2015 EMS Manual

Fairfax County
Fire and Rescue Department

County of Fairfax, Virginia

To protect and enrich the quality of life for the people, neighborhoods and diverse communities of Fairfax County

Office of the Fire Chief

The Fairfax County Fire and Rescue Department is an all-hazard fire-based EMS Department. Our firefighter EMTs and paramedics are highly trained and skilled to provide emergency medical services to the residents of Fairfax County and those that pass through its boundaries or work here.

The department has transitioned to a one and one service delivery model with an ALS and BLS provider staffing our transport units. This service delivery model is necessary to match the resources to the response environment. The response environment changes periodically and we must keep pace and lean forward!

This EMS manual will provide the focus for our providers while continuing to build our knowledge, skills, and abilities in the application of medical protocols when caring, treating, and transporting patients.

It is very important for each career and volunteer member to read the manual and apply the techniques as outlined. Our success is measured in patient outcomes and to that end our training, care, treatment, and transport of injured and sick patients are our most important priority.

Keep focused on training and utilize this manual as an EMS road map and guidebook for providers! Thank you for your excellent care of patients!

Respectfully,

Fire Chief Richie Bowers
Fairfax County Fire and Rescue Department

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Document Format

The General Supportive Care, Hypoperfusion, and Symptomatic Care protocols are to be used in conjunction with other protocols, if indicated.

Protocol Title

Definition Prehospital care goals

Clinical Pearls

- Unique to protocol – specific tips
- Items to look for during assessment
- The "whys" behind symptoms and prehospital care

Treatment

All Providers

- Direction for all providers (the starting point for treatment for BLS and ALS providers).
- **Perform assessment** – refers to the general assessment protocol.
- **Focused assessment** – gives additional guidance specific to that protocol.
- **Ensure oxygenation** – directs providers to assess the patient's need for oxygenation and treat appropriately.
  - **Oxygen should be administered as needed to achieve the following saturation levels:**
    - Normal: > 94%
    - COPD: 88 – 92%
  - **Oxygen should be administered in the following situations regardless of room air saturation level:**
    - Evidence of increased work of breathing
    - Illnesses or injuries characterized by impaired mechanics of respiration, impaired oxygen carrying capacity, impaired oxygen utilization at the cellular level (i.e. flail chest, carbon monoxide poisoning, or cyanide poisoning, respectively)
    - TBI with altered mental status
    - Unconsciousness
  - **Providers should continuously monitor the patient for changes in respiratory status and adjust treatment accordingly.**
- **Advanced Airway** – refers to King Airway only

ALS Providers

- Treatment steps for ALS providers. All BLS providers are encouraged to become familiar with this section, especially those interventions that BLS providers may prepare for/assist with.
- **Establish vascular access** – refers to any IV or IO access the provider elects to use.
- **Advanced Airway** – refers to ETT, King Airway, and Cricothyrotomy.

Physician OLMD

- Physician On-Line Medical Direction (**Physician OLMD**) represents direct contact with a physician for consultation or authorization to treat. Physician OLMD is always available regardless of whether specific orders are included in a given protocol, and encouraged whenever guidance is desired.

What the Operational Medical Director Expects of EMS Providers

To be an authorized prehospital EMS provider, personnel shall:

- Meet all state requirements and comply with all state regulations governing the provision of prehospital care.
- Meet all departmental requirements:
    - Maintain the following certifications:
        - BLS providers: EMT-B, CPR
        - ALS providers: EMT-I/P, ACLS, ITLS, CPR, PALS
    - Meet both state and departmental continuing education requirements.
    - Demonstrate retention of knowledge and skills, as well as, proficiency with protocols through a recertification process.
    - Adhere to departmental policies, procedures, manuals, and patient care protocols.

An authorized Fairfax County Fire & Rescue EMS provider is expected to consistently demonstrate:

- **Unwavering compassion, professionalism, and empathy** – Every call represents a need to assist the party who called, whether it is a child with a fever, a concerned family member, patients in a multi-vehicle crash, or any other citizen in need. All persons should be treated with respect and dignity. Some of the most rewarding patient care encounters may also be the simplest; providing reassurance, relieving pain or distress, and transporting the patient for definitive evaluation and treatment.
- **Cognitive knowledge and knowledge of the protocols to effectively manage patient care including recognition of protocol application and limitations** – Master your protocols and be able to recognize when the patient's need requires consultation with Physician OLMD to provide advice and/or authorize care supplementing that described within the patient care protocols.
- **Technical proficiency and the ability to apply diagnostic skills and therapeutic interventions when warranted and appropriate** – Master the application of diagnostic and therapeutic modalities and commit yourself to maintaining these skills, particularly those that are infrequently used yet are required in circumstances of critical patient care.
- **Excellent oral and written communication skills** – Effectively gather information from patients, families, and bystanders at the scene. You should be able to relay the pertinent information in a coherent manner to providers at the receiving facility, and effectively document your assessment, medical decision-making and subsequent changes in the patient's condition.
- **Model what good patient care delivery looks like** – Consistently model expectations of good patient care delivery; this includes holding fellow providers accountable when they do not.

- **Commitment to being an engaged member of a learning and evolving organization** – As is the case in any large EMS organization, the provider membership exhibits a wide variety of strengths and weaknesses. EMS providers are expected to share a common commitment to the following:
    1. Clearly defined expectations – As the agency commits to clearly defining expectations, our providers are expected to assure they understand expectations and consistently model them thereby demonstrating what success looks like for our patients, our partners and our peers.
    2. Reasonable and appropriate efforts to remediate when indicated – The agency commits to reasonable and appropriate efforts to support EMS providers with their responsibility to acquire and maintain the knowledge and skills needed to meet expectations, but the providers must recognize that they have primary responsibility.
    3. Accountability – The agency commits to evaluating performance in light of clearly defined expectations. Providers commit to consistently meeting those expectations as well as holding themselves and their peers accountable for doing so. When performance falls short of expectations, providers commit to identifying contributory causes, taking action to remedy them, and aligning future performance with expectations.
    4. Aligning skills with assignments so performance may consistently meet expectations – The agency recognizes that despite reasonable and appropriate efforts performance can fail to consistently meet expectations due to gaps in knowledge/skills/abilities. It then becomes necessary to reassign providers so that they may serve in a capacity more suited to their strengths. Providers recognize this principle and recognize that all members are valued whatever their domain of service.

What EMS Providers Can Expect of the EMS Division

Accessibility – EMS providers can expect EMS leadership and the Office of the Operational Medical Director to be available for discussion of concerns and ideas. Remember to follow the chain of command when requesting a meeting with the Operational Medical Director and/or members of EMS leadership.

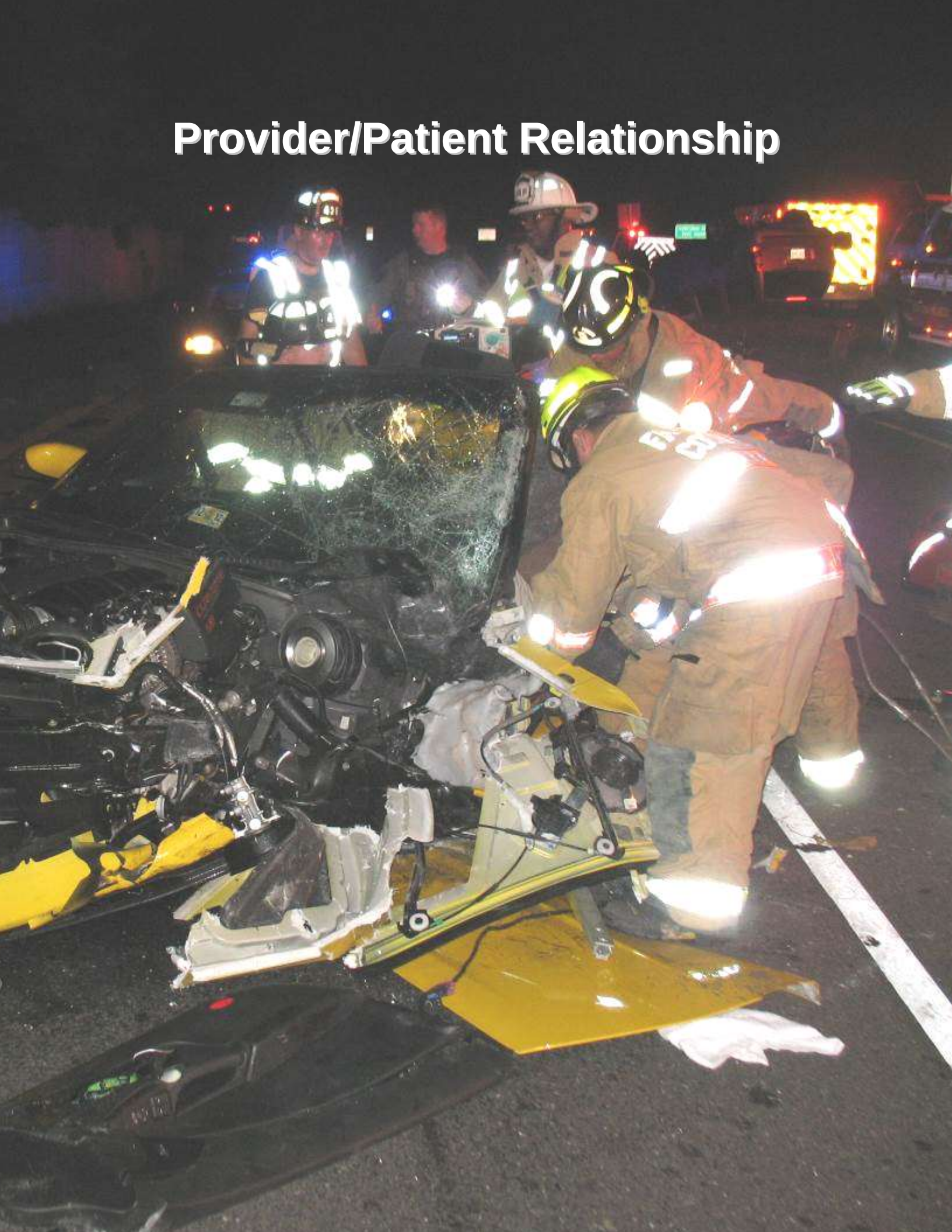
Respectful consideration – EMS providers can expect that their concerns and suggestions will be heard and weighed with an unbiased mind. Issues will be considered objectively and with open-minded consideration using national standards, state regulations, regional and local practice standards, empirical evidence, and systematic analysis when feasible. In all instances, quality patient care is the paramount objective followed by care of the community at large.

Fairness in review of patient care concerns – EMS providers can expect prompt notification of case investigation with potential for disciplinary action. The provider can expect that reasonable efforts to complete an investigation in a timely manner will be made and information regarding the status of that investigation will be available. EMS providers will be afforded due process including an opportunity to hear clinical care concerns and to present their impression and recollection of events. All investigations will be reviewed objectively and when deviations are noted the case will undergo a root-cause analysis to determine the contributory factors. The quality improvement loop will be tied back to addressing those contributory causes identified from the case analysis. The goal is to improve the care delivered by comprehensively focusing attention on analyzing and advancing the 5 P's of the EMS domain: patients, providers, provisions (equipment/supplies), place (environment of care), and protocols.

Commitment to being a learning and evolving organization – As is the case in any large EMS organization, the provider membership exhibits a wide variety of strengths and weaknesses. EMS providers can expect departmental commitment to the following plan:

1. Clearly defined and consistently modeled expectations, to include demonstrations of what success looks like.
2. Reasonable and appropriate efforts made to provide EMS providers with the knowledge and skills needed to meet expectations. Providers retain primary responsibility to acquire and maintain proficiencies.
3. Accountability to ensure EMS providers meet expectations and consequences when they do not.
4. Reassignment for those providers who demonstrate an inability to consistently meet expectations so that they may serve in a capacity more suited to their strengths.

Provider/Patient Relationship



When a Person Becomes a Patient

EMS providers may be called on to provide care under a variety of circumstances, including:

- Public service encounters
- Employee medical evaluations and monitoring
- Patient encounters

Public Service encounter examples include a citizen arriving at the fire station seeking a blood pressure check or approaching departmental personnel present at a community event and requesting an over-the-counter remedy for a self-identified problem. This category is generally not the same as dispatched Public Service (PSERVF) calls

Employee medical evaluations and monitoring occur when an EMS provider is assigned to conduct routine pre- or post-entry assessments for HazMat personnel, or are monitoring personnel on any incident requiring rehab (e.g. operating as the Medical Unit). Refer to the Emergency Incident Rehabilitation Manual for further information, and be aware that personnel being evaluated may become patients requiring treatment at any point.

Patient encounters occur when EMS providers are dispatched to an incident scene to assess, treat, and/or transport a member of the public. The Virginia Department of Health's Office of EMS regulations (12VAC 5-31-10) defines a patient as "a person who needs immediate medical attention or transport, or both, whose physical or mental condition is such that he or she is in danger of loss of life or health impairment, who may be incapacitated or helpless as a result of physical or mental condition or a person who requires medical attention during transport from one medical care facility to another."

When a patient-provider relationship is established

A person becomes a patient the moment the EMS provider has determined that an assessment of the individual is necessary to ensure that no illness or injury is overlooked and to ensure that the individual's capacity to decline an assessment is not impaired by illness, injury, or intoxication.

Factors to consider when determining if a person should be considered a patient include but are not limited to:

- Mechanism of injury/nature of illness
- Origin of call for assistance (Is this a first party or third party call?)
- Potential for missed illness/injury
- Potential consequences of missed illness/injury
- Social variables that may impact the person's ability to access care should his or her condition change

Be aware that a person may ask for assessment and thereby initiate a patient-provider relationship at any time.

Decision-Making Capacity

Intact decision-making capacity

Patients' decision-making capacity is dependent upon their ability to understand their condition, the recommended treatment, and the risks, benefits, and alternatives to our treatment. A useful technique for assessing decision-making capacity is to have patients restate their condition, provider recommendations, and the risks, benefits, and alternatives associated with refusal, and then ask their reasons for refusal.

A language barrier may make informed consent and assessment of decision-making capacity difficult. Therefore, an approved translator via the language line should be used if clinical condition allows and call circumstances require it.

It should be apparent that illness, injury, or intoxication may impair a patient's decision-making capacity.

Impaired decision-making capacity

Patients demonstrate impaired decision-making capacity if they are unable to understand their condition or our recommendations or if they have unreasonable excuses for refusing treatment or transport.

For example, if it appears that a patient understands our recommendations but does not wish to go to the ED because he is delusional, his decision-making capacity is impaired. Delusional reasoning and/or inability to understand their condition and our recommendation may render patients unable to make medical decisions, to include informed consent and refusal.

Impaired decision-making capacity due to psychiatric illness

If the EMS provider has reason to believe that a patient has an illness or injury and the patient's decision-making capacity is impaired by psychiatric illness, the EMS Supervisor should be notified and police should be requested immediately to evaluate the patient. On arrival, officers will determine if the patient represents a threat to self, others, or public safety using their own criteria and judgment.

If the patient is deemed a threat, the officers may take the patient into custody on their own authority for four hours ("4 hour rule") during which providers and officers may coordinate transport to hospital or other facility (preferred facilities are Fairfax and Mt. Vernon due to proximity to mental health facilities). Note that the police do not make medical decisions or take our medical assessment results into consideration. They have a formal process they follow with respect to mental capacity.

An alternative to using the police directly is to petition the Magistrate for an Emergency Custody Order (ECO). Any responsible person may do this, and it is possible that the Magistrate may grant an Order where the police will not intervene of their own accord.

Emergency Custody Order (Mental) process:

- Notify the EMS Supervisor.
- Call Woodburn Mental Health/Mobile Crisis and Law Enforcement for assistance in obtaining the ECO if not already on scene.
- Notify Physician OLMD of the situation.
- Obtain the ECO through the Magistrate.
- Delivery of Order to scene by law enforcement officer.
- Involuntary patient transport to ED.

EMS providers should attend to the medical needs of the patient. Either agency may transport the patient based on presentation, and full transport (if FRD) or refusal (if PD) documentation should be made on the PCR.

Impaired decision-making capacity due to physical illness

If the EMS provider has reason to believe that a patient's decision-making ability is impaired due to illness or injury, Physician OLMD may be able to obtain an Emergency Custody Order through a Magistrate. This medical Emergency Custody Order can be picked up and delivered to the scene by a law enforcement officer, on whose authority and in whose custody the patient is involuntarily transported for further evaluation and management.

Emergency Custody Order (Medical) process:

- Notify the EMS Supervisor.
- **Contact Physician OLMD** to ask for justification for the ECO.
- Obtain the ECO through the Magistrate.
- Delivery of Order by law enforcement to the hospital for the Physician OLMD signature.
- Delivery of Order to scene by law enforcement officer.
- Involuntary patient transport to ED by EMS

Court Appointed or Durable Power of Attorney

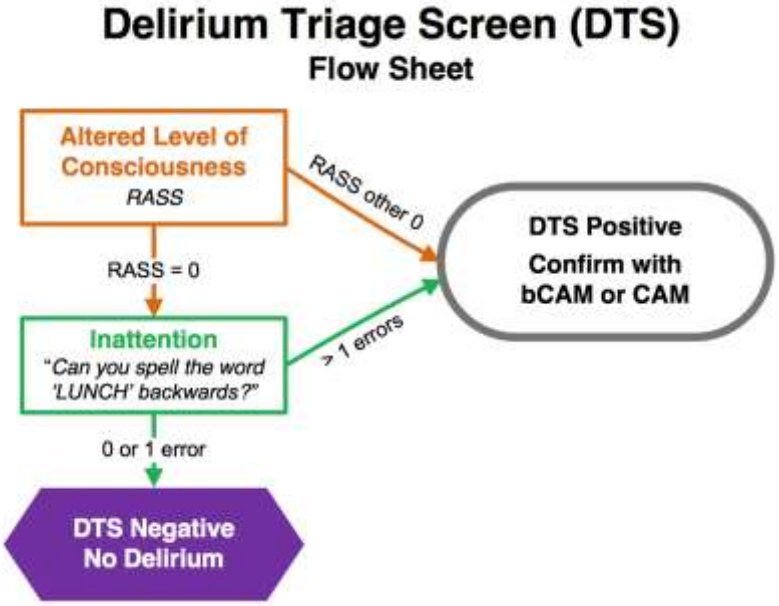
Adult patients with impaired decision-making capacity may have court-appointed representatives or a representative with durable power of attorney (DPA) who make decisions on the patient's behalf. Under such circumstances, the name of the patient's decision-making representative should be documented on the PCR. Note that patients do not forfeit their rights completely to a DPA; if the patient is lucid and demonstrating intact decision-making capacity, the patient's wishes should be respected. The DPA only comes into play when the patient is impaired.

Capacity evaluation by an EMS Supervisor

Whenever a question or concern arises regarding the decision-making capacity of a patient, the EMS supervisor should conduct a capacity evaluation and fully document the evaluation on the appropriate form.

To assist in the evaluation of decision-making capacity and impairment due to delirium personnel should use the following resources:

1. Screen using the Delirium Triage Screen (DTS) in conjunction with the Richmond Agitation Severity Score (RASS). Anything other than Alert and Calm (RASS zero) is abnormal on RASS.



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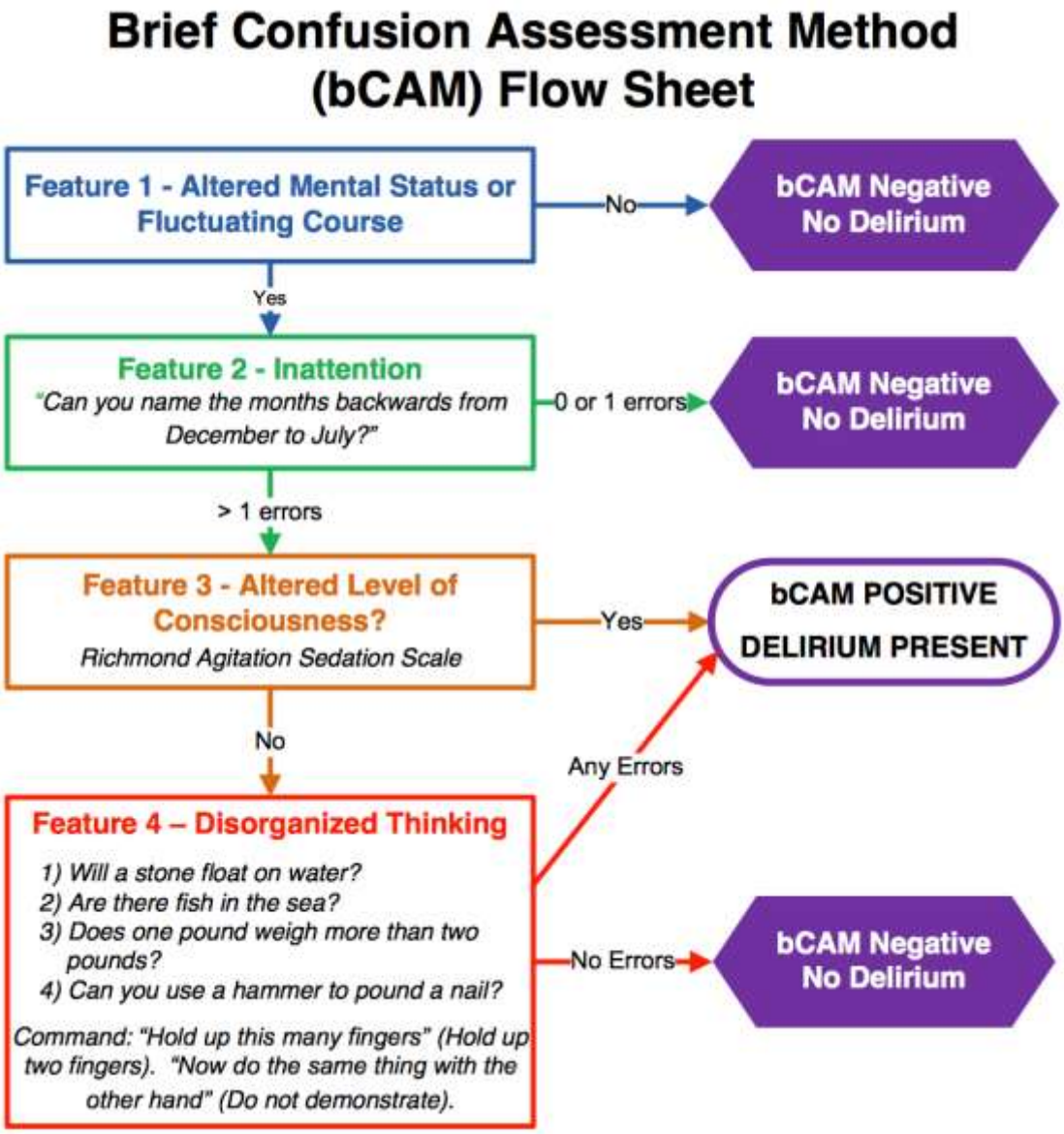
Richmond Agitation Sedation Scale (RASS) *

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff	
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive	
+2	Agitated	Frequent non-purposeful movement, fights ventilator	
+1	Restless	Anxious but movements not aggressive vigorous	
0	Alert and calm		
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to *voice* **(≥10 seconds)**	Verbal Stimulation
-2	Light sedation	Briefly awakens with eye contact to *voice* **(<10 seconds)**	Verbal Stimulation
-3	Moderate sedation	Movement or eye opening to *voice* **(but no eye contact)**	Verbal Stimulation
-4	Deep sedation	No response to voice, but movement or eye opening to *physical* stimulation	Physical Stimulation
-5	Unarousable	No response to *voice or physical* stimulation	Physical Stimulation

www.icudelirium.org/docs/**RASS**.pdf

2. If the DTS screens positive it should be followed by the Brief Confusion Assessment Method (bCAM) for confirmation.



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3. If the DTS and bCAM are both positive for impairment due to delirium the patient likely lacks decision-making capacity. Use the Aid to Capacity Evaluation (ACE) Worksheet (FRD-218) to help characterize and describe their impairment to **Physician OLMD** and Magistrate.

Consent to Assessment, Treatment, and Transport

Consent to prehospital assessment and treatment is based on the premise of capacity, autonomy, and self-determination. These concepts dictate that individuals have the right to determine what is done to their person. Except in cases of potentially life-threatening emergencies and/or impaired decision-making capacity, consent for treatment should always be obtained.

Informed Consent

Once criteria for capacity have been met, patient consent must be given. For consent to be valid it must be informed consent, except in potential life-threatening emergencies. This requires that the patient (or authorized decision-maker) be informed of, understand and be reasonably able to repeat or explain:

- What the assessment revealed
- The treatments or interventions recommended
- The anticipated benefits of those treatments or interventions
- The anticipated risks of those treatments or interventions
- The foreseeable alternatives that are available

Implied Consent – When Informed Consent is Not Required

Consent is not required in the presence of life-threatening (or potentially life-threatening) illness or injury, or if the patient is unconscious or unable to communicate due to illness, injury, or intoxication and may reasonably be presumed to have a life threatening condition. Emergency care for such conditions should never be delayed by lengthy efforts to obtain legal consent. Patients whose decision-making capacity is clearly impaired generally fall into this category as well.

Consent obtained from authorized decision-makers not present on the scene

For minors and adults with impaired decision-making capacity, informed consent for treatment or for refusal of services may be obtained by telephone from an authorized decision-maker using the procedure below:

- Confirm the identity of the party on the phone.
- Confirm the relationship to the patient as an authorized decision-making authority.
- Inform the party of the following:
    - The nature of the emergency response
    - The findings of patient assessment and potential implications
    - The departmental recommendation for initial treatment and transport to the ED for further evaluation and management
    - The risks, benefits, and alternatives to the recommendations
- Allow the authorized decision-maker to make informed treatment decisions or refusal of services.
- Have a second provider repeat the above process to verify and witness the consent.

- Document the acquisition of consent by phone on the patient care report (PCR). Include the name and nature of the relationship of the authorized decision-maker and signatures of the EMS provider and the party witnessing the consent.

Recognize that there are additional factors influencing the operational feasibility of obtaining informed consent by telephone and leaving a patient without decision-making capacity on the scene of the emergency incident.

Minors

For field EMS operations, minors are patients under age 18. When treating minors, providers should obtain consent for treatment or refusal from a legally authorized representative as defined by Virginia Code §54.1-2969. In most cases this will be a parent, but may be another relative or legal guardian. The following persons may generally give consent on behalf of a minor when the legally authorized representative is not readily available:

- Grandparent of a minor
- Adult sibling (over 18 years of age)
- Adult aunt or uncle of a minor
- An educational institution in which the minor is enrolled that has received written authorization to consent from a person having the right to consent.
- An adult who has actual care, control, and possession of a child under the jurisdiction of a juvenile court or committed by juvenile court to the care of an agency of the state or county.
- A law enforcement officer who has lawfully taken custody of a minor, if the law enforcement officer has reason to believe the minor may have a life-threatening illness or injury requiring emergency treatment.

If no such representative is available and delays in providing care may adversely affect the minor's recovery, consent for stabilization and transport may be implied for minors.

Special Circumstances: Emancipated and Pregnant Minors

In Virginia, persons between the ages of 14 and 18 may be declared an emancipated minor by court order. Emancipated minors may make medical decisions on their own behalf. A patient in this age range who declares emancipated status should have a court order verifying this status. It is typically a result of court petition, marriage, or military service.

A pregnant minor, regardless of age, can give medical consent for herself and her baby solely relating to the delivery of the child. A minor mother can give medical consent for her child (children).

If a minor patient makes a claim to emancipated status that cannot be verified, an EMS Supervisor shall be dispatched to scene to assist in disposition resolution.

Patient Refusal of Service

Whenever emergency medical services are requested for a patient and a patient-provider relationship is established, it is the responsibility of the EMS system to assess, treat and transport that patient with consent. Assessment, treatment, and transportation to an ED **shall always be recommended** to the patient.

A patient or authorized decision-maker (e.g. the parent of a minor) with intact decision-making capacity may make an informed refusal of assessment, treatment, and/or transportation. This requires that the patient (or authorized decision-maker) understand and be reasonably able to repeat or explain the risks, benefits, and alternatives to a recommended course of action. They should further be informed of and understand:

- That transport to an Emergency Department (ED) or Emergency Care Center (ECC) is recommended.
- That ED staff would provide more complex evaluation which may include X-rays, laboratory studies, and more definitive management.
- That the risks of refusing transport for more definitive evaluation and management may result in missed or delayed identification of illness or injury and may, as a result, place them at risk for worsening condition, disability, or death.
- That if they refuse transport at this time they may call back if they change their mind or if their condition changes. They may elect to go to the ED by alternate means, or they may arrange further evaluation and management through their doctor.

Only the patient or an authorized decision-maker can refuse transport to a facility. Do Not Transport orders (or any similar documents) will not be recognized or honored.

A number of anticipatable scenarios represent complex or high-risk refusals. These warrant careful and deliberate management and decision-making:

- Minors - described below. Best practice is to make contact with a designated decision-maker.
- Third party calls - if reasonable and achievable make contact with the calling party to assure them that we have made patient contact, assessed the patient, found them to have decision-making capacity and that they have refused transport. Communication goes a long way to resolving/preventing complaints and managing expectations.
- Second party calls with disagreement between parties about consent to transport - confirm the patient has decision-making capacity, demonstrate and explain that to the second party who called 911, clearly document that in your patient care record. Then emphasize to the patient and the second party that if the patient condition changes or the patient changes their mind they can call back and we will return. If the EMS provider has concern about the wisdom of the patient's decision to refuse transport, both parties should be extensively counseled and that must be documented. The EMS provider should let the second party know what to watch for and the signs/symptoms or changes for which they should call back.

- Potential head injury, and suspected intoxication - thoroughly assess and clearly document of the patient's functional status and decision-making capacity are critical. Confirm and document that the patient is in a condition that s/he can safely care for themselves and/or that they are in a condition/environment that can safely provide for them. If the patient is left with a second party tell them what to watch for and the signs/symptoms or changes for which they should call back.
- EMS uncertainty regarding the patient's decision-making capacity - early involvement of the EMS Supervisor is beneficial in such cases (see Decision-Making Capacity: Capacity evaluation by an EMS Supervisor). If abnormal formalize and document using Aid to Capacity Evaluation Worksheet (FRD-218) and **contact Physician OLMD** and Magistrate (presumed medical cause) or Mobile Crisis (presumed psychiatric cause or inability to meet physiological needs).
- Medical or social isolation - the key to successful management is identifying these issues, discussing them candidly and taking steps to remove barriers to care where possible. These features raise the potential risks associated with refusal of treatment/transport. Follow up welfare checks may benefit such cases, engage the patient's support network if possible.
    - Medical isolation - Involves a patient warranting care who has no primary physician and/or no good capacity to navigate the health care system.
    - Social isolation - Involves barriers to care due to social circumstances - no phone, no car, no child care, etc.

Minors

For minors refusal of services may be obtained by telephone from an authorized decision-maker not present on the scene using the procedure below:

- Confirm the identity of the party on the phone.
- Confirm the relationship to the patient as an authorized decision-making authority.
- Inform the party of the following:
    - The nature of the emergency response
    - The findings of patient assessment and potential implications
    - The departmental recommendation for initial treatment and transport to the ED for further evaluation and management
    - The risks, benefits, and alternatives to the recommendations
- Allow the authorized decision-maker to make informed treatment decisions or refusal of services.
- Have a second provider repeat the above process to verify and witness the consent.
- Document the acquisition of consent by phone on the patient care report (PCR). Include the name and nature of the relationship of the authorized decision-maker and signatures of the EMS provider and the party witnessing the consent.

Minors with intact decision-making capacity, who are 14 years of age or older and whose parent or guardian are unable to be contacted, may refuse assessment, treatment, and/or transportation.

Refusals may be partial or complete; e.g. a patient may refuse to be touched at all but accept transport, refuse any immobilization or just allow application of a cervical collar, consent to extensive assessment and treatment but refuse transport, etc. If providers encounter difficulty determining decision-making capacity, or providing the required counsel, they should **contact Physician OLMD** for advice, consultation, or assistance and should notify the EMS Supervisor.

If a patient refuses treatment or transport, the patient's reasons must be rational. For example, patients who understand their condition and our recommendations but refuse transport because they must pick up their children from school are making rational decisions. Alternatively, patients whose religious and/or cultural beliefs provide the basis for their refusal must be respected.

All refusal details should be thoroughly documented on the patient care report (PCR), to include:

- Available history of illness or injury
- Summary of provider counseling
- All assessment findings and/or treatments, to the extent they were permitted
- Patient or authorized decision-maker signature on the PCR refusal statement, if refusing transport (if the patient or authorized decision-maker refuses to sign, this should be documented, including witnesses' names if possible)

Provide any patient who requests additional information about their call (such as billing, medical records, or refusal information) an *EMS Treatment Information* (FRD-215) form along with a *Notice of Privacy Practices*, if requested.

If the police request documentation of service, a *Record of Refusal of Transport for Patient in Police Custody* (FRD-432) form shall be completed and given to the requesting officer.

Special Circumstances: Fairfax County Public Schools (FCPS)
Pre-existing agreements between the schools and parents require that students must leave school any time one of the following medications is given at the clinic:

- Epinephrine autoinjector
- Glucagon
- Diastat (diazepam)
- Solu-Cortef

In these cases, the nurse will call 911 and attempt to contact the parents. As with all transports from county schools, a FCPS representative will accompany the student to the hospital (in the unit or by personal vehicle).

If the parent arrives prior to transport, providers are free to consult and make a new determination with respect to destination; that is, the student cannot stay at the school but a parent may refuse service if appropriate and take the child home.

Note that this mandatory policy is only in effect after administration of the four medications listed. If called for other reasons, providers may obtain refusals from students (or authorized decision-makers) or transport as indicated.

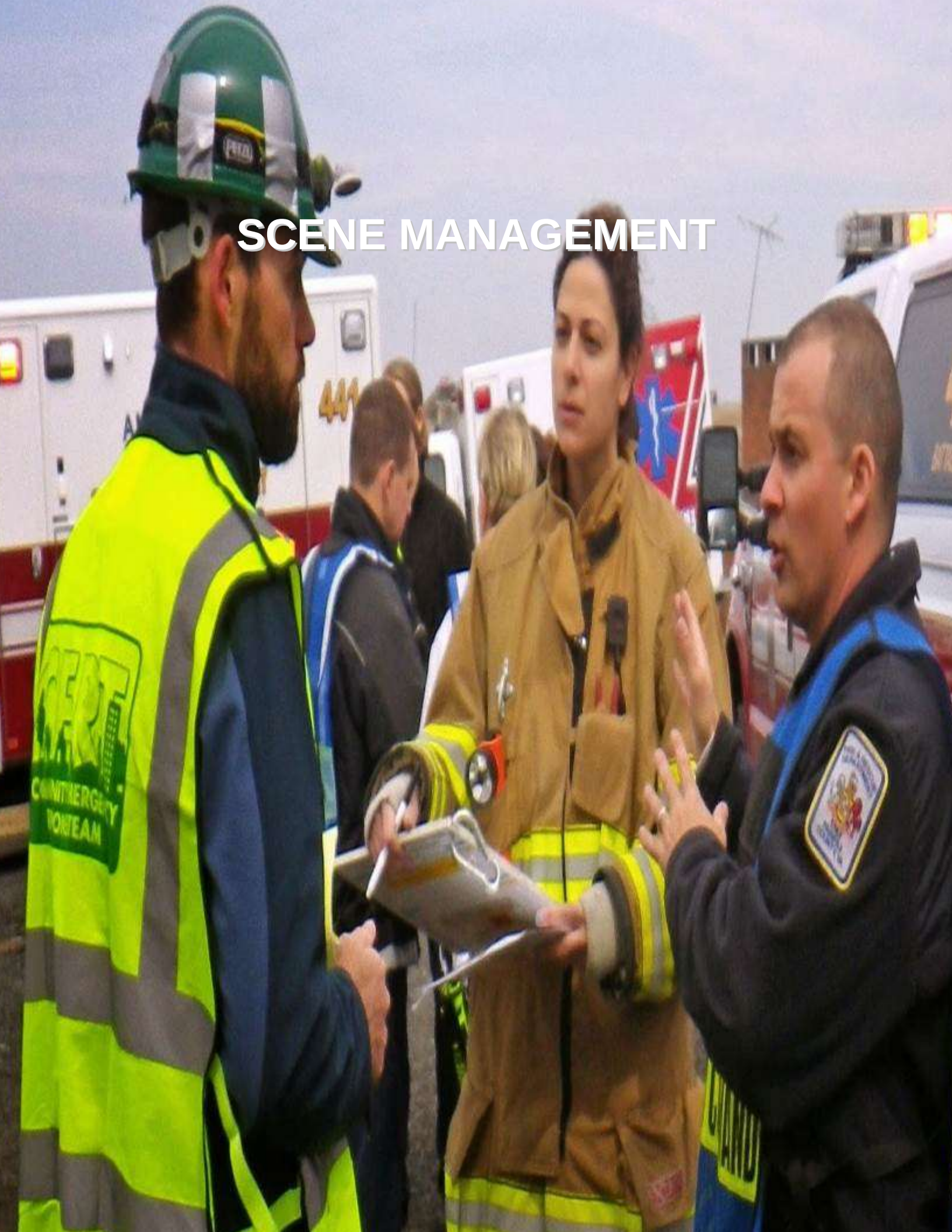
Patient Confidentiality

In accordance with good practice, expected professionalism, departmental policy, and state and federal regulations, all information gathered during the course of evaluating, treating and transporting a patient is considered confidential. Personnel have an obligation to handle all information and documentation in a manner that reflects and maintains this confidentiality.

Judgment should be exercised on the scene while assessing and treating a patient and reasonable accommodations should be made to protect the patient's privacy and confidentiality. It is recognized that scene management and patient care are the primary concerns.

Patient information may be shared with the parties involved in patient care, quality improvement representatives, and cost recovery representatives with required protections and security measures. Hard or electronic copies of patient care reports (PCRs) are medical records; they should not be left unattended or unsecured, or handled in a manner that may compromise the confidentiality of the record or the patient.

Specific HIPAA Privacy Practices (e.g. what information may be shared with police, etc.) are detailed in departmental Standard Operating Procedures, Section 6.


SCENE MANAGEMENT

Abuse, Neglect, and Exploitation

Often, Fire and Rescue personnel are well positioned to advocate for patients who are suspected of being, or who are, abused, neglected, and exploited. Our goal is to identify and/or treat injuries and illnesses, protect victims from further abuse, and notify the proper authorities. These victims may or may not be the patient we were called to see. Use the following definitions as guidelines when considering if a patient is abused, neglected and/or exploited:

- **Abuse** – Willful infliction of physical pain, injury, mental anguish, or unreasonable confinement. Sexual abuse falls into this category as well.

- **Neglect** – Nonexistent or insufficient care and support necessary to maintain a person's physical and/or mental health to the extent that his or her well-being is impaired or threatened. Persons who live alone/unaided and are unable to care for themselves can be considered to fall into this category, as can lack of supervision of young children.

- **Exploitation** – The illegal use of an incapacitated adult/child or their resources for another person's profit or advantage.

Remember that proof of abuse is not needed to make a report, but there should be "reasonable cause to suspect." As an EMS provider in Virginia, you are legally required to report your suspicions of abuse, neglect, and/or exploitation of members of the following patient populations:

- Children (all patients under 18 years of age, including those physically or mentally disabled/incapacitated)
- The elderly (all patients 60 years of age or greater, including those physically or mentally disabled/incapacitated)
- The physically or mentally disabled/incapacitated from 18-59 years of age

You can be charged if you have suspicions and do not report them; failure to report is punishable by a civil penalty. Reports must be made by the witnessing provider directly to the service bureaus listed below. Notification of suspected abuse, neglect or exploitation to an EMS supervisor or hospital personnel does NOT meet the reporting requirements outlined in the statute. If your good faith report turns out to be unfounded, you are legally protected from civil and criminal liability. Reporting does not violate the Health Insurance Portability and Accountability Act (HIPAA).

Use the following procedure in cases or suspected cases of abuse, neglect, and exploitation:

- Follow appropriate treatment protocols, if indicated. Avoid questions or comments suggesting blame or mechanism of injury.
- Notify the EMS Supervisor.

- Every effort should be made to remove the patient from the environment by transporting the patient to a receiving hospital for evaluation. Immediately inform the attending physician (required) at the receiving facility of your suspicions.
    - In the event of a refusal of medical services, contact the appropriate social service agency and/or law enforcement agency (if indicated) prior to clearing the scene.
- Document all pertinent observations on the PCR. Include a detailed history using direct quotes from individuals on the scene, if possible, the attending physician's name and the details of your conversation.
- As soon as practical, report potential occurrences and your actions to the social service agency having jurisdiction:
    - **Fairfax County Child Protective Services** (patients under 18 years of age)
        - **703-324-7400**
    - **Fairfax County Adult Protective Services** (disabled 18-59 years of age and all patients 60 years of age or greater)
        - **703-324-7450**
    - After hours, or if in another jurisdiction, you may contact the **Virginia State Department of Social Services** directly.
        - **800-552-7096** (all patients under 18 years of age)
        - **888-832-3858** (disabled 18-59 years of age and all patients 60 years of age or greater)
- Be prepared to give:
    - The victim's name, address, and date of birth
    - Location of incident if not home address
    - The identity of the victim's caregiver(s) if any
    - The circumstances and your actions
    - Disposition (transport destination, refusal, notifications, etc.)
    - FRD contact information

Domestic Violence: incidents of suspected domestic violence should be reported directly to the appropriate law enforcement agency.

Hoarding: incidents of hoarding may or may not be related to abuse, neglect and/or exploitation. If such a link is suspected, report to the appropriate social services and the hoarding task force. The **Fairfax County Hoarding Taskforce** can be reached at **703-324-1300** (Monday - Thursday 8 a.m. - 4 p.m., Friday 9:15 a.m. - 4 p.m.)

The EMS Supervisor is the first line of contact for any questions or concerns regarding treatment, documentation, or notification.

Do Not Resuscitate (DNR) Orders

The Virginia Durable DNR Order provides Virginia EMS personnel the ability to honor a patient's request for humane comfort measures while avoiding aggressive resuscitation efforts. The EMS provider can honor such a request when the DNR order is executed in writing and with proper documentation.

The Virginia Durable DNR Order and other authorized DNR Orders (described below) are the only written Do Not Resuscitate Orders that can be honored by Virginia EMS personnel without requiring authorization by Physician OLMD.

Be sure to bring all DNR Order documentation with you when transporting a patient. Give the Order to personnel taking over care when you transfer the patient at the receiving facility.

Virginia Durable DNR (VDDNR or DNR) Form– The standardized document currently available (via download) or previously specified (yellow form) from the Virginia Department of Health that honors a patient's request for humane comfort measures while avoiding aggressive resuscitation efforts.

- **There is no time limit on the Virginia Durable DNR Order** – it is valid until revoked.
- Legible photocopies of VDDNR or other authorized DNR forms may be honored.
- There are five key parts of the form:
    1. The patient's full legal name
    2. A do not resuscitate determination
    3. Signature of Physician (MD) or Nurse Practitioner (NP)
    4. Date of issue
    5. The patient's signature or, if applicable, that of the person authorized to consent on the patient's behalf

Alternate Form of Virginia Durable DNR Identification (Bracelets/Necklaces) – In conjunction with the issuance of Durable DNR Orders, the Board of Health has authorized a bracelet or necklace as an alternate form of Durable DNR Order Identification. Any alternate form may be used to validate the Durable DNR Order or used in place of an original Durable DNR Order.



Alternate Forms of DNR Identification **must** contain the following information:

- Patient's full legal name
- The words – Do Not Resuscitate
- The VDDNR Form issuance date
- Name of Physician (MD) or Nurse Practitioner (NP)
- Phone number of Physician (MD) or Nurse Practitioner (NP)

Other Authorized DDNR orders – In some cases, DNR Orders are written on site for patients who are admitted to (or in medically attended transit between) a hospital or other skilled nursing facility (not to include assisted living facilities). To be honored by EMS personnel, such DNR Orders need not be in the state format, but must contain:

- The patient's full legal name
- A do not resuscitate determination
- Signature of Physician (MD) or Nurse Practitioner (NP)
- Date of issue
- The patient's signature or, if applicable, that of the person authorized to consent on the patient's behalf

Physician Orders for Scope of Treatment (POST) – A POST is a distinctive bright lime colored form. OEMS has elected to recognize copies of the form as well. The POST lets serious or terminally ill patients choose what treatments they wish to receive for their medical condition and is considered a companion document to the DDNR. They are typically issued through a nursing home or hospice-associated physician. It is possible that the POST may be encountered with a patient in home hospice care and without an accompanying Virginia DDNR form. Under such circumstances the POST itself represents an "other authorized DDNR order." EMS providers should:

- Know what a POST form looks like;
- Recognize it in transfer records (for example from nursing home to hospital);
- Communicate to medical control that the patient has a POST form and relay the basic contents;
- Ensure that the presence of a POST form is passed on at each transfer of care.
- Recognize that the first section regarding DNR most directly applies to prehospital care. The remaining sections apply to hospital and hospice care.
- If a POST document is presented outside of a licensed healthcare facility independently as a DDNR, begin treatment and **contact Physician OLMD** if clarification or guidance is needed.

Direct Physician Order – A direct order by a licensed physician who is physically present with a patient in cardiac or respiratory arrest can also be recognized by EMS personnel.

Special Circumstances

- If CPR is indicated and the family insists on resuscitation in the presence of a valid DNR order, immediately **contact Physician OLMD** while further assessing patient and preparing for resuscitative efforts.
- If you have a question concerning the validity of a DNR Order, begin resuscitation and **contact Physician OLMD**.
- If a DNR Order has been appropriately revoked, altered, or is illegible, begin treatment, including resuscitation, and **contact Physician OLMD**.

Procedure for Verifying Valid DNR Orders:

- Perform standard patient assessment and resuscitation or intervention until it is confirmed that the patient has a valid DNR Order as defined herein.

- Make a good faith effort to verify the patient's identity through family, friends, and other health care personnel present or photo ID (such as a driver's license).

- Be aware that a DNR Order can be revoked at any time by destroying or verbally withdrawing consent to the DNR Order. Those authorized to revoke the order include only:
    - The patient, if the patient executed the order
    - The person authorized to consent on behalf of the patient, if that person executed the order
    - The provider (MD/NP) who issued the order

- **"Do Not Resuscitate" does not mean "Do Not Treat."** The following comfort care interventions are encouraged:
    - Airway management (excluding intubation or advanced airway adjuncts)
    - Suction
    - Supplemental oxygen delivery devices, to include CPAP
    - Pain medications or intravenous fluids
    - Bleeding control
    - Patient positioning
    - Other therapies deemed necessary to provide comfort care or to alleviate pain

- The following resuscitative measures should be avoided or withdrawn if resuscitation has begun prior to confirmation of valid DNR status:
    - Cardiopulmonary resuscitation (CPR)
    - Endotracheal intubation or other advanced airway management
    - Artificial ventilation
    - Defibrillation
    - Cardiac resuscitation medications

- Documentation of the call on the PCR must include:
    - The type of document used to confirm DNR status: Virginia Durable DNR Order form, bracelet or necklace, or other DNR form
    - The Virginia Durable DNR Order form number (if applicable)
    - The name of the issuing MD/NP

Scene Management

All unwitnessed deaths outside of skilled nursing facilities are investigated by police. Preserve the scene and turn it over to law enforcement in accordance with departmental policy. In order to maintain a chain of custody, Fire and Rescue Department personnel should remain on scene until law enforcement arrives to take custody of the scene. Be prepared to assist family members through the process of understanding and dealing with the decision to not resuscitate.

Extraordinary Care

Scope of Practice

In Virginia, EMS providers may only provide emergency medical care while acting under the authority of their operational medical director (via written protocols or Physician OLMD) and within the scope of the EMS agency license (e.g. ALS and/or BLS) (12VAC5-31-1040)**.**

In Fairfax County, the scope of practice for all providers is defined by these protocols. That is, providers shall exercise good clinical judgment based on training and experience and apply appropriate FRD protocols to specific patient encounters. It is recognized that written protocols cannot provide guidance for every possible situation providers may encounter. Protocols are meant to guide providers in achieving consistently excellent prehospital care, not to replace judgment or initiative.

In routine cases where written protocols do not address the unique patient care or disposition needs, physician OLMD is always available and appropriate for such circumstances.

Extraordinary Care

In rare cases, when there is an immediate threat to life or limb not addressed by protocol, treatments or interventions outside routine protocol may be required. Under such circumstances this extraordinary care must be authorized by Physician OLMD (in accordance with 12VAC5-31-1070). Cases requiring such extraordinary care will be exceedingly rare. Most providers will never encounter such a case throughout their career. Nothing in this protocol should be interpreted as empowering providers to circumvent existent protocol or practice beyond their scope. In all situations, both the EMS providers and the Physician OLMD are accountable for their actions and decisions.

The provider shall request the immediate dispatch of the EMS Supervisor to the scene or receiving hospital.

Procedure for authorization:

- Physician OLMD (without Physician OLMD there can be no extraordinary care).
- Both the physician and the provider must acknowledge and agree that:
    - The patient's condition and/or the required/requested extraordinary care are not addressed elsewhere within the protocols, and
    - The order is necessary to maintain the life/limb of the patient.
- The provider must feel capable of correctly performing the care directed by the physician, based on available equipment, prior training, experience, and/or the instructions given by Physician OLMD.
- The provider must verbally confirm the order and agree to proceed.

Procedure for documentation:

- The provider must inform the Physician OLMD of the effect of the treatment, and notify the receiving physician of the treatment as soon as possible.
- The provider must also notify the operational medical director immediately following the transfer of care.
- All instances of extraordinary care shall automatically be reviewed by the Operational Medical Director (OMD) and Quality Assurance (QA).

Inability to Carry Out Physician OLMD Orders

In rare circumstances, providers may receive orders from Physician OLMD that they are unable to carry out. EMS providers may refuse to perform specific procedures or treatments (in accordance with 12VAC5-31-1080):

- If not adequately trained and proficient to perform the procedure.
- If the procedure is not fully understood.
- If the procedure is judged to be not in the best interests of the patient.
- Nothing precludes the provider and physician from reaching agreement on another order if within the scope of this document.

If the provider cannot carry out an order, Physician OLMD must be immediately notified and given the reason the order could not be carried out.

Procedure for documentation:

- The provider must inform the receiving physician of the situation as soon as possible (if not the Physician OLMD).
- The provider must also notify the EMS Supervisor and the operational medical director as soon as practical within 24 hours.
- The provider shall fully document the call on the PCR (including all communications) checking "Inability to carry out OLMD Orders" where appropriate and detailing all specifics of the matter in the narrative.
- All such instances shall automatically be reviewed by the OMD and QA.

Inability to Contact Physician OLMD

In the rare event providers are unable to contact Physician OLMD, attempts should be made to contact the Duty OMD through the Department of Public Safety Communications (DPSC) and the EMS Supervisor. If this is not practical under emergent conditions the provider should:

- Use good clinical judgment and do what is reasonable and within their scope of practice and training.
- Document the events, assessment and interventions.
- Make notifications to the EMS Supervisor, OMD, and Deputy Chief of EMS as soon as it is reasonable to do so.

Nothing contained herein implicitly or explicitly authorizes the provision of care exceeding training or scope of practice.

Physician On Scene

In the event that a physician licensed to practice medicine and surgery in the Commonwealth of Virginia is present on the scene of an EMS call, providers shall follow the procedures below:

- Advise the physician that providers are operating under the *Fairfax County Fire and Rescue Department 2015 EMS Manual* developed by the Fairfax County Fire and Rescue Department and the Operational Medical Director.
- Have ready access to Physician OLMD.
- Request that you be allowed to follow these directives.

Intervening Physician With Pre-existing Patient Relationship Wishing to Assume Patient Care

If there is a previously established physician/patient relationship and the physician wishes to assume responsibility for patient care, the physician must confirm identity, licensure and relationship with the patient; the patient and/or the patient's family can assist in providing such confirmation (see *Physician Onscene* FRD-210). Under such circumstances, reasonable requests should be followed. EMS providers shall not carry out orders that exceed their training, certification, and authorization.

- If the EMS provider believes that the care rendered or recommended by the patient's personal physician is inconsistent with quality patient care, the EMS provider should **contact Physician OLMD** for guidance and assistance.

- If the patient's personal physician wishes to take responsibility for patient care and the care rendered exceeds the EMS Providers training, certification and/or authorization, and the recommended care is on-going, the physician must accompany the patient to the ED or ECC, and document the care provided.

Intervening Physician Without Pre-existing Patient Relationship Wishing to Assume Patient Care

If the physician **does not** have a previously established physician/patient relationship but the physician wishes to assume responsibility for patient care, then he or she must:

- Confirm his or her identity and physician licensure
- Agree to assume responsibility for patient care including the documentation of treatments rendered
- Be willing to accompany the patient during transport

Physician OLMD **must** be contacted and agree to yield patient care authority and medical direction to the on scene physician.

Under such circumstances, EMS providers may carry out orders from the intervening physician that are reasonable, within their scope of training, certification and authorization, and consistent with EMS protocols. EMS providers shall **not** perform procedures or administer treatments that exceed their training, certification and/or

authorization; such treatments or procedures must be performed by the intervening physician assuming responsibility for patient care.

If the care rendered is inconsistent with Fairfax County Fire and Rescue Department protocols or contradictory to quality patient care, then the EMS provider should immediately **contact Physician OLMD** for guidance and assistance.

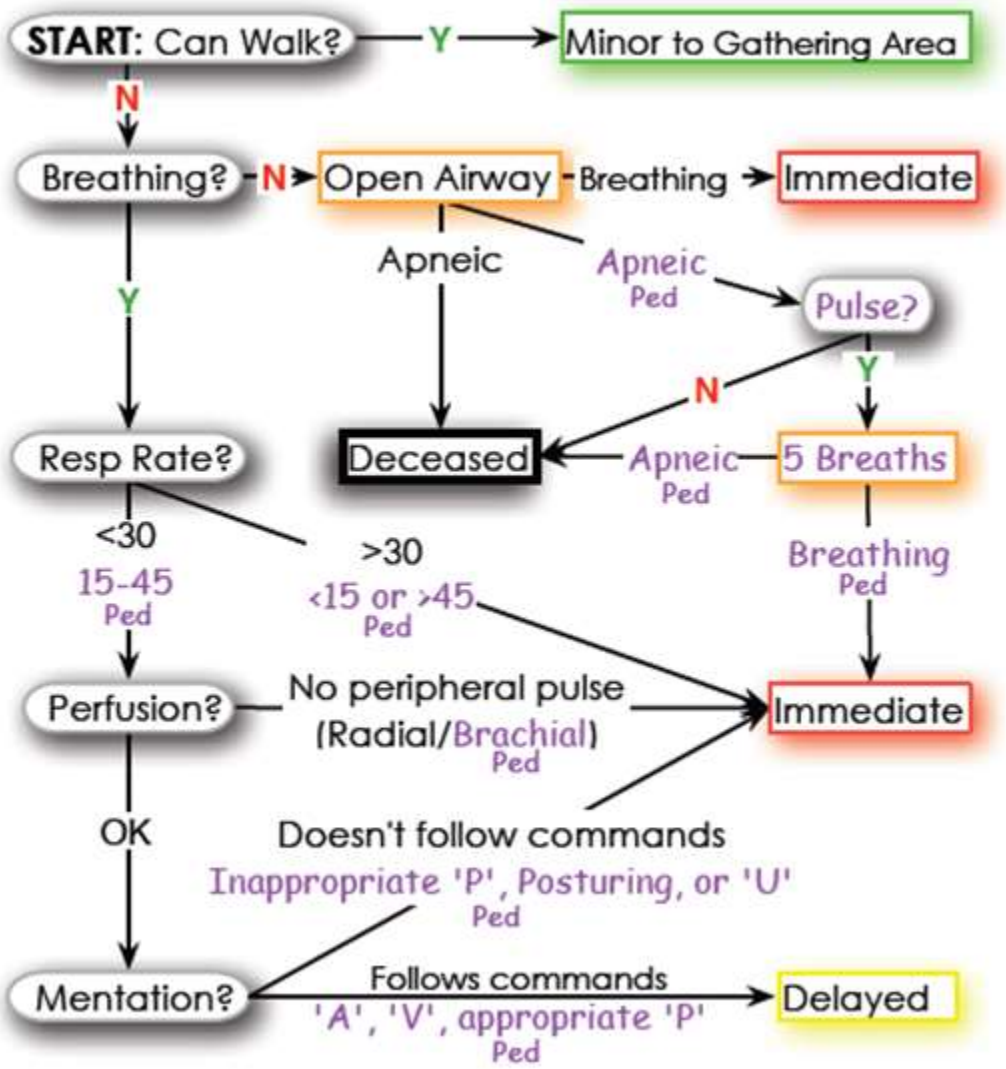
In the event of conflicts between the intervening physician on scene and the Physician OLMD, the EMS provider shall follow the directives of the Physician OLMD.

Physician Direction Without Physical Presence

An intervening physician (regardless of relationship with patient) who is not directly on scene may not assume patient care responsibility or provide Physician OLMD.

Simple Triage and Rapid Treatment (START)/JumpSTART

- Once hazard mitigation is addressed, initiate triage.
- Follow START/Jump START (Pediatrics in purple below) Algorithm of triage and treat life-threatening injuries.
  - Maintain the rule of 30-45 seconds or less patient contact time.
  - Move the ambulatory patients to a defined gathering area.



Special Circumstances

Certain incidents present non-clinical challenges to providers on scene, requiring them to improvise, invent, or otherwise "think outside the box." This section is meant to present some guidance/suggestions when providers run these calls.

Animals on Scene

The FRD runs many calls associated with animals, wild and domestic, and EMS providers are often called on to provide care to trapped/injured pets. When it can be carried out without compromising provider safety, this service directly supports our mission to save lives and protect property.

Beyond initiating BLS care (such as providing O_2 via the purpose-built "pet masks" carried on certain apparatus) however, the FRD has little ability to help in these cases. Call for appropriate resources (Animal Control, Wildlife Rescue, Police, etc.) rapidly and then care for the owners by providing reassurance, any needed medical care (if ill or injured), and information on the disposition of the animal. This is especially important if the animal in question is a service animal and must be separated from its owner.

At other times, animals on scene may pose a potential barrier to our ability to access or care for a patient. In such cases, animal control should be called to assist as early as possible given that their response time might be lengthy. In those cases where patient condition requires immediate action, the OIC must make a risk/benefit analysis before exposing personnel to any hazard. Resources immediately available include the structural ensemble, which provides considerable protection, and the CO_2 extinguisher, which may be used to frighten an animal out of the work area or into an area that can be secured.

Assistive Transport Devices

Many disabled or chronically ill patients utilize powered chairs/machines to move about. These range from simple battery powered three-wheeled 'scooters' to sophisticated motorized carts with built-in life support functions. In many cases, additional help will be needed to safely manage the incident; request resources and the EMS Supervisor.

Removing patients from these machines may be difficult or counter-productive if the patient depends on any of the on-board functions, or if the patient's anatomy is supported by the structure of the device.

If removal from the chair is preferred, ensure that any required therapies are ready to be applied as soon as the patient is removed from the chair and built-in therapies are disconnected (e.g. ventilator, etc.).

Wheelchairs and similar equipment cannot be secured in FRD transport units, so if the patient and device must be transported as a unit, alternative transport will be required. Consider Fastran or other assistive transportation services, FRD medical ambulance bus,

private ambulance resources, etc. Ensure someone knowledgeable about the operation of the machines accompanies the patient.

Contact Physician OLMD if any clinical questions arise beyond the scope of practice of providers on scene.

Bariatric Patients

Bariatric patients may be defined in a number of ways, but the field definition is any patient who whose size (height, weight, girth, or combination) poses a significant challenge to on scene personnel and may require specialized equipment. The department has larger cots and special transfer equipment to facilitate safe and efficient movement of these patients, however, the potential for bariatric resources to have an extended response time is high, so on scene providers must carefully evaluate options if patient condition deteriorates to the point that immediate transport is required.

When providers are treating a patient and believe specialized bariatric equipment is necessary, they shall request this resource through the Department of Public Safety Communications (DPSC). Providers shall ensure sufficient personnel for safe lifting are also dispatched to the scene, and request other specialized resources, such as a rescue squad for rigging and/or structural modification, if needed.

DPSC will contact the closest station housing bariatric equipment to determine how best to coordinate the dispatch. The goal is to deliver to the scene a bariatric cot, all associated equipment, and at least three personnel trained in their use.

Once the resource has been requested, on scene personnel should check back to determine an ETA while developing plans to employ the most effective combination of equipment and techniques to move the patient to the bariatric cot and into a transport unit. Pre-arrival communications with the incoming unit may be helpful, particularly with respect to equipment dimensions and structural barriers. The receiving facility should also be alerted early so as to prepare to receive the patient. Although INOVA Fair Oaks is the only hospital in the County with a dedicated bariatric in-patient care unit, patients should be transported to the most appropriate hospital that will meet their current healthcare needs (e.g. cardiac, stroke, trauma, etc.).

Typically the transport will be made by the first due unit and crew who made initial contact and assessment, with other units meeting at the hospital to manage unloading and exchange equipment. This does not preclude the initial crew from riding with the patient in the unit that brought the bariatric equipment and having theirs taken to the hospital 'empty.' Regardless of which vehicle actually transports, bariatric patients will typically require personnel from more than one unit to manage patient care during transport and upon arrival at the receiving facility. At the hospital, FRD personnel shall make the bariatric patient transfer equipment available for safe movement of the patient from the EMS cot to a hospital bed.

The patient must receive continuous medical monitoring during transfer and transport with special attention to respiratory status. Bariatric patients often cannot tolerate supine positioning. The patient shall be transported in a fully stocked, licensed EMS vehicle with appropriate level of care for transport (bariatric cots are compatible with all county cot brackets). While standard medical treatments and therapies may require modification for bariatric patients, providers shall work within the guidelines of the EMS Manual. If a need is perceived to operate beyond protocol, **contact Physician OLMD**. At all times make every effort to maintain patient comfort and dignity.

Crime Scenes

All personnel should avoid disturbing crime scenes when possible, and protect evidence when found (e.g. do not cover bodies, touch weapons, etc.). Examples of crime scenes include (but are not limited to):

- Suicides/attempts
- Shootings, Stabbings
- Domestic violence cases (with substantial injury)
- Homicides
- DOA (suspicious deaths)
- MVCs (only serious accidents with serious injuries/death are considered crime scenes)
- Robberies (involving injury)
- SIDS cases
- Rape

When our patients are involved in crime, certain accommodations may be required:

- **Victims -** unless illness or injury severity dictates rapid transport, providers should allow police officers time with the patient, and ensure they know the destination hospital.
- **Inmates (from jail) -** should be secured, but not to cot or unit. If full restraint is desired handcuffs can be attached to a backboard, which can then be belted normally to the cot. Providers should be comfortable with the level of restraint and also able to medically manage the patient. Deputies should accompany the inmate in the unit. Never transport a patient restrained in a prone position.
- **Subjects in custody/under arrest (usually from scene):** may be secured, but not to cot or unit. Providers should be comfortable with the level of restraint and also able to medically manage the patient. Providers should have an officer accompany the subject in unit if indicated by the nature of offense or subject's state of mind, and any time the providers/officers prefer. Officers may also follow if providers are comfortable with the arrangement. Generally, patients in handcuffs should be escorted in unit as the officer has the only key in case of need. Never transport a patient restrained in a prone position.

If any disagreements arise between law enforcement and FRD personnel contact the EMS Supervisor immediately. Providers should document law enforcement personnel information in the PCR.

EMS Special Events

Periodically the FRD provides service at scheduled special events such as fairs, athletic events, festivals or concerts. The operational guidelines are found in SOP 01.04.05 *Standby at Scheduled Community Events*. The following policies apply to patient care at these incidents.

Incident Reporting

DPSC will create a "public service" incident in the CAD system at the start time of the event. Multi-day events will have a different public service event and incident number each day.

- When units are assigned to a public service event and they are enroute or on scene, they shall add themselves to the event via MCT and status correctly (enroute or on scene).
- If the unit is unable to locate the event on the MCT, the OIC shall contact the UFO via phone or CAD message to verify that the event has been created and have the unit dispatched to it.
- Units without MCTs (bike teams, UTVs, brush units, etc.) shall notify DPSC via radio or phone to have their units added to the event.

Each unit assigned to the event is responsible for completing the necessary incident report(s). The public service standby report serves as permanent record of the event. The narrative should provide a brief synopsis and any actions taken or assistance provided. All units must complete the NFIRS (fire) report and at least one unit must complete an OEMS (EMS) report. Patient care documentation beyond the public service event report is addressed below.

Patient Care Reporting

The nature of patient care at special events is different than standard 911 responses. Specifically, providers are often asked for "routine" minor first aid type assistance.

- All medical assistance must be tracked and a specific "Citizen Contact Log" FRD-204 is provided for this purpose. For minor assistance that does not meet the threshold of creating a "patient provider relationship" (PPR), the entry in the contact log is sufficient.
- If the level of care or assessment involved means a PPR is established, then full documentation on an ePCR is required, whether or not patient accepts transport. Refer to the "Patient/Provider" section of the EMS Manual.

Full ePCR – Patient Provider Relationship Established

When assisting a person and a PPR has been established a complete ePCR must be entered. A new unique CAD incident number will be created for this patient.

- The unit on scene at the standby shall notify DPSC via radio or phone and provide the necessary information to start the new event.
- Example: *Fairfax from A414. Requesting new incident number for our unit at the 10K race. We are on scene treating a 27 year old female with knee injury. No other units or assistance required.*

- DPSC will acknowledge, create the incident and place A414 on scene. In the above example, the ambulance crew will then be responsible for further status updates. Upon completing the knee injury (whether refusal or transport) A414 would then go in service and re-assign the unit to the public service event.

Citizen Contact Log

Citizens who attend special gatherings often request assistance with minor scrapes, blisters, sunburn, or other concerns. This may also include a person arriving at an aide station seeking a blood pressure check or an over-the-counter remedy for a self-identified condition. These assistance requests generally do not meet the criteria of patient-provider relationship, and neither a full ePCR nor a unique incident number is required.
Typical examples of care rendered at special EMS events and the appropriate documentation:

- Fairgoer requests simple first aid item (e.g. Band-Aid, cold pack, etc.) or an uneventful blood pressure check is provided without any specific EMS care rendered or PPR established.
    - Citizen contact information recorded in the contact log; no ePCR is necessary.
- Concert attendee reports feeling fatigued and light headed and "wants sugar checked" but refuses transport. The nature of assistance request justifies full patient assessment and PPR is established.
    - Citizen contact information recorded in the log; full ePCR with refusal signatures is required.
- Runner at 10K presents with 3 cm scalp laceration after falling. The nature of assistance request justifies full patient assessment and PPR is established.
    - Citizen contact information recorded in the log with notation of transporting unit; full ePCR is required.

All ePCR reports must be associated with a licensed EMS unit (e.g. ambulance, medic, engine, etc.). Upon conclusion of the event, the FRD-204 Citizen Contact Log shall be faxed to the EMS Records Fax number (703-653-1328). EMS Division staff will append it to the EMS public service report for permanent archiving.

Special Circumstances

If a medical issue that creates a patient provider relationship occurs and no licensed EMS vehicle is on scene (only a brush or utility for example), a fully equipped and licensed EMS vehicle must be dispatched to handle and complete an ePCR. If EMS providers have established an aid station distant from their vehicle, any required ePCRs are entered under the licensed vehicle identifier.

Special Medical Protocol for Acetaminophen and Ibuprofen

At larger EMS Special Events (such as Celebrate Fairfax) stand by units may be provided over the counter versions of Tylenol (acetaminophen) and Advil (ibuprofen). Upon citizen request, FRD personnel may provide these medications after the citizen has answered the following questions:

1. Are they over 18 years of age? *If no, they cannot have the requested item.*

2. Have they ever used the item previously? *If no, then they cannot have the requested item.*
3. Have they ever had a reaction to the item? *If yes, then they cannot have the requested item.*

Once above criteria are met, citizens can be offered the medicine and must administer it themselves.

Administrative After Action Requirements

Each unit must complete the required incident report(s).

- If a Citizen Contact Log was utilized, it shall be faxed in for archiving.
- Any notable or significant incidents shall be reported to the proprietary battalion management and forwarded to the duty DFC aid.

Mutual Aid

It is important for providers to know the ALS capabilities of surrounding agencies. It can be critical to patient care if a mutual aid agency responds to assist without additional ALS resources. Providers should be aware of the limitations of responding units and call for additional resources early if needed.

Tactical Emergency Casualty Care Guidelines

Background

Traditional EMS protocols and Trauma related patient care guidelines generally begin with the assessment for scene safety. There is the implied assumption that immediate steps to mitigate threats are taken prior to further interventions. Real world experiences show that this is an oversimplified notion. There are anticipatable scenarios where the threat to providers and patients cannot be completely rendered safe, yet timely intervention is essential for preservation of life.

The Columbine School shootings, the Virginia Tech shootings, the Boston bombing and other experiences have made it plain that people will die preventable deaths if immediate life-threatening injuries are not rapidly identified and treated. Prolonged staging will contribute to preventable deaths due to hemorrhage/exsanguination. Event management and response frame works have been developed to allow us to operate effectively and deliberately during events where the scene is not completely safe.

This should not be foreign to us as a fire-based EMS system. In the setting of a highway MVC incident, we frequently block lanes, set out flares, wear high-visibility vests and PPE but the scene is not entirely safe. Risk is managed and patient care is delivered with an awareness of the risks and benefits in each phase of the event - in the vehicle, on the roadside, and in the unit. Similarly for a below grade rescue, high-angle rescue situational variables drive decisions about what care is rendered and where it must be rendered. We would not leave a person with uncontrolled bleeding from an extremity to assemble a lifting system; but we would screen for and/or take steps to mitigate direct threats from utilities, atmosphere, etc. to allow safer operation in the environment. On

the suppression side we make decisions about the appropriateness of interior offensive fire attack based on fire conditions, building conditions and life threats.

The following is a description of the guidelines that should be driving our management of such events. While much of the discussion may be framed within the context of a shooting or bombing-type event, the principles equally apply in any environment with ongoing dynamic threats to victim and responders. It is the duty of the responding personnel to assess and establish the nature of the threats as well as our ability to mitigate them. In light of this risk assessmen,responding personnelmust weigh the benefits of clinical care to be rendered under the observed conditions based on the following guidelines.

Scene Threat Assessment

Historically, most standard EMS trauma protocols begin with assessment of scene safety – declaring the "Scene Safe." Our new paradigm recognizes that there are circumstances when intervention is needed but the scene is not "safe." The scene threat assessment involves a deliberate consideration of the presence of threats, likelihood of threat exposure, our ability to reasonably mitigate identified threats and the relative magnitude of adverse impact from the threat. On the other side of the equation, one weighs the event management and patient management interventions we consider assuming under such conditions. Assessment of scene threat and risk-benefit ratio of interventions is highly dynamic and fluid – conditions change rapidly. It is also a judgment based on a complete awareness and understanding, based on knowledge and prior experience.

Phases of Care

For ease of consideration, three "environments" exist:

- **Hot Zone** (Direct Threat) – In the Hot Zone, the external, ongoing threat to life is as dangerous or more dangerous than the injury sustained. Very minimal "medical" intervention is generally warranted in this setting. The risk of further injury to the patient and the rescuer is extremely high. Priorities are to prevent further injury, mitigate the threat, minimize public harm and control life-threatening bleeding. Examples include a law enforcement officer shot in the doorway of an apartment during a high-risk warrant search, a rescue technician encountering a patient in a structure at risk for imminent structural collapse, a medical emergency in active fire conditions, etc. Adapting a military dictum to Hot Zone care, it may be said, "the best medicine under Direct Threat is good tactics."
- **Warm Zone** (Indirect Threat) – The Warm Zone is characterized as risk that is higher than the standard call but relatively secure compared to the Hot Zone. While a threat exists, it is neither imminent nor immediate. There is greater capacity to render essential time critical care, but medical gear is still appropriately limited and mitigation of threat and/or exiting the hostile environment remains a high priority. Although the more secure Warm Zone allows for a more deliberate patient assessment, the responder must remain aware that the threat assessment is fluid and dynamic. Scene security can change rapidly. Examples include the scene of a presumed gang shooting with a crowd

gathering, an active shooter event with the suspect barricaded in a contained location, a below grade rescue requiring ongoing atmospheric monitoring, etc. There is a wide array of circumstances that could be classified as a Warm Zone, including many of our routine calls. We can anticipate greater variation in Warm Zone circumstances than the Hot Zone. The Warm Zone scene may be the point of wounding; it may be a hardened location serving as a temporary casualty collection point. Management may involve rapid treatment of the most serious wounds followed by rapid movement/extraction or a more prolonged time to render treatment if patient movement/extraction is delayed or limited.

- **Cold Zone** (Evacuation Care) – In this phase the threat is fully mitigated or the patient is wholly removed from the hostile environment and appropriate care is rendered in anticipation of and during transport to definitive medical care. It includes a secure casualty collection point and treatment areas in a mass casualty event. This phase is most similar to our traditional EMS context. The care is similar to our day-to-day care with special awareness of unique injury patterns. This is particularly true when transport units are readily available. Circumstances can be anticipated when transport units are severely limited or non-traditional transport platforms are used. These circumstances introduce additional complexities and produce a different risk-benefit calculus and relative clinical prioritization – prolonged on scene treatment times, delays to transport and transport on non-traditional platforms.

MEDEVAC – refers to evacuation or transport of patients using a medical transport platform where ongoing assessment and intervention can be delivered.

TACEVAC – refers to evacuation or transport using non-traditional platforms or vehicles where ongoing monitoring and care cannot be delivered.

Tactical Patient Care Objectives

We will begin by discussing the patient care objectives in the generic sense with the recognition that they will subsequently be limited, impacted or have the priority driven by the phase of care.

First achieve tactical advantage if possible, then a general progression of priorities follows MARCHE:

- M - Address massive bleeding
- A - Assess and address adequacy of airway
- R - Assess and address life threats to respiration/breathing
- C - Assess and address life threats to circulation
- H - Assess and address life threats related to head injury and hypothermia
- E - Assess and address every other injury in order of priority

Another useful schema as we consider the above objectives is helpful. It involves the PACE method for considering our possible strategies/tactics for achieving our objectives in the order of priority. The PACE method recognizes that there are multiple ways to complete a priority objective and that some are better than others. It also recognizes that

getting stuck on the ideal method when it is not reasonable/achievable, delays the successful application of an acceptable alternative method – but the circumstances dictate when it is reasonable to deviate from the preferred strategy, not convenience or provider style.

P - Preferred means of accomplishing our objective provided it is reasonable and achievable. If it is not reasonable or not achievable then consider next step.
A – Alternative means of accomplishing the objective, while it is not our preferred method it is a reasonable alternative.
C – Contingency methods of accomplishing our objectives when neither our preferred or alternative methods are reasonably achievable.
E – Emergency methods are utilized when none of our standard and scripted means of accomplishing our objective are achievable and improvised or field expedient methods must be implemented.

This schema helps us to have the flexibility to respond to dynamic real-world challenges, yet still remain committed to objectives within a reasonable framework. It also will provide a useful foundation upon which to understand the different priorities based on the phase of care and what is reasonable and achievable in that environment.

Patient Care Objectives

Massive Hemorrhage Control (Extremity vs. Junctional vs. Core) – Early hemorrhage control is one of the critical concepts of Tactical Emergency Casualty Care (TECC) based care. Uncontrolled extremity hemorrhage is a significant cause of preventable mortality – yet even hemorrhage control must be balanced with operational risk assessment. In this context TECC guidelines recommend rapidly controlling potentially life-threatening extremity hemorrhage. Junctional hemorrhage or bleeding from locations such as neck, groin and axilla pose a different challenge with different strategies for management.

- Tourniquet (TQ) use is the most effective and expedient method of achieving control of life-threatening extremity bleeding. The benefits of TQ use are greatest when applied before the patient progresses to a shock state and there is evidence that TQs are reasonably safe for use for periods less than 2-4 hours. The time of TQ application should be marked on the patient, usually in the Cold Zone (Evacuation Care) phase of care, and communicated at transfer to accepting providers. TQs are not beneficial for junctional hemorrhage by definition.
    - Hot Zone (Direct Threat) – In the Hot Zone, the TQ should be applied as proximal as possible on the limb in the interest of speed and efficacy. It may be placed over the clothing, but with caution that no objects impair the compression. Circumstances may require patient self-application due to a direct threat.
    - Warm Zone (Indirect Threat) –if a TQ was applied in the Hot Zone and Warm Zone conditions allow, it should be reassessed in the Warm Zone for effectiveness and need. A TQ applied hastily over clothing under direct threat may not deliver effective compression. Patient movement may have dislodged the TQ. In addition, if a trained medic assesses the injury under more controlled and secure conditions and determines that a

TQ is not required, he/she may de-escalate. The medic may apply an appropriate pressure dressing and release the TQ slowly and re-assess the extremity and injury. *Caution is warranted* – If the distal limb is amputated, the patient has signs of impaired perfusion, the patient is multiply injured limiting their ability to tolerate additional insult, or circumstances limit our ability to monitor for recurrent bleeding or deterioration, then the TQ should remain in place. If there is ambiguity, lean on the side of leaving it in place until greater security and resources are available. For extremity hemorrhage not addressed in the Hot Zone apply the TQ directly over the skin proximal to the injury and tighten until the distal pulse is no longer palpable. Eliminating as much distal flow as possible decreases the likelihood for developing compartment syndrome. If the first TQ is not effective a second should be placed directly proximal to the first directly over the skin.

- Pressure Dressings may be appropriate for soft-tissue injury without injury to major vessels, particularly on the extremities and for those injuries not warranting or not appropriate for TQ use (including junctional hemorrhage). They may also be used to supplement TQ use or wound packing/hemostatic gauze. Pressure dressings take time to apply, require monitoring of effectiveness and are less definitive.
    - Hot Zone (Direct Threat) – They are not appropriate for our use in the Hot Zone due to the time needed to apply them and the need for ongoing monitoring. Patient removal from the threat is preferred strategy and higher priority.
    - Warm Zone (Indirect Threat) – Pressure dressings are more reasonable and achievable.
    - Cold Zone (Evacuation Care) – Pressure dressings are more reasonable and achievable.

- Wound Packing and Hemostatic Agents requires packing the dressing (sterile gauze or hemostatic gauze) into the wound, directly to the point of bleeding in a manner that allows the direct application of pressure to the site of bleeding. This must be followed by 3-5 minutes of continuous direct pressure. Packing and hemostatic agents are appropriate for wounds not amenable to TQ application including injuries to the groin, axilla, and neck. Hemostatic agents rely on effective skills of wound packing; these agents are not intended for topical superficial application but must be placed directly in the wound to the location of bleeding vessels.
    - Hot Zone (Direct Threat) – Wound packing and Hemostatic agents are not appropriate for our use in the Hot Zone due to the time to properly deliver and the need for 3-5 minutes of continuous direct pressure. Patient removal from the threat is preferred strategy and higher priority.
    - Warm Zone (Indirect Threat) – Wound packing and hemostatic agents can reasonably be employed in the Warm Zone if conditions allow. Because 3-5 minutes of continuous pressure is needed for hemostatic agents to be

effective, it may be necessary to use pressure dressings as well, if number of patients, number of wounds or scene dynamics make manual direct pressure unreasonable or unachievable.

- Junctional hemorrhage devices (hemorrhage clamp) have been developed to aid in the control of bleeding from junctional sites. The efficacy of these devices and the role of these devices in civilian EMS are under investigation. These devices either involve a vascular compressive mechanism or a proximal compressive mechanism. At present these devices are limited by available evidence to support their use, time to apply, limitations on patient movement and availability.
    - Hot Zone (Direct Threat) – these devices are not appropriate for our use in the Hot Zone. Patient removal is a higher priority.
    - Warm Zone (Indirect Threat) – junctional hemorrhage devices are reasonable for the Warm Zone if available and conditions allow.

Airway Management under TECC emphasizes BLS measures. Use of nasopharyngeal airways and positioning are prioritized.

- Airway adjuncts – Nasopharyngeal airways are best tolerated and recommended on all patients with decreased level of consciousness (Less than A on AVPU). They should be taped in place if reasonable to do so. They are well tolerated, will not cause gagging in conscious patients, are stimulating if decreased LOC is transient, provide an assessment of responsiveness to noxious stimuli and are relatively stable once placed. Oropharyngeal airways are not recommended for the same reasons.

- Positioning for ease of breathing - Patients should be placed in recovery position or allowed to assume a position of comfort – even sitting up. Particularly in penetrating trauma, the patient should be allowed to assume a position of comfort. Many visually striking facial injuries can maintain their own airway and adequate respirations if allowed to assume a prone position. Unconscious patients should be placed in the recovery position.

- King airways have limitations based on phase of care and need for patient movements – they can be dislodged during movement; they require monitoring; they will likely require bag ventilation exceeding the limits of the operational setting. This makes these methods less reasonable in the Hot Zone and less than preferred in most cases in the Warm Zone. Individual cases/circumstances may warrant consideration of endotracheal intubation or supraglottic airway, but they are less common.

- Endotracheal intubation (ETT) – ETT is time and resource intensive and has many of the same limitations as King Airways above. Both are only reasonable when external risk/threat has been mitigated or the patient has been removed from the threat environment.

- Surgical cricothyrotomy (with lidocaine if conscious) may also be reasonable in the Warm Zone and Cold Zone if circumstances warrant, scope of practice and training/authorization permitting.

Airway Management by phase of care:

- Hot Zone (Direct Threat) – Positioning alone is warranted if it can be done safely. All other interventions prolong the exposure to risk for both patient and rescuer.
- Warm Zone (Indirect Threat) – Most circumstances can be reasonably managed with a nasopharyngeal airway and positioning, many times resources and demands will limit the consideration other interventions. If the airway cannot be managed by such measures; surgical cricothyrotomy, ETT, and King Airway may be reasonable with limitations.
- Cold Zone (Evacuation Care) – Greater consideration is given to advanced airway measures in this phase of care. Clinical circumstances and resource availability will shape the selection of preferred strategies.

Respiration/Breathing – After addressing uncontrolled bleeding, attention can be turned to assessment of respiration and breathing. Assessment and management of threats to respiration and breathing are centered on identifying and treating remediable life-threats – tension pneumothorax and open pneumothorax as the primary threats. Tension pneumothorax remains a significant cause of preventable death in penetrating trauma. As part of the initial assessment in the Warm Zone, the chest should be completely exposed and examined for any wounds. The operational setting may limit the ability to continuously monitor a patient for signs of an evolving pneumothorax – increasing respiratory distress, hypoxia, narrowing pulse pressure, tachycardia, progressively impaired perfusion. Therefore in the setting of the Warm Zone with penetrating chest trauma (GSW/shrapnel) and progressive respiratory distress or hypotension not attributable to other causes, the patient should be reasonably presumed to have a developing tension pneumothorax and should be treated with chest decompression. An open pneumothorax should be managed with an occlusive dressing preferably with one-way valve.

- Chest Decompression – Chest decompression remains an important procedure with potential to address a significant cause of preventable death. Limitations of monitoring/assessment in the Warm Zone justify a lower threshold than in standard scene safe settings. In the presence of penetrating injury to the chest from GSW or shrapnel, the potential for tension pneumothorax is significant. Patients with such injuries and progressive respiratory distress or poor perfusion not attributable to other causes are likely to have tension pneumothorax. The two appropriate locations are the same as standard care – anterior 2nd intercostal mid-clavicular line staying lateral to the nipple, perpendicular to the chest wall and lateral 4th/5th intercostal anterior axillary line staying perpendicular to the chest wall. If the initial decompression is ineffective or if signs of tension pneumothorax recur, then a repeat chest decompression should be done using the alternative site.

- Hot Zone (Direct Threat) – Chest decompression is not appropriate for our use in the Hot Zone due to the time needed to perform it. Patient removal from the threat is preferred strategy and higher priority.
- Warm Zone (Indirect Threat) – Chest decompression is appropriate by authorized providers.
- Cold Zone (Evacuation Care) – Chest decompression is appropriate by authorized providers.

- Occlusive Dressings – Management of open pneumothorax is an important treatment to reduce preventable deaths. All open chest wounds should be treated with an occlusive dressing with a one-way valve if available (e.g. Hyfin, Bolin, etc.). If a commercial one-way valve device is not readily available then a completely occlusive dressing should be used with the recognition that the patient is then at significant risk for developing a tension pneumothorax requiring intervention. There is no evidence to support the effectiveness of a 3-sided taped dressing and such an improvised strategy is discouraged. Utilize either a valved occlusive dressing or a completely occlusive dressing with deliberate awareness and monitoring for the development of tension pneumothorax.
  - Hot Zone (Direct Threat) – Occlusive dressings are deferred to the Warm Zone. Patient removal from the threat is the preferred strategy under direct threat and a higher priority.
  - Warm Zone (Indirect Threat) – the use of Occlusive dressings for open pneumothorax is a threat to respiration and breathing and is a clinical priority that should be addressed in the Warm Zone. We should maintain deliberate awareness of the potential to develop a tension pneumothorax following application of an occlusive dressing and maintain readiness to perform chest decompression if there are signs of continued or worsening respiratory distress.
  - Cold Zone (Evacuation Care) – the use of Occlusive dressings for open pneumothorax is a threat to respiration and breathing and is a clinical priority that should be addressed immediately. We should maintain deliberate awareness of the potential to develop a tension pneumothorax following application of an occlusive dressing and maintain readiness to perform chest decompression if there are signs of continued or worsening respiratory distress.

Circulation/Resuscitation – Support of circulation and resuscitation begins with controlling life threatening bleeding, and then preservation and restoration of circulatory volume and blood volume. Notably, our only tool at present is saline administration that will expand volume but not restore blood volume. Saline does nothing to restore clotting factors or oxygen-carrying capacity. There is some evidence that large volumes of saline may increase mortality; however at present, administering blood products in the prehospital phase is not reasonable or achievable.

- Intravenous (IV) fluid administration is limited to the Cold Zone and should be used in accordance with our existing permissive hypotension protocol for penetrating torso trauma. Our existing protocol limits crystalloid resuscitation in

the setting of non-compressible penetrating trauma to the torso. End-points of resuscitation are a palpable radial pulse and mental status (provided no other cause of altered mental status and no co-existent traumatic brain injury warranting higher blood pressure end-point).

- Hot Zone (Direct Threat) – There is no indication for IV fluids at this phase of care.
- Warm Zone (Indirect Threat) – There is no indication for IV fluids at this phase of care.

Head-injury Management/Hypothermia prevention – Consideration specific to head-injury and hypothermia prevention are appropriate for the Cold Zone. Higher priorities take precedence in the Hot Zone and Warm Zone. Attention to these aspects has the potential to decrease morbidity and mortality from delayed complications.

- Head Injury – Prevention of secondary brain injury is critical. Care should be taken to avoid hypoxia and hypotension, which are known to worsen outcome in traumatic brain injury.
  - Oxygen saturation should be maintained above 94%
  - Systolic Blood Pressure should be maintained > or = 110 mm Hg

- Hypothermia preventions – all efforts should be made to avoid hypothermia. Hypothermia, acidosis and coagulopathy are significant contributors to deaths within the first days and are significantly impacted by prehospital management.
  - Remove wet clothing and replace with dry coverings as encapsulated as reasonably achievable while still allowing patient access and monitoring.
  - Place the patient on a vapor barrier to avoid conductive heat loss to the ground.
  - If IV fluids are indicated warmed IV fluids are preferred.

Everything Else - Other Assorted Considerations

- Disarming the patient – An important part of caring for a patient involves ensuring the patient does not pose a threat to himself/herself or the provider. This is true in the traditional EMS context and it applies equally in this high threat context as well. Ensure patient and provider safety by removing weapons from the patient and securing in an approved manner. Rescuers should exercise caution when distraction devices or other explosive devices are present on the patient. These devices should be removed and rendered safe if feasible to do so. This task should be done in the Warm Zone and again more deliberately in the Cold Zone.

- Spinal Motion Restriction (SMR) – Spinal motion restriction has very limited indications in the setting of penetrating trauma and is the same as the traditional EMS environment. There is virtually no role for traditional methods of SMR in the Hot and Warm Zones. When moving the patient from the Warm Zone environment, reasonable efforts to move the patient in an axial, inline manner to minimize movement should be made if the possible. SMR is of greater concern in blast injuries and blunt trauma but risk of worsening spinal injury must be

balanced against risks associated with on scene delays and direct/indirect threat exposure. In most cases SMR is appropriately considered in the Cold Zone.

- Patient Movement/Extraction – In the high threat context, patient movement should be considered a therapeutic treatment with the added value of reducing the continued exposure to the high threat environment. The value of patient movement is weighed against value of alternative priority interventions. This is consistent with the traditional EMS context – a patient is defibrillated at the point of arrest and identification of a VF; they are not carried down from the second-floor bedroom and out to the unit to be defibrillated. Similarly, time-critical injuries are treated as near to the point of wounding as safe and reasonably achievable. Leaving a broad stripe of blood from uncontrolled bleeding along the evacuation corridor does not meet the goal, and yet 12-lead in the Warm Zone is similarly ridiculous. Patient care and patient movement are led by the axiom:

  > "*We should deliver every time-critical, life-saving intervention that reduces death and disability, and nothing that distracts or delays from moving to a secure location and definitive care without clear time-sensitive benefit*."

Teamwork and Decision-Making

The department's paramilitary organizational structure provides the supervisory hierarchy for day-to-day operations in the system. However, strong teamwork and open communication are required on EMS incidents. The best clinical decisions are made in an environment where providers of all ranks and certification levels work together to confirm assessment findings and devise and implement a treatment plan. Everyone on scene has the legal duty to act and the professional responsibility to ensure we deliver the best patient care possible. Anyone with a patient care concern needs to promptly bring it to the attention of the crew leader. Providers should look to their partners, regardless of rank or certification, to confirm and potentially challenge critical patient care decisions.

All providers must realize that these critical decisions and their consequent actions, such as IV medication administration, airway placement, or cardioversion are all as potentially dangerous as beneficial and therefore a team effort is indicated to ensure confirmation of any treatment plan prior to initiation. Each drug administered, no matter how routine, should be verified by a second provider (ALS or BLS) for proper name, dose, route, indication, and expiration date. Any single subjective advanced assessment finding that will dictate treatment (e.g. crackles in the lungs) should be confirmed by another ALS provider.

These routine "checks and challenges" decrease the chance of human error and medical mistakes. In a situation where disagreement regarding patient care arises, consider all options to arrive at the best clinical decision, including:

- Reassessing patient for additional information
- Consulting physician On-Line Medical Direction (OLMD)
- Consulting another ALS provider (e.g. EMS supervisor)
- Erring on the side of caution and pursuing the "most conservative" patient care option

EMT-B's work directly to carry out any indicated diagnostic and therapeutic interventions authorized for All Providers unless directed otherwise. In time critical and/or resource poor situations when ALS Providers (if any) are committed to advanced interventions, every EMT-B is fully authorized and wholly expected to:

- Place King Airways
- Set up and adjust the flow of nebulizers and IV fluid administration sets
- Check and confirm the name and expiration date of IV fluids and medications
- Set up and attach all ECG monitoring electrodes and acquire tracings
- Operate all department AEDs
- Assess breath sounds for presence or absence
- Set up and apply oxygen therapy adjuncts to include CPAP
- Provide suctioning, airway positioning, confirmation, and other assistance to intubation
- Administer auto-injectors per protocol

- Voice their opinion regarding clinical decisions any time they feel it would be in the best interest of the patient

ALS providers must empower their EMT-B partners by allowing them to employ their full scope of practice, encouraging them to learn more about ALS, and asking for and listening to their opinions about patient care. This inclusive attitude will increase interest, involvement, and ultimately improve crew integrity and overall patient care.

ADULT PATIENT CARE PROTOCOLS

Patient Assessment

Recognize that optimal patient care is the goal of every EMS provider and agency. This protocol is intended to serve as a general guideline and framework for assessing and treating adult patients suffering from illness or traumatic injury.

When the need to expose a patient arises, as with a traumatic injury, make every effort to respect the patient's dignity and consider ambient temperatures and conditions.

Scene Survey

- Ensure Scene Safety:
  - Identify and avoid potential hazards
  - If applicable, "Stage" until scene is declared stable
  - Establish safe working area
  - Use personal protective measures

- Identify:
  - Mechanism of injury (MOI)/ Nature of Illness (NOI)
  - Number of patients
  - Need for additional resources
  - Environment where patient is found
  - Position of patient

- Refer to local and/or regional MCI procedures, if indicated.

- Preserve potential crime scene and/or evidence, when possible.

- Update dispatch and pre-alert receiving facilities, as needed.

