East Central Illinois EMS System

Pediatric

Protocol Manual

2024

Intentionally Left Blank

Preface

The following medical treatment protocols were developed for use by credentialed providers within the OSF HealthCare East Central Illinois 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 East Central Illinois EMS System. These protocols were adapted based on the NASEMSO National Model EMS Guidelines Version 3.0, IDPH Illinois Emergency Medical Services for Children Pediatric Prehospital Protocols, AHA guidelines, as well as other evidence-based information from local and national standards.

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).

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 East Central Illinois EMS.

From time to time, protocols may be added or revised. Additional recommendations are welcome and appreciated at any time. They may be submitted to the East Central Illinois EMS office for consideration.

408 S Neil Street

Champaign, IL 61820

Office Hours: Monday—Friday 8:00 am to 4:30 pm

Telephone: (217) 359-6619

Preface

Introductory Letter to the System

The vision of the East Central Illinois EMS System is to be an integrative, high performance EMS system aligning 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 take in order to achieve our vision. These new protocols are intended to be the guidelines and framework of a team-based approach to prehospital care within our system.

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,

Kurt Bloomstrand, MD, FACEP, FAAEM

EMS Medical Director

East Central Illinois EMS

OSF HealthCare

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—Basic (EMT-Basic)
	Emergency Medical Technician-Intermediate (EMT-I)
	Paramedic Only
	Medical Control

Intentionally Left Blank

Table of Contents

Table of Contents

Table of Contents

Intentionally Left Blank

Universal Patient Care

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.

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.
   - Make eye contact and smile at the child.
   - 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.
   - 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.

Initial Assessment

A. Airway Assessment and Maintenance with Spinal Motion Restriction
   - Maintainable with assistance: positioning.
   - Maintainable with adjuncts: oral airway, nasal airway.
   - Maintainable with endotracheal tube.
   - 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.

Protocol Continues

Initial Assessment (Continued)

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.

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 transient numbness / tingling.

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.

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; compliance with 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.

Protocol Continues

Focused History / Physical Assessment (Continued)

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.

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.

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**.

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 on: medications, baseline vitals, functional level / normal mentation, likely 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.
- 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 so familiarity with respiratory emergency interventions / adjuncts / treatment is appropriate.

Intentionally Left Blank

Abuse and Maltreatment

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 of any age group

Child Maltreatment/Abuse: Child maltreatment includes any act or series of acts of commission or omission by a parent or other caregiver that results in harm, potential for harm, or threat of harm to a child. An act of commission (child abuse) is the physical, sexual or emotional maltreatment or neglect of a child or children. An act of omission (child neglect) includes, but is not limited to, failure to provide for the child's needs (e.g. physical, emotional, medical / dental, and educational neglect) and failure to supervise (e.g. inadequate supervision or safety precautions, lack of appropriate car seat use, and exposure to violent or dangerous environments).

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 2.2*

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 per mandatory reporting laws.

The Illinois EMS Act (210 ILCS 50/3.230) and The Illinois Abused and Neglected Child Reporting Act (325 ILCS 5/4) requires all licensed EMS providers to report suspected cases of child abuse or neglect. To report, call the Child Abuse hotline at 1-800-25-ABUSE.

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.

Abuse and Maltreatment

Illinois EMSC 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 5 months or younger
        - ◊ injuries of soft tissue areas, including the face, neck and abdomen
        - ◊ 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)

Abuse and Maltreatment

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 and any other vulnerable individuals on scene 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 themself, 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 for injuries or infections.
    e. Unexplained trauma to genitourinary systems or frequent infections to this system.
    f. Evidence of malnourishment and/or serious dental problems.
- Have a high index of suspicion for abuse in children presenting with a BRUE.

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.

Abuse and Maltreatment

Intentionally Left Blank

Airway Management

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

EMR & EMT-Basic

1. **UNIVERSAL PATIENT CARE**
   a. Assess ABC's (Respiratory Rate, Effort, Adequacy)
   b. Pulse Oximetry and $EtCO_2$ (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 known or suspected head injuries.
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.
   b. **Rate**: Infant/Child: 20-30 breaths/minute
6. If patient has a tracheostomy tube, refer to RESPIRATORY DISTRESS WITH A TRACHEOSTOMY TUBE / VENTILATOR Protocol.

EMT-Intermediate & Paramedic

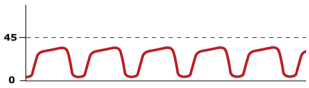
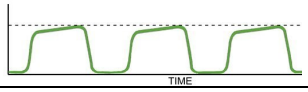
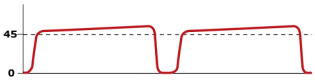
1. Continue **EMR / BLS TREATMENT.**
2. For apnea / respiratory failure or impending respiratory failure with impaired or absent gag reflex where BVM is not providing adequate ventilation consider a system approved BLIND INSERTION AIRWAY DEVICE (BIAD) (i.e. i-gel®).
3. When less-invasive methods (BVM, BIAD) are ineffective, consider OROTRACHEAL INTUBATION**.
   a. Any intubation attempts in a pediatric patient should be considered a "difficult intubation" and any attempts should be made by the most experienced appropriately licensed provider.
   b. $EtCO_2$ / waveform capnography is mandatory for all intubations.
   c. Video laryngoscopy may enhance intubation success rates and should be used when available.
   d. Limit of 2 total intubation attempts per patient.
      i. Evaluate reason for failure and change technique or person attempting to increase chance of success.
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.
5. Ventilate with minimal volume in order to see chest rise, approximately 6-8 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.

***Prehospital endotracheal intubation of children ≤ 8 years old has not shown benefit, and may cause harm. Intubation should ONLY be considered if you are still unable to oxygenate or ventilate utilizing BVM, OPA, NPA or BIAD.*

Airway Management

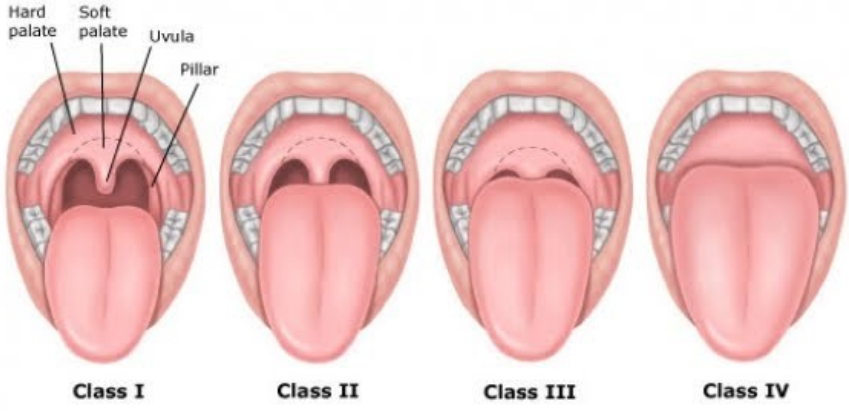
Normal Pediatric Vital Signs			
Age	**Pulse**	**Systolic BP**	**Respiratory Rate**
Neonate (0-1 mo)	100-180	>60	30-60
Infant (1-12 mo)	100-160	>70	30-60
Toddler (1-3 yrs)	90-150	>70 + (age in yrs x 2)	24-40
Pre-School (3-5 yrs)	80-140	>70 + (age in yrs x 2)	22-34
School Age (5-12 yrs)	70-120	>70 + (age in yrs x 2)	18-30
Adolescent (12-18 yrs)	60-100	>90	12-20

***Created based off of Illinois EMSC Guidelines*

$EtCO_2$		
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 6-8 mL/kg ideal body weight
- Avoid endotracheal intubation, unless less invasive methods fail, since it can 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>.
- 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. Child: 20-30 breaths/minute
        ii. Infant: 20-30 breaths/minute
        iii. Pediatric – infant/child
            - Support spontaneous respirations if the patient is hypoventilating
            - For apnea, provide 1 breath every 2–3 seconds adjusting based on pulse oximetry and digital capnometry or capnography (with the goal of 35–45 mmHg)
- **Orotracheal intubation**:
    a. Approximate depth of insertion = (3) x (endotracheal tube size).
    b. In addition to preoxygenation, apneic oxygenation (high-flow oxygen by nasal cannula) may prolong the period before hypoxia during an intubation attempt.
    c. Appropriate attention should be paid to adequate preoxygenation 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

- First pass intubation success rate
- 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

Intentionally Left Blank

Determination of Death / Withholding Resuscitative Efforts

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" 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, ECG activity or AED shockable rhythm, 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 • Massive blunt or penetrating trauma

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 Do Not Resuscitate (DNR) order in hand.
   Scene safety: The physical environment is not safe for the EMS providers to enter.
3. Pediatric Considerations:
   Infant death (SIDS): An infant who is apneic and meets the above criteria may be presumed dead.
   Neonatal death: A neonate who is apneic, pulseless, and exhibits neonatal maceration (softening or degeneration of the tissues after death in utero), anencephaly (absence of a major portion of the brain, skull, and scalp) may be presumed dead.
4. If any of the findings are different than those described above, clinical death is not confirmed and resuscitative measures should be immediately initiated or continued.
5. Contact **MEDICAL CONTROL** to confirm death.
6. Once death confirmation has been made by medical control and resuscitation will not be attempted:
   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.

Determination of Death / Withholding Resuscitative Efforts

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, ECGactivity, 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

Functional Needs / Special Needs Populations

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 with the following exceptions:
    i. A public entity may ask an individual with a disability to remove a service animal from the premises if:
        1. The animal is out of control and the animal's handler does not take effective action to control it; or
        2. The animal is not housebroken
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 clinicians 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. EMS clinicians are not responsible for the care of the service animal. If the patient is incapacitated and cannot personally care for the service animal, a decision can be made whether to transport the animal in this situation.
d. Animals that solely provide emotional support, comfort, or companionship do not qualify as service animals

Functional Needs / Special Needs Populations

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.

Intercept Criteria

Criteria

The appropriate ALS vehicle will be dispatched to intercept with a BLS or ILS unit / team when:

1. The BLS or ILS unit or 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. Stroke/CVA
n. Symptomatic overdose or poisoning
o. Any patient situation that higher level of care may benefit the patient

ILS Intercept Criteria:

a. Cardiogenic shock
b. Obstructed airways that cannot be cleared
c. Cardiac tamponade
d. Severe traumatic injuries
e. Symptomatic overdose or poisoning
f. Any patient situation that higher level of care may benefit the patient

4. The decision to utilize an intercept may be influence 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

Intercept Criteria

Intentionally Left Blank

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 & EMT-Basic

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 or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT.**
2. Determine pain score and continue to monitor / trend score.

   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).

   a. IV/IO is a slow push over 2-3 minutes.

   -OR-

   MORPHINE SULFATE 0.1 mg/kg IV/IO/IM (max 5 mg). May repeat IV/IO dose x 1 after 15 minutes if needed.
3. Continuous monitoring of patient with cardiac monitor, continuous SpO2 and capnography is required.

Paramedic

1. Continue **ILS TREATMENT**

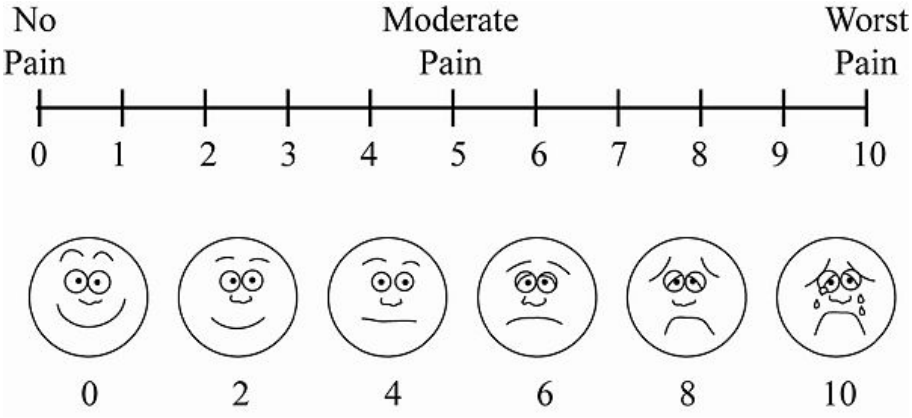
Medical Control

2. Consider **KETAMINE 0.2 mg/kg IV/IO Infusion** (max 25 mg) in 100 mL NS given over 10-15 min for pain refractory to opiates or in patients with hemodynamic compromise
   a. *Contraindicated* in patients < 3months old, uncontrolled hypertension or known allergy.

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 contraindicated in patients with GCS less than 15, 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.



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
- Documentation of estimated weight in kilograms

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.
    c. The "Quick Confusion Scale" was administered and patient received a score of greater than 11.
- 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 the *"Refusal of Service" 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. Utilize the "Quick Confusion Scale" to help make determination of patients capacity. 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.

