counter clockwise rotations; catheter should feel firmly seated in the bone (1st confirmation of placement);
    - Dispose of all sharps and biohazard materials using standard biohazard practices and disposal containers.
    - If using the NeedleVISE® 1 port sharps block, place on stable surface and use a one-handed technique.
2. Place the EZ-Stabilizer® Dressing over the hub.
3. Attach a primed extension set to the catheter hub, firmly secure by twisting clockwise.
4. Pull the tabs off the dressing to expose the adhesive, apply to the skin.
5. Aspirate for blood / bone marrow (2nd confirmation of placement).*

    **Inability to withdraw / aspirate blood from the catheter hub does not mean the insertion was unsuccessful.*
6. Proceed with technique below, based on situation:

Adult - Responsive to Pain:

a. Prime extension set with **2% LIDOCAINE.**

Note that the priming volume of the EZ-Connect® Extension Set is approximately 1 mL

b. Slowly infuse **2% LIDOCAINE 40 mg IO** over 120 seconds.

c. Allow to dwell in IO space for 60 seconds.

d. Flush with **5 to 10 mL** of **NORMAL SALINE.**

Adult - Unresponsive to Pain:

a. Prime extension set with **NORMAL SALINE.**

Note that the priming volume of the EZ-Connect® Extension Set is approximately 1 mL

b. Flush with **5 to 10 mL** of **NORMAL SALINE**

Infant/Child - Responsive to Pain:

a. Prime extension set with **2% LIDOCAINE.**

- *Note that the priming volume of the EZ-Connect® Extension Set is approximately 1 mL*
- *For small doses of lidocaine, consider administering by carefully attaching syringe directly to needle hub (prime extension set with normal saline)*

b. Slowly infuse **2% LIDOCAINE 0.5 mg/kg mg IO** over 120 seconds (max 40 mg).

c. Allow to dwell in IO space for 60 seconds.

d. Flush with **2 to 5 mL** of **NORMAL SALINE.**

Infant/Child - Unresponsive to Pain:

a. Prime extension set with **NORMAL SALINE.**

Note that the priming volume of the EZ-Connect® Extension Set is approximately 1 mL

b. Flush with **2 to 5 mL** of **NORMAL SALINE**

7. Stabilize and monitor site and limb for extravasation or other complications.

Hemorrhage Control
-Tourniquet-

Clinical Indications:

- Life threatening hemorrhage that cannot be controlled by other means, such as direct pressure.
- Serious or life threatening extremity hemorrhage and operational considerations (location, tactical or hazmat environment, etc.) prevent the use of standard hemorrhage control techniques.

Procedure:

1. Apply commercially made tourniquet approximately 2-3 inches proximal to the wound / injury.
    a. Do NOT apply tourniquet over a joint. If wound is over a joint or just distal to a joint, apply the tourniquet just proximal to the joint.
    b. Do NOT apply tourniquet over a fracture.
2. Tighten tourniquet until bleeding stops and/or distal pulse is absent.
3. Document time of application and location of tourniquet and ensure that receiving facility is aware of time of placement.
4. Tourniquet should be easily visible on affected limb.
5. Manage pain per the PAIN MANAGEMENT Protocol.
6. If bleeding continues, place a second tourniquet proximal to the first.
7. For thigh wounds, consider placement of two tourniquets, side-by-side, and tighten sequentially to eliminate distal pulse.
8. Do not release a properly applied tourniquet until the patient reaches definitive care.

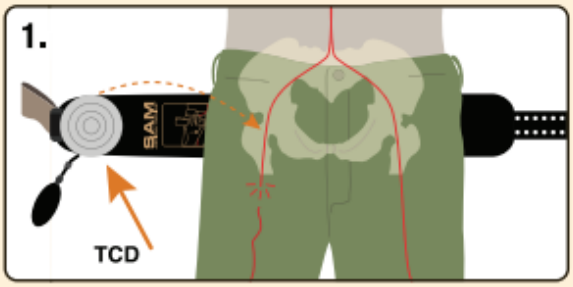
Hemorrhage Control
-SAM® JunctionalTourniquet-

Clinical Indications:

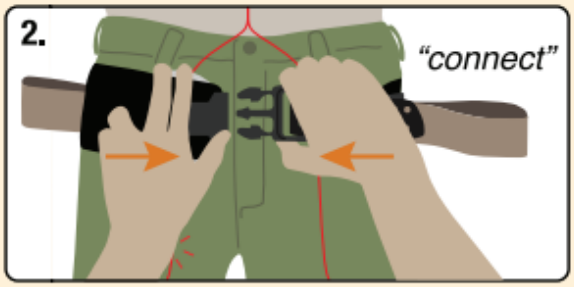
- Serious or life threatening hemorrhage from a site is not amenable to tourniquet placement (i.e. junctional injury).

Procedure:

TO CONTROL DIFFICULT BLEEDS IN THE INGUINAL AREA
Part No. SJT 102,101

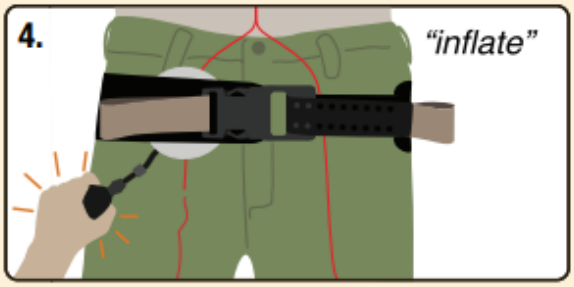


Slide the belt underneath the patient, positioning the Target Compression Device (TCD) over the area to be compressed. Use sterile gauze or hemostatic dressing if targeting directly over a wound. **For bi-lateral application, use a second TCD.**



Hold the TCD in place and connect the belt using the buckle.

Pull the **BROWN HANDLES** away from each other until the buckle secures. You will hear an audible click. Fasten excess belt in place by pressing it down on the Velcro. You may hear a second click once the belt is secure.



Use the hand pump to inflate the TCD until hemorrhage stops. Monitor patient during transport for hemorrhage control and adjust the device if necessary. **TO REMOVE**, unbuckle the belt.

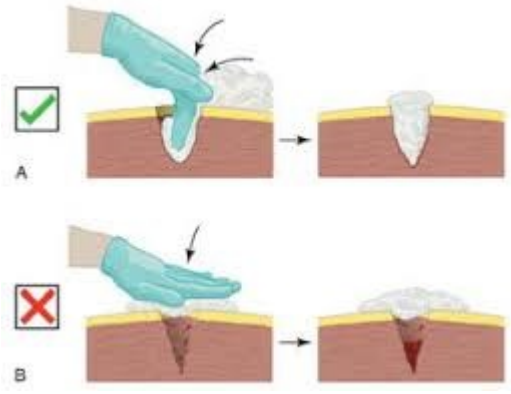
Hemorrhage Control
-Wound Packing / Hemostatic Gauze-

Clinical Indications:

- Serious hemorrhage that can not be controlled by other means.

Procedure:

1. Apply direct pressure to bleeding site.
2. If the bleeding site is not amenable to tourniquet placement (i.e. junctional injury), pack wound tightly with a hemostatic gauze and apply direct pressure. Consider using a Junctional Hemostatic Device if available.
    a. Begin packing the gauze into the wound with your finger, while maintaining pressure on the wound.
    b. Completely and tightly pack the wound to stop the bleeding.
    c. Hold direct pressure on the wound for **3 minutes**.
    d. After applying manual pressure for 3 minutes, place a pressure dressing over the wound.



High Performance CPR

Purpose:

- To improve the overall survival rate of sudden out-of-hospital cardiac arrest patients within the EMS System. Research indicates that High Performance CPR (HP CPR) along with Code Resource Management (CRM) can save lives. In order to have effective HP CPR ALL involved must work as team. This systematic change in treatment and management of cardiac arrest patients is based on research and practices being used in many other high performance EMS systems across the county. Minimal breaks in compressions, full chest recoil, adequate compression depth, and adequate compression rate are all components of CPR that can increase survival from cardiac arrest. Together, these components combine to create high performance CPR (HP CPR).

Procedure:

1. **Effective Compressions**
   a. CPR should be initiated immediately upon identification of cardiac arrest as long as the scene is safe.
   b. Compressors should be rotated **every 2 minutes.**
   c. Ideally, one compressor is on each side of the patient's chest (one person compressing and the other person ready to start).
   d. Maintain compression depth of **at least 2 inches.**
   e. Compression should allow for complete chest recoil/decompression between compressions (50% Compression / 50% Decompression).
   f. Compressor shall also rotate when a decrease every two minutes when possible.
2. **Continuous Compressions**
   a. Compressions at a rate of **100-120 per minute** for 2 minutes (use of a metronome is recommended). (Compression Fraction Goal ≥ 80%)
   b. Do NOT interrupt chest compressions during the 2 minute cycle for ANY reason.
   c. Treatments such as ventilations, IV/IO access, or Orotracheal Intubation shall be done while CPR is ongoing.
   d. After completion of a two-minute cycle, a phase to assess pulses and/or defibrillate will be limited to <10 seconds.
3. **Defibrillation**
   a. Turn on the AED/monitor as soon as cardiac arrest is confirmed.
   b. Chest compressions should NOT be interrupted to remove clothing or place defibrillation pads.
   c. Compressions should continue during charging of the AED; pausing only for analysis and shock delivery.
   d. Compressors will hover over the patient with hands ready during defibrillation so compressions can start IMMEDIATELY after a defibrillation.
   e. NO PULSE CHECKS AFTER SHOCKS.
   f. Manual Defibrillator:
      i. Charge to appropriate energy level as the end of the compression cycle nears (approx. 1 minute and 45 seconds into a two-minute cycle).
      ii. At the end of the two-minute cycle, the patient will be cleared, the rhythm will be interpreted rapidly and then the patient will either be defibrillated or the defibrillator energy will be cancelled.
      iii. This sequence must be performed within **10 seconds**.
      iv. Rhythm interpretation will not occur after a shock, but only after the two-minute cycle of CPR is performed.

Procedure Continues

Procedure:

4. **Ventilations**
   a. Once an advanced airway is in place, ventilations will be performed WITHOUT STOPPING chest compression.
   b. Once an advanced airway is in place, ventilations will be asynchronous with compressions during the recoil phase (**1 ventilation for every 10 compressions** which equates to about **1 ventilations every 6 seconds**).
   c. Compressions should NOT be interrupted to place an advanced airway.
5. **Mechanical CPR Devices**
   **Mechanical CPR devices should be used in accordance with the devices specific instructions.
   a. Per AHA 2015 manual chest compression remain the standard of care for the treatment of cardiac arrest.
   b. Mechanical CPR devices may be reasonable alternative to conventional CPR in specific settings where delivery of high-quality manual compressions may be challenging or dangerous for the provider:
      i. Limited rescuers available
      ii. Prolonged CPR
      iii. CPR during hypothermic cardiac arrest
      iv. CPR in a moving ambulance
   c. Placement of mechanical CPR device should not create excessive interruptions in compressions.
   d. Mechanical CPR devices should be deployed by providers who have received proper training on the device and a trained provider should accompany any patient who the device is being used on for the duration of transport.
   e. Upon arrival at the hospital, the mechanical CPR device should be left in place and active until the receiving ED staff advises otherwise.
   f. Impedance Threshold Devices (ITD) should only be considered when using mechanical CPR devices that are capable of doing active compression-decompression CPR.
6. **Advanced Life Support**
   a. ALS providers will address manual defibrillation, IV/IO access medication administration and advanced airway placement, as indicated.
      *** However, Orotracheal Intubation is no longer a primary focus of cardiac arrest management and any advanced airway intervention should NOT interrupt chest compressions.
   b. Capnography should be utilized to optimize CPR performance and evaluation of ROSC.
      i. EtCO2 > 10 mm Hg is indicative of quality CPR
      ii. Abrupt sustained increase in EtCO2 is indicative of potential ROSC

7. **Transport Considerations**
   a. Medical Cardiac Arrests generally do not benefit from “load-n-go” situations.
   b. Patient’s best chance of survival is obtaining ROSC on scene (working where found).
   c. Consider “load-n-go” for traumatic and pediatric arrests.
   d. Transport rapidly after obtaining ROSC, and after prolonged resuscitation for persistent V-fib/Pulseless V-Tach.