Initial Assessment

Identify and treat immediate life-threatening conditions.
Consider withholding CPR or termination of resuscitative efforts, if appropriate.

- Establish a general impression while approaching the patient:
  - Age
  - Gender
  - Weight
  - General appearance
- Assess the patient's level of consciousness (AVPU):
  Note: If trauma is suspected, simultaneously establish cervical spine stabilization while assessing the level of consciousness and plan to immobilize as soon as practical.
  - Alert
  - Verbal
  - Painful
  - Unresponsive
- Assess and open the Airway:
  - Trauma patient – jaw thrust
  - Medical patient – head tilt or jaw thrust
  - Clear airway – sweep and suction the airway as needed
  - Maintain airway – use BLS airway adjuncts (OP, NP), as needed
- Assess Breathing:
  - Assess presence, rate, and quality
  - Ensure oxygenation
  - Provide BVM ventilation, as needed
- Assess Circulation (compare core to periphery):
  - Assess presence, rate, and quality
  - Assess for and control major external bleeding
  - Assess skin color, temperature, moisture, and capillary refill
  - Initiate CPR, if indicated
- Identify priority:
  - **Load-and-Go patients** – Critically ill or injured patients requiring immediate attention; unstable patients with potentially life threatening injury or illness. Recommended on scene times include:
    - Trauma: < 10 minutes once providers have full access (e.g. extricated, removed from IDLH, etc.)
    - ACS and Stroke: < 15 minutes
  - **Urgent** – Less serious condition that requires immediate emergency medical attention but does not immediately endanger the patient's life.
  - **Non-Urgent** – Conditions requiring medical attention but not on an emergency basis.

Medical Assessment

Unresponsive Medical Patient **Rapid Medical Assessment**	**Responsive Medical Patient** **Focused Medical Assessment**

• Head to toe assessment:
  ○ Inspection/Visualization
  ○ Palpation
  ○ Auscultation
  ○ Neurological assessment (PMSC)
  ▪ Pulse
  ▪ Motor
  ▪ Sensation
  ▪ Capillary Refill
  ○ Medic Alert jewelry
 	
• Establish baseline vital signs:
  ○ Blood pressure
  ○ Pulse
  ○ Respiration
  ○ Lung sounds
  ○ Pulse oximeter
  ○ End-Tidal CO_2 monitoring
  ○ Skin
  ○ Temperature
  ○ Pupils
  ○ Blood glucose
  ○ GCS
  ○ ECG Monitor/AED
 	
• Obtain prior medical history (from family or bystanders):
  ○ Signs and Symptoms
  ○ Allergies
  ○ Medications
  ○ Past medical history
  ○ Last oral intake
  ○ Events leading up to the emergency
 	
• Look for and correct underlying cause (AEIOU-TIPS)
 	
• Load and Go – Lifesaving interventions and transport
 	
• Complete Ongoing Assessment
	• Determine chief complaint and obtain history of present illness:
	  ○ Onset of symptoms
	  ○ Provoking factor
	  ○ Quality of pain/problem
	  ○ Region/Radiation of pain/Referred pain
	  ○ Severity (pain/discomfort scale)
	  ○ Time (duration)/Treatment prior to arrival (and outcome)
	
	• Obtain prior medical history:
	  ○ Signs and Symptoms
	  ○ Allergies
	  ○ Medications
	  ○ Past medical history
	  ○ Last oral intake
	  ○ Events leading up to the emergency
	
	• Focused Physical exam, on chief complaint
	
	• Establish baseline vital signs:
	  ○ Orientation, GCS
	  ○ Blood pressure
	  ○ Pulse
	  ○ Respiration
	  ○ Lung sounds
	  ○ Pulse oximeter
	  ○ Skin
	  ○ Temperature
	  ○ Pupils
	  ○ Blood glucose
	  ○ ECG Monitor and 12-lead
	  ○ Stroke scale, if indicated
	  ○ Pain/discomfort scale
	
	• Interventions and transport
	
	• Complete Ongoing Assessment

Trauma Assessment

Significant Injury or Significant Mechanism of Injury-Trauma Patient	No Significant Injury or No Significant Mechanism of Injury- Trauma Patient

Rapid Trauma Assessment - Physical Exam and History
 	
• Perform head to toe assessment (DCAPP-BTLS):
  ○ Deformity
  ○ Contusion
  ○ Abrasion
  ○ Puncture
  ○ Penetration
  ○ Burn
  ○ Tenderness
  ○ Laceration
  ○ Swelling
 	
• Neurological assessment (PMSC)
  ○ Pulse
  ○ Movement
  ○ Sensation
  ○ Capillary Refill
 	
• Establish baseline vital signs:
  ○ Pulse
  ○ Blood pressure
  ○ Respiration
  ○ Pupils (reaction & size)
  ○ Lung sounds
  ○ Pain/discomfort scale
 	
• Obtain prior medical history:
  ○ Signs and Symptoms
  ○ Allergies
  ○ Medications
  ○ Past medical history
  ○ Last oral intake
  ○ Events leading up to the emergency
 	
• Load and Go – Lifesaving interventions and transport
 	
• Complete Ongoing Assessment
	Focused Trauma Assessment - Physical Exam and History
	
	• Perform focused physical exam, on chief complaint (DCAPP-BTLS):
	  ○ Deformity
	  ○ Contusion
	  ○ Abrasion
	  ○ Puncture
	  ○ Penetration
	  ○ Burn
	  ○ Tenderness
	  ○ Laceration
	  ○ Swelling
	
	• Focused neurological assessment (PMSC)
	  ○ Pulse
	  ○ Movement
	  ○ Sensation
	  ○ Capillary Refill
	
	• Establish baseline vital signs:
	  ○ Pulse
	  ○ Blood pressure
	  ○ Respiration
	  ○ Pupils (reaction & size)
	  ○ Lung sounds
	  ○ Pain/discomfort scale
	
	• Obtain prior medical history:
	  ○ Signs and Symptoms
	  ○ Allergies
	  ○ Medications
	  ○ Past medical history
	  ○ Last oral intake
	  ○ Events leading up to the emergency
	
	• Interventions and transport
	
	• Complete Ongoing Assessment

Ongoing Assessment

- Perform detailed head to toe assessment or repeat focused physical exam

- Continue assessment to include:
    - Airway
    - Breathing
    - Lung sounds
    - Oxygenation
    - Circulation
    - Skin condition

- Continue neurological assessment, when appropriate:
    - Level of consciousness – assess alertness and orientation to person, place and time
    - Seizure activity or signs of
    - Motor – assess ability to move all extremities
    - Sensory – assess sensation in all extremities
    - Pupils – assess equality and reactivity to light
    - Establish baseline Glasgow Coma Score (GCS)
    - Use the Cincinnati Prehospital Stroke Scale, as needed

- Repeat regularly (every 5 minutes for unstable patients, every 15 minutes for stable) and after any intervention:
    - Orientation
    - Blood pressure/perfusion
    - Pulse
    - Respiration
    - If indicated
        - Lung sounds
        - Pulse oximeter
        - Skin
        - Pain/discomfort scale
        - Pupils
        - ECG monitor and 12-lead
        - GCS
        - Blood glucose
        - Stroke scale
        - End-Tidal CO_2

- Complete required patient care documentation.

ADULT PROTOCOLS

Abdominal Pain

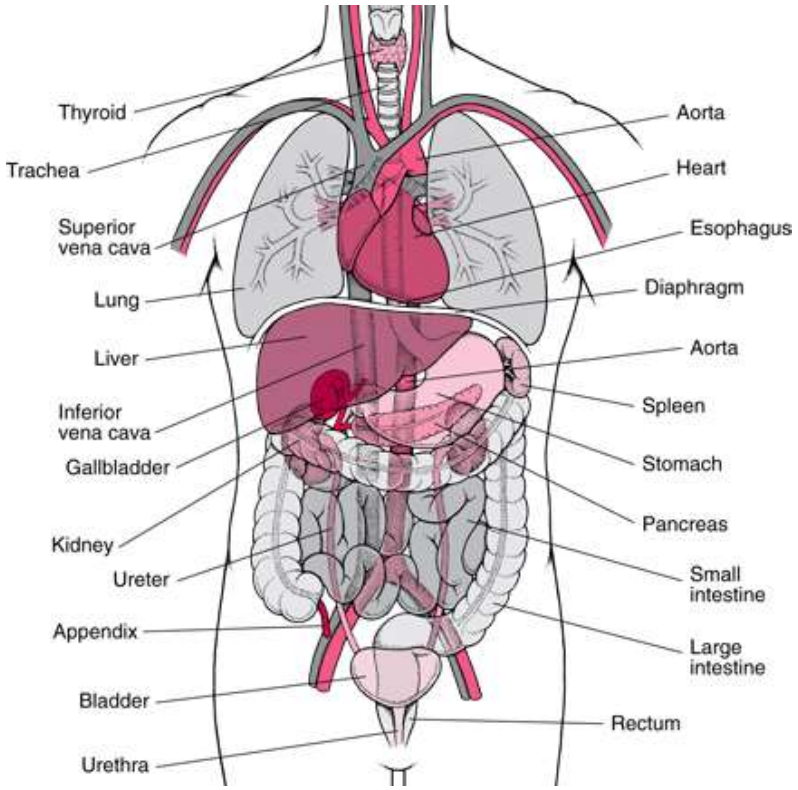
Abdominal pain is a common condition with many causes including gastrointestinal, urological, renal, vascular, gynecological, obstetrical, atypical MI, and traumatic emergencies.

The prehospital care goals are to stabilize and rapidly transport to an appropriate facility.

Clinical Pearls

- Patients with AAA are frequently older than 60 years old and may have a sudden onset of abdominal pain with associated syncope and hypotension.

- Pain preceding vomiting is suggestive of a cause that may require surgical intervention.



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Abdominal Pain

Treatment

All Providers

- Perform assessment: focused exam of the abdomen and flanks (inspection and palpation), and temperature.
- Ensure oxygenation.
- Place patient in the most comfortable position possible and provide reassurance to help relieve pain.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG
- Establish vascular access.
- Follow the **Pain Management** protocol, if indicated.

Acute Coronary Syndrome

Acute Coronary Syndrome (ACS) is an umbrella term used to cover any group of clinical symptoms compatible with acute myocardial ischemia.

Prehospital care goals are focused on re-establishing coronary blood flow, minimizing myocardial injury (with a goal of reduction of pain/distress to zero), ensuring rapid identification and notification and transport to an appropriate ED for revascularization (thrombolytic therapy or angioplasty). The American Heart Association recommends no more than 15 minutes on scene in the case of an identified ST-Segment Elevation Myocardial Infarction (STEMI).

Clinical Pearls

- The actual diagnosis of ACS is based on many factors including history, pre-disposing risk factors, ECG findings, cardiac enzyme studies, and other diagnostic tools.

- In the presence of ACS, blood thinner use is not a contraindication for aspirin and other analgesics (e.g. ibuprofen) are not substitutes for aspirin.

- Points to note:
    - A patient may be suffering an ACS with a perfectly normal 12-lead ECG.
    - A patient may have an abnormal ECG with no signs/symptoms of an ACS.

- Atypical presentations can occur with any population and may include any or all of the following characteristics/complaints: “silent” (painless), abdominal pain, and right arm pain. Right arm pain is in fact one of the most predictive symptoms of ACS.

- Patients with right ventriclular (RV) infarction are heavily dependent on preload and hypotension may occur if nitroglycerin and narcotics are administered.

- Reciprocal changes (ST depression in opposite leads) increase the positive predictive value of STEMI determination.

- Early notification of STEMI should be made to the receiving facility so that activation of the catheterization lab and other life-saving interventions can be initiated.

Acute Coronary Syndrome

Treatment

All Providers

- Time/Care Goals: 5-5-10-2
  - At patient to 12-Lead ECG < 5min
  - STEMI Identification to Alert < 5min
  - STEMI Identification to enroute to facility < 10min
  - 2 ALS providers should be at the patient's side during transport

- Perform assessment andfocused exam to include: past history and self-administration of aspirin and/or nitroglycerin triggered by event.

- Ensure oxygenation.

- If the patient is over 18 years old, administer **Baby Aspirin 2 tablets** (81 mg per tablet).
  - Aspirin may be administered even if the patient has already taken his or her normal daily prescribed (maintenance) dose.
  - If the patient has taken at least 162 mg of aspirin specifically for this event then withhold FRD aspirin.

- If the patient is prescribed nitroglycerin and has been instructed to take it for the observed symptoms, assist patient with prescribed **Nitroglycerin** up to a total of 3 doses **(**total includes self-administration triggered by event prior to EMS arrival).

- Reassess vital signs 5 minutes after each administration and every 5 minutes thereafter.

- Place electrodes/acquire 12-lead ECG.

Acute Coronary Syndrome

Treatment (continued)

ALS Providers

- Continue assessment, to include 12-lead ECG.
  - Unless extraordinary circumstances apply, the initial 12-lead ECG shall be obtained as soon as possible once a 12-lead capable device is available.
  - Inferior wall MIs may be associated with right ventricular (RV) involvement and require a V_4R lead tracing.
  - Findings consistent with STEMI (indicative ST elevations) should be relayed to the appropriate ED (STEMI Alert) as soon as practical, to include making a preliminary notification if the full transport report is not ready.
  - Repeat 12-lead ECG with each reassessment.

- If 12-lead ECG is negative for STEMI but signs/symptoms suggest ACS, perform 15-lead ECG.

- Establish vascular access and consider secondary access.

- If RV infarct (as evidenced by ST elevation in V_4R), **withhold Nitroglycerin and Fentanyl**.

- Administer **Nitroglycerin 0.4 mg** SL every 5 minutes to a max of 3 doses if the patient is over 18 years old (do **NOT** include self- or assisted administration of prescribed Nitroglycerin in total).
  - If evidence of atypical or silent MI exists, titrate treatment to the patient's signs/symptoms and any changes noted on 12-lead ECG.
  - Carefully adhere to blood pressure limits.

- If the patient's pain/discomfort is severe and/or refractory to Nitroglycerin, administer:
  - **Fentanyl 0.5 microgram/kg** IV slow to a max single dose of 50 mcg. If refractory after 5 minutes repeat once.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to a max cumulative dose of 100 mcg.

Acute Coronary Syndrome

Treatment (continued)

- Transport patient to a PTCA capable center, if indicated.

Hospital Communication: STEMI Alert, if indicated and transmit 12-lead ECG, if possible.

Patients should be classified according to 3 successive decision points:

1. Does the clinical picture suggest acute MI? (Yes/No/Uncertain)
2. Does ALS Provider interpret 12-lead to demonstrate ST-segment elevation suggestive of acute MI? (Yes/No/Uncertain)
3. Does the automated algorithm reading state acute MI? (Yes/No/Uncertain)

STEMI Alert, when all 3 criteria are met with **Yes.**

Possible STEMI notification, when 2 of the 3 criteria above are met with **Yes**.

Allergic Reactions

Allergic reactions fall along a spectrum ranging from mild to severe. At the extreme end, anaphylactic reactions are life-threatening and care is focused on reducing or stopping the allergic reaction (exaggerated immune response). The typical response begins within minutes of exposure and primarily involves the cardiovascular and respiratory system.

The prehospital care goals are to vigilantly monitor and maintain the airway, provide cardiovascular support if needed, and reduce or stop the allergic reaction.

Clinical Pearls

- Epinephrine is the only immediate-acting medication for an allergic reaction. Antihistamines and steroids require a significant period of time to exert their therapeutic effects.

- For patients with anaphylaxis, controlling the reaction takes precedence over patient age when giving epinephrine. Be prepared for adverse reactions in patients with coronary artery disease and/or dysrhythmias after giving epinephrine.

- In severe states of hypoperfusion, the patient may not be perfusing sufficiently for IM epinephrine to be fully absorbed.

- Symptoms associated with anaphylaxis may begin within seconds of exposure to an allergen or may be delayed for several hours.

- In some cases of anaphylaxis, the symptoms can become recurrent one hour or more after the initial exposure to the antigen. Patients are encouraged to be transported even if their symptoms are resolved.

Allergic Reactions

Treatment

All Providers

- Perform assessment: focused assessment of exposure to allergens (bee stings, food, medications, etc.). Determine if the patient has self-administered epinephrine autoinjector prior to EMS arrival and document dose.
- Ensure oxygenation.
- Remove any insect stinger(s) by scraping the skin. Apply ice packs to sting sites.

Moderate to Severe Allergic Reaction
If the patient presents with signs of a moderate to severe allergic reaction including respiratory distress (trouble speaking/tachypnea), stridor, airway obstruction/swelling (trouble swallowing), altered mental status, or hypoperfusion:

- Administer Epinephrine as soon as possible using an autoinjector.
  - Use the patient's prescribed autoinjector.
  - If the patient has no prescribed autoinjector**, contact Physician OLMD** for authorization to administer an **FRD Epinephrine 0.3 mg autoinjector** (see below).
- Follow the **Hypoperfusion** protocol, if indicated.

ALS Providers

- Continue assessment.
- Establish vascular access.

Mild Allergic Reaction
If patient presents with signs of a mild allergic reaction including localized swelling/itching/erythema:

- Administer **Diphenhydramine 50 mg** IV or IM.

Allergic Reactions

Treatment (continued)

Moderate to Severe Allergic Reaction
Systemic symptoms are a spectrum and may include diffuse hives/itching/erythema/edema, vomiting/GI symptoms, respiratory symptoms and hypoperfusion. If patient presents with signs of a moderate to severe allergic reaction characterized by symptoms that are not limited to localized cutaneous hives/itching/erythema/edema:

- If respiratory symptoms, airway swelling or hypoperfusion are present:
  - Administer **Epinephrine (1:1,000) 0.3mg** IM in the lateral thigh for patients with respiratory symptoms, airway swelling or hypoperfusion. It is the most rapidly acting agent and should be given early for patients meeting these criteria.
  - If refractory, repeat after 5 minutes.

- Administer **Diphenhydramine 50 mg** IV or IM.

- Administer **Methylprednisolone 125 mg** IV slow.

- If wheezing or shortness of breath is present:
  - Administer **Albuterol 2.5 mg** via NEB, repeat as needed.

- Follow the **Hypoperfusion** protocol, if indicated.

Physician OLMD

- BLS providers: Obtain authorization to use an **FRD Epinephrine 0.3 mg autoinjector**.

- ALS providers:
  In the setting of severe refractory shock, consider:
  - Repeated administrations of **Epinephrine (1:1,000) 0.3mg** IM in the lateral thigh every 5 minutes based on symptoms.
  - **Epinephrine (1:10,000) 0.1-0.25 mg** IV over 5-10 minutes. Administer as follows:
    - **Epinephrine (1:10,000) 0.1-0.25mg (1-2.5 ml) in 100 ml Normal Saline** IV drip **120 gtts/minute** (10 gtts/ml set).

Cardiac Arrest
Withholding Cardiopulmonary Resuscitation (CPR)

Under select circumstances it is reasonable and appropriate for EMS providers to withhold CPR. These situations primarily center around patients with valid DNRs, those with injuries incompatible with life, signs of non-recent death plus asystole, and selected patients in arrest due to blunt/penetrating trauma.

The prehospital care goal is to fully assess the patient in arrest and determine if CPR initiation should be withheld based on established criteria.

Clinical Pearls

- Livor mortis is a settling of the blood in the dependent portion of the body, causing a purplish red discoloration of the skin. Livor mortis starts twenty minutes to three hours after death with maximum lividity occurring within 6 – 12 hours.

- Rigor mortis is the stiffening of all muscles in the body. It sets in after about three to four hours, reaches maximum stiffness after 12 hours, and gradually dissipates until approximately 48 to 60 hours after death.

- There are a number of cases from systems across the country of providers misinterpreting skin findings and contractures to be livor mortis and rigor mortis in live patients. Death should be confirmed with an ECG tracing showing asystole.

Withholding Cardiopulmonary Resuscitation (CPR)

Treatment

All Providers

Promptly initiate CPR on all patients in cardiac arrest unless reliable criteria for determination of irreversible death are present, or a valid Virginia Durable Do Not Resuscitate (VDDNR) or other authorized Do Not Resuscitate (DNR) order is present.

If resuscitative efforts have begun prior to the arrival of EMS providers, but the patient meets the criteria for withholding resuscitation, resuscitative efforts should be discontinued.

Indications for withholding resuscitation in the context of cardiac arrest include:

- Confirmation of a valid VDDNR or other authorized DNR order in accordance with the Office of EMS regulations and the DNR protocol contained herein.
- Conditions obviously incompatible with life:
    - Decomposition
    - Decapitation
    - Incineration
    - Mortal wounds (severe traumatic injuries resulting in the destruction of vital organs such as the brain, thoracic contents, etc.) **plus** the absence of signs of life (organized ECG rhythm, pulse, respirations, pupillary reflex, spontaneous movement).

If hypothermia, drowning, or cold-water immersion is suspected to be the primary cause of cardiac arrest, resuscitative efforts should be initiated and continued through transport to the ED.

ALS Providers

Further indications for withholding resuscitation in the context of cardiac arrest include:

- **Asystole plus reliable signs of non-recent death including:**
    - Dependent lividity
    - Rigor mortis in non-hypothermic patients without contractures

Withholding Cardiopulmonary Resuscitation (CPR)

Treatment (continued)

- **Traumatic Cardiac Arrest:**
  - Blunt and penetrating trauma patients without signs of life or organized rhythm on initial contact may have further resuscitative measures withheld.
    - Signs of life include the following - pulse, spontaneous respiratory effort, spontaneous movement, pupillary reflex.
    - Organized rhythms are any cardiac rhythm other than VF or asystole. PEA represents an organized rhythm.
  - Entrapped patients who deteriorate to the point of having no signs of life and no organized rhythm prior to extrication when extrication and transportation time to the ED/Trauma center is greater than 15 minutes may have further resuscitative measures withheld.

- **Ventricular Assist Device (VAD) patients:**
  - VAD patients in apparent asystole with rigor and/or lividity shall be treated/transported following the **Asystole/Pulseless Electrical Activity** protocol, adhering to the CPR modifications noted elsewhere.
  - Withhold resuscitation only on VAD patients with clearly identifiable traumatic injuries incompatible with life (e.g. decapitation, incineration, hemicorpectomy, destruction of vital organs, etc.) or valid DNRs.
    - Such deceased VAD patients shall not be resuscitated but should be transported to the VAD center following the **Transportation of the Deceased** protocol.

Universal Management

Cardiac arrest is the absence of effective ventricular contraction that immediately results in systemic circulatory failure. Rapid recognition and treatment of lethal dysrhythmias provide the best opportunity for a return of spontaneous circulation (ROSC).

The **Cardiac Arrest** protocol is divided into sub-sections: Withholding Cardiopulmonary Resuscitation (CPR), Universal Management, Asystole/Pulseless Electrical Activity, Ventricular Fibrillation/Ventricular Tachycardia without a Pulse, Hypothermic Arrest, Post Resuscitation Management, and Termination of Resuscitative Efforts.

For patients believed to be in cardiac arrest due to hypothermia, go directly to the **Hypothermic Arrest** protocol.

The prehospital care goals are to identify and treat dysrhythmias (and their underlying causes) in order to achieve ROSC.

Clinical Pearls

- Acidosis is a dynamic process observed during cardiac arrest. It is caused primarily by the lack of blood flow and a decreased delivery of oxygenated blood. Restoration of perfusion, oxygenation and ventilation is the most effective measure to reduce acidosis.

- Sodium bicarbonate administration is linked to a wide array of adverse effects including decreased coronary perfusion pressures, worsening tissue acidosis, and impaired oxygen-delivery at the cellular level.

- If an advanced airway is placed, do not pause chest compressions to deliver ventilations.

- Do not excessively ventilate during cardiopulmonary arrest; too many breaths per minute or breaths that are too large or forceful, reduce the heart's ability to refill and cause gastric distension.

- Gastric distension reduces lung capacity, impeding ventilation.

- In this edition of the EMS Manual, FRD is introducing the Pit Crew concept.

Pit Crew CPR Concept

The best strategy for managing complex activities in a well-orchestrated fashion is to have pre-assigned roles and tasks. Whether it is a football play or a response plan for a house fire, clearly defined roles and assignments helps avoid wasted motion, duplication of efforts, unassigned tasks and other inefficiencies. For this reason we describe guidelines for task assignment and positioning for a Sudden Cardiac Death or CPR. The guidelines describe a successful model and are strongly encouraged. Clearly there will need to be room for reasonable deviations and adaptation as they are applied to any specific call. Use them to guide and form a basis for assignments with latitude to adapt to the specifics of the call.

These assignments and positions illustrate the management prior to arrival of the LUCAS 2 device but anticipate its application when available. They also show the resuscitation being worked on scene to the anticipated end-point of either Return of Spontaneous Circulation (ROSC) or termination. Adjustments are appropriate when this is not reasonable or achievable.

The principles remain

- Good fast, hard, and deep compressions with adequate recoil.
- Minimal interruption in compressions.
- Rotate every two minutes.
- Monitor/AED applied as soon as feasible to deliver timely energy to shockable rhythms.
- Management of airway and breathing is important but secondary to CPR and early defibrillation, particularly during the early electrical phase of sudden cardiac arrest.
- Two-handed mask seal if resources allow and controlled ventilation – Avoid over-ventilation!
- Generally speaking cardiac arrests should be worked immediately at the point of arrest until they reach one of three end-points:
    1. ROSC is obtained,
    2. Criteria for Termination of Resuscitation (TOR) are met after at least 20 minutes of full resuscitative efforts,
    3. Exclusion criteria for TOR are met and initial resuscitation to the point of 3 shocks for shockable rhythms and/or 3 drugs for non-shockable rhythms.

Priorities in order: Good quick CPR, then AED/Monitor applied ASAP to shock shockable rhythms, then address breathing, then vascular access and then drugs.

How do we make this a reality

- First person entering room does initial assessment of responsiveness, breathing, pulse and begins immediate CPR as indicated.
- Second person entering brings and applies the AED/Monitor. Primary responsibility is AED/Monitor operations, secondary responsibility is alternating compressions with first provider and both monitor the rate/depth/recoil of the other during off cycle.
- Third Person entering brings airway bag, oxygen, suction and positions at the head of the patient. Primary responsibility is airway management and BVM.

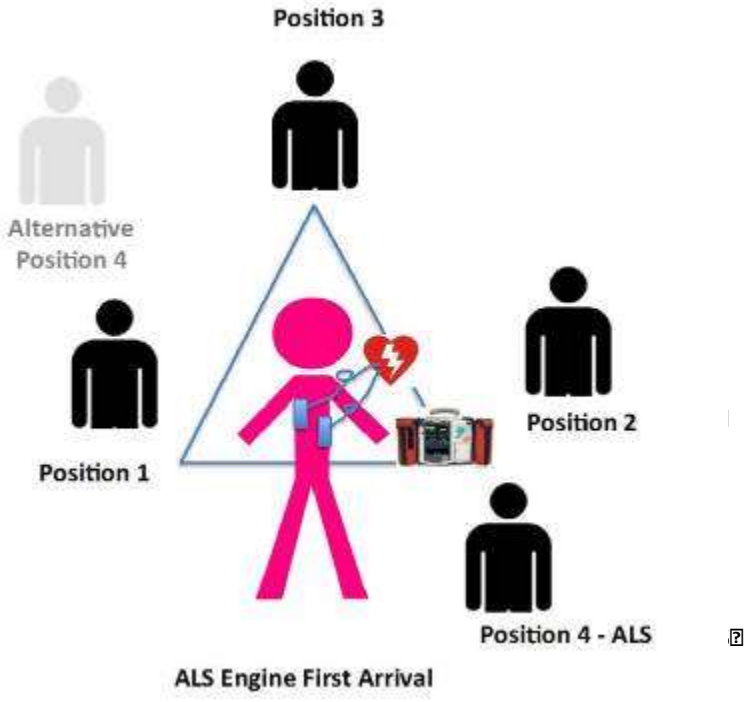
- Following first shock or no shock advised the ALS provider moves to a position, which allows BLS on each side of the patient and one at the head. In this way the three EMTs form the BLS Triangle. The two sides alternate CPR and monitor CPR quality of the other in off cycles and are available to assist the EMT at the head with either King Airway placement, or BVM with two handed mask seal as needed.
- From outside the BLS Triangle the ALS provider has access to peripheral veins for IV or humeral head/tibia for IO access and drug administration.

First arriving units

For purposes of illustration two figures follow showing:

- Suggested ALS First Response Engine/Truck/Rescue positioning and assignments.
- Suggested 1+1 Medic unit positioning and assignments.

Suggested ALS First Response Engine/Truck/Rescue positioning and assignments



Person in Position 1 (P1) always on the patient's <u>right side</u>

1. Initial patient assessment of responsiveness, breathing, pulse
2. Initiates CPR – continuous compressions until AED/Monitor is applied and P2/P3 arrive
3. Provides ventilations in the off cycle
4. King Airway preparation in the off cycle

Person in Position 2 (P2) always on the patient's <u>left side</u>

1. Brings and operates the AED unless Manual Monitor is used by P4
2. Alternates compressions with P1
3. Ventilates in off cycle
4. Assists with King Airway preparation if needed in off cycle

Person in Position 3 (P3) always at the patient's <u>head</u>.

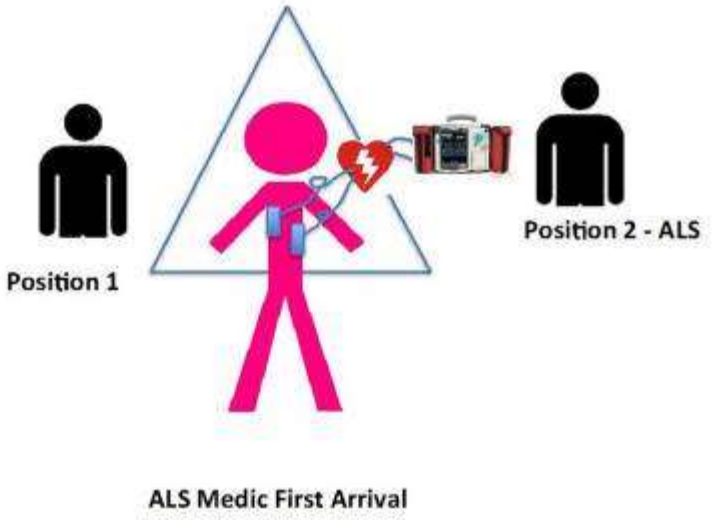
1. Opens/clears the airway and inserts OPA
2. Assembles BVM
3. Provides 2 hand mask seal
4. Inserts/secures King Airway & ETCO2

Person in Position 4 (P4) always outside the "CPR Triangle"

1. Team Lead – likely ALS provider from Engine
2. May assist with King Airway preparation and securing if needed from alternative position.
3. May move to the position to operate manual defibrillator unless run off AED.
4. At the appropriate time is responsible for vascular access and drugs unless supplemented by Medic unit –from the illustrated position, right or left lower

Figure 1: ALS Engine first on scene

Suggested 1+1 Medic unit positioning and assignments



Person in Position 1 (P1) always on the patient's right side

1. Initial patient assessment of responsiveness, breathing, pulse.
2. Initiates CPR – continuous compressions until AED/Monitor applied and P2 arrives with BVM to assist
3. Provides ventilations in the off cycle
4. King Airway preparation in the off cycle

Person in Position 2 (P2) always on the patient's left side (ALS Provider)

1. Brings and operates the AED/Monitor
2. Alternates compressions with P1
3. Provides ventilation in the off cycle
4. Assists with King Airway preparation if needed in off cycle.
5. Establishes vascular access and administers drugs

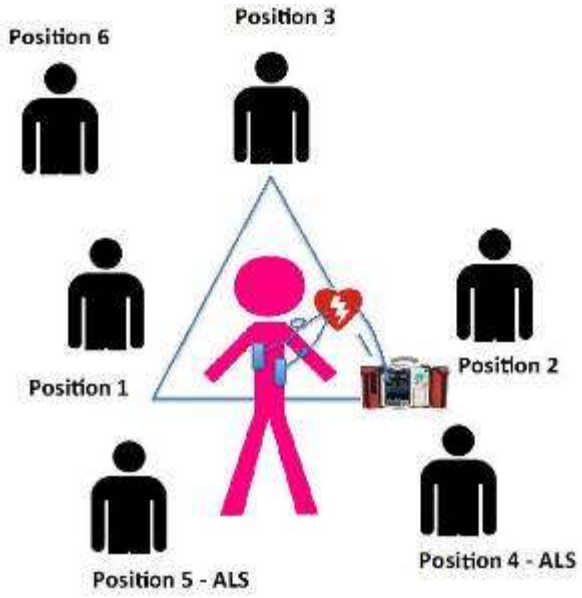
Figure 2: Medic Unit first on scene

Transition and integration of additional personnel

When additional units arrive new providers are integrated. Both scenarios shown in Figures 1 and 2 adjust to the final positions/assignments as illustrated below in Figure 3:

- If Engine is present and Medic unit arrives afterward, the Engine ALS provider at Position 4 continues ALS care position illustrated in Figure 1. The Engine medic will retain responsibility for either vascular access and medication administration or monitor use and delegates the other task to second medic provider in Position 5.
- If the Medic Unit is present and in position as shown in Figure 2 and the Engine arrives afterward, 2 Engine EMT's take over responsibility for compressions from right and left side of the BLS Triangle. This relieves the Medic Unit EMT so he can move to assume Position 6. The Medic Unit ALS provider moves to the patient's left hip (P4) and continues ALS care. P4 retains either monitor operation or vascular access/drugs and assigns the other task to the Engine Medic who positions himself/herself at the other side.

Suggested ALS First Response unit + Medic unit



ALS Engine First Response plus Medic Unit

Person in Position 1 (P1) always on the patient's <u>right side</u>
1. Continues CPR, alternating with P2
2. Monitors rate, depth, and recoil to assure high quality CPR in the off cycle
3. Assist with LUCAS 2 placement when available

Person in Position 2 (P2) always on the patient's <u>left side</u>
1. Alternates compressions with P1
2. Monitors rate, depth, and recoil to assure high quality CPR in the off cycle
3. Assist with LUCAS 2 placement when available.

Person in Position 3 (P3) always at the patient's <u>head</u>.
1. Opens/clears the airway and inserts OPA
2. Assembles BVM
3. Provides 2 hand mask seal
4. Inserts/secures King Airway & ETCO2

Person in Position 4 (P4) remains outside the "CPR Triangle", moves to the lower location
1. Team Lead – until transfer report to transport medic
2. Retains either responsibility for monitor use or vascular access & medications
3. Delegates either monitor operation or vascular access/drugs to P5 ALS provider from Medic unit

Person in Position 5 (P5) outside the "CPR Triangle" ALS provider off Medic unit
1. Assumes responsibility for either vascular access & drugs or monitor operations.
2. May assume Team Lead following transfer of care report or may continue to support the ALS Engine provider

Person in Position 6 (P6) EMT off medic unit
1. Moves to the head of the patient to assist in airway management and ventilation. Watches closely to avoid over-ventilation
2. May assist with King Airway placement and securing if needed.
3. May assist with SAMPLE history and planning patient movement at the appropriate times.

Figure 3 – ALS first response unit + Medic unit

Universal Management

Treatment

All Providers

- Perform assessment.
  - Unresponsive
  - Not breathing or gasping only

- Consider appropriateness of resuscitation.
  - Presence of DNR
  - Reason for Withholding CPR

- Confirm pulselessness, initiate chest compressions, apply and utilize defibrillator as soon as it is available (use only FRD pads or those from responding mutual aid transport units).
  - When performing chest compressions – "Push Hard and Push Fast" at a rate of at least 100 per minute and a depth of at least 2 inches, in a ratio consistent with AHA and Pit Crew recommendations (continuous compressions until adequate personnel at patient's side then of 30:2). Ensure full chest recoil and minimize interruptions in chest compressions.
  - In the setting of witnessed and unwitnessed cardiac arrest, chest compressions should not be delayed while applying defibrillator pads and analyzing cardiac rhythm.
  - Place the Q-CPR sensor and engage function, if available.
  - Apply LUCAS 2 device, as soon as available. Discontinue use of Q-CPR.
  - Do not initiate chest compressions on TAH or VAD patients.
    - If the VAD device has an external emergency pump/actuator, follow directions.
    - All other resuscitative measures should be performed as normal.

- Maintain adequate airway position and ventilate.
  - Ensure patent airway, use BLS adjuncts and suction as necessary.
  - Ensure proper rate and volume of ventilation with BVM using 100% oxygen.
  - Establish advanced airway, if indicated.
    - After placement of an advanced airway, do not pause chest compressions to deliver ventilations.
  - Place End-Tidal CO_2 monitor.

- BLS Providers: repeat sequence of 5 cycles of CPR, AED analyze, and shock if advised until ALS providers arrive, the patient starts to move, or providers can feel a pulse.

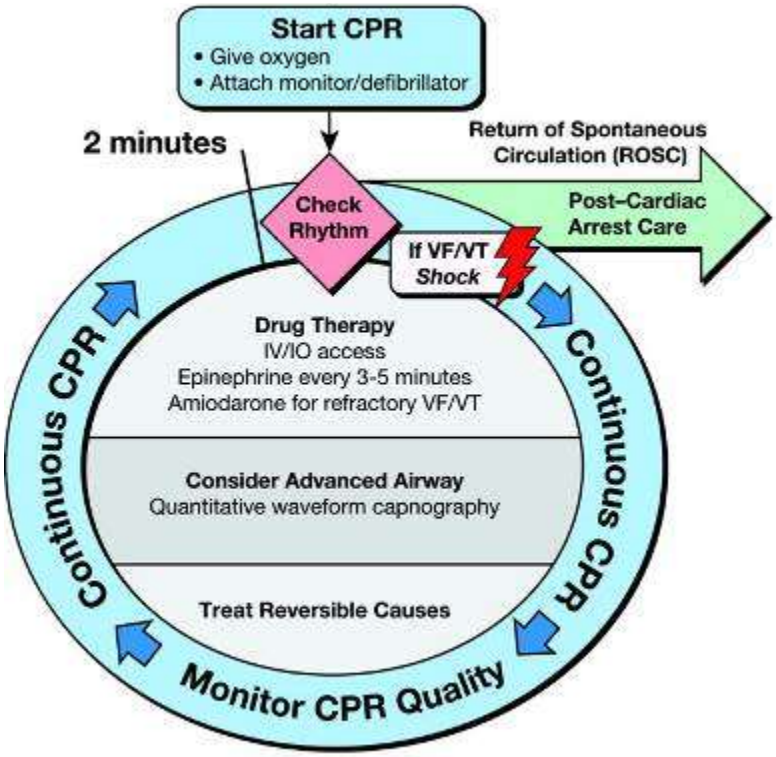
- Perform blood glucose assessment.

Universal Management

Treatment (continued)

ALS Providers

- Continue patient assessment. Consider and treat underlying causes.
    - In the case of traumatic arrest with suspected thoracic involvement, consider bilateral chest decompression.
- Transfer the Q-CPR cable (if placed by first responders) to the transport unit's monitor/defibrillator to ensure continuity.
- Establish vascular access.
- Monitor End-Tidal CO_2.
- Interpret rhythm and follow appropriate cardiac arrest protocol.
- Give medications in a "Drug during CPR, Shock" sequence.
- If patient regains pulse, reassess vital signs, maintain patent airway, support respirations and follow the **Post Resuscitation Management** protocol.
- When appropriate, consider the **Termination of Resuscitative Efforts** protocol.



Universal Management

Treatment (continued)

Reversible Causes

H's & T's	Treatment
Hypovolemia	Stop any bleeding. Consider fluid administration.
Hypoxia	Ensure patent airway and effective ventilation. Avoid excessive ventilations.
Hydrogen Ion (acidosis)	Ensure effective ventilations.
Hyperkalemia	Consider administration of Calcium Chloride, Sodium Bicarbonate, and Albuterol per **Metabolic Emergencies: Electrolyte Abnormalities** protocol.
Hypothermia	Prevent heat loss. Do not rewarm hypothermic patients.
Tension Pneumothorax	Decompress chest per protocol.
Tamponade, cardiac	Assess and report to ED.
Toxins	Assess, document, administer antidote per protocol and report to ED.
Thrombosis, pulmonary	Assess, consider 12-lead and report to ED.
Thrombosis, coronary	Assess, consider 12-lead and report to ED.

Asystole/Pulseless Electrical Activity

Asystole is the absence of mechanical or electrical cardiac activity.

Pulseless Electrical Activity (PEA) is the absence of a detectable pulse and the presence of any type of organized rhythm other than ventricular tachycardia.

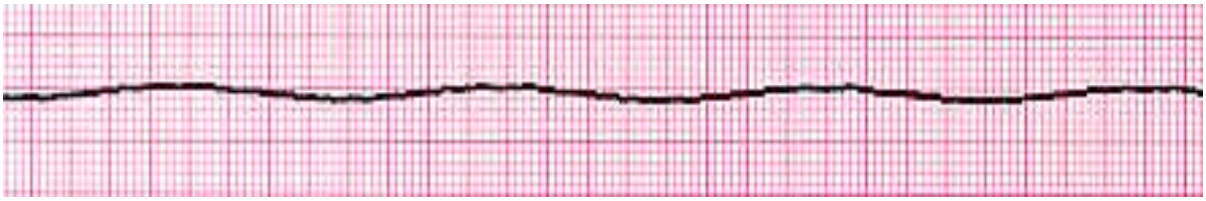
The prehospital care goals are to identify and treat dysrhythmias (and their underlying causes) in order to achieve ROSC.

Clinical Pearls

- Asystole can occur following a lightning strike that depolarizes cardiac pacemakers. A rhythm may return spontaneously or shortly after CPR is initiated. These patients may survive if given immediate attention.

- Research indicates some mechanical contraction is often present in PEA but is not sufficient to generate a corresponding mechanical pulse.

Asystole



Rate	Regularity	P Wave	PR Interval	QRS
0	No Electrical Activity	Absent	Absent	Absent

Asystole/Pulseless Electrical Activity

Treatment

All Providers

- Follow **Cardiac Arrest** – **Universal Management** protocol**.**

ALS Providers

- Check cable connections and confirm asystole in more than one lead.
- Perform focused assessment to include H's and T's.
- Administer **Epinephrine** every 3–5 minutes
  - **Epinephrine (1:10,000) 1 mg** IV
  - If no vascular access, **Epinephrine (1:10,000) 2 mg** ET

Ventricular Fibrillation/Ventricular Tachycardia without a Pulse

Ventricular fibrillation is characterized by a chaotic ventricular rhythm that is usually the result of multiple re-entry circuits within the ventricles.

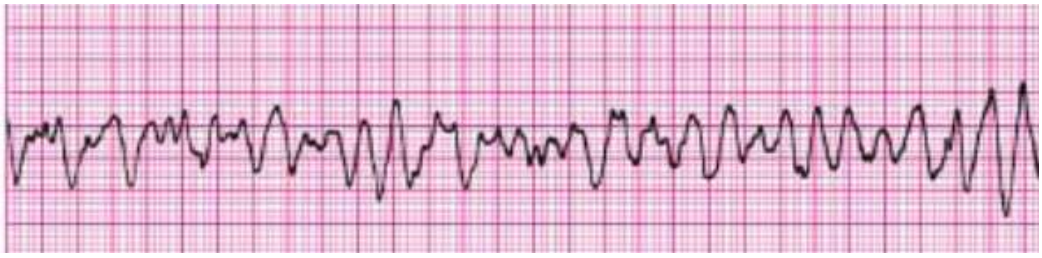
Ventricular tachycardia is three or more ventricular complexes in succession. Sustained ventricular tachycardia without a pulse requires the same treatment as ventricular fibrillation.

The prehospital care goals are to identify and treat dysrhythmias (and their underlying causes) in order to achieve ROSC.

Clinical Pearl

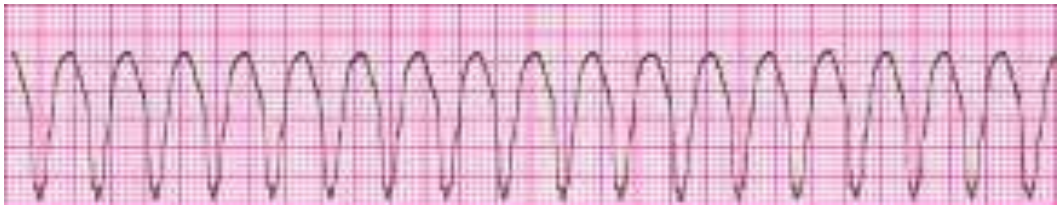
- Alternating current (AC) from man-made sources of electrical current usually results in VF.

Ventricular Fibrillation



Rate	Regularity	P Wave	PR Interval	QRS
0	Unorganized	Absent	Absent	Absent

Ventricular Tachycardia



Rate	Regularity	P Wave	PR Interval	QRS
100 – 250 (Approx.)	Regular	Absent	None	Wide (> 0.12)

Ventricular Fibrillation/Ventricular Tachycardia without a Pulse

Treatment

All Providers

- Follow **Cardiac Arrest** – **Universal Management** protocol.

ALS Providers

Note: After the **second shock**, medication should be given in a "Drug during CPR, Shock" sequence. CPR is only interrupted to analyze the rhythm, to deliver defibrillations, or when an organized rhythm with ROSC is achieved. Deliver medication during each cycle of CPR.

- **Defibrillate** – **150J** (Philips MRx)
- Resume **CPR** for 2 minutes
- **Defibrillate** – **150J** (Philips MRx)
- Resume **CPR** for 2 minutes
  - Drug during CPR

▪ Administer **Epinephrine**

- **Epinephrine (1:10,000) 1 mg** IV
- If no vascular access, **Epinephrine (1:10,000) 2 mg** ET

- **Check rhythm. If rhythm changes, check pulse.**
  - If no pulse and not shockable, continue CPR and proceed to the appropriate protocol.
  - If pulse is present, proceed to the **Post Resuscitation Management** protocol.
- **Defibrillate** – **150J** (Philips MRx)
- Resume **CPR** for 2 minutes
  - Drug during CPR

▪ Administer **Amiodarone 300 mg** IV

▪ If patient has a known allergy to Amiodarone administer **Lidocaine**

- **1.5 mg/kg** IV or
- If no vascular access, **3 mg/kg** ET

▪ For patients in torsades de pointes (as initial dysrhythmic prior to Amiodarone), administer **Magnesium Sulfate 2 grams in 100 ml of Normal Saline** IV drip **run wide open** (10 gtts/ml set).

Ventricular Fibrillation/Ventricular Tachycardia without a Pulse

Treatment (continued)

- **Check rhythm. If rhythm changes, check pulse.**
  - If no pulse and not shockable, continue CPR and proceed to the appropriate protocol.
  - If pulse is present, proceed to the **Post Resuscitation Management** protocol.

- **Defibrillate** – **150J** (Philips MRx)

- Resume **CPR** for 2 minutes
  - Alternate drugs (Epinephrine or antidysrhythmic) during CPR. Do not use multiple antidysrhythmics (Amiodarone and Lidocaine).
    - **Epinephrine (1:10,000)** every 3–5 minutes
      - **1 mg** IV
      - If no vascular access, **2 mg** ET
    - If **Amiodarone** given initially,
      - Second (final) dose **150 mg** IV
    - If **Lidocaine** given initially, second and third (final) dose
      - **0.75 mg/kg** IV
      - If no vascular access, **1.5 mg/kg** ET

- Continue with the "Drug during CPR, Shock" sequence.

Hypothermic Arrest

For patients whose arrest is believed to be due to hypothermia (core temperature below 95° F).

The prehospital care goal is to provide the best opportunity for a ROSC by preventing ongoing heat loss, rapidly recognizing and treating lethal dysrhythmias, and rapidly transporting to a receiving facility.

Clinical Pearls

- Defibrillation may not restore an organized electrical rhythm in a heart less than 86^{o} F.

- Medications may not be effectively metabolized by the hypothermic patient. Therefore, standard dosing regimens may result in the accumulation of these medicines which are then delivered to the central circulation and target tissues when perfusion resumes.

Hypothermic Arrest

Treatment

All Providers

- Perform assessment. Consider appropriateness of resuscitation and any reasons for withholding CPR. Assess:
  - Airway, Breathing, Circulation
  - Check pulse for 30 – 45 seconds to differentiate absence of pulse from profound bradycardia.
  - If no pulse, begin CPR.
  - If a pulse is present, follow **Hypothermia** protocol.

- Initiate sequence of 5 cycles of CPR, AED analyze, and shock if advised.
  - If patient is greater than 86^{o} F, follow **Cardiac Arrest – Universal Management** protocol.
  - If patient is less than 86^{o} F, limit defibrillation to one shock. If refractory after initial shock, continue with CPR.

- Initiate or maintain adequate airway position and ventilate patient.
  - Ensure patent airway, use adjuncts and suction as necessary.
  - Ensure proper rate and volume of ventilation with BVM using 100% oxygen.

- Prevent additional heat loss by removing wet, cold or constrictive clothing from patient. Place patient in warm environment and prevent re-exposure to wind and cold temperature.

ALS Providers

- Continue assessment and perform blood glucose.

- Interpret rhythm and follow appropriate cardiac arrest protocol. Remember defibrillation is limited to one shock, including shocks by an AED, for patient below 86^{o} F.

- Double the time intervals between medications.

- If the patient regains a pulse, reassess vital signs, maintain patent airway, support respirations, and follow **Post Resuscitation Management** protocol.

Post Resuscitation Management

Return of spontaneous circulation (ROSC) refers to the return of a spontaneous (self-sustaining) pulse in the patient. ROSC patients may or may not have a return of breathing. The patient's ROSC can occur as a result of an intervention or for undetermined reasons.

The prehospital care goal is focused on maintaining perfusion to improve neurological outcome.

Clinical Pearls

- Excessive ventilation has potentially adverse effects including increased intrathoracic pressure which causes decreased cardiac filling and decreased coronary perfusion.

- Prehospital passive cooling may be beneficial to the patient's outcome. In-hospital targeted temperature management ($96.8^{o}F/36^{o}C$) has been demonstrated in certain populations to improve the patient's neurological outcome because metabolic demand is decreased, particularly in the brain.

Post Resuscitation Management

Treatment

All Providers

- Reassess airway, oxygenation, ventilation, vital signs, and interventions.
- For patients that are comatose, hemodynamically stable, and cardiac arrest not due to hypothermia
  - Initiate targeted temperature management (96.8°F/36°C) by exposing patient's core, covering with wet sheets and applying cold packs to the head, neck, armpits, and groin.
- Place monitors
  - Place electrodes/acquire 12-lead ECG
  - End-Tidal CO_2

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Reassess underlying cause for arrest (H's & T's) and treat if indicated.
- Initiate targeted temperature management (96.8°F/36°C) by administering **1,000 ml/hr Iced Normal Saline** IV drip (10 gtts/ml set).
- Follow the **Hypoperfusion** protocol, if indicated.
- If patient is persistently **bradycardic**,
  - Optimize ventilation and oxygenation by maintaining oxygen saturation ≥ 94 and consider an advanced airway if not placed previously.
  - Administer chronotropic drip with **Dopamine 400 mg in 250 ml Normal Saline IV drip at 10 microgram/kg/min (60 gtts/ml set)** titrated to HR > 60 and SBP > 90 (MAP > 65), alternatively or in addition transcutaneous pacing may be indicated for persistent bradycardia.
- In order to prevent removal of advanced airways, periodically evaluate the patient for response to noxious stimulus (mild pain response, pinching the hand, etc.). If the test is positive, administer **Midazolam 2 mg** IV slow.
  - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
- If arrest occurred in the setting of suspected cyanide poisoning or severe smoke inhalation, follow the **Poisonings – Cyanide Exposure** protocol.

Post Resuscitation Management

Treatment (continued)

Transportation Considerations:

- Transport patients with ROSC to a PTCA/PCI capable facility (not an ECC). If not possible, transport to a hospital-based ED.
- If **Cyanokit** has been administered, **contact Physician OLMD** regarding destination selection.

Termination of Resuscitative Efforts

Under select circumstances it is reasonable and appropriate for EMS providers engaged in the resuscitation of a medical patient to stop, assess progress, and then terminate further efforts if that patient has not responded.

This protocol is primarily intended for medical patients. Traumatic arrest is generally covered under the **Withholding Cardiopulmonary Resuscitation (CPR)** protocol. As severely injured patients should be transported as rapidly as possible to definitive surgical care, they are not candidates for extensive on scene treatment, and arrests in the unit are excluded from this protocol.

For patients who meet the criteria below and fail to respond to full resuscitative efforts in the prehospital setting, termination of efforts is permitted with Physician OLMD.

The prehospital care goals are to provide comfort and compassion to family and friends present in those cases where the patient has not responded to treatment and to facilitate subsequent care of the deceased.

Clinical Pearls

- The public's perception of survival following cardiac arrest is overly optimistic; studies suggest that the public vastly over estimates the likelihood of resuscitation and return to functional status.

- End Tidal CO_2 < 10 despite full and complete resuscitative efforts predicts death and not return of spontaneous circulation (ROSC).

Termination of Resuscitative Efforts

Treatment

ALS Providers

- Continue resuscitative efforts according to rhythm and consider the following to verify protocol eligibility:
  - Resuscitative efforts **may not be terminated** in the following circumstances:
    - Patient under 18 years of age
    - Any arrest from
      - Hypothermia
      - Drowning/Cold Water Immersion
      - Overdose
    - Any EMS witnessed arrest
    - ROSC (transient or permanent) at any point during the resuscitation
    - Any conversion to a shockable rhythm (VF/VT) during resuscitation
      - This does NOT include initially presenting VF/VT shocked to persistent asystole/PEA
    - Provider feels efforts should continue
    - Physician OLMD feels efforts should continue

  - A reasonable trial of resuscitative efforts has been delivered for a minimum of 20 minutes from initiation of ALS care (application of ECG monitor and identification of initial rhythm). A trial of resuscitative efforts includes:
    - CPR, and
    - Defibrillation (if applicable), and
    - Successful ventilation via advanced airway (to include King LT-SD), and
    - Successful vascular access (to include IO), and
    - Appropriate pharmacological intervention

- On verification of eligibility, the EMS Supervisor shall:
  - Gather all information required for the **Termination Request**
  - **Contact Physician OLMD** to make the alert, obtain permission to terminate and time of death.
  - Ensure all interventions are left in place and the body is left uncovered.
    - If the body is in public view and/or concealment is required by propriety/privacy, a clean sheet from the transport unit shall be used.

Termination of Resuscitative Efforts

Treatment (continued)

- Coordinate on scene assistance:
  - Advise police/nursing home staff of situation and assist as needed.
  - Assist any family/friends as needed:
    - If the family is unable to arrange transport of the deceased, Priority 2 transport of the decedent may be offered. Follow the **Transportation of the Deceased** protocol.
    - If family counseling and support resources are unavailable, counseling and related assistance may be offered.

- Record time of death declared by Physician OLMD, include it in the PCR, and leave all therapeutic equipment in place.

Hospital Communication: Termination Request, if indicated
For patients who have met the criteria for Termination of Resuscitative Efforts, a formal request should be made and include the following

- Age/Gender
- Current arrest status/rhythm
- Timeline
  - Last seen alive
  - 911 call/dispatch
  - Initiation of EMS treatment
  - Duration of efforts so far
  - Total down time
- Pertinent history
- Treatments
  - Medications
  - Airway
  - End-Tidal CO_2 readings
  - Patient response to treatment
  - Transfer of Care

Cardiac Dysrhythmias
Atrial Fibrillation/Atrial Flutter

Atrial fibrillation (A-Fib) is the result of abnormal electrical impulses in the atria that cause the ventricles to contract irregularly. New onset A-Fib with slow or fast conduction and chronic A-Fib with rapid ventricular response are the most clinically relevant. Atrial flutter is similar to A-Fib except the ventricles can contract regularly. A-Fib and atrial flutter are treated the same in the prehospital setting.

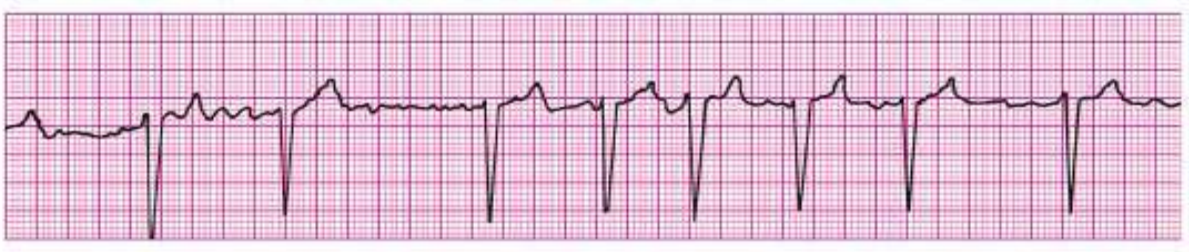
The prehospital care goals are to identify and assess for symptoms attributable to the tachycardic rhythm; classify as asymptomatic, symptomatic but stable, or unstable, and treat accordingly.

Clinical Pearls

- The hallmark of A-Fib is a narrow-complex tachycardia that is irregularly irregular.
- A-Fib may cause syncope, orthostatic hypotension, or hypotension due to the loss of atrial kick. Rate related signs and symptoms usually occur at rates greater than 150 beats per minute, but can occur at any rate.
- Chronic A-Fib is the most common dysrhythmia seen in patients over 65 years old. In these patients, A-Fib is generally well tolerated and the ventricular rate is controlled.
- Chronic A-Fib with rapid ventricular rate may be due to medication non-compliance or other underlying illnesses including fever, infection, ischemia, PE, etc.
- Patients with A-Fib lasting longer than 24 hours are at a greater risk of clot formation. These patients are frequently placed on anticoagulants before elective cardioversion. Due to the risks of dislodging a clot, cardioversion should generally be limited to those patients who are unstable due to the dysrhythmia.

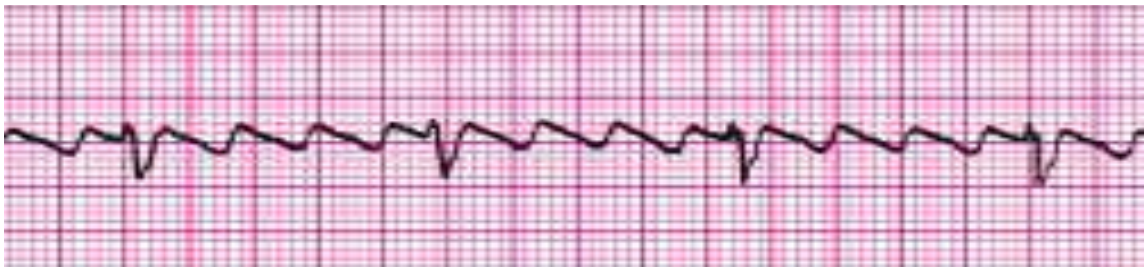
Atrial Fibrillation/Atrial Flutter

Atrial Fibrillation



Rate	Regularity	P Wave	PR Interval	QRS
Varies (Dependent on Ventricular Response)	Irregular	Non-Discernible	None	Normal (0.4 - 0.12)

Atrial Flutter



Rate	Regularity	P Wave	PR Interval	QRS
Varies (For 2:1 conduction rate will be about 150)	Regular	Flutter Wave, Upright & "Saw Tooth"	N/A	Normal (0.4 - 0.12)

Atrial Fibrillation/Atrial Flutter

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. Whenever the patient condition and time allow, the 12-lead ECG should be obtained prior to initiation of treatment.
- Establish vascular access.
- Consider treatable causes for tachycardic rhythms (e.g. hypoxia, AMI).
- **Stable:** Provide supportive care, monitor and transport.
- Patients with an implantable cardioverter defibrillator (ICD):
    - If patient is stable and receiving multiple discharges from the ICD with transient restoration of a normal rhythm, administer **Midazolam 2 mg** IV slow.
        - For patients greater than 65 years of age give ½ the single dose stated above.
- **Unstable**: Prepare for synchronized cardioversion in patients with a ventricular rate over 150 beats per minute.
    - Signs/Symptoms attributable to the tachycardia:
        - Acutely altered mental status
        - Hypotension
        - Ischemic chest discomfort
        - Acute heart failure
        - Other signs of shock
    - Perform **Synchronized Cardioversion** at **100 Joules** (Philips MRx). If refractory, increase energy to **150J, 200J** as needed.
        - Consider **Midazolam 2 mg** IV slow.
            - For patients greater than 65 years of age give ½ the single dose stated above.

Bradycardia (including AV blocks)

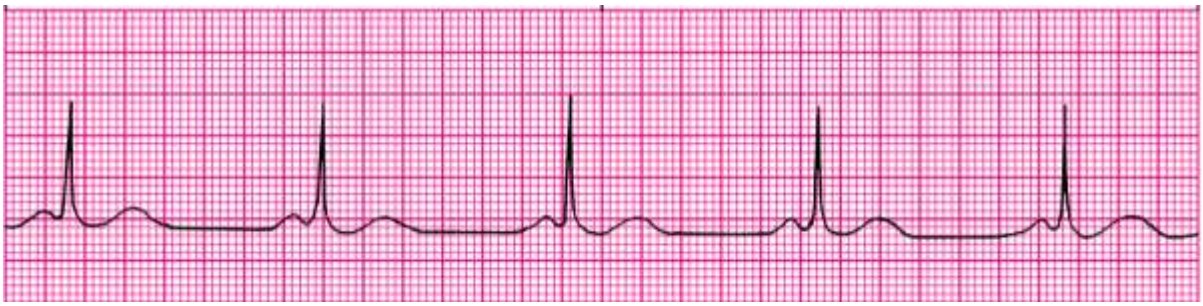
Symptomatic bradycardia is a heart rate less than 60 beats per minute with signs suggesting that the heart rate is the underlying cause for the patient's clinical condition.

The prehospital care goal of the symptomatic patient is to manage the bradycardia.

Clinical Pearls

- Autonomic influences, hypothermia, drugs, and intrinsic disease of the cardiac conducting system may lead to bradycardia.
- Acute MI can affect the cardiac conducting system and produce bradydysrhythmias ranging from sinus bradycardia to high degree AV block.
- Many people, particularly athletes, have a low resting heart rate.

Sinus Bradycardia



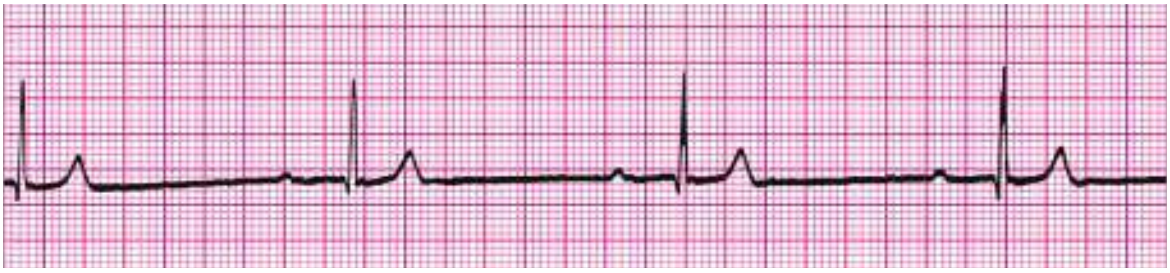
Rate	Regularity	P Wave	PR Interval	QRS
Slow (< 60)	Regular	Present, Upright & Rounded	Constant, (0.12 - 0.20)	Normal (0.4 - 0.12)

AV Blocks

AV Block	PR Interval	R – R Regularity
1^{o}	Constant	Regular
2^{o} Type I	Varies	Irregular
2^{o} Type II	Constant	Irregular
3^{o}	Varies	Regular

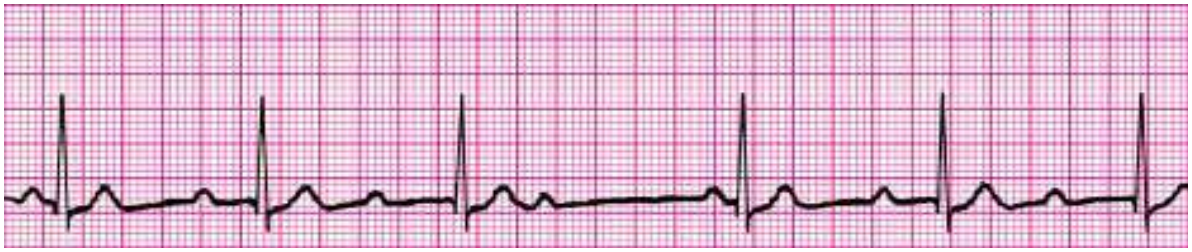
Bradycardia (including AV blocks)

1st Degree AV Block (Underlying NSR)



Rate	Regularity	P Wave	PR Interval	QRS
Depends on Underlying Rhythm	Regular	Present, Upright & Rounded	Constant, Long (> 0.20)	Normal (< 0.12)

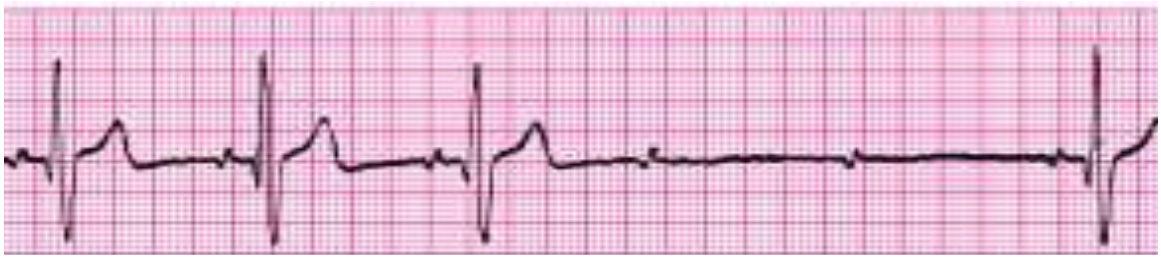
2nd Degree Type I (Wenckebach)



Rate	Regularity	P Wave	PR Interval	QRS
Varies	Irregular	Present, Upright & Rounded but drops	Varies Long, Longer, Drop	Normal (< 0.12)

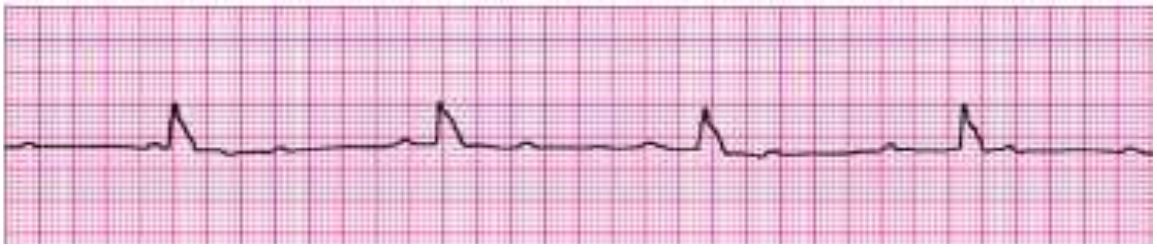
Bradycardia (including AV blocks)

2nd Degree Type II



Rate	Regularity	P Wave	PR Interval	QRS
Varies	Irregular	Present, Upright & Rounded but drops	Constant, Long with Dropped beats (> 0.20)	Normal to Wide (0.12 or more)

3rd Degree



Rate	Regularity	P Wave	PR Interval	QRS
Slow (< 60	Regular	Present, Upright & Rounded	No correlation with QRS Complexes	Usually Wide (> 0.12)

Bradycardia (including AV blocks)

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. Whenever patient condition and time allows, the 12-lead ECG should be obtained prior to initiation of treatment.
- Establish vascular access. Look for and correct underlying causes, H's and T's.
- **Stable**: Provide supportive care, monitor and transport.
- **Unstable**:
  - Signs/Symptoms caused by bradycardia
    - Acutely altered mental status
    - Hypotension
    - Ischemic chest discomfort
    - Acute heart failure
    - Other signs of shock
  - Administer **Atropine 0.5 mg** IV every 3-5 minutes to a max cumulative dose of 3 mg.
  - Atropine is not likely to be effective in Second-degree Type II or Third-degree heart block with wide rhythm. If Atropine is ineffective, administer **Dopamine 400 mg** in **250 ml Normal Saline** IV drip at **10 microgram/kg/min** (60 gtts/ml set) and/or initiate **Transcutaneous Pacing**.
  - If refractory to Atropine and Dopamine, initiate **Transcutaneous Pacing.**
    - Consider **Midazolam 2 mg** IV slow.
      - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat once.
  - Follow the **Hypoperfusion** protocol, if indicated.

Paroxysmal Supraventricular Tachycardia (PSVT)

Paroxysmal Supraventricular Tachycardia (PSVT) is classified primarily based on the appearance of the narrow QRS complex (0.12 or less) and a fast regular rhythm (above 150) with no discernible P waves.

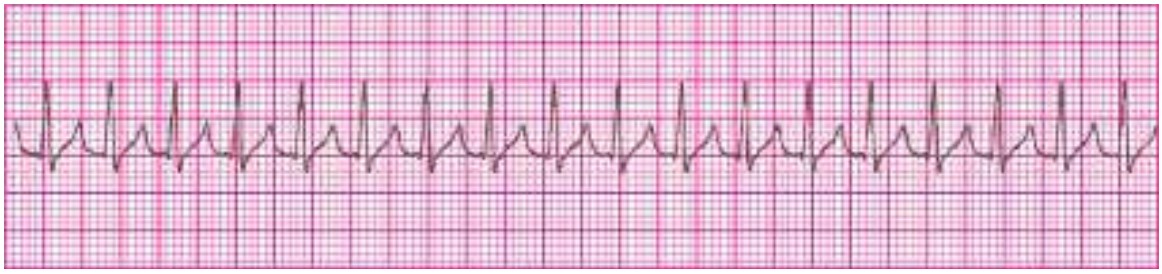
The prehospital care goal is aimed at slowing conduction through the AV node.

Clinical Pearls

- Due to the heart's rapid contractions during PSVT the heart is unable to pump an appropriate amount of blood through the blood stream. The patient's symptoms may include lightheadedness or dizziness.

- Rapid heart rates often do not allow time for adequate cardiac filling, eventually causing congestive heart failure or cardiogenic shock.

PSVT



Rate	Regularity	P Wave	PR Interval	QRS
Rapid (150 - 250)	Regular	Not discernible due to rate	N/A	Normal (0.4 - 0.12)

Paroxysmal Supraventricular Tachycardia (PSVT)

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. Whenever the patient condition and time allow, the 12-lead ECG should be obtained prior to initiation of treatment.
- Establish vascular access.
- **Stable VAD** patients: Provide supportive care, monitor and transport.
- **All other Stable** patients**:**
  - Attempt **vagal maneuvers**. If abnormal rhythm persists,
  - Administer **Adenosine 6 mg** IV rapid, followed immediately by a **20 ml Normal Saline** rapid fluid bolus.
  - If no conversion after 1–2 minutes, administer **Adenosine 12 mg** IV rapid, followed immediately by a **20 ml Normal Saline** rapid fluid bolus.
- **Unstable**:
  - Signs/Symptoms caused by tachycardia:
    - Acutely altered mental status
    - Hypotension
    - Ischemic chest discomfort
    - Acute heart failure
    - Other signs of shock
  - Perform **Synchronized Cardioversion** at **100J** (Philips MRx). If refractory, increase energy to **150J, 200J** as needed.
    - Consider **Midazolam 2 mg** IV slow.
      - For patients greater than 65 years of age give ½ the single dose stated above.

Ventricular Tachycardia/Wide Complex Tachycardia with a Pulse

Ventricular tachycardia (VT) is three or more successive ventricular complexes at a rate greater than 100 beats per minute. VT is considered sustained when it lasts for more than 30 seconds. VT can be divided into monomorphic (all complexes are similar) and polymorphic (complexes vary).

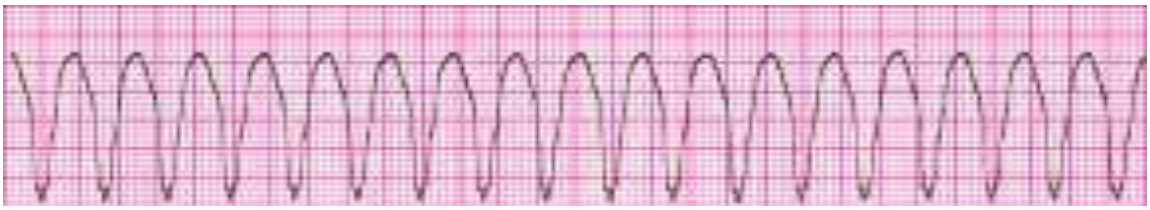
The prehospital care goal is to convert the heart to a less lethal rhythm.

Clinical Pearls

- Polymorphic VT (torsades de pointes) is a form of VT in which the QRS appears to be constantly changing. This form of VT is often caused by toxicity or a reaction to agents that prolong the QT interval such as tricyclic antidepressants and cocaine.

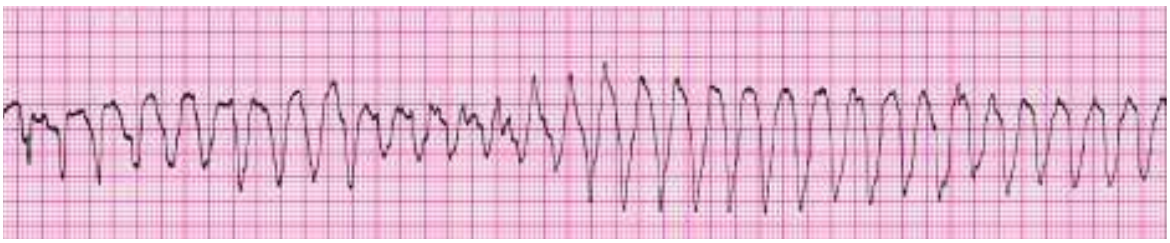
- Wolf Parkinson White (WPW) syndrome is a wide complex tachycardia that may not resemble other such tachycardias due to the morphology of the QRS. It is often narrow at the top, but still wide at the baseline due to the characteristic slurring of the initial deflection (Q or R wave) known as the delta wave.

Ventricular Tachycardia



Rate	Regularity	P Wave	PR Interval	QRS
100 – 250 (Approx.)	Regular	Absent	None	Wide (> 0.12)

Polymorphic Ventricular Tachycardia (Torsades de Pointes)



Rate	Regularity	P Wave	PR Interval	QRS
>100	Irregular	Absent	N/A	Wide & Varies (> 0.12)

Ventricular Tachycardia/Wide Complex Tachycardia with a Pulse

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. Whenever the patient condition and time allow, the 12-lead ECG should be obtained prior to initiation of treatment.
- Establish vascular access.
- Look for and correct underlying causes, H's and T's.
- Patients with an implantable cardioverter defibrillator (ICD):
  - If patient is stable and receiving multiple discharges from the ICD with transient restoration of a normal rhythm, administer **Midazolam 2 mg** IV slow.
    - For patients greater than 65 years of age give ½ the single dose stated above.
- **Stable**: See **Physician OLMD**.
- **Unstable:** Patients with an implantable cardioverter defibrillator (ICD), presenting in VT, are managed the same as patients without an ICD.
  - Signs/Symptoms caused by tachycardia:
    - Acutely altered mental status
    - Hypotension
    - Ischemic chest discomfort
    - Acute heart failure
    - Other signs of shock

Monomorphic VT/ Wide Complex of Uncertain Origin	Perform **Synchronized Cardioversion**. Begin at **100 Joules** (Philips MRx). If refractory, increase energy to **150J**, **200J**, as needed.
Polymorphic VT (torsades de pointes)	**Defibrillate**. Begin at **150 Joules** (Philips MRx). If refractory, repeat at **150J** as needed.

  - Consider **Midazolam 2 mg** IV slow.
    - For patients greater than 65 years of age give ½ the single dose stated above.

Ventricular Tachycardia/Wide Complex Tachycardia with a Pulse

Treatment (continued)

Physician OLMD

Note: If at any point the patient becomes unstable, then follow **Unstable.**

Stable:

Monomorphic VT/ Wide Complex of Uncertain Origin	Administer **Amiodarone 150 mg in 100 ml Normal Saline** IV drip **60 gtts/minute** (10 gtts/ml set).
Polymorphic VT (torsades de pointes)	Administer **Magnesium Sulfate 2 grams in 100 ml Normal Saline** IV drip **60 gtts/minute** (10 gtts/ml set).

Environmental Emergencies
Cold-related Illnesses

A patient with a core body temperature less than 95^{o} F is hypothermic.

Severe hypothermia is a core body temperature less than 90^{o} F. Mild hypothermia is core temperature between 90^{o} – 95^{o} F.

The prehospital care goals are to limit further heat loss, provide cardiovascular and respiratory support, promote active and passive external warming while preventing core temperature after drop.

Clinical Pearls

- Children, the elderly, patients with acute and chronic medical conditions, and alcoholics are more susceptible to heat loss, even at normal environmental temperatures.

- Never wrap a hypothermic patient in cold blankets or cold covering because cold air gets trapped next to the patient's body and warming will not occur. Use warm blankets and heat packs to warm a hypothermic patient.

- Acutely injured patients cool faster than non-injured patients, particularly when they are in shock or have a head injury.

- Shivering stops when core body temperature falls below 90^{o} F.

Cold-related Illnesses

Treatment

All Providers

- Perform assessment. Focused history to include: duration of exposure, ETOH ingestion, body temperature, and blood glucose.

- Ensure oxygenation.
  - Avoid excessive suctioning or airway manipulation and support ABCs if indicated.

- Check pulse for 30 – 45 seconds, to differentiate absence of pulse from profound bradycardia.
  - If no pulse is detected, begin CPR, follow **Hypothermic Arrest** protocol.
  - If a pulse is detected, do not perform CPR.

- Prevent additional heat loss by removing wet or constrictive clothing from patient. Place patient in warm environment and maintain core temperature by wrapping patient in blankets. Prevent re-exposure to wind and cold temperature. Carefully handle patient, rough handling can precipitate ventricular fibrillation.

- Treat mild hypothermia by re-warming the patient with heat packs in the armpits, groin, and neck. To prevent burns, do not allow heat packs to have direct skin contact.

- Treat frostbite:
  - Bandage injured areas lightly to protect from pressure, trauma, or friction.
  - Place bandages between fingers and toes for protection.
  - Do not rub the skin or break blisters.
  - Transport patient with frostbitten areas supported, elevated, and covered.

- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG.

- Establish vascular access.

Heat-related Illnesses

Hyperthermia is an unusual elevation of the normal core body temperature. It can lead to heat-related illnesses including heat cramps, heat exhaustion, and heat stroke.

The prehospital care goals are focused on cooling the patient and providing fluid replacement.

Clinical Pearls

- Immunocompromised, elderly, pediatric, and intoxicated patients may not thermoregulate well.

- CNS impairment is the major difference between heat exhaustion and heat stroke.

Heat-related Illnesses

Treatment

All Providers

- Perform assessment. Focused assessment to include: duration of exposure, ETOH ingestion, cocaine/stimulants use, and medication use (particularly phenothiazines, barbiturates, tricyclic antidepressants, thyroid medications, and amphetamines).

- Move patient to cooler environment and remove excess clothing.

- Ensure oxygenation.

- Turn on air conditioner in unit.

- If patient displays signs of **heat cramps**:
  - Normal mental status
  - Warm, moist skin
  - Cramps in the fingers, arms, legs, or abdominal muscles
  - Weakness
  - Dizziness

  Cool patient with tepid water soaks to head and neck.

- If patient displays signs of **heat exhaustion**:
  - Normal mental status
  - Cool, moist skin
  - Weak and rapid pulse
  - Rapid and shallow respirations
  - Headache, dizziness, nausea, and cramping

  Cool patient with tepid water soaks to head, neck, armpit, and groin.

- If patient displays signs or symptoms of heat stroke:
  - Altered mental status, disorientation, coma (heat stroke requires altered mental status)
  - Seizures
  - Hot and dry skin (or hot, moist skin if exertional heatstroke)
  - Increased and bounding pulse
  - Rapid and deep respirations

  Remove clothing and begin aggressive cooling therapy with towels or sheets soaked in tepid water and apply cold packs to armpits and groin.

- Continually monitor temperature. Care should be taken not to cause shivering if possible.

- Place electrodes/acquire 12-lead ECG.

Heat-related Illnesses

Treatment (continued)

ALS Providers

- Continue assessment, including 12-lead ECG.
- Establish vascular access.
- For **heat stroke**, administer **1,000 ml/hr Iced Normal Saline** IV drip (10 gtts/ml set).

General Supportive Care

This protocol is meant to provide guidance in three situations: conditions with signs/symptoms that are serious to the patient but have no emergent treatment options, conditions not normally treated in the field, and conditions where a particular protocol cannot be selected and no obvious treatment options present themselves. This protocol may be used exclusively, or in conjunction with other symptom-driven care protocols.

When in doubt about the applicability of a protocol/treatment, especially in the presence of complex medical histories where inappropriate or imprecise treatment may do harm, this protocol allows the provider to complete assessment and to defer treatment to the ED if indicated.

The prehospital care goals are focused on supportive care and ongoing assessment to reveal any treatable signs/symptoms.

Clinical Pearls

- Examples of urgent/emergent conditions not normally treated in the field:
  - Hypertension (not associated with pulmonary edema, head injury, etc.)
  - Pulmonary embolism
  - Aneurysm
  - Pericarditis
  - Suspected pneumothorax not meeting decompression criteria
  - Pneumonia not meeting volume replacement criteria

- Examples of conditions serious to patient but not warranting specific field intervention
  - Flu-like symptoms
  - Headache
  - Undifferentiated chest pain (where ACS is not suspected)

General Supportive Care

Treatment

All Providers

- Perform assessment. Focused exam to detailed history and physical review, including all plausibly related diagnostic modalities.
- Ensure oxygenation.
- Reassess vital signs regularly and watch closely for trends.
- Focus ongoing assessment on area of chief complaint and seek to rule out treatable causes.

ALS providers

- Continue assessment, to include consideration of all advanced diagnostic modalities.
  - General indications for acquisition/interpretation of 12-lead ECG:
    - Nontraumatic jaw or arm pain, especially as consequence of exertion
    - Nausea/vomiting
    - Diaphoresis
    - Shortness of breath
    - Syncope/lightheadedness/weakness
    - Palpitations
    - GI/abdominal upset/pain/cramps
  - Monitor End-Tidal CO_2 in the presence of undifferentiated symptomatic shortness of breath or tachypnea.
- Establish vascular access, if indicated.
- Review all diagnostic modalities in an effort to arrive at a differential diagnosis
  - Initiate supportive care protocols if indicated (e.g. pain management).
  - Move immediately to appropriate direct care protocol if indicated (e.g. ACS, Stroke, etc.).
- Treat symptoms if indicated.
- **Contact Physician OLMD** as needed.

Hypoperfusion

Hypoperfusion presents with a clinically significant hypotension (SBP less than 90).

Hypoperfusion may be caused by a variety of conditions such as hypovolemia (severe dehydration, GI bleeding), anaphylaxis, diminished cardiac output, sepsis, neurologic dysfunction, or an acute MI.

The prehospital care goals are to identify and manage the underlying cause of hypoperfusion.

Clinical Pearls

- Hypotension is a late sign of shock. Shock is poor perfusion and can occur before hypotension is evident.

- Manifestations of hypoperfusion include:
    - **Low-volume shock** (absolute hypovolemia): caused by hemorrhage and loss of body fluids. Examples include abdominal/back pain associated with AAA or rupture injury, OB complications, burns, GI bleeding, and dehydration from illness.
    - **High-space shock** (relative hypovolemia): caused by spinal injuries, sepsis, anaphylaxis, certain drug overdoses.
    - **Mechanical shock** (cardiogenic or obstructive shock): caused by tension pneumothorax, pulmonary embolism, cardiac tamponade, myocardial infarction, and myocardial contusion.

Hypoperfusion

Treatment

All Providers

- Perform assessment and control bleeding.
- Place patient supine with legs elevated. Use caution with patients in respiratory distress.
- Ensure oxygenation.

ALS Providers

- Establish vascular access (consider two access sites).
- Administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until one of the following end-points are reached:
  - SBP > 90 and MAP > 65
  - Signs/Symptoms of pulmonary edema occur (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg
    - If refractory, administer **Dopamine 400 mg in 250 ml Normal Saline** IV drip at **10 microgram/kg/min** (60 gtts/ml set).

Medical Devices
SynCardia Total Artificial Heart

Evolving care of advanced heart failure has contributed to the increasing complexity of the prehospital care of such patients. A new device is making its way into the prehospital and out of hospital environment – The SynCardia Total Artificial Heart and Freedom Driver (TAH). The TAH is quite different from the ventricular assist device (VAD). Unlike a VAD that assists the native heart, the Total Artificial Heart involves the surgical removal of the native ventricles and replacement with the TAH device. The atria remain. These devices are particularly useful as a bridge to transplant for patients with biventricular heart failure, those with associated valve abnormalities and those with persistent/recurrent ventricular dysrhythmias. The TAH can also reverse some of the end organ effects of advanced heart failure making the patient a better transplant candidate when a heart is available for transplant.

The prehospital care goals are to recognize the presence of the device, assist in maintaining/restoring function, avoid damage, and rapidly transport to an appropriate facility.

Clinical Pearls

- Identification –TAH patients may be identified by a number of methods. In addition, to a computer aided dispatch location of interest (LOI) for their home address the following methods are available:
    - Med-alert bracelets – Like VAD patients, TAH patients are given a color-coded bracelet that corresponds to their device and can direct EMS to the correct section of the Mylvad.com online EMS Field Guide. The bracelet will also have the home health center and phone number of the heart transplant coordinator.

    - Device and tubes –Like VAD patients, TAH patients are also identifiable on assessment due to the shoulder bag, waist bag or back pack that contains their device. The lines and tubes will also help identify these patients – extreme care should be taken to avoid pinching, kinking, pulling or cutting any such lines/tubes.

- The patient and their support person, usually a family member, are competent on the device prior to discharge and they may be valuable sources of information related to the device and the patient's history.

SynCardia Total Artificial Heart

Clinical Pearls (continued)

- There are similarities between TAH and VAD patients.
    - Both patients are on anticoagulation medications and are at risk of bleeding. Anticipatable emergencies for patients include:
        - Any and every call unrelated to their device or disease state
        - Bleeding related to anticoagulation
        - Thromboembolism related to device and flow state
        - Infection
        - Organ failure related to advanced heart failure state – includes pulmonary edema related to elevated afterload
        - Device malfunction
    - TAH and VAD patients should NOT have CPR performed and should NOT have the LUCAS 2 device applied.

- In contrast to VAD patients, TAH patients will indeed have a palpable pulse and a measurable blood pressure due to the pulsatile flow of the device.

- With the removal of the right and left ventricles and valves, these patients will not have a cardiac rhythm. Because of this modification to the heart, the following applies:
    - Cardiac arrest drugs are NOT to be used in these patients as it relates to cardiac care intervention. The use of vasopressors/medications for other indications such as epinephrine for life-threatening anaphylaxis or dopamine for sepsis unresponsive to volume is still appropriate, but only if clearly indicated. Strongly consider Physician OLMD to guide decision-making and patient selection.
    - TAH patients will have no ECG rhythm to monitor or acquire by 12-lead ECG. In assessing a patient for signs of life, the traditional organized cardiac rhythm does not apply to TAH patients. Signs of life include pulse, BP, respiratory movement/effort, spontaneous movement, and pupillary reaction. If the driver is pumping it is reasonable to assume that it is still pumping and interpret that as a "sign of life. You will know that the pump is running by the audible pumping noise coming from the external driver.
    - NO electrical therapies are indicated in TAH patients; no cardioversion, no defibrillation, no pacing.

SynCardia Total Artificial Heart

Clinical Pearls (continued)

- TAH patients may be thought of as heart failure patients. Two principles guide their TAH related care – Partial filling and complete emptying:
    - Partial Filling – the chambers of the TAH may accommodate up to 70 ml of blood, but optimal function keeps the resting volume slightly below this maximum capacity. This allows for the natural physiologic increases in blood return during exercise without exceeding the maximum capacity of the TAH chamber.
    - Complete Emptying – The TAH chamber must completely empty with each beat, unlike the native heart. Incomplete emptying of the left-sided TAH chamber will result in pulmonary edema. This can occur with increased afterload, optimal blood pressure is generally < 130 mm Hg. Patients may have as needed orders for medications to reduce afterload such as sublingual Nitroglycerin or oral Hydralazine.

SynCardia Total Artificial Heart

Treatment

Call Types

- Call related to the presence of the device or disease state.
  - Patients with signs /symptoms related to the presence of a TAH but not directly related to the malfunction device itself – infection of the insertion site of the drive lines, bleeding from the state of anticoagulation, thromboembolism from the low flow state are examples.
  - Patients with signs /symptoms related to the underlying state of advanced heart failure for which they were implanted with a TAH – these include worsening renal failure or end-organ failure from heart failure.

- Call related to the malfunction of the device.
  - Advisory alarms or other minor malfunction with little or no effect on patient.
  - Critical alarms/malfunctions with the potential to impact device operation and patient health.

- Call wholly unrelated to the device or disease state.
  - Patient with signs/symptoms wholly unrelated to the advanced heart failure or TAH device (e.g. broken ankle).

All Providers

- Perform patient assessment prioritizing the patient first and then assessing the device:
  - Assess level of responsiveness
    - Mentation/Level of Consciousness – If the patient is unconscious and with evidence of poor peripheral perfusion, standard ACLS protocols CAN NOT be initiated on these patients.
      - Do NOT use the LUCAS 2 device or perform compressions on these patients.
      - Do NOT attempt to defibrillate.
      - Assess blood glucose and treat accordingly.
  - Assess airway and breathing – provide standard supportive care as indicated by clinical condition.
    - Pulse oximetry
    - End-Tidal CO_2
    - Supplemental oxygen and supportive ventilations

SynCardia Total Artificial Heart

Treatment

- Assess perfusion status
  - Blood pressure - blood pressure readings should be obtainable
    - Target systolic blood pressure is less than 130 – pressures above this may result in incomplete emptying and pulmonary edema.
  - Pulses – should be palpable
  - Capillary refill
  - $ETCO_2$
- Confirm presence of a TAH and verify function by listening for pumping sounds.
  - Distinguish device as TAH rather than VAD – look for medical alert style bracelet, which is color-coded to device type and section of the Mechanical Circulatory Support Organization (MCSO) EMS Field Guide and has the phone number of the patient's Heart Transplant Coordinator.
    - After determining device and color code, refer to the MCSO EMS Field Guide or patient's Emergency Information Form.
  - Consult with patient/care providers if possible.

- For patients who have a TAH with complete emptying chambers, incomplete emptying of the left-sided chamber will result in pulmonary edema. This can occur with increased afterload, optimal blood pressure is generally < 130 mm Hg. Patients may have as needed orders for medications to reduce afterload such as sublingual Nitroglycerin or oral Hydralazine.
  - Assist the patient with self-administration of Nitroglycerin SL or Hydralazine PO.
  - If the patient is unable to self-administer, reference the patient's emergency information form and **contact Physician OLMD** for authorization to administer the medications directed. If the patient shows signs of pulmonary edema follow the **Pulmonary Edema** protocol, if indicated.

- Manage according to call type:
  - Device-related issues if indicated
    - Ensure oxygenation
    - Supportive care
    - Work with patient and support person. Consult Transplant coordinator and **contact Physician OLMD** as needed.

SynCardia Total Artificial Heart

Treatment

- For all other patients, follow appropriate protocol and utilize all indicated medications/procedures with the following modifications:
  - **Resuscitation of unstable TAH patients with impaired perfusion (unconscious, unresponsive, without signs of perfusion/circulation, without rigor mortis and lividity) should receive resuscitative efforts with the exceptions that follow:**
    - No compressions.
    - No use of AED or defibrillator.
    - No use of cardiac arrest drugs. The use epinephrine for life-threatening anaphylaxis is still appropriate, but only if clearly indicated.
    - Consider and evaluate for other causes of unresponsiveness – hypoglycemia, bleeding, head injury, infections, hypoxia, hypercarbia, and narcotics. Supportive care as indicated.
  - **Withhold CPR**
    - SynCardia TAH patients who are unconscious/unresponsive, without signs of life and have traumatic injuries incompatible with life warrant no further resuscitation. Injuries incompatible with life include decapitation, hemicorpectomy, incineration, decomposition, mortal wounds with major organ damage/destruction plus absent signs of life – heart, brain, thoracic contents, abdominal contents.
    - Syncardia TAH patients who are found unconscious/unresponsive, without signs of life and have DNR/POST directing no resuscitative efforts warrant no further resuscitation.
    - Syncardia TAH patients who are found unconscious/unresponsive, without signs of life and with signs of non-recent death (rigor mortis and lividity) should have pump function assessed by sound and drive display showing rate, fill volume, and cardiac output. This information should be provided to the heart transplant coordinator and under their direction resuscitation can be withheld, the pump turned off.