Protocol Continues

Patient Refusal

Special Considerations for Minors

- It is preferable for minors to have a parent or legal guardian who can provide consent for treatment on behalf of the child
- All states allow healthcare providers to provide emergency treatment when a parent is not available to provide consent. This is known as the emergency exception rule or the doctrine of implied consent. For minors, this doctrine means that the prehospital professional can presume consent and proceed with appropriate treatment and transport if the following four conditions are met:
    a. The child is suffering from an emergent condition that places his or her life or health in danger.
    b. The child's legal guardian is unavailable or unable to provide consent for treatment or transport.
    c. Treatment or transport cannot be safely delayed until consent can be obtained.
    d. The prehospital professional administers only treatment for emergency conditions that pose an immediate threat to the child.
    e. As a general rule, when the prehospital professional's authority to act is in doubt, EMS providers should always do what they believe to be in the best interest of the minor.
    f. If a minor is injured or ill and no parent contact is possible, the provider may contact Medical Control for additional instructions.

Patient Refusal

PEARLS

- Refer to the *"Refusal of Service"* 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 determined to lack decision-making capacity by EMS providers should not be allowed to refuse care against medical advice or to be released at the scene. 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.
- EMS providers should not put themselves in danger by attempting to treat and/or transport an individual who refuses care.
- Always act in the best interest of the patient – EMS providers, with the support of direct medical oversight, must strike a balance between abandoning the patient and forcing care.

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
- For minors: guardian name, contact and relationship
- Patient was advised of risks / benefits of refusal / treatment
- Patient voices understanding of risks of refusal
- Patient was advised that they can changer 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-Makin 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.
- Quick Confusion Scale (if applicable)

QUALITY METRICS

- Patient decision-making capacity was determined and documented
- Guardians contacted or efforts to contact the guardians for minor patients who are not or cannot be confirmed to be emancipated

Patient Refusal

Intentionally Left Blank

Radio Report

All Levels

1. Unit must identify call letters, level of service and city of origin.
    a. Non-transport agencies may use MERCI, local radio frequency or cellular phone to communicate with Medical Control.
    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 must be documented by risk screen and submitted to EMS system office within 24 hours.
5. In the event that a provider deviates from these protocols, a completed risk screen with written explanation must be completed and submitted to the EMS Medical Director within 24 hours of the occurrence.

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

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 (PIC, Ectopic pregnancy, Ovarian cyst)
- Splenomegaly
- Diverticulitis
- Bowel obstruction
- Gastroenteritis (infectious)

EMR & EMT-Basic

1. **UNIVERSAL PATIENT CARE.**
2. Maintain the patient NPO (nothing by mouth).
3. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue EMR / BLS 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

- Assess for life-threatening causes of abdominal pain, which may include:

Ischemic, necrotic, or perforated bowel
- ◊ 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

Ruptured ectopic pregnancy
- ◊ Vaginal bleeding
- ◊ Recently diagnosed pregnancy
- ◊ Recent missed period/menstrual cycle in women of childbearing age

Appendicitis
- ◊ Focal right lower quadrant tenderness
- ◊ 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 as indicated.

Agitated or Violent Patient / Behavioral Emergencies

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

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

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

EMR, EMT-Basic & EMT-Intermediate

1. **UNIVERSAL PATIENT CARE**.
   a. Maintain and support airway.
   b. Note respiratory rate and effort—If possible, monitor pulse oximetry and/or capnography.
   c. Check blood glucose level.
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 PATIENT RESTRAINTS Procedure)*
   a. Patient must be out of control and a threat to themselves and/or others.
   b. If physical restraint is required, make sure adequate personnel are present. This generally means four people, one for each of the patient's extremities.
   c. Stretcher straps should be applied as the standard procedure for all patients during transport.
   d. Secure all four extremities to the stationary frame of the stretcher if needed.
   e. 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

1. Continue **EMR / BLS / ILS TREATMENT**.
2. Sedate patient as necessary based on patient's presentation and potential for self-harm. Contact medical control prior to sedation if questions / concerns exist regarding care.
3. Administer **MIDAZOLAM** **IV/IM/IN: 0.1 mg/kg**; (maximum dose 5 mg)
   Onset: IV: 3-5 min; IM: 10-15 min; IN: 3-5 min
4. If sedation is used, continuous cardiac, pulse oximetry and $EtCO_2$ monitoring and vital signs every 5 minutes are required.

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.

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

KEY DOCUMENTATION ELEMENTS

- Etiology of agitated or violent behavior if known
- Patient's medications, other medications or substances found on scene
- Patients medical history
- Physical evidence or history of trauma
- Adequate oxygenation by pulse oximetry
- 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/or 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

- Incident of injuries to patient, EMS personnel or others on scene or during transport
- Medical or physical complications (including sudden death) in patients
- Documentation of estimated weight in kilograms

Agitated or Violent Patient / Behavioral Emergencies

Intentionally Left Blank

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 / Reactive Airway Disease

EMR

1. **UNIVERSAL PATIENT CARE**
2. If signs of anaphylaxis, administer and/or assist patient with **EPINEPHRINE AUTOINJECTOR** if available.
3. Relay information to incoming ambulance.

EMT-Basic

1. Continue **EMR TREATMENT**.
2. If signs of anaphylaxis, administer **EPINEPHRINE (1:1,000) 0.15 mg IM** (less than 30 kg) or **0.3 mg IM** (30kg and over).
3. **DuoNeb** nebulizer for wheezing. May repeat x2 if needed for continued symptomatic relief.
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **BLS TREATMENT**.
2. If signs of anaphylaxis persist, repeat **EPINEPHRINE (1:1,000) 0.01 mg/kg IM** (max single dose 0.3 mg). May repeat every 5-15 minutes. (Max 3 total doses)
3. Establish IV access.
4. **DIPHENHYDRAMINE 1 mg/kg IM/IV/IO** (Max dose 50 mg).
5. **METHYLPREDNISOLONE 2 mg/kg IV/IM** (Maximum dose 125 mg).

   Alternative medication: **DEXAMETHASONE 0.6 mg/kg IV/IM (maximum 10 mg)**
6. For signs of hypoperfusion, administer **NORMAL SALINE 20 mL/kg**. Repeat as needed for ongoing hypoperfusion to a maximum of 60 mL/kg.
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 compromise the 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

Severity

- **Anaphylaxis**—More severe and characterized by an acute onset involving:
  1) Skin (urticaria) and/or mucosa with either respiratory compromise or hypotension or signs of end-organ dysfunction **-OR-**
  2) Hypotension for that patient after exposure to a known allergen **-OR-**
  3) 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

PERTINENT ASSESSMENT FINDINGS

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

QUALITY METRICS

- Percentage of patients with anaphylaxis that receive Epinephrine
- Airway assessment documented
- Documentation of estimated weight in kilograms

Altered Mental Status

History
- History from bystanders
- Environment where patient found
- Past medical history
- Medications
- Recent illness
- Changes in feeding / sleeping
- Lethargy
- Diabetes
- History of trauma
- Potential ingestion

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

Differential
- Head trauma
- CNS (stroke, tumor, seizure, infection)
- 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-Basic

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 with an intact gag reflex, administer **ORAL GLUCOSE one tube (15g)**.
5. If opioid overdose suspected and airway compromise or inadequate respiratory effort present refer to POISONING AND OVERDOSE Protocol.
6. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access. Consider **NORMAL SALINE 20 mL/kg** fluid bolus as needed to a maximum of 60 mL/kg.
3. If blood glucose < 60 mg/dL, administer **DEXTROSE 10% (D10)**; administer **5mL/kg**
    a. Repeat blood glucose. Consider repeating the dose if blood glucose < 60 mg/dL, with symptoms of hypoglycemia.
4. If no IV access available, administer **GLUCAGON IM/IN**.

    < 20 kg: **0.5 mg IM** or **IN**

    > 20 kg: **1 mg IM** or **IN**
5. If opioid overdose suspected and airway compromise or inadequate respiratory effort present refer to POISONING AND OVERDOSE 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 patients underlying mental health disease.

PEDIATRIC GLASGOW COMA SCALE (GCS)

Behavior	Response	Score
Eye Opening	Spontaneous	4
	To Verbal	3
	To Pain	2
	None	1
Verbal Response	Oriented (Smiles, coos, oriented to sounds, interacts)	5
	Confused (Cries but consolable, Irritable)	4
	Inappropriate Words (Inconsolable, Persistent Crying)	3
	Incomprehensible Sounds (Moans to Pain)	2
	None (No vocalization)	1
Best Motor Response	Obeys Commands (normal spontaneous movements)	6
	Localizes Pain	5
	Withdraws from Pain	4
	Flexion to Pain (decorticate)	3
	Extension to Pain (decerebrate)	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

- Mental status
- Breath odor
- Skin temperature

QUALITY METRICS

- Blood glucose obtained. Hypoglycemia considered and treated appropriately
- Naloxone is used as therapeutic intervention, not a diagnostic tool
- Documentation of estimated weight in kilograms

Brief Resolved Unexplained Event (BRUE)

History

- **Age < 1 year**
- Circumstances and symptoms before, during and after event
- Duration
- Associated symptoms (fever, congestion, cough, rhinorrhea, vomiting, diarrhea, rash, dyspnea, fussy, lethargy, poor sleep, poor feeding)
- Prior history of BRUE
- Past medical history
- Family history of sudden unexplained death in other children or young adults
- Social history (home environment, etc)

Signs and Symptoms

- Absent, decreased or irregular breathing
- Color change (central cyanosis or pallor)
- Hypertonia or Hypotonia
- Altered level of responsiveness

Differential

- Gastric reflux
- Swallowing dysfunction
- Nasal congestion
- Periodic breathing of the newborn
- Breath-holding spell
- Change in tone associated with choking, gagging, crying, feeding
- Seizures
- Child abuse or neglect
- Trauma (accidental / non-accidental)

Definition

Brief Resolved Unexplained Event (BRUE): An event in an infant **less than 1 year** reported by a bystander as sudden, brief (less than 1 min), unexplained, and completely resolved upon EMS arrival that includes one or more of the following:

- Breathing change (absent, decreased, or irregular)
- Color change (central cyanosis or pallor)
- Marked change in muscle tone (hyper– or hypotonia)
- Altered level of responsiveness

EMR & EMT-Basic

1. **UNIVERSAL PATIENT CARE**.
   a. Maintain and support airway.
   b. Continuous pulse oximetry.
   c. Check blood glucose level.
2. If hypoglycemic (glucose < 60 mg/dL) refer to DIABETIC EMERGENCIES Protocol.
3. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Apply cardiac monitor and observe for any arrhythmias.

Brief Resolved Unexplained Event (BRUE)

PEARLS

- Regardless of patient appearance, all patients with a history of signs or symptoms of BRUE should be transported for further evaluation.
- BRUE is a group of symptoms, not a disease process.
- Thorough history is key:
    a. History of circumstances and symptoms before, during, and after the event, including duration, interventions done, and patient color, tone, breathing, feeding, position, location, activity, level of consciousness.
    b. Other concurrent symptoms (fever, congestion, cough, rhinorrhea, vomiting, diarrhea, rash, labored breathing, fussy, less active, poor sleep, poor feeding).
    c. Prior history of BRUE.
    d. Past medical history (prematurity, prenatal / birth complications, gastric reflux, congenital heart disease, developmental delay, airway abnormalities, breathing problems, prior hospitalizations, surgeries, or injuries).
    e. Family history of sudden unexplained death or cardiac arrhythmia in other children or young adults.
    f. Social history: who lives at home, recent household stressors, exposure to toxins / drugs, sick contacts).
    g. Considerations for possible child abuse (multiple / changing versions of the story; reported mechanism of injury does not seem plausible, especially for child's developmental stage).

KEY DOCUMENTATION ELEMENTS

- Document key aspect of history
    - ◊ The Event
      -Breathing (apnea or respiratory distress); Color change (central and/or peripheral); Change in muscle tone; Level of responsiveness; Event duration; Witnessed?
    - ◊ Pre-Event circumstances and history
      -Event associated with feeding or other activity; History of prematurity; Prior BRUE events (ever or in past 24 hours); Past medical history, especially cardiac, respiratory, gastrointestinal, neurologic
    - ◊ Caregiver resuscitation efforts
    - ◊ Post-events symptoms and circumstances
- Document key aspects of physical exam
- Document environmental and scene/social clues, especially those suggesting abuse, neglect, non-accidental trauma, or unsafe sleeping practices.

PERTINENT ASSESSMENT FINDINGS

- Signs of respiratory distress
- Color change
- Mental status changes

QUALITY METRICS

- Complete set of vital signs recorded

Diabetic Emergencies

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

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

1. **UNIVERSAL PATIENT CARE**.
2. Check 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)**.
4. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access.
3. If blood glucose < 60 mg/dL, administer **DEXTROSE 10% (D10) 5mL/kg**
   a. Repeat blood glucose. Consider repeating the dose if blood glucose < 60 mg/dL, with symptoms of hypoglycemia.
4. If no IV access available, administer **GLUCAGON IM/IN**.
   < 20 kg: **0.5 mg IM** or **IN**
   > 20 kg: **1 mg IM** or **IN**
5. If blood glucose > 300 mg/dL, administer **NORMAL SALINE 20 mL/kg** fluid bolus. Reassess and re-bolus as needed as lungs remain clear.