Procedure Continues

Positions for 6-Person High-Performance Teams*

American Heart Association.
life is why™

Resuscitation Triangle Roles

Compressor

- Assesses the patient
- Does 5 cycles of chest compressions
- Alternates with AED/Monitor/Defibrillator every 5 cycles or 2 minutes (or earlier if signs of fatigue set in)

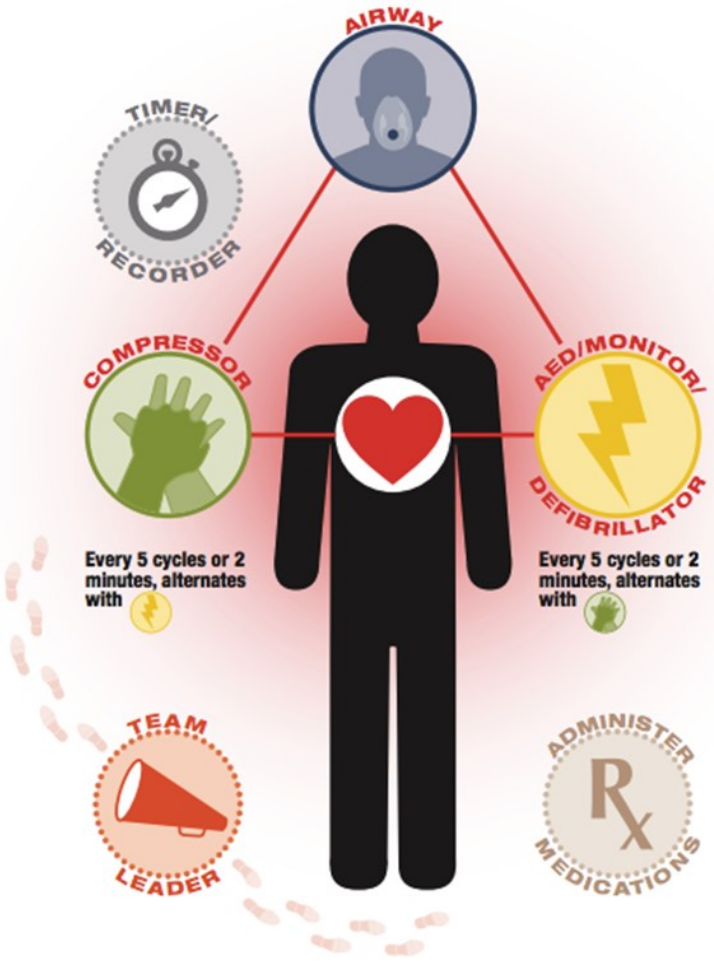
AED/Monitor/Defibrillator

- Brings and operates the AED/monitor/defibrillator
- Alternates with Compressor every 5 cycles or 2 minutes (or earlier if signs of fatigue set in), ideally during rhythm analysis
- If a monitor is present, places it in a position where it can be seen by the Team Leader (and most of the team)

Airway

- Opens and maintains the airway
- Provides ventilation

The team owns the code. No team member leaves the triangle except to protect his or her safety.



Leadership Roles

Team Leader

- **Every resuscitation team must have a defined leader**
- Assigns roles to team members
- Makes treatment decisions
- Provides feedback to the rest of the team as needed
- Assumes responsibility for roles not assigned

Administer Medications

- An ALS provider role
- Administers medications

Timer/Recorder

- Records the time of interventions and medications (and announces when these are next due)
- Records the frequency and duration of interruptions in compressions
- Communicates these to the Team Leader (and the rest of the team)

*This is a suggested team formation. Roles may be adapted to local protocol.

Mechanical CPR Device - LUCAS™

Clinical Indications:

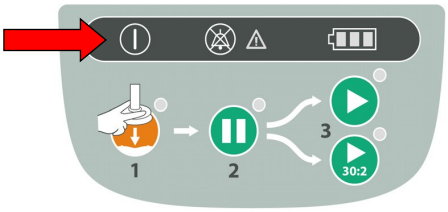
- Adult patient in non-traumatic cardiac arrest
  - Intended for use as an adjunct to manual CPR when effective manual CPR is not possible (e.g. during patient transport or extended CPR when fatigue may prohibit the delivery of effective / consistent compression to the victim, or when insufficient EMS personnel are available to provide effective CPR)

Contraindications:

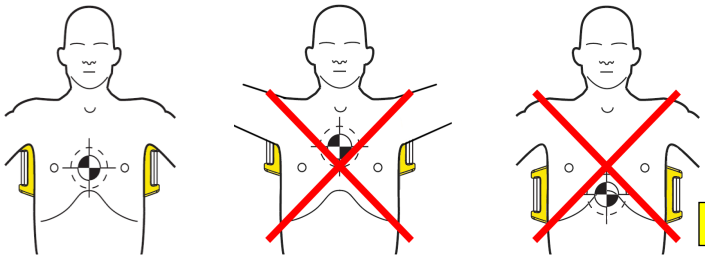
- Pediatric patients in cardiac arrest
- Patients suffering traumatic cardiac arrest
- Patients who do not fit within the device
  - Patients who are too large and with whom you cannot press the pressure pad down 2 inches
  - Patients who are too small and with whom you cannot pull the pressure pad down to touch the sternum

Placement Procedure:

1. All therapies related to the management of a patient in cardiac arrest should be continued as outlined in the protocols.
   a. Manual chest compression should be initiated **immediately** while the LUCAS™ device is being placed on the patient.
   b. Limit interruptions in chest compressions to **10 seconds or less**.
   c. **Early** defibrillation should be considered and provided as indicated.
   d. **Do NOT delay manual CPR for the LUCAS**. Continue manual CPR until the device can be placed.
2. While resuscitative measures are initiated, unpack the LUCAS™ device and place on the patient in the following manner:
   a. Push **ON/OFF** on the user control panel for 1 second to start the self test.



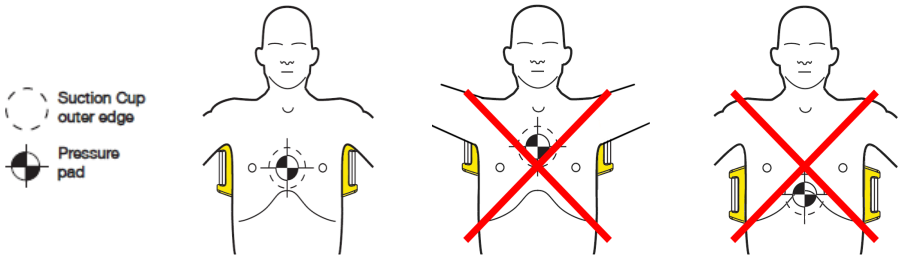
   b. **Back Plate Placement** - Remove the LUCAS™ back plate from the carrying bag and place under the patient, immediately below the arm pits. Placement should occur during a scheduled discontinuation of compressions (e.g. after five cycles of 30:2 or two minutes of uninterrupted compressions)



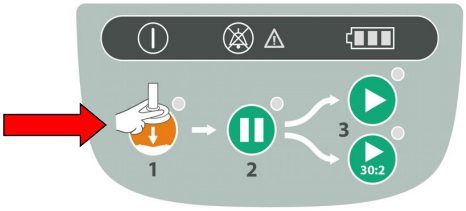
Procedure Continues

Placement Procedure:

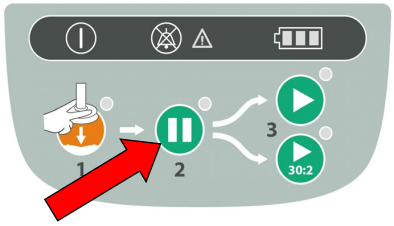
c. Continue manual CPR.
d. Hold the handles on the support legs to remove the LUCAS™ upper part from the bag. Pull the release rings once to make sure that the claw locks are open.
e. Approach the patient from the side opposite the person performing CPR.
f. Attach the support leg that is nearest to you to the back plate and listen for a “click”. Stop CPR and attach the other support leg to the back plate and listen for a “click”.
g. Pull up once to make sure that the parts are correctly attached.
h. Use two fingers to ensure that the pressure pad in the suction cup is in the correct position. The lower edge of the suction cup is immediately above the end of the sternum. If necessary, move the device by pulling the support legs to adjust the position.



i. Press the orange **ADJUST Mode (1)** button on the control panel. Push the suction cup down with two fingers until the pressure pad touches the patient's chest without compressing the chest.



j. Press the **PAUSE Mode (2)** button to lock the start position once the position of the suction cup and compression arm is in satisfactory position.
   – If the position is incorrect, press the **ADJUST Mode (1)** button, adjust the suction cup and/or compression arm and press the **PAUSE Mode (2)** button once in satisfactory position.

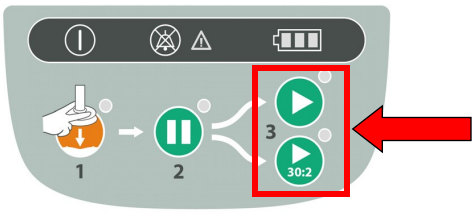


Procedure Continues

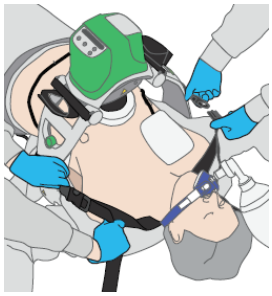
Mechanical CPR Device - LUCAS™

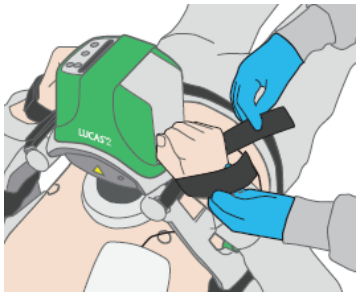
Placement Procedure:

3. **Start Compressions**.
    a. If an advanced airway is NOT in place, press the green **ACTIVE (30:2)** button.
    b. If an advanced airway is in place, press the green **ACTIVE (continuous)** button.



4. **Patient Stabilization / Transport**
    a. Remove the cushion strap from the carrying bag and extend the cushion strap fully at the buckles.
    b. Carefully lift the patient's head and put the cushion behind the patient's neck. Position the cushion as near to the patient's shoulders as possible.
    c. Connect the buckles on the support leg straps with the buckles on the cushion strap, making sure that the straps are not twisted.
    d. Tighten the cushion strap.
    e. Place the patients arms in the wrist straps provided at the top of the LUCAS™ Device.