SynCardia Total Artificial Heart

Treatment (continued)

ALS Providers

- Continue assessment, to include End-Tidal CO_2 monitoring.

- **Continue resuscitation of unstable TAH patients with impaired perfusion (unconscious, unresponsive, without signs of perfusion/circulation, without rigor mortis and lividity)**:
  - Do NOT attempt to pace, cardiovert, or defibrillate.
  - Do NOT use any cardiac arrest drugs. The use of vasopressors/medications for other indications such as epinephrine for life-threatening anaphylaxis or dopamine for sepsis unresponsive to volume is still appropriate, but only if clearly indicated.
  - Consider volume resuscitation for clear signs of hypovolemia or suspected hemorrhage with poor perfusion.

- The driver is powered by batteries, AC power or DC power (the patient will need to be on batteries for transport). Bring the patient's back up batteries and back up driver if possible.

Physician OLMD

Authorization for Emergency Information Form (EIF) directives - For patients with specific unique directives as part of their EIF or written/verbal directives given by their heart transplant team, authorization may be obtained from **Physician OLMD** to comply with the treatments directed.

Transportation Consideration:

- Destination selection – TAH patients should be transported to the closest VAD/TAH center. They need not be transported directly to their "home health center" but rather be evaluated at the specialty center and secondarily transferred if needed.

Ventricular Assist Device

The VAD (ventricular assist device) or LVAD (Left ventricular assist device, as most replace/support the left ventricle) was developed as a bridge device for patients waiting for heart transplants. As technology has improved, these devices have been approved for prolonged use particularly in patients unable to receive a heart transplant.

The prehospital care goals are to recognize the presence of the device, assist in maintaining/restoring function, avoid damage, and rapidly transport to an appropriate facility.

Clinical Pearls

- VAD patients may be wearing a color coded medical alert bracelet which will correspond with the type of device implanted. This bracelet will also list the patient's home health center as well as the medical care coordinator and contact information.

- VADs are very sophisticated, and evolving quickly:
  - Early VADs, commonly referred to as 1st generation, emulated the heart by using a pump that created a "pulsatile" action where blood is alternately sucked into the pump from the left ventricle then forced out into the aorta.
  - More recent 2nd generation devices feature continuous flow pumps. These pumps have the advantage of smaller size and greater reliability.
  - 3rd generation VADs suspend the impeller in the pump (with hydrodynamic or electromagnetic suspension), reducing the number of moving parts to one.
  - Another technology undergoing clinical trials is transcutaneous induction to power and control the device, rather than percutaneous cables. Such devices will be difficult for first responders to detect if the patient or caregivers are not able or willing to provide information.

- VAD patients are required to be on blood thinners, so any bleeding (or injury that may cause bleeding) must be addressed with caution. As blood pressure may not be measurable, standard diagnostic cues (e.g. high blood pressure following head injury) may not be present.

- VAD patients with centrifugal or axial flow pumps will be pulseless (or very nearly so). Standard blood pressure measurement will not be possible, so perfusion must be assessed by other means. This is especially important in the unconscious patient who may be mistaken for dead.

- Hypovolemia can be deadly to VAD patients (pump cavitation can cause a deadly condition known as Suckdown). Carefully assess perfusion and do not hesitate to provide volume if indicated.

Ventricular Assist Device

Treatment

Call Types

- Call related to the presence of the device or disease state.
  - Patients with signs /symptoms related to the presence of a VAD but not directly related to the malfunction device itself – infection of the insertion site of the device and bleeding from the state of anticoagulation are examples.

- Call related to the malfunction of the device.
  - Advisory alarms or other minor malfunction with little or no effect on patient.
  - Critical alarms/malfunctions with the potential to impact device operation and patient health.

- Call wholly unrelated to the device or disease state.
  - Patient with signs/symptoms wholly unrelated to device (e.g. broken ankle).
  - Patient with cardiac signs/symptoms but normal device function (e.g. SVT).

All Providers

- Perform assessment, to include:
  - Assess perfusion
    - Skin
    - Mentation/LOC
      - Blood glucose
    - Respiratory effort
      - End-Tidal CO_2
    - Capillary refill
    - May or may not be reliable:
      - Pulses
      - Pulse oximetry

  - Determine VAD type and verify function
    - Pulsatile vs. pulseless
    - Consult with patient/care providers if possible
    - Determine device and color code and refer to MARPH Task Force Field Guide (Field Guide is a resource and does not supersede this protocol)

Ventricular Assist Device

Treatment (continued)

- Manage according to call type:
  - Device-related issues if indicated
    - Ensure oxygenation
    - Supportive care
    - Consult **Physician OLMD** as needed
  - For all other patients, follow appropriate protocol and utilize all indicated medications/procedures with the following modifications:
    - **VAD patients in apparent asystole** with rigor and/or lividity shall be treated/transported following the **Asystole/Pulseless Electrical Activity** protocol, adhering to the cardiac arrest modifications below.
    - **Cardiac Arrest** (unconscious, unresponsive, without signs of perfusion/circulation)
      - No compressions
      - Anterior/Posterior defib pad placement
    - **Withhold CPR**
      - Deceased VAD patients with valid DNRs shall be transported to the VAD center.
      - Withhold resuscitation only on VAD patients with clearly identifiable traumatic injuries incompatible with life (e.g. decapitation, incineration, hemicorpectomy, destruction of vital organs, etc.)

ALS Providers

- Continue assessment, to include End-Tidal CO_2 and12-lead ECG if the underlying condition warrants.

- Continue care if indicated, following appropriate protocol and utilizing all indicated medications/procedures with the following modifications:
  - **Stable tachydysrhythmia** (as evidenced by adequate perfusion assessment) to include SVT, VT, etc.
    - Supportive care with no pharmacologic or electrical intervention.
  - **Unstable dysrhythmias** (as evidenced by inadequate perfusion assessment) treated normally.
  - For signs of hypoperfusion including low $ETCO_2$, normal respiratory rate, prolonged capillary refill, or suspected low intravascular volume
    - Consider bolus with **20 ml/kg Normal Saline**

Transportation Consideration:

- All patients with VAD devices, excepting only those with traumatic injuries listed under Withhold CPR above, shall be transported under ALS care to their VAD center, or the closest VAD center in case of cardiac arrest.

Wearable Cardioverter Defibrillator

The Wearable Cardioverter Defibrillator (WCD) is an external medical device used to prevent sudden cardiac death from ventricular fibrillation or pulseless ventricular tachycardia in patients who are at increased risk. It is used in cases where a long term Implanted Cardioverter Defibrillator (ICD) may not be needed. The device continually monitors cardiac rhythm. If it senses a potentially lethal arrhythmia, both vibration and audible alarms sound, providing the patient an opportunity to abort the shock by pushing buttons on the monitor module. If the patient is unconscious (and therefore unable to abort the therapy), the device will release conductive gel and shock the patient, potentially up to six times. Unlike an ICD, this device delivers an unsynchronized shock at 150J, so provider injury is possible. The device has no pacemaker function.

The prehospital care goals are to recognize the presence of the device, assist in maintaining function, or disabling the device and converting the heart to a less lethal rhythm when the patient becomes unstable.

Clinical Pearl

- Always assume that a device that delivered therapy did so correctly. The patient may not remember any symptoms (or may think they fell asleep or tripped and fell). The presence of conductive gel is a clue that a shock was delivered.

Wearable Cardioverter Defibrillator

Treatment

All Providers

- The device consists of two portions: a garment containing monitor/defibrillator leads and conductive gel which is worn like a shoulder harness or vest, and a monitor/battery module worn on the waist (Figures A and B).
- When a patient with a WCD is encountered:
  - Apply MRx monitor and defibrillation pads in standard manner, leave WCD intact.
  - If the patient becomes unconscious or unstable, disable the device by removing the battery pack, then proceed as you would with any other patient.
  - Never prevent a patient from pushing the buttons to abort a shock.
  - Only the patient should push the abort buttons.
  - If possible, bring the docking station/charger along with the patient so the device can be interrogated at the hospital.
  - See **Special Circumstances** protocol, which authorizes providers to utilize the patient's Emergency Information Form, if present, to guide care for unique populations, **Physician OLMD** authorization is required.

ALS Providers

- WCD may be left on patient to assist with ongoing monitoring.
- If the patient's clinical condition warrants
  - Synchronized cardioversion
  - Pacing
  - Defibrillation

Metabolic Emergencies
Electrolyte Abnormalities

Electrolyte abnormalities are commonly associated with cardiovascular emergencies. EMS providers may encounter patients who, as a result of electrolyte imbalances, experience cardiovascular compromise.

The prehospital care goals are to assess the patient, establish appropriate monitoring and supportive care, and in select circumstances initiate specific treatments.

Clinical Pearls

- Electrolyte abnormalities may cause or contribute to cardiac arrest and may hinder resuscitative efforts.

- Hyperkalemia (defined as potassium level above 5.5 mEq/L, with intervention usually required above 6.5 mEq/L) is the most significant and potentially life-threatening electrolyte abnormality.
    - Causes include end-stage renal disease, medications (particularly ACE inhibitors, potassium sparing diuretics like spironolactone, potassium supplements), metabolic acidosis and crush injury.
    - Nebulized Albuterol is beneficial when treating presumed hyperkalemia because it pushes potassium into cells.

- Hypokalemia (defined as potassium level below 3.5 mEq/L) may result in weakness, fatigue, leg cramps, ECG changes, ventricular dysrhythmias and less commonly may cause abnormal heart rhythms including PEA or asystole. Causes include GI losses, renal losses, diuretics, and malnutrition.

- Hypernatremia (elevated sodium) exhibits as altered mental status, weakness, irritability, seizures, or coma. Causes include excess loss of total body water or excess gain in sodium.

- Hyponatremia (low sodium) is commonly observed as nausea/vomiting, headache, and decreased mental status. Severe hyponatremia with acute onset may be associated with seizures or coma. Causes include either excess total body water or excess loss of sodium in the urine.

Electrolyte Abnormalities

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. Whenever the patient condition and time allow, the 12-lead ECG should be obtained prior to initiation of treatment.
- Establish vascular access.

Hyperkalemia

- ECG evidence of hyperkalemia may include:
  - Peaked T-waves
  - Progressive loss of P-waves
  - Lengthening PR interval
  - Widening of the QRS complex
  - Merging of the S and T waves
  - Sine-wave pattern
- **Stable:** Provide supportive care, monitor and transport.
- **Unstable** (Signs/Symptoms include acutely altered mental status, hypotension or other signs of shock) administer:
  - **Calcium Chloride (10%) 10 ml IV** slow over 5 minutes. Calcium administration should be limited to known hyperkalemia (labs known) or appropriate clinical context plus life-threatening symptoms and ECG evidence of hyperkalemia.
  - **Sodium Bicarbonate (8.4%) 50 mEq** IV over 5 minutes.
  - **Dextrose 50% (D50) 25 grams** IV slow.
  - **Albuterol 10 mg** via NEB.

Hyponatremia / Hypernatremia / Hypokalemia

- Follow appropriate protocol based on patient signs and symptoms.

Hyperglycemia

Hyperglycemia is a condition in which an excessive amount of glucose circulates in the blood.

Causes of hyperglycemia include cessation of insulin injections and physiologic stress such as infection, stroke, and pregnancy.

The prehospital care goals are to recognize and manage associated symptoms.

Clinical Pearls

- Glucometers are consumer grade and readings are affected by inadequate sample size, alcohol, and temperature. Treat the patient, not the machine.

- High blood glucose levels are not generally treated in the field. Hospital lab results dictate the patient's treatment.

- Blood glucose from a venous sample may be expected to be slightly lower than capillary blood from a finger stick. The exact difference is not static, but rather depends on the dynamics of glucose absorption and utilization at the tissue level across the capillary bed.

Hyperglycemia

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.

ALS providers

- Continue assessment, including End-Tidal CO_2 monitoring.
- Consider 12-lead ECG.
- Establish vascular access.
- If the patient has a blood glucose level > 400 plus End-Tidal CO_2 < 25 or blood glucose level > 500 and decreased level of consciousness,
    - **Administer 20 ml/kg Normal Saline IV** drip at **1,000 ml/hr** (10 gtts/ml set).

Hypoglycemia

Hypoglycemia is a condition in which a very low amount of glucose circulates in the blood.

Causes of hypoglycemia include excessive administration of insulin, excessive insulin for dietary intake, and overexertion relative to dietary intake.

The prehospital care goal is to increase the blood sugar level.

Clinical Pearls

- The digestion and absorption of orally administered sugar drinks is unpredictable.
- The action of Glucagon depends on the patient's ability to make glucose from glycogen; success depends on both adequate stores of glycogen and the metabolic ability to convert it to glucose for fuel. Liver disease, chronic alcohol use, and malnutrition may prevent the patient from responding adequately to glucagon.
- Glucometers are consumer grade and readings are affected by inadequate sample size, alcohol, and temperature. Treat the patient, not the machine.
- Blood glucose from a venous sample may be expected to be slightly lower than capillary blood from a finger stick. The exact difference is not static, but rather depends on the dynamics of glucose absorption and utilization at the tissue level across the capillary bed.
- Dextrose 10% (D10) may be used to treat hypoglycemia in select patients, those who are mildly symptomatic, conscious, and cooperative. The advantage of a D10 drip over Dextrose 50% (D50) is a lower total dose of glucose to resolve hypoglycemia and symptoms, less subsequent disruption of glycemic control, and no higher rate of observed complications. D50 or Glucagon is still a reasonable choice of preferred intervention in the unconscious, combative, or uncooperative patient.

Hypoglycemia

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- If the patient has a blood glucose level of less than 70, can protect his or her airway, is able to swallow, and can follow commands, assist the patient with the self-administration of **1 Instant Glucose tube (15 grams).**
- Reassess and monitor for signs of clinical improvement. Repeat blood glucose assessment 5 minutes after glucose administration. **Instant Glucose tube** can be repeated once, if necessary.

ALS providers

- Continue assessment and consider 12-lead ECG.
- Establish vascular access.
- If patient has a blood glucose less than 70 and an altered mental status and
  - Patient is conscious and mildly symptomatic
    - Administer **Dextrose 10% (D10) 250 cc ml** IV drip **wide open** (10 gtts/ml set). Titrate to improvement in mental status or blood glucose greater than 70.
    - If no vascular access, administer **Glucagon 1 mg** IM.
  - Patient is unconscious, combative, or uncooperative
    - Administer **Dextrose 50% (D50) 25 grams** IV slow.
    - If no vascular access, administer **Glucagon 1 mg** IM.
- If refractory after 5 minutes, repeat initial treatment or alternative treatments above based on patient's current clinical condition.

Transportation Considerations:

- Patients that have been administered glucagon should be transported to an ED facility.
- Those patients who take oral diabetic medications are at a greater risk of recurrent hypoglycemia and should be transported to an ED facility.

Obstetric Emergencies

While most childbirths are uncomplicated and require minimal assistance from health care providers, abnormal deliveries do occur.

The prehospital care goals are to recognize and effectively manage childbirth and provide care for the mother and infant. This includes recognizing complications, providing supportive care, and transporting to definitive care as soon as possible. Obstetric surgical intervention is often required when complications arise.

Clinical Pearls

- When managing a complicated obstetric emergency, you are in fact caring for two patients: the mother and the infant. Consider an additional EMS unit.
- Pre-eclampsia/eclampsia can occur up to two weeks after the delivery of the infant.
- Lack of uterine tone causes hemorrhages and risk of inadequate uterine tone increases with multiple pregnancies.
- Magnesium is the preferred agent in eclampsia with demonstrated mortality benefit over benzodiazepines.
- Eclamptic seizures are thought to be primarily vascular in nature rather than neurologic. Treatment with Magnesium Sulfate vasodilates arteries which will lower peripheral and cerebral vascular resistance, relieve vasospasm, and decrease arterial blood pressure. Ultimately, Magnesium Sulfate helps to reduce the likelihood of recurrent seizure activity.

Obstetric Emergencies

Treatment

Childbirth

All Providers

- Perform assessment including blood glucose. Focused history to include:
  - Pregnancy history:
    - Number of previous pregnancies, deliveries, and complications (precipitous deliveries)
    - Expected delivery date
    - Multiple births expected
    - Prenatal care/OB or clinic name
    - Known complications regarding this pregnancy (gestational diabetes, hypertension, bleeding, etc.)
    - Passage of clots or tissue
    - Number of pads per hour if bleeding vaginally
    - Any recent medications or drugs that may affect the infant

- Current status of delivery to include: pain, duration and interval of contractions, ruptured membranes (to include color, odor, and amount of fluid as well as time of rupture), urge to push/move bowels.

- Ensure oxygenation.

- Visually examine perineum for vaginal bleeding or fluid, crowning, and abnormal presentation (breech, limb, prolapsed umbilical cord, gross meconium, and placenta previa). Refer to abnormal presentation section as needed.

- All patients greater than 20 weeks pregnant who are having an obstetric-related emergency shall be transported to an OB-capable facility.
  - Transport the supine patient in the left lateral recumbent position if delivery is not imminent.
  - Ensure unit is warm prior to transport. Interior should be 90^{o}–100^{o} F, if delivery is imminent.

Obstetric Emergencies

Treatment (continued)

Childbirth (continued)

All Providers

- Deliver baby if delivery is imminent and appears uncomplicated:
  - Guide and control delivery but do not delay or hasten the delivery.
  - Keep the infant at the level of the mother's hips during the delivery process and through the cutting of the cord.
  - Suction is not routinely necessary post-delivery if there is no respiratory distress. It is indicated in limp or ill-appearing newborns and those with evidence of obstruction from secretions.
  - Stimulate crying.
  - Aggressively dry and keep the infant warm.
  - In the vigorous newborn, allow the cord to stop pulsing before cutting (may be 3 minutes or more), clamp cord in two places about 8-10" from infant; cut between clamps.
  - Wrap the infant in blankets and cover infant's head.
  - Hand infant to mother and encourage nursing unless infant requires resuscitative effort.
  - Record time of delivery.
  - Observe infant and document APGAR score at one and five minutes.

APGAR	0	1	2
Appearance (skin color)	Blue, pale	Pink body, blue extremities	Completely pink
Pulse Rate (heart rate)	None	Less than 100/minute	Greater than 100/minute
Grimace (reaction to suction, etc.)	None	Grimace	Cough, sneeze, cry
Activity (muscle tone)	Limp	Some flexion	Active motion
Respirations (respiratory effort)	None	Slow, irregular	Good, crying
Score 0-3: CPR/advanced resuscitation **Score 4- 6:** Immediate resuscitation efforts **Score 7- 10:** Active and vigorous neonate			

- Place placenta in a plastic bag and bring to the hospital with the patient if it delivers spontaneously. Do not apply traction or actively try to deliver placenta.
- If infant requires resuscitation, refer to **Pediatric Section: Distressed Newborn** protocol.

Obstetric Emergencies

Treatment (continued)

Abnormal Presentations

All Providers

Gross Meconium

- Wipe face clear as soon as possible.
- Thoroughly suction oropharynx and nasopharynx prior to stimulation.
- If newborn is vigorous (generally APGAR greater than 6) proceed normally.
- If newborn has depressed respirations, poor muscle tone, or is bradycardic, initiate resuscitation immediately.

Progressive Breech Birth

- Allow buttocks and trunk to deliver spontaneously.
- Support body on the palm of a hand and forearm when legs are free. This allows the baby's head to deliver.
- Treat as normal delivery.

Delayed Breech Birth (if the head is not delivered within 3 minutes)

- Place mother in either a knee-chest position or in supine position with hips elevated on a pillow.
- Insert a gloved hand in the vagina with palm toward baby's face, form "V" with your fingers on either side of baby's nose and push vaginal wall away from baby's face. Alternatively, put a gloved index finger in the baby's mouth and pull the chin to the chest.
- Do not allow an explosive delivery or attempt to pull the baby out.

Prolapsed Umbilical Cord

- Place mother in either a knee-chest position or in a supine position with hips elevated on a pillow.
- Using gloved hand, gently raise the presenting part off of the cord to restore blood flow.
- Do not push the cord back and do not attempt delivery.
- Gently palpate cord for pulse without compressing it.
- Apply moist dressing on exposed portion of cord.

Limb Presentation

- Place mother in knee-chest position.
- **Do not touch the presenting extremity,** contact may stimulate infant to gasp**.**
- Do not pull on limb or attempt to replace into birth canal. Do not attempt delivery.
- Do not place gloved hand into vagina unless there is an associated prolapsed cord.

Obstetric Emergencies

Treatment (continued)

Complications following delivery

All Providers

Postpartum Hemorrhage

- If excessive postpartum bleeding occurs (generally greater than 500 ml), massage uterus and have mother nurse infant to stimulate uterine contraction.

Uterine Inversion

- If placenta is attached, do not attempt to remove it.
- With a gloved hand, attempt to push the uterus back manually.
- If unsuccessful, keep protruding tissue moist with normal saline.

Vaginal Bleeding

- Apply trauma pad and ice pack to perineum.

Potential complications observed during late pregnancy

All Providers

Supine Hypotensive Syndrome

- Place mother in left lateral recumbent position.

Pre-Eclampsia/Eclampsia

- Place mother in left lateral recumbent position

Placenta Previa

- Do not attempt internal vaginal examination which may rupture placenta and cause fatal bleeding.
- Place mother in left lateral recumbent position.

Abruptio Placentae

- Place mother in left lateral recumbent position.

Obstetric Emergencies

Treatment (continued)

ALS Providers

- Continue assessment.
- Establish vascular access.
- If hypotensive, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - SBP > 90 and MAP > 65
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg
- For **Gross Meconium**

Restriction

Authorization for this procedure is limited to EMT-Paramedic level providers. If no EMT-P is on scene, proceed with standard BLS suction techniques and mask ventilation.

  - Initiate deep tracheal suctioning in the presence of gross meconium only if the newborn has depressed respirations, poor muscle tone, or is bradycardic. In the absence of these symptoms provide routine care as described in All Providers.
  - Suction until clear or until the infant's heart rate indicates that resuscitation must proceed without delay.
  - If airway patency is in question, intubate with a clean tube and secure.
  - Continue resuscitation if indicated.

- For **Eclamptic Seizures**
  - Administer **Magnesium Sulfate 4 grams in 100 ml Normal Saline** IV drip **60 gtts/minute** (10 gtts/ml set).
    - For magnesium sulfate overdose resulting in cardiac arrest, respiratory arrest, or hypotension**:**
      - Administer **Calcium Chloride (10%) 10 ml** IV over 2 minutes. If refractory after 5-10 minutes, repeat once.
  - If patient is still seizing after initiating magnesium sulfate drip or if IV access for magnesium sulfate is delayed:
    - Administer **Midazolam 5 mg** IV slow. If refractory after 5 minutes, repeat once.
    - If no vascular access, administer **Midazolam 5 mg** IM or IN. If refractory after 5 minutes, repeat once.
    - If refractory, **contact Physician OLMD**.

Overdose and Adverse Drug Reactions
Beta Blocker/Calcium Channel Blocker

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals are to provide supportive care and administer treatment modalities, if indicated.

Clinical Pearls

- In addition to their traditional role in treating hypertension and other cardiovascular disorders, beta-blockers are also used to treat migraine headaches, hyperthyroidism, glaucoma, anxiety, and various other disorders.

- Bradycardia, by itself, is not necessarily helpful as a warning sign because slowing of the heart rate and damping of tachycardia in response to stress is observed at therapeutic doses. Bradycardia with associated hypotension and shock (systolic BP < 80 mm Hg, heart rate < 60 bpm) defines severe beta-blocker toxicity.

- Extended-release tablets and once-a-day preparation overdoses may have a delayed onset and therefore can require 24 to 36 hours of monitoring in the Intensive Care Unit. Releasing a patient who has ingested an extended-release tablet too soon places them in jeopardy.

Beta Blocker/Calcium Channel Blocker

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG.
- Establish vascular access.
- Follow the **Hypoperfusion** protocol, if indicated.
- If hypotensive and bradycardic
  - Administer **Dopamine 400 mg** in **250 ml Normal Saline** IV drip **10 microgram/kg/min** (60 gtts/ml set).
    - If refractory, initiate **Transcutaneous Pacing.**
  - If bradycardia or hypotension does not respond to the above treatment, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
    - SBP > 90 and MAP > 65
    - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)

Physician OLMD

- Administer **Calcium Chloride (10%) 10 ml** IV over 2 minutes. If refractory after 5-10 minutes, repeat once.

Magnesium

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals are to provide supportive care and administer treatment modalities, if indicated.

Clinical Pearl

- Magnesium overdose may occur if IV Magnesium Sulfate is inadvertently administered too quickly, resulting in cardiac arrest, respiratory arrest, or hypotension.

Magnesium

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG.
- Establish vascular access.
- Administer **Calcium Chloride (10%) 10 ml** IV over 2 minutes. If refractory after 5-10 minutes, repeat once.

Narcotic

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals are to provide supportive care and administer treatment modalities, if indicated.

Clinical Pearl

- The effects of narcotics are multiplied when used in combination with other depressant drugs and alcohol, causing increased risk of an overdose.

Narcotic

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
  - Administer **Naloxone 0.4 mg** IV, repeat as needed every 2-3 minutes titrating to achieve and maintain an adequate respiratory rate.
- If no vascular access, administer **Naloxone 2 mg** IM or IN.

Transportation Consideration:

- Patients that have been administered Naloxone should be transported to an ED facility.

Phenothiazine (Dystonic)

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals are to provide supportive care and administer treatment modalities, if indicated.

Clinical Pearl

- Phenothiazine (Dystonic) reactions are caused by certain antipsychotic and antiemetics.

Phenothiazine (Dystonic)

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG.
- Establish vascular access.
- Extra-pyramidal signs/symptoms:
  - Protruding or pulling sensation of tongue
  - Twisted neck or facial muscle spasm
  - Roving or deviated gaze
  - Abdominal rigidity and pain
  - Spasm of the entire body
- Administer **Diphenhydramine 50 mg** IV or IM.

Tricyclic Antidepressant (TCA)

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals are to provide supportive care and administer treatment modalities, if indicated.

Clinical Pearls

- Tricyclic antidepressants have a narrow therapeutic index and, therefore, become potent cardiovascular and central nervous system toxins in moderate doses.

- Consider TCA overdose in patients with any combination of the following:
    - Hypotension
    - Decreased LOC
    - Wide complex tachycardia
    - Large R wave in AVR
    - Seizure

Tricyclic Antidepressant (TCA)

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation.
- Establish vascular access.
- For sustained Wide Complex Tachycardia with heart rate > 120 bpm and QRS > 0.12
  - If hypotensive, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
    - SBP > 90 and MAP > 65
    - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
    - Max cumulative dose of 20 ml/kg
  - Administer **Sodium Bicarbonate (8.4%) 50 mEq** IV over 5 minutes.

Poisonings
Carbon Monoxide

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

Carbon monoxide (CO) is an odorless, colorless gas that can cause sudden illness and death. CO is found in combustion fumes, such as those produced by cars and trucks, small gasoline engines, stoves, lanterns, burning charcoal and wood, and gas ranges and heating systems. CO from these sources can build up in enclosed or semi-enclosed spaces.

The prehospital care goals are to remove the patient from the noxious environment, provide supportive care, and provide appropriate oxygen therapy.

Clinical Pearls

- Hemoglobin binding affinity for CO is 250 times greater than its affinity for oxygen. Small amounts of CO dramatically reduce hemoglobin's ability to transport oxygen.

- Pulse oximetry reflects saturation of hemoglobin binding sites but does not reflect cell's ability to use oxygen for cellular metabolism; high flow oxygen should always be administered.

- Pregnant patients exposed to carbon monoxide may not display signs and symptoms of poisoning. However, levels of carboxyhemoglobin in the fetus may be higher than in the mother and the fetus may be in distress.

- CO toxicity is frequently misdiagnosed as a simple headache or viral syndrome. A high index of suspicion must be maintained, particularly during the winter months, when faulty heating systems and enclosed spaces make CO poisoning more common than it is at other times.

SpCO %	Clinical Manifestations
0-4%	None – Normal
5-9%	Minor Headache
10-19%	Headache, Shortness of Breath
20-29%	Headache, Nausea, Dizziness, Fatigue
30-39%	Severe Headache, Vomiting, Vertigo, ALOC
40-49%	Confusion, Syncope, Tachycardia
50-59%	Seizures, Shock, Apnea, Coma
60% -up	Coma, Death

Carbon Monoxide

Treatment

All Providers

- Ensure scene safety, wear appropriate PPE to avoid exposure. Remove patient from source of toxic exposure.
- Perform assessment including blood glucose.
- Administer high-flow oxygen.
- Obtain oxygen saturation (%SpO_2) and carboxyhemoglobin saturation (%SpCO) readings using the RAD-57, if available.
- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place monitors
  - RAD-57
  - End-Tidal CO_2
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Administer high-flow oxygen.
- Patients with ischemic changes on ECG, syncope or any period of unconsciousness may benefit from Hyperbaric Oxygen therapy. **Contact Physician OLMD** for recommended transportation destination.

Caustic Ingestion

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

The prehospital care goals are to provide decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearls

- Occupational exposures often are more severe than other exposures because industrial products are more concentrated than those found in the home.

- The severity of tissue injury from acidic and alkaline substances is determined by the duration of contact, the amount of the substance involved, and the substance's physical properties (pH, concentration, etc.).

Caustic Ingestion

Treatment

All Providers

- Ensure scene safety, wear appropriate PPE to avoid contamination, and decontaminate self and others as needed. Remove patient from source of poisoning or toxic exposure.

- Perform assessment including blood glucose. Focused history to include:
  - Type of agent involved. Do not transport toxic or hazardous substances. Document product information if possible.

- Ensure oxygenation.

- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.

- Place electrodes/acquire 12-lead ECG.

- Administer nothing by mouth. Do not delay transport.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation.

- Establish vascular access.

Cyanide Exposure

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

The prehospital care goals are to provide decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearls

- Cyanide makes the cells of the body unable to use oxygen.
- Inhalation of high concentrations of cyanide causes a coma with seizures, apnea, and cardiac arrest. At lower doses, loss of consciousness may be preceded by general weakness, giddiness, headaches, vertigo, confusion, and perceived difficulty in breathing.
- Pulse oximetry reflects saturation of hemoglobin binding sites but does not reflect cell's ability to use oxygen for cellular metabolism; high flow oxygen should always be administered.

Cyanide Exposure

Treatment

All Providers

- Ensure scene safety, wear appropriate PPE to avoid contamination. Remove patient from source of poisoning or toxic exposure.
- Perform assessment including blood glucose.
- Ensure oxygenation. Pulse oximetry reflects saturation of hemoglobin binding sites but does not reflect cell's ability to use oxygen for cellular metabolism; high flow oxygen should always be administered.
- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place monitors as available
  - End-Tidal CO_2
  - Pulse oximetry
  - RAD57
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.

Cyanide Exposure

Treatment (continued)

- Evaluate patient and scene to verify indications for antidote (Cyanokit) administration. Cyanokit administration requires:
    - Known or strong suspicion of exposure to cyanide:
        - Known/suspected ingestion, inhalation or exposure to cyanide product
          or
        - History of being exposed to dense smoke in a confined space or the presence of oropharyngeal soot or carbonaceous expectorations
    - Findings suggestive of cyanide toxicity including:
        - Any altered level of consciousness
        - Inexplicable hypotension (SBP < 90)
        - Seizure
        - Moderate to severe respiratory distress
        - Cardiac arrest in the setting of suspected cyanide poisoning or severe smoke inhalation.

- If criteria 1 and 2 are not met, provide supportive care and follow indicated protocols.

- If both criteria 1 and 2 are met, prepare to administer Cyanokit
    - Manage burns or trauma if indicated; carefully monitor airway
    - Establish secondary vascular access if possible as a dedicated route for Cyanokit administration.
    - Access the Cyanokit medication and two 100ml bags **Normal Saline** from the Cyanokit Bag. Immediately administer **5g** total of Cyanokit as follows:
        - Reconstitute medication then gently rotate for 30 seconds to mix:
            - For bags with a single vial containing **5g,** use both 100ml bags **Normal Saline** and transfer spike.
            - For bags with two vials each containing **2.5g,** use one 100ml bag **Normal Saline** and transfer spike for each vial.
        - Infuse **Cyanokit 5g** IV drip.
            - For bags with a single vial containing **Cyanokit 5g**, infuse entire vial over 15 minutes (260 gtts/min or ~4gtts/sec using supplied 20 gtts/ml set.
            - For bags with two vials each containing **Cyanokit 2.5g**, infuse one vial over 7.5 minutes (260 gtts/min or ~4gtts/sec using supplied 20 gtts/ml set. After first vial has been infused, repeat with second vial for a total of **5g**.

Cyanide Exposure

Treatment (continued)

- Transport patient to WHC following Cyanokit administration.
    - Patients requiring immediate stabilization shall be taken to the closest appropriate hospital. Such patients include:
        - Associated trauma.
        - Unstable airway that cannot be maintained in the field.
    - All other patients with or without burns shall be transported to the WHC Burn Center.

- Administrative notifications:
    - Notification of Cyanokit administration should be made via the EMS Supervisor within 24 hours to the medical director, and the Deputy Chief of EMS.
    - Notification should include date and time of incident, incident number, summary of incident, patient data, and destination hospital.

Hospital Communication: Be sure to include Cyanokit administration in the radio communication report to the destination hospital.

Envenomation

Envenomation is an accidental exposure to a substance that causes harm to the body.

The prehospital care goals are to provide decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearl

- Consider all snake bites as potentially venomous.

Envenomation

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Remove all jewelry and restrictive clothing.
- Splint the involved extremity and place it in dependent position.
- Do not use cold packs on poisonous snakebites.
- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- **Contact Physician OLMD** for recommended transportation destination to prevent delay in administration of anti-venin.

Organophosphate/Nerve Agent Exposure

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

The prehospital care goals are to provide decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearls

- Atropine will not reduce the weakness and respiratory depression associated with organophosphate poisoning.

- IV administration of Atropine before adequately supporting ventilations and correcting hypoxia may result in ventricular fibrillation. If the patient is hypoxic, Atropine should be administered IM until respiratory support is initiated.

Organophosphate/Nerve Agent Exposure

Treatment

All Providers

- Perform assessment including blood glucose. Focused history to include:
  - Type of agent involved:
    - Do not transport toxic or hazardous substances. Document product information if possible.
  - Route of exposure: ingestion, injection, inhalation, or absorption.
  - Duration of exposure.

- Ensure oxygenation.

- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.

- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry

- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring

- Establish vascular access.

- In small incident environment, ALS providers should assess patients and deliver treatment with BLS assistance.

- In the MCI environment, BLS providers should administer autoinjectors under the supervision of ALS providers.
  - The Incident Commander shall consult with the senior ALS provider on scene to determine when to delegate care to BLS personnel.

Organophosphate/Nerve Agent Exposure

Treatment (continued)

Manage according to severity of exposure as follows:

Mild Symptoms:

Blurred vision
Excessive teary eyes
Excessive runny nose
Increased salivation such as sudden drooling
Chest tightness or difficulty breathing
Tremors throughout the body or muscular twitching
Nausea and/or vomiting
Unexplained wheezing, coughing, or increased airway secretions
Acute onset of stomach cramps
Tachycardia or bradycardia

- If the patient experiences **two or more MILD symptoms**, administer **(1) DuoDote** IM.
    - If after 10-15 minutes, the patient develops any of the SEVERE symptoms listed below, administer **(2) additional DuoDote** IM in rapid succession.

Severe Symptoms:

Strange or confused behavior
Severe difficulty breathing or copious secretions from lungs/airway
Severe muscular twitching and general weakness
Involuntary urination and defecation
Convulsions
Unconsciousness

- If the patient has any of the **SEVERE symptoms**, administer **(3) DuoDote** IM in rapid succession.
    - Administer **Atropine 2 mg** IV or IM every 5 minutes, titrating to drying of secretions and ease of ventilation. Monitor for Atropine toxicity (delirium, increased fasciculations, hyperthermia).
    - If the patient is unconscious and seizing, administer **(1) Diazepam Autoinjector** IM. If refractory, follow **Seizures** protocol.

Psychiatric Emergencies

A psychiatric emergency occurs when a person's behavior becomes so unusual that it alarms the patient or other people.

The prehospital care goals are to provide supportive care and ensure that the patient does not harm himself/herself or others.

Clinical Pearls

- New onset of psychiatric disease in patients over 60 is commonly due to an underlying medical condition.

- Consider substance-induced disorders (intoxication, withdrawals), organic causes (cerebral lesions), endocrine emergencies (hypoglycemia and hyperglycemia), possible traumatic injury, and hypoxia before a patient's condition is identified as a psychiatric emergency.

Psychiatric Emergencies

Treatment

All Providers

- Ensure scene safety.
  - If the patient is violently agitated or if you are considering restraint, refer to the **Violent and Severely Agitated Patients** protocol.

- Perform assessment including blood glucose. Focused history to include:
  - Prior history of psychiatric illness.
  - Treatment/medication for psychiatric illness and compliance with treatment.
  - Precipitating events or recent psychosocial stressors.
  - Other pertinent medical history and recent drug/alcohol use.

- Ensure oxygenation.

- Consider substance-induced disorders (intoxication, withdrawals), organic causes (cerebral lesions), endocrine emergencies (hypoglycemia and hyperglycemia), possible traumatic injury, and hypoxia before a patient's condition is identified as a psychiatric emergency.

- Consult with the following parties to obtain a temporary detention order if necessary:
  - EMS Supervisor
  - Law enforcement officer
  - Woodburn Mental Health/Mobile Crisis Unit
  - Physician OLMD

- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. The 12-lead ECG should be obtained prior to initiation of treatment whenever the patient condition and time allow.

Respiratory Emergencies
Asthma/Bronchospasm

Asthma/Bronchospasm presents as increased work of breathing and abnormal ventilation. Asthma is a disease characterized by reversible episodic bronchospasm, airway inflammation, and excess mucous production. Bronchospasm in the absence of asthma can be caused by allergens, infections, CHF, toxic exposure, and other pulmonary insult.

The prehospital care goal is to improve oxygenation using oxygen, bronchodilators, and ventilatory assistance.

Clinical Pearls

- Wheezing, the classic sign of asthma, results from turbulent air flow through inflamed and narrowed bronchioles. However, some asthmatics present only with a persistent cough, frequently worse at night.

- Wheezing is a common sign of asthma, however not a diagnosis. It may be the result of a number of other causes, including pneumonia and CHF.

- Asthma patients who are experiencing an acute exacerbation will often have a prolonged expiratory phase of respiration, which may be observed with or without wheezing.

- Status asthmaticus is a severe and/or prolonged asthma attack that does not improve with aggressive management. Breath sounds may be inaudible (silent chest) and the increased work of breathing may exhaust the patient's respiratory muscles and ultimately lead to respiratory arrest.

- CPAP (especially when used with an in-line nebulizer) can significantly reduce the work of breathing in patients with actual or impending respiratory muscle fatigue by lessening the resistance to airflow and allowing rest to the muscles of respiration.

- History of sudden asphyxiant asthma or intubation due to asthma may predict a more severe course.

Asthma/Bronchospasm

Treatment

Signs and Symptoms

Mild/Moderate episode – Respiratory Distress: Audible wheezes (expiratory, inspiratory, or both), some respiratory distress, but with adequate tidal volume.

Severe episode – Severe Respiratory Distress at Risk for Respiratory Failure: Unable to speak comfortably (short sentences, < 5 word dyspnea, etc.), absent or greatly diminished breath sounds with or without wheezing, tachypnea, altered level of consciousness (tired), reduced pulse oximetry (< 92% on O_2).

All Providers

- Perform assessment. Focused history to include:
  - Recent nebulizer/MDI use
  - Fever or upper respiratory signs/symptoms.
  - Intubation history
- Prepare to assist ventilations with BVM.
- Assist patient with his or her bronchodilator medication prescribed for acute symptoms (rescue MDI).
- Ensure oxygenation. Prepare nebulizer and/or CPAP if indicated.
- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.

Asthma/Bronchospasm

Treatment (continued)

Manage according to severity of illness as follows:

Mild/Moderate episode – Respiratory Distress:

- Administer **Albuterol 5 mg** mixed with **Ipratropium Bromide 0.5 mg** via NEB. Repeat once.
    - Do not discontinue until medication delivery is complete unless adverse effects manifest.
    - If no significant improvement after 10 minutes, administer **Methylprednisolone 125 mg** IV slow. Reconsider reclassification if indicated.

Severe episode – Severe Respiratory Distress at Risk for Respiratory Failure:

- Administer all of the following:
    - **Albuterol 5 mg** mixed with **Ipratropium Bromide 0.5 mg** via NEB. Repeat as needed.
    - **Methylprednisolone 125 mg** IV slow.
    - **Magnesium Sulfate 2 grams in 100 ml of Normal Saline** IV drip, **30 gtts/minute** (10 gtts/ml set).

- Apply CPAP with in-line NEB, if indicated. CPAP may be useful in lowering the work of breathing in severe episodes.

- If ventilatory support is needed, as evidenced by actual or impending respiratory muscle fatigue, use BVM with in-line NEB.

- For extreme respiratory distress, marked by diminished air movement resulting in questionable delivery of nebulized medication, administer **Epinephrine** (**1:1,000) 0.3 mg** SQ.

Physician OLMD

In the setting of bronchospasm refractory to treatment, markedly decreased lung compliance with BVM, apnea, or other signs of impending arrest consider:

- Repeat **Epinephrine** (**1:1,000) 0.3 mg** SQ, or
- **Epinephrine** (**1:1,000) 0.3 mg** IM

COPD

Chronic Obstructive Pulmonary Disease (COPD) includes emphysema (destruction of lung tissue with decreased alveoli elasticity and permanent airway dilation), and chronic bronchitis (inflammatory process with increased mucous production and mucosal thickening). The two diseases may co-exist and can be difficult to distinguish.

The prehospital care goal is to improve oxygenation using oxygen, bronchodilators, and ventilatory assistance.

Clinical Pearls

- Acute exacerbations are most frequently caused by infection. COPD patients are vulnerable to bacterial/viral colonization as combination of increased mucous and the disease's destructive effect on the ciliary elevator reduces the efficiency of cough in expelling foreign contaminants.

- When complexity and ambiguity prevent definitive identification of the cause of respiratory distress, progressive supportive care will maximize benefit while minimizing potential for adverse effects of treatment.

- Patients on home oxygen are usually late stage COPD, with severely impaired pulmonary function and very low baseline O_2 saturation. They have little if any reserve if their system is challenged. Do not withhold oxygen for COPD patients in prehospital setting.

- CPAP (especially when used with an in-line nebulizer) can significantly reduce the work of breathing in COPD patients by lessening the resistance to airflow and allowing the muscles of respiration to rest.

COPD

Treatment

Signs and Symptoms

Mild/Moderate episode – Respiratory Distress: Audible wheezes (expiratory, inspiratory, or both)/diminished breath sounds, increased cough, mildly increased respiratory and heart rate, but with adequate tidal volume.

Severe episode – Severe Respiratory Distress at Risk for Respiratory Failure: Unable to speak comfortably (short sentences, < 5 word dyspnea, etc.), absent or greatly diminished breath sounds with or without wheezing, tachypnea, altered level of consciousness (tired), reduced pulse oximetry (< 90% room air/home O_2).

All Providers

- Perform assessment. Focused history to include:
  - Recent nebulizer/MDI use.
  - Fever or upper respiratory signs/symptoms.
  - Smoking/contaminant exposure history
- Prepare to assist ventilations with BVM.
  - For mild/moderate episodes, titrate to effect (work of breathing and respiratory rate) rather than attempting to achieve pulse oximetry levels > 96%. In patients with advanced disease, oxygen saturation of 90 – 93% may be acceptable.
- Assist patient with his or her bronchodilator medication prescribed for acute symptoms (rescue MDI).
- Ensure oxygenation. Prepare nebulizer and/or CPAP if indicated.
- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.

COPD

Treatment (continued)

- Manage according to severity of illness as follows:

Mild/Moderate episode – Respiratory Distress:

- Administer **Albuterol 5 mg** mixed with **Ipratropium Bromide 0.5 mg** via NEB
- If no significant improvement after 10 minutes, administer **Methylprednisolone 125 mg** IV slow

Severe episode – Severe Respiratory Distress at Risk for Respiratory Failure:

- Administer all of the following:
  - **Albuterol 5 mg** mixed with **Ipratropium Bromide 0.5 mg** via NEB. Repeat as needed.
  - **Methylprednisolone 125 mg** IV slow
- Apply CPAP with in-line NEB if indicated. CPAP may reduce the work of breathing in severe episodes.
- If ventilatory support is needed, as evidenced by actual or impending respiratory muscle fatigue, use BVM with in-line NEB.

Pneumonia

Pneumonia is an inflammation of the lung, usually caused by an infection.

The prehospital care goal is to improve oxygenation using oxygen and ventilatory assistance.

Clinical Pearls

- A common presentation of pneumonia may include fever, unilateral abnormal lung sounds and a productive cough as evidenced by the presence of discolored sputum (green, yellow, brown).

- In the presence of pneumonia, adventitious breath sounds may include localized or diffuse crackles, wheezing or diminished breath sounds depending on the progression of the illness.

Pneumonia

Treatment

All Providers

- Perform assessment. Focused history to include:
  - Fever
  - Productive cough
  - Unilateral abnormal lung sounds
- Ensure oxygenation.
- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
  - Screen for Sepsis (follow the **Sepsis** protocol, if indicated).
- Establish vascular access.
- Consider CPAP.

Pulmonary Edema

Pulmonary edema is excess fluid found in the alveoli and interstitial tissues of the lungs. Congestive Heart Failure (left sided) is the most commonly observed cause of pulmonary edema.

The prehospital care goals are to improve oxygenation, reduce/optimize preload and reduce cardiac afterload thereby improving cardiac output, and identify Acute Coronary Syndrome.

Clinical Pearls

- Pulmonary edema is not a diagnosis. It can be a sign of Congestive Heart Failure (CHF) or result from other causes.

- Early application of CPAP in moderate to severe CHF has been shown to improve mortality, decrease the need for intubation, and decrease ICU stay.

- When complexity and ambiguity prevents definitive identification of the cause of respiratory distress, progressive supportive care will maximize benefit while minimizing potential for adverse effects of treatment.

- Although significant overlap may exist, the following may be helpful when trying to differentiate between pneumonia and CHF:
    - Pneumonia patients often have a fever, yellow sputum, more gradual onset, and unilateral or localized rales. Pneumonia patients are not typically hypertensive.
    - CHF patients frequently present with elevated systolic and diastolic blood pressures. CHF often has a more sudden/abrupt onset, after exertion or at night.

Pulmonary Edema

Treatment

Signs and Symptoms

Mild episode – Respiratory Discomfort: Slight dyspnea at rest, able to speak in full sentences.

Moderate episode – Respiratory Distress: Unable to speak full sentences, normal mental status, SBP generally greater than 150 mmHg, oxygen saturation < 93% on oxygen.

Severe episode – Severe Respiratory Distress at Risk for Respiratory Failure: One word sentences, altered mental status, diaphoresis, SBP generally greater than 180 mmHg, oxygen saturation < 90% on oxygen.

All Providers

- Perform assessment. Place patient in semi-fowler or upright position. Consider keeping the lower extremities dependent.
- Prepare to assist ventilations with BVM.
- If the patient is prescribed Nitroglycerin, and has been instructed to take it for the observed symptoms, all providers may assist patients with self-administration of their Nitroglycerin.
    - Assist patient with **up to 3 doses** of **Nitroglycerin.**
- Endpoints for nitroglycerin administration:
    - Overall improvement in the patient's symptoms (respiratory rate, work of breathing, oxygen saturation, etc.)
    - Deterioration of hemodynamic status (SBP < 100mm Hg and/or HR < 60)
- Ensure oxygenation. Prepare CPAP and/or nebulizer if indicated.
- Place monitors
    - End-Tidal CO_2
    - Pulse oximetry
- Place electrodes for 12-lead ECG.

ALS providers

- Continue assessment to include:
    - 12-lead ECG interpretation
    - End-Tidal CO_2 monitoring
    - Treat signs and symptoms of ACS if indicated

Pulmonary Edema

Treatment (continued)

- Establish vascular access.

- Manage according to severity of illness as follows:

Mild/Moderate episode – Respiratory Distress:

  - Apply CPAP if indicated - increased work of breathing, unable to speak in full sentences or mild hypoxia (less than 95% but greater than 90% which marks severe episode)

  - Administer **Nitroglycerin 0.4 mg SL** while preparing and titrating CPAP.

  - Repeat **Nitroglycerin at 0.8 mg SL** (double dose) every 3-5 minutes until a therapeutic endpoint is reached or additional dose limited by hypotension.

Severe episode – Severe Respiratory Distress at Risk for Respiratory Failure:

  - Apply CPAP.

  - Administer Nitroglycerin while preparing and titrating CPAP.
    - Administer **Nitroglycerin 0.8 mg** SL (double dose) every 3-5 minutes until a therapeutic endpoint is reached or additional dose limited by hypotension.

  - If there is evidence of significant associated bronchospasm (wheezing) administer **Albuterol 2.5 mg** via NEB.
    - CPAP should not be removed once initiated except under extreme circumstances or to administer Nitroglycerin; use an in-line nebulizer to maintain effective CPAP.
    - Reassess for therapeutic effect and discontinue Albuterol if there is a significant increase in heart rate and blood pressure.

  - If patient displays signs/symptoms of hypoperfusion, consider causes:
    - If due to **Nitroglycerin** administration, administer fluid challenge **500 ml Normal Saline** IV rapid and reassess.
    - If due to suspected cardiogenic shock, administer **Dopamine 400 mg in 250 ml Normal Saline** IV drip at **10 microgram/kg/min** (60 gtts/ml set).

Undifferentiated Respiratory Distress

Undifferentiated respiratory distress is respiratory distress due to unknown causes.

The prehospital care goal is to improve oxygenation using oxygen and ventilatory assistance.

Clinical Pearls

- Consider underlying causes of respiratory distress in patients without a history of respiratory disease to include possibility of pulmonary embolus, spontaneous pneumothorax, CVA or other neurologic injury.

- Frequent reassessment of lung sounds is critical because lung sounds that were clear and equal may deteriorate rapidly.

- Undifferentiated respiratory distress can also commonly result from disease pathologies related to cancer and cancer treatments (including patients that have undergone lungectomies), renal disease, and diabetes (such as ketoacidosis).

- Even in patients without previous history of respiratory disease, wheezing can develop when the patient has had exposure to environmental, chemical, or other respiratory tract irritants.

- Wheezing can mask other adventitious breath sounds and once treated other underlying pathologies may become evident. Close monitoring and continued patient reassessment is required.

Undifferentiated Respiratory Distress

Treatment

All Providers

- Perform assessment
- Ensure oxygenation.
- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Consider CPAP.
- If wheezing, administer **Albuterol 2.5 mg** via NEB. If refractory, repeat once.
- Reconsider suspected causes and reclassify if possible based on ongoing-evaluation and response to interventions.

Seizures

A seizure is defined as an episode of impaired neurological function caused by an abnormal electrical discharge of brain neurons.

The prehospital care goals are to protect the patient's airway, prevent injury, identify and treat the underlying cause, and suppress the seizure activity.

Clinical Pearls

- Status epilepticus refers to persistent or recurring seizures without a return to baseline between episodes. Compensatory mechanisms are overcome by prolonged seizures. The resultant hypoxia, decreased cerebral perfusion and depletion of brain oxygen and glucose result in injury to brain tissue. Status epilepticus is potentially life-threatening.

- Consider underlying causes for the seizure including hypoxia, hypoglycemia, drug overdose or withdrawal, head injury, meningitis, eclampsia, and fever.

- Seizure patients are frequently post-ictal, indicating the brain's attempt to recover to normal function. Postictal patients can present as combative, confused, amnesic about the event or their medical history, or in another altered mental state.

Seizures

Treatment

All Providers

- Perform assessment including blood glucose.
- Take cervical spine precautions, if necessary.
- If the patient is actively seizing:
  - Do not restrain or force any device into patient's mouth.
  - Protect patient from further injury.
  - Consider cause of seizure activity.
- Treat injuries and place patient in the recovery position when the patient's seizure activity stops.
- Ensure oxygenation.

ALS Providers

- Continue assessment.
- Establish vascular access.
- Consider the **Obstetric Emergencies** protocol (eclampsia) if patient is more than 20 weeks pregnant, or less than 4 weeks post-partum.
- Treat active seizures.
  - Administer **Midazolam 5 mg** IV slow. If refractory after 5 minutes, repeat once.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
  - If no vascular access, administer **Midazolam 5 mg** IM or IN (IM preferred). If refractory after 5 minutes, repeat once.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
  - If refractory, **contact Physician OLMD**.

Sepsis

Sepsis is a complex and dynamic systemic infection that can potentially become life threatening.

The prehospital care goal is to sustain adequate organ perfusion to maintain function.

Clinical Pearls

- Common presentation of sepsis includes elevated body temperature (> 100.4) however providers should be aware that sepsis can also present with decreased body temperature (< 96.8).

- Hypotensive septic patients are primarily hypotensive from relative hypovolemia due to third spacing not cardiogenic shock. When aggressively treating blood pressures, fluid is the necessity and vasopressors are secondary to adequate fluid therapy.

- Septic shock is severe sepsis plus hypotension.

- The mean arterial pressure (MAP) is a measure of how well the body's organs are perfusing. A minimum MAP of 60 is necessary for proper blood flow to the organs, like the kidneys and brain. A normal range is 70 – 110 mmHg.

- Sepsis can result in decreased tissue perfusion, causing reduction in oxygen delivery to body organs.

Sepsis

Treatment

All Providers

- Perform assessment. Focused history to include recent surgical or invasive procedures and blood glucose.
- Ensure oxygenation.
- Place monitors
  - Place electrodes/acquire 12-lead ECG
  - End-Tidal CO_2

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Screen for sepsis based on the following guidelines:
  - **Sepsis Alert:** Strong suspicion of infection plus two or more of the following signs/symptoms:
    - Tachycardia (HR greater than 120)
    - Systolic BP < 90 or MAP < 65
    - Lactate greater than 4 mmol/L, if available

    Sepsis Alert treatment:
    - Follow the **Hypoperfusion** protocol, if indicated.
    - Hospital Communication: early notification for **Sepsis Alert**
    - Consider CPAP, if indicated for ventilator/respiratory support

Sepsis

Treatment

- **Possible Sepsis:** Strong suspicion of infection plus two or more of the following signs/symptoms (without evidence of hypoperfusion described above):
  - Temperature greater than 101^{o} F or less than 96^{o} F
  - Heart Rate greater than 90 bpm
  - Respiratory rate greater than 20 breaths/min
  - Change in mental status, delirium
  - Hyperglycemia (blood glucose greater than 120 mg/dl) without a history of diabetes

  Possible Sepsis treatment:
  - Supportive care
  - Hospital Communication: early notification for **Possible Sepsis** without impaired perfusion
  - Consider CPAP, if indicated for ventilator/respiratory support

Hospital Communication: Sepsis Alert or Possible Sepsis Notification, if indicated

Special Circumstances

This protocol is meant to provide guidance when signs/symptoms are serious to the patient and the emergent treatment options are specific to the patient. This protocol may be used exclusively, or in conjunction with other symptom-driven care protocols. For a subset of patients we encounter, there may be specific treatments unique to their condition but outside the traditional prehospital medications. The guidelines in this protocol and consultation with Physician OLMD should guide your decision-making. The patient and family are frequently well informed and valuable sources of information regarding the condition and its management.

The prehospital care goal is to provide patient-specific treatment to the patient in crisis.

Clinical Pearls

- Adrenal insufficiency may result from adrenal suppression by steroid medications, congenital adrenal hyperplasia, or Addison's disease. The end result is that the adrenal gland does not produce the body's usual steroids.

- Signs of adrenal crisis, which are not readily identifiable, include:
  - Pallor
  - Dizziness
  - Headache
  - Weakness/lethargy
  - Abdominal pain
  - Vomiting/nausea
  - Hypoglycemia
  - Hypotension
  - Shock
  - Heart failure

- Hemophilia is an inherited disorder of clotting. Patients are missing proteins critical in the formation of blood clots. Such patients present with severe bleeding complications related to relatively minor trauma.
  - The main treatment for hemophilia is called "replacement therapy." This involves getting the clotting factor that the body is missing. There are different types of replacement clotting factors. Some are made from human blood, and others aren't. Replacement therapy goes into a vein.

- Pulmonary hypertension patients may have significant resistance to blood flow across the pulmonary capillary bed and have respiratory or hemodynamic symptoms of their disease. Some patients are managed with continuous infusions and may have severe rebound symptoms should the infusion be interrupted due to catheter related complications.

Special Circumstances

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Establish vascular access.
- Identify patient's condition by way of patient, family members, Med-Alert jewelry, Emergency Information Form or other means.

Physician OLMD

Determine the recommended intervention for the patient condition and confirm the availability of the therapeutic agent.

Obtain authorization to administer the patient's medication if the patient presents an Emergency Information Form or equivalent documentation that

- Identifies the patient's medical condition
- States the recommended treatment

Stroke

A stroke is ischemic or hemorrhagic in nature and presents with a spectrum of neurologic symptoms related to the area of the brain deprived of blood flow.

The prehospital care goals are to focus on symptomatic supportive care and transport to an appropriate ED. The American Heart Association recommends no more than 15 minutes on scene in the case of suspected stroke.

Clinical Pearls

- Hemorrhagic stroke frequently presents as a severe headache or an unconscious or unresponsive patient with no sign of trauma-related cause.
- A high index of suspicion should be maintained for patients on blood thinners with any signs or symptoms of stroke or TIA.
- INOVA Fairfax Hospital is the only Level I Stroke Response Center with neurosurgical capabilities for the treatment of hemorrhagic stroke. Appropriate transportation considerations should be made to prevent a delay in definitive treatment.
- Patients with ischemic strokes may have focal deficits relating to the area of the brain that is affected.
- Thrombolytic therapy is limited to non-hemorrhagic strokes. Treatment requires rapid and careful patient assessment and must be initiated within a few hours of symptoms. Selected patients may receive localized thrombolytics up to 6 hours from the onset of symptoms.
- TIAs (transient ischemic attacks) are no longer defined solely by duration (i.e. < 24hours), rather by absence of tissue death. A TIA is a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction. A CVA is an infarction of central nervous system tissue. Treat all patients as if they are having a CVA, regardless of symptom duration.
- Atrial fibrillation increases a patient's risk of stroke and this risk increases with patient age and duration of atrial fibrillation.

Stroke

Treatment

All Providers

- Perform assessment including blood glucose. Focused history to include onset of symptoms and baseline neurological status.

- Perform Cincinnati Prehospital Stroke Assessment:
  - **Assess Speech Difficulty**. Ask the patient questions. If patients are slurring their speech or you cannot comprehend their answers, the test is positive.
  - **Check for Facial Droop**. Ask the patient to smile. If the smile is unequal, the test is positive. (Note: Weakness/paralysis of both upper and lower face on the same side is indicative of peripheral nerve palsy rather than acute CVA)
  - **Test for Arm Drift**. Have patients fully extend their arms in front of their body at shoulder height with palms facing up and eyes closed. If one arm drifts up or down within 10 seconds, the test is positive.

- If time allows, complete Miami Emergency Neurologic Deficit (MEND) assessment enroute.
  - **Mental Status**
    - Level of Consciousness (AVPU)
    - Speech: "You can't teach an old dog new tricks."
    - Questions (age, month)
    - Commands (close, open eyes)
  - **Cranial Nerves**
    - Facial droop (show teeth or smile) Note: Weakness/paralysis of both upper and lower face on the same side is indicative of peripheral nerve palsy rather than acute CVA.
    - Visual fields (four quadrants)
    - Horizontal gaze (side to side)
  - **Limbs**
    - Motor – Arm drift (close eyes, hold out arms), Leg drift (open eyes-lift each leg separately)
    - Sensory – Arm, Leg (close eyes and touch, pinch)
    - Coordination – Arm, Leg (finger-nose, heel-shin)

- Protect paralyzed extremities.

- Ensure oxygenation.

- Place electrodes/acquire 12-lead ECG.

Stroke

Treatment (continued)

ALS Providers

- Continue assessment to include:
  - 12-lead ECG. The 12-lead ECG should be obtained as soon as possible whenever patient condition and time allow.
  - Assessment of the patient for additional functional impairments such as sensation changes (paresthesia, numbness, or decreases in sensation) and movement impairments (weakness, abnormal muscle tone or control).

- Establish vascular access (18g in antecubital vein preferred) if it will not delay transportation.

Transportation Considerations:

- Sudden loss of consciousness or decreased level of consciousness associated with headache or vomiting or SBP > 220 is suggestive of a hemorrhagic event. Consider transportation to a Comprehensive Stroke Center (INOVA Fairfax Hospital), if reasonable to do so.
- Transport the following patients to a Primary Stroke Center
  - Those with symptoms for less than 4.5 hours, or
  - Those who have deteriorating clinical conditions, or
  - Those with a loss of consciousness
- All other stroke patients can be transported to the most appropriate facility.

Hospital Communication:

- **Stroke Alert**, if indicated by positive screening on Cincinnati Prehospital Stroke Assessment or MEND exam.
- **Possible Stroke Notification** if provider has clinical suspicion of an acute stroke not otherwise fitting criteria for Stroke Alert

Symptomatic Care
Acute Agitated State

The acute agitated state may be characterized by agitation, irrational behavior, incoherent thoughts, and impaired decision-making capacity. When a patient's condition or behavior poses an imminent threat to the safety and health of himself/herself or others, safe and humane restraint may be required. A number of entities may be causing or contributing to the observed behavioral state. These include metabolic conditions, head trauma, seizure, meningitis/encephalitis or other infections, intoxication, withdrawal, psychiatric conditions, infarction and/or a combination of these entities. Such patients are at higher risk of adverse events due to the underlying condition and the challenges it poses to effective patient care.

Acute Undifferentiated Agitation (AUA) is a nonspecific classification based on the recognition that information may be extremely limited. **Violent and Severely Agitated Patients (VSAP)** specifically includes violent behavior and **Agitated Delirium** specifically references the behavioral condition coupled with metabolic derangements and elevated temperature.

The prehospital care goal is to provide a safe means to treat and transport agitated patients.

Clinical Pearls

- Temporary physical restraint in order to administer treatment is different from mechanical restraint for involuntary transport.

- The minimum amount of restraint necessary should be used. Methods include:
    - Verbal de-escalation
    - Situational interventions
    - Physical and chemical restraint

Acute Agitated State

Treatment

All Providers

- Perform assessment including blood glucose and pulse oximetry.
- Ensure oxygenation.
- Place monitors, if possible.
  - Place electrodes/acquire 12-lead ECG
  - End-Tidal CO_2
- Follow appropriate treatment protocols, if indicated.
- Use verbal techniques prior to physical or chemical techniques:
  - Speak in direct, empathetic and calm voice.
  - Present clear limits and options.
  - Respect personal space.
  - Avoid direct eye contact.
  - Take non-confrontational posture.
  - Continue verbal efforts throughout the physical/chemical restraint process.
- Once the decision to physically restrain a patient is made:
  - Provider safety must be the paramount consideration.
  - Law enforcement personnel should initiate the effort whenever possible.
  - All personnel should agree on both the decision and the planned action.
- Physical restraints should be safe and humane, using the least amount of force required.
  - Restrain patient in a position of comfort and safety where the patient's airway, breathing, and circulation are protected and can be continuously monitored (this can often be effectively accomplished by standard immobilization techniques in combination with soft arm/wrist restraint such as girth-hitched cravats).
  - Any restraint used should allow for rapid removal if the patient vomits or develops respiratory distress.
  - Use of hard restraints, such as handcuffs, is generally discouraged.
  - Never restrain patients in a prone, hogtied, or hobbled position.
  - Never sandwich patients between devices such as backboards or Reeve's stretchers.
  - Never cover a patient's mouth or nose except with a surgical mask or with a NRB mask supplied with high flow oxygen.
  - Avoid securing a patient to the cot, as at some point the restraints will need to be removed to effect patient transfer at the receiving facility.

Acute Agitated State

Treatment (continued)

All Providers

- Regularly and frequently evaluate the neurovascular status of all restrained extremities and the respiratory and hemodynamic condition of the patient.

- If patients are restrained in devices that require a key, the police officer holding the key should accompany the patient during treatment and transportation.

ALS Providers

- Continue assessment, to include the following if possible:
  - End-Tidal CO_2 monitoring
  - 12-lead ECG interpretation
  - Pulse oximetry

- Establish vascular access, if possible.

- There is a risk of serious complication or death if the patient continues to struggle violently against restraints. Chemical restraint by sedation may be indicated in some circumstances.

- Whenever chemical restraint is used, supplemental oxygen, BVM, and suction must be readily available.

- Providers should be prepared to fully explain the need to use chemical restraint.

- **Contact Physician OLMD** for permission to treat behavioral control issues and then, assess for **Agitated Delirium** (metabolic syndrome) based on the following:
  - Evidence or strong suspicion of sympathomimetic intoxication – cocaine, PCP, amphetamine, methamphetamine, bath salts, etc.
  - Elevated temperature, diaphoresis, hypertension, tachycardia, violent and agitated behavior.

  Agitated Delirium (metabolic syndrome) treatment:
  - Administer **Sodium Bicarbonate (8.4%) 1 mEq/kg** IV over 5 minutes.
  - Infusion of **1,000 ml/hr Iced Normal Saline** IV drip (10 gtts/ml set).

Acute Agitated State

Treatment (continued)

Physician OLMD

If the patient requires chemical restraint for safe transport consider the following interventions based on patient presentation and history.

Delirium related to Acute Undifferentiated Agitation - suspected drug or ETOH intoxication or withdrawal:

- Administer **Midazolam 2 mg** IV.
  - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
- If no vascular access, administer **Midazolam 5 mg** IM or IN.
  - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.

Restriction

Authorization for Ketamine administration is limited to EMT-Paramedic level providers.

In Violent and Severely Agitated Patients (VSAP) requiring immediate Behavioral Control:

- Administer **Ketamine 250 mg** IM. If refractory, repeat once.
  - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
- After adequate sedation with Ketamine, administer **Midazolam 5 mg** IN or IM.
  - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.

Nausea/Vomiting

Nausea and vomiting may accompany any number of clinical entities, both benign and serious. While the primary patient care priorities remain patient assessment, monitoring and supportive care, the ability to treat the patient's nausea/vomiting brings beneficial symptomatic relief. Symptomatic relief may allow a more revealing clinical assessment and at a minimum relieves discomfort.

The prehospital care goals are to treat the patient's nausea/vomiting and prevent further associated dehydration.

Clinical Pearls

- Pain that precedes nausea/vomiting may suggest a surgical cause.
- It is important to recognize that not all vomiting is viral-related, or due to simple GI upset; serious medical conditions may be the cause, especially in the elderly, those with a history of or predisposition to cardiovascular or endocrine disease.
- Always perform a thorough assessment in order to uncover and address any underlying issues/problems such as AMI, pregnancy, toxic exposure (e.g. CO), or CNS disorders (e.g. meningitis, head injury, etc.).

Nausea/Vomiting

Treatment

All Providers

- Perform assessment. Focused history to include fluid loss (emesis/diarrhea), poor intake, and fever.
- Ensure oxygenation.
- Follow appropriate treatment protocols, if indicated.

ALS Providers

- Establish vascular access.
- Administer **Ondansetron 4 mg** PO ODT (preferred) or IV slow. If refractory, repeat once.
    - If no vascular access and patient is unable to comply with PO instructions, administer **Ondansetron 4 mg** IM. If refractory, repeat once.

Pain Management

Pain is a subjective symptom. Patients may characterize their discomfort using a variety of words, gestures, or expressions.

The prehospital care goal is to relieve pain as the patient perceives it. Serial pain scales should be used to measure progress.

Clinical Pearls

- Narcotic analgesics may decrease blood pressure and/or cause respiratory depression.
- Patients perceive, express, and tolerate pain in different ways; some with obvious and apparently painful injuries may appear to be in no distress while others react strongly to seemingly minor trauma. Ask patients about their pain, and their desire for pain relief (or lack thereof) as part of your assessment.
- While most adults can conceptualize and quantify pain using an abstract numerical scale (0-10), some patients (e.g. those with dementia, AMS, language barrier, etc.) may require more concrete tools. The scales below may be helpful.

Visual Analog Pain Scale

Show patient a horizontal line labeled with "no pain" at one end and "worst possible pain" at the other. Ask patient to mark or otherwise indicate on the line the intensity of their pain. The result is given a value of 0 to 10 based on relative location. Alternatively:

1. The numbers 0-10 may be written at even intervals on the line, or
2. The line may be represented as a thermometer.

(McCaffrey and Beebe, 1993)

Faces Pain Scale

(Faces: Wong and Whaley, 1985)

Pain Management

Treatment

All Providers

- Follow appropriate treatment protocols, if indicated.
- For extremity injuries: ice, immobilize, and elevate the injury.
- Ensure oxygenation.

ALS Providers

- Continue assessment, to include End-Tidal CO_2 monitoring.
- Establish vascular access.
- For pain associated with IO infusion, administer **Lidocaine 2% 40 mg** IV slow immediately after IO placement is verified.
- For pain management of the following conditions in the absence of hypotension, uncontrolled bleeding, or suspicion of thoracic or abdominal trauma:
  - Abdominal pain/back pain
  - Amputations
  - Burns
  - Trauma to the extremities
  - History of kidney stones, severe flank pain, and other signs and symptoms consistent with the presence of kidney stones
  - Other painful condition warranting treatment
- Administer **Fentanyl**
  - Up to **1 microgram/kg** IV slow to a max single dose of 100 micrograms, if refractory after 5 minutes repeat once.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
  - If no vascular access:
    - Administer **2 microgram/kg** IN to a max single dose of 200 micrograms, if refractory after 5 minutes repeat once.
      - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.

      OR
    - Administer up to **1 microgram/kg** IM to a max single dose of 100 micrograms, if refractory after 5 minutes repeat once.
      - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.

Pain Management

Treatment (continued)

- For patients allergic to Fentanyl, administer **Morphine Sulfate**
  - **1–5 mg** IV slow every 5 minutes as needed, to a max cumulative dose of 10 mg.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
  - If no vascular access, administer **1–5 mg** IM every 5 minutes as needed, to a max cumulative dose of 10 mg.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.

Restriction

Authorization for Ketamine administration is limited to EMT-Paramedic level providers.

- For patients who are chronically opioid dependent, whose pain is refractory to relief by opioids or for patients whose respiratory status makes opioids less desirable, administer **Ketamine**
  - As a single medication: **0.2 mg/kg IV or IM** may repeated after 5 minutes titrating to effect or max cumulative dose of 1 mg/kg or nystagmus (fast, uncontrollable movements of the eyes) is observed.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
    - If no vascular access, **1 mg/kg IN**
      - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
  - If used in combination with opioid medications: **0.1 mg/kg IV or IM** repeated every 5 minutes titrating to effect or max cumulative dose of 1 mg/kg or nystagmus (fast, uncontrollable movements of the eyes) is observed.
    - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
    - If no vascular access, **0.5 mg/kg IN**
      - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.
- Reassess patient (to include at least blood pressure, respiratory effort, and pain level) every five minutes after medication administration.

Physician OLMD

- Contact for additional doses as needed.

Trauma
Tactical Emergency Casualty Care

Almost every call we run has some degree of threat or risk, but there are some call types where the threat or risk is more direct, real and with greater potential impact. While most traditional EMS training begins with the declaration "Scene Safe…," there are undeniably circumstances that require swift and deliberate intervention even when the scene cannot be definitively declared "Safe" but only safe as reasonably achievable. The Tactical Emergency Casualty Care Guidelines (see **Scene Management: Special Circumstances**) describe these concepts, operations and priorities in such an environment – for this protocol it is essential to understand the 3 distinct phases of care:

Hot Zone (Direct Threat) – threat is real, directly present and poses greater risk than the benefit of most patient care interventions – Good tactics is good medicine. Tactical superiority is paramount. Patient care is limited.

Warm Zone (Indirect Threat) – threat is conceivable but remote. Benefits of time-critical, life-saving interventions are justified, followed by removal from threat environment as soon as achievable.

Cold Zone (Evacuation Care) – threat is mitigated or the patient has been removed from the threat environment. Care is centered on injury specific and context specific stabilization, packaging and preparation/completion of transport to definitive care.

Prehospital care goals:

1. Manage the threat environment to prevent further injury to patient or providers.
2. Prevent death and disability from time-critical injuries that are known causes of preventable death – uncontrolled bleeding, chest injuries requiring rapid intervention, airway occlusion.
3. Remove the patient from threat environment to a location where more deliberate stabilization and resuscitation can be rendered.
4. Move the patient to a location for definitive care in a timely manner and in the best condition achievable.

Clinical Pearls

- Bleeding from amputations may be limited if the limb or digit is cut cleanly or may be severe if the injury is jagged or crushed.

- High threat care is more about what not to do, than it is about novel care in the high threat environment.

- Patient movement is a patient care intervention. Moving from the Hot Zone to the Warm Zone is of greater benefit to the casualty than most any other treatments that place both the casualty and the provider at ongoing risk of injury.

- All interventions are weighed by the benefit they bring balanced against other treatments and the risk associated with doing them in the current location/environment.

Clinical Pearls (continued)

- PACE framework (**P**referred, **A**lternative, **C**ontingency, **E**mergency) helps inform strategies when context is different from traditional EMS. It also is the rationale for the differences in strategy and tactics compared with traditional EMS contexts.

- Concrete differences are most evident in the Hot Zone and Warm Zone and include triage, assessments, airway management, bleeding control, spinal motion restriction, patient movement techniques, etc.

- Why we apply MARCHE (massive bleeding, airway, respiration, circulation, head injury/hypothermia, every other injury)
    - Death from arterial bleeding: 2-4 minutes
    - Death from airway compromise: 4-6 minutes
    - Death from tension pneumothorax: 10+ minutes
    - "Golden Hour" for Shock: 60+ minutes

Tactical Emergency Casualty Care

Treatment

All Providers

- Prepare and Stage
  - Early preparation of casualty collection points and patient treatment areas remote from the high threat environment is important. This preparation can begin while the Rescue Task Force is assembling.
  - Avoid depleting transport personnel and resources to the extent possible, as patient transport from the scene is a priority after addressing immediate time-critical life threats.
- Triage – In the Hot Zone and Warm Zone, triage by rescue task force is much more limited than in the traditional EMS context.
  - Hot Zone and Warm Zone – (Rescue Task Force perspective) - The primary goal is to distinguish dead patients from those with potential for resuscitation – dead v. not dead.
  - Hot Zone and Warm Zone – (Extraction Task Force perspective) - Classification by the Extraction Task Force is driven by the patient's ability to exit the high threat environment under his or her own power – ambulatory v. non-ambulatory.
  - Cold Zone (Evacuation Care) at Casualty Collection Point and treatment areas - Traditional triage/re-triage (Red-Yellow-Green-Black) should be completed in the Cold Zone. In that setting it guides care priorities in the treatment area and informs transportation prioritization.
- Rescue Task Force (RTF) – Properly equipped providers will coordinate with law enforcement assets tasked with providing force protection and will be operating under Unified Command in standard fashion. Under escort by the force protection element, the RTF will enter the Warm Zone to make casualty contact and address immediate life-threats (uncontrolled arterial bleeding, airway occlusion, open pneumothorax, tension pneumothorax).
  - Most assessments and skills are performed at the All Providers level including:
    - Nasal Airway
    - Control of bleeding with tourniquet, pressure dressings, wound packing, hemostatic agents, junctional hemorrhage devices (hemorrhage clamp), if available, or direct pressure. The preferred method will be dictated by the phase of care, number of patients and providers and location and nature of the injury (see **Hemorrhage Control** protocol).
    - Chest seal for open pneumothorax

Tactical Emergency Casualty Care

Treatment (continued)

- Extraction Task Force – Properly equipped providers coordinate with law enforcement within controlled areas and will be operating under Unified Command in standard fashion. The Extraction Task Force is tasked with removing patients from the point of wounding in the Warm Zone environment toward casualty collection points and transport to definitive care.
- Casualty Collection Points and Medical Treatment Areas – care in these controlled locations is consistent with the traditional care routinely delivered as appropriate.

ALS Providers

- Perform chest decompression of tension pneumothorax, if indicated.

Physician OLMD

- Early notification of incidents with potential prolonged on scene duration and delayed transport should be made through DPSC to the Duty OMD. If available, the Duty OMD may respond to support on scene care.

Amputations

An amputation is the partial or complete severance of a digit or limb.

The prehospital care goals are to control bleeding, preserve the amputated part, manage pain and transport to the appropriate facility.

Clinical Pearl

- Bleeding from amputations may be limited if the limb or digit is cut cleanly or may be severe if the injury is jagged or crushed.

Amputations

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Control hemorrhage with direct pressure. If the hemorrhage cannot be controlled, consider use of hemostatic trauma gauze or a tourniquet (follow **Windlass Tourniquet** procedure).
- Cover the wound with a sterile dressing saturated with sterile saline and cover with a dry bandage. Splint and elevate as necessary.
- Place the severed part in sterile gauze to preserve all amputated material. Moisten the gauze with sterile saline. Keep the part cool, but do not allow the severed part to freeze or come into direct contact with ice or cold packs.

ALS Providers

- Continue assessment.
- Establish vascular access.
- If hypotensive, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - SBP > 90 and MAP > 65
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg

Hospital Communication: Trauma Alert, if indicated

Burns

In this protocol, burns are classified by type (mechanism of burn) and severity (simple or complex).

The prehospital care goals are:

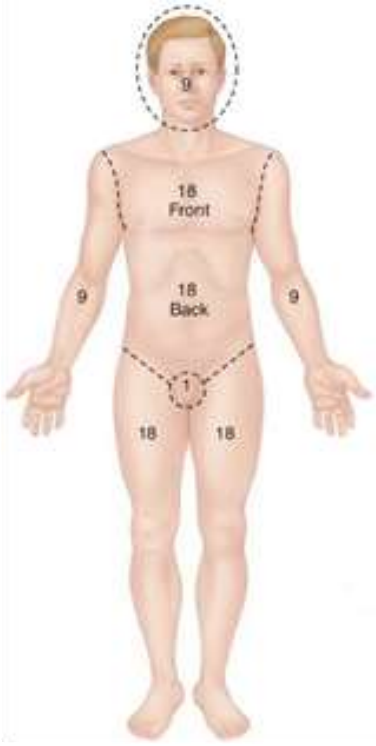
Thermal: Stop the burning process, maintain normal body temperature, and protect the airway.

Chemical: Take extreme care to avoid exposure to chemical agents and remove contaminants from patient to prevent continued injury.

Electrical: Focus on ABCs, look for entrance and exit wounds and be aware of any cardiac dysrhythmias and associated trauma.

Clinical Pearls

- Shock in the early stages of a burn is generally not associated with the burn. Be sure to rule out other life-threatening injuries in such cases.
- Lethal cardiac dysrhythmias can be caused by low voltage exposures. Fatal dysrhythmias usually occur immediately, but other dysrhythmias can emerge at any time if the heart has been electrically injured.
- Traumatic injuries can be caused by high voltage exposures and often include internal injuries and burns.



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Burns

Treatment

All Providers

- Prevent further injury by stopping the burning process and removing the patient from the source.

- Perform assessment and address immediate life-threats as they are identified. Focused history to include:
  - Cause of burn.
  - Length of exposure.
  - Presence in closed environment.
  - Nature of burning material.
  - Past history of respiratory diseases, smoking, and cardiac diseases.
  - Treatment by bystanders.
  - Signs and symptoms of possible inhalation injury (SOB, wheezing, severe cough, hoarse voice, singed nasal and facial hair).
  - Evidence of potential carbon monoxide exposure or cyanide exposure in thermal burns.

- Ensure oxygenation.

- Remove clothing and jewelry around burn site if possible without causing further injury. Cut around clothing that adheres to the skin.

- Determine burn depth and extent of body surface area (BSA) involvement by Rule of Nines.

Simple Burns

Superficial burns (1st degree) involving less than 50% BSA
Partial thickness burns (2nd degree) involving less than 10% BSA

- For treatment of burns less than 10% BSA, apply sterile gauze soaked with cool/tepid water or saline to burned area taking care to maintain temperature and avoid hypothermia. Wrap the patient in a dry sheet.

- For treatment of all other simple burns, wrap burned area in a sterile dry dressing, and wrap the patient in a dry sheet.

Burns

Treatment (continued)

Complex Burns - Transport the patient to the Washington Hospital Burn Center
Age > 50 years
Superficial burns involving more than 50% BSA
Partial thickness burns (2nd degree) involving more than 10% BSA
Any Full thickness burn
Inhalation
Circumferential
Special area (feet, hands, genital, face, and major joints)
Electrical
Chemical

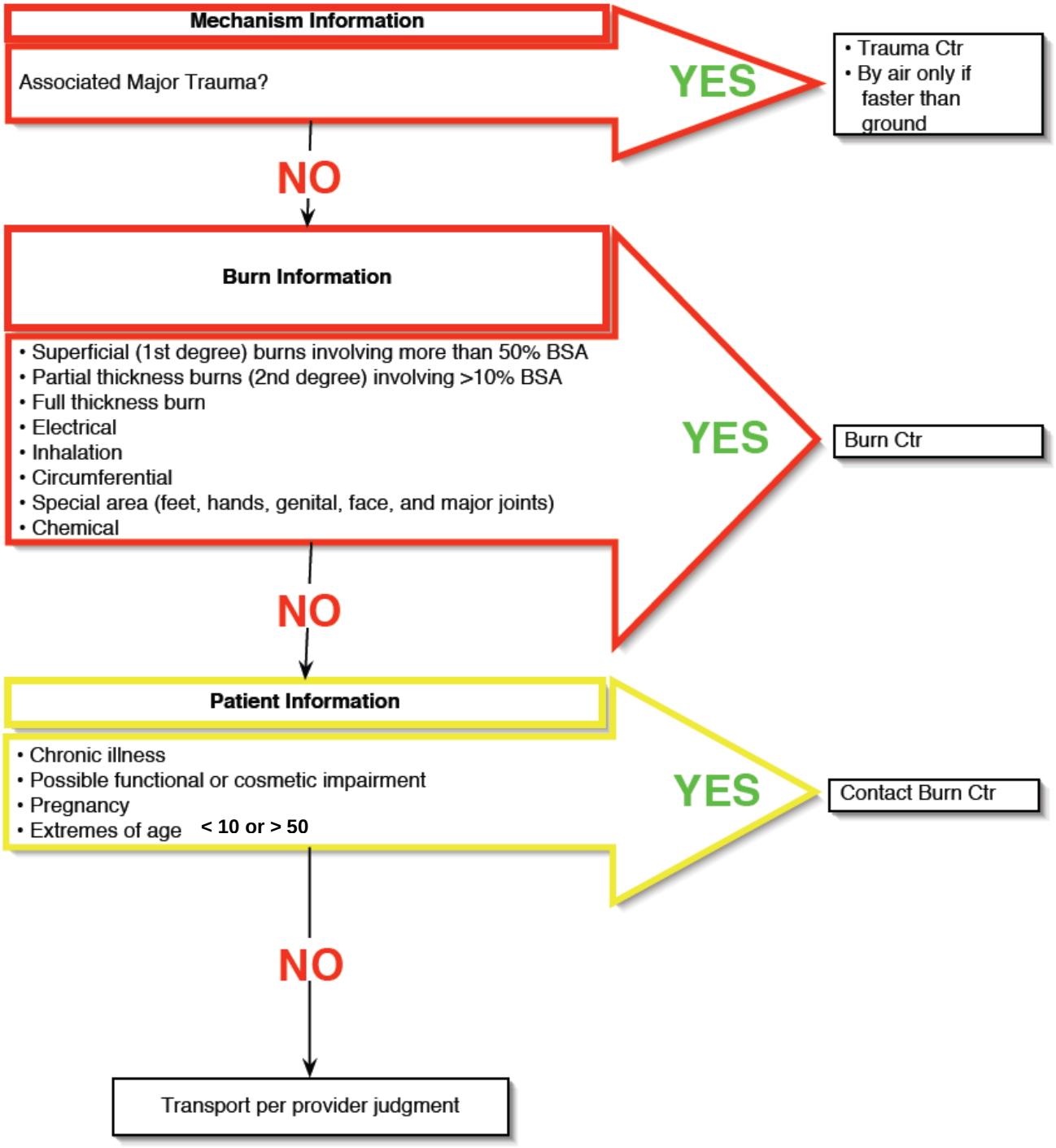
- For treatment of all complex burns, apply a dry sterile dressing to burned area and wrap the patient in a dry sheet.
- For treatment of electrical burns, look for entrance and exit wounds and be aware of any cardiac dysrhythmias and associated trauma.
- For treatment of chemical burns, remove and flush the chemical agent with copious amounts of water and provide supportive care. Remember that eyes are particularly vulnerable to chemical burns.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG if electrical burns.
- Establish vascular access
- If hypotensive, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - SBP > 90 and MAP > 65
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg

Hospital Communication: Trauma Alert, if indicated

Burn Triage and Transport Decision Tree



Crush Syndrome

Crush Syndrome is the death of skeletal muscle and the release of cellular contents from the dead muscle cells into the plasma. It results when patients suffer prolonged and continuous pressure on large muscle masses. For our purposes a 4-hour time frame serves as a threshold at which Crush Syndrome may be considered.

The prehospital care goals are to estimate the time trapped and balance the administration of fluids and electrolytes to prevent associated complications.

Clinical Pearls

- After skeletal muscle injury occurs and the crushing object is removed, accumulated fluid shifts into the injured muscle resulting in acute hypovolemia and hypotension. In addition, high levels of cellular toxins (myoglobin) and electrolytes (potassium and hydrogen) are released into circulation. This can cause acute renal failure, lethal cardiac dysrhythmias and sudden death.

    - IV fluids should be initiated as soon as practical prior to extrication. Early initiation allows a large volume to be gradually infused over the duration of extrication, preventing hypotension and diluting toxins to help prevent renal failure.

    - Adding sodium bicarbonate to the IV solution can help prevent the myoglobin deposition in the renal tubules and counteract hyperkalemia.

    - Nebulized Albuterol may be beneficial when treating presumed hyperkalemia because it pushes potassium into cells.

- Controlling hemorrhage can be difficult because the actual source of bleeding can be hard to identify. Several large vessels can be damaged and the crushed bone does not support direct pressure application.

- The Crush Syndrome protocol is intended for the management of patients under significant load for an extended period of time. Patients who have been on the floor for an extended period of time due to intoxication, injury, immobility, etc. may have some modest rhabdomyolysis, they generally do not have the same degree of acidosis and hyperkalemia. Such patients are generally not appropriate for the Crush Syndrome protocol and benefit from IV fluids alone.

Crush Syndrome

Treatment

All Providers

This protocol applies to patients with prolonged entrapment **approaching and exceeding 4 hours.**

- Perform assessment. Focused history to include:
  - Entrapment time
  - Extrication time

  Note: Do not extricate the patient until an ALS assessment and intervention is complete unless immediate lifesaving measures are required.

- Provide supportive care, taking care to maintain patient's temperature.

- Immobilize cervical spine and administer care for soft tissue injuries.

- Ensure oxygenation.

- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. Remember that patients suffering a prolonged entrapment are prone to hyperkalemia, hypoglycemia, and hypothermia.

- Establish two large-gauge vascular access sites.

- In the absence of immediate life threat, delay extrication to deliver treatment.

- Prior to release, all patients should receive an initial dose of **Normal Saline 20 ml/kg** IV **run wide open** (10 gtts/ml set).
  - For prolonged extrication, administer the initial dose of **Normal Saline** followed by **Normal Saline IV** drip at **10 ml/kg/hr** (10 gtts/ml set).

- For entrapment greater than 4 hours administer:
  - **Sodium Bicarbonate (8.4%) 1 mEq/kg** IV over 5 minutes to a max dose of 100 mEq.
  - If there are ECG signs of hyperkalemia, administer **Albuterol 10 mg** via NEB.

- Post extrication, continue **Normal Saline** IV drip at **5 ml/kg/hr** (10 gtts/ml set).

Crush Syndrome

Treatment (continued)

Physician OLMD

- Call for additional orders or consultation as needed.
  - Physician support by the Duty OMD can be made through the Department of Public Safety Communications (DPSC). If unavailable, physician members of the US&R task force may assist with on scene operations.

- In the setting of entrapment greater than 4 hours, consider adding **Dextrose 50% (D50)** to IV fluids.

Hospital Communication: Trauma Alert, if indicated

Drowning/Near-drowning

Drowning is asphyxiation resulting from submersion in liquid.

Near-drowning describes an incident of potentially fatal submersion in liquid which did not result in death or in which death occurred more than 24 hours after the submersion.

The prehospital care goals are airway maintenance, reversal of hypoxia, maintenance of circulation, cervical immobilization and transport to appropriate facility.

Clinical Pearls

- All near-drowning victims should be evaluated in the ED since complications may appear in a delayed manner. The patients who deteriorate later usually have a cough, hypoxia, or respiratory distress upon initial removal from the water.

- Always suspect and consider the possibility of cervical spine injury in association with drowning or near-drowning.

Drowning/Near-drowning

Treatment

All Providers

- Perform assessment. Focused history to include:
  - Approximate submersion time.
  - Dive associated injuries.
  - Any loss of consciousness, respiratory distress, or hypoxia.

- Provide stabilization of the cervical spine, if indicated. Maintain a high suspicion of possible cervical spine injury.

- Ensure oxygenation. CPAP may be beneficial for appropriate patients in the setting of hypoxia, respiratory distress or increased work of breathing. For respiratory arrest or cyanosis with decreased level of consciousness, assist with BVM.

- Prevent heat loss. Remove wet clothing.

ALS Providers

- Continue assessment.

- Establish vascular access, if indicated.

- All symptomatic near-drowning patients and those who had symptoms at any time should be transported.

- Near-drowning patients refusing transport require **Physician OLMD** prior to completing the patient refusal form**.**

Eye Injury

Eye injuries can occur from direct trauma (blunt or penetrating), or from chemical or thermal exposure. Field decontamination may be indicated for chemical exposure.

The prehospital care goals are to assess nature of injury, prevent further injury, including complications from movement and from increasing intraocular pressure, pain control and transport to an appropriate facility.

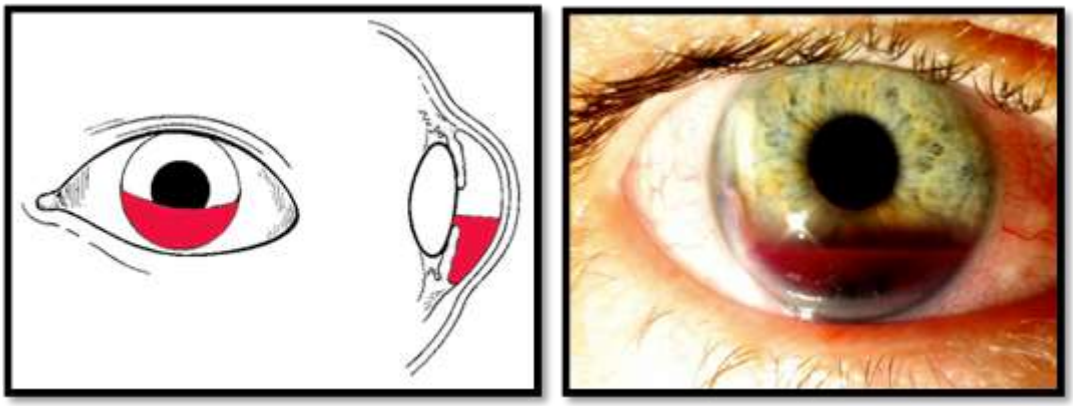
Clinical Pearls

- Serious eye injuries can occur from seemingly minor mechanisms as grinding or yard work. A very low threshold should be used to transport for emergency department evaluation.

- Full-thickness injuries to surface of the eye can be rapidly worsened and eye contents extruded by increases in intraocular pressure. Any nausea (common in eye injuries) should be immediately treated with antiemetics unless contraindicated due to the increases in intraocular pressure caused by vomiting. Whenever possible, the patient should be transported sitting upright.

- The eyes move together (conjugate), so covering the non-injured eye is essential to prevent unintended movement of the injured eye. This is important with an impaled object that remains in the injured eye.

- A few injury types worth noting:
    - Hyphema injury to the anterior chamber.



Hyphema – Blood layering in the anterior chamber of the eye

Clinical Pearls (continued)

- Ruptured Globe & Penetrating Globe injuries.

Ruptured Globe – Characterized by irregular pupil

- Impaled object in the eye with obvious open globe injury.

Eye Injury

Treatment

All Providers

Eye injuries are evaluated and managed within the context of overall clinical priorities. This is particularly true in the multiple injured patient. Eye trauma is managed in accordance with these guidelines if an isolated injury and/or after addressing higher priority injuries.