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.
- A clear cause of the hypoglycemia is identified (e.g. missed meal).

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%.
- 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

Hyperglycemia

- Consider causes for hyperglycemia:
  a. Insulin – this refers to any medication changes for insulin or oral medications including poor compliance or malfunctioning insulin pump.
  b. Infection – underlying infection can cause derangements in glucose control
- Asymptomatic hyperglycemia poses no risk to the patient while inappropriately aggressive interventions to manage blood sugar can harm patients. Overly aggressive administration of fluid in hyperglycemic patients may cause cerebral edema or dangerous hyponatremia.
- 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) and tachypnea (Kussmaul respirations—low $EtCO_2$).

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

- Concomitant trauma.
- Diaphoresis or hypothermia may be associated with hypoglycemia.
- Abdominal pain, “fruity breath,” and Kussmaul breathing may be associated with DKA

QUALITY METRICS

- Glucose level checked when appropriate.
- If patient released at scene, criteria documented for safe release.
- Hyper- / Hypoglycemia considered and treated appropriately
- Documentation of estimated weight in kilograms

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

All Levels

Conscious Patient – Able To Speak:

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

Conscious Patient – Unable To Speak:

1. **For an Infant (< 1 yo):** Administer five back blows followed by five chest thrusts repeatedly until the foreign body is expelled or until the patient becomes unconscious / unresponsive.

   For a Child: 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 (if applicable) and begin chest compressions.
2. Open the airway and check for Foreign Body Airway Obstruction.
   a. If object is visible, remove foreign body.
   b. Caution using OPA or BIAD until airway is open as to not push the object farther into the airway.
3. If object is not visible, continue chest compressions until object dislodged.

EMT-Intermediate & Paramedic

Unconscious Patient:

1. Continue above treatment.
2. Perform advanced airway control measures as available, using the AIRWAY MANAGEMENT Protocol. Utilize Magill forceps as necessary.

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 a blind finger sweep 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

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
- Travel history
- Suspected food poisoning

Signs and Symptoms
- Fever
- Pain
- Constipation
- Diarrhea
- Anorexia
- Hematemesis

Differential
- CNS (increased pressure, headache, tumor, trauma or hemorrhage)
- Drugs
- Appendicitis
- Gastroenteritis
- GI or Renal disorders
- Diabetic Ketoacidosis (DKA)
- Infections (pneumonia, influenza)
- Electrolyte abnormalities
- Food or toxin induced

EMR

1. **UNIVERSAL PATIENT CARE**.
2. For older pediatric patients that are able to follow commands, consider a trial of inhalation from an isopropyl alcohol prep pad.
3. Relay information to incoming ambulance.

EMT-Basic

1. Continue **EMR TREATMENT**.
2. For patient > 4 years old, administer **ONDANSETRON ODT 4mg 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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT.**
2. Establish IV access.
3. Consider **NORMAL SALINE 20 mL/kg fluid bolus** for signs of dehydration.
4. For patient > 6 months old, administer **ONDANSETRON 0.15 mg/kg IV or IM** or for patients ≥ 4 years old **ONDANSETRON ODT 4 mg PO**.
    a. Maximum total dose: 4 mg. (Not to be repeated if already given by BLS provider)

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).
- Ondansetron is preferred in children for the treatment of nausea and vomiting.
- For very young pediatric patients, Ondansetron can be sedating.
- 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.

Pediatric Medical

KEY DOCUMENTATION ELEMENTS

- Patient age and weight
- 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

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
- Documentation of estimated weight in kilograms

Respiratory Distress - Upper Airway

History
- Time of onset
- Possibility of foreign body
- Concurrent symptoms (fever, cough, rhinorrhea, tongue / lip swelling, rash, labored breathing, FBAO)
- Home treatment
- Sick contacts
- History of trauma

Signs and Symptoms
- Stridor
- Barking cough
- Gagging
- Drooling
- Inability to swallow
- Respiratory distress (hypoxia, retractions, nasal flaring, tripoding, cyanosis, tachypnea, etc)
- Anxious appearing
- Fever, cough, congestion

Differential
- Croup
- Epiglottitis
- Allergic Reaction / Anaphylaxis
- Aspiration
- Foreign body
- Medication or toxin
- Trauma

EMR, EMT-Basic & EMT-Intermediate

1. **UNIVERSAL PATIENT CARE**.
    a. Give supplemental **OXYGEN** as needed.
    b. Suction the nose and/or mouth if excessive secretions are present.
2. Manage airway per AIRWAY MANAGEMENT Protocol.
    a. The airway should be managed in the least invasive way possible. For suspected epiglottitis do not attempt invasive airway maneuvers unless absolutely necessary.
3. Place patient in position of comfort. Avoid any agitation.
4. For allergic reaction and/or anaphylaxis refer to ALLERGIC REACTION / ANAPHYLAXIS Protocol.
5. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Paramedic

1. Continue **EMR / BLS / ILS TREATMENT.**
2. Children with severe croup with signs of stridor at rest, give **RACEMIC EPINEPHRINE 0.5 mL of 2.25% solution diluted in 3 mL NS nebulized.**

Respiratory Distress - Lower Airway

History
- Time of onset
- Possibility of foreign body
- 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

Signs and Symptoms
- Wheezing or stridor
- Respiratory distress (hypoxia, retractions, nasal flaring, tripoding, cyanosis, tachypnea, etc)
- Shortness of breath (inability to speak full sentences)
- Anxious appearing
- Fever, cough, congestion
- Tachycardia

Differential
- Asthma / Reactive Airway Disease
- Bronchiolitis
- Allergic Reaction / Anaphylaxis
- Aspiration
- Foreign body
- Pneumonia
- Congenital heart disease
- Medication or toxin
- Trauma

EMR & EMT-Basic

1. **UNIVERSAL PATIENT CARE**.
    a. Give supplemental **OXYGEN** as needed.
    b. Suction the nose and/or mouth if excessive secretions are present.
2. Manage airway per AIRWAY MANAGEMENT Protocol.
3. Place patient in position of comfort.
4. Consider **DuoNeb** by nebulizer. May repeat x2 if needed for continued symptomatic relief.
5. For allergic reaction and/or anaphylaxis refer to ALLERGIC REACTION / ANAPHYLAXIS Protocol.
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access as needed.
3. Consider **METHYLPREDNISOLONE 2 mg/kg IV/IM**. (Maximum dose 125 mg)
    Alternative medication: **DEXAMETHASONE 0.6 mg/kg IV/IM (maximum 10 mg)**
4. Reassess need for intubation if respiratory symptoms worsen or do not improve with treatment (e.g. BVM)
5. Call for intercept per INTERCEPT CRITERIA.

Paramedic

1. Continue **ILS TREATMENT.**
2. In patients with persistent respiratory distress despite the above treatment, consider **MAGNESIUM SULFATE 50 mg/kg IV** in 50 mL NS over 10-15 minutes. Maximum dose: 2 grams.
3. Continue to monitor need for advanced airway if respiratory symptoms worsen or do not improve with treatment. See AIRWAY MANAGEMENT Protocol.
4. If in severe distress with impending respiratory failure, consider **EPINEPHRINE (1:1,000)** at **0.01 mg/kg IM.** Maximum dose: 0.3 mg

Respiratory Distress
Upper and Lower Airway

PEARLS

General Respiratory Disress

- Pulse oximetry and end-tidal CO2 ($EtCO_2$) should be routinely used as an adjunct to other forms of respiratory monitoring.
- Supraglottic devices and intubation – should be utilized only if bag-valve-mask ventilation fails - the airway should be managed in the least invasive way possible.

Upper Airway

- **Croup** typically affects children 6 months- 3 years. It is viral, low grade fever, gradual onset (viral prodrome), no drooling is noted.
- **Epiglottitis** is bacterial in etiology. Rapid onset. Drooling, Dysphagia, Distress. Possible stridor. Patient wants to sit up to keep airway open.
- For suspected Epiglottitis, DO NOT attempt intubation, invasive glottic visualization or IV access.
- For Bronchiolitis, suctioning can be a very effective intervention to alleviate distress, since infants are obligate nose breathers.
- Upper airway obstruction can have inspiratory, expiratory or biphasic stridor
- Foreign bodies can mimic croup, it is important to ask about a possible choking event.
- In croup, without stridor at rest (i.e. severe croup) or other evidence of respiratory distress, inhaled medications may not be necessary.

Lower Airway

- Wheezing in the breathing patient with respiratory distress indicates lower airway disease, which may come from a variety of causes. The patient with severe lower airway disease may have altered LOC, be unable to talk, may have absent or markedly decreased breath sounds and severe retractions with accessory muscle use.
- 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 congenital heart disease / congestive heart failure may present with lung sounds that mimic asthma (“cardiac wheeze”)

KEY DOCUMENTATION ELEMENTS

- Reparatory rate
- Oxygen saturation and/or $EtCO_2$
- 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

- Utilization of continuous pulse oximetry and $EtCO_2$
- Appropriate medication(s) were administered (including proper dosage) and the patient's response
- Documentation of estimated weight in kilograms

Intentionally Left Blank

Respiratory Distress with a Tracheostomy Tube / 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-Basic

1. **UNIVERSAL PATIENT CARE**.
2. Place patient in position of comfort.
3. Administer 100% **OXYGEN** per **tracheostomy collar**.
4. Evaluate for DOPE:
    b. **D**isplaced tracheostomy tube / ETT, **O**bstructed tracheostomy tube / ETT, **P**neumothorax and **E**quipment Failure.
5. If tracheostomy tube is obstructed with secretions, suction tracheostomy tube.
    a. Remove inner catheter of tracheostomy tube and re-suction.
    b. Suction for no more than 10-15 seconds while withdrawing the suction catheter.
    c. 1-3 mL saline may be used to help loosen secretions.
6. If tracheostomy tube still remains obstructed have caregiver / family assist in changing tracheostomy tube if there is a spare tube available.
7. If tracheostomy tube still remains obstructed, ventilate with 100% **OXYGEN** via **Bag Valve Mask (BVM)**.
8. Consider **DuoNeb** by nebulizer. May repeat x2 if needed for continued symptomatic relief.
9. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Reassess patency of tracheostomy tube. If needed, replace tracheostomy tube with spare tracheostomy tube or appropriately sized ET tube into stoma.

Respiratory Distress with a Tracheostomy Tube / Ventilator

PEARLS

- Especially in pediatric tracheostomy patients with significant respiratory distress, plugging or dislodgement of the tracheostomy is the problem until proven otherwise
- Pulse oximetry and end-tidal CO2 ($EtCO_2$) should be routinely used as an adjunct to other forms of respiratory monitoring.
- Always talk to family / caregivers and 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**islodgement or misplaced tracheostomy (e.g., decannulation)
  - ◊ Assess for subcutaneous air in the neck which may indicate the tracheostomy is not in the trachea
  - ◊ Directly visualize the tracheostomy and the stoma (i.e., remove anything obstructing direct view of stoma including clothing/bandages/sponges etc.) to assure it remains properly seated in the stoma
- **O**bstruction or secretions in tracheostomy
  - ◊ Assure tracheostomy is patent. Especially in pediatric tracheostomy patients with significant respiratory distress, plugging or dislodgement/decannulation of the tracheostomy is the problem until proven otherwise
  - ◊ Auscultate breath sounds, consider potential for plugging of large airways in patients with significant respiratory distress
- **P**neumothorax
- **E**quipment connection problems

Tracheostomy tube components:

- Outer cannula: the tracheostomy size is stamped on the collar
- Inner cannula: not found in all tracheostomies
  - ◊ Not commonly used in pediatric patients
  - ◊ Removed by gently twisting a quarter turn to the left and pulling out
- Balloon cuff: protects lower airway from secretions/blood from above, allows for better mechanical ventilation
- Collar: includes imprint of tube size and attachment for umbilical tape/tracheostomy ties
- Obturator: stiffens and provides shape to tracheostomy tube to facilitate insertion. Must be removed for ventilation

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 $EtCO_2$

Seizure / Status Epilepticus

History
- Reported / Witnessed seizure activity
- Previous seizure history
- Seizure medications (recent changes, compliance)
- Medications administered prior to arrival
- History of trauma
- History of diabetes
- 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
- Hypoglycemia

EMR & EMT-Basic

1. **UNIVERSAL PATIENT CARE**.
   a. Check blood glucose level.
   b. Ensure patent airway
2. If blood glucose < 60 mg/dL, refer to DIABETIC EMERGENCIES Protocol.
3. Immobilize cervical spine if indicated.
4. Position patient to prevent injury.
5. If patient has a fever (>100.4°F) and febrile seizure is suspected, attempt to cool the patient by removing any excess clothing and apply cool compresses to the body.
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access.
3. If patient actively seizing, administer **MIDAZOLAM** (IN/IM preferred):

   IN/IM: 0.2 mg/kg (maximum dose 10 mg)

   - OR -

   IV/IO: 0.1 mg/kg over 2 minutes (maximum dose 5 mg); may repeat x 1 after 5 minutes if seizure persists.
4. If blood glucose < 60 mg/dL, refer to DIABETIC EMERGENCIES Protocol.