Miscellaneous Procedure:

1. **Defibrillation**:
    a. Defibrillation can be performed while LUCAS™ operates.
    b. You can apply the defibrillation electrodes before or after LUCAS™ has been put in position.
    c. Position the defibrillation electrodes so that they are not under the suction cup.
    d. Defibrillation should be performed according to the appropriate protocol and following the instructions from the manufacturer of the defibrillator.
2. **Pulse Checks**
    a. To analyze the heart rhythm and/or check for return of spontaneous pulses, press the **PAUSE Mode** button. Rhythm checks should be done every 2 minutes and limited to no more than 10 seconds.
3. **Malfunction of LUCAS™ Device**
    a. If disruption or malfunction of the LUCAS™ Device occurs, immediately revert to Manual CPR.

Mechanical CPR Device - ZOLL® AutoPulse®

Clinical Indications:

- Adult patient in non-traumatic cardiac arrest
  - Intended for use as an adjunct to manual CPR when effective manual CPR is not possible (e.g. during patient transport or extended CPR when fatigue may prohibit the delivery of effective/ consistent compression to the victim, or when insufficient EMS personnel are available to provide effective CPR)

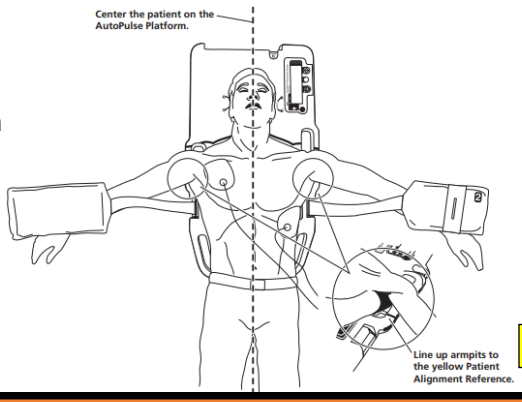
Contraindications:

- Pediatric patients in cardiac arrest
- Patients suffering traumatic cardiac arrest
  - Patients who do not fit within the AutoPulse® Operating Parameters.

Patient Parameter	AutoPulse® Specification
Patient chest circumference permitted	29.9 to 51.2 in (76 to 130 cm)
Patient chest width permitted	9.8 to 15 in (25 to 38 cm)
Maximum patient weight permitted	300 lbs. (136 kg)

Procedure:

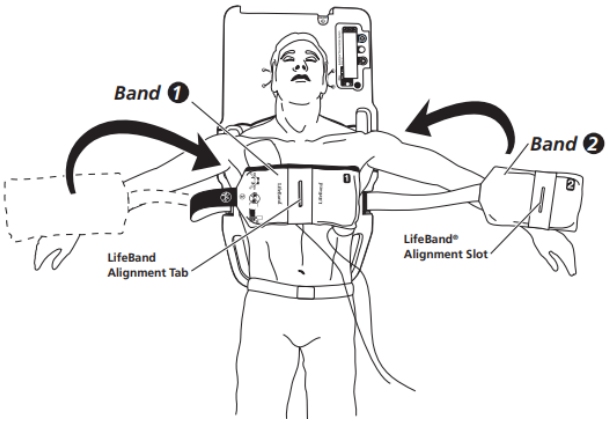
1. All therapies related to the management of a patient in cardiac arrest should be continued as outlined in the protocols.
   a. Manual chest compression should be initiated **immediately** while the AutoPulse® device is being placed on the patient.
   b. Limit interruptions in chest compressions to **10 seconds or less**.
   c. **Early defibrillation** should be considered and provided as indicated.
   d. **Do NOT delay manual CPR for the AutoPulse®**. Continue manual CPR until the device can be placed.
2. While resuscitative measures are initiated, power up the AutoPulse® by pressing the On/Off button located on the top ("head") edge of the AutoPulse® Platform.
   a. The AutoPulse® illuminates the green Power LED on the User Control Panel and performs its self-tests.
   b. The AutoPulse® will indicate that it is ready for use.
3. Briefly stop CPR and sit the patient up and remove patient's clothing to ensure skin-to-platform contact.
4. Slide the AutoPulse® Platform into position behind the sitting patient and lay the patient down onto the platform.
   a. The patient should be centered and the patient's armpits should be aligned with the yellow patient alignment lines on the platform.



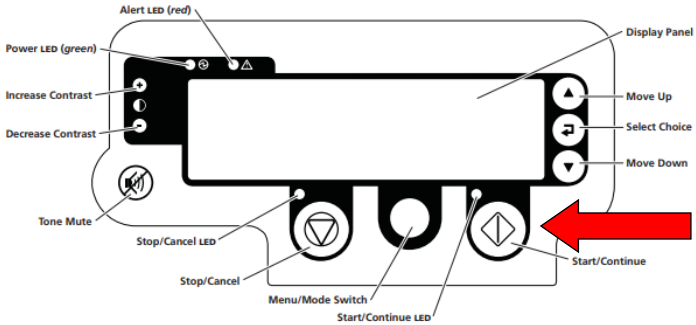
Procedure Continues

Procedure:

5. Close the LifeBand® around the patient's chest.
    a. Place band 1 on top of patient's chest.
    b. Locate mating slot of band 2 over the alignment tab 1.
    c. Press the bands together to engage and secure the Velcro fastener.
    d. Lift up the LifeBand® to its fullest extension, ensuring that the side bands are at a 90 degree angle to the platform, that they are not twisted and that there are no obstructions.
    e. Center the LifeBand® on the patient's chest, placing it such that its center is over the area upon which manual compressions are conducted.



6. Press and release the **Start / Continue** button once. The AutoPulse® automatically adjusts the bands to the patient's chest.
    a. The AutoPulse® will pause for 3 seconds to allow you to verify that the patient is properly aligned and that the LifeBand® has taken up any slack in the bands.
    b. If the patient is not properly aligned, press the **Stop / Cancel** button, realign the patient , and begin compression again.
7. After the 3 second verify patient alignment pause is complete, compressions will automatically begin. You may press the **Start / Continue** button to immediately initiate compressions ahead of that time.
    a. Depending on the Mode setting in Administrative Menus, the AutoPulse® will perform 30:2 or Continuous compressions.



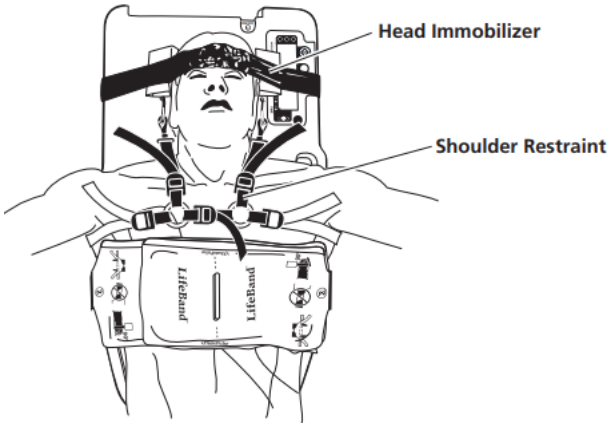
8. To access the patient or to pause the AutoPulse® for any reason , press the **Stop / Cancel** button.
9. To restart compression, press the **Start / Continue** button.

Procedure Continues

Mechanical CPR Device - ZOLL® AutoPulse®

Procedure:

10. **Patient Stabilization / Transport**
    a. Attach the Shoulder Restraint to keep the patient properly aligned on the AutoPulse® Platform.
    b. The Head Immobilizer assists in keeping the patients head from moving, especially when combined with a cervical collar.



11. Always ensure the following:
    a. Make sure that the patient's armpits and the upper edge of the LifeBand® are aligned with the yellow line on the AutoPulse®.
    b. Make sure that the LifeBand® is not twisted and properly mated with the Velcro.
    c. Maintain the LifeBand® at 90 degrees with the AutoPulse® Platform. Ensure that the LifeBand® is not impeded by anything such as the patient's arms, clothing, straps, and buckles that may interfere with the movement of the LifeBand®.
12. **Malfunction of AutoPulse® Device**
    a. If disruption or malfunction of the AutoPulse® Device occurs, immediately revert to Manual CPR.

Physical Restraints

Clinical Indications:

- Any patient who may harm themselves or others may be gently restrained to prevent injury to the patient or crew. This restraint must be in a humane manner and used only as a last resort. Other means to prevent injury to the patient or crew must be attempted first. These efforts could include reality orientation, distraction techniques, or other less restrictive therapeutic means. Physical or chemical restraint should be a last resort technique.

Procedure:

1. Attempt less restrictive means of managing the patient.
2. Request law enforcement assistance wherever and whenever possible.
3. Ensure adequate personnel are present. This generally means four people, one for each of the patient's extremities.
4. Restrain the patient in a lateral or supine position. No devices such as backboards, splints, or other devices will be on top of the patient. ***The patient will never be restrained in the prone position.***
5. The patient's upper extremities should be restrained with one arm at or above the level of the head and one arm at or below the waist level if possible, unless clinically inappropriate.
6. The patient must be under constant observation of the EMS crew at ALL times. This includes direct visualization of the patient as well as cardiac and pulse oximetry monitoring whenever possible.
7. The extremities that are restrained will have a circulation check at least every 15 minutes. The first of these checks should occur as soon after placement of the restraints as possible. This MUST be documented in the patient care report (PCR).
8. Documentation in the PCR should include the reason for the use of restraints, the type of restraints used, and the time restraints were placed.
9. If the above actions are unsuccessful, or if the patient is resisting the restraints, consider administering medications per the AGITATED OR VIOLENT PATIENT / BEHAVIORAL EMERGENCIES Protocol.
10. If a patient is restrained by law enforcement personnel with handcuffs or other devices EMS personnel cannot remove, a law enforcement officer must accompany the patient to the hospital in the transporting ambulance.
11. **All restraints should have the ability to be quickly released, if necessary.**