- Perform assessment, including evaluation for concurrent injuries. Focused exam to include the following:
  - Pupil size, reactivity and shape/irregularity.
  - Conjunctiva & anterior chamber – edema (chemosis), hemorrhage, impaled objects and signs of penetrating injury or globe rupture.
  - If no foreign body is suspected, eye movement should be assessed in the six cardinal positions of gaze – center, left, right, upward downward in center and right/left position.
  - Gross visual acuity described as:
    - reads print or clearly counts fingers at 1 foot distance
    - perceives hand motion at 1 foot distance
    - perceives/localizes light at 1 foot distance
    - none
- Obtain medical history, including mechanism of injury, previous eye conditions and eye surgeries, all eye medications and any blood thinners (anticoagulants/antiplatelet agents).

Specific Injuries

- Hyphema injury to the anterior chamber – sit upright if safe to do so.

- Ruptured Globe & Penetrating Globe injuries – Rigid shield to the injured eye only, do not apply pressure to globe. Sit upright if safe to do so. Do not apply gauze patch.

- Impaled object in the eye with obvious open globe injury – Stabilize foreign body without applying pressure to globe and cover unaffected eye to prevent conjugate movement of the injured eye. Do not apply pressure or gauze patch to any open globe or ruptured globe injury.

- Chemical exposure - Immediately irrigate with copious amounts of saline. If needed to facilitate irrigation and there is no associated open globe injury/penetrating globe injury,

- If the patient is unable to open the eye, do not force the eye open unless it is to irrigate for decontamination. Never apply pressure to the injured eye.

- Transport with patient seated upright if not contraindicated by concurrent injuries or spinal immobilization.

Eye Injury

Treatment (continued)

ALS Providers

- Continue assessment.

  Administer **Tetracaine 2 drops** to the affected eye. May repeat once in 15 minutes.
- Establish vascular access, if indicated.
- To avoid the associated increases in intraocular pressure that accompany vomiting, treat any associated nausea in accordance with **Nausea/Vomiting** protocol.
- Follow **Pain Management** protocol, if indicated. No Ketamine use in the setting of penetrating globe injuries or open globe injuries.

Hemorrhage Control

There have been great strides in the management and treatment of bleeding in recent years. Recent editions of ITLS, as well as Tactical Emergency Casualty Care (TECC) guidelines, have assigned a higher priority to control of massive bleeding than in the past. This is primarily because uncontrolled bleeding is the leading cause of preventable deaths.

Over recent years, some new methods, devices and medications have emerged. Some established methods, devices and medications have found new favor and better understanding of their potential role. Choice of method, and/or device is based on a number of variables including - injury pattern, anatomic location, and the circumstances/setting of the call at the given point in time.

Our protocol is based on American College of Surgeons position statement, as well as, TECC guidelines and other consensus guidelines where applicable. We will describe general indications, a progressive algorithm for escalation and selection of method/device, and finally specific guidance on the individual devices/methods.

The prehospital care goals are to identify and manage hemorrhagic blood loss.

Clinical Pearls

- Most traumatic injuries producing significant external bleeding can be readily managed by direct pressure and pressure dressings. On rare occasion, heavy bleeding requires more aggressive management by tourniquet, wound packing, hemostatic agents, hemorrhage clamp, if available, or a combination of these measures. Selection of method and device is based on rate of bleeding, anatomic location of injury, as well as, incident scene dynamics.

- Success requires us to balance our desire to use the simplest method possible against the need to avoid prolonged blood loss in the face of ineffective efforts requiring us to move to more invasive measures.
    - Don’t use a TQ on a paper cut, and don’t spend prolonged time on direct pressure when both legs are traumatically amputated with ongoing bleeding.

Hemorrhage Control

Treatment

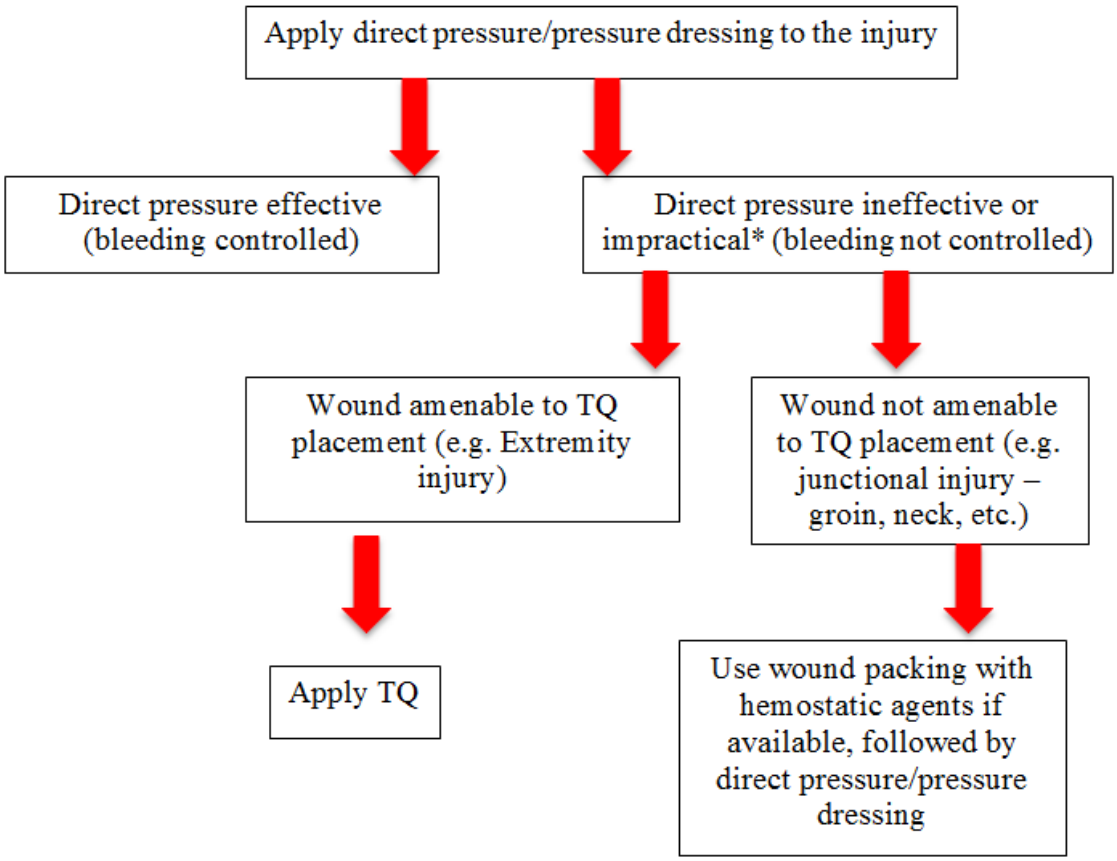
All Providers

- Perform assessment.
- Bleeding control methods and devices in approximate order of consideration:
  - Direct pressure
  - Pressure dressings
  - Tourniquet use
  - Wound Packing with or without hemostatic agents
  - Hemorrhage clamp, if available – best suited to large scalp lacerations with heavy bleeding, may also be used on wounds to junctional locations following wound packing with or without hemostatic agents if direct pressure is impractical

ALS Providers

- Continue assessment.
- Establish vascular access.
- If patient hypotensive with SBP < 90 then based on injury pattern and observed BP manage resuscitation according to trauma protocols:
  - Penetrating Torso resuscitate to palpable pulse and improved mental status.
  - Traumatic Brain Injury with altered mental status less than A on AVPU resuscitate to SBP 110.
  - Otherwise resuscitate to a SBP > 90 by administering **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until one of the following end-points are reached:
    - SBP > 90 and MAP > 65
    - Signs/Symptoms of pulmonary edema occur (rales, respiratory distress, declining oxygen saturation)
    - Max cumulative dose of 20 ml/kg
- If blunt or penetrating trauma within 3 hours of injury and either heart rate persistently > 110 or SBP < 90, administer **Tranexamic Acid (TXA) 1 gram in 100 ml Normal Saline** IV drip over 10 minutes, **100 gtts/min** (10 gtts/ml set). Heart rate > 110 should be persistent but TXA need not be delayed until determining response to saline resuscitation.

Control of External Bleeding Decision Tree



Source: Adapted from ACS position statement 2014

*Direct pressure may be considered impractical when number of patients exceeds available personnel to deliver care, number of critical interventions preclude sustained direct pressure by one provider, unable to access the site of bleeding, indirect threat to the providers makes direct pressure at the site of wounding impractical, etc.

Isolated Extremity Injury

Isolated fractures and dislocations of the extremities are a result of traumatic forces.

The prehospital care goals are to recognize and treat injuries and transport the patient to an appropriate facility.

Clinical Pearls

- The pulse oximeter can be used to monitor the distal pulse during the splinting process. Affix the probe to a free finger or toe to establish a baseline. Monitor the oximeter and look for any changes such as erratic or absent readings.

- Injury near a joint carries a high incidence of blood vessel and nerve involvement and requires a different approach to positioning and splinting. For this reason, consider a joint injury to be any muscular or connective tissue injury, dislocation, or fracture within three inches of a joint.

Isolated Extremity Injury

Treatment

All Providers

- Perform assessment. Focused exam to include:
  - Mechanism of injury
  - Pulse
  - Movement
  - Sensation

- Immobilize injuries:
  - If the fracture/dislocation is open, cover the open area with a sterile dressing. If the bone is protruding, make no attempt to push the bone back into the open site.
  - If fracture or dislocation is angulated and pulseless, attempt to align the long bones to their normal anatomical position under mild traction. If significant mechanical resistance is met, stop immediately and splint in current position.
  - If the fracture or dislocation is angulated with a pulse, splint as found.

- Control hemorrhage with direct pressure. If the hemorrhage cannot be controlled, consider use of hemostatic trauma gauze, a pressure dressing, or a tourniquet (follow **Windlass Tourniquet** procedure).

Specific Injuries

- **Closed Femur Fracture**: Apply traction splint.

- **Open Femur Fracture:** Immobilize to the backboard.

- **Hip Fracture:** Splint with long board splint or use KED.

- Ensure oxygenation.

ALS Providers

- Continue assessment.

- Establish vascular access.

- If hypotensive, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - SBP > 90 and MAP > 65
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg

Selective Spinal Motion Restriction

The goal of Spinal Motion Restriction (SMR) is to minimize movement of an unstable fracture of the spine and in so doing prevent secondary injury. While it seems reasonable that there is theoretical benefit in minimizing movement at an unstable fracture, there is limited evidence to support the effectiveness of this longstanding practice.

It has recently been suggested that efforts to apply SMR measures may actually increase the movement of the spine. Once applied, the spine still moves and like all interventions SMR has potential risks and complications. These include spinal movement during application, respiratory compromise, risk of aspiration associated with the forced supine position, soft-tissue injury from prolonged application, and patient discomfort.

In select patients the likelihood of unstable spinal injury may be determined to be negligible based on history, mechanism of injury, and physical exam findings. Clinical decision rules guide our decision-making. This strategy, Selective Spinal Motion Restriction, allows providers to minimize the adverse events of unnecessary SMR and more reliably identify those patients with greater likelihood to benefit from these measures.

The prehospital care goals are to assess and identify those patients at risk for spinal injury, prevent further injury during extrication and transport, and prevent unnecessary harm from methods used to restrict spinal motion.

Clinical Pearls

- Certain risk factors place some patient populations at higher risk for injury to the spinal column:
    - Age (geriatric patients age > 65)
    - Osteoporosis
    - Metastatic spinal disease
    - Preexisting/past spinal injury/damage
    - Rheumatoid arthritis
    - Long-term steroid use

- Traditional Methods of Spinal Motion Restriction are useful in some patients; it is however not appropriate for all injured patients.
    - There are no definitive studies that demonstrate the benefits of spinal immobilization.
    - Currently employed and commonly taught methods do not “immobilize” the spine. They are not anatomically correct, and implementing these measures will cause some movement of the spine.
    - There are studies suggesting adverse effects associated with use of backboards and forcing the patient to assume a supine position on a hard surface. Select patients may be clinically harmed by forced immobilization on a backboard.

Selective Spinal Motion Restriction

Clinical Pearls (continued)

- Spinal motion restriction refers to efforts to minimize spinal motion, and there are a range of options for achieving SMR. All should include efforts to ensure that anytime the patient is relocated, it is as a unit by way of in-line movements (log rolling, lift-and-slide, etc.). For the cervical spine, a cervical collar is generally the preferred method. In some cases, application of a cervical collar and positioning the patient supine on the stretcher may be the best method. In other cases, a collar, head rolls, and backboard may be the most reasonable way to assure the spine moves as a unit.
    - The preferred method and means when SMR is indicated is application of a cervical collar, and not every patient that warrants a cervical collar requires a backboard.
    - The decision to additionally utilize a backboard is a separate decision based on the position in which the patient is found, our ability to assess the patient based on mental status, vital signs, intoxication, and the patient's ability to sit on the stretcher under their own power.
    - For further guidance refer to the **Spinal Motion Restriction** procedure.

Selective Spinal Motion Restriction

Treatment

All Providers

- In the presence of trauma where cervical spine injury is a concern, stabilize the cervical spine and address clinical needs in standard order of priority.

- Perform assessment to determine the appropriateness of Spinal Motion Restriction measures. Evaluate history, mechanism and injuries.
    - If not trauma related, follow appropriate protocol.
    - If penetrating trauma is the mechanism of injury then determine appropriateness of spinal motion restriction as follows:
        - If the patient is intoxicated, or cannot be assessed due to altered mental status/decreased level of consciousness then spinal motion restriction is indicated.
        - If the patient has an evident neurologic deficit then spinal motion restriction is indicated.
        - In the absence of these indications, spinal motion restriction is not indicated or necessary on clinical grounds and may be harmful.
        - Spinal motion restriction should never be done at the expense of accurate physical examination or identification and correction of other life threatening conditions in patients with penetrating trauma.
    - In the setting of blunt trauma continue assessment as follows below.

- Identify features that would warrant SMR and exclude the patient from a selective strategy:
    - GCS < 15
    - Abnormal/unstable vital signs
    - Evidence of paralysis or paresis
    - Known vertebral disease
    - Previous cervical spine surgery
    - Distracting injury
    - Language barrier
    - Intoxication

- Screen for any dangerous mechanism/findings that would warrant application of SMR measures:
    - Age ≥ 65
    - Numbness or tingling in the extremities
    - Dangerous mechanism of injury
        - Fall from elevation ≥ 3 feet/5 stairs
        - Axial load to the head (i.e. diving)
        - MVC high speed (> 60 mph), rollover, or ejection
        - Motorized recreational vehicles
        - Bicycle struck or collision

Selective Spinal Motion Restriction

Treatment (continued)

- Screen for any low risk mechanism and findings; if **no** low risk findings are present SMR measures are warranted:
    - Ambulatory at any time on scene
    - No neck pain at scene
    - Absence of midline cervical spine tenderness
    - Simple rear end MVC, excluding:
        - Pushed into oncoming traffic
        - Hit by bus/large truck
        - Rollover
        - Hit by high speed vehicle

- If need for SMR is uncertain, maintain manual stabilization pending completion of final functional check.

- Ensure oxygenation.

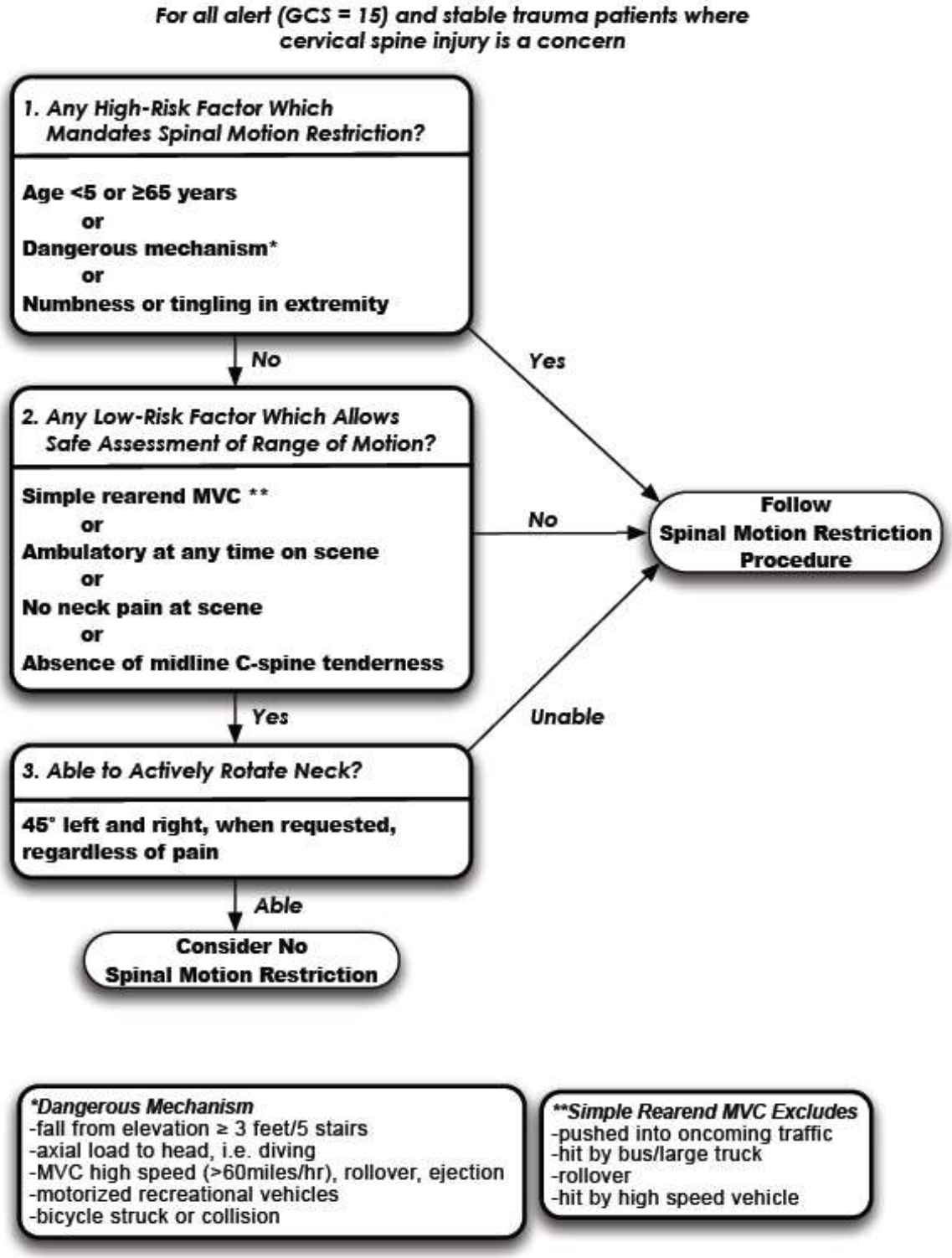
ALS Providers

- Continue assessment.

- If all above criteria warranting SMR measures are negative, perform a final functional check to assess the patient's neck range of motion. Instruct patient to actively rotate neck/head 45 degrees left and right.
    - If patient is able, SMR measures are not required
    - If patient is unable then SMR measures are warranted; follow **Spinal Motion Restriction** procedure to determine optimal method

Hospital Communication: Trauma Alert, if indicated

Selective Spinal Motion Restriction



Soft Tissue Injury

Soft tissue injuries are infrequently life threatening but may endanger blood vessels, nerves, connective tissue and other important internal structures.

The prehospital care goals are to manage bleeding, support underlying tissue, prevent further contamination and manage pain and swelling.

Clinical Pearls

- A severe hematoma in the thigh can contain a liter of blood before swelling becomes noticeable.

- The wound care provided in the ED entails much more than simple closure of a wound. The decision of which wounds are candidates for immediate closure is a complex decision based on wound contamination, likelihood of infection, time of injury, health status of the patient and location of the wound.

- Prehospital providers should expressly avoid advising patients regarding which wounds require closure.

Soft Tissue Injury

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Provide stabilization of the cervical spine, if indicated.
- Control hemorrhage with direct pressure. If the hemorrhage cannot be controlled, consider use of hemostatic trauma gauze, a pressure dressing, or a tourniquet (follow **Windlass Tourniquet** procedure).
- Prevent further contamination by cleaning the wound and applying a sterile dressing.
- Prevent heat loss.

Specific Injuries

- **Impaled objects:** Stabilize the impaled object in place, unless in the cheek with exposure into the airway.
- **Lacerations, incisions, abrasions, and/or avulsions:** Apply dry dressing and bandage. Consider pressure dressing or hemostatic trauma gauze if indicated.
- **Contusions and hematoma:** Apply ice pack.
- **Crush injury:** Apply dry dressing to any open wounds, apply ice, and splint injured site.

ALS Providers

- Continue assessment.
- Establish vascular access, if indicated.

Hospital Communication: Trauma Alert, if indicated

Torso Injury

Anatomically the torso is defined as the region above the pelvic floor and below the clavicles and includes the retroperitoneum.

Trauma to this region may be caused by either blunt or penetrating mechanisms of injury. Trauma within this region may produce a source of hemorrhage that is not easily compressible and therefore difficult to control outside the operating room. Improved outcomes have been demonstrated in penetrating torso trauma with uncontrolled hemorrhage if aggressive IV fluids are delayed until after the site of bleeding is surgically controlled.

The prehospital care goals are to recognize and treat injuries and transport the patient to the appropriate facility for definitive care.

Clinical Pearls

- For penetrating injuries check for the presence of entrance and exit wounds. In these injuries the trajectory of the injury can be very difficult to determine and multiple organs and/or structures may be involved.
- Patients with a fractured pelvis can lose approximately 2 L of blood due to internal hemorrhage in a very short span of time and this blood loss may not be visibly noticeable.

Torso Injury

Treatment

All Providers

- Perform assessment. Focused exam to include penetrating vs. blunt trauma.
- Immobilize cervical spine and administer care for soft tissue injuries.
- Ensure oxygenation.

Specific Injuries

- **Sucking chest wound**: Apply occlusive dressing.
- **Flail Chest**: Provide respiratory support with bag-valve-mask ventilation.
- **Impaled Objects:** Stabilize the impaled object in place.
- **Pelvic fractures:** For suspected Anterior-Posterior Compression (APC) injuries with hypoperfusion (pedestrian struck, frontal impact MVC, etc.), follow the **SAM Sling II** procedure.
- **Evisceration:** Do not touch or attempt to push abdominal contents back into the abdominal cavity. Cover the area with a sterile moist dressing, and transport patient with knees flexed to decrease tension on the abdominal muscles only if there is no suspicion of spinal trauma.

ALS Providers

- Continue assessment, including 12-lead ECG if indicated.
- Establish vascular access. Consider secondary access.
- If tension pneumothorax, follow **Chest Decompression** procedure.

Torso Injury

Treatment (continued)

Manage hemorrhagic shock according to the mechanism of injury. A Verbal GCS ≥4 (confused/disoriented or better) and Level of Consciousness ≥ Verbal on AVPU scale indicates adequate cerebral perfusion.

Penetrating torso trauma

- If patient has adequate cerebral perfusion and palpable radial pulse:
  - **Normal Saline** IV KVO
- If patient showing signs of inadequate cerebral perfusion and no palpable radial pulses, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - Adequate cerebral perfusion and palpable radial pulse
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg

Blunt torso trauma (to include mixed blunt & penetrating trauma)

- If hypotensive, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - SBP > 90 and MAP > 65
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg

Hospital Communication: Trauma Alert, if indicated

Traumatic Brain Injury

Traumatic Brain Injury (TBI) is classified as a primary or secondary injury to the brain tissue.

The prehospital care goal is airway maintenance, aggressive prevention/reversal of hypoxia and hypotension to reduce secondary injury, immobilization and rapid transport to a trauma center.

Clinical Pearls

- Isolated closed head injuries are not a common cause of hypotension. Hypotension usually indicates injury unrelated to the head trauma.

- Patients on coumadin (Warfarin) are at a greater risk for intracranial bleeding following head trauma.

- TBI may be present even in the absence of significant intrusion or vehicle damage in side impact collisions when the striking vehicle is larger than the impacted vehicle. The patient's head may have direct impact with the incoming vehicle or other front seat passengers. This may happen even with correct seatbelt use.

- Directives regarding hyperventilation have been removed from the TBI protocol with the agreement of trauma services for the following reasons:
    - Brain Trauma Foundation recommendations for hyperventilation with signs of herniation are based on weak evidence. The signs of herniation should be assessed only after normalizing blood pressure, oxygenation and ventilation. Hyperventilation is also stated to be temporary measures only preferably with intracranial pressure monitoring.
    - The guidelines note the low positive predictive value of pupillary findings; yet then list those findings as sufficient evidence for herniation. Inadvertent hyperventilation in non-herniating patients is common and is known to worsen outcomes by decreasing cerebral blood flow and worsening ischemic injury.
    - Lastly, TBI without hyperventilation is much more common than TBI with impending herniation. Since exam findings are unreliable and the benefit is unproven, a greater number of patients would likely be harmed than would reasonably be expected to benefit from hyperventilation.

Traumatic Brain Injury

Treatment

All Providers

- Perform assessment. Focused assessment to include signs/symptoms of herniation:
  - Asymmetric unreactive pupils (blown pupil)
  - Cushing's Triad (increased BP, decreased pulse, irregular respirations)
  - Posturing
  - Progressive neurologic deterioration evidenced by declining GCS greater than 2 points not attributable to other causes

- Provide supplemental oxygen. Avoid hypoxia, hyperventilation (too fast), and overventilation (too much volume), all three are associated with worse outcomes.
  - Consider advanced airway.
  - Ventilate normally (10–12 breaths/minute).

ALS Providers

- Establish vascular access.

- If hypotensive, administer **500 ml Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - SBP greater than or equal to 110 mmHg
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation)
  - Max cumulative dose of 20 ml/kg

Traumatic Brain Injury

Treatment (continued)

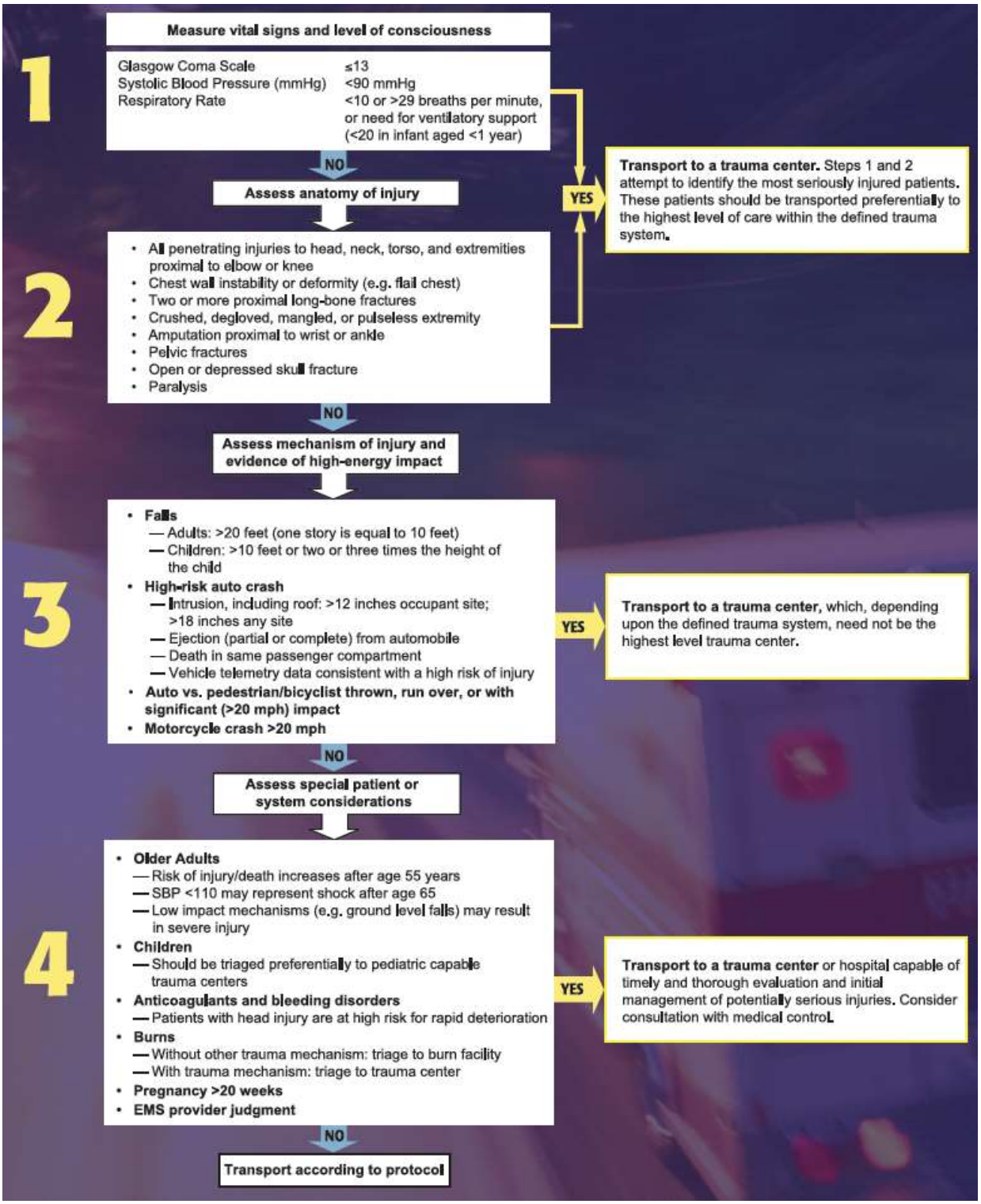
Physician OLMD

- If patient is combative, administer **Midazolam 2 mg** IV slow.
  - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.

- If no vascular access, administer **Midazolam 5 mg** IM or IN.
  - For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.

Hospital Communication: Trauma Alert, if indicated

Trauma Triage and Transport Decision Tree



Helicopter transport only if faster than ground (especially if extrication will be necessary) or if ground transport is more than 30 minutes (consider time of day and traffic conditions). Refer to **Transportation Section** for more information on Helicopter Transport criteria.

PEDIATRIC PATIENT CARE PROTOCOLS

General Guidelines

For patients less than 14 years old (generally the age of puberty), pediatric orders always apply. It is recognized that the exact age of a patient is not always known; use your judgment and consider the presence of secondary sexual characteristics (axillary hair in boys, breast development in girls).

Consider weight-based dosing for small teenagers. Pediatric dosing should never exceed adult dosing unless specifically noted.

The following definitions may be helpful in thinking about pediatric patients:

- Newborn – immediately post birth
- Neonate – birth to 1 month
- Infant – 1 month to 1 year
- Child – 1 year through 8 years
- Adolescent – 9 years through 16 years
- Adult – age 17 or older

Parents or other primary caregivers are usually the best source of information about young children (and recall that children's behavior may regress in age under stress). Even if not knowledgeable about specific conditions, they can provide invaluable insight on the child's current state of health vs. the baseline.

Allow parents to stay with children during evaluation and transport, if appropriate. The parent's lap is usually the best place for the examination of a stable patient.

All patients and passengers must be adequately restrained during transport.

Patient Assessment

When the need to expose a patient arises, take care to maintain body temperature and make every effort to respect the patient's privacy and consider ambient temperatures and conditions.

In pediatric patients, the parent or primary caregiver should be the primary source of information for weight-based calculations if they are reliable historians. Use of the length-based resuscitation tape is an alternative means of obtaining the weight of the patient, especially under circumstances where no other source of dependable information exists. The tape's estimates are from averages and do not account for the undernourished or the overweight.

Scene Survey

- Ensure Scene Safety:
  - Identify and avoid potential hazards
  - If applicable, "Stage" until scene is declared stable
  - Establish safe working area
  - Use personal protective measures

- Identify:
  - Mechanism of injury (MOI)/ Nature of Illness (NOI)
  - Number of patients
  - Need for additional resources
  - Environment where patient is found
  - Position of patient

- Refer to local and/or regional MCI procedures, if indicated.

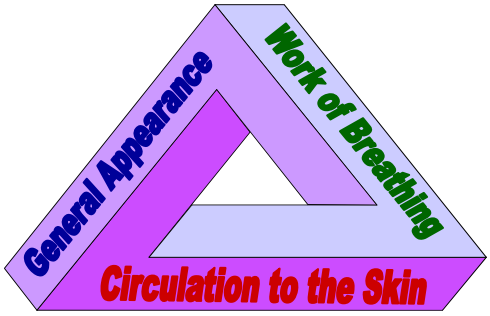
- Preserve potential crime scene and/or evidence, when possible.

- Update dispatch and pre-alert receiving facilities, as needed.

Initial Assessment

Identify and treat immediate life-threatening conditions.

- Establish a general impression while approaching the patient:
  - Age
  - Gender
  - Weight
  - Pediatric Assessment Triangle:



    - General Appearance (normal or abnormal: TICLS):
      - Tone
      - Interactivity
      - Consolability
      - Look/Gaze
      - Speech/Cry
    - Work of breathing (normal, abnormal: increased or decreased):
      - Rate
      - Effort (retractions, nasal flaring, etc.)
      - Audible sounds (stridor, grunting, etc.)
      - Position/posture
    - Circulation to skin (normal or abnormal):
      - Color (pale, mottled, cyanotic, ashen)

- Assess the patient's level of consciousness (AVPU) and compare to baseline (from parent):
  - Alert
  - Verbal
  - Painful
  - Unresponsive

  Note: If trauma is suspected, simultaneously establish cervical spine stabilization while assessing the level of consciousness and plan to immobilize as soon as practical

- Assess and open the Airway:
  - Consider padding to align the ear canal with the shoulder
    - For patients less than 3 years old, place padding under torso (shoulders to pelvis)
    - For patients 3-5 years old, place padding under shoulders only
  - Trauma patient – jaw thrust
  - Medical patient – head tilt or jaw thrust
  - Clear airway – sweep and suction the airway, as needed
  - Maintain airway – use BLS airway adjuncts (OP, NP), as needed

- Assess Breathing:
  - Assess presence, rate, and quality
  - Ensure oxygenation
  - Provide BVM ventilation, as needed

- Assess Circulation (compare core to periphery):
  - Assess presence, rate, and quality of pulses
  - Assess for and control major external bleeding
  - Assess skin color, temperature, moisture, and capillary refill
  - Compare core and periphery
  - Initiate CPR, as needed

- Identify priority:
  - Load-and-Go patients – Critically ill or injured patients requiring immediate attention; unstable patients with potentially life-threatening injury or illness.
    - Trauma: < 10 minutes once providers have full access (e.g. extricated, removed from IDLH, etc.)
  - Urgent – Less serious condition that requires immediate emergency medical attention but does not immediately endanger the patient's life.
  - Non-Urgent – Conditions requiring medical attention but not on an emergency basis.

Respiratory Assessment	Presenting Signs
Respiratory Distress	Tachypnea, retraction, nasal flaring, wheezing, stridor, crackles, gurgling, pink or pallid central skin color
Respiratory Failure	Hypoxia – SPO_2 less than 90 room air, tachypnea, periods of bradypnea, altered mental status, severe retractions, head bobbing, grunting, pale, ashen, mottled, or cyanotic central skin color

Medical Assessment

Unresponsive Medical Patient:
Rapid Medical Assessment

- Head to toe assessment:
  - Inspection/Visualization
  - Palpation
  - Auscultation
  - Neurological assessment (PMS)
  - Medic Alert jewelry
- Establish baseline vital signs:
  - Blood pressure
  - Pulse
  - Respiration
  - Lung sounds
  - Pulse oximeter
  - End-Tidal CO_2 Monitoring
  - Skin
  - Temperature
  - Pupils
  - Blood glucose (heel stick in smaller children)
  - GCS
  - ECG Monitor/AED
- Obtain prior medical history (from family or bystanders):
  - Signs and Symptoms
  - Allergies
  - Medications
  - Past medical history
  - Last oral intake
  - Events leading up to the emergency
- Look for and correct underlying cause (GHOST)
- Load and Go – Lifesaving interventions and transport
- Complete Ongoing Assessment

Responsive Medical Patient:
Focused Medical Assessment

- Determine chief complaint and obtain history of present illness (from parent and/or child):
  - Onset of symptoms
  - Provoking factor
  - Quality of pain/problem
  - Region/Radiation of pain/Referred pain
  - Severity (pain/discomfort scale)
  - Time (duration)/Treatment prior to arrival (and outcome)
- Obtain prior medical history (from parent and/or child):
  - Signs and Symptoms
  - Allergies
  - Medications
  - Past medical history
  - Last oral intake
  - Events leading up to emergency
- Focused Physical exam, on chief complaint:
  - Consider toe-to-head approach
  - Use parents to assist in assessment
- Establish baseline vital signs:
  - Orientation
  - Blood pressure (≥3yo), assess perfusion in young children
  - Pulse, Respiration, and Lung sounds
  - Pulse oximeter
  - Skin
  - Pupils
  - Blood glucose (heel stick in smaller children)
  - GCS
  - ECG Monitor (12-lead if indicated)
  - Stroke scale, if indicated
  - Pain/discomfort scale
- Interventions and transport
- Complete Ongoing Assessment

Trauma Assessment

Significant Injury or Significant Mechanism of Injury – Trauma Patient	**No Significant Injury or No Significant Mechanism of Injury – Trauma Patient**

Rapid Trauma Assessment – Physical Exam and History
 	
• Perform head to toe assessment: (DCAPP-BTLS)
  o Deformity
  o Contusion
  o Abrasion
  o Puncture
  o Penetration
  o Burn
  o Tenderness
  o Laceration
  o Swelling
 	
• Neurological assessment (PMSC)
 	
• Establish baseline vital signs:
  o Pulse
  o Blood pressure (assess perfusion if unable)
  o Respiration
  o Pupils (reaction & size)
  o Lung sounds
  o Pain/discomfort scale
 	
• Obtain prior medical history:
  o Signs and Symptoms
  o Allergies
  o Medications
  o Past medical history
  o Last oral intake
  o Events leading up to the emergency
 	
• Load and Go – Lifesaving interventions and transport
 	
• Complete Ongoing Assessment
	Focused Trauma Assessment – Physical Exam and History
	
	• Perform focused physical exam, on chief complaint (DCAPP-BTLS):
	  o Deformity
	  o Contusion
	  o Abrasion
	  o Puncture
	  o Penetration
	  o Burn
	  o Tenderness
	  o Laceration
	  o Swelling
	
	• Focused neurological assessment (PMSC)
	
	• Establish baseline vital signs:
	  o Pulse
	  o Blood pressure (assess perfusion if unable)
	  o Respiration
	  o Pupils (reaction & size)
	  o Lung sounds
	  o Pain/discomfort scale
	
	• Obtain prior medical history:
	  o Signs and Symptoms
	  o Allergies
	  o Medications
	  o Past medical history
	  o Last oral intake
	  o Events leading up to the emergency
	
	• Interventions and transport
	
	• Complete Ongoing Assessment

Ongoing Assessment

- Perform detailed head to toe (consider toe to head for younger children) assessment or repeat focused physical exam

- Continue assessment to include:
  - Airway
  - Breathing
  - Lung sounds
  - Oxygenation
  - Circulation
  - Skin condition

- Continue neurological assessment, when appropriate:
  - Level of consciousness – assess alertness and orientation to person, place and time
  - Seizure activity or signs of
  - Motor – assess ability to move all extremities
  - Sensory – assess sensation in all extremities
  - Pupils – assess equality and reactivity to light
  - Establish baseline Glasgow Coma Score (GCS)
  - Use the Cincinnati Prehospital Stroke Scale, as needed

- Repeat regularly (every 5 minutes for critical patients, every 15 minutes otherwise) and after any intervention:
  - Orientation
  - Blood pressure/perfusion
  - Pulse
  - Respiration
  - If indicated:
    - Lung sounds
    - Pulse oximeter
    - Skin
    - Pain/distress scale
    - Pupils
    - ECG Monitor and 12-lead
    - GCS
    - Blood glucose
    - Stroke scale
    - End-Tidal CO_2

- Complete required patient care documentation.

PEDIATRIC PROTOCOLS

Allergic Reactions

Allergic reactions fall along a spectrum ranging from mild to severe. At the extreme end, anaphylactic reactions are life-threatening and care is focused on reducing or stopping the allergic reaction (exaggerated immune response). The typical response begins within minutes of exposure and primarily involves the cardiovascular and respiratory system.

The prehospital care goal is to vigilantly monitor and maintain the airway and perfusion status to prevent cardiovascular collapse.

Clinical Pearls

- Symptoms associated with anaphylaxis may begin within seconds of exposure to an allergen or may be delayed for several hours.
- Epinephrine is the only immediate-acting medication. Antihistamines and steroids require significant periods of time to exert their therapeutic effects.
- In severe shock, the patient may not be perfusing sufficiently for IM epinephrine to be fully absorbed.
- Children will compensate for decreasing perfusion as long as possible by making adjustments in other vital signs before quickly dropping their blood pressure. Monitor closely for changes in respiratory rate, heart rate, capillary refill, and mental status.
- Each subsequent allergic reaction can be significantly more severe than prior episodes.
- In some allergic reactions, the symptoms can become recurrent one hour or more after the initial exposure to the antigen. Patients are encouraged to be transported even if their symptoms are resolved.

Allergic Reactions

Treatment

All Providers

- Perform assessment. Focused assessment of exposure to allergens (bee stings, food, medications, etc.). Determine if the patient has self-administered an epinephrine autoinjector prior to EMS arrival and document dose.
- Ensure oxygenation.
- Obtain and monitor $ETCO_2$ readings.
- Remove any insect stinger(s) by scraping the skin. Apply ice packs to sting sites.

Moderate to Severe Reaction
If the patient shows signs of a moderate to severe reaction: respiratory distress (trouble speaking/tachypnea), stridor, airway obstruction/swelling (trouble swallowing), altered mental status, or hypoperfusion:

- Administer Epinephrine as soon as possible using an autoinjector.
  - Use the patient's prescribed autoinjector.
  - If the patient or has no prescribed autoinjector, **contact Physician OLMD** for authorization to administer an **FRD Epinephrine Junior 0.15 mg autoinjector** (see below).
- Follow the **Hypoperfusion** protocol, if indicated.

ALS Providers

- Continue assessment.
- Establish vascular access.

Mild Allergic Reaction
If patient presents with signs of a mild allergic reaction limited to localized swelling/itching/erythema, reassess frequently

- Administer **Diphenhydramine 1 mg/kg** IV or IM.

Allergic Reactions

Treatment (continued)

Moderate to Severe Allergic Reaction
Symptoms are a spectrum and may include diffuse hives/itching/erythema/edema, vomiting/GI symptoms, respiratory symptoms and hypoperfusion. If patient presents with signs of a moderate to severe allergic reaction characterized by symptoms that are not limited to localized cutaneous hives/itching/erythema/edema:

- If respiratory symptoms, airway swelling or hypoperfusion are present:
  - Administer **Epinephrine (1:1,000) 0.01 mg/kg** IM in the lateral thigh for patients with respiratory symptoms, airway swelling or hypoperfusion. It is the most rapidly acting agent and should be given early for patients meeting these criteria.
  - If symptoms continue to progress or fail to improve **Epinephrine (1:1,000) 0.01 mg/kg** IM in the lateral thigh may be repeated after 5 minutes.

- Administer **Diphenhydramine 1 mg/kg** IV or IM.

- Administer **Methylprednisolone 1 mg/kg mg** IV slow.

- If wheezing or shortness of breath is present:
  - Administer **Albuterol 2.5 mg** via NEB, repeat as needed.

- Follow the **Hypoperfusion** protocol, if indicated.

Physician OLMD

- BLS providers: Obtain authorization to use an **FRD Epinephrine Junior 0.15 mg autoinjector**.

- ALS providers:
  In the setting of severe refractory shock, consider:
  - Repeated administration of **Epinephrine (1:1,000) 0.01 mg/kg** IM in the lateral thigh every 5 minutes based on symptoms.
  - **Epinephrine (1:10,000) 0.1 mg** IV over 5-10 minutes. Administer as follows:
    - **Epinephrine (1:10,000) 0.1 mg (1 ml) in 100 ml Normal Saline** IV drip **120 gtts/minute** (10 gtts/ml set).

Cardiac Arrest
Withholding Cardiopulmonary Resuscitation (CPR)

Under select circumstances it is reasonable and appropriate for EMS providers to withhold CPR. These situations primarily center around patients with valid DNRs or cardiac arrests resulting from traumatic etiologies.

The prehospital care goal is to fully assess the patient in arrest and determine if CPR initiation should be withheld based on established criteria.

Clinical Pearls

- Livor mortis is a settling of the blood in the dependent portion of the body, causing a purplish red discoloration of the skin. Livor mortis starts twenty minutes to three hours after death with maximum lividity occurring within 6 – 12 hours.

- Rigor Mortis is the stiffening of all muscles in the body. It sets in after about three to four hours, reaches maximum stiffness after 12 hours, and gradually dissipates until approximately 48 to 60 hours after death.

- There are a number of cases from systems across the country of providers misinterpreting skin findings and contractures to be livor mortis and rigor mortis in live patients. Death should be confirmed with an ECG tracing showing asystole.

Withholding Cardiopulmonary Resuscitation (CPR)

Treatment

All Providers

Promptly initiate CPR on all patients in cardiac arrest unless reliable criteria for determination of irreversible death are present, or a valid Virginia Durable Do Not Resuscitate (VDDNR) or other authorized Do Not Resuscitate (DNR) Order is present.

If resuscitative efforts have begun prior to the arrival of EMS providers, but the patient meets the criteria for withholding resuscitation, resuscitative efforts should be discontinued.

Indications for withholding resuscitation in the context of cardiac arrest include:

- Confirmation of a valid VDDNR or other authorized DNR Order in accordance with the Office of EMS regulations and the DNR protocol contained herein.
- Conditions obviously incompatible with life:
    - Decomposition
    - Decapitation
    - Incineration
    - Mortal wounds (severe traumatic injuries resulting in the destruction of vital organs such as the brain, thoracic contents, etc.) **plus** the absence of pulse or spontaneous respirations

If hypothermia, drowning, or cold-water immersion is suspected to be the primary cause of cardiac arrest, resuscitative efforts should be initiated and continued through transport to the ED.

ALS Providers

Further indications for withholding resuscitation in the context of cardiac arrest include:

- **Asystole plus reliable signs of non-recent death including:**
    - Dependent lividity
    - Rigor mortis in non-hypothermic patients without contractures

- **Traumatic Cardiac Arrest:**
    - Blunt and penetrating trauma patients without signs of life or organized rhythm on initial contact may have further resuscitative measures withheld.
        - Signs of life include the following - pulse, spontaneous respiratory effort, spontaneous movement, pupillary reflex.
        - Organized rhythms are any cardiac rhythm other than VF or asystole. PEA represents an organized rhythm.
    - Entrapped patients who deteriorate to the point of having no signs of life and no organized rhythm prior to extrication when extrication and transportation time to the ED/Trauma center is greater than 15 minutes may have further resuscitative measures withheld.

Withholding Cardiopulmonary Resuscitation (CPR)

Treatment (continued)

- **Ventricular Assist Device (VAD) patients:**
    - VAD patients in apparent asystole with rigor and/or lividity shall be treated/transported following the **Asystole/Pulseless Electrical Activity** protocol, adhering to the CPR modifications noted elsewhere.
    - Withhold resuscitation only on VAD patients with clearly identifiable traumatic injuries incompatible with life (e.g. decapitation, incineration, hemicorpectomy, destruction of vital organs, etc.) or valid DNRs.
        - Such deceased VAD patients shall not be resuscitated but should be transported to the VAD center following the **Transportation of the Deceased** protocol.

Universal Management

Cardiac arrest is the absence of effective ventricular contraction that immediately results in systemic circulatory failure. Rapid recognition and treatment of lethal dysrhythmias provide the best opportunity for a return of spontaneous circulation (ROSC).

The **Cardiac Arrest** protocol is divided into sub-sections: Withholding Cardiopulmonary Resuscitation (CPR), Universal Management, Asystole/Pulseless Electrical Activity, Ventricular Fibrillation/Ventricular Tachycardia without a Pulse, Hypothermic Arrest, Post Resuscitation Management, and Termination of Resuscitative Efforts.

For patients believed to be in cardiac arrest due to hypothermia, go directly to the **Hypothermic Arrest** protocol.

The prehospital care goal is to identify and treat dysrhythmias (and their underlying causes) in order to achieve ROSC.

Clinical Pearls

- Most pediatric cardiac arrests are due to respiratory etiologies.
- Acidosis is a dynamic process observed during cardiac arrest. It is caused primarily by the lack of blood flow and a decreased delivery of oxygenated blood. Restoration of perfusion, oxygenation and ventilation is the most effective measure to reduce acidosis.
- Sodium bicarbonate administration is linked to a wide array of adverse effects including decreased coronary perfusion pressures, worsening tissue acidosis, and impaired oxygen-delivery at the cellular level.
- If an advanced airway is placed, do not pause chest compressions to deliver ventilations.
- Do not excessively ventilate during cardiopulmonary arrest; too many breaths per minute or breaths that are too large or forceful, reduce the heart's ability to refill and cause gastric distension.
- Gastric distension reduces lung capacity, impeding ventilation.
- In this edition of the EMS Manual, FRD is introducing the Pit Crew concept.

Pit Crew CPR Concept

The best strategy for managing complex activities in a well-orchestrated fashion is to have pre-assigned roles and tasks. Whether it is a football play or a response plan for a house fire, clearly defined roles and assignments helps avoid wasted motion, duplication of efforts, unassigned tasks and other inefficiencies. For this reason we describe guidelines for task assignment and positioning for a Sudden Cardiac Death or CPR. The guidelines describe a successful model and are strongly encouraged. Clearly there will need to be room for reasonable deviations and adaptation as they are applied to any specific call. Use them to guide and form a basis for assignments with latitude to adapt to the specifics of the call.

The principles remain

- Good fast, hard, and deep compressions with adequate recoil.
- Minimal interruption in compressions.
- Rotate every two minutes.
- Monitor/AED applied as soon as feasible to deliver timely energy to shockable rhythms.
- Management of airway and breathing is important but secondary to CPR and early defibrillation, particularly during the early electrical phase of sudden cardiac arrest.
- Two-handed mask seal if resources allow and controlled ventilation – Avoid over-ventilation!

Priorities in order: Good quick CPR, then AED/Monitor applied ASAP to shock shockable rhythms, then address breathing, then vascular access and then drugs.

How do we make this a reality

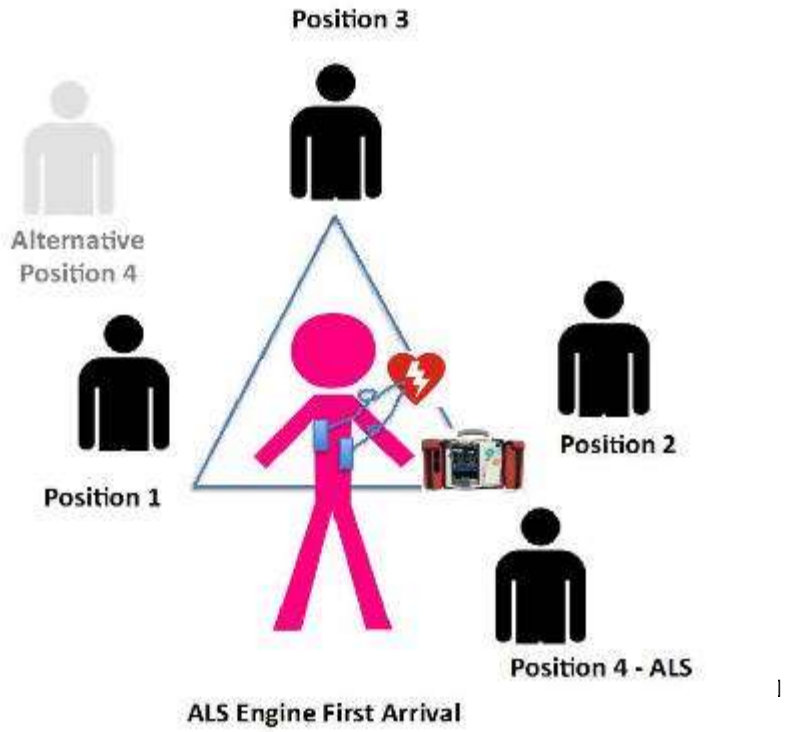
- First person entering room does initial assessment of responsiveness, breathing, pulse and begins immediate CPR as indicated.
- Second person entering brings and applies the AED/Monitor. Primary responsibility is AED/Monitor operations, secondary responsibility is alternating compressions with first provider and both monitor the rate/depth/recoil of the other during off cycle.
- Third Person entering brings airway bag, oxygen, suction and positions at the head of the patient. Primary responsibility is airway management and BVM.
- Following first shock or no shock advised the ALS provider moves to a position, which allows BLS on each side of the patient and one at the head. In this way the three EMTs form the BLS Triangle. The two sides alternate CPR and monitor CPR quality of the other in off cycles and are available to assist the EMT at the head with either King Airway placement, or BVM with two handed mask seal as needed.
- From outside the BLS Triangle the ALS provider has access to peripheral veins for IV or humeral head/tibia for IO access and drug administration.

First arriving units

For purposes of illustration two figures follow showing:

- Suggested ALS First Response Engine/Truck/Rescue positioning and assignments.
- Suggested 1+1 Medic unit positioning and assignments.

Suggested ALS First Response Engine/Truck/Rescue positioning and assignments



Person in Position 1 (P1) always on the patient's right side

1. Initial patient assessment of responsiveness, breathing, pulse
2. Initiates CPR – continuous compressions until AED/Monitor is applied and P2/P3 arrive
3. Provides ventilations in the off cycle
4. King Airway preparation in the off cycle

Person in Position 2 (P2) always on the patient's left side

1. Brings and operates the AED unless Manual Monitor is used by P4
2. Alternates compressions with P1
3. Ventilates in off cycle
4. Assists with King Airway preparation if needed in off cycle

Person in Position 3 (P3) always at the patient's head.

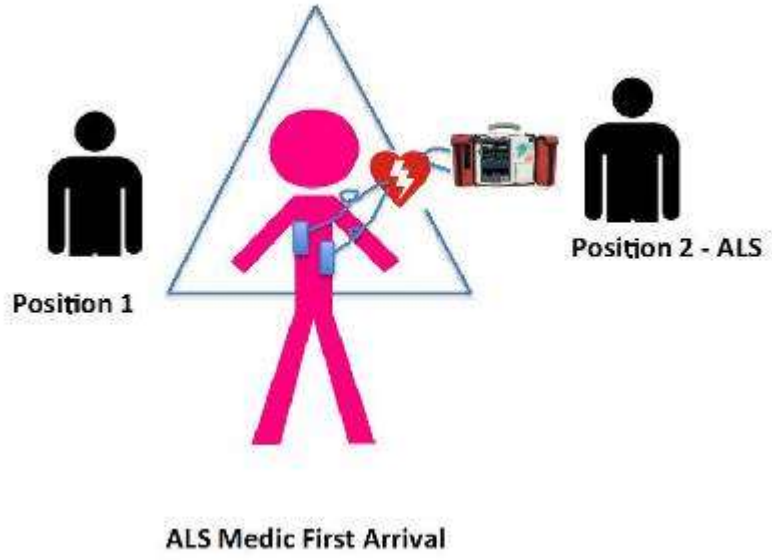
1. Opens/clears the airway and inserts OPA
2. Assembles BVM
3. Provides 2 hand mask seal
4. Inserts/secures King Airway & ETCO2

Person in Position 4 (P4) always outside the "CPR Triangle"

1. Team Lead – likely ALS provider from Engine
2. May assist with King Airway preparation and securing if needed from alternative position.
3. May move to the position to operate manual defibrillator unless run off AED.
4. At the appropriate time is responsible for vascular access and drugs unless supplemented by Medic unit –from the illustrated position, right or left lower

Figure 1: ALS Engine first on scene

Suggested 1+1 Medic unit positioning and assignments



Person in Position 1 (P1) always on the patient's right side

1. Initial patient assessment of responsiveness, breathing, pulse.
2. Initiates CPR – continuous compressions until AED/Monitor applied and P2 arrives with BVM to assist
3. Provides ventilations in the off cycle
4. King Airway preparation in the off cycle

Person in Position 2 (P2) always on the patient's left side (ALS Provider)

1. Brings and operates the AED/Monitor
2. Alternates compressions with P1
3. Provides ventilation in the off cycle
4. Assists with King Airway preparation if needed in off cycle.
5. Establishes vascular access and administers drugs

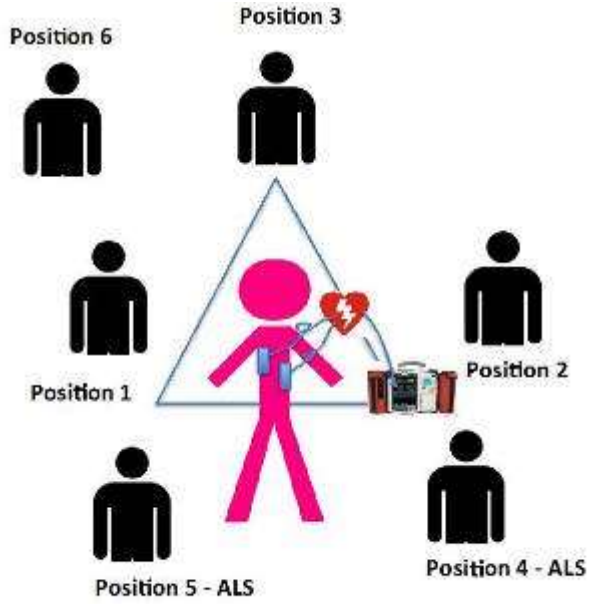
Figure 2: Medic Unit first on scene

Transition and integration of additional personnel

When additional units arrive new providers are integrated. Both scenarios shown in Figures 1 and 2 adjust to the final positions/assignments as illustrated below in Figure 3:

- If Engine is present and Medic unit arrives afterward, the Engine ALS provider at Position 4 continues ALS care position illustrated in Figure 1. The Engine medic will retain responsibility for either vascular access and medication administration or monitor use and delegates the other task to second medic provider in Position 5.
- If the Medic Unit is present and in position as shown in Figure 2 and the Engine arrives afterward, 2 Engine EMT's take over responsibility for compressions from right and left side of the BLS Triangle. This relieves the Medic Unit EMT so he can move to assume Position 6. The Medic Unit ALS provider moves to the patient's left hip (P4) and continues ALS care. P4 retains either monitor operation or vascular access/drugs and assigns the other task to the Engine Medic who positions himself/herself at the other side.

Suggested ALS First Response unit + Medic unit



ALS Engine First Response plus Medic Unit

Person in Position 1 (P1) always on the patient's <u>right side</u>
1. Continues CPR, alternating with P2
2. Monitors rate, depth, and recoil to assure high quality CPR in the off cycle

Person in Position 2 (P2) always on the patient's <u>left side</u>
1. Alternates compressions with P1
2. Monitors rate, depth, and recoil to assure high quality CPR in the off cycle

Person in Position 3 (P3) always at the patient's <u>head</u>.
1. Opens/clears the airway and inserts OPA
2. Assembles BVM
3. Provides 2 hand mask seal
4. Inserts/secures King Airway & ETCO2

Person in Position 4 (P4) remains outside the "CPR Triangle", moves to the lower location
1. Team Lead – until transfer report to transport medic
2. Retains either responsibility for monitor use or vascular access & medications
3. Delegates either monitor operation or vascular access/drugs to P5 ALS provider from Medic unit

Person in Position 5 (P5) outside the "CPR Triangle" ALS provider off Medic unit
1. Assumes responsibility for either vascular access & drugs or monitor operations.
2. May assume Team Lead following transfer of care report or may continue to support the ALS Engine provider

Person in Position 6 (P6) EMT off medic unit
1. Moves to the head of the patient to assist in airway management and ventilation. Watches closely to avoid over-ventilation
2. May assist with King Airway placement and securing if needed.
3. May assist with SAMPLE history and planning patient movement at the appropriate times.

Figure 3 – ALS first response unit + Medic unit

Universal Management

Treatment

All Providers

- Perform assessment.
  - Unresponsive
  - Not breathing or gasping only
- Consider appropriateness of resuscitation.
  - Presence of DNR
  - Reason for Withholding CPR
- Confirm pulselessness and initiate chest compressions.
  - When performing chest compressions – "Push Hard and Push Fast" at a rate of 100 per minute, in a ratio consistent with AHA and Pit Crew recommendations (continuous compressions until adequate personnel at patient's side then of 30:2 for one provider or 15:2 for two providers). Ensure full chest recoil and minimize interruption in chest compressions.
  - In the setting of witnessed and unwitnessed cardiac arrest, chest compressions should not be delayed while applying defibrillator pads and analyzing cardiac rhythm.
  - Place Q-CPR sensor and engage function, as soon as available ($\geq$ 8yo/25kg)
  - Do not initiate chest compressions on TAH or VAD patients.
    - If the VAD device has an external emergency pump/actuator, follow directions.
    - All other resuscitative measures should be performed as normal.
- Apply defibrillator as soon as it is available (use only FRD pads or those from responding mutual aid transport units). Utilize defibrillator (Manual or AED) using pads, cables, and settings appropriate for patient's age/weight.
  - Review pad package for age/weight restrictions prior to placing.
  - AED pads may differ from Manual device pads.
  - Pads must be at least one (1) inch apart.
  - Use A/P placement for infants (place the sternal pad on the posterior).
  - Note that the monitor/defibrillator's AED function cannot be used on pediatric patients.
- Maintain adequate airway position and ventilate.
  - Ensure patent airway, use BLS adjuncts and suction as necessary.
  - Ensure proper rate and volume of ventilation with BVM using 100% oxygen.
  - Establish advanced airway, if indicated. After placement of an advanced airway, do not pause chest compressions to deliver ventilations.
  - Place End-Tidal CO_2 monitor.

Universal Management

Treatment (continued)

- BLS Providers: repeat sequence of 2 minutes of CPR, AED analyze, and shock if advised until ALS providers arrive, the patient starts to move, or providers can feel a pulse.
- Perform blood glucose assessment.

ALS Providers

- Continue patient assessment. Consider and treat underlying causes.
    - In the case of traumatic arrest with suspected thoracic involvement, consider bilateral Chest Decompression procedures.
- Transfer the Q-CPR cable (if placed by first responders) to the transport unit's monitor/defibrillator to ensure continuity.
- Establish vascular access.
- Monitor End-Tidal CO_2.
- Interpret rhythm and follow appropriate cardiac arrest protocol.
- Give medications in a "Drug during CPR, Shock" sequence.
- If patient regains pulse, reassess vital signs, maintain patent airway, support respirations, and follow the Post Resuscitation Management protocol.

Universal Management

Treatment (continued)

Reversible Causes

H's & T's	Treatment
Hypovolemia	Stop any bleeding. Consider fluid administration.
Hypoxia	Ensure patent airway and effective ventilation. Avoid excessive ventilations.
Hydrogen Ion (acidosis)	Ensure effective ventilations.
Hypoglycemia	Administer Dextrose.
Hyperkalemia	Consider administration of Calcium Chloride, Sodium Bicarbonate, and Albuterol per **Metabolic Emergencies: Electrolyte Abnormalities** protocol.
Hypothermia	Prevent heat loss. Do not rewarm hypothermic patients.
Tension Pneumothorax	Decompress chest per protocol.
Tamponade, cardiac	Assess and report to ED.
Toxins	Assess, document, administer antidote per protocol and report to ED.
Thrombosis, pulmonary	Assess, consider 12-lead and report to ED.
Thrombosis, coronary	Assess, consider 12-lead and report to ED.

Asystole/Pulseless Electrical Activity

Asystole is the absence of mechanical or electrical cardiac activity.

Pulseless Electrical Activity (PEA) is the absence of a detectable pulse and the presence of any type of organized rhythm other than ventricular tachycardia.

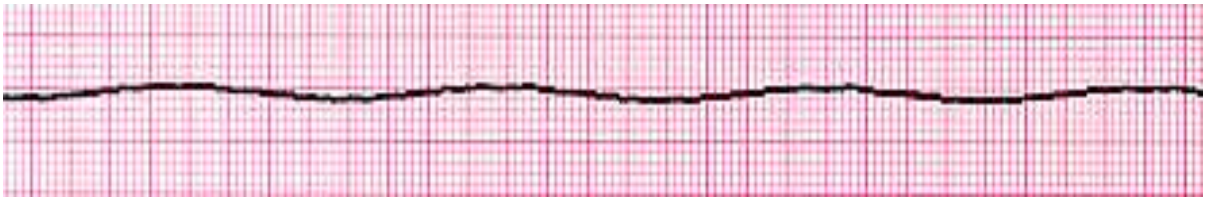
The prehospital care goals are to identify and treat dysrhythmias (and their underlying causes) in order to achieve ROSC.

Clinical Pearls

- Asystole can occur following a lightning strike that depolarizes cardiac pacemakers. A rhythm may return spontaneously or shortly after CPR is initiated. These patients may survive if given immediate attention.

- Research indicates some mechanical contraction is often present in PEA but is not sufficient to generate a corresponding mechanical pulse.

Asystole



Rate	Regularity	P Wave	PR Interval	QRS
0	No Electrical Activity	Absent	Absent	Absent

Asystole/Pulseless Electrical Activity

Treatment

All Providers

- Follow **Cardiac Arrest** – **Universal Management** protocol**.**

ALS Providers

- Check cable connections and confirm Asystole in more than one lead.
- Perform focused assessment to include H's and T's.
- Administer Epinephrine every 3–5 minutes
  - **Epinephrine (1:10,000) 0.01 mg/kg** IV
  - If no vascular access, **Epinephrine (1:1,000) 0.1 mg/kg** ET

Ventricular Fibrillation/Ventricular Tachycardia without a Pulse

Ventricular fibrillation is characterized by a chaotic ventricular rhythm that is usually the result of multiple re-entry circuits within the ventricles.

Ventricular tachycardia is three or more ventricular complexes in succession. Sustained ventricular tachycardia without a pulse requires the same treatment as ventricular fibrillation.

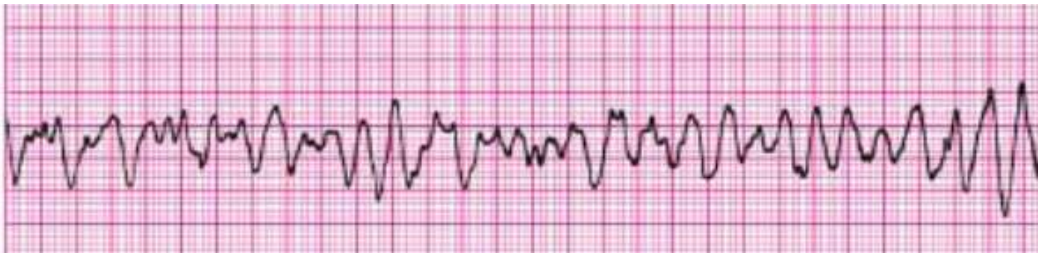
The prehospital care goals are to identify and treat dysrhythmias (and their underlying causes) in order to achieve ROSC.

Clinical Pearls

- Primary ventricular fibrillation and ventricular tachycardia are rare in young and previously healthy patients. Common causes include hypoxia, electrocution, and drug overdoses.

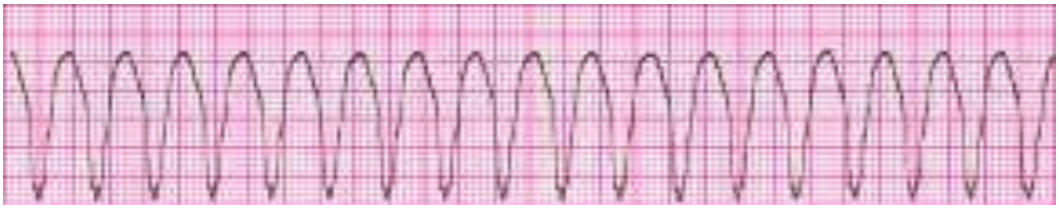
- Alternating current (AC) from man-made sources of electrical current usually results in VF.

Ventricular Fibrillation



Rate	Regularity	P Wave	PR Interval	QRS
0	Unorganized	Absent	Absent	Absent

Ventricular Tachycardia



Rate	Regularity	P Wave	PR Interval	QRS
At least 120	Regular	Absent	None	Wide (> 0.12)

Ventricular Fibrillation/Ventricular Tachycardia without a Pulse

Treatment

All Providers

- Follow **Cardiac Arrest** – **Universal Management** protocol.

ALS Providers

Note: After the **second shock**, medication should be given in a "Drug during CPR, Shock" sequence. CPR is only interrupted to analyze the rhythm, to deliver defibrillations, or when an organized rhythm with ROSC is achieved. Deliver medication during each cycle of CPR. The calculated shock dose shall be rounded off to the nearest energy level available on the Monitor/Defibrillator.

- **Defibrillate** –**2J/kg** (Philips MRx)
- Resume **CPR** for 2 minutes
- **Defibrillate** –**4J/kg** (Philips MRx)
- Resume **CPR** for 2 minutes
  - Drug during CPR
    - Administer **Epinephrine**
      - **Epinephrine (1:10,000) 0.01 mg/kg** IV
      - If no vascular access, **Epinephrine (1:1,000) 0.1 mg/kg** ET
- **Check rhythm. If rhythm changes, check pulse.**
  - If no pulse and not shockable, continue CPR and proceed to the appropriate protocol.
  - If pulse is present, proceed to the **Post Resuscitation Management** protocol.
- **Defibrillate** – **4J/kg** (Philips MRx)
- Resume **CPR** for 2 minutes
  - Drug during CPR
    - Administer **Amiodarone 5 mg/kg** IV
    - If patient has a known allergy to Amiodarone or no vascular access, administer **Lidocaine**
      - **1 mg/kg** IV
      - If no vascular access, **2 mg/kg** ET to a max dose of 200 mg
    - For patients in torsades de pointes (as initial dysrhythmic prior to Amiodarone) administer **Magnesium Sulfate 50 mg/kg in 100 ml Normal Saline** IV drip **run wide open** (10 gtts/ml set).

Ventricular Fibrillation/Ventricular Tachycardia without a Pulse

Treatment (continued)

- **Check rhythm. If rhythm changes, check pulse.**
  - If no pulse and not shockable, continue CPR and proceed to the appropriate protocol.
  - If pulse is present, proceed to the **Post Resuscitation Management** protocol.

- **Defibrillate** – **4J/kg** (Philips MRx)

- Resume **CPR** for 2 minutes
  - Alternate drugs (Epinephrine or antidysrhythmic) during CPR. Do not use multiple antidysrhythmics (Amiodarone and Lidocaine).
    - **Epinephrine, repeat every 3-5 minutes**
      - **Epinephrine (1:10,000) 0.01 mg/kg** IV
      - If no vascular access, **Epinephrine (1:1,000) 0.1 mg/kg** ET
    - If **Amiodarone** given initially, subsequent dosing (max cumulative dose 300 mg)
      - **5 mg/kg** IV
      - May repeat **5 mg/kg** IV
    - If **Lidocaine** given initially, second and third dose
      - **0.5 mg/kg** IV to a max cumulative dose of 100 mg
      - **1 mg/kg** ET to a max cumulative dose of 200 mg

- Continue with "Drug during CPR, Shock" sequence.

Hypothermic Arrest

For patients whose arrest is believed to be due to hypothermia (core temperature below 95°F).

The prehospital care goal is to provide the best opportunity for a ROSC by preventing ongoing heat loss, rapidly recognizing and treating lethal dysrhythmias, and rapidly transporting to a pediatric specialty center.

Clinical Pearls

- Defibrillation may not restore an organized electrical rhythm in a heart less than 86^{o} F.

- Medications may not be effectively metabolized by the hypothermic patient. Therefore, standard dosing regimens may result in the accumulation of these medicines which are then delivered to the central circulation and target tissues when perfusion resumes.

Hypothermic Arrest

Treatment

All Providers

- Perform assessment. Consider appropriateness of resuscitation and reasons for withholding CPR. Assess:
  - Circulation, Airway, Breathing
  - Check pulse for 30–45 seconds to differentiate absence of pulse from profound bradycardia.
  - If no pulse, begin CPR.
  - If a pulse is present, follow **Hypothermia** protocol.

- Initiate sequence of 5 cycles of CPR, AED analyze, and shock if advised.
  - If patient is greater than 86^{o} F, follow **Cardiac Arrest – Universal Management** protocol.
  - If patient is less than 86^{o} F, limit defibrillation to one shock. If refractory after initial shock, continue with CPR.

- Initiate or maintain adequate airway position and ventilate patient.
  - Ensure patent airway, use adjuncts and suction as necessary.
  - Ensure proper rate and volume of ventilation with BVM using 100% oxygen.

- Prevent additional heat loss by removing wet, cold or constrictive clothing from patient. Place patient in warm environment and prevent re-exposure to wind and cold temperature.

ALS Providers

- Continue assessment, including blood glucose.

- Interpret rhythm and follow appropriate cardiac arrest protocol. Remember, defibrillation is limited to one shock, including shocks by an AED, for patients below 86^{o} F.

- Double the time intervals between medication administrations.

- If patient regains pulse, reassess vital signs, maintain patent airway, support respirations and follow **Post Resuscitation Management** protocol**.**

Transportation Consideration:

- Transport as soon as possible to closest pediatric specialty center.

Post Resuscitation Management

Return of spontaneous circulation (ROSC) refers to the return of a spontaneous (self-sustaining) pulse in the patient. ROSC patients may or may not have a return of breathing. The patient's ROSC can occur as a result of an intervention or for undetermined reasons.

The prehospital care goal is focused on maintaining perfusion to improve neurological outcome.

Clinical Pearls

- Excessive ventilation has potentially adverse effects including increased intrathoracic pressure which causes decreased cardiac filling and decreased coronary perfusion.

- Prehospital passive cooling may be beneficial to the patient's outcome. In-hospital targeted temperature management (96.8^{o}F/36^{o}C) has been demonstrated in certain populations to improve the patient's neurological outcome because metabolic demand is decreased, particularly in the brain.

Post Resuscitation Management

Treatment

All Providers

- Reassess airway, oxygenation, ventilation, vital signs, and interventions.

- For patients that are unconscious, hemodynamically stable, and cardiac arrest not due to hypothermia:
  - Initiate targeted temperature management (96.8°F/36°C) by exposing patient's core, then covering with wet sheets and applying cold packs to the head, neck, armpits, and groin.

- Place monitors
  - Place electrodes/acquire 12-lead ECG
  - End-Tidal CO_2

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring

- Reassess underlying cause for arrest (H's & T's) and treat if indicated.

- If patient is **bradycardic**, rule out hypoxia, airway, or ventilation problems and follow the **Bradycardia (including AV blocks)** protocol.

- Follow the **Hypoperfusion** protocol, if indicated.

- In order to prevent removal of advanced airways, periodically evaluate the patient for response to noxious stimulus (mild pain response, pinching the hand, etc.). If the test is positive, administer **Midazolam 0.1 mg/kg** IV slow (not to exceed 2 mg).

- If arrest occurred in the setting of suspected cyanide poisoning or severe smoke inhalation, follow the **Poisonings - Cyanide Exposure** protocol.

Transportation Considerations:

- Transport patients with ROSC to a PTCA/PCI capable facility (not an ECC). If not possible, transport to a hospital-based ED.

- If **Cyanokit** has been administered, contact **Physician OLMD** regarding destination selection.

Cardiac Dysrhythmias
Bradycardia (including AV blocks)

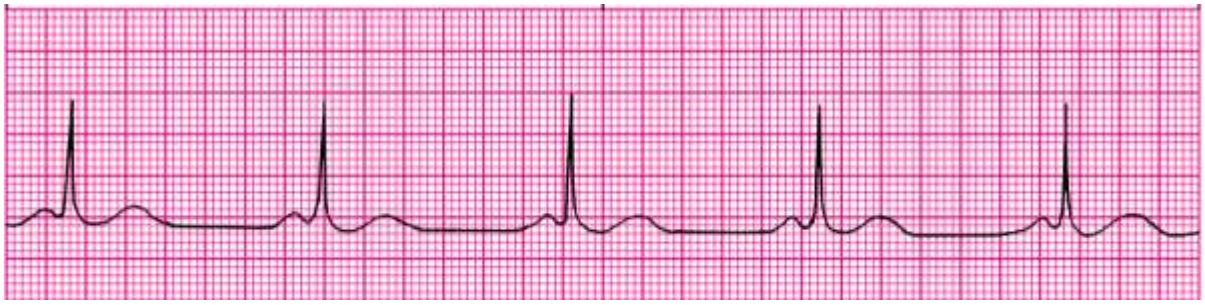
Bradycardia is generally defined as a heart rate of less than 60 beats per minute. The primary cause of bradycardia in children is hypoxia.

The prehospital care goals are managing the airway, ventilation, and oxygenation.

Clinical Pearls

- Due to the underdeveloped left ventricle, perfusion in children is dependent on heart rate.
- Absolute bradycardias can be pre-arrest rhythms in children, and decompensating children may exhibit relative bradycardias. A declining heart rate without improvement in other areas is an ominous sign.

Sinus Bradycardia



Characteristic

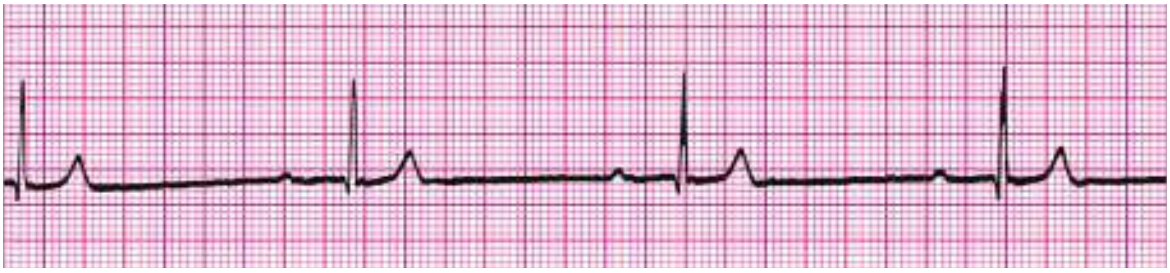
- Rate is slow compared with normal rates for the patient's age.

AV Blocks

AV Block	PR Interval	R – R Regularity
1^{o}	Constant	Regular
2^{o} Type I	Varies	Irregular
2^{o} Type II	Constant	Irregular
3^{o}	Varies	Regular

Bradycardia (including AV blocks)

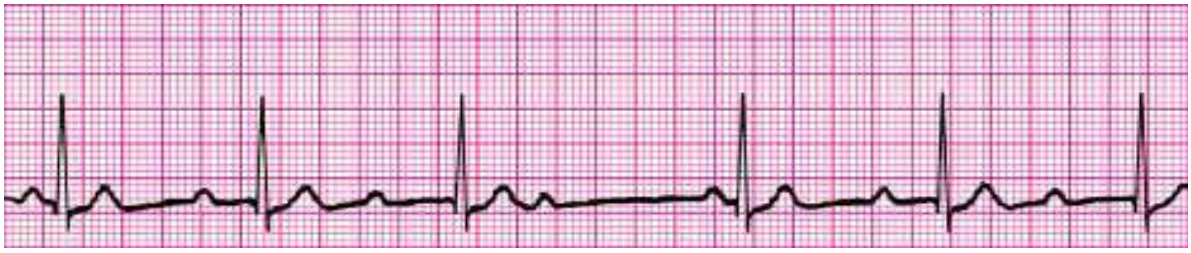
1st Degree AV Block (Underlying NSR)



Characteristic

- Prolonged PR interval

2nd Degree Type I (Wenckebach)

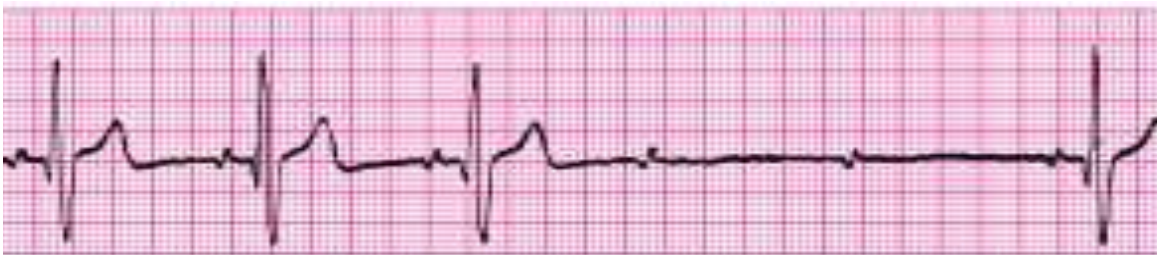


Characteristic

- Progressive prolongation of the PR interval until a P wave is blocked and the cycle is repeated.

Bradycardia (including AV blocks)

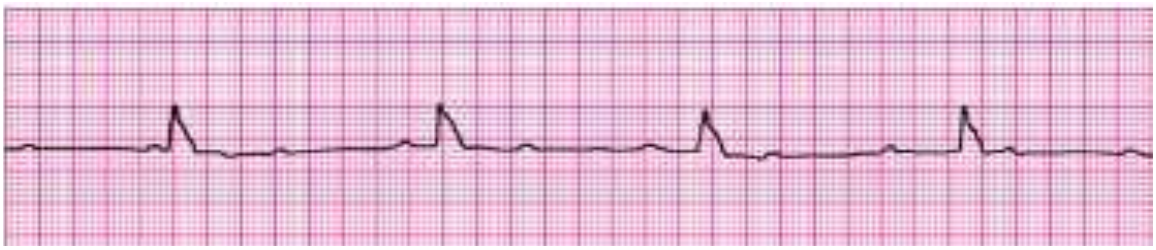
2nd Degree Type II



Characteristics

- Some but not all P waves are conducted to the ventricle (PR interval is typically prolonged but constant)
- Most often every other P wave is conducted (2:1 block).

3rd Degree



Characteristics

- No relationship between P waves and QRS complex.
- No atrial impulses reach ventricles.

Bradycardia (including AV blocks)

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- For patients with signs/symptoms of poor perfusion attributable to bradycardia (decreased LOC, hypotension, shock, or severe respiratory distress)
  - Ventilate 12–20 breaths/minute with BVM
  - If heart rate does not readily increase with assisted ventilations and patient remains unstable, perform CPR at a compression rate of 100 per minute until bradycardia is relieved, then reassess.
- Asymptomatic patients are managed with supportive care, monitoring, and transport.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Establish vascular access.
- Look for and correct underlying causes, H's and T's.
- If bradycardia is refractory to CPR
  - Administer **Epinephrine (1:10,000) 0.01 mg/kg** IV repeat every 3–5 minutes
    - If no vascular access, **Epinephrine (1:1,000) 0.1 mg/kg** ET
  - Consider **Transcutaneous Pacing**
    - Consider sedation - **Midazolam 0.1 mg/kg** IV slow.
  - If known increased vagal tone/stimulation, 2^{o} Type I & II heart block or 3^{o} heart block, Atropine should be given prior to Epinephrine
    - Administer **Atropine 0.02 mg/kg** IV (single dose: minimum 0.1 mg and max 0.5 mg). If refractory after 3-5 minutes, repeat once. If ineffective proceed to Transcutaneous Pacing and Epinephrine.
- Follow the **Hypoperfusion** protocol, if indicated.

Paroxysmal Supraventricular Tachycardia (PSVT)

Paroxysmal Supraventricular Tachycardia (PSVT) is classified usually based on the appearance of the narrow QRS complex (0.12 or less) and a regular rhythm with no discernible P waves.

PSVT Rates: Infants greater than 220 bpm and children greater than 180 bpm with absent P waves.

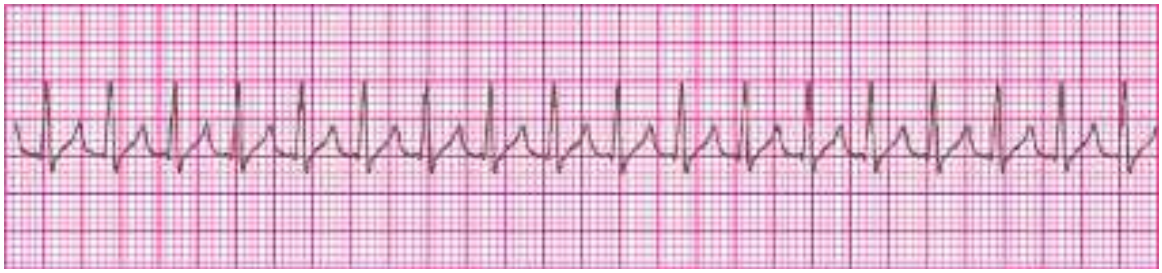
The prehospital care goal is aimed at slowing conduction through the AV node.

Clinical Pearls

- Rapid heart rates often do not allow time for adequate cardiac filling, eventually causing congestive heart failure or cardiogenic shock.

- PSVT may be very difficult to distinguish from sinus tachycardia. For help in distinguishing PSVT from sinus tachycardia, note the following:
  - The child with sinus tachycardia usually has a history or findings consistent with shock unrelated to the cardiac rhythm (trauma, fever, pain, dehydration).
  - In sinus tachycardia the heart rate usually varies with activity or stimulation. In PSVT the heart rate rarely deviates from the baseline regardless of activity or stimulation.

PSVT



Rate	Regularity	P Wave	PR Interval	QRS
> 220 infants > 180 children	Regular	Not discernible due to rate	N/A	Narrow

Paroxysmal Supraventricular Tachycardia (PSVT)

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Consider and treat other causes of physiological sinus tachycardia, if indicated:
  - Hypoxia
  - Hypovolemia
  - Pain
  - Fever
- Establish vascular access.
- **Stable** VAD Patients: Provide supportive care, monitor and transport.
- All other **Stable** patients
  - Attempt **vagal maneuvers**.
    - Infant – Blow in the face or apply ice packs to both sides of the face/neck.
    - Child (if old enough to follow commands) – valsalva, blow on thumb, etc.
    - If the patient does not convert with vagal maneuvers **contact Physician OLMD.**
- **Unstable**:
  - Signs/Symptoms caused by tachycardia:
    - Poor skin color
    - Shortness of breath
    - Decreased LOC
    - Hypoperfusion
  - Perform **Synchronized Cardioversion** at **0.5J/kg**, **1J/kg**, **2J/kg (Philips MRx),** if indicated. If the patient fails to convert after three attempts **contact Physician OLMD**.
    - The calculated shock dose shall be rounded off to the nearest energy level available on the Monitor/Defibrillator.
    - Consider sedation - **Midazolam 0.1 mg/kg** IV slow.

Paroxysmal Supraventricular Tachycardia (PSVT)

Treatment (continued)

Physician OLMD

Note: If at any point the patient becomes unstable, then follow **Unstable**.

Stable: For patients who do not convert with vagal maneuvers:

- Administer **Adenosine:**
  - **0.1 mg/kg** IV rapid followed immediately by a **10 ml Normal Saline** rapid fluid bolus.
  - If no conversion after 1–2 minutes, **0.2 mg/kg** IV rapid followed immediately by a **10 ml Normal Saline** rapid fluid bolus.

Ventricular Tachycardia/Wide Complex Tachycardia with a Pulse

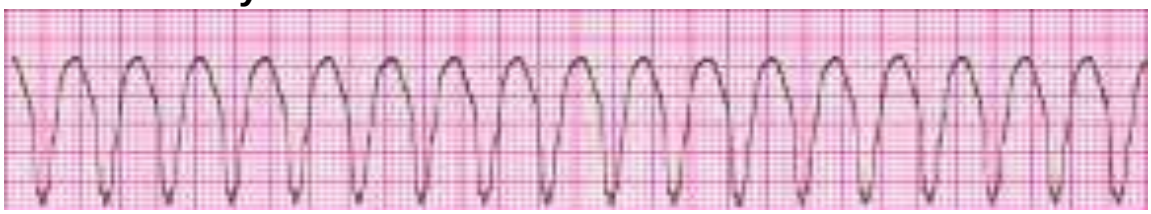
Ventricular tachycardia (VT) is three or more successive ventricular complexes at a rate greater than 100 beats per minute. VT is considered sustained when it lasts for more than 30 seconds. VT can be divided into monomorphic (all complexes are similar) and polymorphic (complexes vary).

The prehospital care goal is to convert the heart to a less lethal rhythm.

Clinical Pearls

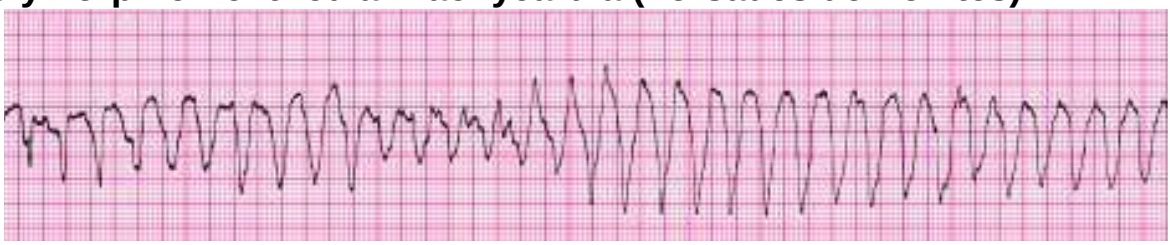
- Ventricular tachycardia is rarely seen in pediatric patients. Some pediatric experts suggest that a wide-complex tachycardia in a child is more likely to be a PSVT with conduction delay than VT. However, it is occasionally seen in near-drowning patients or prolonged resuscitation attempts.
- Patients with congenital heart disease often do not respond to anti-dysrhythmic medications and must be cardioverted.
- Tricyclic overdose or hyperkalemia can cause wide complex tachycardia.
- Wolf Parkinson White (WPW) syndrome is a wide complex tachycardia that may not resemble other such tachycardias due to the morphology of the QRS. It is often narrow at the top, but still wide at the baseline due to the characteristic slurring of the initial deflection (Q or R wave) known as the delta wave.

Ventricular Tachycardia



Rate	Regularity	P Wave	PR Interval	QRS
At least 120	Regular	Often not identifiable	None	Wide (> 0.08)

Polymorphic Ventricular Tachycardia (Torsades de Pointes)



Rate	Regularity	P Wave	PR Interval	QRS
150 to 250	Irregular	Absent	N/A	Varies

Ventricular Tachycardia/Wide Complex Tachycardia with a Pulse

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including blood glucose and 12-lead ECG.
- Establish vascular access.
- Look for and correct underlying causes, H's and T's.

Stable: See **Physician OLMD**.

Unstable:

- Signs/Symptoms
  - Poor skin color
  - Shortness of breath
  - Decreased LOC
  - Hypoperfusion
- Perform **Synchronized Cardioversion** at **0.5 J/kg**, **1 J/kg**, **2 J/kg (Philips MRx),** if indicated. If the patient fails to convert after three attempts **contact Physician OLMD**.
  - The calculated shock dose shall be rounded off to the nearest energy level available on the Monitor/Defibrillator.
  - Consider **Midazolam 0.1 mg/kg** IV slow.

Physician OLMD

Stable:

- Administer **Amiodarone 5 mg/kg in 100 ml Normal Saline** IV drip **50 gtts/min** (10 gtts/ml set)
- For Polymorphic VT (torsades de pointes), consider **Defibrillation** or **Magnesium Sulfate 50 mg/kg in 100 ml Normal Saline** IV drip **run wide open** (10 gtts/ml set)

Distressed Newborn

Newborn distress is based on breathing effort, heart rate, and skin color.

The prehospital care goals are to focus on improving respiratory and circulatory status and to maintain body temperature.

Clinical Pearls

- The most common factor causing respiratory distress in newborns is premature birth.

- Premature infants delivered in arrest may be viable if definitive care can be reached in time. Gestational age of 23 weeks is generally considered the lower limit of viability in the NICU, but there is a considerable margin of error if the mother's prenatal history/estimated due date is uncertain. Always error on the side of resuscitation.

- Hypothermia is the most common complication of prehospital deliveries. A low body temperature can cause:
    - Bradycardia
    - Hypoxia
    - Apnea
    - Respiratory distress
    - Hypoglycemia
    - Acidosis and seizures

- The newly born are wet, which greatly accelerates heat loss. Do not wrap the newborn in towels that were used for drying. The smaller the newborn, the faster body heat is lost.

- Excessive ventilation (too fast and/or too much volume) with a BVM may cause gastric distension (which may prevent newborns from fully expanding their lungs) or barotraumas. A typical 4 kg newborn needs only an ounce (30ml) of air.

- Heart rate provides the best indication of adequate oxygenation and circulation in the newborn.

- The easiest way to palpate a pulse in a newborn is at the base of the umbilical cord. The umbilical arteries will continue to palpate for several minutes after birth.

- If the mother has used narcotics within several hours of delivery, the baby may exhibit respiratory depression. Narcan can cause withdrawal seizures in these newborns.