Medical Control

5. If seizure persists, contact Medical Control for additional **MIDAZOLAM**.

Seizure / Status Epilepticus

PEARLS

- **Simple Febrile Seizure** is defined as a generalized tonic-clinic seizure that last less than 15 minutes in a patient between the ages of 6 months and 5 years. Only occurs once in a 24 hour period.
- **Complex Febrile Seizure** is defined as any exception to the above.
- **Status Epilepticus** is defined as one prolonged seizure lasting more than 5 minutes or 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.

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

PERTINENT ASSESSMENT FINDINGS

- Fever
- 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 and treated if necessary
- Documentation of estimated weight in kilograms

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 for age
- Impaired perfusion (cap refill)
- Hypotension for age
- Altered mental status
- Hyperglycemia / Hypoglycemia

Differential

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

Criteria

Obvious or suspected source of infection

↓

Temperature > 100.4°F or < 96.8°F

↓

Tachycardia for age

↓

+1 Criteria

- Capillary Refill > 3 seconds
- Altered Mental Status
- $EtCO_2$ < 25 mmHg
- High Risk Conditions **

↓

SEPSIS ALERT

****High Risk Conditions:**

- Splenectomy / Asplenia
- Sickle Cell Disease
- PICC/Central Venous Catheter
- CSF Shunt
- Tracheostomy
- Indwelling Urinary Catheter
- Cerebral Palsy
- Severe Intellectual Disability
- Developmental Disability
- Cancer
- Immunosuppression
- Petechial or Purpuric Rash

Pediatric Tachycardia

Age	Tachycardia
Neonate (0-1 mo)	> 180
Infant (1-12 mo)	> 160
Toddler (1-3 yrs)	> 150
Pre-School (3-5 yrs)	> 140
School Age (5-12 yrs)	> 120
Adolescent (12-18 yrs)	> 100

Protocol Continues

Sepsis

EMR & EMT-Basic

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

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT.**
2. Notify receiving hospital of **"SEPSIS ALERT".**
3. Consider 12-Lead ECG.
4. Establish at least one large bore IV.
    a. Administer **NORMAL SALINE 20ml/kg IV** fluid bolus **(Document TOTAL amount of IVF given).**
        i. Reassess after each 20 mL/kg increment and STOP fluids if signs of pulmonary edema (increasing shortness of breath or rales / crackles on lung exam).
        ii. May repeat as needed as long as pulmonary edema is not suspected.
        iii. Total amount of IVF should not exceed 60 mL/kg.
5. Continue to reassess patient including vital signs (manual BP), breath sounds, capnography, pulse oximetry, cardiac monitor.

Medical Control

6. Medical Control may consider **NOREPINEPHRINE (Levophed) 0.05 - 1 mcg/kg/min** (if available, with IV pump) titrated to age appropriate SBP.

    Alternative medication: **DOPAMINE 2 - 20 mcg/kg/min**

    ***While drip is being set up, consider **PUSH DOSE EPINEPHRINE 1 mL (10 mcg) IV/IO** every 2-5 minutes to maintain age appropriate SBP.

    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.

Normal Pediatric Vital Signs			
Age	**Pulse**	**Systolic BP**	**Respiratory Rate**
Neonate (0-1 mo)	100-180	>60	30-60
Infant (1-12 mo)	100-160	>70	30-60
Toddler (1-3 yrs)	90-150	>70 + (age in yrs x 2)	24-40
Pre-School (3-5 yrs)	80-140	>70 + (age in yrs x 2)	22-34
School Age (5-12 yrs)	70-120	>70 + (age in yrs x 2)	18-30
Adolescent (12-18 yrs)	60-100	>90	12-20

***Created based off of Illinois EMSC Guidelines*

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 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 sepsis. 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.
- ECGshould be considered with suspected sepsis, but should not delay care in order to obtain.

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
- Documentation of estimated weight in kilograms

Sepsis

Intentionally Left Blank

Shock

History
- Blood loss
- Fluid loss (Vomiting, Diarrhea, Fever)
- Infection
- Cardiac problems (Congenital)
- Medications
- Allergic reaction
- Poor oral intake

Signs and Symptoms
- Restlessness, confusion
- Weakness
- Dizziness
- Increased HR, rapid pulse
- Decreased BP
- Pale, cool, clammy skin
- Delayed capillary refill (> 2 sec)

Differential
- Trauma
- Infection
- Dehydration (Vomiting, Diarrhea, Fever)
- Congenital Heart Disease
- Medication or Toxin
- Allergic reaction

EMR & EMT-Basic

1. **UNIVERSAL PATIENT CARE**.
2. Keep patient warm and elevate feet if possible.
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.

EMT-Intermediate

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access.
3. Consider etiology of shock state:
   a. **DISTRIBUTIVE** (Anaphylaxis, Neurogenic, Sepsis) and **HYPOVOLEMIC** (Dehydration, Bleeding)
      i. Administer **NORMAL SALINE 20 mL/kg bolus** to maintain age appropriate SBP. Repeat fluid bolus as needed as long as lungs remain clear; maximum **60 mL/kg**.
   b. **OBSTRUCTIVE** (Cardiac tamponade, PE, Tension Pneumothorax)
      i. If tension pneumothorax suspected, perform NEEDLE DECOMPRESSION.
   c. **CARDIOGENIC** (CHF, STEMI)
      i. Administer **NORMAL SALINE 10 mL/kg bolus** if lung sounds clear to maintain age appropriate SBP. Maximum **500 mL.**
4. Call for intercept per INTERCEPT CRITERIA.

Paramedic

1. Continue **ILS TREATMENT**.
2. If shock due to hemorrhage, consider **TRANEXAMIC ACID (TXA) 15 mg/kg IV/IO** over 10 minutes.
   a. Mix **15 mg/kg** (max 1g)in **50 mL NS and administer over 10 minutes**.

Medical Control

3. Medical Control may consider **NOREPINEPHRINE (Levophed) 0.05 - 1 mcg/kg/min** (if available, with IV pump) titrated to age appropriate SBP.

   Alternative medication: **DOPAMINE 2 - 20 mcg/kg/min**

   ***While drip is being set up, consider **PUSH DOSE EPINEPHRINE 1 mL (10 mcg) IV/IO** every 2-5 minutes to maintain age appropriate SBP.
   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.

Shock

PEARLS

- Early, aggressive IV fluid administration is essential in the treatment of suspected shock.
    a. Therapeutic end-points in children are: Normal mental status, normal cap refill, normal pulses and heart rate, warm extremities, normal blood pressure.
- 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
- Tachycardia can be a late sign of shock in children and a tachycardic child may be close to cardiovascular collapse.
- Decreasing heart rate and hypotension occur late in children and are signs of imminent cardiac arrest.

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

- Signs / Symptoms: Tachycardia, Weak thread 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
- Documentation of estimated weight in kilograms

Bradycardia

History

- Past medical history
- Foreign body exposure / Swallowed
- Respiratory distress or arrest
- Apnea
- Possible toxic or poison exposure
- Congenital disease
- Medication

Signs and Symptoms

- Decreased heart rate
- Delayed capillary refill or cyanosis
- Mottled, cool skin
- Hypotension or arrest
- Altered level of consciousness

Differential

- Respiratory failure (foreign body, secretions, infection)
- Hypoxia / Hypothermia
- Sinus bradycardia
- Congenital heart disease
- Athletic
- Head injury (elevated ICP) / Trauma
- Spinal cord lesion
- Overdose
- Hypoglycemia

EMR

1. **UNIVERSAL PATIENT CARE**.
    a. Support ABC's
    b. Give supplemental oxygen as needed.
2. If patient shows signs of *cardiopulmonary compromise* (hypotension, AMS, signs of shock) despite oxygenation / ventilation (BVM) and **HR <** 60 in infant and children begin **CPR**.
3. Consider possible underlying causes of bradycardia (*see differential above*).
4. Check blood glucose level and if blood glucose < 60 mg/dL refer to DIABETIC EMERGENCIES Protocol.
5. Relay information to incoming ambulance.

EMT-Basic

1. Continue **EMR TREATMENT.**
2. Perform 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.

EMT-Intermediate & Paramedic

1. Continue **BLS TREATMENT**.
2. Establish IV access. Consider **NORMAL SALINE 20 mL/kg IV/IO** if hypovolemic. May repeat as needed for signs of poor perfusion to a maximum of 60 mL/kg.
3. **EPINEPHRINE (1:10,000) 0.01 mg/kg (0.1mL/kg) IV/IO** for persistent bradycardia with signs of cardiopulmonary compromise**.** May repeat every 3-5 minutes as needed. (Maximum single dose: 1 mg)
4. **ATROPINE 0.02 mg/kg IV/IO** for increased vagal tone or primary AV block (minimum single dose: 0.1 mg; maximum single dose: 0.5mg). May be repeated once in 3-5 minutes.
5. If bradycardia persists with signs of cardiopulmonary compromise, consider TRANSCUTANEOUS PACING.
    a. Consider sedation with **MIDAZOLAM 0.1 mg/kg IV/IO/IN** (maximum dose 2mg).

Bradycardia

PEARLS

- In children, bradycardia almost always reflects hypoxia, rather than a primary cardiac problem. It is a pre-arrest rhythm and the prognosis is poor if left untreated. Immediate delivery of high-flow oxygen and assisted ventilation are essential. Untreated bradycardia will quickly cause shock, hypotension and death.
- Bradycardia should be managed via the least invasive manner possible, escalating care as needed
- Epinephrine is the first drug choice for persistent, symptomatic bradycardia.
- Atropine is the second choice, unless there is evidence of increased vagal tone or a primary AV conduction block, then give Atropine first.
- 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.

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
- Respiratory status

QUALITY METRICS

- Blood glucose obtained
- Correct medication and dose given for patient condition
- Correct application and use of cardiac pacing
- Use of sedation with cardiac pacing
- Documentation of estimated weight in kilograms

Cardiac Arrest

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

Signs and Symptoms
- Unresponsive
- Apneic
- Pulseless

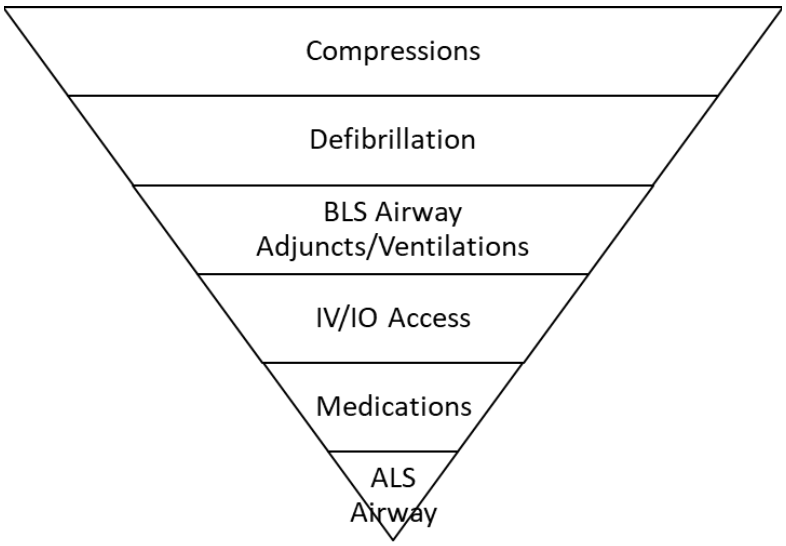
Differential
- Medical vs. Trauma
- V. fib vs Pulseless V. tach
- Asystole
- Pulseless Electrical Activity (PEA)

High Performance CPR

- Chest compressions at a depth of at least 1/3 anteroposterior diameter or at least 1.5 inches in infants (< 1 yr) and 2 inches in children (1 yr - puberty)
- Rate of compressions between 100-120 per minute
    - ◊ Compression-to-ventilation ratio: 1 rescuer—30:2; 2 rescuer—15:2
- Allowing for complete chest recoil
- Minimizing interruptions between cycles to less than 10 seconds (Compression fraction >60%)
- Switching providers frequently, about every 2 minutes or sooner if fatigued
- If advanced airway present, provide continuous compressions and give one breath every 2-3 sec

Code Resource Management

- Crews should coordinate their duties keeping the call priorities in mind. Intervention priorities are (in order of highest to lowest):



Cardiac Arrest

EMR & EMT-Basic

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.

EMT-Intermediate & Paramedic

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 60% and $EtCO_2$ greater than 10mmHg.
5. Consider placement of advanced airway per AIRWAY MANAGEMENT Protocol.
6. If return of pulses, refer to RETURN OF SPONTANEOUS CIRCULATION Protocol.