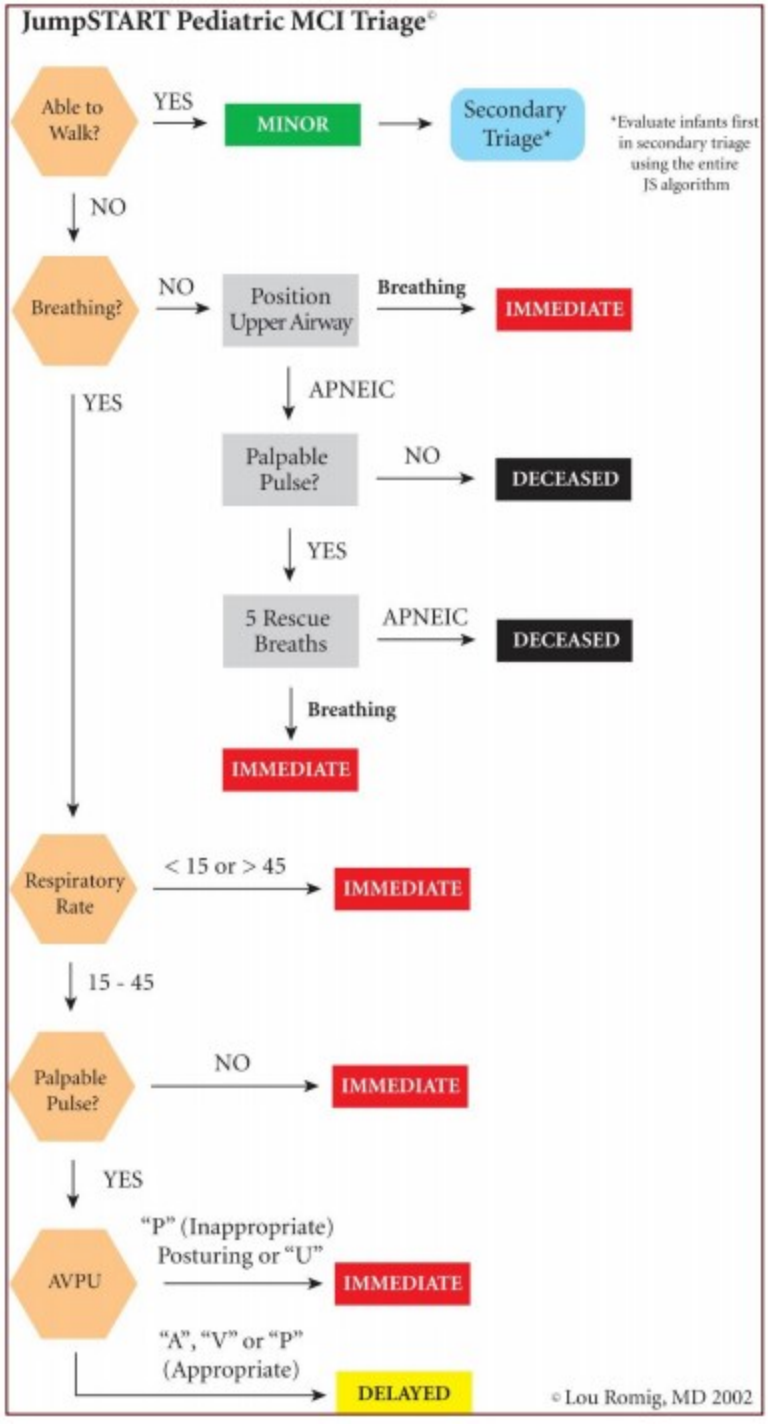
JumpSTART© Triage

Clinical Indications:

- Anytime an event overwhelms the available resources and the victim appears to be a child

Procedure:

1. Start where you stand.
2. Identify the uninjured or "walking wounded" and direct them to a designated area.
3. Move in an orderly and systematic manner through the remaining victims, stopping at each person for a quick assessment and tagging focusing on Respirations, Perfusion and Mental Status. The stop at each patient should not take more than 30-60 seconds.



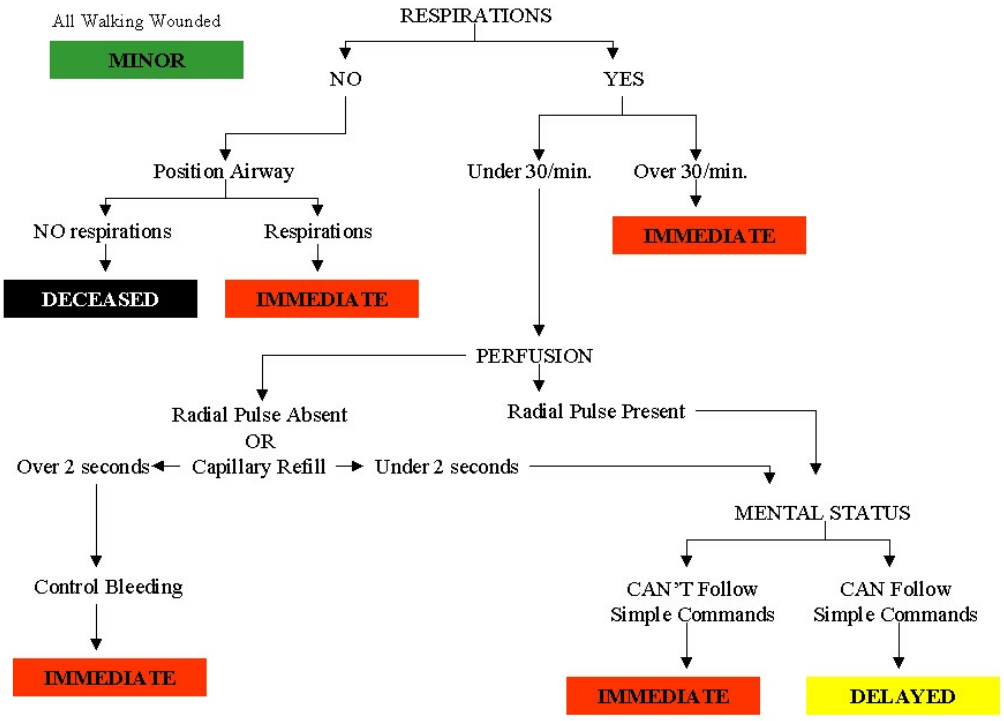
START Triage

Clinical Indications:

- Anytime an event overwhelms the available resources and the victim appears to be an adult

Procedure:

1. Start where you stand.
2. Identify the uninjured or “walking wounded” and direct them to a designated area.
3. Move in an orderly and systematic manner through the remaining victims, stopping at each person for a quick assessment and tagging focusing on Respirations, Perfusion and Mental Status. The stop at each patient should not take more than 30-60 seconds.

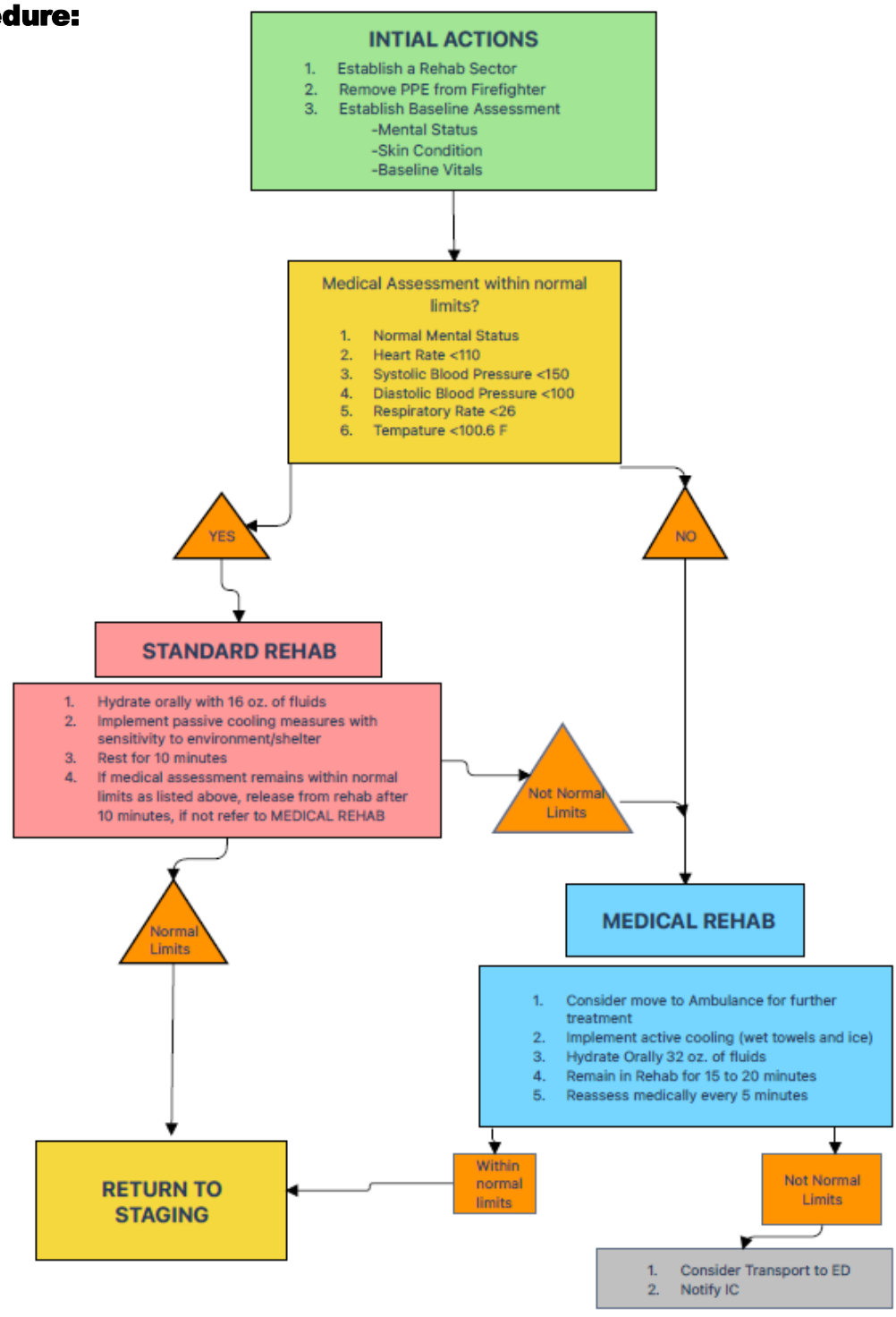


Firefighter - Rehabilitation

Clinical Indications:

- EMS crews may be called upon to assist with firefighter rehabilitation. It is the responsibility of the Authority Having Jurisdiction (fire department) to assign a rehab sector, send fire personnel to the rehab sector, and supply sports drinks, etc.

Procedure:



Ventricular Assist Device Color Coding System

MOST The following three reference sections have been color coded to assist in quickly identifying and locating the corresponding reference guides.

HEARTMATE III

HEARTMATE II

HEARTWARE

January 2019

EMERGENCY GUIDE

2020-2021

International Consortium of Circulatory Assist Clinicians

This guide was created in 2008 by the innovation of VAD Coordinators from some of the largest and most successful VAD implantation hospitals in the United States. ICCAC has ensured that this document continues to be a current resource for not only emergency medical services but to all healthcare workers providing care to the mechanical circulatory support patient population. The purpose is to be a quick emergency guide and should not replace the manufacturers' Instructions For Use as the primary source of information for each device listed in this guide.

Questions and Answers
MECHANICAL CIRCULATORY SUPPORT

Mechanical Circulatory Support Devices (MCS) are heart pumps that move blood from the heart to the body. They are temporary or permanent devices that either supplement or replace the action of a failing heart. MCS devices implanted are assisting the left ventricle (LVAD), the right ventricle (RVAD), or both ventricles (BiVAD) and the total heart (Total Artificial Heart – TAH). They consist of two major categories: Pulse generating (pulsatile) and pulseless devices (non-pulsatile/continuous flow). Patient management varies greatly between the two device categories.

Pulsatile or Non-pulsatile

Pulse generating devices have a chamber that fills with blood and ejects the blood similar to the rhythmic action of the human heart. These devices replace the majority of the heart and move the full amount of blood the patient needs. The Total Artificial Heart pump is a pulse generating device. Non-pulsatile or continuous flow devices use a motor at a fixed speed leading to a constant ejection of blood to the body. This is the reason patients with continuous flow VADs often lack a pulse upon palpation. The most common VADs are non-pulsatile/continuous flow devices.

What is a VAD?

A ventricular Assist Device (VAD) is an implantable mechanical heart pump that helps to pump blood from the lower chambers of the heart to the rest of the body in patients with advanced heart failure. The device helps move partial or full amount of blood meeting the patient needs. These devices can be attached to the Left (LVAD) or Right (RVAD) ventricles of the heart. Most patients have an LVAD and less common are RVADs and BiVADs (both left and right or Biventricular support).

What are the parts of a VAD?