Distressed Newborn

Treatment

All Providers

Follow all assessments and treatments in the **Adult: Obstetric Emergencies** protocol.

- Perform assessment, including blood glucose (heel stick preferred).

- Assess breathing and adequacy of ventilation:
  - If newborn has normal respirations with central cyanosis
    - Administer blow-by **Oxygen 5 lpm** for 30 seconds.
    - After 30 seconds, if newborn has persistent central cyanosis, ventilate at 40 – 60 breaths/minute BVM for 30 seconds.
  - If newborn is apneic or has shallow breathing
    - Ventilate at 40 – 60 breaths/minute BVM for 30 seconds.

- After 30 seconds, assess heart rate by palpation of brachial artery or umbilical cord stump. If the heart rate is:
  - **Greater than 100 bpm:** continue assisted ventilation until newborn is breathing adequately on its own and is vigorous.
  - **Less than 100 bpm:** continue to ventilate at 40 – 60 breaths/minute BVM. Reassess after 30 seconds. If not improving after 30 seconds proceed as below for Less than 60 bpm.
  - **Less than 60 bpm:** continue with 3:1 compressions to breath ratio at a rate of 90 compressions and 30 breaths per minute. Avoid simultaneous administration of compressions and ventilations, even if intubated.
    - Perform chest compressions until bradycardia is relieved, then reassess.
    - Use 2 thumb-encircling hands technique.

ALS Providers

- Continue assessment.

- Establish vascular access.

- Establish advanced airway if BVM is not adequate.

- If heart rate does not improve after 30 seconds of CPR, administer:
  - **Epinephrine (1:10,000) 0.01 mg/kg** IV every 3-5 minutes.
    If no IV access, **Epinephrine (1:1,000) 0.1 mg/kg** ET to a max single dose of 3 ml, repeat every 3-5 minutes.

Distressed Newborn

Treatment (continued)

- If blood glucose is less than 45 mg/dl administer **Dextrose 10% (D10) 2 ml/kg** IV slow over 5 minutes.
    - For IV bolus:
        - Waste 40 ml of the D50 pre-filled amp and draw up 40 ml of **Normal Saline**, yielding 5 grams (50 ml) of D10.
    - For IV drip (60 gtts/ml set):
        - Attach Buretrol to 250 ml bag of **Dextrose 10% (D10)**, then fill Buretrol chamber based on patient weight.

- For suspected blood loss and persistently poor perfusion not responding to ventilation, oxygenation, CPR and epinephrine, administer fluid challenge **10 ml/kg Normal Saline** IV over 10 minutes via Buretrol or multiple syringe boluses. May repeat once for persistent symptoms.

- Ensure unit is warm prior to transport. Interior should be 90^{o}–100^{o} F.

Environmental Emergencies
Cold-related Illnesses

A patient with a core body temperature less than 95^{o} F is hypothermic.

Severe hypothermia is a core body temperature less than 90^{o} F. Mild hypothermia is core temperature between $90^{o} – 95^{o}$ F.

The prehospital care goals are to prevent ongoing heat loss, maintain adequate perfusion, and warm patients who have mild hypothermia. For patients with severe hypothermia provide supportive care and rapid transport to the ED for active re-warming.

Clinical Pearls

- Children are more prone to hypothermia.
- Acutely injured patients cool faster than non-injured patients, particularly when they are in shock or have a head injury.
- Never wrap a hypothermic patient in cold blankets or cold covering because cold air gets trapped next to the patient's body and warming will not occur. Use warm blankets, heat packs, and hot water bottles to warm a hypothermic child.
- If bradycardia is due to hypothermia the primary treatment is re-warming.

Cold-related Illnesses

Treatment

All Providers

- Perform assessment. Focused assessment to include
  - Duration of exposure
  - Blood glucose
  - Temperature

- Ensure oxygenation.
  - Avoid excessive suctioning and airway manipulation as this may cause ventricular fibrillation.

- Check pulse for 30 – 45 seconds to differentiate absence of pulse from profound bradycardia.
  - If no pulse, begin CPR. Follow **Hypothermic Arrest** protocol.
  - If any pulse is detected, do not perform CPR.

- Prevent additional heat loss by removing wet or constrictive clothing from patient. Place patient in warm environment and maintain core temperature by wrapping patient in blankets. Prevent re-exposure to wind and cold temperature.
  - Carefully handle patient as rough handling can precipitate ventricular fibrillation.

- Treat mild hypothermia by re-warming the patient with hot packs in the armpits, groin, and neck.
  - Do not allow hot packs to have direct skin contact as they can cause burns.

- Treat frostbite
  - Bandage injured areas lightly to protect from pressure, trauma, or friction.
  - Place bandages between fingers and toes for protection.
  - Refrain from rubbing the skin or breaking blisters.
  - Transport patient with frostbitten areas supported, elevated, and covered.

- Place electrodes/acquire 12-lead ECG.

ALS providers

- Continue assessment, to include:
  - 12-lead ECG interpretation

- Establish vascular access.

Heat-related Illnesses

Hyperthermia is an unusual elevation of the normal core body temperature. It can lead to heat-related illnesses including heat exhaustion and heat stroke. Heat-related illnesses encompass a wide variety of both environmental and metabolic emergencies.

The prehospital care goal is focused on cooling the patient and providing fluid replacement.

Clinical Pearls

- A child's body surface in proportion to mass is greater than an adult's, which encourages absorption of ambient heat during warm environmental conditions.

- Infants and children younger than two years are particularly vulnerable to the complication of heat illness. Children in this age group are dependent on others to remove them from temperature extremes, dress them appropriately, and provide hydration.

- When outside temperatures are 86^{o} to 104^{o} F, the temperature inside a vehicle can reach 140^{o} F within 15 minutes.

Heat-related Illnesses

Treatment

All Providers

- Move patient to cooler environment and remove excess clothing.
- Ensure oxygenation.
- Turn on air conditioner in unit.
- If patient displays signs of **heat cramps**:
  - Normal mental status
  - Warm, moist skin
  - Cramps in the fingers, arms, legs, or abdominal muscles
  - Weakness
  - Dizziness

  Cool patient with tepid water soaks to head and neck.
- If patient displays signs of **heat exhaustion**:
  - Normal mental status
  - Cool, moist skin
  - Weak and rapid pulse
  - Rapid and shallow respirations
  - Headache, dizziness, nausea, and cramping

  Cool patient with tepid water soaks to head, neck, armpit, and groin.
- If patient displays signs or symptoms of **heat stroke**:
  - Disorientation, altered mental status, seizures, coma
  - Hot and dry skin (or hot, moist skin if exertional heatstroke)
  - Increased and bounding pulse
  - Rapid and deep respirations

  Remove clothing and begin aggressive cooling therapy with towels or sheets soaked in tepid water and apply cold packs to armpits and groin.
- Continually monitor temperature. Care should be taken not to cause shivering if possible.

ALS Providers

- Continue assessment.
- Establish vascular access.

General Supportive Care

This protocol is meant to provide guidance in three situations: conditions with signs/symptoms that are serious to the patient but have no emergent treatment options, conditions not normally treated in the field, and conditions where a particular protocol cannot be selected and no obvious treatment options present themselves. This protocol may be used exclusively, or in conjunction with other symptom-driven care protocols/procedures.

When in doubt about the applicability of a protocol/treatment, especially in the presence of complex medical histories where inappropriate or imprecise treatment may do harm, this protocol allows the provider to complete assessment and to defer treatment to the ED if indicated.

The prehospital care goals are focused on supportive care and ongoing assessment to reveal any treatable signs/symptoms.

Clinical Pearls

- ALTE is defined as a sudden event, frightening to the observer, in which the infant exhibits some combination of symptoms including apnea, color change (pallor, redness, cyanosis), change in muscle tone (floppiness, rigidity), choking, gagging, or coughing.
    - These episodes are usually self-limiting, and often the infant may appear normal on arrival of EMS.
    - Transport is indicated as the evaluation and decision-making required are not available in the field.

- Examples of urgent/emergent conditions not normally treated in the field:
    - ALTE (Apparent Life Threatening Event) in young children
    - Pulmonary embolism
    - Suspected pneumothorax not meeting decompression criteria
    - Infection/dehydration not meeting volume replacement criteria

- Examples of conditions serious to patient/caregiver but not warranting specific field intervention
    - Flu-like symptoms
    - Headache
    - Uncomplicated febrile seizure

General Supportive Care

Treatment

All Providers

- Perform assessment. Focused exam to detailed history and physical review, including all plausibly related diagnostic modalities.
- Ensure oxygenation.
- Reassess vital signs regularly and watch closely for trends.
- Focus ongoing assessment on area of chief complaint and seek to rule out treatable causes.

ALS providers

- Continue assessment, to include consideration of all advanced diagnostic modalities.
  - Consider monitoring End-Tidal CO_2 in the presence of undifferentiated symptomatic shortness of breath.
- Review all diagnostic modalities in an effort to arrive at a differential diagnosis.
  - Initiate supportive care protocols if indicated (e.g. pain management).
  - Move immediately to appropriate direct care protocol if indicated (e.g. Seizure, OD, etc.)
- Establish vascular access, if indicated.
- **Contact Physician OLMD** as needed.

Hypoperfusion

Hypoperfusion may be caused by a variety of conditions such as cardiac events (rare), poisoning, allergic reactions/anaphylaxis, infection, hypothermia, or hypovolemia (severe dehydration, blood loss).

The prehospital care goal is to identify and correct compensated shock before further deterioration. If initially confronted with decompensated shock, rapid intervention including mechanical ventilation and transportation is paramount.

Clinical Pearls

- Compensated shock (prior to circulatory collapse) presents with:
  - Tachycardia
  - Tachypnea
  - Delayed capillary refill (less than two seconds in children under 6 years old)
  - Irritability/inconsolability/lethargy (ask parents)

- Decompensated shock: Signs of compensated shock with hypotension and
  - Altered mental status
  - Absent peripheral pulses
  - Bradycardia
  - Mottled extremities

- Children are mostly dependent on their heart rate to increase cardiac output. Ability to increase contractility in response to catecholamine stimulation is limited due to insufficient muscle mass of the myocardium compared to the adult heart. When the compensatory mechanisms are activated children become dependent on intravascular volume (preload) to maintain cardiac output.

- A child in decompensated shock is critically ill and may rapidly die.

- Children in shock will often be tachypneic without retractions as they attempt to compensate for metabolic acidosis by blowing off CO_2. This pattern of rapid respiration may be termed "effortless tachypnea."

- A rule of thumb for the lower limit of normal pediatric systolic blood pressure is 70 + (2 x Age in years).

Hypoperfusion

Treatment

All Providers

- Perform assessment, including blood glucose. Focused assessment to include:
  - Urine output/number of diapers used
  - Vomiting/diarrhea
  - Skin color (core vs. periphery) and temperature
  - Lack of tears
  - Mental status
  - Heart rate
- Ensure oxygenation.
- Prevent heat loss.
- Place patient supine with legs elevated. Use caution with patients in respiratory distress.
- Place monitors
  - End-Tidal CO_2

ALS providers

- Continue assessment, to include:
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Administer fluid challenge **Normal Saline**.
  - Neonates: **10 ml/kg** IV over 10 minutes via Buretrol or multiple syringe boluses. If refractory, repeat once. Reassess lungs and vitals after each bolus. Carefully monitor for fluid overload.
  - Infants to children: **20 ml/kg** IV rapid via Buretrol or multiple syringe boluses. If refractory, repeat up to two times. Reassess lungs and vitals after each bolus. Carefully monitor for fluid overload.

Physician OLMD

- Consider **Dopamine** drip if refractory to fluid challenge.

Metabolic Emergencies
Hyperglycemia

Hyperglycemia is a condition in which an excessive amount of glucose circulates in the blood.

Causes of hyperglycemia include cessation of insulin injections and physiologic stress such as infection and stroke.

The prehospital care goals are to recognize and manage associated symptoms.

Clinical Pearls

- Glucometers are consumer grade and readings are affected by inadequate sample size, alcohol, and temperature. Treat the patient, not the machine.

- High blood glucose levels are not generally treated in the field. Hospital lab results dictate the patient's treatment.

- Blood glucose from a venous sample may be expected to be slightly lower than capillary blood from a finger stick. The exact difference is not static, but rather depends on the dynamics of glucose absorption and utilization at the tissue level across the capillary bed.

Hyperglycemia

Treatment

All Providers

- Perform assessment, including blood glucose assessment (heel stick preferred with newborns and infants).
- Ensure oxygenation.

ALS Providers

- Continue assessment.
- Establish vascular access.

Hypoglycemia

Hypoglycemia is a condition in which a very low amount of glucose circulates in the blood.

Causes of hypoglycemia include excessive administration of insulin, excessive insulin for dietary intake, and overexertion relative to dietary intake.

The prehospital care goal is to increase blood sugar level.

Clinical Pearls

- The digestion and absorption of orally administered sugar drinks is unpredictable.

- The action of Glucagon depends on the patient's ability to make glucose from glycogen; success depends on both adequate stores of glycogen and the metabolic ability to convert it to glucose for fuel. Liver disease and malnutrition may prevent the patient from responding adequately to glucagon.

- Glucometers are consumer grade and readings are affected by inadequate sample size, alcohol, and temperature. Treat the patient, not the machine.

- Blood glucose from a venous sample may be expected to be slightly lower than capillary blood from a finger stick. The exact difference is not static, but rather depends on the dynamics of glucose absorption and utilization at the tissue level across the capillary bed.

Hypoglycemia

Treatment

All Providers

- Perform assessment, including blood glucose assessment (heel stick preferred with newborns and infants).
- Ensure oxygenation.
- If the patient has a blood glucose level of less than 60, can protect his or her airway, is able to swallow, and can follow commands, assist the patient with the administration of **1 Instant Glucose tube (15 grams).**
- Reassess and monitor for signs of clinical improvement. Repeat blood glucose assessment five minutes after glucose administration. **Instant glucose tube** can be repeated, if indicated.

ALS Providers

- Continue assessment.
- Establish vascular access.
- If patient is unable to self-administer and swallow oral glucose, or patient's condition does not improve after oral therapy:
  - For infants and all children: if blood glucose is less than 60, administer **Dextrose 10% (D10) 2 - 4 ml/kg** IV drip.
    - Attach Buretrol to 250 ml bag of **Dextrose 10% (D10)**, then fill Buretrol chamber based on patient weight.
    - Run drip **wide open** (60 gtts/ml set).
  - For neonates: if blood glucose is less than 45, administer **Dextrose 10% (D10) 2 ml/kg** IV slow over 5 minutes.
    - For IV bolus:
      - Waste 40 ml of the D50 pre-filled amp and draw up 40 ml of **Normal Saline**, yielding 5 grams (50 ml) of D10.
    - For IV drip (60 gtts/ml set):
      - Attach Buretrol to 250 ml bag of **Dextrose 10% (D10)**, then fill Buretrol chamber based on patient weight.
- If no vascular access, administer **Glucagon 0.1 mg/kg** IM.

Transportation Considerations:

- Patients that have been administered glucagon should be transported to an ED facility.
- Those patients who take oral diabetic medications are at a greater risk of recurrent hypoglycemia and should be transported to an ED facility.

Overdose and Adverse Drug Reactions
Beta Blocker/Calcium Channel Blocker

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals include supportive care and administration of treatment modalities, if indicated.

Clinical Pearl

- Extended-release tablets and once-a-day preparation overdoses may have a delayed onset and therefore can require 24 to 36 hours of monitoring in the Intensive Care Unit. Releasing a patient who has ingested an extended-release tablet too soon places them in jeopardy.

Beta Blocker/Calcium Channel Blocker

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Establish vascular access.
- If hypotensive, administer **Normal Saline 20 ml/kg** IV rapid via Buretrol or multiple syringe boluses. If refractory after 10 minutes, repeat once.
- If bradycardic, administer **Atropine 0.02 mg/kg** IV (single dose: minimum 0.1 mg and max 0.5 mg).
- If hypotension or bradycardia is refractory, initiate **Transcutaneous Pacing**.

Physician OLMD

- If refractory, consider **Calcium Chloride**.

Narcotic

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals include supportive care and administration of treatment modalities, if indicated.

Clinical Pearl

- The effects of narcotics are multiplied when used in combination with other depressant drugs and alcohol, causing increased risk of an overdose.

Narcotic

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must contact Physician OLMD for permission before following any Poison Control recommendation outside protocol.
- Place monitors
  - 12-lead ECG
  - End-Tidal CO_2

ALS providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Administer **Naloxone 0.1 mg/kg** IV to a max single dose of 0.4 mg. Repeat as needed every 2-3 minutes to a max cumulative dose of 2 mg, titrating to achieve and maintain an adequate respiratory rate.
- If no vascular access, administer **Naloxone 2 mg** IM or IN.

Transportation Consideration:

- Patients that have been administered Naloxone should be transported to an ED facility.

Phenothiazine (Dystonic)

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals include supportive care and administration of treatment modalities, if indicated.

Clinical Pearl

- Dystonic reactions are caused by certain antipsychotic and antiemetics which are more commonly being prescribed in children.

Phenothiazine (Dystonic)

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Establish vascular access.
- Extra-pyramidal signs/symptoms:
  - Protruding or pulling sensation of tongue
  - Twisted neck or facial muscle spasm
  - Roving or deviated gaze
  - Abdominal rigidity and pain
  - Spasm of the entire body
- Administer **Diphenhydramine 1 mg/kg** IV or IM.

Tricyclic Antidepressant (TCA)

An overdose is considered an intentional or accidental intake of more than the normal or recommended amount of medication that causes harm to the body.

The prehospital care goals include supportive care and administration of treatment modalities, if indicated.

Clinical Pearls

- Tricyclic antidepressants have a narrow therapeutic index. Therefore, they become potent cardiovascular and central nervous system toxins in moderate doses.

- Overdose is a serious problem in the pediatric population due to the potential toxicity and availability of TCAs in the home when prescribed for bed wetting and depression.

Tricyclic Antidepressant (TCA)

Treatment

All Providers

- Perform assessment, including blood glucose.
- Ensure oxygenation.
- Consider contacting Poison Control for advice and information on effects of overdose.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must contact Physician OLMD for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Establish vascular access.
- With widened QRS complex
  - Administer **Sodium Bicarbonate (8.4%) 1 mEq/kg** IV over 5 minutes. If QRS does not narrow after 5 minutes, repeat once.
    - For infants, use **Sodium Bicarbonate (4.2%) 1 mEq/kg** IV.
      Note: To mix Sodium Bicarbonate (4.2%) waste 25 ml of the 8.4% pre-filled amp and draw up 25 ml of **Normal Saline**, yielding 25 mEq of 4.2% solution.

Poisonings
Carbon Monoxide

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

The prehospital care goals include decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearls

- Hemoglobin binding affinity for CO is 250 times greater than its affinity for oxygen. Small amounts of CO dramatically reduce hemoglobin's ability to transport oxygen.

- Pulse oximetry reflects saturation of hemoglobin binding sites but does not reflect cell's ability to use oxygen for cellular metabolism; high flow oxygen should always be administered.

- CO toxicity is frequently misdiagnosed as a simple headache or viral syndrome. A high index of suspicion must be maintained, particularly during the winter months, when faulty heating systems and enclosed spaces make CO poisoning more common than it is at other times.

SpCO %	Clinical Manifestations
0-4%	None – Normal
5-9%	Minor Headache
10-19%	Headache, Shortness of Breath
20-29%	Headache, Nausea, Dizziness, Fatigue
30-39%	Severe Headache, Vomiting, Vertigo, ALOC
40-49%	Confusion, Syncope, Tachycardia
50-59%	Seizures, Shock, Apnea, Coma
60% -up	Coma, Death

Carbon Monoxide

Treatment

All Providers

- Ensure scene safety, wear appropriate PPE to avoid exposure. Remove patient from source of toxic exposure.
- Perform assessment including blood glucose.
- Administer high-flow oxygen.
- Obtain oxygen saturation (%SpO_2) and carboxyhemoglobin saturation (%SpCO) readings using the RAD-57, if available.
- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place monitors
  - RAD-57
  - End-Tidal CO_2
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Administer high-flow oxygen.
- Patients with ischemic changes on ECG, syncope or any period of unconsciousness may benefit from Hyperbaric Oxygen therapy. **Contact Physician OLMD** for recommended transportation destination.

Caustic Ingestion

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

The prehospital care goals include decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearl

- The severity of tissue injury from acidic and alkaline substances is determined by the duration of contact, the amount of the substance involved, and the substance's physical properties (pH, concentration, etc.).

Caustic Ingestion

Treatment

All Providers

- Ensure scene safety, wear appropriate PPE to avoid contamination, and decontaminate self and others as needed. Remove patient from source of poisoning or toxic exposure.

- Perform assessment including blood glucose. Focused history to include:
  - Type of agent involved. Do not transport toxic or hazardous substances. Document product information if possible.

- Ensure oxygenation.

- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.

- Place electrodes/acquire 12-lead ECG.

- Administer nothing by mouth. Do not delay transport.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation

- Establish vascular access.

Cyanide Exposure

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

The prehospital care goals include decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearls

- Cyanide makes the cells of the body unable to use oxygen.

- Inhalation of high concentrations of cyanide causes a coma with seizures, apnea, and cardiac arrest. At lower doses, loss of consciousness may be preceded by general weakness, giddiness, headaches, vertigo, confusion, and perceived difficulty in breathing.

Cyanide Exposure

Treatment

All Providers

- Ensure scene safety, wear appropriate PPE to avoid contamination. Remove patient from source of poisoning or toxic exposure.
- Perform assessment including blood glucose.
- Ensure oxygenation. Pulse oximetry reflects saturation of hemoglobin binding sites but does not reflect cell's ability to use oxygen for cellular metabolism; high flow oxygen should always be administered.
- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place monitors as available
  - End-Tidal CO_2
  - Pulse oximetry
  - RAD57
- Place electrodes/acquire 12-lead ECG.

ALS providers

- Continue assessment to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.

Cyanide Exposure

Treatment (continued)

- Evaluate patient and scene to verify indications for antidote (Cyanokit) administration. Cyanokit administration requires:
    - Known or strong suspicion of exposure to cyanide:
        - Known/suspected ingestion, inhalation or exposure to cyanide product

          or
        - History of being exposed to dense smoke in a confined space or the presence of oropharyngeal soot or carbonaceous expectorations
    - Findings suggestive of cyanide toxicity including:
        - Any altered level of consciousness
        - Inexplicable hypotension (SBP < 90)
        - Seizure
        - Moderate to severe respiratory distress
        - Cardiac arrest in the setting of suspected cyanide poisoning or severe smoke inhalation.

- If criteria 1 and 2 are not met, provide supportive care and follow indicated protocols.

- If both criteria 1 and 2 are met, prepare to administer Cyanokit
    - Manage burns or trauma if indicated; carefully monitor airway
    - Establish secondary vascular access if possible as a dedicated route for Cyanokit administration.
    - Access the Cyanokit medication and two 100ml bags **Normal Saline** from the Cyanokit Bag. **Contact Physician OLMD** to administer **70mg/kg** total of Cyanokit as follows (max **5g**):
        - Reconstitute medication then gently rotate for 30 seconds to mix:
            - For bags with a single vial containing **5g**, use both 100ml bags **Normal Saline** and transfer spike.
            - For bags with two vials each containing **2.5g**, use one 100ml bag **Normal Saline** and transfer spike for each vial.
        - Infuse **Cyanokit 70mg/kg** IV drip. Concentration for all vials is 25mg/ml. Attach supplied 20 gtts/ml dripset to supplied Buretrol, then Buretrol to vial, then fill Buretrol chamber based on patient weight:
            - 5kg: 14ml
            - 7kg: 20ml
            - 10kg: 28ml
            - 13kg: 37ml
            - 15kg: 42ml
            - 20kg: 56ml
            - 25kg: 70ml
            - 30kg: 84ml
            - 35kg: 98ml

Cyanide Exposure

Treatment (continued)

        - Clamp tubing between Buretrol and vial, then start infusion at 260 gtts/min or ~4gtts/sec (10-15ml/min).
        - Patients weighing more than 35kg will require refilling the Buretrol.
            - For bags with **2.5g** vials, the second vial will need to be reconstituted to replace the now empty first vial.
            - Subtract 35 from total patient weight in kg and refer above to determine volume to add to Buretrol.

- Transport patient following Cyanokit Administration.
    - Patients requiring immediate stabilization shall be taken to the closest appropriate hospital. Such patients include:
        - Associated trauma
        - Unstable airway that cannot be maintained in the field
    - All other Cyanokit patients with or without burns shall be transported to the WHC Burn Center.

- Administrative Notifications to facilitate oversight and program management.
    - Notification of Cyanokit administration should be made via the EMS Supervisor within 24 hours to the medical director, and the Deputy Chief of EMS.
    - Notification should include date and time of incident, incident number, summary of incident, patient data, and destination hospital.

Envenomation

An accidental exposure to a substance that causes harm to the body.

The prehospital care goals include decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearl

- Consider all snake bites as potentially venomous.

Envenomation

Treatment

All Providers

- Perform assessment including blood glucose.
- Ensure oxygenation.
- Remove all jewelry and restrictive clothing.
- Splint the involved extremity and place it in dependent position.
- Do not use cold packs on poisonous snake bites.
- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.
- Place electrodes/acquire 12-lead ECG.

ALS providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Establish vascular access.
- **Contact Physician OLMD** for transportation recommendation to appropriate facility to prevent delay in administration of anti-venin.

Organophosphate/Nerve Agent Exposure

A poisoning is considered an intentional or accidental exposure to a substance that causes harm to the body.

The prehospital care goals include decontamination, supportive care, and appropriate antidotes or other medications.

Clinical Pearls

- Atropine will not reduce the weakness and respiratory depression associated with Organophosphate poisoning.

- IV administration of Atropine before adequately supporting ventilations and correcting hypoxia may result in ventricular fibrillation. If the patient is hypoxic, Atropine should be administered IM until respiratory support is initiated.

Organophosphate/Nerve Agent Exposure

Treatment

All Providers

- Perform assessment including blood glucose. Focused history to include:
  - Type of agent involved:
    - Do not transport toxic or hazardous substances. Document product information if possible.
  - Route of exposure: ingestion, injection, inhalation, or absorption.
  - Duration of exposure.

- Ensure oxygenation.

- Consider contacting Poison Control for advice and information on effects of poison.
  - Treatment recommendations from Poison Control are not considered Physician OLMD.
  - Providers must **contact Physician OLMD** for permission before following any Poison Control recommendation outside protocol.

- In the MCI environment, BLS providers should administer autoinjectors under the supervision of ALS providers.
  - The Incident Commander shall consult with the senior ALS provider on scene to determine when to delegate care to BLS personnel.

- Place monitors
  - 12-lead ECG placement
  - End-Tidal CO_2

ALS providers

- Continue assessment
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring

- Establish vascular access.

- **Contact Physician OLMD** early if small children are exposed.

- In small incident environment, ALS providers should assess patients and deliver treatment with BLS assistance.

Organophosphate/Nerve Agent Exposure

Treatment (continued)

Manage according to severity of exposure as follows:

Mild Symptoms:

Blurred vision
Excessive teary eyes
Excessive runny nose
Increased salivation such as sudden drooling
Chest tightness or difficulty breathing
Tremors throughout the body or muscular twitching
Nausea and/or vomiting
Unexplained wheezing, coughing, or increased airway secretions
Acute onset of stomach cramps
Tachycardia or bradycardia

Severe Symptoms:

Strange or confused behavior
Severe difficulty breathing or copious secretions from lungs/airway
Severe muscular twitching and general weakness
Involuntary urination and defecation
Convulsions
Unconsciousness

- Administer **Atropine 0.05 mg/kg** IV (mild symptoms) to **0.1 mg/kg** IV (severe symptoms)
    - Minimum single dose 0.1 mg.
    - Repeat every 10 minutes as needed, titrating to drying of secretions.

- Follow **Seizure** protocol, if indicated.

Respiratory Emergencies
Asthma/Bronchiolitis

Reactive airway disease exhibits as abnormal ventilation and includes asthma and bronchiolitis.

Asthma is a chronic disease characterized by reversible, episodic bronchospasm, airway inflammation, and excess mucous production.

Bronchiolitis is an inflammation of the bronchioles typically associated with viral illness.

The prehospital care goals are to improve oxygenation using oxygen, bronchodilators, and ventilator assistance.

Clinical Pearls

- Wheezing, the classic sign of asthma, results from turbulent air flow through inflamed and narrowed bronchioles. However, some asthmatics present only with a persistent cough, frequently worse at night. This cough-variant asthma is especially prevalent in the pediatric population.

- Respiratory distress in infants may be subtle unless a provider specifically looks for it. Tachypnea, nasal flaring, and retractions are hallmarks of increased respiratory effort.

- Asthmatics with a history of previous intubation, or progressively worsening symptoms despite increasing use of bronchodilators, may be at risk for severe asthmatic attack.

- Bronchiolitis often presents as wheezing in febrile infants. Bronchiolitis carries a high risk of apnea or respiratory failure in infants younger than two months, premature infants, or children with a history of chronic pulmonary disease or congenital heart disease. Bronchodilators are no longer recommended in infants with bronchiolitis.

Asthma/Bronchiolitis

Treatment

Signs and Symptoms

Mild/Moderate Asthma episode - Respiratory Distress: Audible wheezes (expiratory, inspiratory, or both), some respiratory distress and increased work of breathing, but with adequate tidal volume.

Severe Asthma episode – Severe Respiratory Distress, with risk for respiratory failure: Unable to speak/vocalize comfortably (short sentences, <5 word dyspnea, weak cry, etc.), absent or greatly diminished breath sounds with or without wheezing, tachypnea/bradypnea, altered level of consciousness (tired), reduced pulse oximetry (<92% on O_2), mottled skin.

All Providers

- Perform assessment. Focused history to include:
  - Recent nebulizer/MDI use
  - Fever or upper respiratory signs/symptoms
  - Intubation history
- Prepare to assist ventilations with BVM.
- Assist patient with his or her bronchodilator medication prescribed for acute asthma symptoms (rescue inhaler).
- Ensure oxygenation. Prepare nebulizer.
- Place Monitors
  - End-Tidal CO_2
  - Pulse oximetry

ALS Providers

- Continue assessment, to include:
  - End-Tidal CO_2 monitoring
- Establish vascular access if indicated.

Asthma/Bronchiolitis

Treatment (continued)

Manage according to severity of illness as follows:

Mild/Moderate Asthma episode: – Respiratory Distress:

- Administer **Albuterol 5 mg** mixed with **Ipratropium Bromide 0.5 mg** via NEB. Repeat once.
  - Do not discontinue until medication delivery is complete unless adverse effects manifest.
  - If no significant improvement after 10 minutes, administer **Methylprednisolone 1 mg/kg** IV slow. Reconsider reclassification if indicated.

Severe Asthma episode – Severe Respiratory Distress at Risk for Respiratory Failure:

- Administer all of the following:
  - **Albuterol 5 mg** mixed with **Ipratropium Bromide 0.5 mg** via NEB. If refractory, repeat as needed.
  - **Methylprednisolone 1 mg/kg** IV slow.

- If ventilatory assistance is needed at any time, place patient on BVM with in-line NEB. Any child that will tolerate a BVM needs a BVM.

- For extreme respiratory distress, marked by diminished air movement resulting in questionable delivery of nebulized medication, administer **Epinephrine** (**1:1,000) 0.01 mg/kg** IM.

Physician OLMD

- **Magnesium Sulfate 25 mg/kg in 100 ml Normal Saline** IV drip **30 gtts/min** (10 gtts/ml set).

- Consideration of repeat dosing with **Epinephrine** (**1:1,000) 0.01 mg/kg** IM every 15 minutes based on symptoms for extreme respiratory distress, marked by diminished air movement resulting in questionable delivery of nebulized medication.

Croup/Epiglottitis

Croup is a viral infection of the upper airway usually associated with a barking cough. It is most common between the ages of 6 months and 3 years.

Epiglottitis is an acute bacterial infection or inflammation of the epiglottis that is life-threatening. It is most common between the ages of 2 and 8 years.

The prehospital care goals are to keep the patient calm, protect the airway, and rapidly transport to appropriate facility.

Clinical Pearls

- Upper airway obstruction by croup or epiglottitis is marked by clinical signs during the inspiratory phase including stridor, inspiratory retractions, accessory muscle use, and nasal flaring. The patient's respiratory rate is mildly elevated.

- Patients with epiglottitis often assume the "tripod" position: sitting upright and leaning forward with the chin thrust outward in a sniffing position with their mouth open widely.

Croup/Epiglottitis

Treatment

All Providers

- Calm patient and put patient in a position of comfort. Upright on parent's lap often works best.
- Do not try to visualize or place anything in the patient's mouth, including tongue blade, thermometer, or oral airway.
- Limit patient assessment, to avoid agitating the patient and causing additional inflammation.
- Ensure oxygenation.
- Place Monitors:
  - End-Tidal CO_2
  - Pulse oximetry
- For respiratory arrest or cyanosis with decreased level of consciousness assist with BVM.

ALS Providers

- Continue assessment, to include:
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- For moderate to severe respiratory distress due to croup evidenced by labored breathing, intercostal retractions, fatigue or decreased level of consciousness:
  - Administer **Epinephrine (1:1,000) 5 mg** undiluted via NEB.
- Epiglottitis is managed by supportive care. Nebulized epinephrine is not beneficial and may be harmful.
- If unable to ventilate effectively, initiate advanced airway management.

Pneumonia

Pneumonia is an inflammation of the lung, usually caused by an infection.

The prehospital care goal is to improve oxygenation using oxygen and ventilatory assistance.

Clinical Pearls

- "Community-acquired pneumonia" (CAP) refers to a pneumonia in a previously healthy person who acquired the infection outside a hospital or healthcare facility. CAP is one of the most common serious infections in children.

- A common presentation of pneumonia may include fever, unilateral abnormal lung sounds and a productive cough as evidenced by the presence of discolored sputum (green, yellow, brown).

- In the presence of pneumonia, adventitious breath sounds may include localized or diffuse crackles, wheezing or diminished breath sounds depending on the progression of the illness.

Pneumonia

Treatment

All Providers

- Perform assessment. Focused history to include:
  - Fever
  - Productive cough
  - Unilateral abnormal lung sounds
- Ensure oxygenation.
- Place Monitors:
  - End-Tidal CO_2
  - Pulse oximetry
- For respiratory arrest or cyanosis with decreased level of consciousness assist with BVM.

ALS Providers

- Continue assessment, to include:
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Refer to the **Sepsis** protocol if indicated.

Undifferentiated Respiratory Distress

Undifferentiated respiratory distress is respiratory distress due to unknown causes.

The prehospital care goal is to improve oxygenation using oxygen and ventilatory assistance.

Clinical Pearls

- Consider underlying causes of respiratory distress in patients without a history of respiratory disease.

- Frequent reassessment of lung sounds is critical because lung sounds that were clear and equal may deteriorate rapidly.

- Even in patients without previous history of respiratory disease, wheezing can develop when the patient has had exposure to environmental, chemical or other respiratory tract irritants.

- There is no medical reason to avoid giving high flow oxygen to infants and children in the prehospital environment.

- Choking/partial airway obstruction can manifest like wheezing. Look for evidence on history, physical exam and the scene (such as a missing button on clothes).

- Causes of respiratory compromise can be broken down into two categories: upper airway and lower airway disease. Abnormal breath sounds may be observed on inhalation and exhalation.
    - Upper Airway: the inspiratory phase is longer than the expiratory phase (croup, epiglottitis, foreign body, neck injury, bacterial tracheitis, laryngomalacia).
    - Lower Airway: the expiratory phase is longer than the inspiratory phase (asthma, bronchiolitis, pneumonia, foreign body, cystic fibrosis, tracheomalacia, bronchomalacia).

Undifferentiated Respiratory Distress

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place monitors
  - End-Tidal CO_2
  - Pulse oximetry
- For respiratory arrest or cyanosis with decreased level of consciousness assist with BVM.

ALS Providers

- Continue assessment, to include:
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- If wheezing, administer **Albuterol 2.5 mg** via NEB. If refractory, repeat once.

Seizures

A seizure is defined as an episode of abnormal neurological function caused by an abnormal electrical discharge of brain neurons.

The prehospital care goals are to protect the patient's airway, prevent injury, identify and treat the underlying cause, and suppress the seizure activity.

Clinical Pearls

- A febrile seizure, the most common form of seizure seen in young children, can occur in otherwise healthy children between 9 months and 5 years of age. They generally last less than 1 minute, but can last up to 15 minutes. Use of medicines such as acetaminophen or ibuprofen to treat fevers has not been shown to prevent febrile seizures.

- A child is likely to have more than one febrile seizure if:
  - There is a family history of febrile seizures
  - The seizure occurred with a fever below 102°F
  - The first seizure happened before the age of 12 months (the earlier the age at which the first febrile seizure occurs, the more likely are recurrences)

- Status epilepticus refers to prolonged seizure or recurring seizures without a return to baseline between episodes. Compensatory mechanisms are overcome by prolonged seizures. The resultant hypoxia, decreased cerebral perfusion, and depletion of brain oxygen and glucose result in injury to brain tissue.

- The post-ictal state may last from seconds to minutes to hours depending on a number of variables including which area of the brain was affected, the duration of the seizure, the age of the patient and whether or not they were on anti-epileptic drugs. Transport to a medical facility is recommended for assessment after any type of seizure activity.

Seizures

Treatment

All Providers

- Perform assessment, including blood glucose. Focused assessment to include:
  - Recent illness
  - Temperature
  - History of seizures
- Take cervical spine precautions, if necessary.
- If the patient is actively seizing:
  - Do not restrain or force any device into patient's mouth.
  - Protect patient from further injury.
  - Consider cause of seizure activity.
- For infants and children with suspected febrile seizure, remove clothing to passively cool the patient. Prevent shivering.
- Ensure oxygenation.
- Treat injuries and place patient in the recovery position when the patient's seizure activity stops.

ALS Providers

- Continue assessment.
- Establish vascular access.
- Treat active seizures:
  - Administer **Midazolam 0.1 mg/kg** IV slow to a max single dose of 5 mg. If refractory after 5 minutes, repeat once.
    - If no vascular access, administer **Midazolam 0.1 mg/kg** IM (preferred) or **0.2 mg/kg** IN to max single dose of 5 mg. If refractory after 5 minutes, repeat once.
  - If refractory, **contact Physician OLMD.**

Sepsis

Sepsis is a complex and dynamic systemic infection that can potentially become life threatening. Septic shock is severe sepsis plus hypotension.

The prehospital care goal is to sustain adequate organ perfusion to maintain function.

Clinical Pearls

- Neonates are at higher risk for sepsis, as well as, children with traumatic injuries and chronic medical diseases.

- Hypotensive septic patients are primarily hypotensive from relative hypovolemia due to third spacing, not cardiogenic shock. Be cognizant when aggressively treating blood pressures. Vasopressors are secondary to adequate fluid therapy.

- A strong bloodwork marker for poor end organ perfusion is an elevated lactate with a specific Sepsis value range ≥ 2 mmol in the pediatric population.

- Septic shock is severe sepsis plus hypotension.

- Sepsis can result in decreased tissue perfusion, causing reduction in oxygen delivery to body organs.

Sepsis

Treatment

All Providers

- Perform assessment. Focused history to include recent surgical or invasive procedures and blood glucose.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
  - End-Tidal CO_2 monitoring
- Establish vascular access.
- Screen for sepsis based on the following guidelines:
  - **Sepsis Alert**: Strong suspicion of infection plus two or more of the following signs/symptoms:
    - Tachycardia or bradycardia in infants – see table below
    - Capillary refill greater than 2 seconds or mottling
    - Systolic BP less than or equal to 70 + (2 x Age in years) – see table below
    - Lactate greater than 4 mmol/L, if available

    Sepsis Alert treatment:
    - Infants and Children: Administer **20 ml/kg Normal Saline** IV rapid. Reassess vital signs, lung sounds, and liver size. If refractory, repeat twice until
      - SBP and capillary refill improve – see table below
      - Signs/symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation) or liver enlargement/hepatomegaly develops
      - Max cumulative dose of 60 ml/kg
    - Neonate: **10 ml/kg** IV over 10 minutes via Buretrol or slow IV push. Reassess vital signs, lung sounds and liver size after each bolus. If refractory, repeat once until
      - SBP and capillary refill improve – see table below
      - Signs/symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation) or liver enlargement/hepatomegaly develops
      - Max cumulative dose of 20 ml/kg

Sepsis

Treatment (continued)

Age Group	Systolic BP (mmHg) indicative of Hypotension
Newborn – 30 days	**≤ 60**
1 mo – 1 yr	≤ 70
> 1 yr – 10 yrs	≤ 70 + 2x (age in years)
≥ 10 yrs	< 90

- **Possible Sepsis**: Strong suspicion of infection plus two or more of the following signs/symptoms (without evidence of hypoperfusion described above):
  - Temperature greater than 101 °F or less than 96 °F
  - Tachycardia or bradycardia – see table below
  - Increased respiratory rate –see table below
  - Acute change in mental status or Pediatric GCS less than 12
  - Hyperglycemia (blood glucose greater than 120 mg/dl) without a history of diabetes

  Possible Sepsis treatment:
  - Supportive care

Age Group	Tachycardia (Beats/Min)	Bradycardia (Beats/Min)	Respiratory Rate (Breaths/Min)
0 days – 1 wk	**> 180**	**< 100**	**> 50**
1 wk – 1 mo	> 180	**< 100**	**> 40**
1 mo – 1 yr	> 180	**< 90**	**> 34**
2 – 5 yrs	> 140	**NA**	> 22
6 – 12 yrs	> 130	**NA**	> 18
13 to < 18 yrs	> 110	**NA**	> 14

Hospital Communication: Early notification for **Sepsis Alert** or **Possible Sepsis** without impaired perfusion, if indicated

Physician OLMD

- Consider **Dopamine** drip if refractory to fluid challenge.

Special Circumstances

This protocol is meant to provide guidance when signs/symptoms are serious to the patient and the emergent treatment options are specific to the patient. This protocol may be used exclusively, or in conjunction with other symptom-driven care protocols. For a subset of patients we encounter, there may be specific treatments unique to their condition but outside the traditional prehospital medications. The guidelines in this protocol and consultation with Physician OLMD should guide your decision-making. Condition allowing, the patient and family are frequently well informed and valuable sources of information regarding the condition and its management

The prehospital care goal is to provide patient-specific treatment to the patient in crisis.

Clinical Pearls

- Adrenal insufficiency may result from adrenal suppression by steroid medications, congenital adrenal hyperplasia, or Addison's disease. The end result is that the adrenal gland does not produce the body's usual steroids.

- **Signs of adrenal crisis**, which are not readily identifiable, include:
  - Pallor
  - Dizziness
  - Headache
  - Weakness/lethargy
  - Abdominal pain
  - Vomiting/nausea
  - Hypoglycemia
  - Hypotension
  - Shock
  - Heart failure

- **Hemophilia** is an inherited disorder of clotting. Patients are missing proteins critical in the formation of blood clots. Such patients present with severe bleeding complications related to relatively minor trauma.
  - The main treatment for hemophilia is called "replacement therapy." This involves getting the clotting factor that the body is missing. There are different types of replacement clotting factors. Some are made from human blood, and others aren't. Replacement therapy goes into a vein.

- Pulmonary hypertension patients may have significant resistance to blood flow across the pulmonary capillary bed and have respiratory or hemodynamic symptoms of their disease. Some patients are managed with continuous infusions and may have severe rebound symptoms should the infusion be interrupted due to catheter related complications.

Special Circumstances

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, to include:
  - 12-lead ECG interpretation
- Establish vascular access.
- Identify patient's condition by way of patient, family members, Med-Alert jewelry, Emergency Information Form or other means.

Physician OLMD

Determine the recommended intervention for the patient condition and confirm the availability of the therapeutic agent.

Obtain authorization to administer the patient's medication if the patient presents an Emergency Information Form or equivalent documentation that

- Identifies the patient's medical condition
- States the recommended treatment

Symptomatic Care
Nausea/Vomiting

Nausea and vomiting may accompany any number of clinical entities, both benign and serious. While the primary patient care priorities remain patient assessment, monitoring and supportive care, the ability to treat the patient's nausea/vomiting brings beneficial symptomatic relief. Symptomatic relief may allow a more revealing clinical assessment and at a minimum relieves discomfort.

The prehospital care goals are to treat the patient's nausea/vomiting and prevent further associated dehydration.

Clinical Pearls

- Pain that precedes nausea/vomiting may suggest a surgical cause.

- It is important to recognize that not all vomiting is viral-related, or due to simple GI upset; serious medical conditions may be the cause, especially in those with endocrine disease. Always perform a thorough assessment in order to uncover and address any underlying issues/problems such as toxic ingestion/exposure, or CNS disorders (e.g. meningitis, head injury, etc.).

- Bilious (containing bile, green in color) vomiting in infants is worrisome. This could be indicative of an obstruction in the intestine.

Nausea/Vomiting

Treatment

All Providers

- Perform assessment. Focused history to include fluid loss (emesis/diarrhea/poor urine output), poor intake, and fever.
- Ensure oxygenation.
- Follow appropriate treatment protocols, if indicated.

ALS Providers

- Establish vascular access.
- For ages 6 months to 10 years, administer **Ondansetron:**
  - Greater than 15kg: **4 mg** PO ODT (preferred) or IV slow. If refractory, repeat once.
    - If no vascular access and patient is unable to comply with PO instructions, **4 mg** IM. If refractory, repeat once.
  - 8-15kg: **2 mg** PO ODT (break ODT in two like parts, administer one part)
    - If patient is unable to comply with PO instructions, administer **2 mg** IV slow.
- For infants over 1 month old, administer **Ondansetron 0.1 mg/kg** IV slow
  - < 8kg: **Contact Physician OLMD**

Pain Management

Pain is a subjective symptom. Patients may characterize their discomfort using a variety of words, gestures, or expressions.

The prehospital care goal is to relieve pain as the patient perceives it. Serial pain scales should be used to measure progress.

Clinical Pearls

- Narcotic analgesics may decrease blood pressure and/or cause respiratory depression.
- Patients perceive, express, and tolerate pain in different ways. Ask patients about their pain, and their desire for pain relief (or lack thereof) as part of your assessment.

CRIES Pain Scale (Birth to 6mos)	0	1	2
Crying (cries of pain typically *high pitched*)	No	High Pitched	Inconsolable
Requires O_2 for Sat >95 (watch for changes)	No	<30% (NC/blow by)	>30% (NRB)
Increased vital signs	HR = or < than predicted norm	HR 1-20% over norm	HR >20% over norm
Expression (grimace: brow lowering, eyes squeezed shut, deepening naso-labial furrow, open mouth)	None	Grimace	Grimace & Grunt
Sleepless (vs. recent behavior)	No	Wakes frequently	Constantly awake

(CRIES: Krechel and Bildner, 1995)

FLACC Pain Scale (3mos to verbal)			
	0	1	2
Face	No particular expression or smile	Occasional grimace/ frown, withdrawn, disinterested	Frequent/constant frown, clenched jaw, quivering chin
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lies quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry (awake or asleep)	No cry	Moans or whimpers, occasional complaint	Crying steadily, screams/ sobs, frequent complaints
Consolability	Content, relaxed	Consoled by touching/ hugging/talking to, distractible	Difficult to console or comfort

(FLACC: Merkel, Malviya, et al., 1997)

Visual Analogue Pain Scale (6yrs & up)

Show child a horizontal line labeled with "no pain" at one end and "worst possible pain" at the other.
Ask child to mark or otherwise indicate on the line the intensity of their pain. The result is given a value of 0 to 10 based on relative location. Alternatively:

3. The numbers 0-10 may be written at even intervals on the line, or
4. The line may be represented as a thermometer.

Older children may be able to conceptualize like adults and answer from 0-10 without any picture at all.

(McCaffrey and Beebe, 1993)

Faces Pain Scale (3yrs & up/all verbal children)

Pain Management

Treatment

All Providers

- Follow appropriate treatment protocols, if indicated.
- For extremity injuries: ice, immobilize and elevate the injury.
- Ensure oxygenation.

ALS Providers

- Continue assessment, including End-Tidal CO_2 monitors.
- Establish vascular access.
- For pain associated with IO infusion, administer **Lidocaine 2% 0.5 mg/kg** IV slow immediately after IO placement is verified.
- For pain management of the following conditions with the absence of hypotension, uncontrolled bleeding, or suspicion of thoracic or abdominal trauma:
  - Abdominal pain/back pain
  - Amputations
  - Burns
  - Trauma to the extremities
  - Other painful condition warranting treatment
- Administer **Fentanyl:**
  - **1 microgram/kg** IV slow to a max single dose of 100 micrograms, if refractory after 5 minutes repeat once.
  - If no vascular access (or IN preferred route)
    - **2 microgram/kg** IN to a max single dose of 200 micrograms, if refractory after 5 minutes repeat once.

      OR
    - **1 microgram/kg** IM to a max single dose of 100 micrograms, if refractory after 5 minutes repeat once.
- For patients allergic to Fentanyl, administer **Morphine Sulfate:**
  - **0.1mg/kg** IV slow to a max single dose of 5 mg.
  - If no vascular access, **0.1mg/kg** IM to a max single dose of 5 mg.
- Reassess patient (to include at least blood pressure/perfusion, respiratory effort, and pain level) five minutes after medication administration and every five minutes thereafter.

Physician OLMD

- Contact for additional doses.

Trauma
Tactical Emergency Casualty Care

Almost every call we run has some degree of threat or risk, but there are some call types where the threat or risk is more direct, real and with greater potential impact. While most traditional EMS training begins with the declaration "Scene Safe…," there are undeniably circumstances that require swift and deliberate intervention even when the scene cannot be definitively declared "Safe" but only safe as reasonably achievable. The Tactical Emergency Casualty Care Guidelines (see **Scene Management: Special Circumstances**) describe these concepts, operations and priorities in such an environment – for this protocol it is essential to understand the 3 distinct phases of care:

Hot Zone (Direct Threat) – threat is real, directly present and poses greater risk than the benefit of most patient care interventions – Good tactics is good medicine. Tactical superiority is paramount. Patient care is limited.

Warm Zone (Indirect Threat) – threat is conceivable but remote. Benefits of time-critical, life-saving interventions are justified, followed by removal from threat environment as soon as achievable.

Cold Zone (Evacuation Care) – threat is mitigated or the patient has been removed from the threat environment. Care is centered on injury specific and context specific stabilization, packaging and preparation/completion of transport to definitive care.

Prehospital care goals:

1. Manage the threat environment to prevent further injury to patient or providers.
2. Prevent death and disability from time-critical injuries that are known causes of preventable death – uncontrolled bleeding, chest injuries requiring rapid intervention, airway occlusion.
3. Remove the patient from threat environment to a location where more deliberate stabilization and resuscitation can be rendered.
4. Move the patient to a location for definitive care in a timely manner and in the best condition achievable.

Clinical Pearls

- Bleeding from amputations may be limited if the limb or digit is cut cleanly or may be severe if the injury is jagged or crushed.

- High threat care is more about what not to do, than it is about novel care in the high threat environment.

- Patient movement is a patient care intervention. Moving from the Hot Zone to the Warm Zone is of greater benefit to the casualty than most any other treatments that place both the casualty and the provider at ongoing risk of injury.

- All interventions are weighed by the benefit they bring balanced against other treatments and the risk associated with doing them in the current location/environment.

Clinical Pearls (continued)

- PACE framework (**P**referred, **A**lternative, **C**ontingency, **E**mergency) helps inform strategies when context is different from traditional EMS. It also is the rationale for the differences in strategy and tactics compared with traditional EMS contexts.

- Concrete differences are most evident in the Hot Zone and Warm Zone and include triage, assessments, airway management, bleeding control, spinal motion restriction, patient movement techniques, etc.

- Why we apply MARCHE (massive bleeding, airway, respiration, circulation, head injury/hypothermia, every other injury)
    - Death from arterial bleeding: 2-4 minutes
    - Death from airway compromise: 4-6 minutes
    - Death from tension pneumothorax: 10+ minutes
    - "Golden Hour" for Shock: 60+ minutes

Tactical Emergency Casualty Care

Treatment

All Providers

- Prepare and Stage
  - Early preparation of casualty collection points and patient treatment areas remote from the high threat environment is important. This preparation can begin while the Rescue Task Force is assembling.
  - Avoid depleting transport personnel and resources to the extent possible, as patient transport from the scene is a priority after addressing immediate time-critical life threats.
- Triage – In the Hot Zone and Warm Zone, triage by rescue task force is much more limited than in the traditional EMS context.
  - Hot Zone and Warm Zone – (Rescue Task Force perspective) - The primary goal is to distinguish dead patients from those with potential for resuscitation – dead v. not dead.
  - Hot Zone and Warm Zone – (Extraction Task Force perspective) - Classification by the Extraction Task Force is driven by the patient's ability to exit the high threat environment under his or her own power – ambulatory v. non-ambulatory.
  - Cold Zone (Evacuation Care) at Casualty Collection Point and treatment areas - Traditional triage/re-triage (Red-Yellow-Green-Black) should be completed in the Cold Zone. In that setting it guides care priorities in the treatment area and informs transportation prioritization.
- Rescue Task Force (RTF) – Properly equipped providers will coordinate with law enforcement assets tasked with providing force protection and will be operating under Unified Command in standard fashion. Under escort by the force protection element, the RTF will enter the Warm Zone to make casualty contact and address immediate life-threats (uncontrolled arterial bleeding, airway occlusion, open pneumothorax, tension pneumothorax).
  - Most assessments and skills are performed at the All Providers level including:
    - Nasal Airway
    - Control of bleeding with tourniquet, pressure dressings, wound packing, hemostatic agents, junctional hemorrhage devices (hemorrhage clamp), if available, or direct pressure. The preferred method will be dictated by the phase of care, number of patients and providers and location and nature of the injury (see **Hemorrhage Control** protocol).
    - Chest seal for open pneumothorax

Tactical Emergency Casualty Care

Treatment (continued)

- Extraction Task Force – Properly equipped providers coordinate with law enforcement within controlled areas and will be operating under Unified Command in standard fashion. The Extraction Task Force is tasked with removing patients from the point of wounding in the Warm Zone environment toward casualty collection points and transport to definitive care.
- Casualty Collection Points and Medical Treatment Areas – care in these controlled locations is consistent with the traditional care routinely delivered as appropriate.

ALS Providers

- Perform chest decompression of tension pneumothorax, if indicated.

Physician OLMD

- Early notification of incidents with potential prolonged on scene duration and delayed transport should be made through DPSC to the Duty OMD. If available, the Duty OMD may respond to support on scene care.

Amputations

An amputation is the partial or complete severance of a digit or limb.

The prehospital care goals are to control bleeding, preserve the amputated part, manage pain, and transport to the appropriate facility.

Clinical Pearl

- Bleeding from amputations may be limited if the limb or digit is cut cleanly or may be severe if the injury is jagged or crushing.

Amputations

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Control hemorrhage with direct pressure. If the hemorrhage cannot be controlled, consider use of hemostatic trauma gauze or a tourniquet (follow **Windlass Tourniquet** procedure).
- Cover the wound with a sterile dressing saturated with sterile saline and cover with a dry bandage. Splint and elevate as necessary.
- Place the severed part in sterile gauze to preserve all amputated material. Moisten the gauze with sterile saline. Keep the part cool, but do not allow the severed part to freeze or come into direct contact with ice or cold packs.

ALS Providers

- Continue assessment.
- Establish vascular access.

Burns

In this protocol, burns are classified by type (mechanism of burn) and severity (simple or complex).

The prehospital care goals are to:

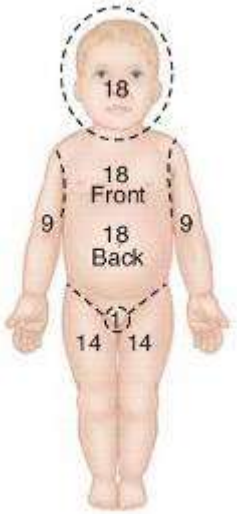
Thermal: Stop the burning process, maintain normal body temperature, and protect the airway.

Chemical: Take extreme care to avoid exposure to chemical agents and remove contaminants from patient to prevent continued injury.

Electrical: Focus on ABCs, look for entrance and exit wounds and be aware of any cardiac dysrhythmias and associated trauma.

Clinical Pearls

- Children have thin skin that is easily damaged. A burn mechanism that may not be severe for an adult often results in a deep burn for a child. Very young children demonstrate a higher mortality from burns.
- Infant and toddlers are more likely to suffer from scald burns.
- Inhalation injury can rapidly result in upper airway obstruction.
- The burned body surface area of a child can be estimated by:
    - Using the size of the child's palm (including the fingers). It is approximately 1% of total the body surface area.
    - Using the Rule of Nines (see diagram below).



Medical-dictionary.thefreedictionary.com

Burns

Treatment

All Providers

- Prevent further injury by stopping the burning process and removing the patient from the source.

- Perform assessment and address immediate life-threats as they are identified. Focused history to include:
  - Cause of burn.
  - Length of exposure.
  - Presence in closed environment
  - Nature of burning material.
  - Past history of respiratory diseases.
  - Treatment by bystanders.
  - Signs and symptoms of possible inhalation injury (i.e. SOB, wheezing, severe cough, hoarse voice, singed nasal and facial hair).
  - Evidence of potential carbon monoxide exposure or cyanide exposure in thermal burns.

- Ensure oxygenation.

- Remove clothing and jewelry around burn site if possible without causing further injury. Cut around clothing that adheres to the skin.

- Determine burn depth and extent of body surface area (BSA) involvement by Rule of Nines.

Simple Burns
Superficial burns (1st degree) involving less than 50% BSA
Partial thickness burns (2nd degree) involving less than 10% BSA

- For treatment of burns less than 10% BSA, apply sterile gauze soaked with cool/tepid water or saline to burned area taking care to maintain temperature and avoid hypothermia. Wrap the patient in a dry sheet.

- For treatment of all other simple burns, wrap burned area in a sterile dry dressing, and wrap the patient in a dry sheet.

Burns

Treatment (continued)

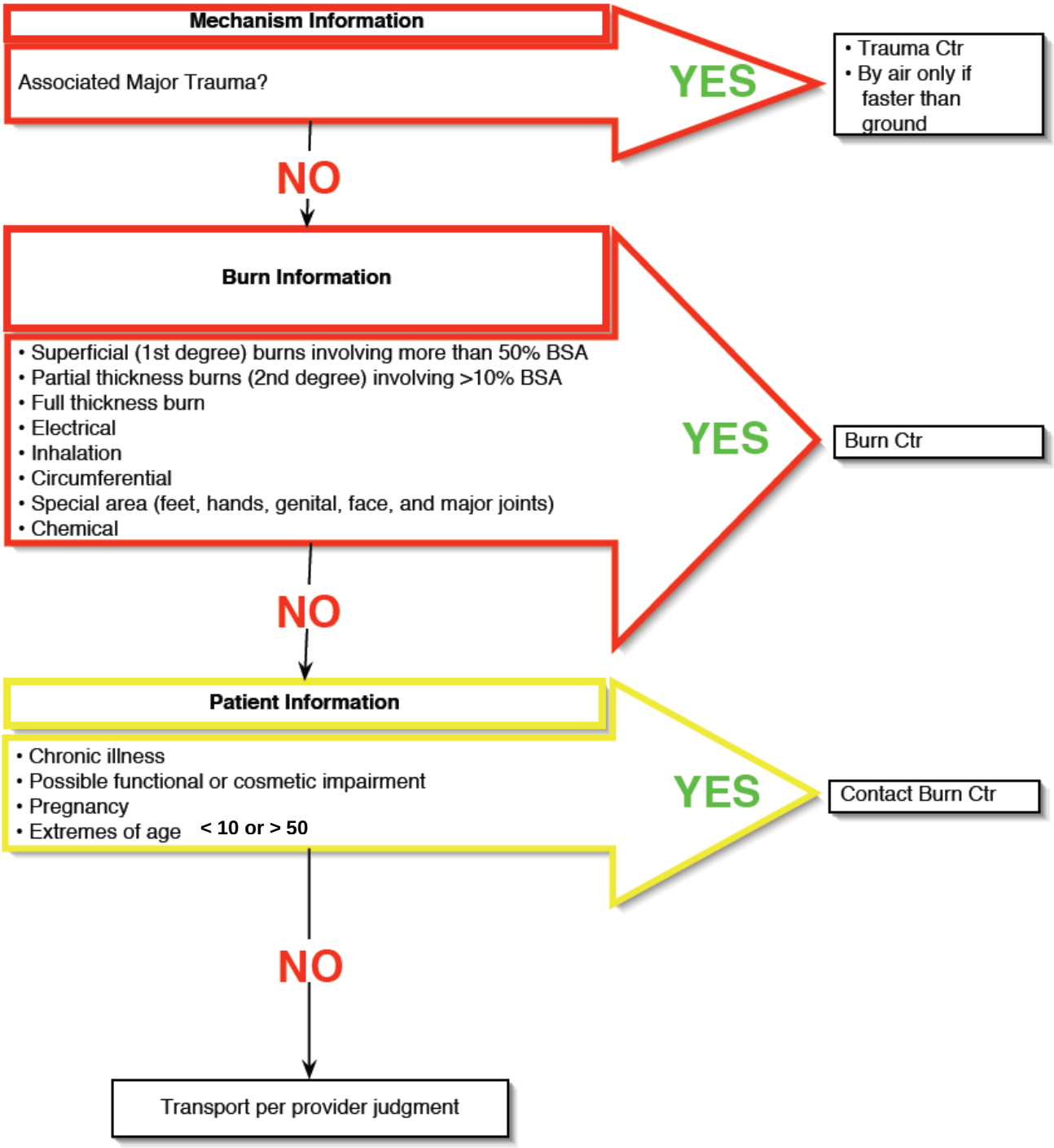
Complex Burns – Transport the patient to the Washington Hospital Burn Center
Age < 10
Superficial burns involving more than 50% BSA
Partial thickness burns (2nd degree) involving more than 10% BSA
All Full thickness burns (3rd degree)
Inhalation
Circumferential
Special area (feet, hands, genital, face, and major joints)
Electrical
Chemical

- For treatment of all complex burns, apply a dry sterile dressing to burned area and wrap the patient in a dry sheet.
- For treatment of electrical burns, look for entrance and exit wounds and be aware of any cardiac dysrhythmias and associated trauma.
- For treatment of chemical burns, remove and flush the chemical agent with copious amounts of water and provide supportive care. Remember that eyes are particularly vulnerable to chemical burns.
- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG if electrical burns.
- Establish vascular access.
- Follow the **Hypoperfusion** protocol, if indicated.

Burn Triage and Transport Decision Tree



Crush Syndrome

Crush Syndrome is the death of skeletal muscle and the release of cellular contents from the dead muscle cells into the plasma. It results when patients suffer prolonged and continuous pressure on large muscle masses. For our purposes a 4-hour time frame serves as a threshold at which Crush Syndrome may be considered.

The prehospital care goals are to estimate the time trapped and balance the administration of fluids and electrolytes to prevent associated complications.

Clinical Pearls

- After skeletal muscle injury occurs and the crushing object is removed, accumulated fluid shifts into the injured muscle resulting in acute hypovolemia and hypotension. In addition, high levels of cellular toxins (myoglobin) and electrolytes (potassium and hydrogen) are released into circulation. This can cause acute renal failure, lethal cardiac dysrhythmias and sudden death.
    - IV fluids should be initiated as soon as practical prior to extrication. Early initiation allows a large volume to be gradually infused over the duration of extrication, preventing hypotension and diluting toxins to help prevent renal failure.
    - Adding sodium bicarbonate to the IV solution can help prevent the myoglobin deposition in the renal tubules and counteract hyperkalemia.
    - Nebulized Albuterol is beneficial when treating presumed hyperkalemia because it pushes potassium into cells.
- Controlling hemorrhage can be difficult because the actual source of bleeding could be hard to identify. Several large vessels can be damaged and the crushed bone does not support direct pressure application.
- The Crush Syndrome protocol is intended for the management of patients under significant load for an extended period of time. Patients who have been on the floor for an extended period of time due to intoxication, injury, immobility, etc. may have some modest rhabdomyolysis, they generally do not have the same degree of acidosis and hyperkalemia. Such patients are generally not appropriate for the Crush Syndrome protocol and benefit from IV fluids alone.

Crush Syndrome

Treatment

All Providers

This protocol applies to patients with prolonged entrapment **approaching and exceeding 4 hours.**

- Perform assessment. Focused history to include:
  - Entrapment time
  - Extrication time

  Note: Do not extricate the patient until an ALS assessment and intervention is complete unless immediate lifesaving measures are required.

- Provide supportive care, taking care to maintain patient's temperature.

- Immobilize cervical spine and administer care for soft tissue injuries.

- Ensure oxygenation.

- Place electrodes/acquire 12-lead ECG.

ALS Providers

- Continue assessment, including 12-lead ECG. Remember that patients suffering a prolonged entrapment are prone to hyperkalemia, hypoglycemia, and hypothermia.

- Establish two large-gauge vascular access sites.

- In the absence of immediate life threat, delay extrication to deliver treatment.

- Prior to release, all patients should receive an initial dose of **Normal Saline 20 ml/kg** IV **run wide open** (10 gtts/ml set).
  - For prolonged extrication, administer the initial dose of **Normal Saline** followed by **Normal Saline** IV drip at **5 ml/kg/hr** (10 gtts/ml set).

- For entrapment greater than 4 hours administer:
  - **Sodium Bicarbonate (8.4%) 1 mEq/kg** IV over 5 minutes to a max dose of 100 mEq.
  - If there are ECG signs of hyperkalemia, administer **Albuterol 10 mg** via NEB**.**

- Post extrication, continue **Normal Saline** IV drip at **5 ml/kg/hr** (10 gtts/ml set).

Crush Syndrome

Treatment (continued)

Physician OLMD

- Call for additional orders or consultation as needed.
  - Physician support by the Duty OMD can be made through the Department of Public Safety Communications (DPSC). If unavailable, physician members of the US&R task force may assist with on scene operations.

- In the setting of entrapment greater than 4 hours, consider adding **Dextrose 50% (D50)** to IV fluids.

Hospital Communication: Trauma Alert, if indicated

Drowning/Near-Drowning

Drowning is asphyxiation resulting from submersion in liquid.

Near-drowning is an incident of potentially fatal submersion in liquid which did not result in death or in which death occurred more than 24 hours after the submersion.

The prehospital care goals are airway maintenance, reversal of hypoxia, maintaining circulation, cervical immobilization, and transport to appropriate facility.

Clinical Pearls

- All near-drowning victims should be evaluated in the ED since complications may appear in a delayed manner. The patients who deteriorate later usually have a cough, hypoxia, or respiratory distress upon initial removal from the water.

- Always suspect and consider the possibility of cervical spine injury in association with drowning or near-drowning.

Drowning/Near-Drowning

Treatment

All Providers

- Perform assessment. Focused history to include:
  - Approximate submersion time.
  - Dive associated injury.
  - Any loss of consciousness, respiratory distress, or hypoxia.
- Provide stabilization of the cervical spine, if indicated. Maintain a high suspicion of possible cervical spine injury.
- Ensure oxygenation. For respiratory arrest or cyanosis with decreased level of consciousness, assist with BVM.
- Prevent heat loss. Remove wet clothing.

ALS Providers

- Continue assessment.
- Establish vascular access, if indicated.
- All symptomatic near-drowning patients and those who had symptoms at any time should be transported.
- Near-drowning patients refusing transport require **Physician OLMD** prior to completing the patient refusal form.

Eye Injury

Eye injuries can occur from direct trauma (blunt or penetrating), or from chemical or thermal exposure. Field decontamination may be indicated for chemical exposure.

The prehospital care goals are to assess nature of injury, prevent further injury, including complications from movement and from increasing intraocular pressure, pain control and transport to an appropriate facility.

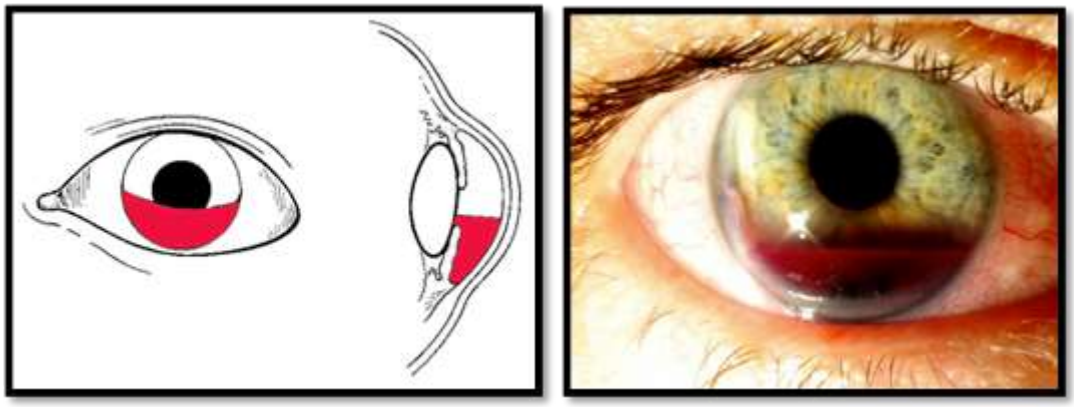
Clinical Pearls

- Serious eye injuries can occur from seemingly minor mechanisms as grinding or yard work. A very low threshold should be used to transport for emergency department evaluation.

- Full-thickness injuries to surface of the eye can be rapidly worsened and eye contents extruded by increases in intraocular pressure. Any nausea (common in eye injuries) should be immediately treated with antiemetics unless contraindicated due to the increases in intraocular pressure caused by vomiting. Whenever possible, the patient should be transported sitting upright.

- The eyes move together (conjugate), so covering the non-injured eye is essential to prevent unintended movement of the injured eye. This is important with an impaled object that remains in the injured eye.

- A few injury types worth noting:
    - Hyphema injury to the anterior chamber.



Hyphema – Blood layering in the anterior chamber of the eye

Clinical Pearls (continued)

- Ruptured Globe & Penetrating Globe injuries.

Ruptured Globe – Characterized by irregular pupil

- Impaled object in the eye with obvious open globe injury.

Eye Injury

Treatment

All Providers

Eye injuries are evaluated and managed within the context of overall clinical priorities. This is particularly true in the multiple injured patient. Eye trauma is managed in accordance with these guidelines if an isolated injury and/or after addressing higher priority injuries.

- Perform assessment, including evaluation for concurrent injuries. Focused exam to include the following:
  - Pupil size, reactivity and shape/irregularity.
  - Conjunctiva and anterior chamber – edema (chemosis), hemorrhage, impaled objects and signs of penetrating injury or globe rupture.
  - If no foreign body is suspected, eye movement should be assessed in the six cardinal positions of gaze – center, left, right, upward downward in center and right/left position.
  - Gross visual acuity described as:
    - reads print or clearly counts fingers at 1 foot distance
    - perceives hand motion at 1 foot distance
    - perceives/localizes light at 1 foot distance
    - none
- Obtain medical history, including mechanism of injury, previous eye conditions and eye surgeries, all eye medications and any blood thinners (anticoagulants/antiplatelet agents).

Specific Injuries

- Hyphema injury to the anterior chamber – sit upright if safe to do so.

- Ruptured Globe & Penetrating Globe injuries – Rigid shield to the injured eye only, do not apply pressure to globe. Sit upright if safe to do so. Do not apply gauze patch.

- Impaled object in the eye with obvious open globe injury – Stabilize foreign body without applying pressure to globe and cover unaffected eye to prevent conjugate movement of the injured eye. Do not apply pressure or gauze patch to any open globe or ruptured globe injury.

- Chemical exposure - Immediately irrigate with copious amounts of saline. If needed to facilitate irrigation and there is no associated open globe injury/penetrating globe injury,

- If the patient is unable to open the eye, do not force the eye open unless it is to irrigate for decontamination. Never apply pressure to the injured eye.

- Transport with patient seated upright if not contraindicated by concurrent injuries or spinal immobilization.

Eye Injury

Treatment (continued)

ALS Providers

- Continue assessment.
- Administer **Tetracaine 2 drops** to the affected eye. May repeat once in 15 minutes.
- Establish vascular access, if indicated.
- To avoid the associated increases in intraocular pressure that accompany vomiting, treat any associated nausea in accordance with **Nausea/Vomiting** protocol.
- Follow **Pain Management** protocol, if indicated.

Hemorrhage Control

There have been great strides in the management and treatment of bleeding in recent years. Recent editions of ITLS, as well as Tactical Emergency Casualty Care (TECC) guidelines, have assigned a higher priority to control of massive bleeding than in the past. This is primarily because uncontrolled bleeding is the leading cause of preventable deaths.

Over recent years, some new methods, devices and medications have emerged. Some established methods, devices and medications have found new favor and better understanding of their potential role. Choice of method, and/or device is based on a number of variables including - injury pattern, anatomic location, and the circumstances/setting of the call at the given point in time.

Our protocol is based on American College of Surgeons position statement, as well as, TECC guidelines and other consensus guidelines where applicable. We will describe general indications, a progressive algorithm for escalation and selection of method/device, and finally specific guidance on the individual devices/methods.

The prehospital care goals are to identify and manage hemorrhagic blood loss.

Clinical Pearls

- Most traumatic injuries producing significant external bleeding can be readily managed by direct pressure and pressure dressings. On rare occasion, heavy bleeding requires more aggressive management by tourniquet, wound packing, hemostatic agents, hemorrhage clamp, if available, or a combination of these measures. Selection of method and device is based on rate of bleeding, anatomic location of injury, as well as, incident scene dynamics.

- Success requires us to balance our desire to use the simplest method possible against the need to avoid prolonged blood loss in the face of ineffective efforts requiring us to move to more invasive measures.
    - Don’t use a TQ on a paper cut, and don’t spend prolonged time on direct pressure when both legs are traumatically amputated with ongoing bleeding.

Hemorrhage Control

Treatment

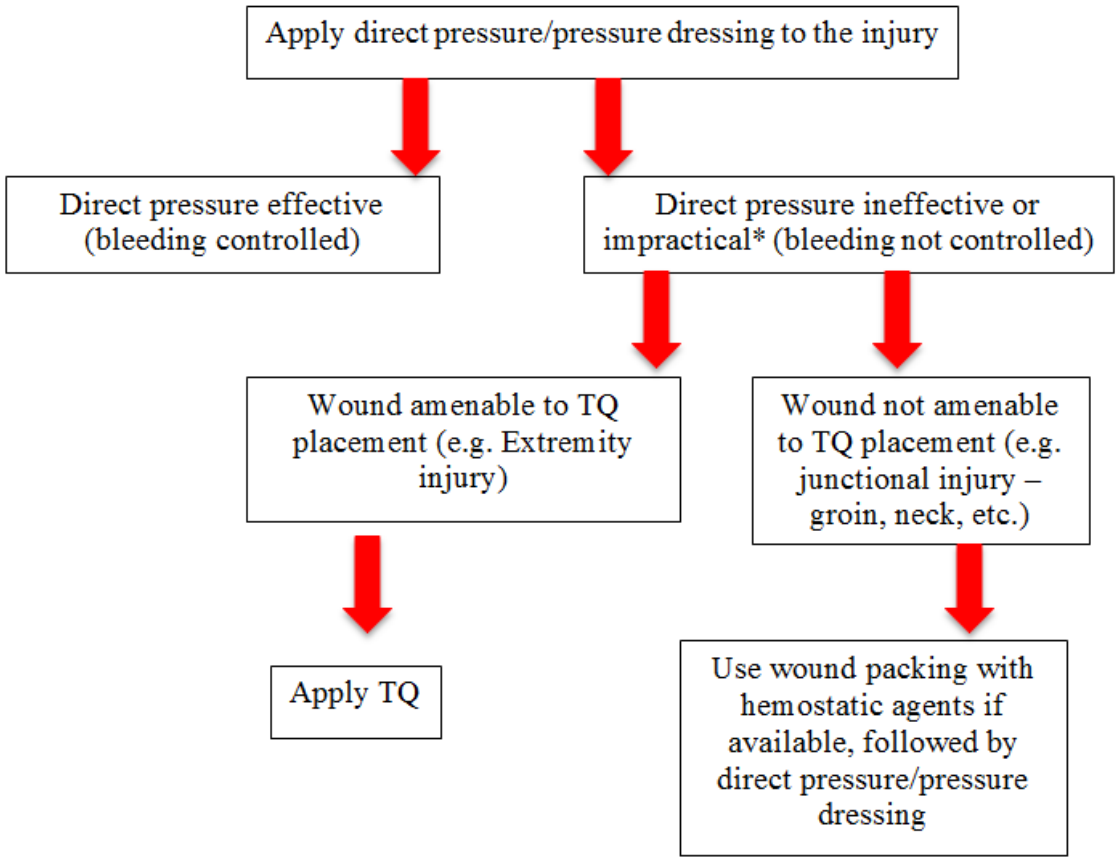
All Providers

- Perform assessment.
- Bleeding control methods and devices in approximate order of consideration:
  - Direct pressure
  - Pressure dressings
  - Tourniquet use
  - Wound Packing with or without hemostatic agents
  - Hemorrhage clamp, if available – best suited to large scalp lacerations with heavy bleeding, may also be used on wounds to junctional locations following wound packing with or without hemostatic agents if direct pressure is impractical

ALS Providers

- Continue assessment.
- Establish vascular access.
- Follow the **Hypoperfusion** protocol, if indicated.

Control of External Bleeding Decision Tree



Source: Adapted from ACS position statement 2014

*Direct pressure may be considered impractical when number of patients exceeds available personnel to deliver care, number of critical interventions preclude sustained direct pressure by one provider, unable to access the site of bleeding, indirect threat to the providers makes direct pressure at the site of wounding impractical, etc.

Isolated Extremity Injury

Isolated fractures and dislocation of the extremities are a result of traumatic forces.

The prehospital care goals are to recognize and treat injuries and transport the patient to the appropriate facility.

Clinical Pearls

- The pulse oximeter can be used to monitor the distal pulse during the splinting process. Affix the probe to a free finger or toe to establish a baseline. Monitor the oximeter and look for any changes such as erratic or absent readings.

- Injury near a joint carries a high incidence of blood vessel and nerve involvement and requires a careful approach to positioning and splinting. For this reason, consider a joint injury to be any muscular or connective tissue injury, dislocation, or fracture within three inches of a joint.

Isolated Extremity Injury

Treatment

All Providers

- Perform assessment. Focused exam to include:
  - Mechanism of injury
  - Pulse
  - Movement
  - Sensation

- Immobilize injuries:
  - If the fracture/dislocation is open, cover the open area with a sterile dressing. If the bone is protruding, make no attempt to push the bone back into the open site.
  - If fracture or dislocation is angulated and pulseless, attempt to align the long bones to their normal anatomical position under mild traction. If significant mechanical resistance is met, stop immediately and splint in current position.
  - If the fracture or dislocation is angulated with a pulse, splint as found.

- Control hemorrhage with direct pressure. If the hemorrhage cannot be controlled, consider use of hemostatic trauma gauze, a pressure dressing, or a tourniquet (follow **Windlass Tourniquet** procedure).

Specific Injuries

- **Closed Femur Fracture -** Apply Sager traction splint.

- **Open Femur Fracture -** Immobilize to backboard.

- Ensure oxygenation.

ALS Providers

- Continue assessment.

- Establish vascular access.

Selective Spinal Motion Restriction

The goal of Spinal Motion Restriction (SMR) is to minimize movement of an unstable fracture of the spine and in so doing prevent secondary injury. While it seems reasonable that there is theoretical benefit in minimizing movement at an unstable fracture, there is limited evidence to support the effectiveness of this longstanding practice.

It has recently been suggested that efforts to apply SMR measures may actually increase the movement of the spine. Once applied, the spine still moves and like all interventions SMR has potential risks and complications. These include spinal movement during application, respiratory compromise, risk of aspiration associated with the forced supine position, soft-tissue injury from prolonged application, and patient discomfort.

In select patients the likelihood of unstable spinal injury may be determined to be negligible based on history, mechanism of injury, and physical exam findings. Clinical decision rules guide our decision-making. This strategy, Selective Spinal Motion Restriction, allows providers to minimize the adverse events of unnecessary SMR and more reliably identify those patients with greater likelihood to benefit from these measures.

The prehospital care goals are to assess and identify those patients at risk for spinal injury, prevent further injury during extrication and transport, and prevent unnecessary harm from methods used to restrict spinal motion.

Clinical Pearls

- Certain risk factors place some patient populations at higher risk for injury to the spinal column:
    - Metastatic spinal disease
    - Preexisting/past spinal injury/damage
    - Rheumatoid arthritis
    - Long-term steroid use

- Traditional Methods of Spinal Motion Restriction are useful in some patients; it is however not appropriate for all injured patients.
    - There are no definitive studies that demonstrate the benefits of spinal immobilization.
    - Currently employed and commonly taught methods do not “immobilize” the spine. They are not anatomically correct, and implementing these measures will cause some movement of the spine.
    - There are studies suggesting adverse effects associated with use of backboards and forcing the patient to assume a supine position on a hard surface. Select patients may be clinically harmed by forced immobilization on a backboard.

Selective Spinal Motion Restriction

Clinical Pearls (continued)

- Spinal motion restriction refers to efforts to minimize spinal motion, and there are a range of options for achieving SMR. All should include efforts to ensure that anytime the patient is relocated, it is as a unit by way of in-line movements (log rolling, lift-and-slide, etc.). For the cervical spine, a cervical collar is generally the preferred method. In some cases, application of a cervical collar and positioning the patient supine on the stretcher may be the best method. In other cases, a collar, head rolls, and backboard may be the most reasonable way to assure the spine moves as a unit.
    - The preferred method and means when SMR is indicated is application of a cervical collar, and not every patient that warrants a cervical collar requires a backboard.
    - The decision to additionally utilize a backboard is a separate decision based on the position in which the patient is found, our ability to assess the patient based on mental status, vital signs, intoxication, and the patient's ability to sit on the stretcher under their own power.
    - For further guidance refer to the **Spinal Motion Restriction** procedure.

Selective Spinal Motion Restriction

Treatment

All Providers

- In the presence of trauma where cervical spine injury is a concern, stabilize the cervical spine and address clinical needs in standard order of priority.

- Perform assessment to determine the appropriateness of Spinal Motion Restriction measures. Evaluate history, mechanism and injuries.
    - If not trauma related, follow appropriate protocol.
    - If penetrating trauma is the mechanism of injury then determine appropriateness of spinal motion restriction as follows:
        - If the patient is intoxicated, or cannot be assessed due to altered mental status/decreased level of consciousness then spinal motion restriction is indicated.
        - If the patient has an evident neurologic deficit then spinal motion restriction is indicated.
        - In the absence of these indications, spinal motion restriction is not indicated or necessary on clinical grounds and may be harmful.
        - Spinal motion restriction should never be done at the expense of accurate physical examination or identification and correction of other life threatening conditions in patients with penetrating trauma.
    - In the setting of blunt trauma continue assessment as follows below.

- Identify features that would warrant SMR and exclude the patient from a selective strategy:
    - GCS < 15
    - Abnormal/unstable vital signs
    - Evidence of paralysis or paresis
    - Known vertebral disease
    - Previous cervical spine surgery
    - Distracting injury
    - Language barrier
    - Intoxication

- Screen for any dangerous mechanism/findings that would warrant application of SMR measures:
    - Age < 5
    - Numbness or tingling in the extremities
    - Dangerous mechanism of injury
        - Fall from elevation ≥ 3 feet/5 stairs
        - Axial load to the head (i.e. diving)
        - MVC high speed (> 60 mph), rollover, or ejection
        - Motorized recreational vehicles
        - Bicycle struck or collision

Selective Spinal Motion Restriction

Treatment (continued)

- Screen for any low risk mechanism and findings; if **no** low risk findings are present SMR measures are warranted:
    - Ambulatory at any time on scene
    - No neck pain at scene
    - Absence of midline cervical spine tenderness
    - Simple rear end MVC, excluding:
        - Pushed into oncoming traffic
        - Hit by bus/large truck
        - Rollover
        - Hit by high speed vehicle

- If need for SMR is uncertain, maintain manual stabilization pending completion of final functional check.

- Ensure oxygenation.

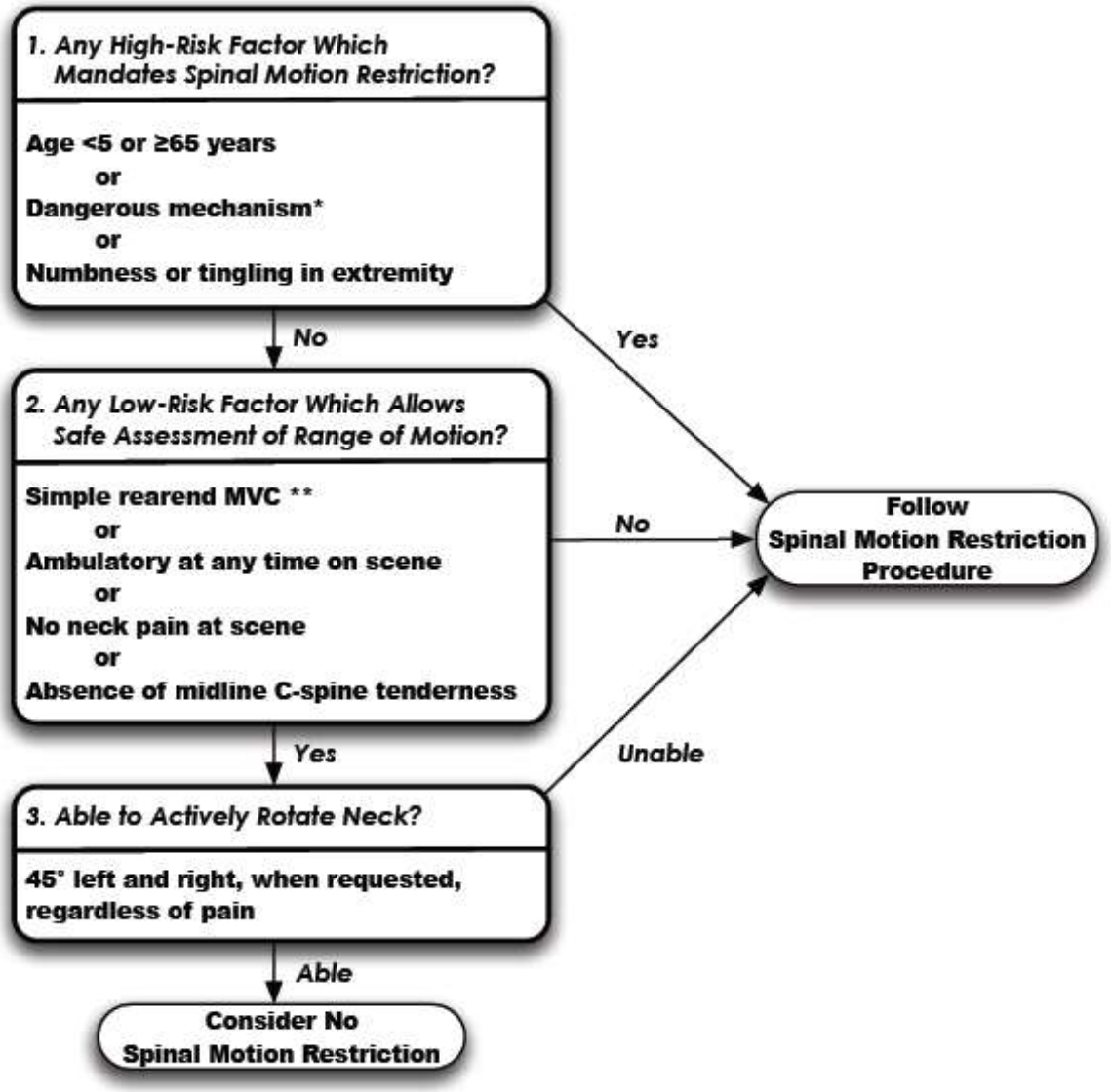
ALS Providers

- Continue assessment.

- If all above criteria warranting SMR measures are negative, perform a final functional check to assess the patient's neck range of motion. Instruct patient to actively rotate neck/head 45 degrees left and right.
    - If patient is able, SMR measures are not required
    - If patient is unable then SMR measures are warranted; follow **Spinal Motion Restriction** procedure to determine optimal method

Selective Spinal Motion Restriction

For all alert (GCS = 15) and stable trauma patients where cervical spine injury is a concern



Dangerous Mechanism
-fall from elevation ≥ 3 feet/5 stairs
-axial load to head, i.e. diving
-MVC high speed (>60miles/hr), rollover, ejection
-motorized recreational vehicles
-bicycle struck or collision

****Simple Rearend MVC Excludes***
-pushed into oncoming traffic
-hit by bus/large truck
-rollover
-hit by high speed vehicle

Soft Tissue Injury

Soft tissue injuries are infrequently life threatening but may endanger blood vessels, nerves, connective tissue and other important internal structures.

The prehospital care goals are to manage bleeding, support underlying tissue, prevent further contamination, and manage pain and swelling.

Clinical Pearls

- A severe hematoma to the thigh can contain a liter of blood before swelling becomes noticeable.

- The wound care provided in the ED entails much more than simple closure of a wound. The decision regarding which wounds are candidates for immediate closure is a complex one based on wound contamination, likelihood of infection, time of injury, health status of the patient and location of the wound.

- Prehospital providers should expressly avoid advising patients and care providers regarding which wounds require closure.

Soft Tissue Injury

Treatment

All Providers

- Perform assessment.
- Ensure oxygenation.
- Provide stabilization of the cervical spine, if indicated.
- Control hemorrhage with direct pressure. If the hemorrhage cannot be controlled, consider use of hemostatic trauma gauze, a pressure dressing, or a tourniquet (follow **Windlass Tourniquet** procedure).
- Prevent further contamination by cleaning the wound and applying a sterile dressing.
- Prevent heat loss.

Specific Injuries

- **Impaled objects**: Stabilize the impaled object in place, unless in the cheek with exposure into the airway.
- **Lacerations, incisions, abrasions, and/or avulsions**: Apply dry dressing and bandage. Consider pressure dressing.
- **Contusions and hematomas**: Apply ice pack.
- **Crush injury:** Apply dry dressing to any open wounds, apply ice, and splint injured site.

ALS Providers

- Continue assessment.
- Establish vascular access, if indicated.

Torso Injury

Anatomically the Torso is defined as the region above the pelvic floor and below the clavicles and includes the retroperitoneum. Trauma to this region may be caused by either blunt or penetrating mechanisms of injury.

The prehospital care goals are to recognize and treat injuries and transport the patient to the appropriate facility for definitive care.

Clinical Pearls

- For penetrating injuries check for the presence of entrance and exit wounds. In these injuries the trajectory of the injury can be very difficult to determine and multiple organs and/or structures may be involved.

- Trauma within this region may produce a source of hemorrhage that is not easily compressible and therefore difficult to control outside the operating room. Studies have suggested better outcomes with more cautious administration of saline until the source of the bleeding can be surgically controlled or blood and blood products are available.

- The increased flexibility of pediatric bones makes them more likely to bend rather than break. Greenstick fractures occur when the bone bends and partially breaks but does not extend through the width of the bone. Because ribs are flexible, serious injuries to underlying organs can be present without overlying rib fractures.

Torso Injury

Treatment

All Providers

- Perform assessment. Focused exam to include penetrating vs. blunt trauma.
- Immobilize cervical spine and administer care for soft tissue injuries.
- Ensure oxygenation.

Specific Injuries

- **Sucking chest wound:** Apply occlusive dressing.
- **Flail Chest**: Provide respiratory support with bag-valve-mask ventilation.
- **Impaled Objects**: Stabilize the impaled object in place.
- **Pelvic fractures:** For suspected Anterior-Posterior Compression (APC) injuries with hypoperfusion (pedestrian struck, frontal impact MVC, etc.), follow the **SAM Sling II** procedure.
- **Evisceration:** Do not touch or attempt to push abdominal contents back into the abdominal cavity. Cover the area with a sterile moist dressing, and transport patient with knees flexed to decrease tension on the abdominal muscles only if there is no suspicion of spinal trauma.

ALS Providers

- Continue assessment, including 12-lead ECG if indicated.
- Establish vascular access. Consider secondary access.
- If tension pneumothorax, follow **Chest Decompression** procedure.

Torso Injury

Treatment (continued)

Manage hemorrhagic shock according to the mechanism of injury. A Verbal GCS ≥4 (confused/disoriented or better) and Level of Consciousness ≥ Verbal on AVPU scale indicates adequate cerebral perfusion.

Penetrating trauma

- If patient is greater than 10 years old and has adequate cerebral perfusion and palpable radial pulse:
  - **Normal Saline** IV KVO

- Patient 10 years old or younger showing signs of adequate cerebral perfusion and with palpable radial pulse: see **Physician OLMD**.