Cardiac Arrest
- Asystole / PEA -

History
- Events leading to arrest
- Estimated downtime
- Past medical history
- Medication
- Existence of terminal illness
- Suspected abuse
- Airway obstruction

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 Emboloism

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, Ventiliation
- **T**hrombosis, coronary – Emergent PCI

EMT-Intermediate & Paramedic
1. Initiate HIGH QUALITY CPR.
2. Establish IV/IO access.
3. **NORMAL SALINE 20 mL/kg** fluid bolus. May repeat as needed to a total of 60 mL/kg.
4. **EPINEPHRINE (1:10,000) 0.01 mg/kg (0.1 mL/kg) IV/IO** (max 1mg) **every 3-5 minutes** as long as patient remains pulseless.
5. Consider possible causes and treatments (H's and T's).
6. Call for intercept per INTERCEPT CRITERIA.
7. If return of pulses, refer to the RETURN OF SPONTANEOUS CIRCULATION Protocol.

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

History
- Estimated down time
- Past medical history
- Medications
- Events leading to arrest
- Airway obstruction
- Hypothermia

Signs and Symptoms
- Unresponsive
- Apneic
- Pulseless

Differential
- Respiratory failure / Airway obstruction
- Hyper / Hypokalemia,
- Hypovolemia
- Hypothermia, Hypoglycemia, Acidosis
- Tension pneumothorax, Tamponade
- Toxin or medication
- Congenital Heart Disease

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, Ventiliation
- **T**hrombosis, coronary – Emergent PCI

EMT-Intermediate
1. Continue high quality CPR per CARDIAC ARREST Protocol pausing for rhythm checks every 2 minutes for no more than 10 seconds.
2. **DEFIBRILLATE** at **2 J/kg**. Resume CPR immediately after defibrillation for 2 minutes.
3. Establish vascular access.
4. After 2 minutes of CPR and if shockable rhythm, **DEFIBRILLATE** at **4 J/kg.** Resume CPR for 2 minutes.
5. **EPINEPHRINE (1:10,000) 0.01 mg/kg (0.1 mL/kg) IV/IO** (max 1mg) **every 3-5 minutes** as long as patient remains pulseless.
6. **DEFIBRILLATE** at **≥4 J/kg** (max 10 J/kg or adult dose) every 2 minutes as needed. Resume CPR for 2 minutes after each defibrillation.
7. For V-fib/Pulseless V-tach refractory to third defibrillation administer **AMIODARONE 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).
8. If V-Fib or V-Tach persists or patient is allergic to AMIODARONE, consider **LIDOCAINE 1 mg/kg IV/IO**. Maintenance **LIDOCAINE infusion at 20-50 mcg/kg/min**.
9. Continue cycles of 2 minutes of CPR followed by defibrillation as needed.
10. Consider possible causes and treatments (H's and T's).
11. If Return of Spontaneous Circulation is achieved refer to ROSC Protocol.

Paramedic
1. Continue **ILS TREATMENT.**
2. Consider **MAGNESIUM SULFATE 25-50 mg/kg IV/IO** for Torsades de Pointes

Cardiac Arrest

PEARLS

- **Special attention should be applied to the pediatric population and airway management / respiratory support. Given that the most likely cause of cardiac arrest is respiratory, airway management may be considered early in the patient's care.**
- **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 in place (BIAD or ETT) compression to ventilation ratio is 30:2 for 1 person CPR or 15:2 for 2 person CPR. If advanced airway is in place, ventilate 1 breath ever 2-3 seconds (20-30 breaths/minute) 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 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. First shock 2 J/kg; second shock 4 J/kg; subsequent shocks ≥ 4 J/kg (maximum 10 J/kg or adult dose).

Cardiac Arrest

PEARLS

Special Circumstances

- **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 and any further history must be obtained by bystanders while treatment is ongoing

QUALITY METRICS

- Time to scene; Time to first CPR; Time to first intervention (shock / Epinephrine); 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 initial confirmation of advanced airway placement and continuous monitoring during transport
- Documentation of estimated weight in kilograms

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 age appropriate respiratory rate.
    b. Do not hyperventilate.
    c. Titrate to maintain oxygen saturations ≥ 94%.
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-Basic

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

EMT-Intermediate & Paramedic

1. Continue **BLS TREATMENT.**
2. Obtain 12 Lead ECG, and transmit to receiving facility.
3. Treat hypotension according to SHOCK Protocol.
4. Monitor $EtCO_2$. Target 35 - 40 mmHg.
5. If no advanced airway, consider placement of advanced airway per AIRWAY MANAGEMENT Protocol.
6. Initiate transport.

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. Similarly, hypoventilation (suggested by an EtCO2 greater than 40–45) contributes to worsening acidosis and may precipitate re-arrest.
- Most patients immediately post resuscitation will require ventilatory assistance.
- Many patients experience “stunning” of the cardiac muscle after ROSC. Hypotension is common, and volume resuscitation or vasopressor support is often required.
- 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 ST elevation MI on ECG.
- 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
- Documentation of estimated weight in kilograms

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)
- PE
- AAA

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 Protocol.
3. Evaluate for hemorrhage and treat for shock if indicated. Refer to SHOCK Protocol.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

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.

EMT-Intermediate & Paramedic

1. Continue **BLS TREATMENT**.
2. Obtain 12-Lead ECG and transmit to receiving facility.
3. Monitor for dysrhythmias closely. If dysrhythmia present, follow 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.
- 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 (young patient with unexplained syncope during exertion)
        iv. Pulmonary embolus
        v. Aortic dissection
        vi. Dysrhythmia
    b. Neurovascular
        i. Intracranial hemorrhage
        ii. Transient ischemic attack or stroke
    c. Hemorrhagic
        i. Ruptured ectopic pregnancy
        ii. GI bleed
        iii. Aortic rupture
- 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

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
- Documentation of estimated weight in kilograms

Tachycardia (with a Pulse)
Narrow Complex (≤ 0.09 sec)

History
- Medications or Toxic Ingestion
- Diet (caffeine, chocolate)
- Drugs (nicotine, cocaine)
- Congenital heart disease
- Respiratory distress
- Past medical history
- History of palpitations / Heart racing
- Syncope / Near syncope

Signs and Symptoms
- Tachycardia
  SVT - Infant > 220/min
  - Child >180/min
- Pale or Cyanosis
- Diaphoresis
- Tachypnea
- Vomiting
- Hypotension
- Altered level of consciousness
- Syncope

Differential
- Heart disease (Congenital)
- Hypo- / Hyperthermia
- Hypovolemia or Anemia
- Electrolyte imbalance
- Anxiety / Pain / Emotional stress
- Fever / Infection / Sepsis
- Hypoxia, Hypoglycemia
- Medication / Toxin / Drugs
- Pulmonary embolus
- Trauma, Tension pneumothorax

EMT-Basic

1. **UNIVERSAL PATIENT CARE**.
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.

EMT-Intermediate & Paramedic

1. Continue **BLS TREATMENT.**
   a. Obtain 12-Lead ECG within 10 minutes of patient contact and transmit to receiving.
2. Establish IV access - preferably large bore in AC.
3. Consider **NORMAL SALINE 20 mL/kg** fluid bolus (max 60 mL/kg) to rule out hypovolemia / dehydration as cause of tachycardia.

SINUS TACHYCARDIA
Infants: rate usually < 220/min & Children: rate usually < 180/min; P waves present / normal

1. Identify and treat underlying cause.

SUPRAVENTRICULAR TACHYCARDIA
Infants: rate usually ≥ 220/min & Children: rate usually ≥ 180/min; P waves absent / abnormal

STABLE (No Cardiopulmonary compromise)

1. Perform vagal maneuvers.
   a. In infants and children apply ice to the face. In older children perform Valsalva maneuvers.
2. **ADENOSINE 0.1 mg/kg (max 6 mg) rapid IV/IO push** followed by a rapid flush.
3. If no change in rhythm give **ADENOSINE 0.2 mg/kg rapid IV/IO push** followed by a rapid flush.

UNSTABLE (Cardiopulmonary compromise)

1. Immediate SYNCHRONIZED CARDIOVERSION at **0.5 - 1 J/kg**.
   a. If normal LOC, consider sedation with **MIDAZOLAM 0.1 mg/kg IV/IO/IN** (maximum dose 2 mg) before SYNCHRONIZED CARDIOVERSION. Do not delay cardioversion to sedate.
2. If no response to initial energy dose, SYNCHRONIZED CARDIOVERSION at **2 J/kg**.
3. If cardioversion is successful obtain 12-Lead ECG.

Tachycardia (with a Pulse)
Wide Complex (> 0.09 sec)

History
- Medications or Toxic Ingestion
- Diet (caffeine, chocolate)
- Drugs (nicotine, cocaine)
- Congenital heart disease
- Respiratory distress
- Past medical history
- History of palpitations / Heart racing
- Syncope / Near syncope

Signs and Symptoms
- Tachycardia
  Infant > 220/min
  Child >180/min
- Pale or Cyanosis
- Diaphoresis
- Tachypnea
- Vomiting
- Hypotension
- Altered level of consciousness
- Syncope
- Diaphoresis

Differential
- Heart disease (Congenital)
- Hypo- / Hyperthermia
- Hypovolemia or Anemia
- Electrolyte imbalance
- Anxiety / Pain / Emotional stress
- Fever / Infection / Sepsis
- Hypoxia, Hypoglycemia
- Medication / Toxin / Drugs
- Pulmonary embolus
- Trauma, Tension pneumothorax

EMT-Basic

1. **UNIVERSAL PATIENT CARE**.
2. Perform 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.

EMT-Intermediate

1. Continue **BLS TREATMENT.**
   a. Obtain 12-Lead ECG within 10 minutes of patient contact and transmit to receiving facility.
2. Establish IV access - preferably large bore in AC.
3. Consider **NORMAL SALINE 20 mL/kg IV** bolus to rule out hypovolemia/dehydration as cause of tachycardia. Repeat fluid bolus as needed as long as lungs remain clear; maximum **60 m/kg**.

STABLE (HR > 220 Infant / HR > 180 child)

1. If regular rhythm and monomorphic QRS, consider **ADENOSINE 0.1 mg/kg (max 6 mg) rapid IV/IO push** followed by a rapid flush.
   a. If no change in rhythm, may repeat **ADENOSINE 0.2 mg/kg (max 12 mg) rapid IV/IO push** followed by a rapid flush.
2. If no change or not monomorphic and regular, administer **AMIODARONE 5 mg/kg (max 150 mg) IV/IO over 20-60 minutes** -OR- **LIDOCAINE 1 mg/kg IV/IO**.

UNSTABLE (HR > 220 Infant / HR > 180 child)
(AMS, signs of shock, respiratory distress, central cyanosis, hypotension-(late sign))

1. If cardiopulmonary compromise, immediate SYNCHRONIZED CARDIOVERSIONat **0.5 - 1 J/kg**.
   a. If normal LOC, consider sedation with **MIDAZOLAM 0.1 mg/kg IV/IO/IN (max 2 mg)** before SYNCHRONIZED CARDIOVERSION. Do not delay cardioversion to sedate.
2. If no response to initial energy dose and pulse present, SYNCHRONIZED CARDIOVERSION at **2 J/kg**.
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.

Paramedic

1. Continue **ILS Treatment**
2. Consider **MAGNESIUM SULFATE 25-50 mg/kg IV/IO** (max 2 grams) over 10 minutes for Polymorphic V-Tach / Torsades de Pointes

Tachycardia (with a Pulse)

PEARLS

Unstable / Cardiopulmonary Compromise: Respiratory distress / failure, Hypotension (late sign), AMS, signs of shock.

Regular Narrow Complex Tachycardia (≤ 0.09 seconds)

- Sinus Tachycardia: P waves present. Variable R-R waves. Infants usually < 220 beats / minute. Children usually < 180 beats / minute.
- SVT:> 90 % of children with SVT will have a narrow QRS seconds. P waves absent or abnormal. R-R waves not variable. Usually abrupt onset. Infants usually > 220 beats / minute. Children usually > 180 beats / minute.

Wide Complex Tachycardia (> 0.09 seconds)

- SVT with aberrancy
- Ventricular tachycardia: Uncommon in children. Rates may vary from near normal to > 200 / minute. Most children with VT have underlying heart disease / cardiac surgery / long QT syndrome / cardiomyopathy.

Torsades de Pointes / Polymorphic Tachycardia: Rate is typically 150 to 250 beats / minute. Associated with long QT syndrome, hypomagnesaemia, hypokalemia, many cardiac drugs. May quickly deteriorate to VT. Magnesium sulfate is the treatment of choice.

- 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)
- Studies in infants and children have demonstrated the effectiveness of adenosine for the treatment of hemodynamically stable or unstable SVT.
- 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.