All VADs have at least 4 components. (1) A heart pump unit consisting of a short tube placed inside the ventricle pulling blood thru the pump and out a tube, delivering blood to the body's great vessel; (2) A power cord called a driveline that exits the abdomen and connects to a controller and power source; (3) A controller that displays information; (4) A power source.

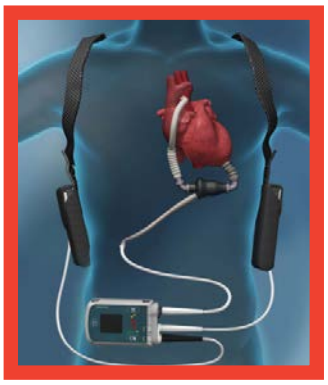
What does the controller do?

The controller is a computer that operates the heart pump. It provides messages and audible alarms to help monitor the pump. It gives information about pump performance such as blood flow through the pump (L/min), pump speed (RPM) and the amount of power consumed (Watts). It also gives warnings and alarms if there is an alert/problem with the pump or with the power source, such as low battery or low flow.

What is the power source?

All VADs can be powered by two power sources: rechargeable batteries or AC (electricity) power. Batteries are used when patients are active throughout the day and often are kept in a holster, vest or belt for safety. AC power is recommended when the patient is planning to remain stationary. AC power should NOT be used when transporting the patient.

HEARTMATE 3 Page 4



HEARTMATE II Page 9

HEARTWARE HVAD Page 13

Patient Management For VADs

1. Treat the patient and follow your protocols. Do not focus only on the device. Most patients do not have a primary pump malfunction. Common MCS patient problems that arise are stroke, bleeding disorders (GI, nose bleeds), arrhythmias, dehydration and right heart failure.

2. Assess the patients airway and intervene per your protocol.

3. Auscultate heart sounds to determine if the device is functioning. If it is continuous flow device, you should hear a "humming sound".

4. Assess vital signs. Non-pulsatile or continuous flow devices provide continuous blood flow from the heart to the aorta. This continuous flow results in a narrow arterial pulse pressure. This means it may be difficult to obtain a pulse or blood pressure reading which may be a normal state for a continuous flow device patients. To obtain a blood pressure an automated cuff or doppler method can be used. If unable to obtain with automated cuff use the mean BP with a doppler (first sound you hear – MAP). Rely on other methods to assess perfusion e.g. mental status, skin color, capillary refill. The device flow shown on the controller display reflects the patient's cardiac output.

5. Start IV if indicated.

6. Assess the device for device information and alarms located on the controller display.

7. Intervene appropriately based on the type of alarm. See specific device alarm guides on the pages that follow.

8. Refer to the patient's medication list. They are typically, but not always, on anticoagulation and antiplatelet therapy.

9. Call the VAD Center's 24 hour emergency number on the patient's contact list, controller/equipment, or emergency bag for assistance in the management of the patient and transportation determination and location.

10. **Bring all of the patients equipment.**

11. **Bring the significant other if possible to act as a expert on the device in the absence of consciousness in the patient.**

HeartMate 3™ Left Ventricular Assist System

1. **Can I do CPR?**

   Yes, in the right clinical scenario. Chest compressions may pose a risk of dislodgement - use clinical judgment. If compressions are administered, confirm function and positioning of the pump.

2. **Can the patient be defibrillated while connected to the device?**

   Yes you can defibrillate, and you do not have to disconnect anything.

3. **Can this patient be externally paced?**

   Yes.

4. **What type of alarm occurs in a low flow state?**

   A red heart alarm indication and steady audio alarm will sound if less than 2.5 lpm. Can give a bolus of normal saline and transport to a VAD center.

5. **Can I change the speed of the device?**

   No, it is a fixed speed.

6. **Does the patient have a pulse with this device?**

   Likely they will not because it is a continuous flow device, however some patients may have a pulse.

7. **What are acceptable vital sign parameters?**

   MAP 70 - 90 mm Hg with a narrow pulse pressure.

FAQs

- Pump has “artificial pulse” created by rapid speed changes in the pump. This can be heard when auscultating the heart and differs from other continuous flow devices.
- May not be able to obtain cuff pressure (continuous flow pump).
- Pump connected to driveline exiting patient’s abdominal area and is attached to controller which runs the pump.
- Pump does not affect ECG.
- All ACLS drugs may be given.
- A pair of fully charged batteries lasts up to 17 hours.
- Any emergency mode of transportation is ok. These patients are permitted to fly.
- Avoid pulling, twisting, or kinking the driveline when strapping the patient to a stretcher.
- Be sure to bring **ALL** of the patient’s equipment with them.

The HeartMate 3™ LVAD has a modular cable connection near the exit site of the driveline (Figure 1). This allows a damaged driveline to be quickly replaced (if damage is external).

- When disconnecting a driveline, NEVER use the modular cable connection.
- If the modular cable requires replacement, it must be done at and by the implanting center. Patients are not given a backup modular cable.
- If the connection is loose, a yellow line at the connection will be showing. If the line is visible, turn the connector in the locked direction. It will ratchet and stop turning once tight.

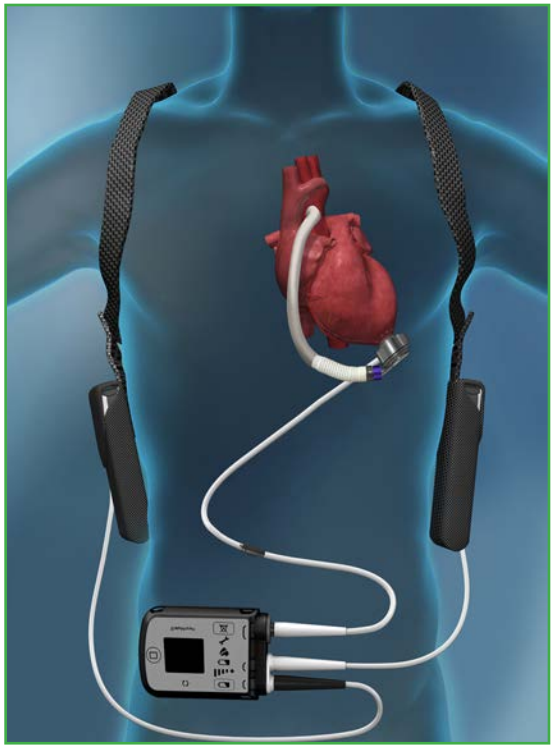
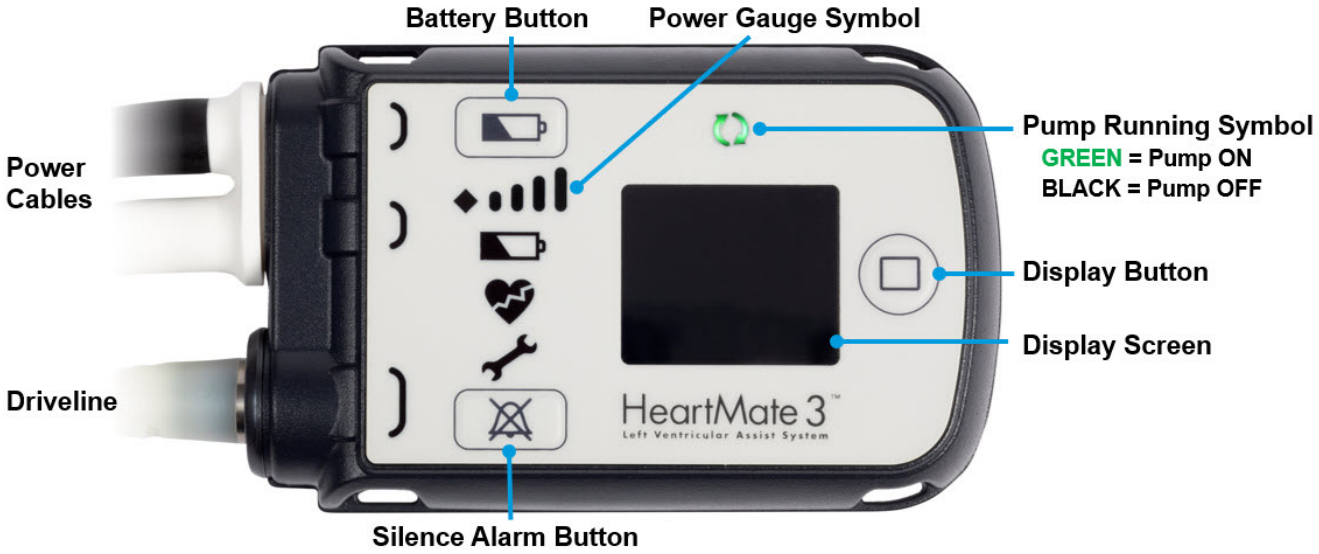


Figure 1

HeartMate 3™ Left Ventricular Assist System

System Controller



Changing Batteries

WARNING: At least one controller power cable must be connected to a power source AT ALL TIMES. Do not remove both batteries at the same time or the pump will stop.

- Obtain two charged batteries from patient's accessory bag or battery charger. The charge level of each battery can be assessed by pressing the button on the battery. Fully charged batteries will display 5 lights. (Figures 1 and 2)

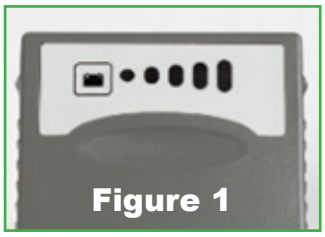


Figure 1

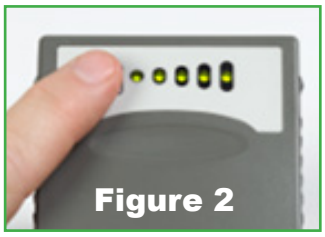


Figure 2

- Check the power level on the batteries, replace the battery with the fewest lights first. Remove only ONE battery from the clip by pressing the release button on the clip to unlock the battery. (Figure 3)

Figure 3

- Controller will start beeping and flashing yellow symbols and will read **CONNECT POWER** on the front screen.

- Insert a new, fully charged battery into the empty battery clip by aligning the **RED** arrows on the battery and clip (Figure 4). The battery will click into the clip. Gently tug on battery to ensure connection. If the battery is properly secured, the beeping and yellow flashing will stop.


Figure 4

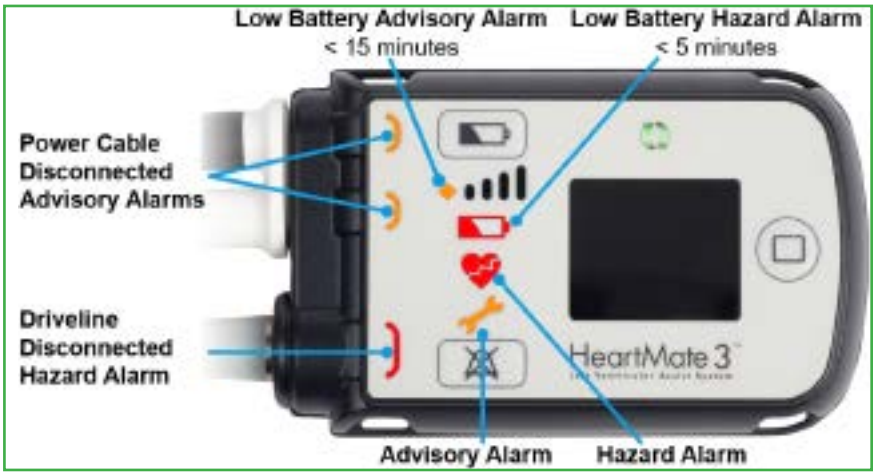
- Repeat previous steps with the second battery and battery clip.