- If patient (all ages) showing signs of inadequate cerebral perfusion and no palpable radial pulses, administer **20 ml/kg Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - Adequate cerebral perfusion and palpable radial pulse
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation) or liver enlargement/hepatomegaly develops
  - Max cumulative dose of 60 ml/kg

Blunt trauma (to include mixed blunt and penetrating trauma)

- If hypotensive, administer **20 ml/kg Normal Saline** IV rapid. Reassess lung sounds and vitals. If refractory, repeat until
  - SBP > than 70 + (2 x age) mmHg
  - Signs/Symptoms of pulmonary edema (rales, respiratory distress, declining oxygen saturation) or liver enlargement/hepatomegaly develops
  - Max cumulative dose of 60 ml/kg

Physician OLMD

- For patients who are 10 years old or younger, consider age specific permissive hypotension.

Hospital Communication: Trauma Alert, if indicated

Traumatic Brain Injury

Traumatic Brain Injury (TBI) is classified as a primary or secondary injury to the brain tissue.

The prehospital care goal is airway maintenance, aggressive prevention/reversal of hypoxia and hypotension to reduce secondary injury, immobilization and rapid transport to a trauma center.

Clinical Pearls

- The skull is not fully formed at birth. It will easily distort with force of an impact and transmit the force directly to the delicate brain tissue.

- While in the adult intracranial hemorrhage cannot significantly contribute to hypovolemia, in the pediatric patient intracranial hemorrhage may significantly contribute to intravascular hypovolemia.

- Directives regarding hyperventilation have been removed from the TBI protocol with the agreement of trauma services for the following reasons:
    - Brain Trauma Foundation recommendations for hyperventilation with signs of herniation are based on weak evidence. The signs of herniation should be assessed only after normalizing blood pressure, oxygenation and ventilation. Hyperventilation is also stated to be temporary measures only preferably with intracranial pressure monitoring.
    - The guidelines note the low positive predictive value of pupillary findings; yet then list those findings as sufficient evidence for herniation. Inadvertent hyperventilation in non-herniating patients is common and is known to worsen outcomes by decreasing cerebral blood flow and worsening ischemic injury.
    - Lastly, TBI without hyperventilation is much more common than TBI with impending herniation. Since exam findings are unreliable and the benefit is unproven, a greater number of patients would likely be harmed than would reasonably be expected to benefit from hyperventilation.

Traumatic Brain Injury

Treatment

All Providers

- Perform assessment. Focused assessment to include signs/symptoms of herniation.
  - Asymmetric unreactive pupils (blown pupil)
  - Cushing's Triad (increased BP, decreased pulse, irregular respirations)
  - Posturing
  - Progressive neurologic deterioration evidenced by declining GCS greater than 2 points not attributable to other causes

- Provide supplemental oxygen. Avoid hypoxia, hyperventilation (too fast), and overventilation (too much volume), all three are associated with worse outcomes.
  - Consider advanced airway.
  - Ventilate normally (rate based on age)
  - The following rates of ventilation are recommended :

Age Group	Normal
Infants	25 breaths/min
Children	20 breaths/min

ALS Providers

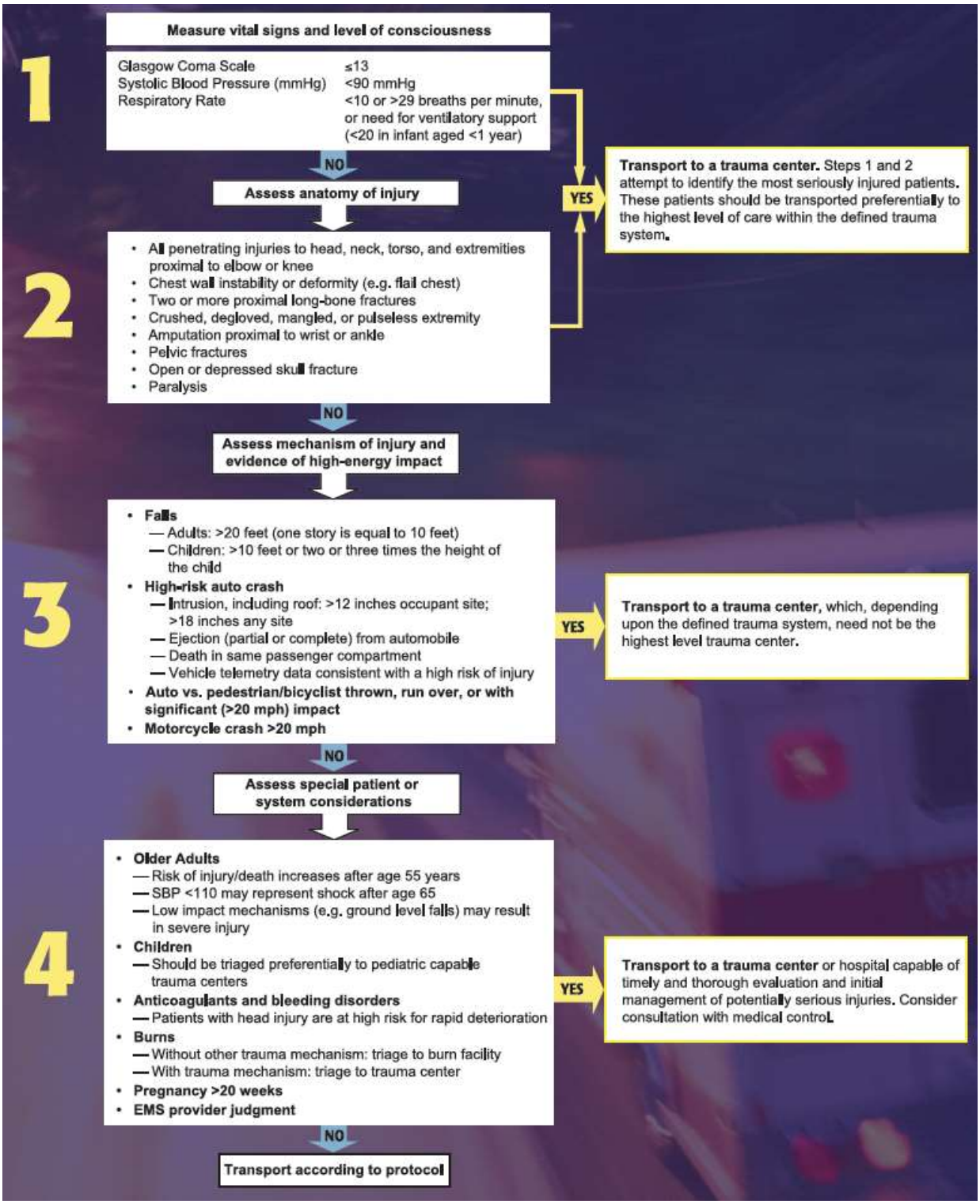
- Establish vascular access.

Physician OLMD

- If patient is combative, administer **Midazolam (Versed) 0.1 mg/kg** IV slow.

Hospital Communication: Trauma Alert, if indicated

Trauma Triage and Transport Decision Tree



Helicopter transport only if faster than ground (especially if extrication will be necessary) or if ground transport is more than 30 minutes (consider time of day and traffic conditions). Refer to **Transportation Section** for more information on Helicopter Transport criteria.


TRANSPORTATION

Regional Receiving Facilities

Fully Capable Emergency Departments – There are a number of full-service EDs in the Fairfax County region capable of receiving emergency patients. While their individual capabilities may vary (i.e. – trauma center designation, primary stroke center designation, etc.) they all assert their capability to manage the wide array of emergency patients and all are accredited and licensed to provide emergency services. Most of the EDs listed have inpatient capabilities on site (with exceptions noted); however, some subspecialty care may require secondary transfer based on the specifics of the individual patient.

Emergency Care Centers – ECCs are free-standing emergency departments, staffed 24 hours per day, 7 days a week, and holidays. These facilities are staffed by physicians, nurses, and technicians. They are prepared to manage patients with routine emergency health care needs. They possess basic laboratory and pharmacy services. They possess varied diagnostic imaging capabilities described below – X-ray, CT scan, and ultrasound. These facilities have minimal availability of on site subspecialty consultation. While they are prepared to manage emergency patients they cannot always deliver definitive care on site and do not routinely have specialty backup on site. These facilities do not have inpatient capacity nor do they have on site access to blood products, emergent dialysis, operating room capability, etc. Patients needing such care will require subsequent transfer to another facility.

Selected Regional Facility Capabilities

Hospital Name	Full Service ED	Specialty Referral Centers					Admitting Capabilities	
		Trauma Center	PTCA (STEMI) Center	Stroke Center	TAH/ VAD Center	Burn Center	OB/ Maternity	Inpatient Peds
Children's National Medical Ctr	Yes *Ped*	Yes *Ped*	N/A	N/A	N/A	Yes *Ped*	No	Yes
INOVA Alexandria	Yes	No	Yes	Yes	No	No	Yes	No
INOVA Fairfax*** #	Yes	Yes *Adult+ Ped*	Yes	Yes *CSC*	Yes	No	Yes	Yes
INOVA Fair Oaks	Yes	No	No	Yes	No	No	Yes	Yes
INOVA Loudoun	Yes	No	Yes	Yes	No	No	Yes	Yes
INOVA Mt Vernon #	Yes	No	No	Yes	No	No	No	No
Fort Belvoir Community Hospital (Active & Ret. Military Personnel)	Yes	No	No	No	No	No	Yes	Yes
Sentara NoVa Medical Ctr	Yes	No	Yes	No	No	No	Yes	Yes
Prince William	Yes	No	Yes	No	No	No	Yes	Yes
HCA Reston	Yes	No	Yes	Yes	No	No	Yes	Yes
Virginia Hospital Ctr (Arlington)	Yes	No	Yes	Yes	No	No	Yes	Yes
MedStar Washington Hospital Ctr	Yes	Yes *Adult*	Yes	Yes	Yes	Yes *Adult*	Yes	No

***Sexual Assault Nurse Examiner (SANE), and Anti-venin capability

Community Services Board on site for Mental Detention Order Evaluation

Other STEMI centers: GW, Suburban Other Stroke centers: Georgetown, GW Other Trauma: Suburban (Level 2)	Emergent Hyperbaric: MIEMSS Baltimore Other TAH/VAD: Johns Hopkins, VCU (Richmond) Other Burn: Johns Hopkins

Emergency Care Center (ECC)/ Other Name	Full Service ED	Diagnostic Procedure	Maternity >20 weeks	CPR with targeted temperature management (96.8°F/36°C)	CSK Restock
ECC – Fairfax	No	X-ray, lab	No	No	Yes
ECC – Lorton Healthplex	No	X-ray, CT, MRI, lab, ultrasound	No	No	Yes
ECC – Reston	No	X-ray, lab	No	No	Yes
ECC – Springfield Healthplex	No	X-ray, CT, MRI, lab, ultrasound	No	No	Yes
HCA Stone Spring Center	No	X-ray, CT, lab, ultrasound	No	No	Yes

These facilities do NOT take Trauma Codes or provide any Inpatient Care (i.e. they cannot admit patients).

Selection of Destination Facility

The final objective of treatment is to deliver the patient to the most appropriate facility capable of delivering the clinical care based on the patient assessment and findings.

Definitions/Principles

A number of factors must be considered and balanced when determining the most appropriate destination facility including:

- **Identifiable/Anticipated clinical needs** – The clinical needs of the patient are the most important factors to consider when determining the most appropriate destination facility.

- **ED/ECC capabilities** – the specific capabilities of the ED/ECC must be considered in light of the patient's clinical needs in order to determine the appropriateness of that destination facility. The capabilities of an ED/ECC can vary on a day-to-day or hour-to-hour basis.

- **"Home" health care center** – When patients have complex or multiple medical problems that have been managed by their doctors at a single hospital, it is reasonable and appropriate to maintain the continuity of care by transporting those patients to their "home hospital." If patients' clinical problems are limited and unrelated to their past medical history, "home hospital" is a less urgent consideration.

- **Patient preference** – The patient's preference with regard to destination facility should be considered. However, the patient's clinical needs are more important than the patient's desires in this regard. Patients should be tactfully informed of their anticipated needs and counseled regarding the importance of transporting them to a facility capable of delivering such care. If the patient requests transportation to a facility that would be longer than one hour, one way, the provider should contact the Uniformed Fire Officer (UFO). The estimated time out of service should be approved by the UFO for these non-emergent transports.

- **Proximity** – Proximity by travel time is a factor to consider for critically ill and/or unstable patients who do not respond to initial therapeutic efforts or who cannot be stabilized in the prehospital setting. Proximity is less crucial when the patient responds to initial therapeutic efforts or can be effectively stabilized during the prehospital phase.

Considerations by Specific Circumstance

Burn Patients

Complex Burns

- Superficial burns involving more than 50% BSA
- Electrical
- Inhalation
- Circumferential
- Special area (feet, hands, genital, face, and major joints)
- Chemical
- Any full thickness burns
- Extremes of age < 10 or > 50

Specialty Referral Centers (Burns)

- Children's National Medical Center, Washington, D.C.
- MedStar Washington Hospital Center, Washington, D.C.
- Baltimore Regional Burn Center/Johns Hopkins Bayview Medical Center, Baltimore

Cardiac Arrest

Patients in cardiac arrest should be transported to the closest ED or ECC. If there is a return of spontaneous circulation enroute to a facility then the patient should be transported to the closest PTCA (STEMI) center.

Hyperbaric Medicine

Specialty Referral Centers

- George Washington University Hospital, Washington, D.C.
- INOVA Mount Vernon Hospital, Alexandria
- R. Adams Cowley Shock Trauma Center/University of Maryland Medical Center Baltimore
- Shady Grove Adventist Hospital, Maryland

Pediatric Emergency Care

Routine Emergencies – Every ED/ECC is capable of receiving pediatric patients with routine emergency needs. As the complexity of the patient's needs increases the potential benefit of evaluation at a specialty pediatric ED increases. However, this potential benefit must be balanced against the immediate needs of critical or unstable patients.

Specialty Referral Centers (Pediatric Intensive Care Units)

- Children's National Medical Center, Washington, D.C.
- INOVA Fairfax Hospital, Falls Church
- Georgetown University Hospital

Post-Operative Complication/Recent Discharge

- Patients with post-operative complications within four weeks of their surgery should be strongly considered for transport to the facility where their procedure was performed.
- Patients discharged within two weeks of a recent hospitalization should be strongly considered for transport to the facility of their recent hospitalization.

Pregnant Patients

All patients greater than 20 weeks pregnant who are having an obstetric-related emergency should be transported to an OB-capable facility.

Specialty Referral Centers (OB/Maternity)

- INOVA Alexandria Hospital, Alexandria
- INOVA Fair Oaks Hospital, Fairfax
- INOVA Fairfax Hospital, Falls Church
- INOVA Loudoun Hospital, Leesburg
- Fort Belvoir Community Hospital, Ft. Belvoir
- George Washington University Hospital, Washington, D.C.
- Georgetown University Hospital, Washington, D.C.
- HCA Reston Hospital Center, Reston
- Virginia Hospital Center, Arlington

Primary Stroke Center

- Those with symptoms for less than 4.5 hours.
- Those who have deteriorating clinical condition.
- Those with loss of consciousness.

INOVA Fairfax is the only Comprehensive Stroke Center (CSC) and the only center in the area that has neurosurgical capabilities to treat hemorrhagic strokes. Hemorrhagic strokes often present with sudden onset of symptoms with unconsciousness, headache, vomiting, or SBP $\geq$ 220. All other potential stroke patients can be transported to the most appropriate facility.

Specialty Referral Centers (Stroke)

- INOVA Alexandria Hospital, Alexandria
- INOVA Fair Oaks Hospital, Fairfax
- INOVA Fairfax Hospital, Falls Church
  - Comprehensive Stroke Center (CSC). Only center in the area that has neurosurgical capabilities to treat hemorrhagic strokes.
- George Washington University Hospital, Washington, D.C.
- Georgetown University Hospital, Washington, D.C.
- INOVA Loudoun Hospital Center, Leesburg
- Virginia Hospital Center, Arlington
- INOVA Mount Vernon Hospital, Alexandria
- HCA Reston Hospital Center, Reston
- MedStar Washington Hospital Center, Washington, D.C.

Psychiatric Patients

Routine Emergencies – Every ED/ECC is capable of receiving psychiatric patients with routine emergency needs. When law enforcement and/or mental detention orders are involved, facilities with specialized psychiatric resources may be more appropriate (i.e. INOVA Mt Vernon, INOVA Loudoun, and INOVA Fairfax).

Specialty Referral Centers (Psychiatric)

- INOVA Fairfax Hospital, Falls Church
- INOVA Loudoun Hospital, Leesburg
- Mount Vernon Hospital, Alexandria
- Fort Belvoir Community Hospital, Ft. Belvoir

ST Segment Elevation MI (STEMI) – INOVA Fairfax, INOVA Alexandria, INOVA Loudoun, Virginia Hospital Center, HCA Reston Hospital Center, Prince William Hospital, Sentara Northern Virginia Medical Center

- Those with STEMI and associated signs and symptoms lasting more than 3 hours should be transported directly to a percutaneous transluminal coronary angioplasty (PTCA) capable center.
- Those with STEMI with contraindications to thrombolytics should be transported directly to a PTCA capable center.
- Those with STEMI with the additional conditions of cardiogenic shock and pulmonary edema should be transported to a PTCA capable center.

Specialty Referral Centers (STEMI)

- INOVA Alexandria Hospital, Alexandria
- INOVA Fairfax Hospital, Falls Church
- George Washington University Hospital, Washington, D.C.
- INOVA Loudoun Hospital, Leesburg
- HCA Reston Hospital Center, Reston
- MedStar Washington Hospital Center, Washington D.C.
- Prince William Hospital, Prince William
- Sentara Northern Virginia Medical Center, formerly Potomac Hospital, Woodbridge
- Suburban Hospital, Bethesda, MD
- Virginia Hospital Center, Arlington

Suspected MI (Non-STEMI or other ACS)

Every ED/ECC is capable of handling these patients.

Trauma

Specific trauma criteria are defined in the **Adult and Pediatric Sections: Trauma Triage and Transport Decision Tree** protocol.

Trauma patients whose airways cannot be maintained or managed in the prehospital setting, those with complete airway obstruction, and those in cardiac arrest should be considered for

transport to the closest ED for primary resuscitation and stabilization. The transporting unit may be required to provide secondary transfer to the trauma center following preliminary stabilization.

Patients who do not meet the specific trauma criteria but are at significant risk for traumatic injury based on mechanism of injury and findings on patient assessment should be considered for transfer to a facility capable of trauma care.

Specialty Referral Centers (Trauma)

Sexual Assault Nurse Examiner (SANE)
- INOVA Fairfax Hospital, Falls Church

Trauma Centers: Level I Adult Trauma Centers
- INOVA Fairfax Hospital, Falls Church
- George Washington University Hospital, Washington, D.C.
- Howard University, Washington, D.C.
- MedStar Washington Hospital Center, Washington, D.C.

Trauma Centers: Level I Pediatric
- Children's National Medical Center, Washington, D.C.
- INOVA Fairfax Hospital, Falls Church

Eye Trauma
- Georgetown University Hospital, Washington, D.C.
- George Washington University, Washington, D.C.
- MedStar Washington Hospital Center, Washington, D.C.

Upper Extremity Trauma
- The Curtis National Hand Center for Treatment of the Hand and Upper Extremity/Union Memorial Hospital, Baltimore

Syncardia Total Artificial Heart (TAH)/Vascular Assistance Devices (VAD)

All patients with a TAH or VAD device must be transported to a specialty referral center capable of managing the patient and device.

Specialty Referral Centers (TAH/VAD)
- INOVA Fairfax Hospital, Falls Church
- MedStar Washington Hospital Center, Washington, D.C.
- Johns Hopkins Bayview Medical Center, Baltimore
- VCU Medical Center, Richmond

Facility Phone Numbers

Fairfax County FRD Recorded EMS Line	703-877-3720
Use this number as primary contact for all Northern Virginia Hospitals	
Alexandria Hospital	703-751-7878
Bayview Medical Center/John's Hopkins	410-550-0350
Children's National Medical Center	202-476-5433
Emergency Care Center – Fairfax	**703-591-9329**
Emergency Care Center – Reston	703-668-8327
Fair Oaks Hospital	703-391-3555
Fairfax Hospital	703-876-0522
Fort Belvoir Community Hospital	**571-231-3162**
George Washington Univ. Hospital	202-715-4911
Georgetown University Hospital	202-444-2119
Howard University Hospital	202-865-1141
Lorton Healthplex	**703-446-9802**
Loudoun Hospital	703-771-9100
MedStar Washington Hospital Center	202-877-7234
Mount Vernon Hospital	703-360-9199
Prince William Hospital	**703-369-7511**
R.A. Cowley Shock Trauma	410-328-8869
Reston Hospital	703-689-9037
Sentara Northern Virginia Medical Center (Potomac)	703-523-1469
Shady Grove Adventist Hospital	**301-279-6053**
Sibley Memorial Hospital	202-537-4080
Springfield Healthplex	703-797-6854
Stone Spring Emergency Center	571-367-4498
Suburban Hospital	**301-896-3880**
Union Memorial Hospital	410-554-2626
Veteran's Administration Hospital	202-745-8360
Virginia Hospital Center L&D	703-558-6171
Virginia Hospital Center (Arlington)	**703-558-6200**
Walter Reed National Military Center	301-295-4810
Poison Control Center	202-625-3333

Level of Care During Ground Transport

The appropriate level of care for transport is a key part of sound patient disposition determination and is based upon assessment findings and anticipated treatment plan.

This protocol provides guidelines for transport decision-making, including when use of personnel from another unit is necessary. Each disposition determination should be made by the team of providers on scene but the level of care during transport is ultimately the responsibility of the transport unit lead provider. The EMS Supervisor should be contacted immediately to provide guidance if questions arise on the scene or at any other time.

Levels of Transport Care

The FRD classifies ground transports in four categories. Levels one through three are considered "ALS" transports and level four is a "BLS" transport.

- **Level 1** – Acute resuscitation situations. Three or more providers with patient during transport. Examples: Cardiac or respiratory arrests, combative head injuries, or multi-system trauma patients.
- **Level 2** - Acute ALS patient with anticipated need for active ALS treatment during transport. Level two requires two medics in the back for transport. Multiple providers permit simultaneous care operations and enable double-checking and/or verification of treatment or medication decisions. Examples: Acute STEMI, CPAP, or seizure patients with likelihood of re-seizing. This usually requires utilization of an additional provider from an engine or other unit on scene.
- **Level 3** - Stable patient requiring ALS monitoring, but not expected to require active treatment, during transport. Level three requires one ALS provider in the back for transport. Examples: syncope or treated hypoglycemia.
- **Level 4** - Stable patient requiring BLS care or monitoring during transport. Level requires one BLS provider in the back for transport. Example: MVC neck-back pain, general injuries or illness patients.

Broad categories of patients that meet criteria for ALS transport (levels 1 to 3) include:

- Trauma center patients
- Chest paint consistent with cardiac or vascular causes
- Respiratory distress
- Acute altered mental status
- Significant bleeding from non-compressible source ("internal" bleeding)
- Clinically significant abnormal vital signs as referenced in chart below:

Vital Signs	Adult	Infant	Child	Adolescent
Systolic BP	<90 or >190 mmHg	hypoperfusion	hypoperfusion	hypoperfusion
Diastolic BP	>120 mmHg	hypoperfusion	hypoperfusion	hypoperfusion
Respiratory Rate	<10 or >30	<20 or >40	<12 or >30	<10 or >30
Heart Rate	<50 or >120	<90 or >140	<60 or >120	<60 or >120

Air Medical Transport

Providers should use air medical transportation when it will benefit the patient (either by providing expanded prehospital care and/or by providing rapid transport for a life-threatening condition) and **ONLY** after a risk/benefit analysis has been completed.

Air Medical Transport should never be used based solely on Mechanism of Injury.

The decision to transport by air must take into account a number of factors, including

- Logistical factors - access and time/distance variables
    - Proximity to the receiving facility - only if faster than ground or if ground transport is more than 30 minutes (consider if extrication is going to delay scene time significantly which may allow for the timely arrival of helicopter)
    - Traffic congestion
    - Topographical factors limiting patient access by ground or water transport units
    - Availability of and proximity to an acceptable landing zone
    - Weather conditions

- Patient Factors

Trauma – MOI significant enough to require transport to a trauma center plus one of the following anatomic/physiologic abnormalities:
Compromised airway, cannot be maintained or managed
Respiratory distress/failure
Signs/Symptoms of hypoperfusion/shock
GCS of 10 or less; GCS decreasing 2 points from 1st and 2nd assessment
Loss of consciousness more than 5 minutes
Major amputations (arms/legs)
Neurological signs/symptoms suggestive of spinal cord injury
Evidence of pelvic instability or hip dislocation
Two or more long bone fractures/deformities

Medical/Surgical - suspicion of the following:	
Acute STEMI with Signs/Symptoms of shock or severe CHF	May allow transport to facility capable of interventional catheterization.
Ruptured Abdominal Aortic Aneurysm (abdominal pain/back pain and hypotension)	May allow timely transport for surgical or interventional management.
Aortic Dissection	May allow timely transport for surgical management.
Acute ischemic CVA (stroke) less than 4.5 hours from symptom onset	May allow therapeutic interventions within the therapeutic window.

Contraindications to Air Medical Transport

Contraindications for Air-Medical transport include:

- Patient has no obtainable vital signs upon initial assessment and remains without vital signs during the course of the resuscitation effort
- Patient is contaminated with a hazardous material
- Patient's condition requires multiple caregivers and/or space to provide CPR

Air Medical Transport Resources

The following resources are available within Fairfax County with an anticipated response of 20 minutes or less:

- Fairfax County Police Department (based at Fair Oaks, VA)
- PHI-Air Medical of VA/Aircare (based at Manassas, Fredericksburg, Leesburg Winchester, and Harrisonburg)
- MedStar Washington Hospital Center (based at Indian Head, MD)
- LIFE EVAC (based at Stafford, VA)
- United States Park Police (based in Washington D.C.)
- Maryland State Police (based at Andrews AFB and Montgomery County, MD)

Procedures for the Use of a Helicopter

Requests for helicopter shall be made through DPSC.

The initial report to the helicopter shall include:

- Age of patient
- Conscious/unconscious
- Status of airway
- Weight in kilograms

The following guidelines shall be followed for transfer of patient care:

- All patients should be placed on a long backboard or Reeves and immobilized when appropriate.
- All patients should have vascular access and blood glucose assessment.
- If Rapid Sequence Intubation (RSI) is used by the helicopter crew to secure the airway, be prepared to support the procedure:
    - Assist with pre-medication, if indicated
    - Verify presence and function of suction equipment to include hard and soft catheters
- The OIC of the unit responsible for completing the PCR shall also be responsible for ensuring the receiving facility obtains a copy as soon as practical.

Radio Communications

Effective communication between EMS providers and ED is essential to the effective delivery of prehospital care. To ensure effective prehospital care and a smooth transfer of care at the receiving facility, the communication of clinical information must be consistent and accurate.

- The radio channel should be used while on scene at trauma emergencies, multiple patient incidents, and any event where patient information and a situation report are indicated.
- Radio communications allow Incident Command, EMS supervisors, the operational medical director and hospital staff to simultaneously be advised of incident and patient situations.
- Landlines and cellular phone communication may be utilized to communicate treatment and transport.
- All communications regarding patient information shall be on a recorded line, when available.

Types of Prehospital to ED Communication

Early notification and alerts

Early notification serves to alert the receiving facility that an emergency response has been initiated in its area and will likely result in the transport of patient(s) to its facility. Early notifications and alerts may be beneficial if the anticipated transport interval will be short, if multiple patients are involved, or if the patient is critically ill or injured.

Routine Notification

In order that the ED may adequately prepare to receive the patient the following information is required:

- Unit number
- Certification level and name
- Patient's age (or estimate)
- Patient's gender
- Chief complaint and pertinent incident details
- Vitals
- Remarkable findings
- Treatments performed and response to treatment
- Estimated time of arrival (ETA)

MCI

For multiple casualty events, the transportation group supervisor of the EMS branch should be prepared to relay the following information either directly to the receiving facilities, RHCC, or both depending on incident dynamics:

- Number of patients
- Triage category and the number in each (Red, Yellow, Green, and Black)
- Gross overview of event, including extenuating circumstances (extrications, etc.)

Physician OLMD

- The protocol specifically requires physician authorization to deliver a required intervention.
- The prehospital provider wishes to deviate from standing protocols, requiring physician authorization to deviate from protocol.
- The prehospital provider is uncertain about the appropriate management and wishes consultation.

Communication with the physician should include all the information relayed in routine notification, the nature of the treatment request, and additional information as needed.

Providers shall repeat the order back prior to implementation, as a means of verbal confirmation. The PCR shall reflect the physician's name, interventions requested, and interventions performed.

Alerts

It is expected that transporting units will provide routine notification and updated reports to the receiving facility while enroute. Alerts should be transmitted as early as possible, and may be made by anyone with the necessary information (e.g. EMS Supervisor). If the routine notification is being made early in the event, an alert can be included.

Sepsis Alert: for patients with a clinical suspicion of infection and two or more of the following:

- Adult:
  - Tachycardia (HR greater than 120)
  - Systolic BP < 90 or MAP < 65
  - Lactate greater than 4 mmol/L, if available
- Pediatric:
  - Tachycardia or bradycardia
  - SBP below threshold or prolonged capillary refill
  - Lactate greater than 4 mmol/L if available

Begin radio report with, "Sepsis Alert."

Possible Sepsis Notification: for patients not meeting Sepsis Alert criteria but meeting the following:

- Adult: Strong suspicion of infection plus two or more of the following signs/symptoms (without evidence of hypoperfusion described above):
  - Temperature greater than 101 ^{o}F or less than 96 ^{o}F
  - Heart Rate greater than 90 bpm
  - Respiratory rate greater than 20 breaths/min
  - Change in mental status, delirium
  - Hyperglycemia (blood glucose greater than 120 mg/dl) without a history of diabetes

- Pediatric: Strong suspicion of infection plus two or more of the following signs/symptoms (without evidence of hypoperfusion described above):
    - Temperature greater than 101 ^{o}F or less than 96 ^{o}F
    - Heart Rate greater threshold values
    - Respiratory rate greater than threshold values
    - Acute change in mental status or Pediatric GCS less than 12
    - Hyperglycemia (blood glucose greater than 120 mg/dl) without a history of diabetes

STEMI Alert: for patients with STEMI or suspected STEMI who meet all the following three criteria:

1. Signs/Symptoms of STEMI
2. ALS provider interprets 12-lead ECG to show ST-segment elevation suggestive of AMI (Excludes common mimics: LBBB, paced rhythms, LVH strain pattern, benign early repolarization, and pericarditis), include:
    - ST changes and their location, presence of reciprocal changes if present
    - Interpretation
3. Machine interpretation of "Acute MI Suspected" or similar only
    - Not to include related/non-specific interpretations (e.g. ischemia, abnormal, etc.) unless in addition to the primary Acute MI interpretation.

Providers should make a STEMI alert as early as possible and anticipate transport directly to the cardiac catheter lab or a rapid ED transition. Alert should include:

- Age/Gender
- STEMI Signs/Symptoms
- Time of onset
- Noted ECG changes, provider interpretation, and machine interpretation
- Patient's cardiologist
- Kaiser patient

Possible STEMI notification, specifically when 2 of the 3 criteria above are met with **Yes** determinations.

Stroke Alert: for patients who screen positive by the Cincinnati Prehospital Stroke Assessment or Miami Emergency Neurologic Deficit (MEND) exam and meet criteria for transport to a Stroke Center, a stroke alert should be made as early as possible and include the following:

- Age/Gender
- Stroke scale findings/deficits noted
- Time of onset or, if unknown, last seen normal
- Associated syncope/seizure
- Associated trauma

Possible Stroke Notification if provider has clinical suspicion of an acute stroke not otherwise fitting criteria for Stroke Alert

Trauma Alert: for patients who meet criteria for transport to a Trauma Center, a trauma alert be made as early as possible and include the following:

- De- Demographics (age and gender)
- M- Mechanism of Injury
- I- Injuries
- S- Vital Signs (initial, relevant changes, most recent) including mental status (GCS or AVPU) AVPU correlation with GCS: A- (13 to 15), V- (9 to 12), P- (6 to 8), U- (3 to 5)
- T- Treatments

Termination Request: for patients who have met the criteria for Termination of Resuscitative Efforts, a formal request should be made and include the following

- Age/Gender
- Current arrest status/rhythm
- Timeline
    - Last seen alive
    - 911 call/dispatch
    - Initiation of EMS treatment
    - Duration of efforts so far
    - Total down time
- Pertinent history
- Treatments
    - Medications
    - Airway
    - End-Tidal CO_2 readings
    - Patient response to treatment
    - Transfer of Care

Movement of patient from the unit to the ED

Therapeutic interventions and diagnostic modalities utilized prehospital will be continued during patient transfer from the unit to the ED. This is important for those interventions based on chief complaint, patient assessment findings, or abnormal vital signs – i.e. cardiac monitoring, supplemental oxygen, CPAP, etc.

Transfer of care to the ED nurse/physician

The verbal report for a non-trauma patient should include:

- Patient's age (or estimate)
- Patient's gender
- Chief complaint and pertinent incident details
- Initial vitals
- Relevant past medical history
- Remarkable findings
- Treatments performed and response to treatment
- Most recent vital signs physical exam findings on reassessment

The verbal report for a trauma patient should follow the DeMIST format:

- De- Demographics (age and gender)
- M- Mechanism of Injury
- I- Injuries
- S- Vital Signs (initial, relevant changes, most recent) including mental status (GCS or AVPU) AVPU correlation with GCS: A- (13 to 15), V- (9 to 12), P- (6 to 8), U- (3 to 5)
- T- Treatments

Documentation of patient care rendered

- The PCR shall be completed describing all patient care. Transfer of care is completed when the signature is obtained by either the medical practitioner or nurse.
- 12-lead ECG and monitor strips should be uploaded into the PCR.

If system needs require the unit to be dispatched on another call before completion of the PCR, it must be completed as soon as possible and prior to end of shift.

Emergency Department Closure

Events that may be expected to potentially render an emergency department (ED) unable to receive EMS patients include:

- Fire
- Hazardous material event
- Structural collapse or instability
- Violence or barricade situations
- Loss of critical infrastructure

Receipt and Notification

Emergency department closure status will be received by the uniformed fire officer (UFO) at the Department of Public Safety Communications (DPSC) and will be entered into the CAD system. Units and fire department leadership will be notified. The EMS Supervisor should visit or communicate with the impacted facility to ascertain the nature of the events and the anticipated duration of the closure.

Resolution of events and termination of ED closure

Notification of termination of ED closure will be received from the emergency department leadership by the UFO at DPSC and will be updated in the CAD system. Units and fire department leadership will be notified.

Emergency Department Diversion

There are times when it may be necessary to divert EMS transport units to an alternative facility. Diversion (reroute) may occur because of emergency department (ED) overcrowding, limited staff, shortage of admission beds, out-of-service diagnostic equipment, or other causes.

The diversion status of local northern Virginia hospitals is posted on this website (maintained by the Northern Virginia Hospital Alliance): http://northernva.diversion.vhha-mci.org.

The Notification of ED Diversion

A notification of ED diversion will be received at DPSC, via a Website update.

Rescinding an ED Diversion Status by DPSC

When all neighboring ED facilities within a geographic zone are simultaneously requesting ED diversion, then all requests for ED diversion will not be considered.

Justifications for Declining a Request for ED Diversion at the Unit Level

There are circumstances under which a unit officer may decide to override ED diversion. These circumstances include the following:

- A critical or unstable patient who cannot be adequately stabilized by initial prehospital therapeutic interventions.
- A patient or family member who is unwilling to be diverted to an alternative facility.
- A patient with complex health care needs who may reasonably be expected to be adversely affected by transport to an ED facility other than his or her "home hospital."

Decisions to decline ED diversion made by the unit officer must be communicated to the intended ED. It is the responsibility of the transport unit OIC to clearly present the details of the case and the factors warranting declining the request for ED diversion for this patient.

Emergency Department Status

Different hospitals may have policies to address special circumstances impacting or altering their routine operational procedures but requiring neither diversion of EMS patients nor emergency department (ED) closure.

Code Purple Status

This designation is specific to INOVA hospitals. This designation reflects a state of heightened security due to gang-related violence.

Guidelines

Notification of Code Purple status is received by the UFO at DPSC and will be entered into the CAD system. Units and FRD leadership will be notified.

Under Code Purple conditions the ED remains open to receive patients. EMS providers should wear/carry proper identification and be prepared to present identification upon entry to the ED.

Loss of Specific Resources

Under select circumstances an ED may elect to notify DPSC regarding loss of specific resources at its facility.

Guidelines

This information is received by the UFO at DPSC and will be entered into the CAD system. Units and FRD leadership will be notified.

This information is advisory and should be considered when determining the appropriate destination facility. The EMS provider is not expected to identify which patients will require that specific resource. Physician OLMD may assist in determining whether the ED's current capacity renders it an inappropriate destination for the patient in question based on availability of the given resource. The name of the physician providing OLMD and the nature of the direction should be recorded on the PCR.

Emergency Interfacility Transports

Emergency interfacility transports (Code 1 transports) are intended to meet the needs of those patients who have presented to an ED without the resources to manage their critical illness or injuries. While commercial transport services may be appropriate for patients, response delays or limited availability may at times render this mechanism unacceptable. It is within this context that the Fairfax County Fire and Rescue Department steps forward to serve our community and the health care system to meet this public health need.

Definitions

Emergency interfacility transport – the transport of a patient from the ED or inpatient setting at one acute health care facility to the ED, operating room, cardiac catheterization lab or other inpatient setting at the receiving acute care facility.

Appropriateness criteria – the appropriateness of a request for emergency interfacility transport is determined retrospectively by the EMS Division Quality Management section as part of a standard utilization process. Findings of such review are provided to the leadership of the respective acute health care facilities.

Supplemented transport – an interfacility transport for which the sending physician has determined that the medically necessary care and equipment needs of a critically injured or ill patient are beyond the scope of practice of the available EMS personnel of the EMS agency (Source: VAOEMS regulations)

Receipt of request for an emergency interfacility transport

Requests for an emergency interfacility transport shall be received and handled by DPSC.

Information to be obtained on arrival

Upon arrival it is expected that the transport OIC will obtain a PCR from the physician and/or nurse responsible for the care and transfer of the patient. In addition to the standard information, the following information should be gathered at the transfer of care:

- Confirmation that all treatments/drugs needed during transport are within the provider's scope of practice.
- Potential complications of both the primary disease process and the treatments rendered.
- Treatment plan for the potential complications that may be anticipated.
- Name of physician requesting and authorizing emergency interfacility transport.
- Name of physician accepting transfer of the patient and/or the exact destination to which the patient is to be transported.
- A thorough and complete assessment of the patient must be performed prior to transferring the patient.

Supplemented Transport

Identification of medications, intravascular infusions, or therapeutic modalities that exceed the provider's scope of practice and/or training/authorization will require a supplemented transport or discontinuation of those interventions during transport.

- If the physician requesting and authorizing emergency interfacility transport determines that the medication/infusion/modality may be safely discontinued during transport, this should be completed prior to transfer of care. This directive should be documented on the PCR.
- If the physician requesting transport determines that the medication/infusion/modality cannot safely be discontinued during transport, then the transferring physician must
    - Identify and provide an attendant-in-charge who must be a physician, registered nurse, or physician assistant who is trained and experienced in the care and the equipment needed for the patient being transported.
    - Provide a written statement that the individual acting as attendant-in-charge for the transport is experienced in the patient care required and the operation of all equipment to be used for the patient to be transported.
    - Provide a written statement detailing the specific nature of the patient's medical condition and the medical equipment necessary for the transport. The written statement may be in the form of transport orders documented in the patient's medical record.

It should be confirmed that the patient's medical record including labs, ECGs, X-rays, CT scans, etc. have been copied and are available to go with the patient to the receiving facility.

Care during transport

Should EMS personnel require Physician OLMD during transport, it should be provided by the receiving physician or the ED physician at the receiving facility.

Transfer of care at the receiving facility

At the receiving facility responsibility for patient care will be transferred to the ED-based or hospital-based provider in accordance with standard procedure articulated in the Transfer of Care protocol. **The transport OIC shall be responsible for completing a PCR.**

Transportation Safety

All patients or individuals accompanying a patient must be seated and properly secured with a safety belt system.

Adults

The primary location for all adult patients during transport shall be on the transport unit's stretcher. Except for extreme circumstances all patients on the unit's stretcher shall be secured with all safety restraint belts to include the shoulder harness.

The safest location for an adult accompanying a patient in a transport unit is the front passenger seat. However, those who may enhance patient care, comfort, or communication or who are required to remain with the patient may ride in the patient compartment at provider discretion. These include law enforcement officers accompanying patients in custody, translators, or others whose presence may benefit the patient. Such persons must be properly restrained.

Children

All children transported under the age of eight should be properly restrained in a child safety seat (CSS) which meets the standards adopted by the National Highway Traffic Safety Administration (NHTSA).

NHTSA makes the following recommendations:

- For a child who is not a patient
    - Ideally, transport the child in another vehicle, not the ambulance. If this is not possible then consider the following options:
        - In the CSS, in the front passenger seat (with air bags off).
        - Forward facing in the CSS in the EMS provider's seat (in the patient compartment).
        - Rear facing in the CSS in the EMS provider's seat (in the patient compartment).

- For a child who is a patient
    - Ideally, transport the child in the CSS secured appropriately to the stretcher. If this is not possible then consider the following options:
        - In the Pedi-mate secured to the stretcher. The Pedi-mate can accommodate children up 40 lbs.
        - In the built-in child safety seat in many EMS provider's seat backs. The child seat built-in to most transport units is designed for children weighing 20-50lbs (refer to the seat itself for more information).
        - Rear facing in CSS in the EMS provider's chair (in the patient compartment).

Child seats that have been involved in a minor motor vehicle crash may be used only after visual inspection verifies that no significant damage has been sustained and that **ALL** of the following criteria have been met:

- The vehicle carrying the seat is able to drive away from the crash site
- The vehicle door nearest the safety seat was undamaged
- There were no significant injuries to other vehicle occupants
- The air bags did not deploy

Service Animals

Disabled patients may have accompanying service animals. A service animal means any guide dog, hearing 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 retrieving medicine and medical supplies.

If present on scene, the service animal shall be transported with the patient unless one or more of the following conditions apply:

- The animal is a direct threat to provider's ability to care for the patient.
- The animal demonstrates aggressive behavior and can't be controlled by the patient.
- The animal does not meet the above definition of a service animal (if such animals require supervision or care, the on scene OIC shall contact Animal Control, coordinate management of the scene, and notify the patient of the outcome; see Special Circumstances in Scene Management).

In such cases, the EMS Supervisor shall be contacted to arrange for alternative transportation (family, friend, police, animal control, alternate FRD vehicle, etc.) of the service animal to the destination hospital. Both the hospital and the patient shall be notified of the arrangements, and every effort shall be made to reunite the patient and service animal at the destination facility. All transportation arrangements shall be documented on the PCR and if possible, authorized by the patient prior to leaving the scene. Whenever possible, providers shall consult with the patient regarding the best way to safely transport the service animal.

Transportation of the Deceased

FRD incidents involving the deceased fall broadly into two categories:

- Those assessed and determined ineligible for resuscitation (**Withholding CPR** protocol applied)
- Those who did not respond to resuscitative efforts (**Termination of Resuscitative Efforts** applied)

Incident scenes involving fatalities shall be secured by FRD personnel if arriving prior to the police. The deceased shall be left uncovered and undisturbed; if decorum calls for immediate concealment prior to removal of the decedent, a perimeter shall be established.

The Fairfax County Police Department normally utilizes the county's private mortuary contractor to handle transportation of the deceased (FCPD jurisdiction only, other jurisdictions served by the FRD may have their own similar arrangements, see Special Circumstances below) but FRD units may on occasion be requested/required to assist with decedent staging or transport.

Once the decision to terminate resuscitation has been made, providers (in consultation with the police and any family) should evaluate whether the decedent may be left as found in the custody of the police or must be removed from the location without delay. Reasons for removal include (but are not limited to):

- The private contractor is unable to provide sufficient resources at a disaster or mass death scene.
- The private contractor is unavailable for response, or is delayed.
- Public decorum or family circumstances necessitates removal.

If prompt removal by the FRD is indicated (to include if decedent has already been moved to ambulance for assessment or some other reason):

- Contact the EMS Supervisor if not on scene.
- Place decedent supine in a body bag.
- Transfer to FRD transport unit (if not already done).

FRD personnel shall consult with police personnel to determine whether to await the vendor on scene, meet the vendor at Fairfax ED, or transport directly to the Morgue. Personnel should consider out of service time, resource requirements, media, family desires, etc., when making this decision. If transporting to the Morgue:

- Do not call ahead to the INOVA Fairfax Hospital communications nurse.
- Obtain responding police case number and responding officer's name, EIN, and contact information and enter in PCR narrative.
- Prior to the police officer or transport unit leaving the scene, ensure the officer:
    - Conducts a thorough search
    - Secures and documents all personal effects
    - Completes police paperwork

        - One signed toe tag on decedent
        - One signed toe tag on exterior of bag
        - Police Death Scene Form (if applicable) in bag
- Do not indicate a transport on CAD
    - Go out of service or remain statused on scene, but do not status "Enroute to Hospital" when leaving, or "At Hospital" on arrival
- On arrival at Fairfax Hospital:
    - Complete and print a PCR (no signatures needed)
    - Complete Morgue Log Book entry in the Communications Room
    - Get directions to Morgue if needed
- On arrival at Morgue entry, call number listed on posted sign (varies based on time of day) to request entry
    - Ensure decedent is still face up prior to transfer
    - Ensure tags and forms are present
    - Transfer the decedent to Morgue staff
    - Give staff copy of PCR
- As soon as possible after transfer, the EMS Supervisor will call INOVA Decedent Affairs (703-776-3506) to alert them and provide a point of contact if any questions arise.
    - A voice mail will be left if the transfer takes place after normal business hours
- If for some reason the Morgue refuses or is unable to accept the decedent, contact the EMS Supervisor. In most cases an alternative site will be selected or a private contractor will assume responsibility (see below).
- Document all actions, to include police case and personnel information on the PCR
    - Do not select a destination hospital or a transportation outcome as this is not a transport of a patient to a medical facility. Select the most appropriate outcome based on the situation and consult with the EMS Supervisor for guidance if needed.

Special Circumstances

- If the incident scene is outside FCPD jurisdiction, the responsible police department should be consulted.
    - The IC/EMS Supervisor may contact the private mortuary contractor directly (via DPSC) either for consultation or for service. However, in these cases, FRD administration (Resource Management) will need to be contacted to authorize mortuary dispatch as such service is outside the scope of the contract and may require direct payment from the FRD.
    - If the FRD transports the deceased, follow the above procedure and ensure the local PD provides the proper paperwork (FCPD may be contacted to assist).
- If a patient with a valid Virginia or Alternate DNR Order dies during transport, the destination hospital shall be advised and the patient shall be transferred to the ED on arrival in normal fashion.
- If the ED refuses to accept the patient or other complications arise, contact the EMS Supervisor immediately. If the matter cannot be resolved at the destination ED, transport to the Morgue may be required as detailed elsewhere in this section.

- Police may be requested to assist, to include supply and completion of appropriate tags and forms.
- Nothing in this protocol should be construed as preventing FRD personnel (generally the IC/EMS Supervisor) from contacting the private mortuary contractor directly (via DPSC) either for consultation or for service. If the private contractor is requested by FRD personnel, Fairfax County Police should also be requested and advised of the situation.


DOCUMENTATION

EMS Incident Reporting

The Fire and Rescue Department anticipates migration to a single fire and EMS reporting system in 2015. As that system is implemented, the most current incident reporting policies will be issued in an Incident Reporting Manual. Until that time, the following policies remain in effect.

As defined by the Virginia Administrative Code, §12 VAC5-31-10, the prehospital patient care report (PCR) is both a medical record and a legal document used to summarize the facts and events of an EMS incident and includes, but is not limited to, the type of medical emergency or nature of the call, the response time, the treatment provided and other minimum data items as prescribed by the board. The PCR includes any supplements, addenda, or other related attachments that document patient information or care provided.

The electronic patient care report is the department's sole legal medical record for all patient care and interactions. The PCR also captures system performance information, fulfills the Virginia Office of Emergency Medical Services' (OEMS) data collection requirements for licensed EMS agencies, and facilitates accurate revenue recovery through the Emergency Medical Services (EMS) transport billing contractor.

The Fire and Rescue Department Data Management Section expects to publish a comprehensive incident documentation manual. The information below will be transferred to that document at that time.

Entering Reports

- All OEMS permitted vehicles dispatched to an EMS event must complete both an EMS ImageTrend report (EMS report) and a Fire Records Management System (FireRMS) report. Licensed units include, but are not limited to, all ambulances, medic units, engines, trucks, rescue squads, EMS supervisors and HM440. The following event types are considered "EMS" and require an EMS report for all units

All "ACCI" events	All "CODE" events	ODF
ALS	CPRF	SHOTF
BLS	DROWNF	STABF
AMED	ECOD	SUIAF
ASLTWF	All "FDACCI" events	
	NEONATAL	

- No call dispatched as an EMS incident may be converted to a non-EMS incident type, regardless of outcome.
- An EMS report may or may not have a full PCR associated with it, depending on the incident type and the unit dispatched.
- If a non-EMS incident generates a patient encounter (e.g. a public service becomes a BLS, a patient is transported from a structure fire, etc.) a complete EMS report and PCR shall be completed. DPSC shall be contacted to either convert the call type to the

appropriate EMS call, or to obtain the numbers required for manual entry if call conversion is not possible.

- A PCR must be completed every time a patient-provider relationship is established; all assessments and treatments must be fully documented. A PCR is required for each patient on a scene (i.e.: five patients require five PCRs). If a transport unit transports two patients, then two PCRs need to be completed by that unit.
- All PCRs shall be entered from a FRD desktop computer or an assigned EMS tablet computer (EMS tablet). Use of personal mobile devices to enter PCRs is prohibited.
- All medic unit ECG-related interventions (monitoring, 12-lead, defibrillation, cardioversion or pacing) shall be exported to the EMS tablet for inclusion in the PCR.
- If a non-transport unit obtains an ECG and no other unit is on scene to capture it in the PCR (such as a refusal) the ECG print out shall be faxed to the secure EMS Records fax (703-653-1328) for attachment to the PCR. Label the ECG with unit, event number, OIC name and patient initials. Note "paper copy ECG submitted for attachment" in the PCR narrative section.
- If the "repeat patient" function is used, the provider must confirm all information obtained with the patient to ensure it is still accurate and applicable.
- Non-transport units are not assigned EMS tablets. These units shall complete EMS reports on a FRD desktop computer.
- When a non-transport unit takes a patient refusal with no transport unit on scene, a hard copy refusal form shall be completed on the *First Responder Information Sheet* (FRD-208). Upon return to the station, the EMS report shall be completed with notation "FRD-208" in the narrative section and "FRD -208" in the patient signature block. The FRD-208 shall be faxed to secure EMS Records fax (703-653-1328) for attachment to PCR. After faxing, shred the form.
- During standard operations, the event number, location, and times shall be obtained from the CAD system feed. CAD data is automatically transferred to the EMS report system for EMS event types only. The only situations when providers shall manually enter CAD data are when systems are down, or when a PCR is required to document care on a non-EMS event (HAZMAT, FHOU, FVEH, etc.).
- In the event that the EMS report server is down, there will be no CAD data feed and the 'sync' feature will not work. All other functionality, such as 'repeat patient' feature, will be present.
    - Notification will be made by DPSC.
    - All CAD incident information shall be entered manually.
    - Complete the PCR including required signatures on the EMS tablet.
    - Verify that calls have posted to server when resumes normal operation.
- With the exception of connectivity problems, MCI declaration or Condition 3 operations, all PCRs for treated and transported patients shall be completed prior to leaving the hospital.

- On MCIs, disaster/triage tags are used in lieu of a real time PCR for each patient when any of the following criteria are met:
    - Units are directed to clear hospital and return to incident for additional transports.
    - More than 20 actual patients are transported from the incident.
- As soon as time is available, a PCR shall be entered with the triage tag scanned and attached (fax tag with unit and incident number to the EMS Records number). Provider shall use the data from the tag and as much information as available to make the permanent record of the transport.
- All EMS reports require a narrative. The minimum expectation is a 1-2 sentence description of actions taken. For full PCRs, a standard structure such as CHART or SOAP is recommended. An organized approach to report writing will ensure consistently thorough reports that are easily read. Read your report once it's completed. Check for errors in spelling or grammar. Spellcheck will not always catch a correctly spelled but incorrect word. Avoid abbreviations, they can mean different things to different readers.

  SOAP Method

  S -Subjective: What the patient has told you. Quote the patient as necessary. Chief complaint, bystander reports, medications, allergies, surgeries, previous medical history, and events leading up to the chief complaint.
  O -Objective: Your findings. What you found during your patient assessments and scene assessments. Vital signs.
  A -Assessment: Your general impression of the conditions present.
  P -Plan: The interventions performed. This should include actions performed prior to your arrival when known.

  CHART Method

  C- Chief Complaint: What the patient has told you. Quote the patient as necessary.
  H- History: Patient's immediate history and events leading up to the complaint. Medications, allergies, surgeries and medical history would be included here.
  A- Assessment: Your findings from the assessments of the patient and scene.
  R- Treatment: Treatments prior to your arrival, if known. Treatments on scene.
  T- Transport: Treatments given enroute. Transport destination, mode, and transfer of care summary.

- During transfer of care at hospital, providers shall give a complete verbal report to the staff accepting the patient and obtain required signatures. This includes patient authorization, two FRD signatures (both crew members), the receiving hospital staff member, as well as airway verification signature from an Emergency Department physician for intubated patients. The PCR is then completed and posted "locked" to the server prior to leaving the hospital.

- *Patient Billing Authorization and HIPAA Signatures*: The Centers for Medicare and Medicaid Services (CMS) mandate a patient's signature or the signature of his or her designee as proof that the patient was transported. Providers do not need to complete an *EMS Treatment & Transport Signature Form* (FRD-082) unless the patient requests a copy of what he or she signed on the PCR tablet. **It is illegal for a provider to sign a patient's name.**
    - Preferred Choice (patient's own signature): If the patient is alert, oriented, 18 years of age or older, and agrees to transport**,** Select *Patient Billing Authorization and HIPAA Signature* then Select Self, enter the patient's name, and have the patient sign his/her own name.
    - The following choices are **only** utilized if patient is unable to sign.
        - Second Choice (authorized patient representative present): If the patient has an altered level of consciousness, is unconscious, a minor (< 18 years of age), or is unable to sign and there is a representative for the patient present, select *Authorized Representative* then select the appropriate choice from the list for the person signing (e.g. Patient's Legal Guardian, Patient's Health Care Power of Attorney, etc.) and enter the patient representative's name, indicate the reason the patient is unable to sign, and have the patient's representative sign his/her own name.
        - Third Choice (no patient representative present): If the patient has an altered level of consciousness, is unconscious, a minor (< 18 years of age), or is unable to sign and <u>there is no authorized patient representative present</u>, select *EMS Provider Signatures and Patient Unable to Sign*, indicate the reason the patient is unable to sign, and the FRD provider signs his/her own name. **It is illegal for a provider to sign a patient's name.**
- *Receiving Facility Signatures*: OEMS requires a representative of the receiving facility to sign the PCR to acknowledge the transfer of care. This is usually the nurse receiving the patient.
    - Select *Receiving Facility Signatures* and enter the signer's full name and obtain the signature.
    - If hospital personnel are unwilling or unable to sign the PCR, attempt to mediate through the charge nurse prior to noting a non-signature.
        - If unsuccessful: Make a notation of non-signature in the PCR.
        - Make a notation in the narrative and identify the hospital personnel by name.
    - *Airway Verification* for intubated patients: if a patient was intubated (to include King LT or King LT-SD) by providers, a third signature is

required (physician confirming tube). Select *Airway Verification* and enter the physician's name and have the physician sign his/her name.

- *EMS Provider Signatures*: The Centers for Medicare and Medicaid Services (CMS) requires signatures from **both** FRD crew members for patients who are treated and transported

- The FRD will no longer routinely print PCRs. Staff at "area hospitals" can access the PCR securely online. Area hospitals with EMS report system access include:

Fort Belvoir Community Hospital	INOVA Lorton Healthplex
HCA Reston Hospital Center	INOVA Loudoun Hospital
HCA Stone Spring Emergency Center	INOVA Mount Vernon Hospital
INOVA Alexandria Hospital	INOVA Springfield Healthplex
INOVA ECC- Fairfax	Prince William Hospital
INOVA ECC-Reston	Sentara Northern Virginia Medical Center
INOVA Fairfax Hospital	Virginia Hospital Center-Arlington
INOVA Fair Oaks Hospital	

- At out-of-area hospitals, before leaving the facility FRD providers shall contact the charge nurse and obtain his/her name and the fax number to send the PCR to. Immediately upon return to station, the provider shall sign on to the web-based EMS report system and print the PCR on the station printer. When the system asks for a reason; type in "for fax to XXX hospital." Use the *EMS Records Fax* (FRD-203) cover sheet and fax the PCR to the charge nurse at the hospital. Afterwards, shred the printed PCR. If the destination is not listed in PCR and the provider selects an "out of state hospital," ensure that the receiving hospital name is specified in the narrative.
- If a provider needs to change or add information to any PCR after it is locked and posted, the EMS Supervisor must be contacted to unlock the report and make the adjustment. Once locked, any subsequent changes made, as well as the date, time and person making them, are permanently recorded by the system (creating an "audit trail").
- Per FRD SOP 01.09.03 *Field Incident Reports and Processing*, all incident reports shall be completed prior to leaving the station at the end of the shift.

Report Checking and Review

- Per FRD SOP 01.09.03 *Field Incident Reports and Processing*, the shift commander is responsible for ensuring the required reports have been entered for all calls run during the shift. EMS reports are checked for completion with the Rescue Bridge CAD Reconciliation Report.
- EMS Supervisors are responsible for reviewing specific reports from the previous shift day on a schedule directed by the DC-EMS Division. This task is the responsibility of the on-duty supervisor, whether the regularly assigned Captain or a fill-in supervisor.
- PCRs shall be reviewed for fundamental compliance with FRD EMS documentation standards. Incidents of exemplary care, as well as general feedback or documentation

deficiencies shall be passed on to the provider and/or regular EMS Supervisor by the QA notes system. Refer to Field EMS Supervisor Handbook for additional chart review information.

System Hardware Maintenance

- EMS tablets shall be stored in a designated area on the unit and plugged in to assure maximum usability.
- If a tablet appears to malfunction, standard trouble shooting procedures including hard re-start and log-off/log-on shall be conducted.
- If providers are unable to resolve the problem, the provider shall contact the on-duty EMS Supervisor to report the problem and arrange a loaner tablet.
- Each Battalion EMS Supervisor office has two assigned loaner tablets.
- Before obtaining a replacement, an EMS eForm must be completed clearly describing the problem. Also specifically note if the provider believes a PCR may be "stuck" on the tablet.
- Print out a copy of the eForm and attach it to the broken tablet.
- After obtaining a loaner, the broken tablet shall be delivered to the battalion chief office and placed in the red courier pouch (with eForm attached) for delivery to headquarters.
- Tablets shall not be sent in for repair via standard Service 1 logistics truck.


PHARMACOLOGY

Introduction

The tables in this section are for reference only. Administer medications according to written protocols or on order of Physician OLMD. Always ask patients if they have an allergy to the medication before administration.

Acetylsalicylic Acid (Aspirin, ASA)
Adenosine (Adenocard)
Albuterol (Ventolin)
Amiodarone (Cordarone)
Atropine (Atropine Sulfate)
Calcium Chloride (10%)
Cyanokit (Hydroxocobalamin)
Dextrose
Diazepam (Valium)
Diphenhydramine (Benadryl)
Dopamine Hydrochloride (Intropin)
DuoDote (Pralidoxime Chloride)
Epinephrine (Adrenaline)
Fentanyl Citrate (Sublimaze)
Glucagon
Glucose – Oral
Ipratropium Bromide (Atrovent)
Ketamine
Lidocaine (2%) (Xylocaine)
Magnesium Sulfate (50%)
Methylprednisolone (Solu-Medrol)
Midazolam (Versed)
Morphine (Morphine Sulfate)
Naloxone (Narcan)
Nitroglycerin
Ondansetron (Zofran)
Sodium Bicarbonate (8.4%)
Tetracaine
Tranexamic Acid (TXA)

Acetylsalicylic Acid (Aspirin, ASA)

Class

- Antiplatelet, anti-inflammatory agent

Therapeutic Action

- Aspirin blocks the formation of the substance thromboxane A_2, which causes platelets to aggregate and arteries to constrict.

Indication

- Acute coronary syndrome (ACS)

Pharmacokinetics

Route	Onset	Peak	Duration
Oral	5–30 minutes	15–120 minutes	3–6 hours

Contraindication

- Known hypersensitivity

Adverse Reactions

- RESP: Bronchospasm for those with hypersensitivity
- GI: Nausea and vomiting

Drug Administration

- Tablets should be chewed and swallowed.

Protocol	Adult	Pediatric
Acute Coronary Syndrome	If the patient is over 18 years old, administer **Baby Aspirin 2 tablets** (81mg per tablet). Aspirin may be administered even if the patient has already taken his or her prescribed dose that day. If the patient has taken at least 162 mg specifically for this event then withhold.	

Adenosine (Adenocard)

Class

- Antiarrhythmic

Therapeutic Action

- Slows conduction time through the A-V Node
- Interrupts the re-entry pathways through the A-V node and restores sinus rhythm in patients with PSVT.

Indication

- Paroxysmal supraventricular tachycardia (PSVT)

Pharmacokinetics

Route	Onset	Peak	Duration
IV	Immediate	10 seconds	20–30 seconds

Contraindications

- Known hypersensitivity
- History of Wolff-Parkinson-White syndrome with wide complex QRS
- For unstable or for *irregular or polymorphic* wide-complex tachycardias (it may cause degeneration of the arrhythmia to ventricular fibrillation).

Adverse Reactions

- RESP: Dyspnea
- CV: Chest pain

Caution

- A defibrillator must be readily available with pads applied for narrow-complex PSVT patients with history of WPW because adenosine given to these patients may cause atrial fibrillation with rapid ventricular conduction.

Special Considerations

- A slow IV push or a distal IV port may cause paradoxical effects.
- Not effective in atrial fibrillation, atrial flutter, or ventricular tachycardia, brief reduction in rate may assist in identifying underlying rhythm.
- Effects antagonized by caffeine and theophylline, may require higher dose to achieve desired response.
- Effects enhanced by dipyridamole (Persantine), digitalis, calcium channel blockers, and benzodiazepines, may require lower dose to achieve desired response.

Drug Administration

- Administered over 1–2 seconds through an IV port closest to the IV site, followed by a NS fluid bolus.

Adenosine (Adenocard) continued

Protocol	Adult	Pediatric
Cardiac Dysrhythmias: Paroxysmal Supraventricular Tachycardia (PSVT)	Stable For patients who do not convert with vagal maneuvers administer: • **6 mg** IV rapid, followed immediately by a **20 ml NS** rapid fluid bolus. • If no conversion after 1–2 minutes, **12 mg** IV rapid, followed immediately by a **20 ml NS** rapid fluid bolus.	Stable **Contact Physician OLMD** for patients who do not convert with vagal maneuvers to administer: • **0.1 mg/kg** IV rapid followed immediately by a **10 ml NS** rapid fluid bolus. • If no conversion after 1–2 minutes, **0.2 mg/kg** IV rapid followed immediately by a **10 ml NS** rapid fluid bolus.

Albuterol (Ventolin)

Class

- Sympathomimetic, bronchodilator

Therapeutic Action

- Selective ß$_2$ agonist which stimulates adrenergic receptors of the sympathetic nervous system, resulting in smooth muscle relaxation in the bronchial tree and peripheral vasculature.
- At higher doses selectivity is lost and the drug acts at ß$_2$ receptors to cause typical cardiac effects.

Indications

- Allergic reaction and anaphylaxis
- Electrolyte abnormalities-Hyperkalemia
- Asthma/Bronchospasm
- COPD
- Pulmonary edema
- Undifferentiated respiratory distress

Pharmacokinetics

Route	Onset	Peak	Duration
Inhalation	5 minutes	60–120 minutes	3–8 hours

Contraindications

- Known hypersensitivity to sympathomimetics

Adverse Reactions

- CNS: Restlessness, tremors, dizziness, nervousness
- CV: Palpitations, tachycardia, peripheral vasodilation, increased blood pressure

Special Considerations

- Effects antagonized by beta-blockers, may require higher dose to achieve desired response.

Albuterol (Ventolin) continued

Protocol	Adult	Pediatric
Allergic Reaction/ Anaphylaxis	Moderate to Severe If wheezing or sob, administer **2.5 mg** via NEB, repeat as needed.	Moderate to Severe If wheezing or sob, administer **2.5 mg** via NEB, repeat as needed.
Metabolic Emergencies: Electrolyte Abnormalities (Hyperkalemia)	Unstable Administer **10 mg** via NEB	
Respiratory Emergencies: Asthma/Bronchospasm (Bronchiolitis-pediatric)	Mild/Moderate Administer **5 mg** mixed with Ipratropium Bromide (Atrovent) 0.5 mg via NEB. Repeat once. Severe Administer **5 mg** mixed with Ipratropium Bromide (Atrovent) 0.5 mg via NEB. Repeat as needed.	Mild/Moderate Administer **5 mg** mixed with Ipratropium Bromide (Atrovent) 0.5 mg via NEB. Repeat once. Severe Administer **5 mg** mixed with Ipratropium Bromide (Atrovent) 0.5 mg via NEB. Repeat as needed.
Respiratory Emergencies: COPD	Mild/Moderate Administer **5 mg** mixed with Ipratropium Bromide (Atrovent) 0.5 mg via NEB. Severe Administer **5 mg** mixed with Ipratropium Bromide (Atrovent) 0.5 mg via NEB. Repeat as needed.	
Respiratory Emergencies: Pulmonary Edema	If there is evidence of significant associated bronchospasms (wheezing), administer **2.5 mg** via NEB. Reassess for therapeutic effect and discontinue if there is a significant increase in heart rate and blood pressure.	
Respiratory Emergencies: Undifferentiated Respiratory Distress	If wheezing, administer **2.5mg** via NEB. If refractory, repeat once.	Administer **2.5mg** via NEB. If refractory, repeat once.
Trauma: Crush Syndrome	For entrapment greater than 4 hours: If there are ECG signs of hyperkalemia, administer 10 mg via NEB.	For entrapment greater than 4 hours: If there are ECG signs of hyperkalemia, administer 10 mg via NEB.

Amiodarone (Cordarone)

Class

- Antidysrhythmic

Therapeutic Action

- Prolongs repolarization and refractory period, increases ventricular fibrillation threshold.
- Acts on peripheral smooth muscle to decrease peripheral resistance.

Indications

- Ventricular fibrillation/ventricular tachycardia without a pulse
- Ventricular tachycardia with a pulse

Pharmacokinetics

Route	Onset	Peak	Duration
IV	Immediate	10 minutes	20–47 days

Contraindications

- Known hypersensitivity
- None for cardiac arrest
- Pregnant patients presenting with stable ventricular tachycardia

Adverse Reactions

- CV: Hypotension, bradycardia, CHF

Special Considerations

- Use with beta blockers may increase risk of hypotension and bradycardia.
- Maintain at room temperature and protect from light in storage.

Protocol	Adult	Pediatric
Cardiac Arrest: Ventricular Fibrillation/ Ventricular Tachycardia without a pulse	Administer **300 mg** IV. Administer 2nd dose, **150 mg** IV.	Administer **5 mg/kg** IV. Administer 2nd dose **5 mg/kg** IV. Administer 3rd dose **5 mg/kg** IV. (max cumulative dose 300 mg)
Cardiac Dysrhythmias: Ventricular Tachycardia/ Wide Complex Tachycardia with a pulse	Stable **Contact Physician OLMD** to administer **150 mg in 100 ml NS** IV drip **60 gtts/minute** (10 gtts/ml set).	Stable **Contact Physician OLMD** to administer **5 mg/kg in 100 ml NS** IV drip **50 gtts/min** (10 gtts/ml set).

Atropine (Atropine Sulfate)

Class

- Anticholinergic agent, parasympatholytic

Therapeutic Action

- Parasympatholytic: inhibits action of acetylcholine at postganglionic parasympathetic neuroeffector sites.
- Increases heart rate in life-threatening bradydysrhythmias by inhibiting the vagus nerve's influence on the heart.
- Competitively blocks acetylcholine excess associated with organophosphate and nerve gas poisoning.

Indications

- Bradycardia (including AV blocks)
- Organophosphate/Nerve Agent Poisoning
- Pediatric Beta Blocker/Calcium Channel Blocker Overdose

Pharmacokinetics

Route	Onset	Peak	Duration
IM	10−15 minutes	30 minutes	4 hours
IV	Immediate	2–4 minutes	4 hours

Contraindications

- Known hypersensitivity
- Acute narrow angle glaucoma
- None for cardiac arrest

Adverse Reactions

- CNS: Headache, dizziness, blurred vision
- CV: Palpitations, tachycardia, dysrhythmias
- GI: Dry mouth, urinary retention
- SKIN: Flushed, hot dry skin

Special Considerations

- Paradoxical bradycardia when pushed slowly or at low doses
- Atropine may be administered by the endotracheal route. However, the preferred route of administration is IV or IO because it will provide more predictable drug delivery and pharmacologic effect.

Atropine (Atropine Sulfate) continued

Protocol	Adult	Pediatric
Cardiac Dysrhythmias: Bradycardia (including AV blocks)	Unstable Administer **0.5 mg** IV every 3-5 minutes to a max cumulative dose of 3 mg.	If bradycardia refractory to CPR and known increased vagal tone/stimulation or 2^{o} Type II heart block, Atropine should be given prior to Epinephrine: Administer **0.02 mg/kg** IV, (single dose: min dose 0.1 mg to a max dose 0.5mg), if refractory after 3-5 minutes repeat once.
Poisonings: Organophosphate/Nerve Agent Exposure	Severe Exposure *After administering (3) DuoDote IM*, administer **2 mg** IV or IM. Repeat every 5 minutes, titrate to drying of secretions and ease of ventilation. Monitor for Atropine toxicity.	Administer **0.05 mg/kg** IV (mild symptoms) to **0.1 mg/kg** IV (severe symptoms) Minimum single dose 0.1 mg. Repeat every 10 minutes as needed, titrating to drying of secretions.
Overdose and Adverse Drug Reactions: Beta Blocker/Calcium Channel Blocker		If bradycardic, administer **0.02 mg/kg** IV (single dose: minimum 0.1 mg and max 0.5 mg)

Calcium Chloride (10%)

Class

- Electrolyte

Therapeutic Action

- Calcium chloride causes a significant increase in the myocardial contractile force and appears to increase ventricular automaticity.

Indications

- Hyperkalemia
- Cardiac arrest with suspected cause hyperkalemia
- Magnesium sulfate overdose resulting in cardiac arrest, respiratory arrest, or hypotension when given for eclampsia.
- Beta blocker/calcium channel blocker overdose

Pharmacokinetics

Route	Onset	Peak
IV	Immediate	3–5 minutes

Contraindication

- None in prehospital emergency setting

Adverse Reactions

- CV: bradycardia

Special Considerations

- Bradycardia may occur with rapid injection.
- Ensure patent IV line, extravasation leads to tissue necrosis.
- Must be administered in a separate line from sodium bicarbonate to avoid precipitation. If a second vascular access is not achievable, then line must be flushed thoroughly with normal saline between drug administrations.

Calcium Chloride (10%) continued

Protocol	Adult	Pediatric
Metabolic Emergencies: Electrolyte Abnormalities (Hyperkalemia)	Unstable S&S include acutely altered mental status, hypotension or other signs of shock, administer **10 ml** IV slow over 5 minutes.	
Obstetric Emergencies: Eclamptic seizures	For magnesium sulfate overdose resulting in cardiac arrest, respiratory arrest, or hypotension, administer **10 ml** IV over 2 minutes, if refractory after 5-10 mins, repeat once.	
Overdose and Adverse Drug Reactions: Beta Blocker/Calcium Channel Blocker	**Contact Physician OLMD** to administer **10 ml** IV over 5 minutes, if refractory after 5-10 mins, repeat once.	**Contact Physician OLMD**
Overdose and Adverse Drug Reactions: Magnesium	Administer **10 ml** IV over 5 minutes, if refractory after 5-10 mins, repeat once.	

Cyanokit (Hydroxocobalamin)

Medication Supplies in each FRD Cyanokit Bag	**Washington Hospital Center Admin Equipment** (2)
• 2 Vials Hydroxocobalamin 2.5g **OR** 1 Vial Hydroxocobalamin 5g • 1 Medication Transfer Spike/Vial • 1 20 gtts Administration Set • 1 Buretrol (without tubing) • 4 Bags NS 100ml	• Documentation and contact information • Patient bracelet

Class

- Antidote

Therapeutic Action

- Binds directly to cyanide ions creating cyanocobalamin (a natural form of vitamin B12) which is excreted in the urine

Indications

- Moderate to severe signs/symptoms of cyanide toxicity in the setting of significant smoke inhalation or other known cyanide exposure.

Pharmacokinetics

Route	Onset	Peak
IV	Rapid	6–7 hours

Contraindications

- Known allergy

Adverse Reactions

- Allergic reaction
- Hypertension

Special Considerations

- May redden or discolor injection site, skin, and mucous membranes
- Incompatible with other medications; use dedicated line

Cyanokit (Hydroxocobalamin) continued

Protocol	Adult	Pediatric

Poisonings: Cyanide Exposure	Access the Cyanokit medication and two 100ml bags **Normal Saline** from the Cyanokit Bag. Immediately administer **5g** total of Cyanokit as follows:
	• Reconstitute medication then gently rotate for 30 seconds to mix:
	  ○ For bags with a single vial containing **5g,** use both 100ml bags **Normal Saline** and transfer spike.
	  ○ For bags with two vials each containing **2.5g,** use one 100ml bag **Normal Saline** and transfer spike for each vial.
	• Infuse **Cyanokit 5g** IV drip.
	  ○ For bags with a single vial containing **Cyanokit 5g**, infuse entire vial over 15 minutes (260 gtts/min or ~4gtts/sec using supplied 20 gtts/ml set.
	  ○ For bags with two vials each containing **Cyanokit 2.5g**, infuse one vial over 7.5 minutes (260 gtts/min or ~4gtts/sec using supplied 20 gtts/ml set. After first vial has been infused, repeat with second vial for a total of **5g**.
		Access the Cyanokit medication and two 100ml bags **Normal Saline** from the Cyanokit Bag. **Contact Physician OLMD** to administer **70mg/kg** total of Cyanokit as follows (max **5g)**:
		• Reconstitute medication then gently rotate for 30 seconds to mix:
		  ○ For bags with a single vial containing **5g,** use both 100ml bags **Normal Saline** and transfer spike.
		  ○ For bags with two vials each containing **2.5g**, use one 100ml bag **Normal Saline** and transfer spike for each vial.
		• Infuse **Cyanokit 70mg/kg** IV drip. Concentration for all vials is 25mg/ml:
		  ○ Attach supplied 20 gtts/ml dripset to supplied Buretrol, then Buretrol to vial, then fill Buretrol chamber based on patient weight:
		  ▪ 5kg: 14ml
		  ▪ 7kg: 20ml
		  ▪ 10kg: 28ml
		  ▪ 13kg: 37ml
		  ▪ 15kg: 42ml
		  ▪ 20kg: 56ml
		  ▪ 25kg: 70ml
		  ▪ 30kg: 84ml
		  ▪ 35kg: 98ml
		  ○ Clamp tubing between Buretrol and vial, then start infusion at 260 gtts/min or ~4gtts/sec (10-15ml/min).
		  ○ Patients weighing more than 35kg will require refilling the Buretrol.
		  ▪ For bags with **2.5g** vials, the second vial will need to be reconstituted to replace the now empty first vial.
		  ▪ Subtract 35 from total patient weight in kg and refer above to determine volume to add to Buretrol.

Dextrose

Class:

- Carbohydrate

Therapeutic Action

- Rapidly increases serum glucose levels

Indications

- Adult patients with blood glucose less than 70 with altered mental status
- Pediatric patients with blood glucose less than 60 with altered mental status
- Distressed newborn with blood glucose less than 45
- Hyperkalemia

Pharmacokinetics

Route	Onset	Peak	Duration
IV	Immediate	Variable	Variable

Contraindications

- None in prehospital emergency setting

Special Considerations

- Ensure patent IV line, extravasation leads to tissue necrosis.

Drug Administration

- If Dextrose 10% (D10) in 250 ml is unavailable, waste 40 ml of the D50 pre-filled amp and draw up 40 ml of Normal Saline, yielding 5 grams (50 ml) of D10.

Dextrose continued

Protocol	Adult	Pediatric

Metabolic Emergencies: Hypoglycemia	If patient has a blood glucose less than 70 and an altered mental status and
	• Patient is conscious and mildly symptomatic
	  ○ Administer **Dextrose 10% (D10) 250 cc ml** IV drip **wide open** (10 gtts/ml set). Titrate to improvement in mental status or blood glucose greater than 70.
	• Patient is unconscious, combative, or uncooperative
	  ○ Administer **Dextrose 50% (D50) 25 grams** IV slow.
	If refractory after 5 minutes, administer **Dextrose 50% (D50) 25 grams** IV slow.
		For infants and all children: if blood glucose is less than 60, administer **Dextrose 10% (D10) 2 - 4 ml/kg** IV drip.
		• Attach Buretrol to 250 ml bag of **Dextrose 10% (D10)**, then fill Buretrol chamber based on patient weight.
		• Run drip **wide open** (60 gtts/ml set).
		
		For neonates: if blood glucose is less than 45, administer **Dextrose 10% (D10) 2 ml/kg** IV slow over 5 minutes.
		• For IV bolus: Waste 40 ml of the D50 pre-filled amp and draw up 40 ml of **Normal Saline**, yielding 5 grams (50 ml) of D10.
		• For IV drip (60 gtts/ml set): Attach Buretrol to 250 ml bag of **Dextrose 10% (D10)**, then fill Buretrol chamber based on patient weight.

Metabolic Emergencies: Electrolyte Abnormalities (Hyperkalemia)	Unstable Administer **Dextrose 50% (D50) 25 grams** IV slow.	
Trauma: Crush Syndrome	In the setting of entrapment greater than 4 hours, **contact Physician OLMD** to consider adding **Dextrose 50% (D50)** to IV fluids.	In the setting of entrapment greater than 4 hours, **contact Physician OLMD** to consider adding **Dextrose 50% (D50)** to IV fluids.
Distressed Newborn		If blood glucose is less than 45 mg/dl administer **Dext 10% (D10) 2 ml/kg** IV slow over 5 minutes. • For IV bolus: Waste 40 ml of the D50 pre-filled amp and draw up 40 ml of **Normal Saline**, yielding 5 grams (50 ml) of D10. • For IV drip (60 gtts/ml set): Attach Buretrol to 250 ml bag of **Dextrose 10% (D10)**, then fill Buretrol chamber based on patient weight.

Diazepam (Valium)

Class:

- Benzodiazepine, anticonvulsant

Therapeutic Action

- Potentiates effects of inhibitory neurotransmitters
- Raises seizure threshold

Indications

- Organophosphate/nerve agent exposure

Pharmacokinetics

Route	Onset	Peak	Duration
IM	15–30 minutes	15–60 minutes	1 hour

Contraindications

- Known hypersensitivity
- Shock

Adverse Reactions

- CNS: Drowsiness, confusion
- RESP: Respiratory depression (rate and/or depth)
- CV: Bradycardia, tachycardia, hypotension

Special Considerations

- Incompatible with most drugs and fluids
- Increased CNS depression with alcohol
- Do not use small veins for IV injection

Protocol	Adult	Pediatric
Poisonings: Organophosphate/ Nerve Agent Exposure	Severe: *After administering (3) DuoDote IM*, if patient is unconscious and seizing, administer **(1) Diazepam Autoinjector** IM	

Diphenhydramine (Benadryl)

Class:

- Antihistamine, anticholinergic

Therapeutic Action

- Blocks cellular histamine receptors
- Sedative effects
- Reverses extrapyramidal reactions (these terms are listed for information only):
  - Buccolingual: protruding or pulling sensation of tongue
  - Torticollic: twisted neck, or facial muscle spasm
  - Oculogyric: roving or deviated gaze
  - Tortipelvic: abdominal rigidity and pain
  - Opisthotonic: spasm of the entire body

Indications

- Allergic reactions and anaphylaxis
- Symptomatic relief from acute dystonic reactions (phenothiazines)

Pharmacokinetics

Route	Onset	Peak	Duration
IM	20–30 minutes	1−4 hours	4–8 hours
IV	Rapid	30–60 minutes	4–8 hours

Contraindications

- Known hypersensitivity to any antihistamines

Adverse Reactions

- CNS: Sedation, Paradoxical CNS excitation in children
- RESP: Thickens bronchial secretions
- CV: Hypotension, dysrhythmias, bradycardia
- GI: Dry mouth and throat

Special Considerations

- Potentiates effects of alcohol and other anticholinergics
- MAOIs prolong anticholinergic effects of diphenhydramine
- Use discretion and perform a risk/benefit analysis before administering to those with reactive airway disease

Protocol	Adult	Pediatric
Allergic Reaction/ Anaphylaxis	Mild/Moderate/Severe Administer **50 mg** IV or IM.	Mild/Moderate/Severe Administer **1 mg/kg** IV or IM.
Overdose and Adverse Drug Reactions: Phenothiazine (Dystonic) Reactions	Administer **50 mg** IV or IM.	Administer **1 mg/kg** IV or IM.

Dopamine Hydrochloride (Intropin)

Class

- Sympathomimetic

Therapeutic Action

- Alpha: increases systemic vascular resistance (vasopressor)
- Beta $_1$: positive inotropic (increases contractile force) and positive chronotropic (increases heart rate) effects, increases automaticity

Indications

- Non-trauma related hypoperfusion
- Bradycardia
- Beta-blocker/Calcium channel blocker overdose
- Bradycardia in Post Resuscitation Management
- Pediatric Sepsis

Pharmacokinetics

Route	Onset	Peak	Duration
IV	1–2 minutes	10 minutes	Length of infusion

Contraindications

- None in prehospital emergency setting

Adverse Reactions

- CV: Tachycardia, angina, palpitations

Dopamine Hydrochloride (Intropin) continued

Protocol	Adult	Pediatric
Cardiac Arrest: Post Resuscitation Management	For persistent bradycardia, administer **400 mg in 250 ml NS** IV drip at **10 microgram/kg/min** (60 gtts/ml set) titrated to HR > 60 and SBP > 90 (MAP > 65)	
Cardiac Dysrhythmias: Bradycardia (including AV blocks)	Unstable Administer **400 mg in 250 ml NS** IV drip at **10 microgram/kg/min** (60 gtts/ml set).	
Hypoperfusion	If refractory to fluid challenges, administer **400 mg in 250 ml NS** IV drip at **10 microgram/kg/min** (60 gtts/ml set).	**Contact Physician OLMD** if refractory to fluid challenges, consider Dopamine drip.
Overdose and Adverse Drug Reactions: Beta Blocker/Calcium Channel Blocker	If hypotensive and bradycardic, administer **400 mg in 250 ml NS** IV drip **10 microgram/kg/min** (60 gtts/ml set).	
Respiratory Emergencies: Pulmonary Edema	If patient displays signs/symptoms of hypoperfusion due to suspected cardiogenic shock, administer **400 mg in 250 ml NS** IV drip at **10 microgram/kg/min** (60 gtts/ml set).	
Sepsis		**Contact Physician OLMD** if refractory to fluid challenges, consider Dopamine drip.

Formula for Dopamine (400 mg in 250 ml) at 10 mcg/kg/min

1. **Desired Dose (DD)** = 10 x (Pt's weight in kg)
2. **Concentration = 1600 mcg** calculated by taking (400mg/250ml) x 1,000mcg
3. **Calculate:** (DD/1600 mcg) x 60 (gtts/ml set) = gtts/min

Chart for Dopamine (400 mg in 250 ml) at 10 mcg/kg/min

Desired Dose is 10 mcg/kg/min										
Weight in kilograms	10	20	30	40	50	60	70	80	90	100
Drops per minute (60 gtts/ml set)	4	7	11	15	19	22	26	30	34	37

DuoDote (Pralidoxime Chloride)

Autoinjector

- **Atropine 2.1 mg** (See Atropine)
- **Pralidoxime Chloride 600 mg (**Listed below)

Pralidoxime Chloride (2-Pam, Protopam)
Class

- Antidote

Therapeutic Action

- Reactivates cholinesterase, inactivated due to organic phosphate or related compound exposure
- Destruction of acetylcholine can then proceed, allowing neuromuscular junction to return to normal function.
- Relief of respiratory paralysis

Indications

- Organophosphate poisoning
- Anticholinesterase drug overdose
- Nerve agent poisoning

Pharmacokinetics

Route	Onset	Peak
IM	Rapid	10–20 minutes

Contraindications

- Known hypersensitivity

Adverse Reactions

- CNS: Dizziness, blurred vision, headache
- CV: Tachycardia, muscular weakness

Protocol	Adult	Pediatric
Overdose and Poisonings: Organophosphate/ Nerve Agent Poisoning	**Mild Symptoms**: Administer **(1) DuoDote** IM. If patient develops Severe symptoms, administer **(2) additional DuoDote** IM **Severe Symptoms**: Administer **(3) DuoDote** IM	

Epinephrine (Adrenaline)

Class:

- Sympathomimetic

Therapeutic Action

- Alpha: increases systemic vascular resistance
- Beta $_1$: positive inotropic (increases contractile force) and positive chronotropic (increases heart rate) effects, increases automaticity
- Beta $_2$: bronchodilation

Indications

- Cardiac arrest
- Severe bronchospasm
- Allergic reactions and anaphylaxis
- Pediatric bradycardia
- Pediatric respiratory

Pharmacokinetics

Route	Onset	Peak	Duration
IM	5−10 minutes	20 minutes	20–30 minutes
IV	Immediate	20 minutes	20–30 minutes
Inhalation	3−5 minutes	20 minutes	1–3 hours

Contraindications

- None for cardiac arrest or severe allergic reactions
- Known hypersensitivity

Adverse Reactions

- CNS: Anxiety, restlessness, headache
- CV: Hypertension resulting in intracranial hemorrhage, tachycardia, ischemia in patients with coronary artery disease

Special Considerations

- Use discretion and perform a risk/benefit analysis before administering to a patient experiencing a moderate allergic reaction with a history of coronary artery disease or hypertension (SBP greater than 180).
- Epinephrine may be administered by the endotracheal route. However, the preferred route of administration is IV or IO because it will provide more predictable drug delivery and pharmacologic effect.

Epinephrine (Adrenaline) continued

Protocol	Adult	Pediatric
Allergic Reactions	**ALL providers:** Moderate to Severe Administer the patient's prescribed **autoinjector**. If patient has no prescribed autoinjector contact **Physician OLMD** for authorization to use the **FRD 0.3 mg autoinjector**. **ALS providers:** Moderate to Severe If respiratory symptoms, airway swelling or hypoperfusion, administer **(1:1,000) 0.3 mg** IM in the lateral thigh. If refractory repeat after 5 minutes. **Contact Physician OLMD** in the setting of refractory severe shock, consider repeated administration of **(1:1,000) 0.3 mg** IM in the lateral thigh every 5 minutes based on symptoms or **(1:10,000) 0.1 mg (1 ml) in 100 ml Normal Saline** IV drip **120 gtts/minute** (10 gtts/ml set) over 5-10 minutes.	**ALL providers:** Moderate to Severe Administer the patient's prescribed **autoinjector**. If patient has no prescribed autoinjector contact **Physician OLMD** for authorization to use the **FRD Junior 0.15 mg autoinjector**. **ALS providers:** Moderate to Severe If respiratory symptoms, airway swelling or hypoperfusion, administer **(1:1,000) 0.01 mg/kg** IM in the lateral thigh. If refractory repeat after 5 minutes. **Contact Physician OLMD** in the setting of refractory severe shock, consider repeated administration of **(1:1,000) 0.01 mg/kg** IM in the lateral thigh every 5 minutes based on symptoms or **(1:10,000) 0.1 mg (1 ml) in 100 ml Normal Saline** IV drip **120 gtts/minute** (10 gtts/ml set) over 5-10 minutes.
Cardiac Arrest: Asystole/PEA	Administer **(1:10,000) 1 mg** IV**,** repeat every 3–5 minutes. • If no vascular access, **(1:10,000) 2 mg** ET, repeat every 3–5 minutes.	Administer **(1:10,000) 0.01 mg/kg** IV**,** repeat every 3–5 minutes If no vascular access, **(1:1,000) 0.1 mg/kg** ET, repeat every 3–5 minutes
Cardiac Arrest: Ventricular Fibrillation/ Ventricular Tachycardia without a pulse	Administer **(1:10,000) 1 mg** IV after second shock is delivered**,** repeat every 3–5 minutes. • If no vascular access, **(1:10,000) 2 mg** ET, repeat every 3–5 minutes.	Administer **(1:10,000) 0.01 mg/kg** after second shock is delivered**,** repeat every 3–5 minutes**.** • If no vascular access, **(1:1,000) 0.1 mg/kg** ET**,** repeat every 3–5 minutes.
Cardiac Dysrhythmias: Bradycardia		If bradycardia is refractory to CPR, administer **(1:10,000) 0.01 mg/kg,** repeat every 3–5 minutes. • If no vascular access, **(1:1,000) 0.1 mg/kg** ET, repeat every 3–5 minutes.
Distressed Newborn		If heart rate does not improve after 30 seconds of CPR, **(1:10,000) 0.01 mg/kg** IV every 3-5 minutes. • If no IV access, **(1:1,000) 0.1 mg/kg** ET to a max single dose of 3 ml, repeat every 3-5 minutes.
Respiratory Emergencies: Croup/Epiglottitis		For cyanosis and severe stridor, administer **(1:1,000) 5 mg** undiluted via NEB.
Respiratory Emergencies: Asthma / Bronchospasm (Bronchiolitis-pediatric)	Severe: For extreme respiratory distress, marked by diminished air movement resulting in questionable delivery of nebulized medication, administer (**1:1,000) 0.3 mg** SQ. **Contact Physician OLMD** to repeat (**1:1,000) 0.3 mg** SQ or IM.	Severe: Administer **(1:1,000) 0.01 mg/kg** IM. **Contact Physician OLMD** to repeat dosing (**1:1,000) 0.01 mg/kg** IM every 15 minutes.

Fentanyl Citrate (Sublimaze)

Class

- Opiate

Therapeutic Action

- Interacts with opiate receptors decreasing pain impulse transmission at the spinal cord level and higher in the CNS.
- Causes peripheral vasodilation and decreases venous return.

Indications

- For pain management of the following conditions in the absence of hypotension, uncontrolled bleeding, or suspicion of thoracic or abdominal trauma:
  - Abdominal pain
  - Amputations
  - Burns
  - Trauma to the extremities
  - History of kidney stones, severe flank pain, and other signs and symptoms consistent with the presence of kidney stones
- Acute Coronary Syndrome

Pharmacokinetics

Route	Onset	Duration
IV	1–2 minutes	0.5–1 hour
IM	7–8 minutes	1–2 hours
IN	5–22 minutes	0.5–4 hours

Contraindications

- Known hypersensitivity
- Hypotension
- Head injury
- RV infarct (as evidenced by ST elevation in V_4R)

Adverse Reactions

- CNS: Seizures
- RESP: Respiratory depression
- CV: Hypotension, cardiac arrest

Special Considerations

- Fentanyl **MUST** be given slowly. Chest wall muscle rigidity, seizures, and hypotension have been associated with rapid administration.
- Use discretion and perform a risk/benefit analysis before administering to patients who have taken MAOI (Monoamine Oxidase Inhibitor) medications. May cause seizures, hyperthermia, hypertension, and death.
- Potentiation of effects when given with other CNS acting drugs or alcohol.
- For patients greater than 65 years of age give ½ the single stated dose. If refractory, repeat every 5 minutes to max full dose.