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
- Documentation of estimated weight in kilograms

Tachycardia (with a Pulse)

Intentionally Left Blank

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-Basic

1. If immediate resuscitation is required and the newborn is still attached to the mother, clamp the cord in two places and cut between the clamps. If no resuscitation is required, warm / dry / stimulate the newborn and then cut / clamp the cord after 60 seconds or the cord stops pulsating.
2. Record APGAR scores at 1 and 5 minutes.
3. Dry, warm and stimulate.
   a. Wrap infant in dry towel or thermal blanket to keep infant as warm as possible during resuscitation; keep head covered if possible.
   b. If strong cry, regular respiratory effort, good tone, and term gestation, infant should be placed skin-to-skin with mother and covered with dry linen.
4. If weak cry, signs of respiratory distress, poor tone, or preterm gestation then position airway (sniffing position) and clear airway as needed - if thick meconium or secretions present *and* signs of respiratory distress, suction mouth then nose.
5. If heart rate **greater than 100 beats** per minute.
   a. Monitor for central cyanosis - provide blow-by oxygen as needed.
   b. Monitor for signs of respiratory distress. If apneic or in significant respiratory distress:
      i. Initiate BVM ventilation with room air at 40-60 breaths per minute.
         – Positive pressure ventilation (PPV) with bag-mask device may be initiated with room air (21% O_2) in term and late preterm babies; otherwise use 100% O_2
         – Goal: SPO_2 at 10 minutes is 85–95%
6. If heart rate **less than 100 beats** per minute
   a. Initiate BVM ventilation with room air at 40-60 breaths per minute for 90 seconds with room air.
      i. Primary indicator of effective ventilation is improvement in heart rate (check HR q 30s)
      ii. Rates and volumes of ventilation required can be variable, only use the minimum necessary rate and volume to achieve chest rise and a change in heart rate.
   b. If no improvement after 90 seconds, change O_2 delivery to 100% FiO_2 until HR normalizes
7. If heart rate **less than 60 beats** per minute
   a. Ensure effective ventilations with supplementary oxygen and adequate chest rise.
   b. If no improvement after 30 seconds, initiate chest compressions - two-thumb-encircling-hands technique is preferred.
   c. Coordinate chest compressions with positive pressure ventilation (3:1 ratio, 90 compressions and 30 breaths per minute).
8. Relay information to incoming ambulances or call for intercept per INTERCEPT CRITERIA.

Protocol Continues

Newborn Care / Neonatal Resuscitation

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS Treatment**.
2. If heart rate **less than 60 beats** per minute despite ventilations and chest compressions:
   a. Continue ventilations and chest compressions and consider endotracheal intubation.
   b. Administer **EPINEPHRINE (1:10,000) 0.01 mg/kg IV/IO** (preferable if access obtained) or 0.1 mg/kg via the ETT (if unable to obtain access). May repeat every 3-5 min if HR remains less than 60bpm.
3. Administer **NORMAL SALINE 20 mL/kg IV/IO** for signs of shock or post-resuscitative care.
4. Check a blood glucose for ongoing resuscitation, maternal history of diabetes, ill appearing or unable to feed.
   a. If blood glucose < 60 mg/dL, administer **DEXTROSE 10% (D10) 5mL/kg** .

Projected Pulse Oximetry in Infants Over Time	
Time Since Birth	**Projected Increase in Pulse Oximeter Over Time**
1 minute	60-65%
2 minutes	65-70%
3 minutes	70-75%
4 minutes	75-80%
5 minutes	80-85%
10 minutes	85-90%

APGAR Score			
Sign	**0**	**1**	**2**
Appear-ance	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
Respira-tions	Absent	Slow, Irregular	Good, Crying

		Intervention Indicated		
		Blow-by Oxygen	**Bag-Mask-Ventilation (BVM)**	**BVM and Chest Compressions**
Assessment	**Heart Rate (BPM)**	> 100	60-100	< 60
	Respiratory Distress/Apnea	No	Yes	
	Central Cyanosis Present	Yes	Yes/No	

Newborn Care / Neonatal Resuscitation

PEARLS

- 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.
- Measuring the pulse oximetry on the right hand provides the most accurate oxygen saturation (SpO2) in infants that are transitioning from fetal to normal circulation. At 60 seconds, 60% is the target with an increase of 5% every minute until 5 minutes of life when pulse oximetry is 80–85%.
- 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 should be appropriately secured (e.g., secured to mother with approved neonatal restraint system, car seat or isolette) and mother should be appropriately secured.

KEY DOCUMENTATION ELEMENTS

- Document full vital signs and physical findings
- 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
- Documentation of estimated weight in kilograms

Intentionally Left Blank

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.
4. Call for additional resources if needed.

Initial Assessment (Use "**MARCH**" algorithm)

1. Obtain a general impression of the patient's condition.
2. **M**assive Hemorrhage
   a. Assess for and stop severe hemorrhage. Refer to EXTREMITY TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol.
3. **A**irway
   a. Assess airway patency by asking the patient to talk to assess 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. Evaluate mental status for ability to protect airway (patients with a GCS less than or equal to 8 are likely to require airway protection).
4. **R**espiratory/Breathing
   a. Assess respiratory rate and pattern.
   b. Assess for tracheal deviation.
   c. Assess symmetry of chest wall movement.
   d. Listen bilaterally for breath sounds. If absent/diminished breath sounds in hypotensive patient, consider tension pneumothorax and perform NEEDLE DECOMPRESSION **(ILS/ALS ONLY)**
   e. For open chest wound, place occlusive dressing.
   f. Monitor oxygen saturation & $EtCO_2$ and, if indicated, provide supplemental **Oxygen**.
5. **C**irculation
   a. Assess blood pressure and pulses noting rate, rhythm and quality.
   b. Assess skin color, temperature and condition.
   c. Establish IV access. If child demonstrates tachycardia for age with signs of poor perfusion *(hypotension, > 2 sec capillary refill, AMS, hypoxia, weak pulses, pallor or mottled/cool skin)* administer **IV Fluid 20 mL/kg** to maintain age appropriate SBP. May repeat x2 as needed to maintain age appropriate SBP. **(ILS/ALS ONLY)**
6. **H**ead Injury/**H**ypothermia (Disability)
   a. Perform initial neurologic status assessment of GCS/AVPU and pupillary size and responsiveness:
      A – Alert; **V** – Responds to verbal; **P** – Responds to pain; **U** – Unresponsive
   b. Assess for gross motor movements of extremities.
   c. Evaluate for clinical signs of traumatic brain injury with herniation including:
      i. Unequal Pupils
      ii. Lateralizing motor signs
      iii. posturing
   d. Prevent hypothermia (remove wet clothing and cover patient to prevent further heat loss).
8. **Critical Transport Decision -** Refer to REGION 6 TRAUMA TRIAGE ALGORITHM
   a. Limit scene time to 10 minutes or less if the patient meets category A or B criteria.

Protocol Continues

All Levels

SECONDARY SURVEY:

SAMPLE History

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

Head to Toe Physical Exam

(Evaluate for: DCAP-BTLS TIC—Deformities, Contusions, Abrasions, Puncture / Penetrition / Paradoxical Movement - Burns, Tenderness, Laceration, Swelling - Tenderness, Instability, Crepitus)

1. Head
    a. Palpate head, scalp and face and evaluate for soft tissue injury or bony crepitus.
    b. Assess for globe injury and subjective change in vision.
    c. Assess pupils.
2. Neck
    a. Examine for contusions, abrasions, hematomas, lacerations, crepitus, JVD, or tracheal deviation.
    b. Palpate the c-spine for deformity and tenderness. Refer to SPINAL MOTION RESTRICTION Protocol.
3. Chest
    a. Palpate for instability / crepitus and look for flail segments or paradoxical movements.
    b. Listen to breath sounds.
    c. Inspect for penetrating or soft tissue injuries.
4. Abdomen
    a. Palpate for tenderness.
    b. Inspect for penetrating or soft tissue injuries.
    c. Cover eviscerated abdominal contents with moist dressings.
5. Pelvis
    a. Inspect for penetrating or soft tissue injuries.
    b. Palpate once for stability by applying medial pressure on the iliac crests bilaterally.
6. Back
    a. Maintain spinal alignment and log roll with a minimum of 2 rescuers.
    b. Inspect for penetrating or soft tissue injuries.
    c. Immobilize if applicable per the SPINAL MOTION RESTRICTION Protocol.
7. 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.
8. Extremities
    a. Assess for fracture / deformity.
    b. Assess peripheral pulses / capillary refill.

Protocol Continues

Initial Trauma Care

All Levels

ONGOING ASSESSMENT:

Monitoring and Reassessment *(seriously ill or injured patients should be reassessed **every 5 min**.)*

1. Reassess mental status (LOC, Pupils, GCS).
2. Reassess ABC's.
3. Reassess identified injuries (change in status, PMS).
4. Reassess and evaluate effectiveness of interventions.

****Monitor patient for deterioration over time with serial vital signs (pulse, blood pressure, respiratory rate, neurologic status assessment) and repeat neurologic status assessment.*

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.

PEDIATRIC GLASGOW COMA SCALE (GCS)

Behavior	Response	Score
Eye Opening	Spontaneous	4
	To Verbal	3
	To Pain	2
	None	1
Verbal Response	Oriented (Smiles, coos, oriented to sounds, interacts)	5
	Confused (Cries but consolable, Irritable)	4
	Inappropriate Words (Inconsolable, Persistent Crying)	3
	Incomprehensible Sounds (Moans to Pain)	2
	None (No vocalization)	1
Best Motor Response	Obeys Commands (normal spontaneous movements)	6
	Localizes Pain	5
	Withdraws from Pain	4
	Flexion to Pain (decorticate)	3
	Extension to Pain (decerebrate)	2
	None	1

Normal Pediatric Vital Signs

Age	Pulse	Systolic BP	Respiratory Rate
Neonate (0-1 mo)	100-180	>60	30-60
Infant (1-12 mo)	100-160	>70	30-60
Toddler (1-3 yrs)	90-150	>70 + (age in yrs x 2)	24-40
Pre-School (3-5 yrs)	80-140	>70 + (age in yrs x 2)	22-34
School Age (5-12 yrs)	70-120	>70 + (age in yrs x 2)	18-30
Adolescent (12-18 yrs)	60-100	>90	12-20

***Created based off of Illinois EMSC Guidelines*

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 6 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
- Documentation of estimated weight in kilograms

Region 6 Trauma Triage Algorithm

Region 6 Trauma Triage Algorithm

When in doubt, take patient to an appropriate Trauma Center.

Measure signs and level of consciousness and assess for major injury.

For Patients Meeting Category A or B Criteria: Initiate Rapid Transport with Maximum of 10 Minute Scene Time

Airway Compromise or Management by a Basic Level EMS Provider without Mutual Aid Should be Transported to the Nearest Facility

Category A:

___GCS Less than or equal to 10
___Systolic BP less than 90 (Adult), 80 (Peds) with mechanism or exam findings suggesting ongoing blood loss
___Paralysis (spine)
___Uncontrolled Bleeding
___Penetrating injuries to abdomen, back, chest or neck and suspicion of significant injury
___Burns >24% surface area, or involving face/airway not meeting other Category A criteria (Direct to Burn Center)
___Salvageable amputation proximal to wrist or ankle not meeting other Category A criteria (Direct To Reimplant Center)
___Unstable Pelvic Fracture
___Pulseless Extremity
___Cardiac Tamponade or Tension Pneumothorax

YES

STRONGLY RECOMMEND:
Transport to Level I Trauma Center or Specialty Center per Protocol

Alert Trauma Team; Consider Helicopter Transport if Quicker and of Clinical Benefit.

NO:
Assess for other injuries.

Category B:

___LOC greater than 5 minutes and GCS 11-12
___Respiratory rate less than 10 or greater than 29
___Head injury with seizure activity, unilaterally dilated pupil or open/depressed skull fracture
___Full arrest not meeting Field Death Criteria
___Penetrating injuries with capability to work up/correct

___ High Risk Vehicular Crash:
*Rollover with unbelted passengers
*Ejection from crash
*Death in same passenger compartment
*Auto v. pedestrian/bicyclist thrown or run over
*Motorcycle crash with separation of rider and bike.
___Falls greater than 20 ft or 2-3 times patient's height if child
___Flail Chest/Chest wall instability
___Two or more proximal long bone fractures

YES

STRONGLY RECOMMEND:
Transport to center capable of providing definitive care (surgery if needed); alert trauma team; consider helicopter transport if quicker and of clinical benefit.