Troubleshooting HeartMate 3™ LVAS

Alarms: Emergency Procedures

When an alarm occurs:

- Contact the Implant Center for direction when possible.
- Check alarm messages on controller display screen.
- Check if pump is running:
- Allow care providers trained on LVAD emergencies to remain with the patient.



When the Pump Has Stopped

- Check modular cable connection, driveline and power cable connections to the controller. Fix any loose connections to restart the pump.
- If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair. (see Changing Batteries section on previous page)
- If pump does not restart, change controllers if directed by implant center. (see Changing Controllers on next page)
- Be sure to bring ALL of the patient's equipment with them.

HAZARD ALARMS		Continuous Audible Tone
Low Flow :03 + Call Hospital Contact :07	Pump is off.	See above, when pump has stopped
	Pump flow is < 2.5 lpm.	Ensure that a power source is connected to the controller. Evaluate the patient for low flow - treat the cause. Assess volume status, hypertension, arrhythmia, right heart failure, etc.
Connect Driveline :02	Driveline disconnected.	Immediately reconnect Driveline to the controller. Check modular cable connection.
Connect Power Immediately :05 + Backup Battery :01	Both power cables are disconnected.	Immediately connect to batteries or the Mobile Power Unit.
Low Battery :06 + Replace Power :02	Low Battery Power < 5 min. remaining.	Immediately replace batteries or switch to the Mobile Power Unit.
ADVISORY ALARMS		Intermittent Audible Tone
Low Battery :06 + Replace Power Immediately :02	Low Battery Power <15 min. remaining.	Immediately replace batteries or switch to the Mobile Power Unit.
Connect Power :04	A power cable is disconnected.	Reconnect the power cable to power.
Check display for alarm type.		Call VAD Coordinator at implant center for direction.

Troubleshooting HeartMate 3™ LVAS

Changing the System Controller

Step 1: Have the patient sit or lie down since the pump will momentarily stop during this procedure.

Step 2: Place the replacement Controller within easy reach,along with the batteries/battery clips. The spare Controller is usually found in the patient's travel case.

Step 3: Attach the battery clips to the replacement controller by lining up half circles, firmly pushing together, and tightening connector nut. Insert the batteries into the clips by aligning the **RED** arrows.

Step 4: On the back of the replacement controller, slide the safety lock so the red release button is fully visible. Repeat this step on the original controller.

Step 5: Disconnect the drive-line from the original controller by pressing the red release button and pulling it out. The pump will stop and an alarm will sound. Note: The alarm will continue until the original controller is turned off. You can silence the alarm by pressing the silence alarm button.

Getting the replacement controller connected and the pump restarted is the first priority!

Step 6: Connect the replacement Controller by aligning the WHITE ARROWS on the driveline and replacement Controller and firmly pushing the driveline into the replacement Controller. The pump should restart, if not complete the following steps:

- Firmly press the Silence Alarm or Battery Button to restart the pump.
- Check the power source to ensure that power is going to the controller.
- Ensure the driveline is fully inserted into the socket by gently tugging on the metal end. **DO NOT** pull the driveline.

Step 7: After the pump restarts, slide the safety lock on the new controller so the red release button is fully covered. If unable to close the safety lock into fully locked position, gently push the driveline into the controller to ensure proper connection. Retry to close safety lock.

Step 8: Disconnect power from the original Controller.

Step 9: Hold down battery symbol for 5 full seconds for complete shutdown of old controller.

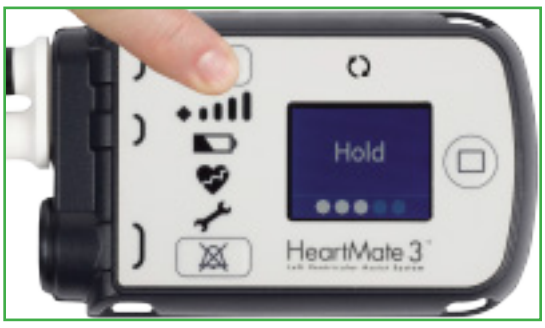
Step 3

Step 4

Step 7

Step 5

Step 6



Step 9

HeartMate II™ Left Ventricular Assist System

1. **Can I do CPR?**

   Yes, in the right clinical scenario. Chest compressions may pose a risk of dislodgement - use clinical judgment. If compressions are administered, confirm function and positioning of the pump.

2. **Can the patient be defibrillated while connected to the device?**

   Yes you can defibrillate, and you do not have to disconnect anything.

3. **Can this patient be externally paced?**

   Yes.

4. **What type of alarm occurs in a low flow state?**

   A red heart alarm indication and steady audio alarm will sound if less than 2.5 lpm. Can give a bolus of normal saline and transport to a VAD center.

5. **Can I change the speed of the device?**

   No, it is a fixed speed.

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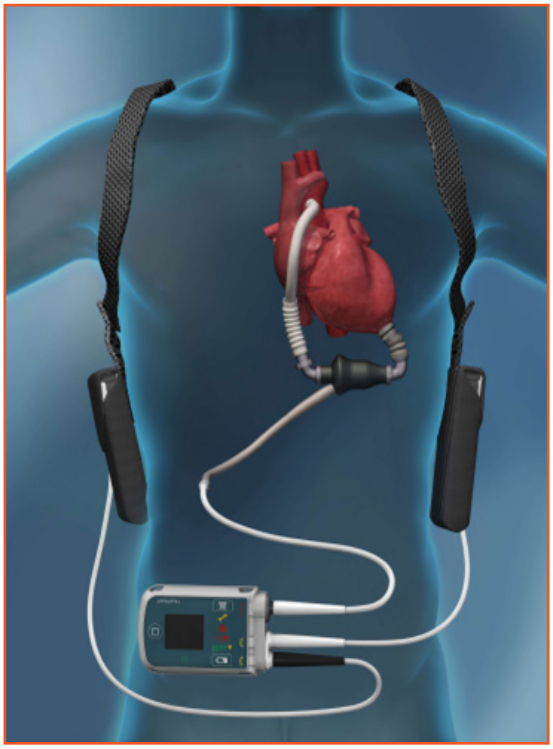
7. **What are acceptable vital sign parameters?**

   MAP 70 - 90 mm Hg with a narrow pulse pressure.

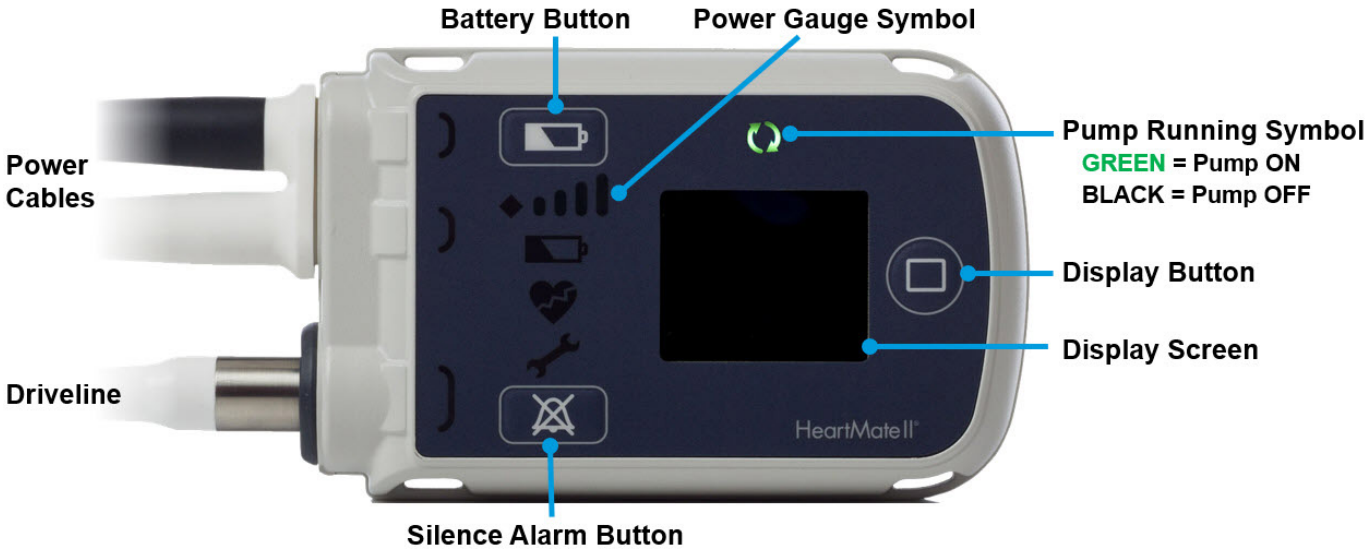


Frequently Asked Questions

- May not be able to obtain cuff pressure (continuous flow pump).
- Pump connected to driveline exiting patient's abdominal area and is attached to controller which runs the pump.
- Pump does not affect ECG.
- All ACLS drugs may be given.
- No hand pump is available.
- A pair of fully charged batteries last approximately 10 - 12 hours.
- Avoid pulling, twisting, or kinking the driveline when strapping the patient to a stretcher.
- Any emergency mode of transportation is ok. These patients are permitted to fly.
- Be sure to bring **ALL** of the patient's equipment with them.

HeartMate II™ Left Ventricular Assist System

System Controller



Changing Batteries

WARNING: At least one controller power cable must be connected to a power source AT ALL TIMES. Do not remove both batteries at the same time or the pump will stop.

- Obtain two charged batteries from patient's accessory bag or battery charger. The charge level of each battery can be assessed by pressing the button on the battery. Fully charged batteries will display 5 lights. (Figures 1 and 2)

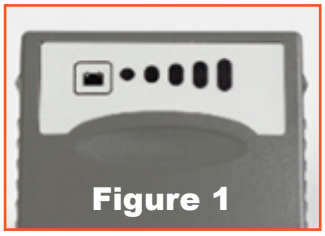


Figure 1

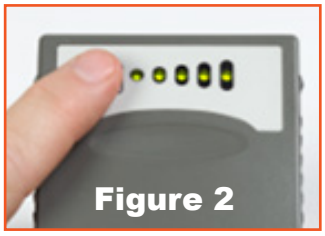


Figure 2

- Check the power level on the batteries, replace the battery with the fewest lights first. Remove only ONE battery from the clip by pressing the release button on the clip to unlock the battery. (Figure 3)

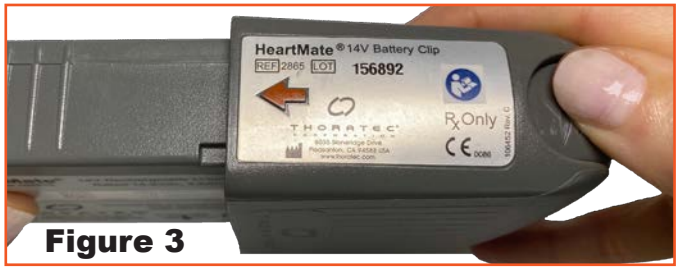


Figure 3

- Controller will start beeping and flashing yellow symbols and will read **CONNECT POWER** on the front screen.

- Insert a new, fully charged battery into the empty battery clip by aligning the **RED** arrows on the battery and clip (Figure 4). The battery will click into the clip. Gently tug on battery to ensure connection. If the battery is properly secured, the beeping and yellow flashing will stop.