Fentanyl Citrate – (Sublimaze) continued

Protocol	Adult	Pediatric
Acute Coronary Syndrome	Administer **0.5 microgram/kg** IV slow to a max single dose of 50 micrograms. If refractory repeat once. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	
Symptomatic Care: Pain Management	Administer up to **1 microgram/kg** IV slow to a max single dose of 100 micrograms, if refractory after 5 minutes repeat once. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose. If no vascular access: Administer **2 microgram/kg** IN to a max single dose of 200 micrograms, if refractory after 5 minutes repeat once. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose. **OR** Administer up to **1 microgram/kg** IM to a max single dose of 100 micrograms. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	Administer **1 microgram/kg** IV slow to a max single dose of 100 micrograms, if refractory after 5 minutes repeat once. If no vascular access (or IN preferred route) • Administer **2 microgram/kg** IN to a max single dose of 200 micrograms, if refractory after 5 minutes repeat once. **OR** • Administer **1 microgram/kg** IM to a max single dose of 100 micrograms.

Glucagon

Class

- Pancreatic hormone

Therapeutic Action

- Increases blood glucose by converting glycogen to glucose in the liver via glycogenolysis
- Decreases GI motility and secretions – smooth muscle relaxant
- Increases heart rate and contractility

Indications

- Hypoglycemia and unable to establish vascular access
- May be used as inotropic or chronotropic agent in beta- or calcium-channel blocker overdose

Pharmacokinetics

Route	Onset	Peak	Duration
IM	8–10 minutes	20–30 minutes	20–30 minutes
IV	1 minute	15 minutes	10–20 minutes

Contraindications

- Hypersensitivity

Adverse Reactions

- GI: Nausea and vomiting
- CV: Tachycardia

Special Considerations

- Ineffective if glycogen stores depleted (chronic alcohol related liver disease and starvation)

Protocol	Adult	Pediatric
Hypoglycemia	If no vascular access, administer **1 mg** IM. If refractory after 5 minutes, repeat once.	If no vascular access, **0.1 mg/kg** IM.

Glucose Tube – Oral

Class

- Carbohydrate

Therapeutic Action

- Provides quickly absorbed glucose to increase blood glucose levels

Indications

- Conscious hypoglycemic patients who
  - Can protect their airways
  - Are able to swallow
  - Can follow commands

Pharmacokinetics

Route	Onset	Peak	Duration
Oral	Immediate	Variable	Variable

Contraindications

- Inability for self-administration
- Nausea and vomiting

Adverse Reactions

- GI: Nausea and vomiting

Protocol	Adult	Pediatric
Hypoglycemia	If the patient has a blood glucose level of less than 70, can protect his or her airway, is able to swallow, and can follow commands, assist the patient with the self-administration of **1 Instant Glucose tube (15 grams).** Repeat once, if necessary.	If the patient has a blood glucose level of less than 60, can protect his or her airway, is able to swallow, and can follow commands, assist the patient with the administration of **1 Instant Glucose tube (15 grams).** Repeat once, if necessary.

Ipratropium Bromide (Atrovent)

Class

- Anticholinergic

Therapeutic Action

- Antagonizes acetylcholine at receptor sites on the bronchial smooth muscle, inhibiting parasympathetic stimulation causing bronchodilation.

Indications

- Asthma/Bronchospasm (Bronchiolitis-peds)
- COPD

Pharmacokinetics

Route	Onset	Peak	Duration
Inhalation	15 minutes	1–2 hours	3–4 hours

Contraindications

- Hypersensitivity to anticholinergics

Adverse Reactions

- CNS: Headache, blurred vision, or nervousness
- CV: Arrhythmias, tachycardia, palpitations, chest pain
- GI: Nausea, dry mouth

Protocol	Adult	Pediatric
Respiratory Emergencies: Asthma/Bronchospasm (Bronchiolitis-pediatric)	Mild/Moderate Administer **0.5 mg** mixed with Albuterol 5 mg via NEB. Repeat once. Severe Administer **0.5 mg** mixed with Albuterol 5 mg via NEB. Repeat as needed.	Mild/Moderate Administer **0.5 mg** mixed with Albuterol 5 mg via NEB. Repeat once. Severe Administer **0.5 mg** mixed with Albuterol 5 mg via NEB. Repeat as needed.
Respiratory Emergencies: COPD	Mild/Moderate Administer **0.5 mg** mixed with Albuterol 5 mg via NEB. Severe Administer **0.5 mg** mixed with Albuterol 5 mg via NEB. Repeat as needed.	

Ketamine

Restriction

Authorization for Ketamine administration is limited to EMT-Paramedic level providers.

Class: Dissociative anesthetic, NMDA receptor antagonist

Therapeutic Action

- Acts on cortex and limbic receptors, producing dissociative analgesia and sedation.

Indications

- Delirium requiring immediate behavioral control.

Pharmacokinetics

Route	Onset	Duration
IM	3-7 minutes	10-15 minutes

Contraindications

- When significant elevations in BP might prove harmful (e.g. intracranial hemorrhage, acute myocardial infarction, angina)
- Hypertensive crisis
- Schizophrenia (increases psychosis)

Adverse Reactions

- CNS: Hallucinations, delirium
- CV: Tachycardia, hypertension, arrhythmias
- RESP: Respiratory depression

Special Considerations

- Can cause an Emergence Reaction (confusion, delirium, excitement, hallucinations, irrational behavior, pleasant dream-like state, vivid imagery).

Ketamine continued

Protocol	Adult	Pediatric
Acute Agitated State: Violent and Severely Agitated Patients requiring immediate Behavioral Control	**Contact Physician OLMD** to administer **250 mg IM.** If refractory repeat once. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	
Pain Management	As a single medication: **0.2 mg/kg IV or IM** may repeated after 5 minutes titrating to effect or max cumulative dose of 1 mg/kg or nystagmus (fast, uncontrollable movements of the eyes) is observed. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose. If no vascular access, **1 mg/kg IN** • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose. If used in combination with opioid medications: **0.1 mg/kg IV or IM** repeated every 5 minutes titrating to effect or max cumulative dose of 1 mg/kg or nystagmus (fast, uncontrollable movements of the eyes) is observed. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose. If no vascular access, **0.5 mg/kg IN** • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	

Lidocaine (2%) (Xylocaine)

Class:

- Antiarrhythmic

Therapeutic Action

- Decreases automaticity of ventricular cells and increases the ventricular fibrillation threshold.
- Potentially prevents the increase in intracranial pressure associated with intubation.
- Local anesthetic Na+ channel blocker.

Indications

- Pulseless ventricular tachycardia or ventricular fibrillation, when allergic to Amiodarone
- Post resuscitation
- Intraosseous pain management

Pharmacokinetics

Route	Onset	Peak	Duration
IV	Immediate	Immediate	10−20 minutes

Contraindications

- Known hypersensitivity
- VT secondary to cocaine ingestion (usually presents as torsades de pointes)

Adverse Reactions

- Dizziness, lightheadedness
- Hypotension, cardiac dysrhythmias, cardiac arrest

Special Considerations

- Lidocaine may be administered by the endotracheal route. However, the preferred route of administration is IV or IO because it will provide more predictable drug delivery and pharmacologic effect.

Lidocaine (2%) (Xylocaine) continued

Protocol	Adult	Pediatric
Cardiac Arrest: Ventricular Fibrillation/ Ventricular Tachycardia without a pulse	If patient has a known allergy to amiodarone, administer **1.5 mg/kg** IV or if no vascular access, **3 mg/kg** ET. 2nd and 3rd dose **0.75 mg/kg** IV. If no vascular access, **1.5 mg/kg** ET	If patient has a known allergy to amiodarone, administer **1 mg/kg** IV. If no vascular access, **2 mg/kg** ET to a max cumulative dose of 200 mg. 2nd and 3rd dose: **0.5 mg/kg** IV to a max cumulative dose of 100 mg. If no vascular access, **1 mg/kg** ET to a max cumulative dose of 200 mg.
Pain Management	For pain associated with IO infusion, administer **40 mg** IV slow immediately after IO placement is verified.	For pain associated with IO infusion, administer **0.5 mg/kg** IV slow immediately after IO placement is verified.

Magnesium Sulfate (50%)

Class

- Antidysrhythmic, anticonvulsant

Therapeutic Action

- Antidysrhythmic properties – calcium channel blocker, reduces SA node impulse formation, prolongs conduction time in myocardium.
- Anticonvulsant properties – reduces striated muscle contractions and blocks peripheral neuromuscular transmission.

Indications

- Torsades de pointes
- Eclamptic seizures
- Severe asthma

Pharmacokinetics

Route	Onset	Duration
IV	Immediate	30 minutes

Contraindications

- Dialysis dependent renal failure
- Known hypersensitivity

Adverse Reactions

- RESP: Respiratory depression/failure
- CV: Heart block, hypotension, cardiac arrest

Special Considerations

- If Magnesium Sulfate is administered too quickly, cardiac arrest, respiratory arrest, or hypotension may result.
- Signs of toxicity include extreme thirst, warm feeling, decreased LOC, decreased patellar reflex, and muscle weakness.

Magnesium Sulfate (50%) continued

Protocol	Adult	Pediatric
Cardiac Arrest: Ventricular Fibrillation/Ventricular Tachycardia without a Pulse **(**torsades de pointes)	Administer **2 grams in 100 ml NS** IV drip **run wide open** (10 gtts/ml set).	Administer **50 mg/kg in 100 ml NS** IV drip **wide open** (10 gtts/ml set).
Cardiac Dysrhythmias: Ventricular Tachycardia/Wide Complex Tachycardia with a Pulse (Polymorphic VT - torsades de pointes)	Stable **Contact Physician OLMD** to administer **2 grams in 100 ml NS** IV drip **60 gtts/minute** (10 gtts/ml set).	Stable **Contact Physician OLMD** for Polymorphic VT (torsades de pointes), consider **50 mg/kg in 100 ml NS** IV drip **run wide open** (10 gtts/ml set).
Obstetric Emergencies: Eclamptic Seizures	Administer **4 grams in 100 ml NS** IV drip **60 gtts/minute** (10 gtts/ml set).	
Respiratory Emergencies: Asthma / Bronchospasm (Bronchiolitis-pediatric)	Severe Administer **2 grams in 100 ml NS** IV drip, **30 gtts/minute** (10 gtts/ml set).	**Contact Physician OLMD** to administer **25 mg/kg in 100 ml NS** IV drip **30 gtts/min** (10 gtts/ml set).

Methylprednisolone (Solu-Medrol)

Class

- Corticosteroids

Therapeutic Action

- Anti-inflammatory

Indications

- Short-term management of various inflammatory and allergic disorders
- Status asthmaticus

Pharmacokinetics

Route	Onset	Duration
IV	Varies	Varies

Contraindications

- Known hypersensitivity
- Premature infants: the **Act-O-Vial** system contains benzyl alcohol, which has been reported to be associated with a fatal "Gasping Syndrome" in premature infants.
- Systemic fungal infections

Adverse Reactions

- GI: Nausea, vomiting
- CV: Edema
- CNS: Headache, dizziness

Special Considerations

- Infuse slowly to reduce cardiac effects, over 1–2 minutes.

Protocol	Adult	Pediatric
Allergic Reaction/ Anaphylaxis	Moderate/Severe Administer **125 mg** IV slow.	Severe Administer **1 mg/kg** IV slow.
Respiratory Emergencies: Asthma/Bronchospasm (Bronchiolitis-pediatric)	Mild/Moderate If no significant improvement after neb treatment, administer **125 mg** IV slow. Severe Administer **125 mg** IV slow.	Mild/Moderate If no significant improvement after neb treatment, administer **1 mg/kg** IV slow. Severe Administer **1 mg/kg** IV slow.
Respiratory Emergencies: COPD	Mild/Moderate If no significant improvement after neb treatment, administer **125 mg** IV slow. Severe Administer **125 mg** IV slow.	

Midazolam (Versed)

Class:

- Short-acting benzodiazepine CNS depressant

Therapeutic Action

- Reduces anxiety
- Sedative properties
- Amnesia

Indications

- Prevent removal of advanced airways
- Sedating the conscious patient prior to synchronized cardioversion or pacing
- Chemical restraint
- Seizures
- Traumatic brain injury (TBI)

Pharmacokinetics

Route	Onset	Peak	Duration
IM/IN	5–15* minutes	15–30 minutes	1–4 hours
IV	1–5 minutes	3–5 minutes	2 hours

*Pediatric seizures controlled in < 2 min 80% of the time

Contraindications

- Know hypersensitivity to midazolam or other benzodiazepine

Adverse Reactions

- GI: Nausea, vomiting
- CV: Edema
- CNS: Headache, dizziness

Special Considerations

- Increases the effects of other CNS depressants, barbiturates, alcohol, and/or narcotics
- Avoid sedation in cases of severe hypotension (SBP less than 70 mmHg) unless absolutely necessary.
- For patients greater than 65 years of age give ½ the single stated dose. If refractory, repeat every 5 minutes to max full dose.

Drug Administration

- Administer at a rate of 2–3 minutes IV.
- Use high concentration (5mg/ml) for IN and IM administration.

Midazolam (Versed) continued

Protocol	Adult	Pediatric
Cardiac Arrest: Post Resuscitation Management	To prevent removal of advanced airways administer **2 mg** IV. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	To prevent removal of advanced airways administer **0.1 mg/kg** IV slow (not to exceed 2 mg).
Cardiac Dysrhythmias: Atrial Fibrillation/Atrial Flutter	ICD (implantable cardioverter defibrillator): Administer **2 mg** IV slow. • For patients greater than 65 years of age give ½ the single dose stated above. Unstable Administer **2 mg** IV slow, if needed for sedating the conscious patient prior to synchronized cardioversion. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose	
Cardiac Dysrhythmias: Bradycardia (including AV blocks)	Unstable Administer **2 mg** IV slow, if needed for sedating the conscious patient prior transcutaneous pacing. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	Consider sedation with transcutaneous pacing **0.1 mg/kg** IV slow.
Cardiac Dysrhythmias: Paroxysmal Supraventricular Tachycardia (PSVT)	Unstable Administer **2 mg** IV slow, if needed for sedating the conscious patient prior to synchronized cardioversion. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	Unstable Administer **0.1 mg/kg** IV slow, if needed for sedating the conscious patient prior to synchronized cardioversion.
Cardiac Dysrhythmias: Ventricular Tachycardia/Wide Complex Tachycardia with a Pulse	ICD (implantable cardioverter defibrillator): Administer **2 mg** IV slow. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose. Unstable Administer **2 mg** IV slow, if needed for sedating the conscious patient prior to synchronized cardioversion. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	Unstable Administer **0.1 mg/kg** IV slow, if needed for sedating the conscious patient prior to synchronized cardioversion.

Midazolam (Versed) continued

Protocol	Adult	Pediatric
Obstetric Emergencies: Eclamptic Seizures	Administer **5 mg** IV slow. If refractory after 5 minutes, repeat once. If no vascular access, administer **5 mg** IM or IN. If refractory after 5 minutes, repeat once.	
Seizures	Administer **5 mg** IV slow. If refractory after 5 minutes, repeat once. If no vascular access, administer **5 mg** IM or IN (IM preferred). If refractory after 5 minutes, repeat once. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	Administer **0.1 mg/kg** IV slow to a max single dose of 5mg. If refractory after 5 minutes, repeat once. If no vascular access, administer **0.1 mg/kg** IM (preferred) or 0.2 mg/kg IN to max single dose of 5 mg. If refractory, repeat once.
Acute Agitated State: Acute Undifferentiated Agitation - suspected intoxication or withdrawal	**Contact Physician OLMD** to administer **2 mg** IV. If no vascular access, administer **5 mg** IM or IN. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	
Acute Agitated State: In Violent and Severely Agitated Patients (VSAP) requiring immediate Behavioral Control	**Contact Physician OLMD** to administer **5 mg** IN or IM (after Ketamine). • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	
Traumatic Brain Injury	If patient is combative, **Contact Physician OLMD** to administer **2 mg** IV slow. If no vascular access, administer **Midazolam 5 mg** IM or IN. • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	If patient is combative, **Contact Physician OLMD** to administer **0.1 mg/kg** IV slow.

Morphine (Morphine Sulfate)

Class

- Opiate

Therapeutic Action

- Alleviates pain
- Suppresses fear and anxiety
- Depresses brain stem respiratory centers
- Increases peripheral venous capacitance and decreases venous return
- Decreases preload and afterload, decreasing myocardial oxygen demand

Indications

- Pulmonary edema
- Pain management
    - Trauma to the extremities
    - Amputations
    - Burns
    - History of kidney stones, severe flank pain, and other signs and symptoms consistent with the presence of kidney stones.
    - Abdominal Pain

Pharmacokinetics

Route	Onset	Peak	Duration
IM	Rapid	30–60 minutes	5–6 hours
IV	Immediate	20 minutes	5–6 hours

Contraindications

- Known hypersensitivity
- Hypotension less than 90
- Heart rate less than 60
- Undiagnosed abdominal pain
- Patients who have taken MAOIs within the past 14 days

Adverse Reactions

- CNS: Decreased level of consciousness
- RESP: Respiratory depression (depth, effort, and/or rate)
- CV: Hypotension, bradycardia, tachycardia

Special Considerations

- CNS depressants may potentiate effects of morphine
- For patients greater than 65 years of age give ½ the stated single dose. If refractory, repeat every 5 minutes to max full dose.

Morphine (Morphine Sulfate) continued

Protocol	Adult	Pediatric
Symptomatic Care: Pain Management	For patients allergic to Fentanyl, administer **1–5 mg** IV slow every 5 minutes as needed, to a max cumulative dose of 10 mg. If no vascular access, **1–5 mg** IM every 5 minutes as needed, to a max cumulative dose of 10 mg • For patients greater than 65 years of age give ½ the single dose stated above. If refractory, repeat every 5 minutes to max full dose.	For patients allergic to Fentanyl, administer **0.1mg/kg** IV slow to a max single dose of 5 mg. If no vascular access, **0.1mg/kg** IM to a max single dose of 5 mg.

Naloxone (Narcan)

Class

- Opiate antagonist

Therapeutic Action

- Competitive inhibition at opiate receptor sites
- Reverse respiratory depression secondary to opiate drugs

Indications

- Opiate overdose or decreased level of consciousness due to opiate drug, e.g. morphine, heroin, hydromorphone (Dilaudid), methadone, meperidine (Demerol), fentanyl (Sublimaze), oxycodone (Percodan and Oxycontin), codeine, propoxyphene (Darvon), butorphanol (Stadol), pentazocine (Talwin), nalbuphine (Nubain)
- Coma of unknown origin

Pharmacokinetics

Route	Onset	Duration
IM	3–5 minutes	4–6 hours
IV	2 minutes	4–6 hours
IN	7–8 minutes	4–6 hours

Contraindications

- Known hypersensitivity
- Respiratory depression in newborn due to mother's drug addiction

Adverse Reactions

- CNS: Withdrawal symptoms in the addicted patient
- CV: Tachycardia
- RESP: Non-Cardiogenic Pulmonary Edema

Special Considerations

- Duration of action may be shorter than the effects of long-acting narcotic agents.
- Actual time for intranasal onset has not been determined.
- Narcan may be administered by the endotracheal route. However, the preferred route of administration is IV or IO because it will provide more predictable drug delivery and pharmacologic effect.
- Use high concentration (1mg/ml) for IN and IM administration.

Protocol	Adult	Pediatric
Overdose and Adverse Drug Reactions: Narcotic	Administer **0.4 mg** IV. Repeat as needed every 2-3 minutes titrating to achieve and maintain an adequate respiratory rate. If no vascular access, administer **2 mg** IM or IN**.**	Administer **0.1 mg/kg** IV to a max single dose of 0.4 mg. Repeat as needed every 2-3 minutes to a max cumulative dose of 2 mg, titrating to achieve and maintain adequate respiratory rate. If no vascular access, administer **2 mg** IM or IN**.**

Nitroglycerin

Class

- Nitrate

Therapeutic Action

- Smooth muscle relaxant
- Decreases preload and afterload, decreasing myocardial oxygen demand
- Dilation of coronary arteries

Indications

- Adult patients with acute coronary syndrome
- Pulmonary Edema

Pharmacokinetics

Route	Onset	Peak	Duration
SL	1–3 minutes	5 minutes	30–60 minutes

Contraindications

- Known hypersensitivity
- Hypotension less than 100
- Heart rate <50
- Phosphodiesterase inhibitor use, **Contact Physician OLMD** when patient has taken:
  - Viagra (within 24 hours)
  - Levitra (within 24 hours)
  - Cialis (within 48 hours)
- Intracranial bleeding or head injury
- Severe anemia

Adverse Reactions

- CNS: Headache
- CV: Reflex tachycardia, hypotension, syncope

Special Considerations

- Hypotension more common in geriatric population
- Nitroglycerin tablets degrade if exposed to light or heat
- Caution with use in right-sided and/or inferior MIs
- Use caution in tachycardic patients
- Nitroglycerin and morphine together in a short time period, may result in hypotension.

Drug Administration

- Replace nitroglycerin tablets 6 months after opening the container.

Nitroglycerin continued

Protocol	Adult	Pediatric
Acute Coronary Syndrome	**All providers** Assist patient with **prescribed dose** up to 3 doses (total includes self-administration triggered by event prior to arrival). **ALS providers** Administer **0.4 mg** SL every 5 minutes to a max of 3 doses (does NOT include self- or assisted administration of prescribed Nitroglycerin in total).	
Respiratory Emergencies: Pulmonary Edema	**All providers** If the patient is prescribed nitroglycerin, and has been instructed to take for the observed symptoms, all providers may assist patients with self-administration of their nitroglycerin. Assist patient with **prescribed dose** up to 3 doses (includes self-administration triggered by event prior to arrival). **ALS providers** Mild/Moderate: Administer **0.4 mg** SL, repeat at **0.8 mg** SL (double dose) every 3–5 minutes until therapeutic endpoint is reached or additional dose limited by hypotension. Severe: Administer **0.8 mg** SL (double dose) every 3–5 minutes until therapeutic endpoint is reached or additional dose limited by hypotension.	

Ondansetron (Zofran)

Class

- Antiemetic

Therapeutic Action

- The mechanism by which ondansetron (Zofran) works to control nausea and vomiting is not fully understood; it is believed that the antiemetic properties occur as a result of serotonin receptor antagonism.

Indications

- Nausea and vomiting

Pharmacokinetics

Route	Onset	Duration
IM/IV/PO	5-10 minutes	4-6 hours

Contraindications

- Known hypersensitivity.
- Children under one month of age

Adverse Reactions

- GI: Constipation, diarrhea, dry mouth
- CNS: Headache, visual disturbances, dizziness
- CV: Cardiac dysrhythmias (rare: long QT/Torsades), hypotension
- RESP: Hiccups

Special Considerations

- Use in pregnant patients only if truly necessary (e.g. to control vomiting in patient requiring immobilization).
- Use caution if administering with amiodarone due to potential QT elongation.

Drug Administration

- Do not attempt to push Orally Disintegrating Tablet (ODT) through foil backing.
- With dry hands/gloves, peel back foil backing and gently remove tablet.
- Immediately place ODT on top of patient's tongue where it will dissolve in seconds (disintegration may be delayed if patient has a dry mouth; encourage patient not to swallow prior to administration).
- Instruct the patient to swallow with saliva, and NOT to chew.
- For patients 8-15kg, break ODT into two like parts and administer one part to patient.

Ondansetron (Zofran) continued

Protocol	Adult	Pediatric
Nausea/Vomiting	Administer **4 mg** PO ODT (preferred) or IV slow. If refractory repeat once. If no vascular access and patient is unable to comply with PO instructions, administer **4 mg** IM. If refractory repeat once.	For ages 6 months to 10 years, administer**:** <u>>15kg</u>: **4 mg** PO ODT (preferred) or IV slow. If refractory, repeat once. If no vascular access and patient is unable to comply with PO instructions, administer **4 mg** IM. If refractory repeat once. <u>8-15kg</u>: **2 mg** PO ODT (break ODT in two like parts, administer one part). If patient is unable to comply with PO instructions, administer **2 mg** IV slow. For infants over 1 month old, administer **0.1 mg/kg** IV slow. If less than 8kg, **Contact Physician OLMD**.

Sodium Bicarbonate (8.4%)

Class

- Alkaline

Therapeutic Action

- Increases plasma bicarbonate
- Buffers excess hydrogen ion concentration thus raising blood pH
- Reverses acidosis

Indications

- Metabolic acidosis, which may occur in circulatory insufficiency due to shock or severe dehydration, cardiac arrest, and overdose
- Indicated in the treatment of certain drug intoxications, including barbiturates and tricyclic antidepressants

Pharmacokinetics

Route	Onset	Peak	Duration
IV	Immediate	Rapid	Unknown

Contraindication

- None in cardiac arrest

Adverse Reaction

- RESP: Shallow, slow respirations

Special Consideration

- Patent IV required; tissue slough or necrosis if infiltrated

Drug Administration

- Precipitates with most medications, flush line

Sodium Bicarbonate (8.4%) continued

Protocol	Adult	Pediatric
Metabolic Emergencies: Electrolyte Abnormalities (Hyperkalemia)	Unstable Administer (8.4%) **50 mEq** IV over 5 minutes.	
Overdose and Adverse Drug Reactions: Tricyclic Overdose	Administer (8.4%) **50 mEq** IV over 5 minutes.	Administer (8.4%) **1 mEq/kg** IV over 5 minutes. If QRS does not narrow after 5 minutes, repeat once. For infants Administer (4.2%) **1 mEq/kg** IV. **Note**: To mix Sodium Bicarbonate (4.2%) waste 25 ml of the 8.4% pre-filled amp and draw up 25 ml of NS, yielding 25 mEq of 4.2% solution.
Acute Agitated State: Agitated Delirium (metabolic syndrome)	Administer (8.4%) **1 mEq/kg** IV over 5 minutes.	
Trauma: Crush Syndrome	For entrapment greater than 4 hours, administer (8.4%) **1 mEq/kg** IV over 5 minutes to a max dose of 100 mEq.	For entrapment greater than 4 hours, administer (8.4%) **1 mEq/kg** IV over 5 minutes to a max dose of 100 mEq.

Tetracaine

Class

- Topical anesthetic

Therapeutic Action

- Sodium channel blocker that inhibits sensory nerve firing and conduction, leading to analgesia.

Indications

- Brief ophthalmic anesthesia to facilitate irrigation or to relieve pain.

Contraindication

- Do not use in patient with suspected open globe.

Pharmacokinetics

Route	Onset	Peak	Duration
Topical	30 seconds – 1 minute	1-2 minutes	10-15 minutes

Contraindication

- Hypersensitivity to ester anesthetics ("caines") or Para-AminoBenzoic Acid **(**PABA)

Adverse Reaction

- OCULAR: Stinging and ocular irritation. Delayed ocular wound healing.
- CNS: Seizures (rare), CNS depression

Special Consideration

- Despite having multiple doses per container, vials should be considered single use. However, in MCIs, multiple patients can be treated with the same vial, providing that great care is used to not touch the vial to the eye

Drug Administration

- Medication should be delivered to the conjunctival sac not directly to the globe by telling the patient to look all the way up, gently pulling down the lower lid and instilling two drops to the conjunctival sac (not the eyeball) then tell the patient to blink.

Protocol	Adult	Pediatric
Trauma: Eye Trauma	Administer **2 drops** to the affected eye. May repeat once in 15 minutes.	Administer **2 drops** to the affected eye. May repeat once in 15 minutes.

Tranexamic Acid (TXA)

Class

- Anti-fibrinolytic

Therapeutic Action

- Shifts the natural clot formation-clot breakdown equilibrium in favor of clotting side by inhibiting clot breakdown. This is achieved by inhibiting plasminogen activation and plasmin activity thereby preventing clot break-down rather than promoting new clot formation.
- The observed delayed mortality benefit suggests another mechanism of action as well. It is thought that it may be related to anti-inflammatory actions.

Indications

- Adults – Patients with all three of the following:
  - Severe blunt or penetrating traumatic injury with significant blood loss evident or strongly suspected.
  - Injury occurred within the preceding 3 hours.
  - Traumatic hemorrhagic shock evidenced by either sustained HR > 110 or SBP < 90.
- Pediatric – None

Pharmacokinetics

Route	Onset	Peak	Duration
IV	5–15minutes	15 minutes	3 hours

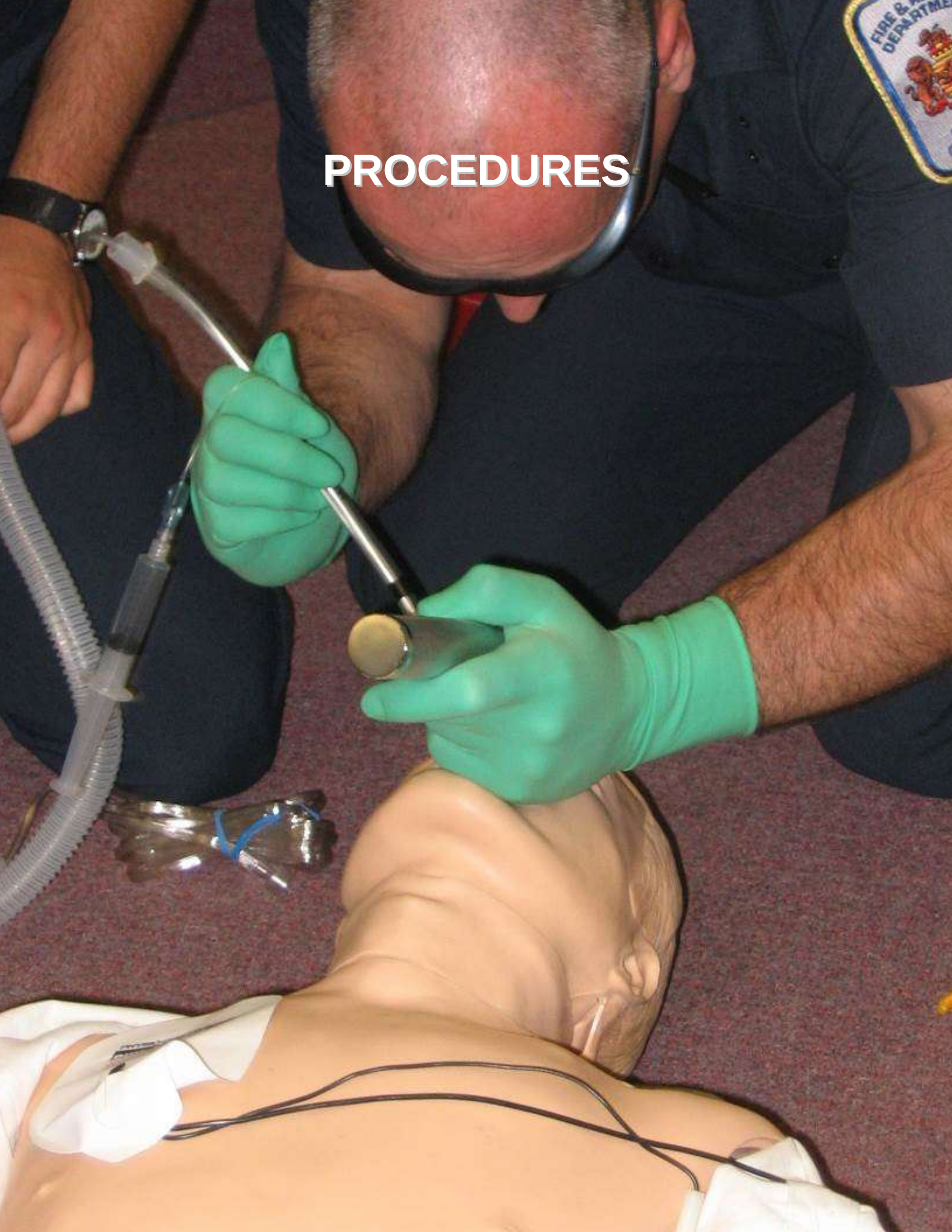
Contraindication

- Non-hemorrhagic shock
- Non-traumatic hemorrhagic shock
- Traumatic hemorrhagic shock that readily stabilizes with routine measures and hemorrhage control.

Adverse Reaction

- CV: A theoretical concern exists for thrombotic complications such as DVT, PE, stroke, MI however large scale studies have not shown higher thrombotic events in patients treated with TXA.

Protocol	Adult	Pediatric
Trauma: Hemorrhage Control	If blunt or penetrating trauma within 3 hours of injury and either heart rate persistently > 110 or SBP < 90, administer **Tranexamic Acid (TXA) 1 gram in 100 ml Normal Saline** IV drip over 10 minutes, **100 gtts/min** (10 gtts/ml set).	


PROCEDURES

Procedures by Certification Level

Procedure	EMT-Basic	EMT-Intermediate	EMT-Paramedic
Cardiac: 12 Lead and 15 Lead	Assist with Set Up	X	X
Cardiac: LUCAS 2	X	X	X
Cardiac: Synchronized Cardioversion	Assist with Set Up	X	X
Cardiac: Transcutaneous Pacing	Assist with Set Up	X	X
General Assessment Tools: Glucometer	X	X	X
General Assessment Tools: RAD-57	X	X	X
Medication Administration: Autoinjector	X	X	X
Medication Administration: Cross Check	X	X	X
Medication Administration: Endotracheal (ET)		X	X
Medication Administration: Inhaler	Assist with Pt's Rx	X	X
Medication Administration: Intramuscular (IM)	Autoinjector	X	X
Medication Administration: Intranasal (IN)		X	X
Medication Administration: Intravenous (IV)		X	X
Medication Administration: Nebulizer (Neb)	Assist with Set Up	X	X
Medication Administration: Oral Glucose	X	X	X
Medication Administration: PICC Access		X	X
Medication Administration: Subcutaneous (SQ)		X	X
Medication Administration: Sublingual (SL)	Assist with Pt's Rx	X	X
Medication Administration: **Ketamine** (IV, IM, IN)			X
Respiratory: Bag-Valve-Mask	X	X	X
Respiratory: Chest Decompression		X	X
Respiratory: CPAP	X	X	X

Procedures by Certification Level continued

Procedure	EMT-Basic	EMT-Intermediate	EMT-Paramedic
Respiratory: Cricothyrotomy			X
Respiratory: End-Tidal CO_2 – Capnography	Assist with Set Up	X	X
Respiratory: End-Tidal CO_2 – Capnometry	X	X	X
Respiratory: Endotracheal Intubation (Adult)		X	X
Respiratory: Endotracheal Intubation (Peds)			X
Respiratory: Esophageal Detection Device		X	X
Respiratory: King Airway	X	X	X
Respiratory: Nasopharyngeal Airway	X	X	X
Respiratory: Oropharyngeal Airway	X	X	X
Respiratory: Suctioning – Meconium			X
Respiratory: Suctioning – Oropharynx	X	X	X
Respiratory: Suctioning – Tracheobronchial	X	X	X
Trauma: Hemorrhage Clamp	X	X	X
Trauma: Pressure Dressing	X	X	X
Trauma: SAM Sling II	X	X	X
Trauma: Spinal Motion Restriction	X	X	X
Trauma: Traction Splint	X	X	X
Trauma: Vacuum Splint	X	X	X
Trauma: Windlass Tourniquet	X	X	X
Trauma: Wound Packing	X	X	X
Vascular Access: External Jugular	Assist with Set Up	X	X
Vascular Access: IO	Assist with Set Up	X	X
Vascular Access: IV	Assist with Set Up	X	X
Vascular Access: Venous Blood Specimen Collection		X	X

Cardiac

12-Lead ECG

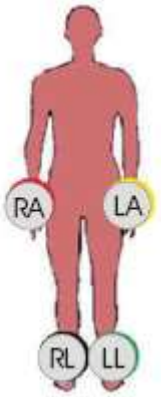
A 12-Lead ECG is a diagnostic ECG tracing showing 12 different views of the heart's electrical activity. Prehospital 12-lead ECGs can confirm the presence of a STEMI, and with advanced notification to the ER, can shorten the time to definitive therapy.

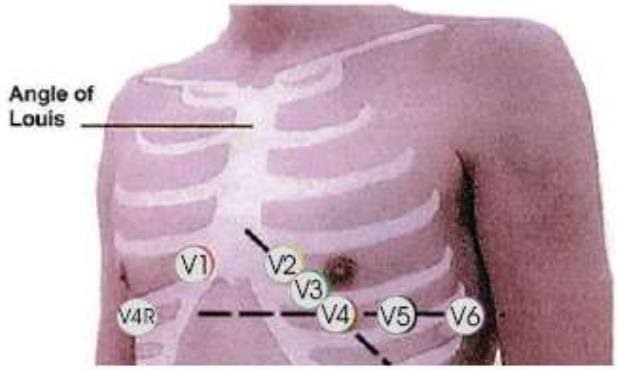
Indications

- Acute coronary syndrome
- Non-traumatic jaw or arm pain, especially as consequence of exertion
- Nausea/vomiting
- Diaphoresis
- Shortness of breath
- Syncope/lightheadedness/weakness
- Palpitations
- GI/abdominal upset/pain/cramps

Procedure

- Prep the skin (dirt, oil, sweat, or excess hair can interfere with obtaining a quality tracing).
- Place the four limb leads on the wrists and ankles as shown. Do not place the limb lead electrodes on the torso when acquiring a 12-lead ECG.





- Place the precordial leads as follows:
  - Locate the V_1 position: Run your fingers down the sternum, starting at the heads of the clavicles, until you meet a bony horizontal ridge (the Angle of Louis). With your finger on this ridge, slide it to the patient's right, into the second intercostal space, now move down two intercostal spaces to the fourth intercostal space, place V_1.
  - Place V_2 to the left of the sternum in the same fourth intercostal space.
  - Place V_4 at the left mid-clavicular line in the fifth intercostal space (V_4 must be placed prior to V_3).
  - Place V_3 between lead V_2 and V_4.
  - Place V_5 at the anterior axillary line at the same level as V_4.
  - Place V_6 at the midaxillary line at the same level as V_4.
  - Right side 12-lead (for suspected right-sided MI) can be accomplished by placing V_4R at the right mid-clavicular line in the fifth intercostal space.
- Ensure that all leads are attached and a good tracing is being received.
- Enter patient's age and record the tracing.
- Document the patient's name and physical position (e.g. supine) on the tracing, as well as, any alternative lead placements.

12-Lead Interpretation Reference Charts

I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

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SITE	FACING	RECIPROCAL
SEPTAL	V1, V2	NONE
ANTERIOR	V3, V4	NONE
ANTEROSEPTAL	V1, V2, V3, V4	NONE
LATERAL	I, aVL, V5, V6	II, III, aVF
ANTEROLATERAL	I, aVL, V3, V4, V5, V6	II, III, aVF
INFERIOR	II, III, aVF	I, aVL
POSTERIOR	NONE	V1, V2, V3, V4

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15-Lead ECG

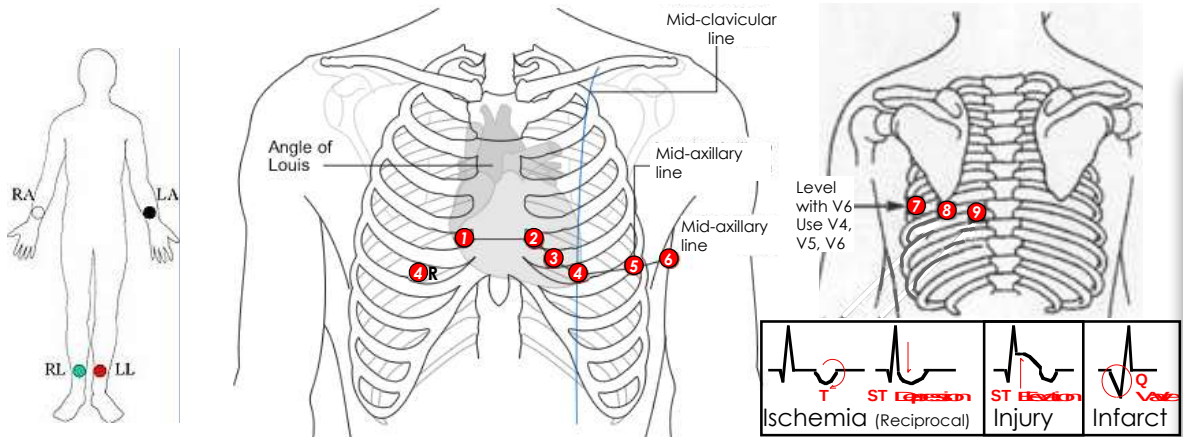
A 15-lead electrocardiogram (ECG) can confirm the presence of a STEMI, and with advanced notification to the ER, can shorten the time to definitive therapy. Leads reflect the right ventricle and posterior heart.

Indication

- If 12-lead ECG is negative for STEMI but signs/symptoms suggest ACS, perform 15-lead ECG.

Procedure

- Prep the skin (dirt, oil, sweat, or excess hair can interfere with obtaining a quality tracing).
- Place the four limb leads on the wrists and ankles as shown. Do not place the limb lead electrodes on the torso when acquiring a 12-lead ECG.
- To obtain the additional 3 leads for a 15-lead ECG, remove the patient cables from precordial electrode positions V_4, V_5, and V_6, leaving V_1, V_2, V_3, and the limb leads in place.
    - Place V_4 (label V7) at the 5th intercostal space left posterior axillary line.
    - Place V_5 (label V8) at the 5th intercostal space midscapula on the left.
    - Place V_6 (label V9) at the 5th intercostal space immediately left of the vertebral column.
- Ensure that all leads are attached and a good tracing is being received.
- Enter patient's age and record the tracing.
- Document the patient's name and physical position (e.g. supine) on the tracing, as well as, alternative lead placements.



LUCAS 2 – Chest Compression System

The LUCAS 2 Chest Compression System (LUCAS) is a battery powered system for performing mechanical chest compressions on patients in cardiac arrest. It delivers 100 compressions per minute at a depth of 1.5 to 2 inches. Once applied, the system can minimize interruptions in chest compressions and the impact of provider fatigue. For example, a patient can be safely defibrillated with the LUCAS in operation. Additionally, the LUCAS can deliver continuous compressions during patient movement. Do not delay manual CPR for the LUCAS. Immediately start manual minimal-interruption chest compressions. Utilize the MRx Q-CPR meter as soon as available. Deploy the LUCAS device when available. Best outcomes have been documented with application during first ten minutes.

Indication

- Patient who requires chest compressions and is not outside device size limitations.

Contraindications

- Sternum height is too low in a small patient or too high in a large patient. Generally, children under 12, or as evidenced by absence of secondary sex characteristics, will be too small for the LUCAS. Also, note that the LUCAS 30:2 compression/pause ratio is not correct for pediatrics without an advanced airway in place.
- Patient's chest is too wide for the device as evidenced by inability to lock compressor into back plate.

Equipment

The LUCAS comes in a carrying case (including back pack shoulder straps) with the following contents:

- Back plate
- Compressor device
- Stabilizer Strap
- Two spare silicone suction cups
- Spare lithium ion battery
- Instruction for Use Manual
- AC (110V) wall power cord
- DC (12V) car power cable

LUCAS 2 – Chest Compression System continued

Procedure

- Push ON/OFF for 1 second to start self-test and power up LUCAS.
- Carefully put back plate under the patient, below the armpits.

- Pull release rings on the compressor once; claw locks open. Then let go of release rings.
- Attach to back plate; listen for "click." Pull up once to ensure attachment.

- Center the suction cup over the chest.
- The lower edge of the suction cup should be immediately above the end of the sternum.

- Push the suction cup down with two fingers (make sure it is in the ADJUST mode).

- Pressure pad inside suction cup should touch the patient's chest. If the pad does not touch or fit properly, continue with minimal-interruption manual chest compressions.
- Push PAUSE to lock Start Position – then remove your fingers from the suction cup.
- Check for proper position. Adjust if necessary.
- Push ACTIVE (continuous) or ACTIVE (30:2).

LUCAS 2 – Chest Compression System continued

- Attach LUCAS stabilization strap.

- The LUCAS case should accompany the patient during transport to ensure that all power supply and charging options remain available.
- If return of spontaneous circulation (ROSC) is achieved, the LUCAS shall be turned off, but can remain in place to be ready in case patient arrests again.
- Recognize that maintaining minimal-interruption chest compressions with the LUCAS for some period of time after transfer of care is likely and in the patient's best interest. FRD personnel shall fully cooperate and operate the device at the request of the hospital staff as long as necessary.

Consideration

- Battery Support - The LUCAS system uses a "smart" lithium ion battery which experiences minimal discharge and can operate the device for 45 minutes or longer. There are three ways to charge the battery:
    - Store unit plugged in with 12V car power cable on the vehicle (preferred method)
    - Use the 110V power cord for extended operations in medic or at ED (also charges)
    - Use the external charger in station for "fastest" charging, estimated 1-2 hours.

Synchronized Cardioversion

Synchronized cardioversion is a controlled defibrillation for patients with a pulse. The monitor interprets the QRS cycle and delivers the electrical discharge during the R wave of the QRS complex.

Indications

Symptomatic patients presenting with the following dysrhythmias:

- Paroxysmal supraventricular tachycardia
- Ventricular tachycardia
- Atrial fibrillation
- Atrial flutter

Contraindications

- It is important to note that polymorphic V-Tach, which includes torsades, cannot be treated with cardioversion because the synchronizer will not function.

Procedure

- Monitor leads and defibrillator pads are required for cardioversion. Infant pads must be used for any patient under 10 kg.
- Consider sedation per protocol.
- Engage synchronization mode by pressing "Sync" mode and look for markers on R waves.
- Select appropriate energy level:

	1st Shock	2nd Shock	3rd Shock
Adult	**100 joules**	**150 joules**	**200 joules**
Pediatric (until onset of puberty)	**0.5 joule/kg**	**1 joule/kg**	**2 joule/kg**

- Announce that unit will be charged and press "Charge" button.
- Direct personnel to stand clear and confirm that no one is in contact with the patient, the stretcher, or the equipment (including BVM and endotracheal tube).
- Press and hold "Shock" button and wait for shock to occur.
- Before continuing Synchronized Cardioversion, reset the "Sync" mode as the unit defaults to an unsynchronized mode. Check monitor and patient. If tachycardia persists, increase joules per protocol and shock again.

Transcutaneous Pacing

Transcutaneous pacing allows electrical pacing of the heart through the skin via the defibrillator pads.

Indication

- Symptomatic bradycardia

Procedure

- Place pads on the patient as indicated on the package.
- Attach limb leads for patient monitoring.
- Set initial settings according to the table below:

	Beats per min	mA	Increasing mA interval until capture
Adult	**70**	**10**	**20**
Pediatric	**100**	**5**	**10**

General Assessment Tools

Glucometer

A glucometer is used to determine the approximate concentration of sugar (glucose) in the blood.

Blood sugar values referenced in the protocols are based on capillary samples. If venous blood was the reference sample, the number would be slightly different (higher). Best practice calls for using capillary samples whenever possible. If venous sampling is used, the resulting meter reading must be carefully evaluated in light of this variance and in the context of the patient's overall condition prior to treatment.

Indications

- Altered mental status
- Suspected hyper/hypoglycemia

Features of the Glucometer System

- Health care provider grade test strips
- Suitable for neonatal, venous, and capillary blood
    - Venous blood may give slightly different results from capillary blood because of differences in the way the test strips react to venous and capillary whole blood.
    - Use finger or heel sticks only for capillary blood (no alternate site use authorized)
- Follow the guidelines in the product documentation for:
    - Operating temperature range
    - Storage temperature range
    - Measurement Range
    - Non-clinical functions such as date/time adjustment
    - Strip insertion orientation
    - Calibration and lot confirmation
- Used only for glucometry. No other blood values measured at this time (e.g. ketone levels).

Blood Glucose Measurement Procedure

Capillary sample:
- Allow hand/foot to hang
- Prep/clean site
- Open strip and insert fully into meter
- Ensure site is clean and dry (even a small amount of residual alcohol may dilute sample and generate inaccurate reading)
- Lance site and allow blood drop to form (do not squeeze site)

Venous (from ProtectIV catheter) sample:
- Ensure sufficient amount of blood in flash chamber
- Ensure catheter is safed
- Open strip and insert fully into meter
- Keeping catheter pointed away from self and all personnel, carefully use pen or blunt cannula to slightly depress flash chamber cap and form blood drop at catheter end.

All samples:
- Touch blood drop to sample collection area at end of strip until test begins.
  - Ensure sample is of sufficient size (better too big than too small).
- Wait for result.
  - If reading is 300mg/dL or higher, meter may show "KETONES?" message. Disregard as we do not currently use this function.
- If result does not match clinical presentation, perform calibration/verification procedure (below) and re-test, ensuring good technique.

Calibration/Verification Procedure
- To be performed every time a new box of strips is opened, or any time a test result is questionable. Follow guidelines for particular glucometer/strip system using supplied test materials.

General Storage and Maintenance
- Store instructions with associated strips, calibrating supplies, and glucometer in glucometer case.
- Control Solutions expire per label AND 90 days after opening; mark bottles with date three months days from first use. Store with or near glucometer in case verification is needed on scene.

Troubleshooting
- If meter will not turn on, replace battery. Replace meter if problem remains.
- Consult instructions for error code interpretation.
- As with all medical devices, treat the patient, not the monitor. If results are in doubt, re-test per procedure or with a different system. While the strips are meant for health care providers, the meter itself is a consumer grade product. Any meter that repeatedly generates error messages or questionable results should be replaced.

- Recall also that the blood sugar values referenced in our protocols are based on capillary samples. If venous blood was the reference sample, the number would be slightly different. Best practice calls for using capillary samples whenever possible; if venous sampling must be used, the resulting meter reading must be carefully evaluated in light of this variance and in the context of the patient's overall condition prior to treatment.

RAD-57

The Rad-57 provides numeric values for oxygen saturation of arterial hemoglobin (%SpO_2) and carboxyhemoglobin saturation (%SpCO).

Indications

- Smoke inhalation/burn patients
- Altered mental status of unknown origin, particularly in multiple patient situations
- Any patient suspected of carbon monoxide exposure

Procedure

- Apply promptly to obtain room air saturation without denying supplemental O_2.
- Turn on device and allow self-calibration (20 seconds).
- Use "display" button to toggle between SpO_2, SpCO, and perfusion index (PI) which is a numeric measurement of pulse strength at the monitoring site. A PI of 1.0% or greater is required for reliable readings.
- Choose appropriate site and check for adequate proximal pulse and tissue temperature.
- Choose the correct sensor (adult vs. pediatric).
- Use antiseptic wipes to assure monitoring site is clean and dry if needed.
- Place sensor on finger (cannot be used on toes or ear lobes, etc.).
- Cover sensor with towel or blanket to limit light exposure.
- Ensure pulse rate on device matches palpated pulse rate.
- Ensure signal strength is sufficient for accurate reading (green light, clear waveform).
- Readings for SpCO, range from zero to 100. Keep in mind that smokers may be expected to have background levels 3-4% points higher than non-smokers.

Common clinical manifestations of Carbon Monoxide exposure

SpCO %	Clinical Manifestations
0-4%	None – Normal
5-9%	Minor Headache
10-19%	Headache, Shortness of Breath
20-29%	Headache, Nausea, Dizziness, Fatigue
30-39%	Severe Headache, Vomiting, Vertigo, ALOC
40-49%	Confusion, Syncope, Tachycardia
50-59%	Seizures, Shock, Apnea, Coma
60% -up	Coma, Death

Medication Administration

Autoinjector

Autoinjectors are intramuscular injection devices designed to be used in emergencies by both civilians and providers. Autoinjectors are designed to work through clothing if necessary.

Indications

- Severe allergic reaction (BLS providers)
- Organophosphate poisoning/Nerve agent exposure

Procedure

- BLS providers **contact Physician OLMD** for permission if patient does not have a prescribed autoinjector.
- Ensure that no contraindications exist prior to administration. Check expiration date.
- Expose skin and wipe site with antiseptic wipe prior to administration if time and patient condition allow.
- Grasp unit with the tip pointing downward. Remove safety cap of autoinjector.
- Hold tip near outer thigh, midway between hip and knee.
- Press injector against the patient's thigh to trigger the release of the spring-loaded needle and inject the dose into the patient.
- Hold injector against the thigh for at least 10 seconds to ensure medication is fully administered. Ensure that patient's leg does not move during administration.
- Remove and dispose of used autoinjector in a sharps container.

Cross-Check

The medication administration cross-check procedure is in place to reduce medication administration errors and ensure quality patient care. The cross-check procedure should be implemented prior to the administration of any medication to a patient.

When an ALS provider is administering a medication, it is preferred that the cross-check be completed by another ALS provider. If this is not possible, a BLS provider may perform the cross-check.

When a BLS provider is administering a medication that is within their scope of practice, another BLS provider is authorized to perform the cross-check.

Providers should ensure the following with verbal and visual checks:

- Right Medication
- Right Dose
- Right Route
- Right Rate
- Right Reason
- No Contraindications
    - Appropriate vital signs
    - No allergy to medication
    - Expiration date still valid

All of the above should be confirmed, but if circumstances do not allow (e.g. BLS provider unable to confirm correct dose due to certification level) then at least the information must be confirmed (e.g. BLS provider confirms that the ALS provider is giving the amount stated).

Any provider may object to the administration of a medication. If there is a disagreement or a need for clarification, the following should be considered:

- Look it up – refer to EMS manual or field guide
- Defer to expertise – highest certified provider's judgment
- Consult Physician OLMD

Never give the contents of a syringe that is not labeled or without visualizing the vial or ampule from which it was immediately drawn.

Endotracheal (ET)

Endotracheal medication administration is a viable medical administration route **only** when no other routes are available. These drugs are absorbed by the pulmonary capillaries, but the efficacy is unreliable.

Indications

- For medication administration when other routes are not accessible.
- Medications that may be administered via the endotracheal tube only; do not administer these medications via the King LT or King LT-SD airway):
    - L – Lidocaine
    - E – Epinephrine
    - A – Atropine
    - N – Narcan

Procedure

- To prevent hypoxia, the patient must be pre-oxygenated before removing the bag-valve-mask.
- Stop compressions while injecting the medication into the endotracheal tube.
- Medications administered should be aggressively circulated with bag-valve-mask ventilation.
- Attempt to limit volume of fluid delivered:
    - For adults, total volume should not exceed 10 ml/dose.
        - Consider using Epinephrine 1:1,000 with added NS.
    - For children, total volume should not exceed 5 ml/dose.
    - For neonates, total volume should not exceed 3 ml/dose.

Inhaler

Inhaled medications can be delivered through metered dose inhalers (MDI) prescribed by a physician which produce a medicated spray.

Indication

- BLS providers may assist a patient with administration of their prescribed inhaler for wheezing/respiratory distress.

Procedure

- Shake and prime the inhaler.
- Coach the patient to exhale deeply, press the inhaler to activate spray as patient begins to inhale.
- Patients should be instructed to hold their breath, if possible, for 5-10 seconds so that medication can be absorbed.
- Repeat if indicated.

Intramuscular (IM)

As an indirect route, intramuscular injection is indicated where rapid drug action is not required or desired. For a number of reasons the absorption rate is less predictable. Absorption is faster than subcutaneous injection because muscle tissue is more vascular than subcutaneous tissue.

Indication

- Administration of approved medications when intravascular administration is not available or desired.

Procedure

Syringe	1 ml, 3 ml, 5 ml depending on site and medication requirements
Needle	19 gauge – 23 gauge (1 ½")
Injection site/ Maximum dose	Deltoid: 1 ml Lateral Quadricep: 5 ml Gluteus: 5 ml
IM Insertion	Cleanse site with antiseptic wipe prior to procedure. Insert needle at a 90 degree angle to the skin. Aspirate before administering medication to ensure that a blood vessel has not been entered.

Intranasal (IN)

This alternate method of drug administration may be used with Narcan, Fentanyl, or Midazolam, when intravascular administration is not available or desired.

Indications

- Patients suspected of opiate overdose
- Seizure patients
- Pain management

Procedure

- Draw the desired dose of the medication plus 0.1ml of air into a 3 ml syringe.
- Remove needle and attach the mucosal atomizer device (MAD) to the tip of the syringe.
- Control the patient's head and gently but firmly place the atomizer into the nostril.
- A max of 1 ml may be administered into each nostril.
    - For larger volumes of fluid, divide into two separate administrations 5 minutes apart.

Considerations

- Bloody nose, nasal congestion, and mucous discharge can prevent mucosal contact of drug.

Intravenous (IV)

As the direct route to the circulatory system, IV access represents the fastest and most predictable means of medication administration.

Indications

- To replace fluids lost from the circulatory system due to injury or illness.
- To maintain direct access to the circulatory system for the administration of medications.

IV Set Up

Mini drip	60 gtts/ml	IV access, medication infusion
Macro drip	10 gtts/ml	IV access, medication infusion, rapid fluid replacement
Buretrol		Measured volume administration, usually for pediatrics (pressurized infusion not possible, use bolus if needed)
Saline lock		IV access

Catheters: 14 gauge–24 gauge

14g–18g	Adult fluid replacement
18g–20g	Medication administration, vascular access, pediatric fluid replacement
22g–24g	Medication administration, vascular access

Fluid Administration

- KVO (Keep Vein Open) – To be used for medication administration and to maintain a patent route in the event that future medication administration is required (as low as 0.5 ml/hour, no more than 30 ml/hour)
- Fluid Challenge – To be used for rapid drip infusion of fluid (run wide open) in the hypotensive patient.

Medication Administration

- Push rates
    - IV rapid (bolus pushed as rapidly as practical)
    - IV (bolus pushed steadily and quickly, standard for CPR medication)
    - IV slow (bolus over 1-2 min, standard for most medications given to living patients; or over specified time)
    - Infusion (drip infused over specified time or at specified rate)

- Medication error reduction
  - Consider diluting concentrated or small volume medications prior to administration (e.g. Morphine, Fentanyl).
    - The lower concentration reduces chance of administering the wrong amount by simplifying dose calculation and increasing visible size of bolus. Increased volume is easier to deliver over 1-2 minutes.
    - Dilute using a 10 ml pre-filled saline flush
      - Determine desired volume of drug
      - Waste equivalent volume of normal saline (NS) from 10 ml flush
      - Draw desired volume into 10 ml flush
      - Administer over appropriate time
    - Example using Fentanyl:
      - Depress then remove white cap from supplied 100 mcg/2 ml prefill
      - Waste 2 ml from 10 ml flush
      - Draw 2 ml into flush from Fentanyl prefill using metal (red) cannula
      - Administer desired Fentanyl dose at 10 mcg/ml
- Clearing the IV line
  - Flush line or lock with NS between each drug administration to avoid possible drug interaction in the IV line and to push medication to central circulation.

Nebulizer (NEB)

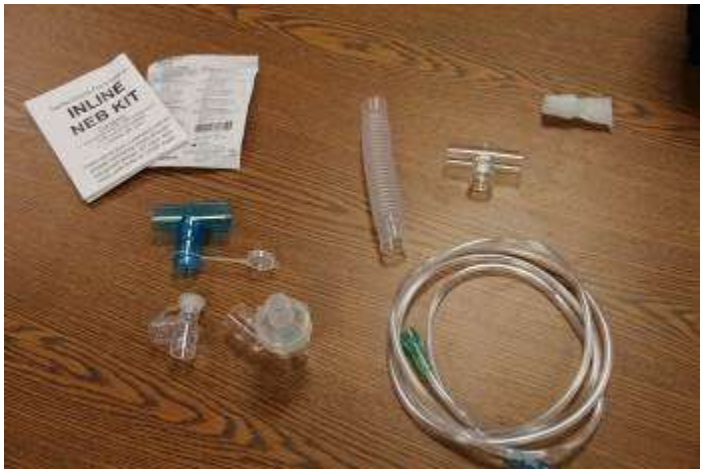
Nebulizers are devices that aerosolize liquid using pressurized oxygen to deliver medication directly to the lungs.

Set Up

Equipment

Patient-held device and cup

Mask

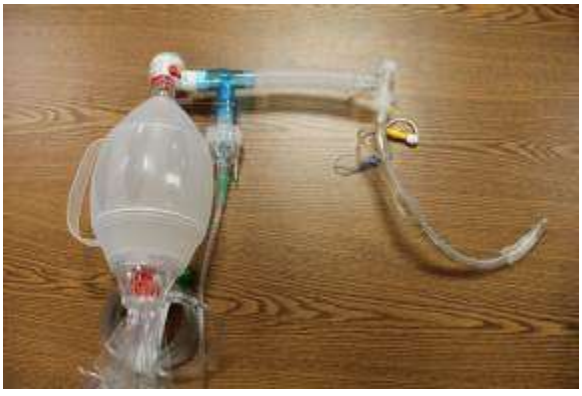


In-line nebulizer kit paired with a standard nebulizer kit.

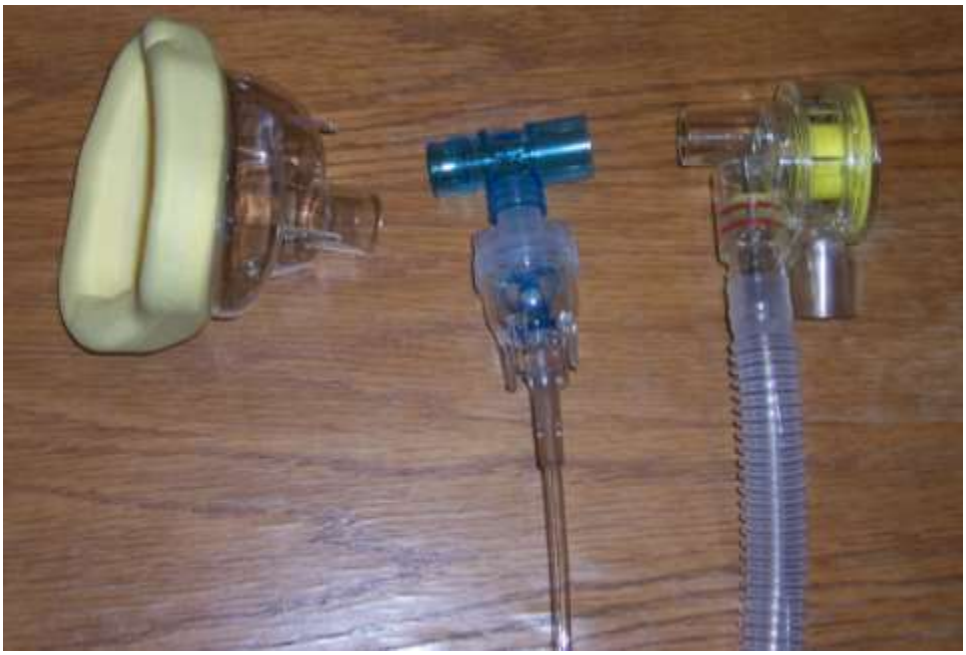
Procedure

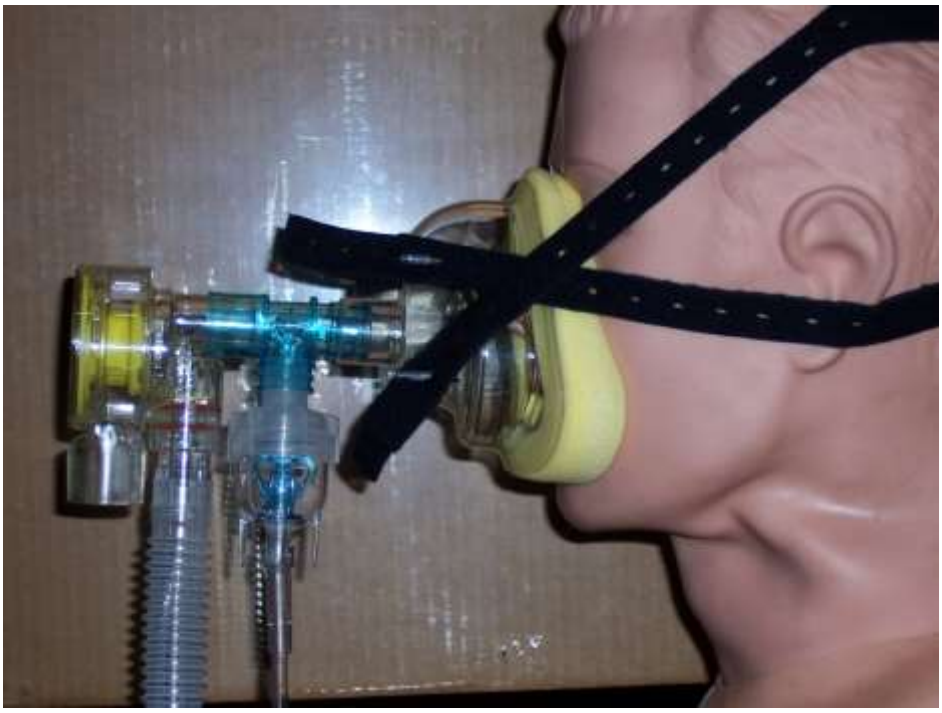
- Items needed from kit:
  - One corrugated tube
  - Medication cup
  - Adapter with 15 mm and 22 mm connections
  - One O_2 tubing
  - 90 degree elbow

In-line nebulizer circuit with BVM and Mask



In-line nebulizer circuit with ET tube.





In-line nebulizer circuit with CPAP.

Nebulizer Administration continued

Indication

- Respiratory distress

Contraindication

- Apnea or insufficient respiratory effort (mask and patient-held device only).

Procedure

- Determine appropriate nebulizer set-up (patient-held device, mask, or in-line).
    - Adults and older children may be able to use patient-held device.
    - Younger children and fatigued patients should be given the mask.
    - In-line systems should be used in conjunction with BVM or CPAP.
- Fill medication cup.
    - Always keep cup upright to prevent spillage and ensure proper function.
- Assemble nebulizer system and attach to oxygen.
    - Turn oxygen to 6–8 liters per minute for proper mist generation.
- Coach the patient to breathe deeply and slowly and hold breath for 5 seconds between inhalations.
    - Advise patients they may feel the need to cough and that is normal.
- Continue until nebulizer cup is empty.
    - Tap sides of cup to force condensation to the bottom of the cup.

Oral - Glucose

Oral glucose can be used to treat patients with hypoglycemia.

Indication

- Patient has a blood glucose level of less than 70 (adults) or 60 (pediatrics).

Contraindications

- Patient cannot protect his or her airway.
- Patient is unable to swallow.
- Patient cannot follow commands.

Procedure

- Squeeze small portions of the glucose gel into the patient's mouth between the cheek and gum on each side until the tube is empty.
- Monitor the patient for signs of airway compromise, such as choking, gagging, drooling, or uncontrolled coughing.

Peripherally Inserted Central Catheter (PICC) Access

A peripherally inserted central catheter is a form of intravenous access that can be used for a prolonged period of time (e.g. for long chemotherapy regimens, extended antibiotic therapy, or total parenteral nutrition). A PICC is inserted in a peripheral vein, such as the cephalic vein, basilic vein, or brachial vein and then advanced through increasingly larger veins, toward the heart until the tip rests in the distal superior vena cava.

Indication

- Any life-threatening medical condition where vascular access is imperative and a reasonable effort to establish an IV has been unsuccessful or the patient refuses attempts at alternative peripheral sites.

Contraindications

- Trauma situations are contraindicated because the PICC line will not flow a large volume of fluid due to the size of the lumen. Forceful flushing may cause the catheter to rupture.

Procedure

- Put on clean or sterile gloves.
- Place a chux under the arm.
- Inspect arm for redness, discharge, etc.
- Place sterile gauze under the PICC site.
- Clean the injection caps with an antiseptic wipe for at least 15 seconds and let dry.
- Unclamp the catheter.
- Aspirate 5−10 ml of blood from the catheter with a 10 cc syringe, if resistance is met STOP and try an alternate lumen.
- Put the aspirated contents in the biohazard container.
- Re-clean the injection cap with an antiseptic wipe for at least 15 seconds and let dry.
- Flush with 10 cc of NS using a 10 cc syringe.
- After determining that line is patent then hang IV fluids or push medications per protocol.

Considerations

- While a PICC line can be used for access in an emergent situation it is not considered vascular access establishment. Establishment of patent vascular access is necessary for large volume fluid replacement.

Subcutaneous (SQ)

As an indirect route, subcutaneous injection is slower than intravenous and intramuscular administration because subcutaneous tissue is less vascular.

Indication

- When a relatively slow rate of medication absorption is desired.

Procedure

Syringe	1 ml
Needle	25 gauge (5/8") or smaller
Medications	Epinephrine 1:1,000
Sites	Most common site used: Deltoid
Angle of insertion	Cleanse site with antiseptic wipe. Insert needle at a 45 degree angle to the skin. Aspirate before administering medicine to ensure that a blood vessel has not been entered.

Precaution

- Subcutaneous administration is not indicated for patients in shock because the associated vasoconstriction will slow medication absorption significantly.

Sublingual (SL)

Medication delivered under the tongue is rapidly absorbed by the sublingual capillaries.

Procedure

- Do not allow tablet to contact provider's bare skin.
- Ensure gloves are dry.
- Instruct patient to open mouth wide and lift tongue.
- Place tablet under tongue.
- Instruct patient to lower tongue and close mouth.
- Instruct patient not to swallow or chew tablet.

Respiratory

Bag-Valve-Mask (BVM)

The bag-valve-mask (BVM) is used for supplemental tidal volume oxygenation and delivery of rescue breathing to the patient.

Indication

- Severe respiratory distress or arrest

Procedure

- Ensure that the correct size equipment combination is used:
  - Bag
    - Newborn - 3 mo Neonatal 450 - 500 ml
    - Child < 30 kg Pediatric 750 ml
    - Child > 30 kg Adult 1,000 - 1200 ml
    - Adult Adult 1,000 - 1200 ml
  - Mask
    - Infant
    - Pediatric
    - Adult
- Connect the BVM to 15 lpm of oxygen, as soon as possible.
- Ensure that an adequate seal is maintained while ventilating. Ventilate at age-appropriate rates in accordance with American Heart Association standards. Use only the force and tidal volume necessary to cause the chest to rise.
  - Adult – 10-12 breaths per minute (bpm)
  - Child – 12-20 bpm
  - Infant – 12-20 bpm
  - Newborn – 40-60 bpm (intubation may be necessary for pre-term infants below 1 kg)
- Over-ventilating should be avoided at all times, and hyperventilation should be avoided except in cases of suspected herniation.
- When ventilating a stoma, first determine if there is a complete or partial laryngectomy. If it is partial, air may escape through the mouth/nose during ventilation; keep the patient's mouth closed and nares pinched while ventilating through the stoma. If the laryngectomy is complete, these steps are not necessary. Ventilate with BVM via the 15 mm connection at the stoma or use a pediatric mask. If it is not possible to ventilate through the stoma, cover the stoma and attempt to ventilate via the mouth.
- If the BVM is equipped with a pressure release valve (pop-off) and it is activating prior to adequate chest rise and proper airway position is being maintained, disable the pop-off while ventilating.

Chest Decompression

A tension pneumothorax develops when air in the pleural space cannot escape. Inserting a needle into the chest wall will convert a tension pneumothorax to an open pneumothorax. No age limit.

Indications

- Traumatic CPR with thoracic involvement (bilateral)
- Evidence of tension pneumothorax requiring emergent prehospital intervention, to include:
    - Contributing mechanism AND
    - Absent breath sounds AND
    - One of the following:
        - Hypotension (SBP less than 90 or age appropriate) not readily attributable to other causes
        - Severe respiratory distress/Hypoxia
        - Tracheal deviation (late sign)

Procedure

- Identify the primary site (second intercostal space on the side of the pneumothorax at the mid-clavicular line):
    - Place your finger at the notch in the top of the sternum.
    - Move your finger slowly downward about 1.5 inches (for adults) until you feel a slight horizontal ridge or elevation. This is the Angle of Louis where the manubrium joins the body of the sternum.
    - Locate the second intercostal space on the affected side, lateral to and just below the Angle of Louis.
- Alternate site (lateral approach): Above the fourth rib, mid-axillary on the side of the pneumothorax.
- Wipe away gross blood/fluid and cleanse the area with alcohol or providone swab.
- Select the appropriate-sized non-safety catheter from kit:
    - Large adult: 3.25" 14g
    - Adult/teen: 2" 14g
    - Child/infant: 1.25" 18g
    - Neonate: 1" 20g
- Advance the needle into the second intercostal space. Enter the thoracic cavity by passing the needle just over the top of the third rib to avoid interference with the blood vessels and nerves that run along the bottom of the second rib: "*Over the top to pop.*" If using the Lateral approach, advance needle above the fourth rib.
- Advance the needle/catheter into the chest enough to ensure the lumen of the catheter itself is in the space, and then anchor the needle and continue to advance the catheter fully being careful not to kink the plastic. Secure the catheter, leave open to air.
- Monitor the patient's vital signs and breath sounds for recurring tension pneumothorax. If signs and symptoms appear again, re-assess to confirm diagnosis, verify affected side, and decompress the chest again.

CPAP: PortO_2Vent

CPAP (continuous positive airway pressure) is a noninvasive positive pressure ventilation device for use in patients with heart failure, chronic obstructive pulmonary disease (COPD), and asthma. CPAP has drastically reduced the length of hospitalization for patients who in the past would have required intubation.

Indications

- CPAP may be applied to patients in moderate to severe respiratory distress due to suspected CHF, COPD, and/or Asthma.
    - CHF: rales/rhonchi, peripheral edema, JVD, ascites, orthopnea and/or frothy sputum
    - COPD: smoking history, pursed lip breathing, cyanosis/red face, dyspnea on exertion, chronic barrel chest
    - Asthma: asthma history, refractory to inhaled beta-agonists (MDI/NEB)
    - Moderate to severe respiratory distress:
        - Increased work of breathing: retractions, rate greater than 30, pursed lips
        - Abnormal lung sounds: bilateral rales (at least half-full), diffuse wheezes, diminished breath sounds
        - Respiratory insufficiency: O_2 saturation less than 98% on 10 lpm, less than 90% on room air

Contraindications

- The use of CPAP is contraindicated in patients **less than 18 years old** or with the following signs and symptoms:
    - Inability to protect the airway
        - Decreased LOC
        - Vomit/secretion
        - Decreased Cough/Gag
    - Inadequate respiratory drive
        - Cardiac arrest
        - Respiratory arrest
        - Rate < 10
    - Pneumothorax
    - SBP < 90 mmHg
    - Gastric distension
    - Inability to fit or tolerate mask

Preparation

- Connect equipment and fit patient with CPAP mask.
- Ensure O_2 cylinders with CPAP adapters are available (full D cylinder may last as little as 10-15min depending on patient)
- Coaching techniques can assist in alleviating fear associated with placing a mask on a patient in respiratory distress. Consider allowing patient to hold mask in place prior to engaging straps.

Procedure

- Set initial positive airway pressure at 5 cm H_2O and titrate upward until signs of clinical improvement are observed. Device is factory limited to 12-16 cm H_2O. Evidence of clinical improvement includes:
  - Improvement of heart rate.
  - Improvement of respiratory rate.
  - Increased/improved oxygen saturation.
  - Decreased work of breathing.
  - Patient's report improvement in dyspnea.
- Closely monitor CPAP administration and immediately discontinue if the patient's status worsens such that:
  - The patient can no longer protect his or her airway.
  - The patient fails to maintain an adequate respiratory drive.
  - The patient develops hypotension SBP less than 90.
  - The patient is unable to tolerate the mask and procedure despite reasonable efforts.
- Any interruptions in CPAP should be brief. If, for example, nitroglycerin therapy is indicated at least two providers should be present to efficiently coordinate mask removal, medication administration, and mask replacement.
- Notify ED for appropriate transition to hospital staff.

CPAP: O2-RESQ

CPAP (continuous positive airway pressure) is a noninvasive positive pressure ventilation device for use in patients with heart failure, chronic obstructive pulmonary disease (COPD), and asthma. CPAP has drastically reduced the length of hospitalization for patients who in the past would have required intubation.

The O2-RESQ device operates on the venturi principle versus a demand-valve mechanism. It delivers 30% FiO_2. When additional oxygen is added via the end-tidal CO_2 cannula (capnoline) the FiO_2 can increase to over 50%. A rule of thumb is that for each liter flow through a nasal cannula, you add 4% to FiO_2.

Indications

- CPAP may be applied to patients in moderate to severe respiratory distress due to suspected CHF, COPD, and/or Asthma.
    - CHF: rales/rhonchi, peripheral edema, JVD, ascites, orthopnea and/or frothy sputum
    - COPD: smoking history, pursed lip breathing, cyanosis/red face, dyspnea on exertion, chronic barrel chest
    - Asthma: asthma history, refractory to inhaled beta-agonists (MDI/NEB)
    - Moderate to severe respiratory distress:
        - Increased work of breathing: retractions, rate greater than 30, pursed lips
        - Abnormal lung sounds: bilateral rales (at least half-full), diffuse wheezes, diminished breath sounds
        - Respiratory insufficiency: O_2 saturation less than 98% on 10 lpm, less than 90% on room air

Contraindications

- The use of CPAP is contraindicated in patients **less than 18 years old** or with the following signs and symptoms:
    - Inability to protect the airway
        - Decreased LOC
        - Vomit/secretion
        - Decreased Cough/Gag
    - Inadequate respiratory drive
        - Cardiac arrest
        - Respiratory arrest
        - Rate < 10
    - Pneumothorax
    - SBP < 90 mmHg
    - Gastric distension
    - Inability to fit or tolerate mask

Preparation

- Connect equipment and thread directly onto the 50 psi DISS fitting on portable O_2. For onboard administration, unscrew "Christmas tree" then connect. Set at 15 lpm.
- Fit patient with CPAP mask. Coaching techniques can assist in alleviating fear associated with placing a mask on a patient in respiratory distress. Consider allowing patient to hold mask in place prior to engaging straps.
- DISS port is totally independent of liter flow barb – can use either or both.
- Corrugated tube extends up to 72 inches. Extend from mask end first and leave several inches compressed near "flow filter" to minimize whistling/flow sound.

Procedure

- Initial pressure is set at 5 cm H_2O. If necessary, titrate upward to 7.5 and 10.0 cm H_2O until signs of clinical improvement are observed. One full rotation of valve is required for each pressure change. Evidence of clinical improvement includes:
    - Improvement of heart rate.
    - Improvement of respiratory rate.
    - Increased/improved oxygen saturation.
    - Decreased work of breathing.
    - Patient's report improvement in dyspnea.
- If poor appearance or marked hypoxia, add oxygen via the end-tidal CO_2 cannula (capnoline) placed under the mask or use the exterior port.
- Closely monitor CPAP administration and immediately discontinue if the patient's status worsens such that:
    - The patient can no longer protect his or her airway.
    - The patient fails to maintain an adequate respiratory drive.
    - The patient develops hypotension SBP less than 90.
    - The patient is unable to tolerate the mask and procedure despite reasonable efforts.
- Any interruptions in CPAP should be brief. If, for example, nitroglycerin therapy is indicated at least two providers should be present to efficiently coordinate mask removal, medication administration, and mask replacement.
- If no improvement, consider trial with PortO_2Vent system or switch to BVM respiratory assistance.
- Notify ED for appropriate transition to hospital staff.

Cricothyrotomy – Needle (< 8 yrs)

Needle cricothyrotomy is the process of puncturing the cricothyroid membrane to create an airway in patients less than 8 years of age. It allows for some degree of ventilation and oxygenation of a patient when controlling the airway is not possible by any other means. This is a potentially life-saving airway; in such cases, spinal motion restriction must be evaluated in light of the overall clinical picture.

All cricothyrotomy procedures require notification to the DC-EMS and Operational Medical Director through the EMS Supervisor within 24 hours.

Restriction

Authorization for this procedure is limited to EMT-Paramedic level providers. If no EMT-P is on scene, utilize other available airway management techniques (e.g. Magills, BVM, suction, etc.) and **contact Physician OLMD** as needed.

Indications

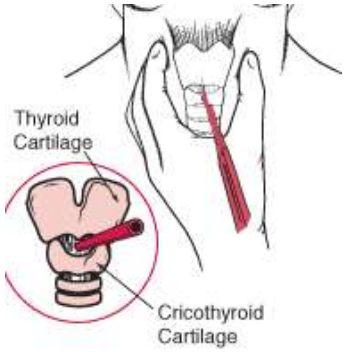
- To establish an emergency airway when basic and other advanced airway techniques are unsuccessful due to airway obstruction or extensive trauma to the face or neck region in **patients less than 8 years of age**.
- For patients ≥ 8 years of age refer to the **Surgical Cricothyrotomy** procedure.

Procedure

- Obtain required materials**:**
  - Cric Catheter (14g purpose built)
  - Antiseptic wipes and dressings
  - Suction unit
  - 10 ml syringe
  - Large bore extension set (optional)
  - 3.0 ET/BVM Adapter
  - Pediatric BVM with oxygen source and End-Tidal CO_2 connected
- Assemble and check equipment.
- Place the patient in a supine position, and hyperextend neck if possible.
  - Placing a pillow or towel beneath the neck may help in locating the landmarks.
  - Patients with airway injuries may have significant spinal injuries; c-spine should be immobilized if indicated before beginning this procedure (manual stabilization is acceptable).
    - Full immobilization, to include securing the upper extremities, may be indicated after the procedure even if cervical spine injury is not suspected in order to prevent the patient from removing or otherwise interfering with the catheter.
  - Consider contacting **Physician OLMD** if sedation is indicated at any time.

Cricothyrotomy – Needle (< 8 yrs) continued

- Locate the cricothyroid membrane by palpating the sternal notch and then the trachea. Carefully move up until a perpendicular ridge is felt. This is the cricoid ring (cartilage). A pointed prominence just above is the thyroid cartilage (larynx or Adam's apple). The space between the two prominences is the cricothyroid membrane, noted by a small depression. The skin needs to be punctured at exactly this point.



- Stabilize the larynx with one hand.
- Palpate the cricoid cartilage and cricothyroid membrane with the other hand to verify site.
- Cleanse site with antiseptic wipe.
- While maintaining control of the larynx with one hand, hold the syringe-catheter assembly in the other and carefully puncture the skin at a near 90° angle, advancing far enough that the tip of plastic catheter is in the lumen of the trachea.
    - A "pop" can be felt as the needle penetrates the trachea and resistance should disappear.
    - Bleeding is not uncommon and can be severe; this is not an indication of correct or incorrect placement. Suction may be helpful.
- Anchor the syringe and aspirate. If air is returned easily, the needle is in the correct location. If it is difficult to aspirate or blood is withdrawn, reevaluate needle placement.

Cricothyrotomy – Needle (< 8 yrs) continued

- Maintain control of the syringe and gently advance just the plastic the catheter.
    - Decrease the angle of entry in relation to the chin as the catheter is advanced, following the curve of the needle.
    - Once the catheter is fully inserted and the flange lies against the neck, aspirate to check position again.
    - Withdraw the syringe-needle assemble and secure the sharp.
- Attach bag-valve-mask (BVM).
    - Placing extension set between catheter and BVM may be helpful if the device will be subject to movement or there is very little working room and a flexible connection is preferred.
    - Attach the 3.0 ET/BVM adapter to the catheter (or extension set).
    - Attach BVM to adapter and ventilate.
        - Watch for chest rise, then stop and allow passive exhalation through the glottis
        - Exhalation will take longer than normal (consider a 1:5 inhalation : exhalation ratio)
        - Ventilations are adequate when you observe chest rise and have breath sounds. Breath sounds may be very difficult to hear due to minimal tidal volume and chest rise may be slight.
- Secure the catheter into place after confirming correct positioning and continue providing ventilatory assistance.
- Monitor pulse oximetry, End-Tidal CO_2, and ECG.

Cricothyrotomy – Surgical (8 yrs or older)

Surgical cricothyrotomy is the process of establishing an airway by making an incision through the cricothyroid membrane and inserting an endotracheal tube or tracheostomy tube. It is restricted to paramedic level providers who have received training and demonstrated proficiency through the Training Division. It is narrowly indicated for complete airway obstruction and cannot intubate/cannot ventilate scenarios that cannot be managed by other less invasive means. This is a potentially life-saving airway, but only in the right circumstances and in the right hands.

All cricothyrotomy procedures require notification to the DC-EMS and Operational Medical Director through the EMS Supervisor within 24 hours.

Restriction

Authorization for this procedure is limited to EMT-Paramedic level providers. If no EMT-P is on scene, utilize other available airway management techniques (e.g. Magills, BVM, suction, etc.) and **contact Physician OLMD** as needed.

Indications

- To establish an emergency airway when basic and other advanced airways techniques are unsuccessful due to airway obstruction or extensive trauma to the face or neck region in **patients 8 years of age or older**.
- For patients < 8 years of age refer to the **Cricothyrotomy – Needle (< 8 yrs)** procedure.

Procedure

- Obtain required materials
  - Appropriate PPE, including gloves, face and eye protection
  - Antiseptic skin prep pads
  - Suction unit available
  - 4x4 gauze sponges
  - Scalpel
  - Endotracheal Introducer
  - 6.0 endotracheal tube
  - 10ml syringe
  - Bag valve mask
  - Supplemental oxygen
  - End-tidal CO_2 or capnography to confirm placement
  - Cloth tape and/or IV tubing to secure airway
- Positioning
  - Place the patient in a supine position.
  - Trauma patients will likely require full spinal motion restriction. Remove collar if applied and stabilize cervical spine manually during and after this procedure. A folded or rolled towel under neck may assist stabilization.
  - Consider restraining the upper extremities to prevent the patient from removing or otherwise interfering with the procedure or displacing the airway.

- Consider patient sedation if time permits. Establish **Physician OLMD** for **Midazolam 2mg** IV.
- Provider positions at the side of the patient– typically right side for a right-handed provider.

- Palpate Anatomical Landmarks
  The cricothyroid membrane can be located by palpating the sternal notch and then the trachea. Carefully move up until a perpendicular ridge is felt. This is the cricoid ring. The pointed prominence just above is the thyroid cartilage (larynx or Adam's apple). The space between the two prominences is the cricothyroid membrane, noted by a small depression. Note there will be another depression superior to this which is the thyrohyoid space. This is not the desired location and is above the vocal cords.

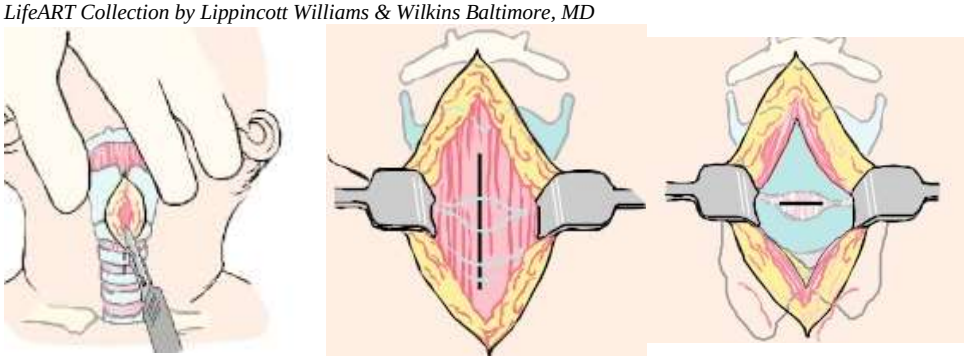
Figure 1: Anatomical Landmarks for Cricothyrotomy

Lateral view *Anterior view*

- Place the airway
  - Clean the site.
  - Grasp the larynx with thumb and middle finger and locate the cricothyroid membrane with the index finger of the non-dominant hand.
  - Make a vertical skin incision approximately 3 cm long, followed by blunt dissection (spread the skin) using your finger to the level of the cricothyroid cartilage and membrane.
  - Confirm landmarks and desired location and then proceed with a horizontal incision through the cricothyroid membrane (refer to Figure 2). Use caution to not incise too deep or risk puncture of the posterior wall of the trachea.
  - Immediately place your finger to secure the opening and bluntly enlarge the opening.
  - Gauze sponges and suction may help with visualization of the procedure field.
  - Use the dominant hand to grasp the endotracheal introducer with the bent tip pointed to the feet. Introduce it into the incision and advance while feeling for tracheal clicks and then stop.
  - You should encounter the carina within 12 cm of insertion, much more shallow than with orotracheal intubation. Keep a hand on the endotracheal introducer to avoid displacing it.

- Advance a 6.0 endotracheal tube over the endotracheal introducer and through the incision into the trachea (refer to figure 3).
  - Some slight pressure and back and forth rotation may be necessary.
  - If time permits, completely deflate any residual air from balloon and apply surgical lube to ease insertion.
- Once the balloon is fully through the skin it is deep enough. Inflate the balloon. Gently withdraw the endotracheal introducer and begin BVM. Confirm placement using capnography and standard clinical methods.

Figure 2: Cricothyrotomy Incisions
LifeART Collection by Lippincott Williams & Wilkins Baltimore, MD



Initial Incision *Subcutaneous Incision* *Horizontal Incision*

Figure 3: Airway Placement

Place endotracheal introducer through incision into trachea

Advance 6.0 ETT over endotracheal introducer

- Manage the Airway
  - Secure the tube to avoid displacement and ventilate patient.
  - Effective techniques to secure include IV tubing girth hitch and/or cloth tape. Use best method based on patient condition.
  - Bleeding is not uncommon and can be severe; this is not necessarily an indication of correct or incorrect placement.

Cricothyrotomy – Surgical (8 yrs or older) continued

- Cardiac monitor, capnography, pulse oximetry should be continued during movement and transport. Any changes in capnography require immediate reassessment of airway.
- Periodically evaluate the patient for response to noxious stimulus (mild pain response, pinching the hand, etc.).
- If the patient becomes responsive to noxious stimuli **establish OLMD for Midazolam 2 mg** IV slow repeated every 5 minutes in order to prevent removal of the airway.
- **OLMD may authorize Ketamine** for additional sedation.

End-Tidal CO_2 – Capnography

Continuous capnography may offer additional information regarding cardiac output, pulmonary perfusion, and effectiveness of ventilation. The combination of a numerical value (normal between 35-45 mmHg) and waveform provides the best picture of respiratory/ventilatory status.

The main uses of capnography include:

- Enhanced respiratory assessment
- Determination of asthma severity
- Cardiac arrest
    - Termination decision (non-survivors <10mm)
    - Early ROSC identification
    - Compression effectiveness
- Advanced airway confirmation

Indications

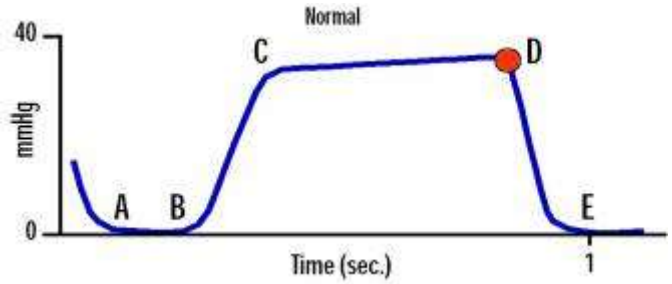
- For monitoring of patient's condition especially in the presence of respiratory distress.
- ETT confirmation and monitoring in the intubated patient.

Procedure

- Apply capnography device probe.
    - Advanced airway patient (BVM adapter device):
        - Apply to BVM while awaiting placement of tube.
        - May be applied during BLS ventilation if available.
        - Should replace capnometry device as soon as available.
    - All other patients (nasal cannula device):
        - May be used to provide supplemental oxygen if indicated.
        - Apply under NRB or CPAP if in use.
- End-Tidal CO_2 numerical values and waveforms should be compared to normal values (35-45 mmHg) and morphology. Observe the waveform and numerical values that appear during exhalation (allow waveform to stabilize).
- If resulting numerical values and/or waveform morphologies are not within normal limits, re-evaluate the patient, and tube placement if applicable.
- Capnography may not indicate right mainstem bronchus intubation, evaluate patient carefully for other signs.