NO

Transport According to Trauma Protocols

Region 6 Trauma Triage Algorithm

Intentionally Left Blank

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 exit 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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT.**
2. Establish IV access.
3. Administer **IV Fluid 20 mL/kg** to maintain age appropriate SBP. May repeat x2 as needed to maintain age appropriate SBP.
4. Consider management of pain per the PAIN MANAGEMENT Protocol.
5. Consider management of nausea/vomiting per the NAUSEA / VOMITING 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 6 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
- Los 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 Protocol 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 in a hypotensive patient, consider tension pneumothorax and perform NEEDLE DECOMPRESSION **(ILS/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. If child demonstrates tachycardia for age with signs of poor perfusion *(hypotension, > 2 sec capillary refill, AMS, hypoxia, weak pulses, pallor or mottled/cool skin)* administer **IV Fluid 20 mL/kg** to maintain age appropriate SBP. May repeat x2 as needed to maintain age appropriate SBP. **(ILS/ALS ONLY)**
5. Disability
    a. Asses 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
- Documentation of estimated weight in kilograms

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-Basic

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.
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.
3. Immobilize if associated trauma suspected. Refer to SPINAL MOTION RESTRICTION Protocol.
4. Determine characteristics - AC or DC, voltage, amperage, time of injury

Protocol Continues

Burns
(Thermal, Chemical, Electrical, Inhalation)

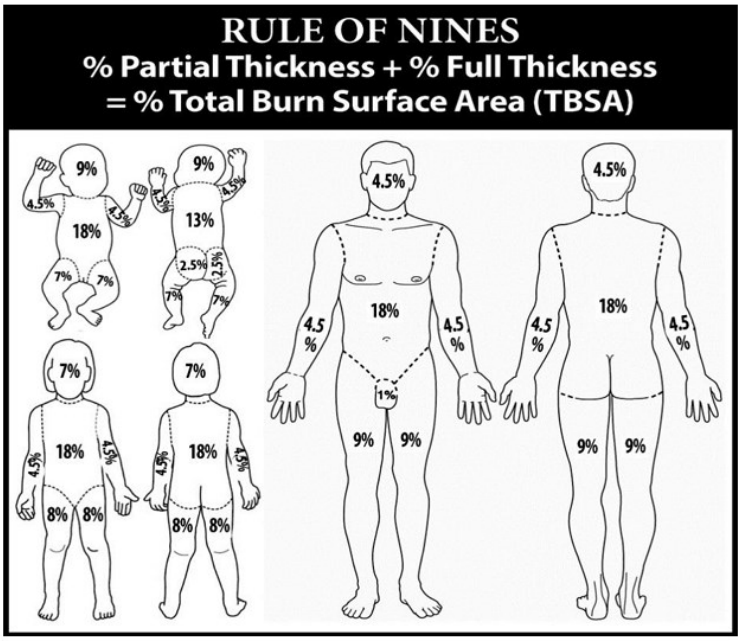
EMT-Intermediate & Paramedic

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 **IV Fluid 20 ml/kg IV** to age appropriate SBP. May repeat x2 as needed to maintain age appropriate SBP.
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.
6. Consider early management of pain per the PAIN MANAGEMENT Protocol.

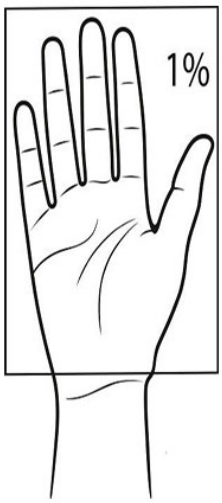
Rule of Nine's

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

%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

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
- Documentation of estimated weight in kilograms

Burns
(Thermal, Chemical, Electrical, Inhalation)

Intentionally Left Blank

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-Basic

1. **INITIAL TRAUMA CARE**.
2. Control bleeding.
3. Treat any obvious chest injuries as indicated:
    a. **Open Chest Wound:** Apply semi-occlusive dressing, leaving one side / corner open. Monitor for tension pneumothorax.
    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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT.**
2. Establish IV access and administer **IV Fluid 20 mL/ kg IV** to maintain age appropriate SBP. May repeat x2 as needed to maintain age appropriate SBP.
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 advanced airway per the AIRWAY MANAGEMENT Protocol.
4. Apply cardiac monitor and perform 12-lead ECG.
5. Consider management of pain per the PAIN MANAGEMENT Protocol.

Chest Injuries

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 only indicated for a true 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 6 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
- Documentation of estimated weight in kilograms

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-Basic

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.

EMT-Intermediate

1. Continue **EMR / BLS TREATMENT.**
2. Establish 2 large bore IVs (not in the injured extremity).
3. Treat pain per PAIN MANAGEMENT Protocol.
4. Administer **NORMAL SALINE 20 mL/kg** bolus prior to release of crushed extremity. Continue **NORMAL SALINE 10 mL/kg/hr**.
5. Call for intercept per INTERCEPT CRITERIA.

Paramedic

1. Continue **ILS TREATMENT.**
2. Initiate cardiac monitoring and assess for hyperkalemia (Wide QRS, Peaked T waved or flattened / absent P waves). Acquire and transmit 12-lead ECG.
3. Consider **SODIUM BICARBONATE 1 mEq/kg** (max 50 mEq) for significant crush injuries or prolonged entrapment of an extremity. Mix Sodium Bicarbonate in Normal Saline 20 mL/kg fluid bolus and administer PRIOR to release of crushed extremity.
4. Lift object **SLOWLY** off of the patient.
5. Continue **NORMAL SALINE 10 mL/kg/hr**.
6. 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.
- Avoid Lactated Ringer's solution as it contains potassium.
- Continue fluid resuscitation through extrication and transfer to hospital.
- Patient may become hypothermic even in warm environments.
- Causes of mortality in untreated crush syndrome:
    a. Immediate
        i. Severe head injury
        ii. Traumatic asphyxia
        iii. Torso injury with damage to intrathoracic or intra-abdominal organs
    b. Early
        i. Sudden release of a crushed extremity may result in reperfusion syndrome (acute hypovolemia, electrolyte abnormalities, and subsequent lethal arrhythmia)
        ii. Hyperkalemia (potassium is released from injured muscle cells)
        iii. Hypovolemia/shock
    c. Late
        i. Acute kidney injury (from release of toxins from injured muscle cells)
        ii. Coagulopathy and hemorrhage
        iii. Sepsis

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
- Documentation of estimated weight in kilograms

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. Expose the wound and 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 and fully with HEMOSTATIC GAUZE to the depth of the wound until bleeding stops and then apply direct pressure.
3. 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. Do not loosen tourniquet to relieve pain.
4. 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.
5. Amputations
    a. Rinse amputated part gently with normal saline if grossly contaminated.
    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).**

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

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-Basic

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).
   b. Maintain and support airway per the AIRWAY MANAGEMENT Protocol.
4. Breathing:
   a. Administer 100% **Oxygen** as appropriate with a target of achieving 94-98% saturation.
      i. In cases of severe head trauma administer high-flow oxygen via non-rebreather as a precaution against unanticipated deterioration.
5. Circulation:
   a. Wound care
      i. Control bleeding with direct pressure if no suspected open skull injury.
      ii. Moist sterile dressing to any potential open skull wound.
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.
7. Treat specific facial injuries as indicated:
   a. **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.
   b. **Eye Trauma**: Place eye shield for any significant eye trauma (if available). If globe is avulsed, cover with moist saline dressing.
   c. **Avulsed Tooth**: Avoid touching the root of the avulsed tooth. Do not wipe off tooth. Pick up at crown end and rinse off with cold water, if dirty. Place in milk or saline as the storage medium.
   d. **Epistaxis**: Squeeze nose for 10-15 minutes continuously.
8. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

Protocol Continues

Head Injury

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. For patients with moderate / severe head injury:
    a. Continue to maintain adequate oxygenation with high-flow oxygen via NRB or BVM ventilation.
    b. If unable to maintain their airway or adequate oxygenation despite high-flow oxygenation, consider SGA placement or intubation utilizing continuous waveform capnography and $EtCO_2$ measurement, with a target $EtCO_2$ of 35-40 mmHg.
    c. Administer **IV Fluid 20 mL/kg** to maintain age appropriate SBP. May repeat x2 as needed to maintain age appropriate SBP. Hypotension should be avoided to maintain cerebral perfusion.
        i. Do not wait until after the patient is already hypotensive—*prevent* hypotension.
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; hyperventilate to a target $EtCO_2$ of 30-35 mmHg as a short-term option.

PEDIATRIC GLASGOW COMA SCALE (GCS)

Behavior	Response	Score
Eye Opening	Spontaneous	4
	To Sound	3
	To Pressure / Pain	2
	None	1
Verbal Response	Oriented (Smiles, oriented to sounds, follows objects, interacts)	5
	Confused (Cries but consolable, inappropriate interactions)	4
	Words (Inconsistently consolable, moaning)	3
	Sounds (Inconsolable, agitated)	2
	None (No vocalization)	1
Best Motor Response	Obeys Commands (normal spontaneous movements)	6
	Localizes Pain	5
	Withdraws from Pain	4
	Flexion to Pain (decorticate)	3
	Extension to Pain (decerebrate)	2
	None	1

Head Injury

PEARLS

- Head injury severity guideline:
  a. Mild: GCS 14-15 / AVPU = (A)
  b. Moderate: GCS 9-13 / 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 and minute volume)preventing both hyperventilation [too fast] and overventilation [too much]).
- 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 hyperventilate patient 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
- Documentation of estimated weight in kilograms
- No oxygen desaturation less than 90% and no hypotension.

Intentionally Left Blank

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, also for pediatric patients agitation, apnea, hypopnea, somnolence)
    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. **Torticollis** (patient is unable to move neck from "abnormal position" to "normal position").
    g. **Communication barrier** (emotional / language / cogitative impairment).
    h. **Significant Mechanism of 3** by providers clinical judgement)
        – Examples include, but are not limited to, (a) fall >10ft, (b) high speed MVC/rollover/ ejection, (c) bicycle/ATV/motorcycle collision, and (d) axial load injury (ex. diving, helmet -to-helmet contact)
2. When SMR is indicated, apply it to the entire spine due to the risk of noncontiguous injuries
3. Spinal Motion Restriction is NOT utilized in penetrating trauma to the head and/or neck without evidence of spinal injury.
4. Once the backboarded patient is placed on ambulance cot, remove backboard by using a log roll technique, minimizing unnecessary movement during the removal process. Maintain Spinal Motion Restriction by assuring that the patient remains securely positioned on the cot with a cervical collar in place.
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

American College of Surgeons. (2022). Best Practices Guidelines—Spine Injury. https://www.facs.org/media/k45gikqv/spine_injury_guidelines.pdf

Spinal Motion Restriction

PEARLS

- 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.
- Prolonged immobilization on spine board can be very uncomfortable for patient.
- Children are abdominal breathers, so immobilization straps should go across chest and pelvis and not across the abdomen, when possible.
- Children have disproportionately larger heads. When securing pediatric patients to a spine board, the board should have a recess for the head, or the body should be elevated approximately 1-2 cm to accommodate the larger head size and avoid neck flexion when immobilized.
- 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.
- Spinal precautions should be considered a treatment or preventive therapy.
- Patients who are likely to benefit from immobilization should undergo this treatment.
- Patients who are not likely to benefit from immobilization, who have a low likelihood of spinal injury, should not be immobilized.
- Ambulatory patients may be safely immobilized on cot with cervical collar and straps and will not generally require a spine board.
- Reserve long spine board use for the movement of patients whose injuries limit ambulation and who meet criteria for the use of spinal precautions. Remove from the long board as soon as is practical.

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
- Evident 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

Traumatic Cardiac Arrest

History
- Events leading to arrest
- Estimated downtime
- Mechanism: blunt / penetrating
- Past medical history
- Medication

Signs and Symptoms
- Evidence of penetrating trauma
- Evidence of blunt trauma
- Apnea
- Pulseless

Differential
- Medical cardiac arrest
- Obvious DOA
- Hypovolemia
- Hypoventilation / Hypoxemia
- Tension pneumothorax

- **Traumatic Cardiac Arrest's should be co-managed with Medical Cardiac Arrest Protocols**
- **Limit scene time to 10 minutes or less**

Reversible Pathology (H.O.T.)

Hypovolemia	• Control external hemorrhage • Splint pelvis / fractures • IV/IO fluid bolus
Oxygenation	• Basic / advanced airway management • $EtCO_2$ and SpO_2 monitoring
Tension pneumothorax	• Decompress chest

Lockey DJ, Lyon RM, Davies GE. Development of a simple algorithm to guide the effective management of traumatic cardiac arrest. Resuscitation. 2013 Jun;84(6):738-42.

EMR & EMT-Basic

1. If patient does not meet criteria for DETERMINATION OF DEATH / WITHOLDING RESUSCITATIVE EFFORTS, Initiate HIGH QUALITY CPR and reference CARDIAC ARREST Protocol.
2. Provide early airway management utilizing the AIRWAY MANAGEMENT Protocol.
3. Control external hemorrhage utilizing the EXTERNAL TRAUMA / EXTERNAL HEMORRHAGE MANAGEMENT Protocol.
    a. Apply pelvic binder as indicated.
    b. Align long bone fractures, splint as indicated.
4. Attempt to maintain spinal motion restriction. Refer to SPINAL MOTION RESTRICTION Protocol.
5. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access and administer **IV Fluid bolus 20 mL/kg** to maintain SBP ≥ 90 mmHg or MAP ≥ 65 mmHg. Repeat fluid bolus as needed.
3. Continue to co-manage traumatic cardiac arrest utilizing the CARDIAC ARREST Protocol.
4. If concern for tension pneumothorax, perform bilateral NEEDLE DECOMPRESSION.
5. If return of pulses, refer to the RETURN OF SPONTANEOUS CIRCULATION Protocol.
6. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Protocol Continues

Traumatic Cardiac Arrest

Paramedic

1. Continue **ILS TREATMENT**.
2. If return of pulses, refer to the RETURN OF SPONTANEOUS CIRCULATION Protocol.
3. Continue to co-manage traumatic cardiac arrest utilizing the CARDIAC ARREST Protocol.
4. Consider **TRANEXAMIC ACID**.
5. Transport patient based on the REGION 6 TRAUMA TRIAGE ALGORITHM Protocol. Alert the receiving facility of Trauma Alert

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

SLUDGEM

- **S**alivation
- **L**acrimation
- **U**rination; increase, loss of control
- **D**efecation / Diarrhea
- **G**I Upset; Abdominal pain)
- **E**mesis
- **M**uscle Twitching / Miosis

Killer B's

- **B**radycardia, **B**ronchorrhea, **B**ronchospasm
- CNS (headache, confusion, seizures, lethargy or unresponsive)

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.)