Figure 4

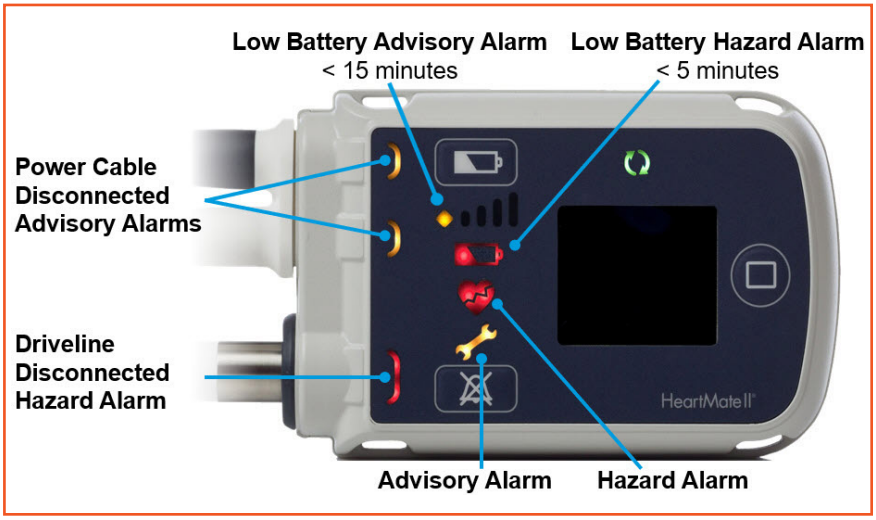
- Repeat previous steps with the second battery and battery clip.

Troubleshooting HeartMate II™ LVAS

Alarms: Emergency Procedures

When an alarm occurs:

- Contact the Implant Center for direction when possible.
- Check alarm messages on controller display screen.
- Check if pump is running:
- Allow care providers trained on LVAD emergencies to remain with the patient.



When the Pump Has Stopped

- Check the driveline and power cable connections to the controller. Fix any loose connections to restart the pump.
- If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair. (*see Changing Batteries section on previous page*)
- If pump does not restart, change controllers if directed by implant center. (*see Changing Controllers on next page*)
- Be sure to bring ALL of the patient's equipment with them.

HAZARD ALARMS		Continuous Audible Tone
Low Flow :03 + Call Hospital Contact :07	Pump is off.	See above, when pump has stopped
	Pump flow is < 2.5 lpm.	Ensure that a power source is connected to the controller. Evaluate the patient for low flow - treat the cause. Assess volume status, hypertension, arrhythmia, right heart failure, etc.
Connect Driveline :02	Driveline disconnected.	Immediately reconnect Driveline to the controller. Check modular cable connection.
Connect Power Immediately :05 + Backup Battery :01	Both power cables are disconnected.	Immediately connect to batteries or the Mobile Power Unit.
Low Battery :06 + Replace Power :02	Low Battery Power < 5 min. remaining.	Immediately replace batteries or switch to the Mobile Power Unit.

ADVISORY ALARMS		Intermittent Audible Tone
Low Battery :06 + Replace Power Immediately :02	Low Battery Power <15 min. remaining.	Immediately replace batteries or switch to the Mobile Power Unit.
Connect Power :04	A power cable is disconnected.	Reconnect the power cable to power.
Check display for alarm type.		Call VAD Coordinator at implant center for direction.

Troubleshooting HeartMate II™ LVAS

Changing the System Controller

Step 1: Have the patient sit or lie down since the pump will momentarily stop during this procedure.

Step 2: Place the replacement Controller within easy reach, along with the batteries/battery clips. The spare Controller is usually found in the patient's travel case.

Step 3: Attach the battery clips to the replacement controller by lining up half circles, firmly pushing together, and tightening connector nut. Insert the batteries into the clips by aligning the **RED** arrows.

Step 4: On the back of the replacement controller, slide the safety lock so the red release button is fully visible. Repeat this step on the original controller.

Step 5: Disconnect the drive-line from the original controller by pressing the red release button and pulling it out. The pump will stop and an alarm will sound. **Note:** The alarm will continue until the original controller is turned off. You can silence the alarm by pressing the silence alarm button.

Getting the replacement controller connected and the pump restarted is the first priority!

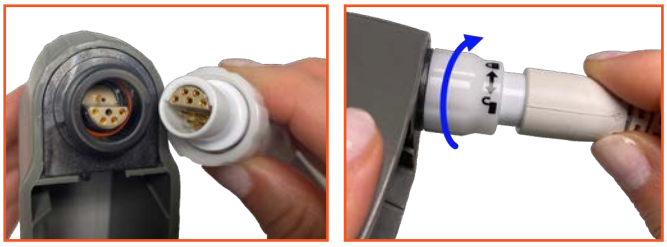
Step 6: Connect the replacement Controller by aligning the YELLOW ARROWS on the driveline and replacement Controller and firmly pushing the driveline into the replacement controller. The pump should restart, if not complete the following steps:

- Firmly press the Silence Alarm or Battery Button to restart the pump.
- Check the power source to ensure that power is going to the controller.
- Ensure the driveline is fully inserted into the socket by gently tugging on the metal end. **DO NOT** pull the driveline.

Step 7: After the pump restarts, slide the safety lock on the new controller so the red release button is fully covered. If unable to close the safety lock into fully locked position, gently push the driveline into the controller to ensure proper connection. Retry to close safety lock.

Step 8: Disconnect power from the original Controller.

Step 9: Hold down battery symbol for 5 full seconds to turn off the original controller.



Step 3

Step 4

Step 7

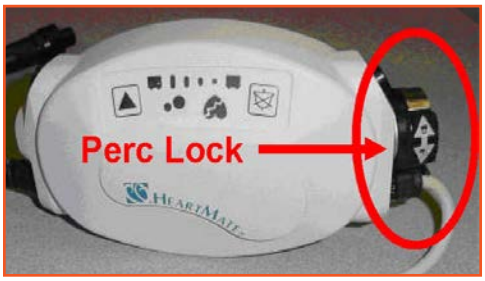
Step 5

Step 6

Step 9

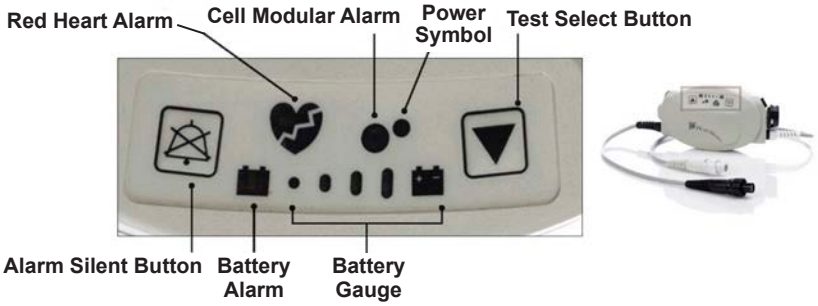
HeartMate II™ Left Ventricular Assist System

The following information applies to the original controller version called External Peripheral Controller (EPC). Some patients have this controller.



Driveline Connection: The Perc Lock must be "unlocked" in order for the driveline to be removed in a controller exchange. The Perc lock remains in locked position once the driveline has been fully inserted.

External Peripheral Controller (EPC)



2 MODES: ON, OFF

On: Driveline+Power source connected.

Off: No driveline or power source connected.

CELL MODULE BATTERY

No backup battery. The cell module battery powers an audible tone if EPC is removed from power while the driveline is connected. The cell module battery is supplied STERILE.

EVENT LOGGER

EPC does not include date/time records in event history. EPC can store 120 events.

GREEN POWER SYMBOL

Green light only mead that the controller is receiving power. Listen over the pump pocket for confirmation that the pump is running.

CONTROLLER BUTTONS

Alarm Silence Button: Displays the battery fuel gauge. Also silences hazard alarms for 2 minutes and advisory alarms for 4 hours.

Test Select Button: Activates a self test when held for 3 seconds.

Note: EPC does not include a display button or user interface screen. The Display Module is used to view pump parameter and alarm events.

SELF TEST

Press and hold the Test Select Button for 3 seconds.

LOW POWER

Yellow Battery Symbol: Displayed when only 15 minutes of external power is remaining.

Red Battery Symbol: Displayed when only 5 minutes of external power is remaining.

POWER SAVER MODE:

Entered when the battery voltage falls to a critically low level. Pump Speed is reduced to 8000 RPM.

STARTING THE PUMP

>8000 RPM: Pump starts automatically.

<8000 RPM: Start pump by pressing Alarm Silence Button or Test Select Button on EPC.

SYSTEM MONITOR EVENT HISTORY SCREEN

PI Event:

System Information:

COMPATIBILITY

System Monitors I and II, Power Module, Power Base Unit (PBU), Power Module Patient Cable (12 Volt and 14 Volt), 14 Volt Lithium-ion Batteries and Battery Clips, 12 Volt SLA and NiMH Batteries and Clips.

ALARMS

For a review of alarms and their meanings, reference the HeartMate II Alarms for Clinicians, Item 103851. Note that EPC does not include Driveline fault detection.

A battery clip can be attached to the EPC controller by lining up the half moons and gently pushing. Batteries can be attached to the battery clip by aligning the RED arrows on the battery and clip.

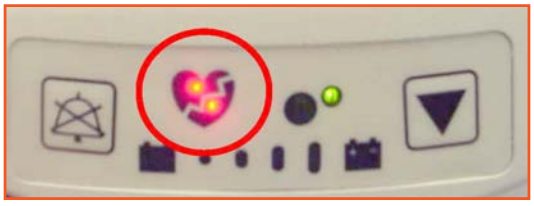
External Peripheral Controller (EPC): A percutaneous lock is located on the side of the controller.

Unlock

Locked

Alarms: Emergency Procedures

Red Heart Flashing Alarm: This may indicate a Low Flow Hazard. Check patient--the flow may be too low. If patient is hypovolemic, give volume. If patient is in right heart failure-- treat per protocol. If the pump has stopped check connections, batteries and controllers as instructed on page 5.



Yellow or Red Battery Alarm: Need to Change Batteries. See changing batteries section on page 5.

HeartWare™ HVAD™ System

1. **Can I do CPR?**

   Yes, in the right clinical scenario. Chest compressions may pose a risk due to pump location and position of the outflow graft on the aorta - use clinical judgment. If chest compressions have been administered, confirm function and positioning of HVAD Pump.

2. **Can the patient be defibrillated while connected to the device?**

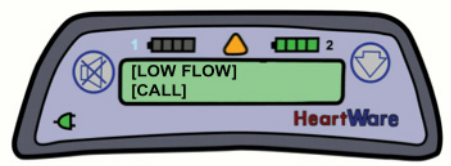
   Yes, you can defibrillate, and nothing needs to be turned off or disconnected.

3. **Can this patient be externally paced?**

   Yes.

4. **What type of alarm occurs in a low flow state?**

   If a low flow state occurs, an alarm will be heard, and the controller display will show a yellow triangle and [Low Flow] [Call] message.