EMR & EMT-Basic

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.
4. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Severity	Signs & Symptoms	Autoinjector Dose *(If Available)* *(DuoDote® or Mark 1® Kit)*	
MILD & MODERATE	Salivation; Lacrimation; Miosis	Adolescent and Child 8-14yrs *(26-50kg)*	• **1 - Atropine/Pralidoxime Autoinjector**
	Localized swelling; Muscle fasciculations; Nausea and vomiting; Weakness; Shortness of breath	Infant 0-6mo (<7kg) Infant 7mo-2yrs (7-13kg) Child 3-7yrs (14-25kg)	**N/A**
SEVERE	Unconsciousness; Convulsions; Apnea or severe respiratory distress requiring assisted ventilation; Flaccid paralysis	Adolescent and Child 8-14yrs *(26-50kg)*	• **2 - Atropine/Pralidoxime Autoinjectors**
		Infant 0-6mo (<7kg) Infant 7mo-2yrs (7-13kg)	**N/A**
		Child 3-7yrs (14-25kg)	• **1 - Atropine/Pralidoxime Autoinjector**

Protocol Continues

Acetylcholinesterase Inhibitors (Carbamates, Nerve Agents, Organophosphates) Exposure

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access. Consider **NORMAL SALINE 20 ml/kg** fluid bolus to maintain age appropriate SBP. May repeat fluid bolus as needed to maintain age appropriate SBP.
3. If symptomatic, administer **ATROPINE** per dosing chart below.
4. Repeat **ATROPINE** every 5-10 minutes until symptoms of SLUDGE subside, most importantly secretions.
5. If seizures occur, refer to SEIZURE protocol.

Atropine Dosage Chart

	ATROPINE DOSE		PRALIDOXIME DOSE *(If Available)*	
	MILD / MODERATE	**SEVERE**	**MILD / MODERATE**	**SEVERE**
Infant 0-6 Months (< 7 kg)	0.25 mg IM	0.5 mg IM	15 mg/kg IM	25 mg/kg IM
Infant 7 mo - 2 yrs (7-13 kg)	0.5 mg IM	1 mg IM	15 mg/kg IM	300 mg IM
Child 3-7 yrs (14-25 kg)	1 mg IM	2 mg IM or 1 Autoinjector	300 mg IM	600 mg IM or 1 Autoinjector
Child 8-14 yrs (26-50 kg)	2 mg IM or 1 Autoinjector	4 mg IM or 2 Autoinjectors	600 mg IM or 1 Autoinjector	1200 mg IM or 2 Autoinjectors
Adolescent > 14 yrs (> 51 kg)	2 mg IM or 1 Autoinjector	4 mg IM or 2 Autoinjectors	600 mg IM or 1 Autoinjector	1200 mg IM or 2 Autoinjectors

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

*per Illinois EMSC Protocols

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 **SLUDGE** and **Killer B's**

QUALITY METRICS

- Recognition and appropriate treatment of patients
- Documentation of estimated weight in kilograms

Acetylcholinesterase Inhibitors (Carbamates, Nerve Agents, Organophosphates) Exposure

Intentionally Left Blank

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. (In infants and young children, symptoms include pallor, fussiness, vomiting, decreased appetite, poor sleep, decreased playfulness.) 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). (In infants and young children, symptoms again include pallor, fussiness, vomiting, decreased appetite, poor sleep, decreased playfulness.) Patients may or may not exhibit new 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).

All Levels

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%.
5. Descend to lower altitude. Descent is the mainstay of therapy and is the definitive therapy for all altitude related illnesses.
   a. Descent should be initiated as soon as scene conditions permit.

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.
- Children with the following are at greater risk for altitude illness:
    a. Those with a concurrent upper or lower respiratory tract infection or otitis media.
    b. Full term infants less than 6 weeks of age, or preterm infants less than 46 weeks post conceptual age
    c. Congenital heart disease
    d. Down syndrome, especially those with obstructive sleep apnea
    e. Those with bronchopulmonary dysplasia (BPD), cystic fibrosis, sickle cell anemia, severe scoliosis, and neuromuscular disease
    f. Premature infants beyond 46-weeks with a history of oxygen requirement, PBD or pulmonary hypertension

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

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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS 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 & EMT-Basic

1. Assure scene is safe and remove patient from toxic environment.
2. **UNIVERSAL PATIENT CARE**.
    a. Check blood glucose level.
    b. Apply **100% OXYGEN** via **NRB**
3. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS 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 component. 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 respiratory 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.

- 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 severe cyanide exposure listed above.

EMR, EMT-Basic & EMT-Intermediate

1. Assure scene is safe and the patient has been decontaminated if needed.
2. **UNIVERSAL PATIENT CARE**.
3. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

Paramedic

1. Continue **EMR / BLS / ILS TREATMENT**.
2. Establish IV access.

Medical Control

3. Consider **HYDROXOCOBALAMIN (Cyanokit)** **70 mg/kg IV** (max **5 grams**).
    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.
- 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 component. 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
- Documentation of estimated weight in kilograms

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 & EMT-Basic

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 94-98%.
5. If patient becomes pulseless and apneic begin CPR and refer to CARDIAC ARREST Protocol.
6. If patient presents with hypothermia, refer to ENVIRONMENTAL HYPOTHERMIA Protocol.
7. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

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

Drowning / Submersion Injury

PEARLS

- **Pediatric Considerations:**
  a. Drowning is a common cause of death in children.
  b. Risk factors for drowning include male gender, age less than 14 yo, alcohol use, lack of supervision, and risky behavior.
- 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. The 2010 American Heart Association update on special circumstances in cardiac arrest notes that routine c-spine precautions in all victims of drowning is likely unnecessary unless the mechanism or injury, history, or physical exam suggests a cervical spine injury.
  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.
- Hypothermia is often associated with drowning and submersion injuries even with warm ambient conditions.

KEY DOCUMENTATION ELEMENTS

- Mechanism of injury or history suggesting cervical pine 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
- Ambient temperature and humidity
- Exertion level
- Duration of exposure
- Fatigue and/or muscle cramping
- Attire (clothing worn)
- Confined space (i.e. child left in car)

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.

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.

Heat Syncope: Transient loss of consciousness with spontaneous return to normal mentation, attributable to heat exposure.

Heat Cramps

EMR & EMT-Basic

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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. If no response to electrolyte solution or none is available, establish IV access and administer **NORMAL SALINE 20 mL/kg** and reassess patient.
3. If patient remains symptomatic, repeat fluid bolus as long as lungs remain clear; maximum **60 mL/kg**.

Protocol Continues

Environmental Hyperthermia

Heat Exhaustion / Stroke

EMR & EMT-Basic

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 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. DO NOT induce shivering. Stop cooling if shivering occurs.
6. Avoid fluids by mouth, especially if patient is nauseated.
7. Relay information to incoming ambulance or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access.
3. If actively cooling patient do not allow patient to shiver. Consider **MIDAZOLAM 0.1 mg/kg IV/IO** (Max 1mg) or **0.2 mg/kg IM/IN** (Max 1mg)
4. Administer **NORMAL SALINE 20 mL /kg** fluid bolus and reassess patient.
5. If patient remains symptomatic, repeat fluid bolus as long as lungs remain clear to a maximum of 60 mL/kg.
6. Be prepared to treat seizures per SEIZURE 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
- Documentation of estimated weight in kilograms

Environmental Hyperthermia

Intentionally Left Blank

Environmental Hypothermia / Frostbite

History
- Age
- Ambient temperature
- Exposure to wind / water
- Duration of exposure
- Past medical history / Medications

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	89.8°-95°F (32°-35°C)	Normal Vitals; Normal mental status; shivering is preserved; body maintains ability to control temperature.
Moderate	82.5°-89.7°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	

EMR & EMT-Basic

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 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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access.
3. Administer **NORMAL SALINE 20 mL/kg** 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 of **60 mL/kg**.

Environmental Hypothermia / Frostbite

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. Have patient place frostbitten hand in his / her armpit.
6. 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.
    e. Do NOT allow to refreeze.

Environmental Hypothermia / Frostbite

Hypothermic Cardiac Arrest

EMR & EMT-Basic

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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS TREATMENT**.
2. Follow appropriate dysrhythmia protocol.
3. Establish IV access.
4. **NORMAL SALINE 20 mL/kg boluses**; use warm solution (102°-106°F) if available.

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 2010 AHA updates to advanced cardiac life support recommend use of vasopressors according to standard ACLS protocols.
- 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
- Documentation of estimated weight in kilograms

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-Basic

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.

EMT-Intermediate & Paramedic

1. Continue **EMR / BLS 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 pistol (Hyperthermia)
- Full as a flask (urinary retention)
- "Tachy" like a pink flamingo (tachycardia and hypertension)

Cholinergic

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

- **D**iarrhea
- **U**rination
- **M**iosis/**M**uscle weakness
- **B**ronchospasm/**B**ronchorrhea/**B**radycardia (the killer Bs)
- **E**mesis
- **L**acrimation
- **S**alivation/**S**weating

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-Basic

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 Protocol.
5. If patient has inadequate respiratory effort from a confirmed or suspected opioid overdose, administer **intranasal NALOXONE** at **0.1 mg/kg** via atomizer (1 mL per nostril maximum). May repeat in 2-3 minutes to a maximum dose of 2 mg if no response. (Not given to restore consciousness)
    a. **Infant / Toddler** (age 1-3): **NALOXONE 0.5 mg** (0.5 mL) per nostril for a total dose of **1 mg**.
    b. **Small Child and Larger** (age > 3): **NALOXONE 1 mg** (1 mL) per nostril for a total dose of **2 mg**.
6. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate

1. Continue **EMR / BLS TREATMENT**.
2. Establish IV access.
3. Consider **NORMAL SALINE 20 mL/kg** fluid bolus to maintain age appropriate SBP. May repeat fluid bolus as needed to maintain age appropriate SBP as long as lungs remain clear.
4. Apply cardiac monitor to include pulse oximetry and waveform capnography.
    a. Monitor ECG with special attention to rate, rhythm, QRS and QT duration
5. If patient has inadequate respiratory effort from a confirmed or suspected opioid overdose, administer **NALOXONE**: *(Titrate to adequate ventilation and oxygenation. Not given to restore consciousness.)*

    IV, IM, IN – 0.1 mg/kg; may repeat every 2-3 minutes to a maximum dose of 2 mg, if no response.
    a. Use atomizer for IN administration with no more than1 mL per nostril maximum.
6. If blood glucose < 60 mg/dL, refer to DIABETIC EMERGENCIES Protocol.
7. Contact Medical Control for agent specific treatment.

Paramedic

1. Continue **ILS TREATMENT**.
2. Apply cardiac monitor to include pulse oximetry and waveform capnography.
    a. Monitor ECG with special attention to rate, rhythm, QRS and QT duration.

Overdose Agent	Treatment
Acetylcholinesterase Inhibitors (Carbamates, Nerve Agents, Organophosphates) Exposure	1. Refer to ACETYLCHOLINESTERASE INHIBITORS (CARBAMATES, NERVE AGENTS, ORGANOPHOSPHATES) EXPSOURE Protocol.
Beta Blocker and **Calcium Channel Blocker**	1. For symptomatic bradycardia, refer to BRADYCARDIA Protocol. 2. For symptomatic patients with cardiac effects (i.e. hypotension, bradycardia) administer **GLUCAGON** • 25-40 kg —> **1 mg IV/IO** • < 25 kg —> **0.5 mg IV/IO**
Opioid	1. If airway compromise or inadequate respiratory effort present from a confirmed or suspected opioid overdose, administer **NALOXONE:** **IV, IM, IN – 0.1 mg/kg**; may repeat every 2-3 minutes to a maximum dose of 2 mg, if no response.
Tricyclic Antidepressant	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 normal or nausea / vomiting. If not detected and treated, causes irreversible liver failure.
- **Aspirin**: Early signs consist of abdominal pain and vomiting. Tachypnea and altered mental status may occur later. Renal dysfunction, liver failure, and or cerebral edema 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 clinical conditions 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
- Documentation of estimated weight in kilograms

Intentionally Left Blank

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-Basic

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 Protocol.
6. Relay information to incoming ambulance and/or call for intercept per INTERCEPT CRITERIA.

EMT-Intermediate & Paramedic

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