5. **Can I change the speed of the device?**

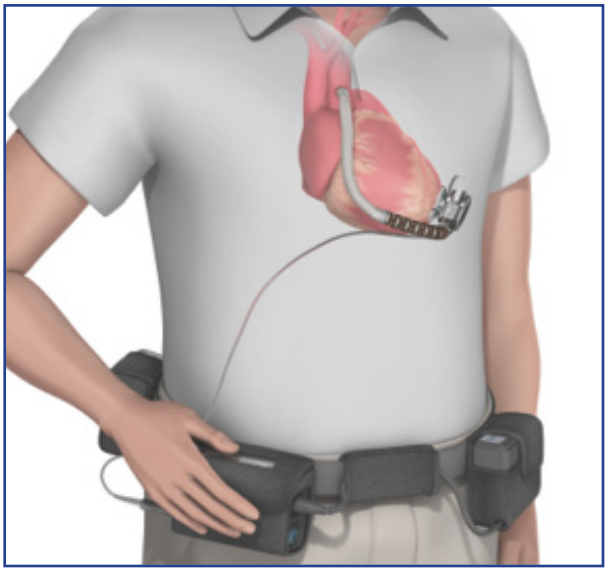
   No, the device runs at a fixed speed. It is not possible to adjust the pump speed in the pre-hospital setting.

6. **Does the patient have a pulse with this device?**

   Likely they will not because it is a continuous flow device, however some patients may have a pulse.

7. **What are acceptable vital sign parameters?**

   For patients with a palpable pulse, MAP targets should be ≤ 85 mm Hg. For patients without a palpable pulse, a manual cuff and a doppler is the preferred method with a MAP target of ≤ 90 mm Hg. If you are using a doppler, place the blood pressure cuff on the patient arm. As you release the pressure in the blood pressure cuff, the first sound you hear with the Doppler is the MAP. If that is not available, use a non-invasive BP (NIBP).



FAQs

- May not be able to obtain cuff pressure (continuous flow pump).
- Pump connected to electric line (driveline) exiting patient's abdominal area and is attached to controller which runs the pump.
- Pump does not affect ECG, but patient may or may not be symptomatic even with ventricular arrhythmias.
- All ACLS drugs may be given.
- This is a rotary (continuous flow) pump with typical speed ranges of 2400 – 3200 RPMs. The patient should have back-up equipment e.g. controller & charged batteries.
- The controller draws power from one battery at a time. A fully charged battery will provide 4-7 hours of power. Both the battery and controller have status lights to indicate the amount of power remaining.
- Transport by ground or flight to the implanting facility if possible.
- Be sure to bring **ALL** of the patient's equipment with them. e.g. back-up controller, charged batteries, ac adapter and charger.

HeartWare™ HVAD™ System

Driveline

Power Source #2

Battery Charge Indicator

ALARM ADAPTER

- Used to silence the [No Power] alarm.
- Should only be used on a controller that is NOT connected to a patient's pump.
- Insert into data port covered with a dust cap of the original controller after a controller exchange BUT before the power sources are disconnected or the [No Power] alarm will sound for up to two hours.

Red Alarm Adapter

DRIVELINE CONNECTION

To Connect to Controller:

- Align the two red marks and push the driveline connector straight into the silver driveline port. (Figure A)
- The Driveline Cover must completely cover the Controller's silver driveline connector to protect against static discharge. (Figure B)

Figure A

Figure B

NOTE: an audible click should be heard when connecting the Driveline to the controller. Failure to use the Driveline Cover may cause an Electrical Fault Alarm.

TO DISCONNECT A DEPLETED BATTERY

- Make sure there is a fully charged battery available to replace the depleted one.
- Disconnect the depleted battery by turning the connector sleeve counterclockwise until it stops.
- Pull the connector straight out from the controller.

CONNECTING POWER TO CONTROLLER

To Connect a Charged Battery:

- Grasp the cable of the charged battery at the back end of the connector (leaving front end of connector free to rotate)
- Line up the solid white arrow on the connector with the white dot on the Controller.
- Gently push (but DO NOT twist) the battery cable into the Controller until it naturally locks into place; you should hear an audible click.
- Confirm that the battery cable is properly locked on the controller by gently pulling the cable near the controller power connector.
- **DO NOT force the battery cable into** the controller connector without correct alignment as it may result in damaged connectors .

Power Source Connection

HeartWare™ HVAD™ System Emergency Operation

STEPS TO EXCHANGE THE CONTROLLER

Exchange the controller when the controller display indicates [Change Controller]. Priority is to restart the pump quickly.

It may be helpful to remember the 4 P's:

1. **POWER...** Connect a power source to the new controller.

2. **PUMP...** Restart the pump by connecting the driveline to the new controller.

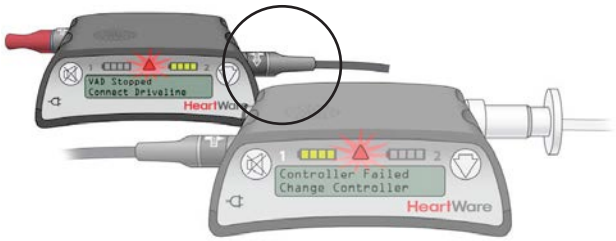
3. **PREVENT...** Prevent the [No Power] alarm on the original controller with the red alarm adapter or by pressing the Scroll and Mute buttons at the same time until a "beep" is heard, or for at least 5 seconds.

4. **POWER...** Connect a second power source to the new controller.

Step 1: Have patient sit or lie down and place the back-up controller within easy reach. The backup controller will become the new controller.

Step 2: Connect one **POWER** source to the new controller.

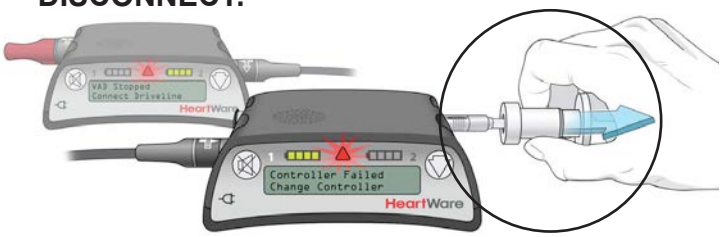
NOTE: The new controller may alarm after 10 seconds with a [VAD Stopped, Connect Driveline] high alarm. This is expected behavior.



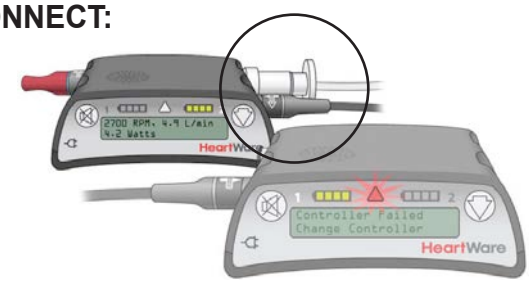
Step 3: Disconnect the driveline from the original controller and connect the driveline to the new controller. This should restart the **PUMP.**

• Verify that the pump is working. The RPM, L/min and Watts numbers should show on the Controller Display. If the pump does not restart, re-check driveline and power source connections, if it still doesn't start, call the patient's VAD team for assistance.

DISCONNECT:



CONNECT:



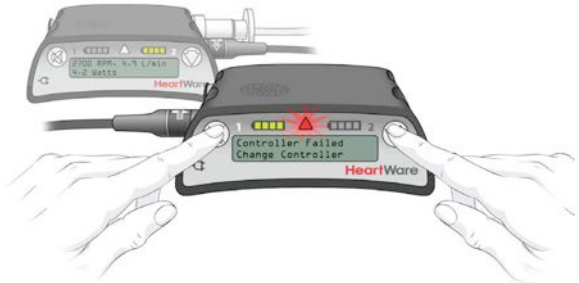
• If you have only connected 1 power source to the new controller, you will also have a [Power Disconnect, Reconnect Power] alarm.

HeartWare™ HVAD™ System Emergency Operation

Step 4: PREVENT the [No Power] alarm from sounding on the original controller. This needs to be done before removing all power. There are 2 options, see below:

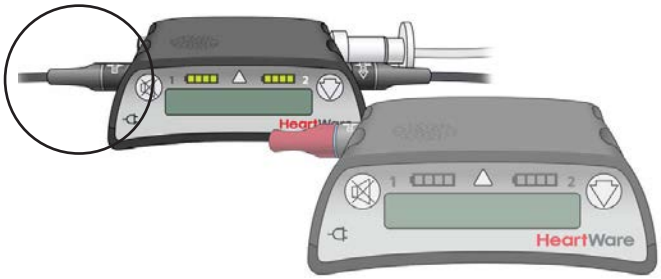
- If a red alarm adapter is available:
  - – Insert it into the connector data port on the original controller
  - – You can now remove all power from the original controller and no alarm should sound.

- If no red alarm adapter is available:
  - – Press and hold the “Alarm Mute” and “Scroll” buttons on the original controller until a “beep” is heard, or for at least 5 seconds.
  - – Release the “Alarm Mute” and “Scroll” buttons.
  - – You can now remove all power from the original controller and no alarm should sound.

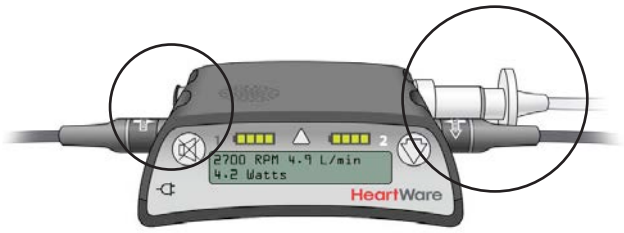


- If you removed power before silencing the [No Power] alarm, reconnect a power source and follow the steps above to silence it.

Step 5: Connect a second **POWER** source to the new controller.

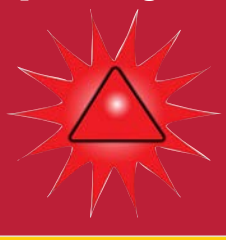
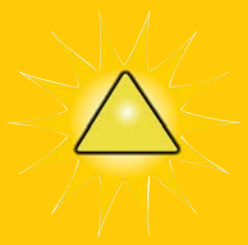


Step 6: Be sure the driveline cover is over the silver driveline connector and the data port is covered by the dust cap. If the red alarm adapter is connected to the controller that is now running the pump, remove it and close the cap on the data port.



Call the patients VAD team to obtain a new back-up controller.

HeartWare™ HVAD™ System Troubleshooting

Alarm Type	Alarm Display (Line 1)	Action (Line 2)
ALARM [No Power]	[no message]	[no message]
	When both power sources (2 batteries or 1 battery and an AC adapter or DC adapter) are removed. NO message will display on the controller. The [No Power] alarm will sound but the Alarm Indicator on the controller WILL NOT light. This indicates the pump has stopped. You should immediately connect two power sources.	
HIGH-CRITICAL [Flashing Red] 	[VAD Stopped]	[Connect Driveline]
	[VAD Stopped]	[Change Controller]
	[Critical Battery]	[Replace Battery 1]
	[Critical Battery]	[Replace Battery 2]
	[Controller Failed]	[Change Controller]
MEDIUM [Flashing Yellow] 	[Controller Fault]	[Call]
	[Controller Fault]	[Call: ALARMS OFF]
	[High Watts]	[Call]
	[Electrical Fault]	[Call]
	[Low Flow]	[Call]
	[Suction]	[Call]
LOW [Solid Yellow] 	[Low Battery 1]	[Replace Battery 1]
	[Low Battery 2]	[Replace Battery 2]
	[Power Disconnect]	[Reconnect Battery 1]
	[Power Disconnect]	[Reconnect Power 2]

[CALL] VAD team listed on the patient's contact sheet.