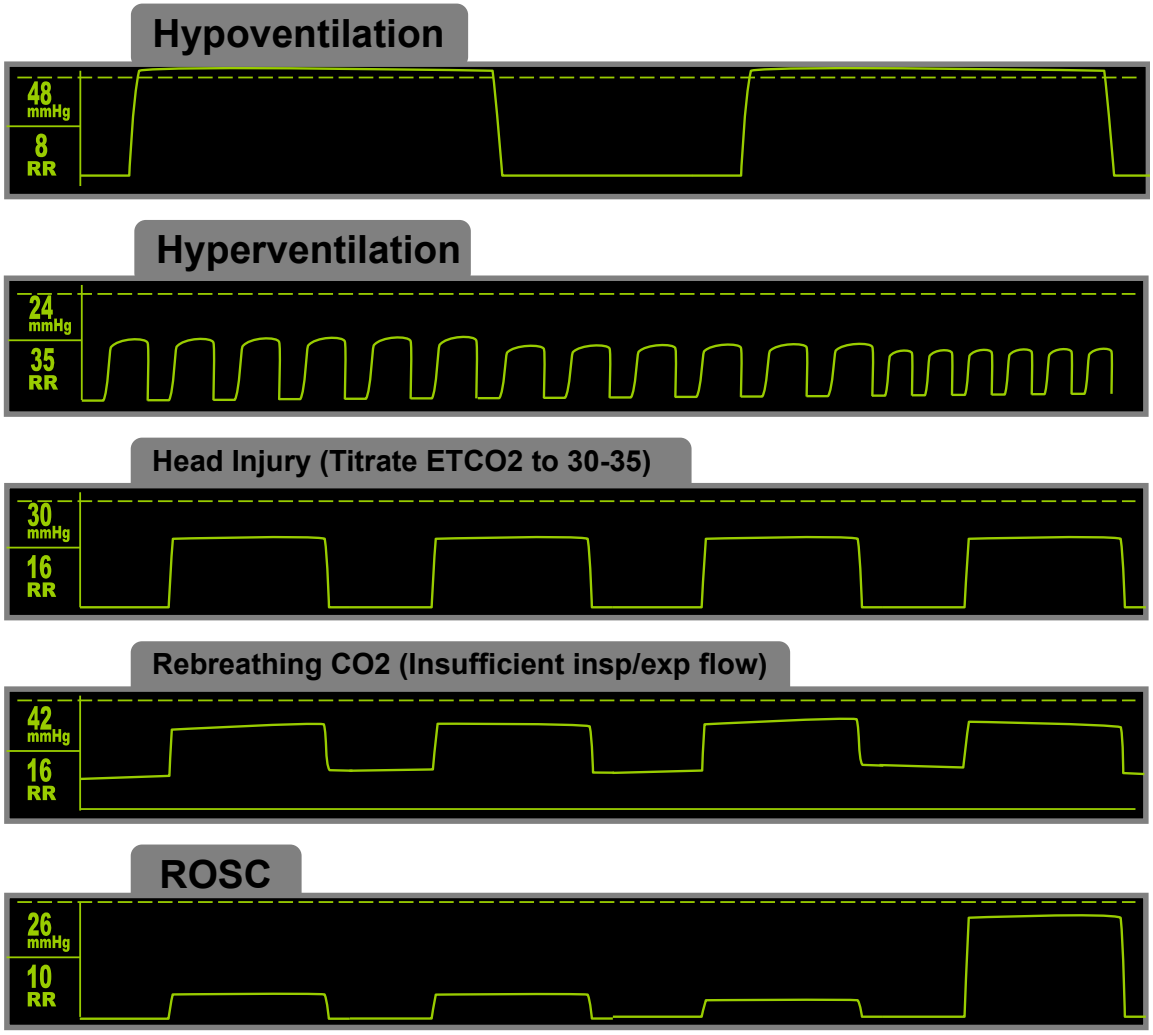
End-Tidal CO_2 - Capnography continued

The Normal CO_2 Waveform



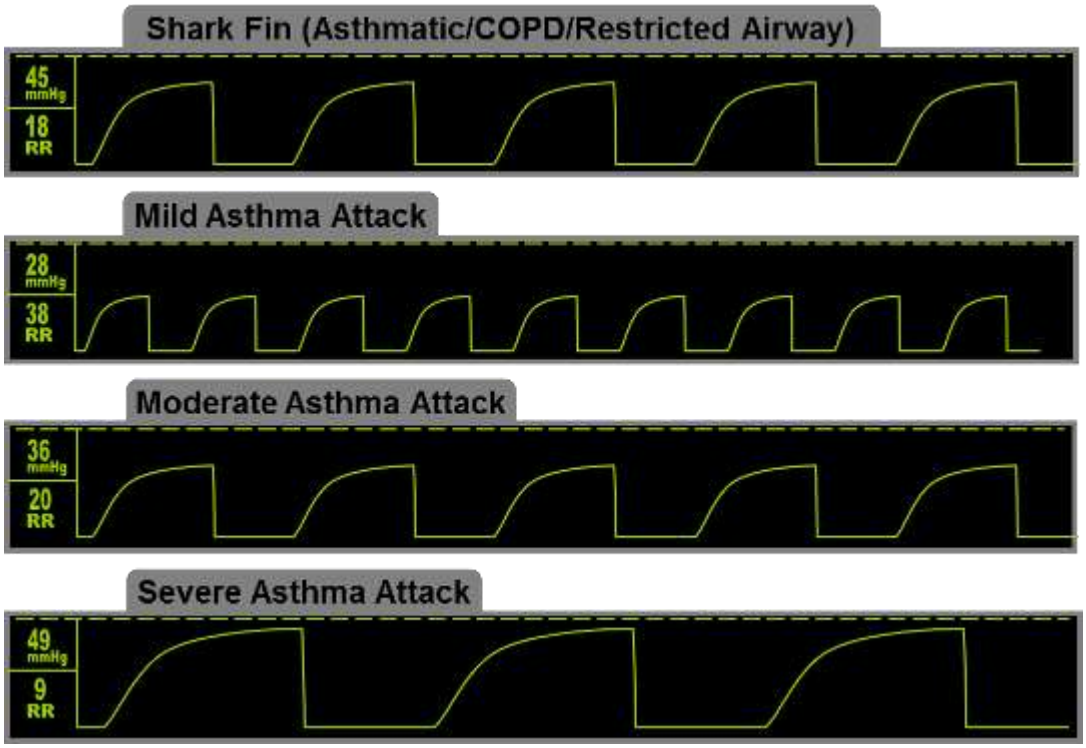
Waveform Labels	
A	End of inhalation
B	Beginning of exhalation
B–D	Exhalation of alveolar gas
D	End exhalation and point of maximal or highest CO_2 concentration (end-tidal CO_2)
D–E	Inhalation

Common Capnography Waveforms

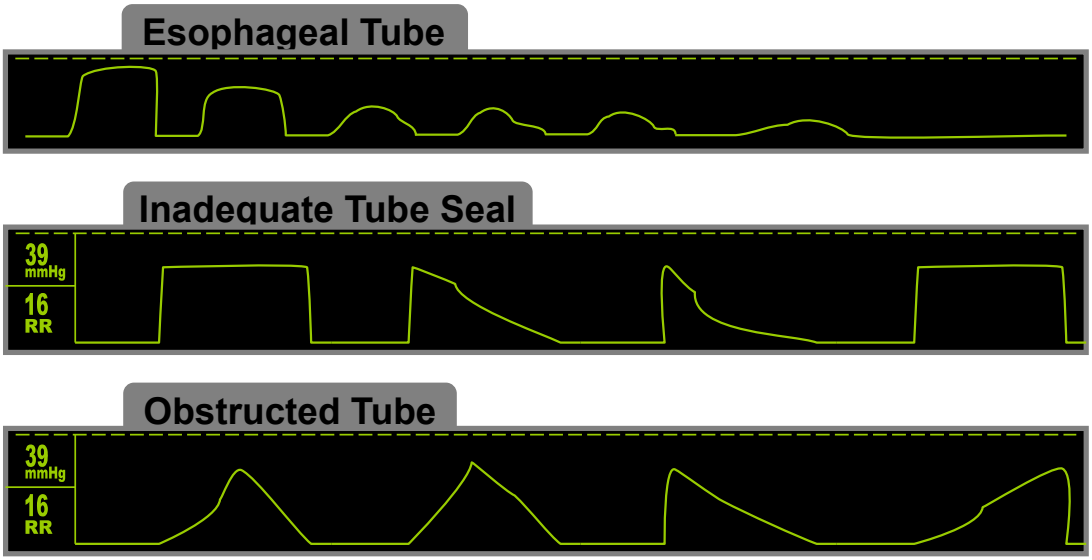


End-Tidal CO_2 - Capnography continued

Common Asthmatic Capnography Waveforms



Common Endotracheal Tube Capnography Waveforms



End-Tidal CO_2 – Capnometry

Capnometry measures the carbon dioxide concentration in expired gases.

Indication

- Confirmation, monitoring, and documentation of advanced airway placement in patients >15kg when capnography is not available.

Procedure

- Turn on and warm up the device prior to advanced airway attempts.
- After tube placement, clinical verification (and prior to the administration of any medications via the ET), apply the infrared chamber to the tip of the tube.
- Utilize the bar graph display to identify the presence of exhaled CO_2 sustained over at least 10 breaths.
    - Failure to detect CO_2 in the exhaled breath in patients **with a pulse** suggests that the tube is misplaced. Under these circumstances the tube should be removed.
    - Failure to detect CO_2 in the exhaled breath of a patient **without a pulse** suggests that the tube may be misplaced. Consider the use of an esophageal detection device (EDD) and/or remove the tube if appropriate placement of tube cannot be verified by objective methods.
        - **Note**: In the absence of a pulse, End-Tidal CO_2 may be a less reliable indicator of tube location. Under these circumstances periodic clinical reassessment coupled with periodic reassessment via EDD may be more reliable.
- Following initial clinical and subsequent objective confirmation of tube placement, utilize capnometry to monitor for displacement during patient movement, packaging and transport.
    - Loss of End-Tidal CO_2 in expired breath mandates immediate clinical reassessment and trouble-shooting of the connections/circuit. If indicated, remove the ETT immediately.
- Leave the device in place for continuous monitoring during transport.

Endotracheal Intubation – Traditional

Endotracheal (ET) intubation is the definitive method of airway management in unconscious, apneic, or cardiac arrest patients without a gag reflex. ET intubation without an ET introducer is not the preferred method; it is reserved for those cases when intubation using an ET introducer or KingVISION intubation is not available or appropriate (i.e. - pediatric patients). .

Patient	Average Tube Size	Average Insertion Depth
Adult Male	8.0 – 8.5 mm	22 cm at teeth
Adult Female	7.5 – 8.0 mm	21 cm at teeth
Children Older than 2 years	ET in mm= (16 + age in years) ÷ 4	Varies on patient size

Indication

- The need for advanced airway in the apneic or unresponsive patient without a gag reflex.

Procedure

- Each intubation attempt shall not exceed 30 seconds. An attempt is defined as passage of the laryngoscope blade (or fingers if tactile intubation is utilized) between the teeth with the intent to intubate (e.g. use of forceps to remove a foreign object is not an attempt).
    - Two (2) attempts are permitted for patients 12 years of age and older, and any ALS provider may make such attempts.
    - One (1) attempt only is permitted for pediatric patients <12 years of age, but authorization for this procedure is limited to EMT-Paramedic level providers.
    - The King LT or King LT-SD Airway shall be utilized if allowed ET intubation attempts are unsuccessful.
- Assemble and check the equipment including:
    - Examining the endotracheal tube distal cuff for leaks.
    - Lubricating the distal end of the endotracheal tube with a water-soluble lubricant.
    - Inserting a stylet, if desired, in the endotracheal tube, ensuring the stylet is recessed 2 cm from the distal end of the tube.
    - Examining the laryngoscope blade to ensure the light is bright white.
- Apply a nasal cannula at 15 liters per minute to prevent or delay decreases in oxygen saturation. Open the airway and preoxygenate the patient with a bag-valve-mask supplied with 100% oxygen for at least 30 seconds.
- Auscultate for breath sounds to establish a baseline.

Endotracheal Intubation – Traditional continued

- Place the head and neck into a neutral position (ear to sternal notch) with the face parallel to the ceiling. In adults, the head usually needs to be elevated. In infants, the torso usually needs to be elevated.
    - When there is a potential for cervical spine injury, ensure the head is firmly held in a neutral position. Tactile intubation is an option in this case.

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- Holding the handle in the left hand, insert the laryngoscope blade into the right side of the patient's mouth. Using a sweeping motion, displace the tongue to the left.
- Move the blade slightly toward the midline and advance it until the distal end is positioned at the base of the tongue.
- Visualize the tip of the epiglottis and then place the laryngoscope blade into the proper position.
    - Curved blade is advanced into the vallecula.
    - Straight blade is inserted under the epiglottis.
- Lift the laryngoscope slightly upward and forward to displace the mandible and airway structures without allowing the blade to touch the teeth.
- Keeping the left wrist straight, use the shoulder and arm to continue lifting the mandible and tongue at a 45° angle to the ground until the glottis is exposed. If needed to improve the view of the glottic opening, apply or direct another provider to apply laryngeal pressure (backward, upward, rightward, pressure - BURP).
- Holding the endotracheal tube in the right hand, advance it through the right corner of the patient's mouth, directing the distal end of the tube up or down to pass it into the pharynx.
- Insert the endotracheal tube into the glottic opening and advance it until the cuff or distal end of the tube disappears slightly (1 to 2 cm) past the vocal cords. Observe the tube as it enters the glottic opening.
    - If the patient's mouth opening is small, direct another provider to hook a finger in the right corner of the patient's mouth and pull to widen the opening while apply counter-pressure to the maxilla to keep the head from turning.

- Hold the tube in place with a free hand. Do not release the tube before it is secured in place.
- If using a cuffed tube, inflate the distal cuff with the prefilled syringe. Use only the minimum amount of air necessary to create an effective seal and prevent air leakage (typically 5 to 10 ml of air).
- Confirm placement (see below).

Confirmation

- Attach BVM to the tube (with appropriate End-Tidal CO_2 adapter - capnometry or capnography) and ventilate.
- Auscultate over the epigastrium.
- Auscultate the chest bilaterally (apex and mid-axillary) for the presence of equal, bilateral lung sounds.
- Check for symmetrical chest rise and fall.
- Look for moisture condensation in the tube with each exhaled breath.
- Verify appropriate depth at teeth (approximately 3 x tube size).
- Evaluate End-Tidal CO_2
    - If unable to apply End-Tidal CO_2 or results are ambiguous, apply Esophageal Detector Device.
- Observe patient for clinical improvement (i.e., pulse oximetry, skin color, etc.).
- Secure the tube in place. A commercial device is preferred but may not fit small tubes properly; in these cases use tape or IV tubing taking care not to overstress soft tissue.
- Apply cervical collar (if not already in place) or otherwise immobilize neck to prevent displacement of the tube.
- Re-confirm tube placement after the tube is secured, after every patient movement, and at regular intervals.
- End-Tidal CO_2 confirmation and continuous End-Tidal CO_2 monitoring is standard for all intubated patients.

Endotracheal Intubation – KingVISION

Endotracheal (ET) intubation is the definitive method of airway management in unconscious, apneic, or cardiac arrest patients without a gag reflex.

Patient	Average Tube Size	Average Insertion Depth
Adult Male	8.0 – 8.5 mm	22 cm at teeth
Adult Female	7.5 – 8.0 mm	21 cm at teeth

Indication

- The need for advanced airway in the apneic or unresponsive patient without a gag reflex **in patients greater than 12 years of age**.

Procedure

- Each intubation attempt shall not exceed 30 seconds. An attempt is defined as passage of the laryngoscope blade (or fingers if tactile intubation is utilized) between the teeth with the intent to intubate (e.g. use of forceps to remove a foreign object is not an attempt).
    - Two (2) attempts are permitted for patients 12 years of age and older, and any ALS provider may make such attempts.
    - The King LT or King LT-SD Airway shall be utilized if allowed ET intubation attempts are unsuccessful.
- Assemble and check the equipment including:
    - Check display of KingVISION by pressing power button on back of display.
    - The LED above the screen should illuminate GREEN. If the LED is RED the batteries need to be replaced.
    - Turn the display OFF. The display must be OFF prior to attaching blade otherwise video image will not display.
    - Select the proper tube and stylet to be used. Stylets are not required with channeled blades.
    - Check the ET tube distal cuff for leaks.
    - Lubricate the distal end of the endotracheal tube with a water-soluble lubricant.
    - Open the blade packaging and remove blade.
    - Insert the display into the blade.
    - Listen for a "Click" and feel the display engage with the blade.
    - Turn the display ON, both the LED should light up GREEN and the video screen should now show an image.
    - If using the channeled blade, take the lubricated endotracheal tube and slide it through the channel to lubricate the channel.
    - If using the standard blade there is no need to lubricate the blade.
- Apply a nasal cannula at 15 liters per minute to prevent or delay decreases in oxygen saturation. Open the airway and preoxygenate the patient with a bag-valve-mask supplied with 100% oxygen for at least 30 seconds.
- Auscultate for breath sounds to establish a baseline.

Endotracheal Intubation – KingVISION continued

- Place the head and neck into a neutral position (ear to sternal notch) with the face parallel to the ceiling. In adults, the head usually needs to be elevated. In infants, the torso usually needs to be elevated.
    - When there is a potential for cervical spine injury, ensure the head is firmly held in a neutral position. Tactile intubation is an option in this case.

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- Holding the handle in the left hand, insert the KingVISION Video laryngoscope into the patient's mouth midline.
- Advance slowly watching for airway structures as you advance the device.
- Always center the vocal cords in the middle of the video screen.
- Pass the endotracheal tube through the vocal cords, confirming placement with the display.
    - With the standard blade simply remove it from the patient's airway.
    - With the channeled blade remove the endotracheal tube from the blade and remove the blade from the patient's airway.
- Hold the tube in place with a free hand. Do not release the tube before it is secured in place.
- If using a cuffed tube, inflate the distal cuff with the prefilled syringe. Use only the minimum amount of air necessary to create an effective seal and prevent air leakage (typically 5 to 10 ml of air).
- Confirm placement (see below).
- Dispose of the blade.
- Display should be cleaned or disinfected prior to next use.

Confirmation

- Attach BVM to the tube (with appropriate End-Tidal CO_2 adapter – capnometry or capnography) and ventilate.
- Auscultate over the epigastrium.
- Auscultate the chest bilaterally (apex and mid-axillary) for the presence of equal, bilateral lung sounds.
- Check for symmetrical chest rise and fall.
- Look for moisture condensation in the tube with each exhaled breath.
- Verify appropriate depth at teeth (approximately 3 x tube size).

- Evaluate End-Tidal CO_2
  - If unable to apply End-Tidal CO_2 or results are ambiguous, apply Esophageal Detector Device.
- Observe patient for clinical improvement (i.e., pulse oximetry, skin color, etc.).
- Secure the tube in place. A commercial device is preferred but may not fit small tubes properly; in these cases use tape or IV tubing taking care not to overstress soft tissue.
- Apply cervical collar (if not already in place) or otherwise immobilize neck to prevent displacement of the tube.
- Re-confirm tube placement after the tube is secured, after every patient movement, and at regular intervals.
- End-Tidal CO_2 confirmation and continuous End-Tidal CO_2 monitoring is standard for all intubated patients.

Endotracheal Intubation – Traditional with ET Introducer

Endotracheal (ET) intubation is the definitive method of airway management in unconscious, apneic, or cardiac arrest patients without a gag reflex. The ET Introducer is used to control the direction of the endotracheal tube during insertion. This is a two-person technique.

Indication

- All intubations using the traditional laryngoscope.

Contraindication

- Endotracheal tubes below 6.0 mm.

Procedure

- Each intubation attempt shall not exceed 30 seconds. An attempt is defined as passage of the laryngoscope blade (or fingers if tactile intubation is utilized) between the teeth with the intent to intubate (e.g. use of forceps to remove a foreign object is not an attempt).
    - Two (2) attempts are permitted for patients 12 years of age and older, and any ALS provider may make such attempts.
    - One (1) attempt only is permitted for pediatric patients <12 years of age, but authorization for this procedure is limited to EMT-Paramedic level providers.
    - The King LT or King LT-SD Airway shall be utilized if allowed ET intubation attempts are unsuccessful.
- Assemble and check the equipment including:
    - The endotracheal tube distal cuff for leaks.
    - The laryngoscope to ensure light is bright white.
- Lubricate the distal end of the endotracheal tube and the distal ½ end of the ET Introducer with a water-soluble lubricant.
- Apply a nasal cannula at 15 liters per minute to prevent or delay decreases in oxygen saturation. Open the airway and preoxygenate the patient with a bag-valve-mask supplied with 100% oxygen for at least 30 seconds.
- Auscultate for breath sounds to establish a baseline.

Endotracheal Intubation – Traditional with ET Introducer
continued

- Place the head and neck into a neutral position (ear to sternal notch) with the face parallel to the ceiling. In adults, the head usually needs to be elevated. In infants, the torso usually needs to be elevated.
    - When there is a potential for cervical spine injury, ensure the head is firmly held in a neutral position. Tactile intubation is an option in this case.

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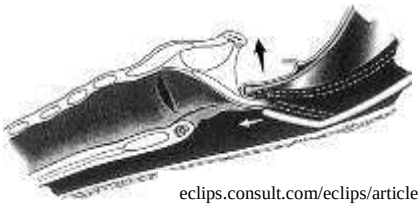
- Holding the handle in the left hand, insert the laryngoscope blade into the right side of the patient's mouth. Using a sweeping motion, displace the tongue to the left.
- Move the blade slightly toward the midline and advance it until the distal end is positioned at the base of the tongue.
- Visualize the tip of the epiglottis and then place the laryngoscope blade into the proper position.
    - Curved blade is advanced into the vallecula.
    - Straight blade is inserted under the epiglottis.
- Lift the laryngoscope slightly upward and forward to displace the mandible and airway structures without allowing the blade to touch the teeth.
- Keeping the left wrist straight, use the shoulder and arm to continue lifting the mandible and tongue at a 45° angle to the ground until the glottis is exposed. If needed to improve the view of the glottic opening, apply or direct another provider to apply laryngeal pressure (backward, upward, rightward, pressure - BURP).
- Visualize vocal cords and insert the ET Introducer with the curved tip to the anterior.
    - If vocal cords cannot be visualized, pass the ET Introducer above the arytenoid cartilage. At a minimum, the tip of the epiglottis must be visible in order to direct the introducer to the glottic inlet.



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Endotracheal Introducer – Traditional with ET Introducer
continued

- Tactile confirmation of tracheal clicking will be felt as the distal tip of the introducer bumps against the tracheal rings. If tracheal clicking cannot be felt, continue to gently advance the introducer until "hold up" is felt when the tip hits the carina. Tracheal "clicking" and "hold-up" are positive signs that the introducer has entered the trachea. No tracheal clicking or hold-up is indicative of esophageal placement.

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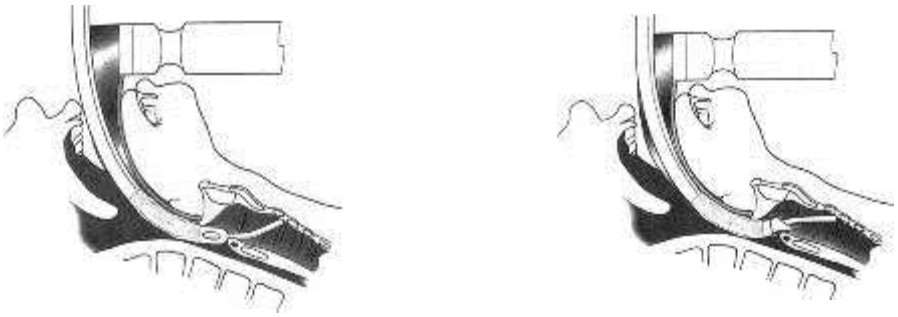
- Advance the introducer to a depth of approximately 25 cm so that the distal tip lies at least 2 to 3 cm beyond the glottic opening.
- While holding the introducer securely and without removing the laryngoscope or taking eyes off the glottis opening, have another provider advance the endotracheal tube over the proximal tip of the introducer. Once the endotracheal tube tip passes beyond the teeth, rotate the endotracheal tube 90° counter clockwise (1/4 turn to the left) so that the endotracheal tube bevel does not catch on the arytenoid cartilage. Advance the endotracheal tube under direct visualization to the proper depth so that the tip of the endotracheal tube lies in the mid-trachea.



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- Holding the endotracheal tube securely, remove the ET introducer.
- Inflate the distal cuff with the prefilled syringe. Use only the minimum amount of air necessary to create an effective seal and prevent air leakage (typically 5 to 10 ml of air).
- Confirm endotracheal intubation (see below).

Endotracheal Introducer – Traditional with ET Introducer
continued

Confirmation

- Attach BVM to the tube (with appropriate End-Tidal CO_2 adapter – capnometry or capnography) and ventilate.
- Auscultate over the epigastrium.
- Auscultate the chest bilaterally (apex and mid-axillary) for the presence of equal, bilateral lung sounds.
- Check for symmetrical chest rise and fall.
- Look for moisture condensation in the tube with each exhaled breath.
- Verify appropriate depth at teeth (approximately 3 x tube size).
- Evaluate End-Tidal CO_2
    - If unable to apply End-Tidal CO_2 or results are ambiguous, apply Esophageal Detector Device.
- Observe patient for clinical improvement (i.e., pulse oximetry, skin color, etc.).
- Secure the tube in place. A commercial device is preferred but may not fit small tubes properly; in these cases use tape or IV tubing taking care not to overstress soft tissue.
- Apply cervical collar (if not already in place) or otherwise immobilize neck to prevent displacement of the tube.
- Re-confirm tube placement after the tube is secured, after every patient movement, and at regular intervals.
- End-Tidal CO_2 confirmation and continuous End-Tidal CO_2 monitoring is standard for all intubated patients.

Precautions

Soft tissue damage or bronchial rupture may occur:

- During blind intubation.
- When positioning past the carina.
- When undue pressure is applied.
- When endotracheal tube is threaded over ET introducer without using a laryngoscope.

Endotracheal Intubation – KingVISION with ET Introducer

Endotracheal (ET) intubation is the definitive method of airway management in unconscious, apneic, or cardiac arrest patients without a gag reflex. The ET Introducer is used to control the direction of the endotracheal tube during insertion. This is a two-person technique.

Indication

- Optional use when intubating with KingVISION channeled blade.

Contraindication

- Endotracheal tubes below 6.0 mm.

Procedure

- Each intubation attempt shall not exceed 30 seconds. An attempt is defined as passage of the laryngoscope blade (or fingers if tactile intubation is utilized) between the teeth with the intent to intubate (e.g. use of forceps to remove a foreign object is not an attempt).
    - Two (2) attempts are permitted for patients 12 years of age and older, and any ALS provider may make such attempts.
    - The King LT or King LT-SD Airway shall be utilized if allowed ET intubation attempts are unsuccessful.
- Assemble and check the equipment including:
    - Check display of KingVISION by pressing power button on back of display.
    - The LED above the screen should illuminate GREEN. If the LED is RED the batteries need to be replaced.
    - Turn the display OFF. The display must be OFF prior to attaching blade otherwise video image will not display.
    - Select the proper tube and stylet to be used. Stylets are not required with channeled blades.
    - The ET tube distal cuff for leaks.
    - Lubricating the distal end of the endotracheal tube with a water-soluble lubricant.
    - Open the blade packaging and remove blade.
    - Insert the display into the blade.
    - Listen for a “Click” and feel the display engage with the blade.
    - Turn the display ON, both the LED should light up GREEN and the video screen should now show an image.
    - Take the lubricated endotracheal tube and slide it through the channel of the channeled blade to lubricate the channel.
- Apply a nasal cannula at 15 liters per minute to prevent or delay decreases in oxygen saturation. Open the airway and preoxygenate the patient with a bag-valve-mask supplied with 100% oxygen for at least 30 seconds.
- Auscultate for breath sounds to establish a baseline.

Endotracheal Intubation – KingVISION with ET Introducer
continued

- Place the head and neck into a neutral position (ear to sternal notch) with the face parallel to the ceiling. In adults, the head usually needs to be elevated. In infants, the torso usually needs to be elevated.
    - When there is a potential for cervical spine injury, ensure the head is firmly held in a neutral position. Tactile intubation is an option in this case.

umem.org/education/educational_pearls/1426/

- Holding the handle in the left hand, insert the KingVISION Video laryngoscope into the patient's mouth midline.
- Advance slowly watching for airway structures as you advance the device.
- Always center the vocal cords in the middle of the video screen.
- Visualize the vocal cords.
- Grasp the ET Introducer with first three fingers of the right hand and insert with the curved tip to the anterior.
    - Place fingers in the top void space of the blade channel
    - Rest lateral portion of hand on the patient's lips.
- Use slight movements, align the ET Introducer with the glottic opening in the camera's visual plane.
- Pass the ET Introducer through the vocal cords
    - If tracheal clicking cannot be felt, continue to gently advance the ET Introducer until "hold up" is felt. Tracheal "clicking" and "hold-up" are positive signs that the ET Introducer has entered the trachea.
    - Absence of tracheal clicking or hold-up is indicative of esophageal placement.
    - Tactile confirmation of tracheal clicking will be felt as the distal tip of the ET Introducer bumps against the tracheal rings.
- Advance the ET Introducer to a depth of approximately 25cm, placing distal tip at least 2 to 3 cm beyond the glottic opening.
- While holding the ET Introducer and blade securely in place, assistant advances tube over the proximal tip of the ET Introducer.
- Once the tube tip passes the teeth, assistant rotates it 90° counter clockwise (1/4 turn to the left) so the tube bevel does not catch on the arytenoid cartilage.
- Advance the ET Introducer to a depth of approximately 25cm, placing distal tip at least 2 to 3 cm beyond the glottic opening.

- Assistant advances tube to proper depth while intubator maintains visualization of the tube through the cords.
- Holding the endotracheal tube securely, remove the ET Introducer.
- Inflate the distal cuff with the prefilled syringe. Use only the minimum amount of air necessary to create an effective seal and prevent air leakage (typically less than 10 ml of air).
- Confirm endotracheal intubation (see below).

Confirmation

- Attach BVM to the tube (with appropriate End-Tidal CO_2 adapter – capnometry or capnography) and ventilate.
- Auscultate over the epigastrium.
- Auscultate the chest bilaterally (apex and mid-axillary) for the presence of equal, bilateral lung sounds.
- Check for symmetrical chest rise and fall.
- Look for moisture condensation in the tube with each exhaled breath.
- Verify appropriate depth at teeth (approximately 3 x tube size).
- Evaluate End-Tidal CO_2
    - If unable to apply End-Tidal CO_2 or results are ambiguous, apply Esophageal Detector Device.
- Observe patient for clinical improvement (i.e., pulse oximetry, skin color, etc.).
- Secure the tube in place. A commercial device is preferred but may not fit small tubes properly; in these cases use tape or IV tubing taking care not to overstress soft tissue.
- Apply cervical collar (if not already in place) or otherwise immobilize neck to prevent displacement of the tube.
- Re-confirm tube placement after the tube is secured, after every patient movement, and at regular intervals.
- End-Tidal CO_2 confirmation and continuous End-Tidal CO_2 monitoring is standard for all intubated patients.

Precautions

Soft tissue damage or bronchial rupture may occur:

- During blind intubation.
- When positioning past the carina.
- When undue pressure is applied.
- When endotracheal tube is threaded over ET Introducer without using a laryngoscope.

Esophageal Detection Device

The Esophageal Detection Device (EDD) is used to verify proper endotracheal tube placement. The trachea has cartilaginous rings and is a rigid structure. Therefore, as vacuum is applied, the device will refill easily if the ET tube is in the trachea. If the ET tube is in the esophagus, the device will not retract because the esophagus will have collapsed against the distal end of the ET tube.

Indication

- The esophageal detector device (EDD) should be used in addition to the end-tidal CO_2 detectors for all patients who have been intubated.

Contraindications

- Children less than 5 years of age or weighing less than 20 kg (44 lbs)
- Pregnant patients

Procedure

- Open the esophageal detector device package and check for leaks prior to intubation.
- Connect the syringe to the end of the endotracheal tube.
- Draw back gently on the plunger past the 40 ml mark on the syringe. Hold for 2 to 3 seconds and release.
    - Positive test: Syringe fills with at least 40 ml of air. Endotracheal tube likely in trachea.
    - Negative test: Resistance to retraction is felt, emesis returns, or plunger rebounds to 10 ml mark or lower. Endotracheal tube likely in esophagus.
- The following actions should be taken depending on test results and other confirmation results:
    - Positive test: Secure the endotracheal tube and resume ventilations at the appropriate rate.
    - Negative test: Remove the endotracheal tube.

King Airway

The King Airway Device (KING LT-SD or King LT-D) is an alternative airway adjunct for patients who require an advanced airway. The King Airway also serves as a rescue airway for difficult-to-intubate patients who meet the King criteria.

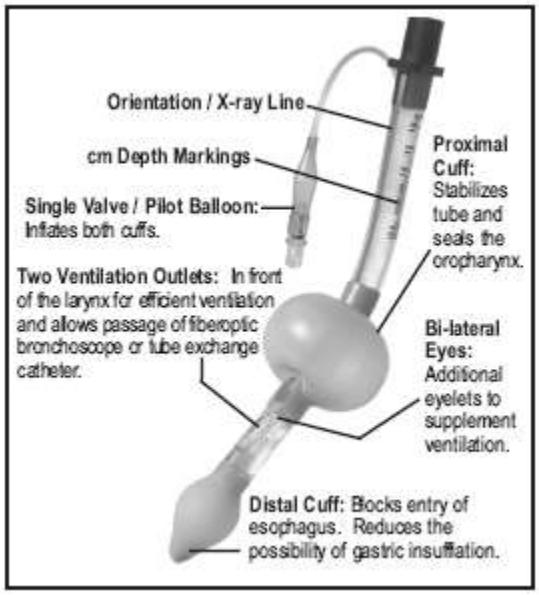
If the patient has progressive airway swelling, choose Endotracheal Intubation over the King Airway.

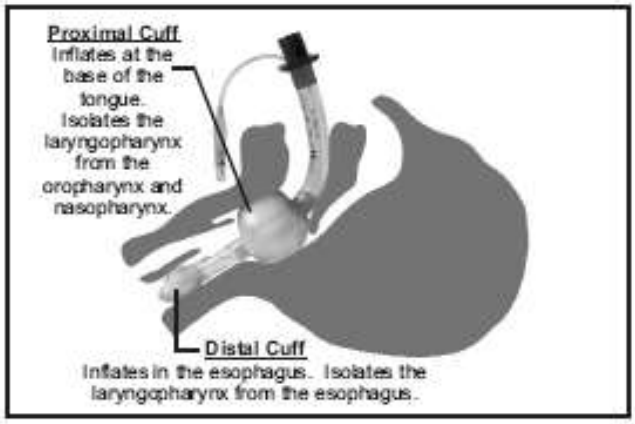
Indication

- The need for advanced airway in the apneic or unresponsive patient without a gag reflex.

Contraindications

- Patients with known esophageal disease.
- Patients who have ingested caustic substances.
- Patients less than 35 inches in height.





Procedure

- Each attempt shall not exceed 30 seconds. An attempt is defined as insertion of the tube between the teeth/gums.
    - Two (2) attempts are permitted for patients 12 years of age and older.
    - One (1) attempt is permitted for pediatric patients <12 years of age.
    - If all King LT insertion efforts are unsuccessful:
        - All providers may attempt BVM ventilation using basic adjuncts.
        - Authorized ALS providers may attempt either endotracheal intubation OR laryngoscope-assisted King LT esophageal insertion if any attempts remain per ETT procedure or airway obstruction is suspected.
        - All providers may attempt an additional King LT insertion if patient cannot be adequately ventilated after following all above steps.
            - In this case, **Physician OLMD** shall be immediately notified of a critical airway and EMT-Paramedics only should consider cricothyrotomy.
- Size tube based on chart

Airway Size	Patient Height	Color	Inflation Volume
2 LT-D	35-45 inches	Green	25-35 ml
2.5 LT-D	41-51 inches	Orange	30-40 ml
3 LT-SD	4–5 feet	Yellow	45–55 ml
4 LT-SD	5–6 feet	Red	65–70 ml
5 LT-SD	Greater than 6 feet	Purple	60-80 ml

- Test cuff and inflation system for leaks (remove all air prior to insertion).
- Lubricate tube with water-soluble jelly.
    - Lubricate only the posterior surface of the KING LT-SD to avoid blockage of the aperture or aspiration of the lubricant.
- Position the patient's head and pre-oxygenate:
    - The ideal position for tube insertion is the "sniffing position;" however, the tube may also be inserted with the head in the neutral position.

- Hold the tube at the connector with dominant hand. With non-dominant hand, hold mouth open and apply chin lift unless contraindicated.
- With the tube rotated laterally 45-90º such that the blue orientation line is touching the corner of the mouth, introduce tip into mouth and advance behind base of tongue. Never force the tube into position.

- As tube tip passes under tongue, rotate tube back to midline so that the blue orientation line faces chin.
    - Keep the tip at midline to ensure tube enters esophagus itself rather than pockets on either side.

- Without exerting excessive force, advance tube until base of connector is aligned with teeth or gums.
    - It is better to initially place the tube too deep rather than too shallow.
- Using the syringe provided, inflate the cuff of the tube with the appropriate volume
    - See chart above; use just enough volume to keep air from leaking and increase only if unable to maintain seal.
- Attach BVM to the tube (with appropriate End-Tidal CO_2 adapter - capnometry or capnography) and ventilate. While gently bagging to assess ventilation, slowly withdraw the tube until ventilation is easy and free flowing (high volume with low pressure).
- Confirm placement (see below).
- Secure the tube in place. As commercial devices generally displace the King LT anteriorly use tape or IV tubing taking care not to overstress soft tissue.

Confirmation

- Auscultate over the epigastrium and chest bilaterally (apex and mid-axillary) for the presence of equal, bilateral lung sounds.
- Check for symmetrical chest rise and fall with each breath.
- Look for moisture condensation in the tube with each exhaled breath.
- Verify appropriate depth at teeth.
- Evaluate End-Tidal CO_2.
- Observe patient for clinical improvement (i.e., pulse oximetry, skin color, etc.).
- Apply cervical collar (if not already in place) or otherwise immobilize neck to prevent displacement of the tube.
- Re-confirm tube placement after the tube is secured, after every patient movement, at regular intervals, and immediately prior to transfer of care.

Suctioning

Indications

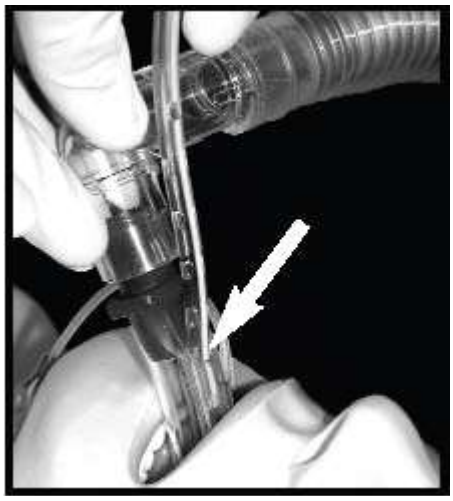
- When there is stomach distention or vomitus after the insertion of the King LT-SD.
- Suctioning can only be done with KING LT-SD sizes 3, 4 or 5.

Contraindications

- Responsive patients with an intact gag reflex.
- Patients with known esophageal disease.
- Patients who have ingested caustic substances.
- The King LT-SD is not proven to protect the airway from the effects of regurgitation and aspiration. The risk of regurgitation and aspiration must be weighed against the potential benefit of establishing an airway.
- THIS IS NOT A ROUTE FOR MEDICATION ADMINISTRATION.

Procedure

- Retrieve the Salem Sump Catheter 16 Fr, 48 inches
- Measure the catheter from the tip of the King LT-SD after insertion to the inferior tip of the xyphoid process.
- Apply water soluble lubricant to the tip of the catheter.
- Insert the catheter into the proximal opening of gastric access lumen to its predetermined length
- To prevent catheter movement after insertion, secure catheter to King LT-SD with tape.
- Attached the end of the catheter to a suction unit.
- Operate suction unit to remove vomitus.
- Once decompression has been achieved or patient needs to be moved, cap off the catheter.



Nasopharyngeal Airway

The nasopharyngeal airway is an uncuffed tube that follows the natural curvature of the nasopharynx. Sizes range from 20F to 36F (French), and range from 17 to 20 cm long.

Indication

- Conscious or unconscious patients who are unable to protect their own airways and will not tolerate the oropharyngeal airway.

Contraindication

- Suspected basilar skull fractures.

Procedure

- The tube should be slightly smaller than the diameter of the patient's nostril or should be slightly longer than the distance from the patient's nose to his or her earlobe.
- Lubricate the tube with water-soluble gel.
- Gently insert it with the bevel end oriented toward the septum of the patient's nostril.
- If you cannot easily insert the tube into one nostril try the other.

Oropharyngeal Airway

The oropharyngeal airway is used to help maintain an open airway. It is a noninvasive semicircular device, designed to follow the curvature of the patient's palate. This prevents the tongue from obstructing the glottis in unconscious patients who cannot protect their own airways. Sizes range from #0 for neonates to #6 for large adults.

Indication

- Unconscious patients who are unable to protect their own airways and have no gag reflex.

Procedure

Adults:

- Sizing the device.
  - Center of the patient's mouth (lips) to the angle of his or her jaw.
  - Corner of patient's mouth and the ear lobe.
- If the patient has no history of trauma, hyperextend the head and neck. If trauma suspected, use the jaw-thrust method.
- Check the mouth and remove any visible obstructions.
- Grasp the patient's jaw and lift anteriorly while inserting the OP, with the curved end reversed (pointing toward the roof of the mouth).
- Once the end reaches the level of the soft palate, gently rotate it 180 degrees, until it comes to rest over the tongue.

Pulse Oximeter

Oxygen is carried in the bloodstream mainly bound to hemoglobin. One molecule of hemoglobin can carry up to four molecules of oxygen (100% oxygen saturation). The average percent saturation of a population of hemoglobin molecules in a blood sample is the oxygen saturation of the blood. In addition, a very small quantity of oxygen is carried dissolved in the blood, which can be important if the hemoglobin levels are extremely low. The latter, however, is not measured by pulse oximetry.

SaO_2 only reflects oxygen bound to hemoglobin. It does not measure O_2 concentration dissolved in solution (PO_2). Hemoglobin will hang on to O_2 in alkalotic states. When O_2 remains bound to hemoglobin, the cells in the body are still deprived of O_2. This is where raising the amount of O_2 dissolved in solution is important; we do this by administering supplemental oxygen.

Likewise, in acidotic states, the so-called "knee" of the oxyhemoglobin dissociation curve shifts to the right. This means that tolerances are severely reduced. These patients MUST have supplemental oxygen even in states where their saturations are at or near normal.

Indication

- To monitor the oxygen saturation of hemoglobin in arterial blood, an indirect measure of overall tissue oxygenation.

Procedure

Apply promptly to obtain room air saturation without denying supplemental O_2.

- Choose appropriate site and check for adequate proximal pulse and tissue temperature.
- Choose the correct sensor (keeping weight limits in mind).
- Use antiseptic wipes to assure monitoring site is clean and dry if needed.
- Completely remove nail polish, if necessary.
- Apply device, not too tightly (accuracy depends on capillary refill to the area).
- Align light-emitting diodes (LEDs) and photoconductive sensors opposite each other, on either side of toe, finger, nose, earlobe, or other site.
- Turn on device.
- Allow time for self-calibration (5 seconds).
- Ensure pulse rate on device matches palpated pulse rate.
- Ensure signal strength is sufficient for accurate reading (green light, clear waveform, etc.).

Considerations

- Oxygen should be administered as needed to achieve the following saturation levels:
  - Normal: > 94%
  - COPD: 88 – 92%
- Oxygen should be administered in the following situations regardless of room air saturation level:
  - Evidence of increased work of breathing
  - Injuries associated with impaired oxygenation
  - Unconsciousness
- Providers should continuously monitor the patient for changes in respiratory status and adjust treatment accordingly.
- Do not rely on pulse oximetry in the presence of CO exposure.
- Pulse oximetry also provides no information on:
  - The oxygen content of the blood.
  - The amount of oxygen dissolved in the blood.
- Treat the patient, not the monitor.

Suctioning: Meconium

Meconium-stained amniotic fluid occurs mostly in post-term or in small-for-gestational-age newborns. Fetal distress and hypoxia can also cause the passage of meconium into the amniotic fluid.

Restriction

Authorization for this procedure is limited to EMT-Paramedic level providers. If no EMT-P is on scene, proceed with standard BLS suction techniques and mask ventilation.

Indication

- Gross meconium presentation in newborns with depressed respirations, poor muscle tone, or bradycardia.

Procedure

- Before stimulating the infant to breathe, perform endotracheal intubation with an appropriate size endotracheal tube.
- Connect the endotracheal tube to a meconium aspirator and the aspirator to suction.
- Apply suction at 100 mmHg or low on portable device.
- Suction for no more than 5 seconds.
- Withdraw the endotracheal tube while applying suction.
- If the endotracheal tube is filled with meconium, repeat intubation with a new tube and suction again until clear, usually not more than two times.
- Once the airway is clear, follow **Distressed Newborn** protocol.

Suctioning: Oropharynx

Suctioning is a procedure for removing blood, vomitus, fluids, and secretions from the airway. Suctioning should be readily available for airway management.

Procedure

- Pre-oxygenate the patient.
- Catheters are measured from the corner of the mouth to the earlobe to determine the maximum insertion depth.
- Do not suction beyond your direct vision to avoid causing gagging, vomiting and possible aspiration.
- Suction only while removing the catheter for no more than 15 seconds at a time for adults and 5 seconds for infants and children.
- If suctioning stimulates a gag reflex and suction is still needed, withdraw the device until the reflex is no longer stimulated.
- If the patient has secretions or emesis that cannot be removed quickly and easily by suctioning, the patient should be log rolled and the oropharynx should be cleared with a finger sweep.
- In situations where patients are conscious and have the ability to manage a suction catheter on their own, allow them to control the catheter.

Suctioning: Tracheobronchial

Tracheobronchial suctioning is used to remove mucus plugs or secretions causing respiratory compromise in intubated patients and patients with stomas

Procedure

- Pre-oxygenate with 100% oxygen using appropriate adjunct (BVM, blow-by, etc.).
- Select largest soft catheter possible (for ET suction, tube size x 2 = maximum French catheter size).
- Open the catheter package.
- Lubricate the catheter tip with a water-soluble gel or dip in saline. This facilitates passage of the catheter through the tube/stoma.
- Insert the suction catheter into the opening of the tube/stoma. Pass the catheter until resistance is met.
- Turn the suction unit on or place the thumb over the suction control opening.
- Withdraw the catheter, rotating it between the fingertips. Limit suctioning to 15 seconds. In infants, children, and hypoxic patients, shorter suction time should be used.
    - ALS providers should monitor the cardiac rhythm if possible. If dysrhythmias or bradycardia develop, the suctioning should be stopped and the patient re-oxygenated.
- Flush out the suction catheter and tubing with saline and evaluate the need for additional suctioning and the patency of the airway.
- Ventilate/oxygenate the patient with 100% oxygen.

Trauma

Hemorrhage Clamp

The Hemorrhage Clamp is a device used to temporarily control severe bleeding in compressible areas on the body including the scalp, extremities, axilla, and inguinal areas. By bringing wound edges together while applying pressure to the site, it allows a stable clot to form in the contained space, ultimately compressing the bleeding vessel. It is best suited to large scalp lacerations with heavy bleeding, and may also be used on wounds to junctional locations following wound packing with or without hemostatic agents if direct pressure is impractical.

Indications

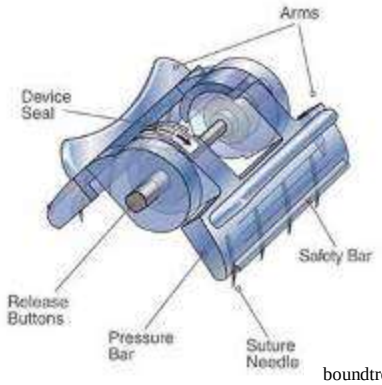
- Bleeding from compressible wound sites that cannot be controlled with the following bleeding control methods and devices (in approximate order of consideration):
  - Direct pressure
  - Pressure dressings
  - Tourniquet use
  - Wound Packing with or without hemostatic agents
- When wound edges can be pulled together.

Contraindications

- Do not use when wound edges cannot be pulled together.
- Do not use where delicate structures (e.g. orbits of the eye) are near the skin surface (within 1 cm).
- Do not use on non-compressible sites (e.g. abdominal and chest cavities).

Procedure

- Open sterile package by pulling on the outer tabs.
- Remove the device from the package by lifting up. Take care not to close the device until applied to the wound.
  - If the device has been accidentally closed, push the side buttons with one hand and pull the device open using the device arms.



boundtree.co.uk

- Pull wound edges together and align the device parallel to the wound. Position the needles approximately 1-2 cm from the wound edge on either side.
- Press the arms of the device together to close the device.
- Ensure the wound is sealed and bleeding stops. More than one device may be required for large wounds.
    - If the device is positioned properly and bleeding continues, apply pressure to the arms of the device to close the device more tightly.
    - If the device is not positioned properly, remove as described below and reapply.

Removal

Removal is indicated for an improperly placed device only. Otherwise, removal should only be done at a medical facility capable of managing the wound.

- Hold the device by the gripping arms and press the device further closed to release the lock.
- While maintaining pressure on gripping arms, press both release buttons with your other hand.
- While pressing the release buttons, pull one of the gripping arms open and rotate needles from the wound, one side at a time.
- Pick up the device only by the buttons to prevent accidental contact with needles.
- Dispose of in sharps container or reapply.

Pressure Dressing

The Pressure Dressing is used to stop uncontrolled hemorrhage from an extremity.

Indication

- Uncontrolled hemorrhage from an extremity.

Procedure (Emergency Bandage)

- Place pad with pressure bar over wound and wrap running end of elastic bandage under limb and around to the other side.

- Insert elastic bandage into pressure bar.

- Tighten elastic bandage and pull back, forcing pressure bar down onto pad.

- Wrap elastic bandage tightly over pressure bar, wrap over all edges of pad.

- Secure hooking ends of closure bar onto elastic bandage.

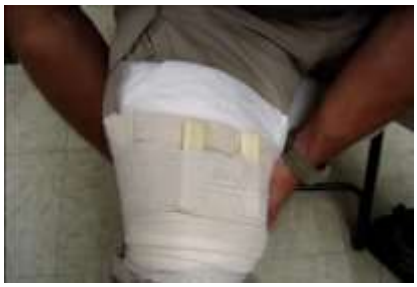
http://ps-med.com/PDF/instructions.pdf

Procedure (H-Bandage)

- Place pad with H bar over wound and wrap running end of elastic bandage under limb and around to the other side.


- Loop elastic bandage around closest side of H bar, pull back under limb and around to other side.

- Loop elastic bandage around other side of H bar, pull back under limb and continue to wrap elastic bandage around limb until the end of bandage is reached.

- Secure to elastic bandage with velcro located at the end of the bandage.

www.youtube.com/watch?v=Q8vzXwZx3yA

SAM Sling II

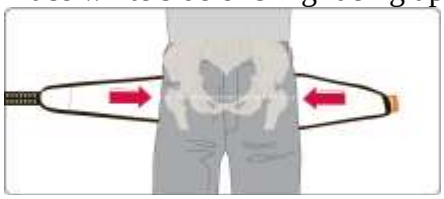
The SAM Sling II is used for effective reduction and stabilization of open book pelvic fractures. These fractures typically result from anterior-posterior compression of the pelvis – pedestrian struck, frontal impact MVC, etc.

Indication

- Suspected pelvic fractures.

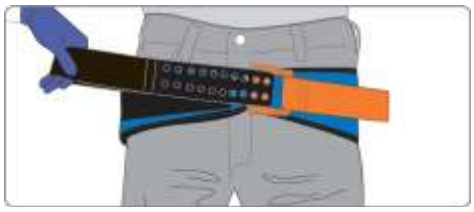
Procedure

- Remove objects from patient's pockets around pelvic area.
  Place white side of sling facing up, beneath patient at level of trochanters (hips).



www.sammedical.com/sam_sling.html

- Place BLACK strap through the orange buckle and pull completely through. Try to place buckle close to midline.



www.sammedical.com/sam_sling.html

- Hold ORANGE handle on outer surface of flap and pull BLACK strap in opposite direction until you hear and fell the buckle click.

www.sammedical.com/sam_sling.html

- Maintain tension and firmly press BLACK strap onto surface of sling.

Spinal Motion Restriction

Spinal motion restriction (SMR) refers to efforts to minimize spinal motion, and there are a range of strategies for achieving that goal. All should include efforts to ensure that anytime the patient is relocated, it is as a unit by way of in-line movements (log rolling, straddle-slide, etc.). The preferred method and intervention when SMR is indicated is application of a cervical collar, and not every patient that warrants a cervical collar requires a backboard. The decision to additionally utilize a backboard is a separate decision based on the position in which the patient is found, the ability to assess the patient based on mental status, vital signs, intoxication, and the patient's ability to sit on the stretcher under their own power.

Indication

- Any patient who meets the criteria for SMR.
- Any patient the provider feels would benefit from SMR.

Equipment

- C-spine splint: properly sized traditional extrication cervical collar or other device/materials (rolled blanket for use as horse collar, vacuum splint, etc.)
- Short spinal board: KED, LSP, etc.
- Long spinal splint: backboard, Ped Board, or other device
- Body securing device: spider straps, integrated system (e.g. KED), or other device/means
- Head securing device: towel rolls, integrated system, or other device/means

Strategy Selection Procedure

- SMR strategies include:
    - C-spine splint, long spinal splint, and head securing device.
        - Preferred method for altered mental status, dangerous mechanism or neurodeficits, and intoxicated patients
    - C-spine splint and patient-regulated motion restriction on the stretcher
        - Reasonable for cooperative, non-intoxicated patients, without dangerous mechanism or neurodeficits.

- A C-spine splint (only) is indicated for almost all patients requiring SMR in the absence of the long spinal splint criteria listed above. Further determination of the most appropriate SMR strategy is based on the following guidelines taking into account position found and patient presentation:
    - Patient found seated in vehicle or chair

      If the patient is intoxicated, has altered mental status or GCS <15, unstable vital signs, dangerous mechanism, evidence of neurologic injury, or is unable to stand from seated position, full SMR measures

(C-spine splint, short spinal board if indicated, long spinal splint, and head securing device) should be applied.
        - If the patient is alert, non-intoxicated, GCS=15, without dangerous mechanism, has stable vital signs, no signs of neurologic injury, and is able to stand and move to the stretcher with assistance, then they may be allowed to do so and the head of the stretcher should then be lowered to 30 degrees or less unless other clinical priorities dictate a higher position (e.g. SOB).
    - Patient found on the ground/floor
        - All patients should have full SMR measures applied.
    - Patient found standing or ambulatory
        - All patients should have a C-spine splint applied and be allowed to sit on stretcher. The head of the stretcher should then be lowered to 30 degrees or less unless other clinical priorities dictate a higher position (e.g. SOB).

Application Procedures

C-spine splint

- Size cervical collar per instructions and apply so that velcro is aligned.
- If a collar cannot be properly fitted and/or causes pain, agitation, difficulty breathing, or other adverse effects, a blanket roll may be reasonably substituted or manual stabilization may be continued through the prehospital phase of care.
    - Inability to fit a collar is not a reason to stop attempting to restrict motion of C-spine if restriction is indicated. Other approved means blanket roll or manual stabilization are acceptable alternative/contingency methods.

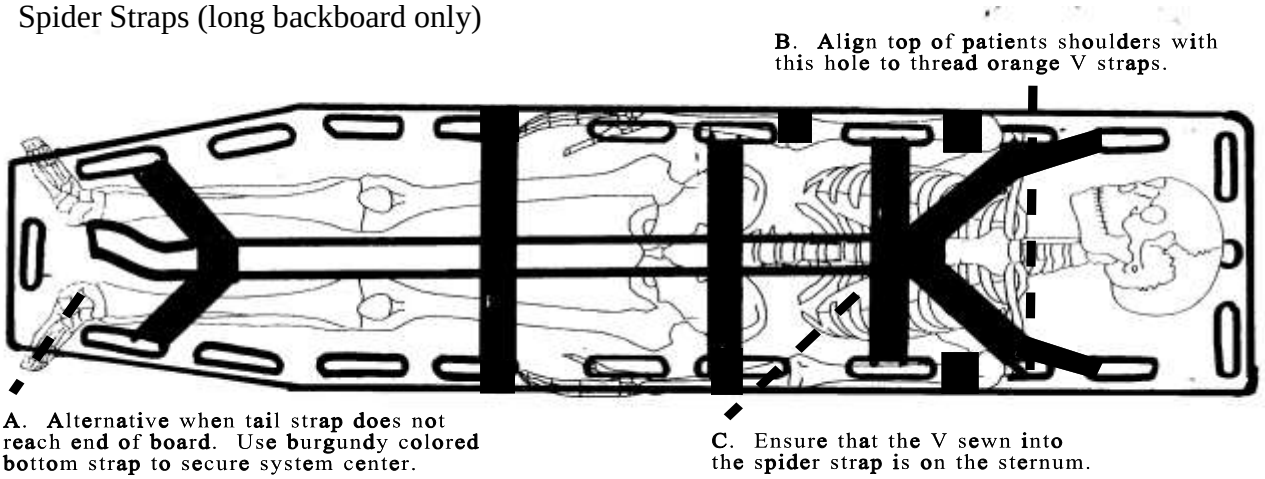
Short spinal splint (KED)

- There is almost no role for a KED. The KED has a very limited role with little evidence to support its value. A KED may be used on seated patients requiring SMR who are unable to move themselves from their seated position to the stretcher, intoxicated, or in the presence of altered mental status or dangerous mechanism/neurologic deficits. The decision to use the KED must be balanced against the increased movement of the spine while applying the device, the delay associated with its application, and the adverse impact on respiration and expansion of the chest.

Long spinal splint

- Patients may be moved onto device via log roll, straddle slide, or other coordinated system to keep spine in-line and minimize spinal movement, with manual C-spine stabilization maintained until mechanical stabilization is complete.
    - The most common devices are the long backboard and pediatric backboard. However, other devices can be utilized if needed/available (e.g. Reeves Stretcher, large vacuum splint, or KED for pediatrics, etc.).
- Patient placement on device should be adjusted using coordinated movements along the long axis of the device (i.e., up-down, not side-to-side) in order to keep the spine in-line.
- Pad any voids, especially if the patient is elderly, and support any spinal curvature.
    - Extreme curvature of the spine (or any other anatomical abnormality or variation from average) is not a reason to stop attempting to restrict spinal motion when restriction is indicated. Other means (improvised and otherwise) are available and only limited by the providers' imagination, good judgment, and equipment at hand.
- For young pediatric patients, pad appropriately to ensure the airway remains open.

Spider Straps (long backboard only)



- Position patient on the board so that the top of the shoulders are just at the lower strap connection/handhold on the board (Refer to Graphic B).
- Place the sewn "V" of the shoulder straps on the sternum (Refer to Graphic C). If the "V" is not positioned on the sternum, the chest and shoulders are not properly secured.
- If straps do not fit for some reason, use alternative methods to secure patient to selected device (tape, webbing, etc.).

D. Secure shoulder straps by threading down through hole in board, then back up through next hole up--do not wrap outside the board.

- Thread the shoulder straps over the shoulder, down through the hole in the board, then back up through the next higher hole (not around the outside of the board) and then velcro back to itself (Refer to Graphic D).
    - By properly connecting shoulder straps, the torso is secured in case of sudden stops or braking. If not secured, sliding forward can cause compression of the cervical spine and compromise a neck injury.
- The chest strap should be high, near the axilla.
- The hip strap should rest on the pelvis, not the abdomen.
- With some large patients, the blue strap is not long enough to connect to the foot of the board. If the strap is found to be too short when the sewn orange "V" is positioned correctly and placed on the sternum, thread the lowest cross-pieces through the lowest hole possible to tightly secure the system against forward movement (Refer to Graphic A).

Head securing device

- Towel rolls:
    - For each roll, fold two towels to one-third of their normal width, and roll tightly to about 7” long and 5” diameter. Use two pieces of 1” tape to secure the roll. Alternatively, use a standard, thin cotton blanket and fold it lengthwise about four times (until it is between 6 and 8 inches wide) and then roll it tightly up to make one headpiece.
- If standard towel rolls do not fit, form towels or blankets as needed (e.g. horseshoe) to secure the head. Vacuum splints may also be used to fill unusually shaped void spaces.
- As with any SMR equipment (KED, Miller or Pediatric Board) the torso must be fully strapped before the head. Secure the head last, and reassess neurological function after procedure is complete.

Special Consideration - Pregnant patient (greater than 20 weeks)

- Tilting the backboard to the left helps to relieve pressure from the uterus off of the inferior vena cava. The backboard can be tilted by placing a folded towel or sheet under the right side of the backboard, effectively raising the patient and angling her position to the left.
- Patients who warrant a c-collar only should be assisted to a position of comfort using padding while maintaining an in-line spine and minimizing spinal movement.

Traction Splint

The traction splint is used to relieve pain and immobilize mid-shaft femoral fractures.

Indications

- Proximal third and mid-shaft femoral fractures
- Treats unilateral and bilateral femoral fractures

Contraindications

- Suspected hip, pelvic and/or knee fractures
- Open, compound femoral fractures

Equipment

- Sager Splint
- 4 elastic velcro straps
- 1-2 padded ankle straps (depending on unilateral or bilateral immobilization is needed)
- 1 “figure 8” ankle strap

Procedure

- Apply manual stabilization to the injured leg and assess motor, sensory and distal circulation.
- Properly measure the splint to the unaffected leg, lengthening it approximately to the heel of the unaffected leg.
- Position the splint to the inside of the injured leg with the padded bar fitted snugly against the ischial tuberosity.
- Secure the ischial strap snugly around the thigh.
- Secure the padded ankle hitch to the injured leg and apply mechanical traction until the pain is relieved or 10 percent of the patient's body weight is achieved. Maximum traction applied should not exceed 15 pounds.
- Apply velcro support straps to the injured leg and reassess motor, sensory and distal pulse.
- Apply the “figure 8” ankle strap to secure both legs together to prevent rotation. Secure the patient to a long backboard, and assess motor, sensory and distal circulation.
- The splint may be used for immobilization of bilateral fractures. In this situation, both padded ankle hitches must be utilized and the maximum traction applied should not exceed 30 pounds. The legs should be secured together using the larger elastic velcro strap.

Vacuum Splint

Vacuum splints can be used for the immobilization of injured extremities. They function by molding around an injured body part when air is removed from the splint.

Indication

- Stabilization of possible dislocations and fractures

Equipment

- 1 vacuum pump
- 1 Leg Splint
- 1 Arm Splint
- 1 Wrist/Ankle Splint
- 1 Medium Forearm Splint
- 1 Large Forearm Splint

Procedure

- Stabilize extremity and ensure pulse, movement, and sensation before splint placement.
- Select the proper splint to secure and immobilize the patient's extremity.
- Place splint around injured extremity and use velcro straps to secure in place.
- Use splint pump or suction unit with adapter to remove air from the splint and engage pinch clamp.
- Monitor pulse, movement, and sensation after splint applied and during transport.

Windlass Tourniquet

The windlass tourniquet is a prefabricated tourniquet used to stop uncontrolled hemorrhage from an extremity.

There is small risk of ischemic injury with tourniquet use; this is balanced against the risk of prolonged uncontrolled blood loss. The risk of ischemic injury increases as tourniquet time increases. Ischemic injury to the nerve begins around 30 minutes, but ischemic injury to the limb generally does not become significant until around 2 hours. Since transport times are generally less than 2 hours, the removal of an appropriately applied tourniquet in the prehospital phase of care is not recommended.

Indication

- When direct pressure or a pressure dressing is ineffective or impractical and the wound is in a location conducive to tourniquet application.
    - Direct pressure or a pressure dressing may be considered impractical under the following circumstances:
        - Numbers of patients and/or number of high priority interventions exceed the resources to achieve them in a timely manner (e.g. five bleeding patients with two providers or patient bleeding from three limbs with one provider, etc.).
        - Incident dynamics make direct pressure or a pressure dressing impractical (e.g. Warm Zone/Indirect Threat location, etc.).

Procedure

- Identify the bleeding extremity.
- Determine tourniquet placement location in relation to the wound:
    - In the Cold Zone (Evacuation Care) setting
        - Place the tourniquet 2-3" above the injury. Avoid placing tourniquet over joints to ensure compression of the vasculature.
    - In the Warm Zone (Indirect Threat) setting
        - Place tourniquet above the injury as proximal as possible to the torso.
- Route running end of tourniquet through buckle, making sure to use the friction adaptor.
- Pull running end tight and velcro back on itself.
- Twist windlass rod until bright red bleeding has stopped and distal pulse is no longer present.
- Lock the windlass rod in place with the clip (secure with strap) or straps (secure both ends).
- Document time of tourniquet placement and time of bleeding control.
- **Ensure you notify hospital staff of tourniquet use and time of application.**
- If first tourniquet placement is unsuccessful, if possible, apply a second tourniquet one to two inches proximal to the first tourniquet.
- Reassess the need for tourniquet if transport is delayed beyond 30 minutes.
- If the decision is made to remove tourniquet, a pressure dressing should be applied (with topical hemostatic agent if available). The tourniquet may then be loosened but left in place and the wound closely monitored. If rebleeding occurs, retighten the tourniquet to stop bleeding and leave in place.
- If tourniquet is loosened in the field, document time.

Wound Packing

Wound packing can be accomplished by using a hemostatic trauma gauze or sterile gauze. Hemostatic trauma gauze is surgical gauze embedded with materials that stop arterial and venous bleeding in seconds. It can be fit to any size or shape wound, including penetrating wounds. Sterile gauze may be used when hemostatic trauma gauze is not immediately available. Sterile gauze may be equally effective in some settings.

Indications

- Wounds with bleeding that cannot be controlled with direct pressure.
- For immediate control of gross bleeding in life threatening situations, to include but not limited to:
    - Patients with airway compromise
    - Patients in cardiac arrest
    - Impaired access to patient requiring extrication

Contraindications

- Wounds that can be controlled by direct pressure or basic bandaging.
- Wounds to chest and abdomen because they are non-compressible spaces.

Procedure

- Expose the injury by opening or cutting away the patient's clothing.
- If possible, remove excess blood from the wound while preserving any clots that may have formed.
- Locate the source of the most active bleeding.
- Remove the hemostatic trauma gauze or sterile gauze from its package and pack it tightly into the wound directly over the site of the most active bleeding.
    - More than one roll of gauze may be required to control the hemorrhage.
- Apply direct pressure quickly with enough force to stop the bleeding.
- Hold direct pressure for a minimum of 3 minutes.
- Reassess for bleeding control.
- Additional packing may be placed as necessary to stop any continued bleeding. Do not remove previous placed dressing.
- When bleeding has been controlled be sure to leave the dressing in place.
- Secure dressing in place with a pressure bandage ensuring the entire dressing area is covered.
- Assess PMS distal to bandaged site.
- Carefully document and transport.
- Ensure hospital personnel are aware of the hemostatic trauma gauze placement upon transfer at the hospital.

Vascular Access

External Jugular

The external jugular vein may be the site of last resort when a patient needs peripheral access and other veins are not usable. It is also an excellent large proximal vein, and closer to the central circulation than the antecubital site.

Indication

- Placement of a venous access line when other peripheral sites are unavailable.

Contraindications

- Lack of anatomical landmarks due to neck size, shape, or deformities.
- Overlying infection
- Suspected fracture of the cervical spine (relative).

Procedure

- Place the patient supine and raise the legs. This will increase blood flow to the chest and neck, thus distending the vein and making it easier to see. Additionally, this position decreases the chance of air entering the circulatory system during cannulation.
    - If the patient is able and no contraindications exist, vagal maneuvers will dilate the vein.
    - Hepatic pressure (firm pressure over the right upper quadrant for at least 10 seconds) will generate venous back-pressure (hepatojugular reflux), further raising the vein.
- Turn the patient's head away from the side of the access site (Figure A).

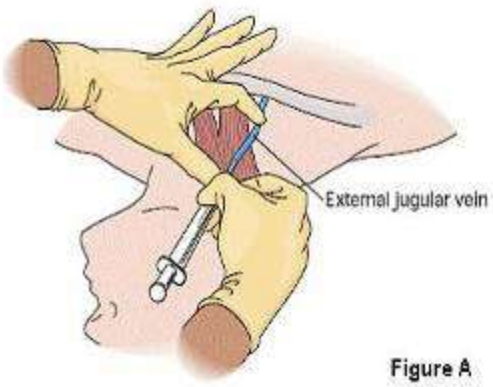


Figure A


meded.ucsd.edu/clinicalimg/head_ejdistension1.htm

- Identify the external jugular vein, located between the angle of the jaw and the middle third of the clavicle.
- Using a circular motion, cleanse the site thoroughly with an antiseptic wipe. Allow the area to dry before penetrating the skin.

External Jugular continued

- Occlude venous return by placing a finger on the external jugular just above the clavicle (having another provider do this will free you to better stabilize the skin). Position the catheter in line with the vein, midway between the angle of the jaw and the clavicle.
- Firmly stabilize the skin just above the site in the direction of insertion, and pierce the skin quickly at a low (10 – 30 degree) angle (use a long catheter). Keep the stabilizing hand out of the way of the catheter.
- Advance on flash as with a standard peripheral insertion, and have the line/lock ready (occluding can be difficult as there is no bone to press against). Quickly make the connection to avoid possible air entry.
- Open the IV flow control valve and run the IV infusion for a brief period of time to ensure that the line is patent.
- Cover the IV site with a sterile dressing and bandage. Secure the catheter, administration set tubing, and sterile dressing in place with tape. A cervical collar may be placed over the site.

Intraosseous (IO)

Intraosseous cannulation (IO) is a relatively safe and effective method of achieving vascular access in both children and adults, where IV access cannot be readily established.

Medication or fluid bolus administration can be extremely painful due to stimulation of pressure receptors in the marrow space. Lidocaine administration immediately after establishing access can provide relief for the conscious/pain-sensing patient.

In an adult, the humeral insertion site is the preferred site for IO access. Humeral insertion allows for better delivery of medications to the central circulation.

Authorized IO Device

- EZ-IO

Newborns (3-39 kg)	15mm needle set (Pink)	Tibial Insertion only – one attempt each site.
Pediatric (> 3 kg)	25mm needle set (Blue)	Tibial or Humeral Insertion – one attempt each site.
Adult (40kg and greater)	45mm needle set (Yellow)	Tibial or Humeral Insertion – one attempt each site.

Equipment Maintenance

- In order to avoid draining the battery, the power driver trigger should not be activated daily during routine equipment check.

Indications

- Seriously injured patients where IV access is needed but will be delayed or difficult (e.g. entrapped patients, etc.).
- Hypoperfusing or cardiac arrest patients where IV access cannot be established or is judged by providers to be excessively challenging due to medical history or current condition.
- Actively seizing pediatric patients.

Post-cannulation Analgesia

- If patient is conscious and/or responsive to pain, administer medication immediately after IO placement is verified by aspiration of blood/marrow (see **Pain Management** protocol).
- Observe site for signs of infiltration/extravasation.

Contraindications to insertion

- Fracture near the insertion site
- Previous significant orthopedic procedures near the insertion site
- Reversible condition (e.g. hypoglycemia, narcotic OD, etc.) where alternative medication routes are readily available and/or easily accessed.
- Any infection over the insertion site
- Inability to locate the anatomical landmarks

Contraindication to use after insertion

- Excessive tissue over the insertion site
    - The 5 mm mark on the EZ-IO catheter should be visible. If this mark is NOT visible, then there is excessive tissue over the site.

Procedure

- Gather equipment
    - EZ-IO® driver
    - EZ-IO® needle set
    - Disinfectant wipe
    - Analgesic medication (if applicable)
    - Primed syringe (10 ml for adult, 5 ml for ped) and large bore extension set
        - Unconscious patient
            - Draw up sufficient NS to fill syringe and extension set.
        - Conscious patient
            - Draw up analgesic medication (see **Pain Management** protocol)
            - Draw up additional NS to fill syringe and extension set.

- Locate proper site for EZ-IO insertion
  - **Adult tibial insertion:** One finger width medial (toward the inside) of the tibial tuberosity (Figure A).
  - **Pediatric tibial insertion:** If the tibial tuberosity can be palpated, the insertion site is one finger width below the tuberosity and then medial along the flat aspect of the tibia (Figure B). If the tibial tuberosity cannot be palpated, the insertion site is two finger widths below the patella and then medial along the flat aspect of the tibia (Figure C).

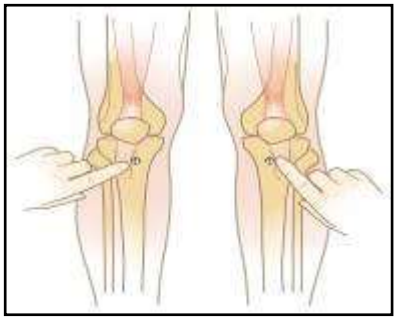


Figure A

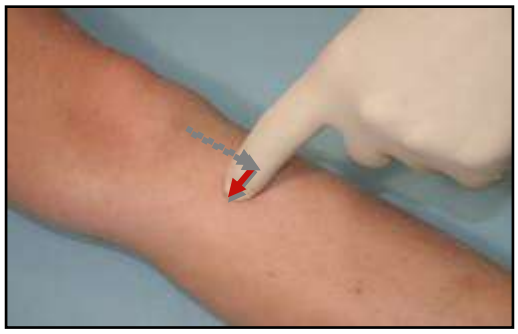


Figure B

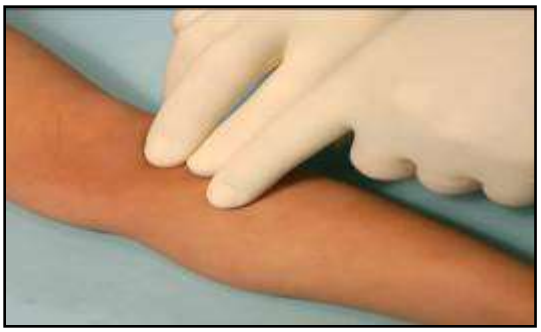
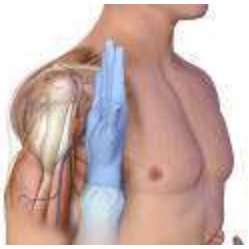


Figure C

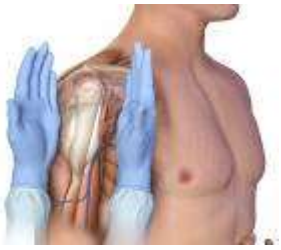
- **Adult humeral insertion:**
  - Place the patient's hand over the abdomen (elbow adducted and humerus internally rotated).

  - Place your palm on the patient's shoulder anteriorly. The area that feels like a "ball" under your palm is the general target area. You should be able to feel this ball, even on obese patients, by pushing deeply.

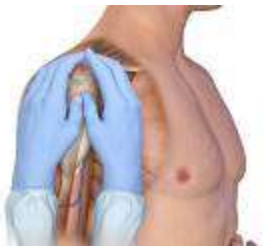
  - Place the ulnar aspect of one hand vertically over the axilla.



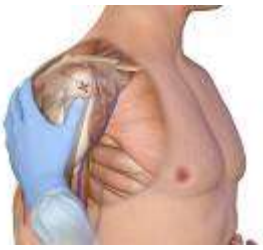
  - Place the ulnar aspect of the opposite hand along the midline of the upper arm laterally.



  - Place your thumbs together over the arm. This identifies the vertical line of insertion on the proximal humerus.



  - Palpate deeply as you climb up the humerus to the surgical neck. It will feel like a golf ball on a tee – the spot where the "ball" meets the "tee" is the surgical neck. The insertion site is on the most prominent aspect of the greater tubercle, 1 to 2 cm above the surgical neck.



http://www.teleflex.com/en/usa/ezioeducation/

- Cleanse site with antiseptic wipe prior to procedure. Prepare the EZ-IO driver and needle set:
    - Open the EZ-IO case and remove the driver and the appropriate size EZ-IO cartridge.
    - Open the EZ-IO cartridge and attach the needle set to the driver (you should feel a "snap" as the small magnet connects).
    - Remove the needle set from the cartridge.
    - Remove the safety cap from the needle set. One way to remove the cap from the needle set (with the needle facing you) is to grasp the cap tightly and rotate clockwise to loosen and remove. Attempting to "pull" the cap off may remove the entire needle set from the driver. Rotating counterclockwise will cause the catheter and stylet to separate.
- Begin insertion of the EZ-IO Needle Set (Figure E).
    - Holding the EZ-IO driver in one hand, stabilize the leg/shoulder near the insertion site with the opposite hand. Make sure your hands and fingers are a safe distance from the path of insertion. Be cautious of sudden patient movements.
    - Position the driver at the insertion site with the needle at a 90 degree angle to the surface of the bone. Power the needle set through the skin at the insertion site until you feel the needle set tip encounter the bone itself.

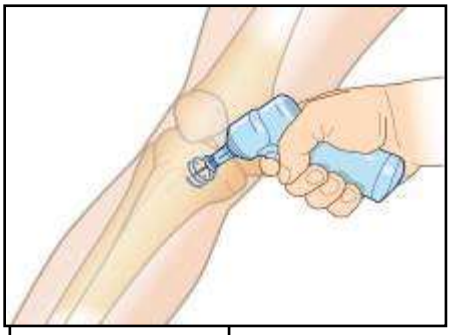


Figure E

- Continue to insert the EZ-IO.
    - At this point if there is any doubt that the needle set is not long enough, verify that you can see the 5 mm marking on the catheter itself (this is the mark closest to the flange). If this mark is not visible, you should abandon the procedure as the needle set may not be long enough to penetrate the IO space.
    - Apply gentle and steady pressure on the driver and power through the cortex (hard, outer surface) of the bone, ensuring the driver is maintained at a 90-degree angle at all times.
- Do not use excessive force. Maintain maximum RPMs, allowing the catheter tip rotation and gentle downward pressure to provide the penetrating action. Let the tool do the work.
    - If the driver stalls and will not penetrate the bone, you may be applying too much downward pressure; pull back and allow driver to return to maximum speed.

- If the driver fails, consider manual completion.
    - Grasp the catheter as shown. Be certain to have a firm grasp on both the stylet and catheter hubs. Twist the set back and forth (maintaining a 90-degree angle to the surface of the bone) while gently pushing into position.

    - Manual insertion is considerably slower and the following should be considered:
        - Failure to hold both the stylet and the catheter hubs may lead to catheter separation and insertion failure.
        - Failure to maintain a 90-degree angle may lead to extravasation due to the creation of a larger than needed pathway for the catheter.
    - Stop when the needle flange touches the skin or a sudden decrease in resistance is felt. This indicates entry into the bone marrow cavity (intramedullary space).
- Remove driver from the needle set.
    - While supporting the needle set in one hand, gently pull straight up on the driver and lift away.
    - Return the driver to its case.
- Remove the stylet from the catheter (Figure F).
    - While grasping the hub firmly with one hand, rotate the stylet counter clockwise (unscrew the stylet from the catheter). Pull the stylet out of the catheter and place it into the empty cartridge, now called the stylet shuttle. The stylet shuttle must then be secured in a biohazard container.

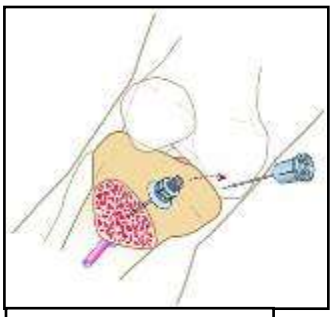


Figure F

- Secure site with EZ Stabilizer.
- Connect primed EZ-Connect extension set to exposed Luer-lock hub. Attach syringe and attempt aspiration. **Note**: Particulate matter or blood may not always be aspirated depending upon patient condition or volume status.
- Remove syringe from EZ-Connect extension set and connect the dripset to the IV extension set and observe for free flow of fluid. Complete inability to infuse implies misplacement of the needle tip, however pressure may be required for continuous flow.
- Confirm correct placement by rapidly flushing 10 ml of NS.
- Apply the wristband. The wristband is designed as a reminder of EZ-IO placement and need for timely removal.
- Monitor site and surrounding area to include opposite side of limb if applicable.

Intravascular (IV)

The intravenous route is the fastest way to deliver fluids and medications throughout the body. Proper technique is crucial in order to minimize infection potential.

Indications

- Anticipated or actual need for fluid resuscitation.
- Anticipated or actual need for medication administration.

Set Up

Saline Bag and Dripset

- Select proper dripset.
  - 10 or 60 drop (and/or Buretrol if applicable)
- Select fluid bag.
  - Proper size (1,000ml, 250ml, or 100ml)
- Check fluid bag.
  - 0.9% normal saline only
  - Sealed packaging
  - Clear fluid
  - No sediment
  - Not expired
- Remove bag packaging and dripset access port plug.
- Remove dripset packaging and spike cap and adjust flow controller to closed position.
- Fully insert dripset spike into bag access port.
  - If applicable, Buretrol usually placed between dripset and bag.
- Hold assembly upright and squeeze drip chamber. Repeat until filled halfway.
- Open flow to prime dripset, close when fluid emerges from end.
- Leave end cap in place.

Saline Lock

- Select extension set.
- Select pre-filled syringe flush.
- Check flush.
  - 0.9% normal saline only
  - Sealed packaging
  - Clear fluid
  - No sediment
  - Not expired
- Remove flush packaging and cap.
  - Apply blunt cannula if applicable (rubber port).
- Remove extension set packaging.
- Attach flush to extension set and prime until fluid emerges from end.
- Leave end cap in place.

Select

- Catheter (appropriate size for patient condition and anticipated treatment)
- Infection control items
    - Chux/towel if applicable
    - Antiseptic wipe
    - 2x2s, 4x4, etc.
    - Gloves
- Securing items
    - Tegaderm or equivalent
    - Tape
    - Kling, armboard, etc., if applicable

Tourniquet Application

- Apply tourniquet high and early to allow extremity's vasculature time to fill. Avoid excessive back pressure in the elderly or others with delicate veins or hypertension.
- Keep extremity dependent to allow gravity to work with maximum effect.

IV Cannulation

- Select site based on presenting anatomy, patient condition, and anticipated treatment.
    - Dilate target vein further if needed
        - Keep extremity dependent
        - Snap/tap vein (vasodilation from localized histamine release)
        - Heat at site will dilate
        - Milk veins with 1"-2" Ace bandage (start at tourniquet and wrap snugly down extremity)
        - Have patient open and close hand
- Cleanse site with antiseptic wipe prior to procedure.
- Stabilize vein and approach bevel up at low angle.
- Pierce skin quickly to minimize pain reaction.
- On flash, advance 1/8" further to position cannula in lumen of vein.
- Anchor needle and advance cannula.
- Remove tourniquet (unless bloods are being drawn).
- Occlude distal end of cannula with firm finger pressure.
- Withdraw needle and place in sharps container
- Connect lock/line and verify flow.
- Secure catheter as needed.
- Set desired rate of infusion.

Venous Blood Specimen Collection

Blood samples occasionally may need to be drawn from patients. EMS Supervisors carry kits for these purposes, and generally perform the procedure.

Indications

- Bloodborne pathogen exposure (FRD provider or Good Samaritan) where the patient will not be transported to an ED. This includes refusals, field termination of resuscitative efforts, DOA's, and any deceased patient transported by FRD to the morgue.

Procedure

- Keep/apply tourniquet 3-5" above site if possible
- Select equipment
    - Blood draw items (provider choice)
        - Purpose-built blood tube adapter/needle,
        - 20ml syringes and needles/cannulas
        - Butterfly set
    - Blood tubes
        - Exposure: at least two gold top tubes and one purple top
    - IV start kit if needed
- Draw Blood
    - If drawing directly (preferred):
        - Raise vein and clean site
        - Insert preferred device needle (larger preferred) to draw blood
            - Butterfly set: Attach adapter/syringe and follow existing IV procedure above.
            - Adapter/needle set: Insert and fill needed tubes completely as possible.
            - Syringe/needle set (especially if deep vessel access is needed use long needles, e.g. 3"): Gently aspirate syringe and fill as much as possible. Fill needed tubes completely as possible using blunt red metal cannula
    - If drawing from an existing or new IV (larger bore preferred). Attach preferred device directly to hub if possible (may draw through saline lock if needed).
        - Syringe
            - Gently aspirate syringe.
            - Waste sufficient samples to clear saline from catheter/extension set.
            - Fill syringe as much as possible.
            - Fill needed tubes as completely as possible using blunt red metal cannula.

        - Adapter
            - Insert an unneeded blood tube.
            - Waste sufficient unneeded tubes to clear saline from catheter/extension set.
            - Insert and fill needed tubes completely as possible.
    - Immediately after filling, gently invert each tube several times.
    - Remove tourniquet.
- Clearly label tubes with date/time, patient name, provider name, or per protocol.
- Place in plastic bag and keep upright during transport.
    - Do not expose to heat.
    - Consider applying ice pack to keep cool but do not allow to freeze.
- Tubes drawn for exposures will be taken immediately to Fairfax Hospital by the EMS Supervisor or Safety Officer.
    - The Safety Officer should be notified in all cases.

EQUIPMENT

EMS Supplies and Equipment

Only FRD authorized and approved EMS supplies and equipment shall be used.

Personnel who would like to suggest changes to approved supplies and equipment shall follow the **EMS Innovation** policy.

Station EMS Supplies

The station captain is responsible for oversight of supply management, with specific emphasis on maintaining station and vehicle inventory levels in accordance with established EMS Division standards.

- Inventory levels are derived from OEMS and EMS Division standards.
- Inventory levels are posted on the intranet. The *Station EMS Supply Inventory* (FRD-213) details station inventory levels and the FRD-209 series has vehicle inventories.
- All station ALS supplies must be secured in a locked storage area.
- There are two FRD resources to obtain EMS supplies: the Boundtree website and the FRD on-line ordering system (all station commanders have on-line ordering access).
- If an interruption in the station supply system has occurred and specific items are lacking, arrangements shall be made to borrow from another fire station until the orders arrive.
- No supplies are to be obtained from hospitals without specific authorization from the EMS Division.
- If other EMS supply issues arise contact EMS Logistics through the EMS Captain for direction.

Non-Expendable EMS Items

While most expendable EMS supplies are ordered by the station captain or designee using a dedicated vendor website. Philips MRx items are primarily ordered by the EMS Supervisor or designee as a replacement to an issued item via internal FRD online ordering and are listed in the "EMS Unique" category. This includes items generally kept in stock at the Fire and Rescue Department Logistics Distribution Center (LDC). These orders are processed by Resource Management and the EMS Division and are delivered by Service One.

Because "EMS Unique" contains mostly accountable or sole-source contract items, each online order must include an explanation in the "Comments" field. Typically, these items are issued to replace damaged, surveyed, or lost items. Sole-source items such as In-line NEB kits and replacement EZ-IO needles can also be obtained via the on-line ordering under "EMS Unique."

A completed EMS e-form should be attached to any item being returned to the warehouse, and a Property Loss RISK-03 form might be required. Examples: KED with frayed straps was surveyed; pulse oximeter was run-over and destroyed on an incident; or 12-lead cables have a broken connection.

Monitor/Defibrillator and AED accessories (e.g. cables, batteries, etc.) are included in this category. Because EMS supervisors are the principal point of contact with the vendor's repair technicians, they also carry reserve monitor/defibrillators, AEDs, and replacement accessories. If a unit finds defective equipment, they are to notify the appropriate EMS Supervisor. The EMS Supervisor will immediately supply the unit with a replacement item from reserve, ensure that an EMS e-form is completed to track the item and then order a new part to replenish the reserve inventory.

Pool Items

The only "pool" EMS equipment items in the FRD are backboards and backboard straps. All other durable equipment (such as Reeves stretchers, KEDs, Pedi-mates, etc.) is assigned to a station and/or unit and should be marked as such. Each station shall have a policy to track EMS equipment left at hospitals.

Online Ordering

The FRD online ordering system has an "EMS Unique" category for equipment items and specific supplies that are not available from Bound Tree. These items are generally stocked at the FRD Logistics Distribution Center (LDC). The following items are among those that must be ordered via the online ordering system:

- Broselow tapes
- Chest decompression kits
- EZ-IO needles
- FRD-208 1st Responder pads
- Glucometers
- Inline nebulizer kits
- LUCAS2 supplies
- MCI supplies
- Tourniquets (CAT and MET)

EMS Supervisor Items

EMS Supervisors are responsible for initial trouble shooting of any issues with MRx monitors. They carry standard user replaceable items that may be needed. These include:

- AC Power module
- Batteries
- Cables
- qCPR replacement meter
- Screen covers
- FRx AED replacement batteries

When any of these items are used to replace a damaged or malfunctioning item, the damaged item needs to be returned to EMS Logistics at the LDC with a printed eForm attached to obtain replacement.

EMS Supervisors also have the following loaner equipment items. Each supervisor is responsible for tracking the loan out and return of these items. Some may be carried on their vehicle, others are stored at the station.

- CPAP PortO_2Vent
- EZ-IO driver
- GPS navigator
- KED
- King Vision digital display
- Nonin pulse oximeter
- Pediatric LSP board
- Philips FRx AED
- Philips MRx – 12 lead and non-12 lead
- Reeves stretcher
- Sager traction splint
- Stryker cot and stair chair

Medications

Only FRD approved drugs in the authorized quantity shall be carried on FRD units. See the *A.L.S. Medication Inventory Sheet* (FRD-212) on the intranet for current drugs and quantities.

Personnel who would like to suggest changes to approved medications shall follow the **EMS Innovation** policy.

Medication Storage and Accountability

The Virginia Board of Pharmacy, the Federal Drug Enforcement Agency and the VAOEMS regulate the handling and accountability of all prescription medications.

No prescription medications shall be stored in fire stations (e.g. EMS closets).

If any expired drug containers are desired for training purposes (vials, amps, etc.) they shall be emptied of contents, marked "training only" and stored with training equipment, not in EMS cabinet. Refill with water prior to training use.

All medications shall be secured in a designated container or compartment that is lockable and secured to the vehicle. Access to this container or compartment shall also be secured so that it is not accessible to the public.

- Vehicles with medication compartments secured by combination locks shall not post or otherwise reveal the entry code.
- Vehicles with medication compartments secured by keyed locks shall carry a second, spare key in a rapid entry box on the unit.
- Drug keys shall be secured in a knox box or carried on the provider's person.

All medications shall be protected from temperature extremes. This shall be accomplished through use of a built-in climate-controlled system if equipped/available or (if not) by utilization of the vehicle cabin climate-control systems.

- If a unit without a climate control system will be parked for an extended period in extreme temperatures with the engine off (EMSCEP, etc.), the medications shall be removed from the vehicle and secured in a climate-controlled area until returned to service.
- This provision also applies if the medication climate control system will not operate without power. Any climate control system found to be malfunctioning shall be promptly reported for repair on M5.

As part of the shift change equipment check, two providers shall conduct a medication inventory. At least one of these will be an ALS provider. However, if the medication kit is sealed, such as on AFR rescue squads, two BLS providers can sign confirming that kit is present and un-tampered with. The daily inventory shall be documented on the FRD-212 and kept on the unit.

On most units, this inventory shall include examination of all medications carried and include verification of:

- Proper quantity per current FRD policy
- Expiration date
- Intact packaging and container integrity

Sealing Drug Kits

With approval of station commander, unit policy may be to seal drug kits with numbered, tamper-proof seals (available on purchase.net). If such a policy is in place, the daily two-signature accounting is still required. On the FRD-212, instead of checking each item, record the seal number in those spaces and write "sealed." Thereafter the daily check shall include two-signature verification of:

- Drug kit is present
- Seal is intact without signs of tampering

After use, or at a minimum once a week on Sunday, the kit shall be inventoried and resealed. Any drugs that expire in the next 10 days shall be replaced before resealing.

Numbered seals may be used in similar fashion on other EMS kits or compartments if infrequent access is anticipated and daily equipment check (glucometers, laryngoscopes, etc.) is not required.

Ready Reserve Drug Kits

Ready-reserve drug kits (such as volunteer ALS units) that are not in service shall be secured under lock and key and must be inventoried and accounted for on the FRD-212 at a minimum once a week on Sundays, per FRD SOP.

Any transfer of ready reserve drug kits from one station to another must be authorized by the EMS Division. Drugs kits must be properly secured at all times during transport between stations. Drugs kits cannot be transported in privately owned vehicles.

Rescue Squad AFR Kits

ALS First Responder Kits carried on Rescue Squads shall be accounted for daily on the FRD-212 with two signatures, ALS or BLS. When no ALS provider is assigned, the kit shall be sealed as described above and providers sign that it is present and un-tampered with. After use, or at a minimum once a week on Sunday, the kit shall be inventoried and resealed. If no ALS provider is assigned on Sunday, an ALS provider from the engine or medic unit shall assist with the inventory and be one of the two signatures.

NVERS NAAK and MCI Caches

As part of the Northern Virginia Emergency Response System (NVERS) the FRD maintains specific medications and antidotes for deployment in a WMD-MCI scenario. An orange Nerve Agent Antidote Kit (NAAK) is assigned to each medic unit and a drug cache with medications for treating a large number of patients is assigned to each EMS Supervisor and HazMat440.

These medications are sealed and not to be opened except for use. If any of the medications are used, notify EMS Logistics through the EMS Supervisor for replenishment. EMS Logistics manages the program inventory and drug expiration dates. The daily responsibility of the crew is to verify that the NAAK and/or MCI Cache is present and un-tampered with. This information is included on the FRD-212.

Routine Medication Issue/Replacement

All medications shall be replaced prior to the expiration date. If the medication date includes only the month and year (e.g. 06/12), it shall be considered to expire on the last day of that month.

- Two EMS providers shall witness the wastage/disposal of expired medications.
- If empty vials are to be retained for training purposes, it shall be done so as specified in the Medication Storage and Accountability section.

Replacement medications may be obtained from the following participating hospital EDs or pharmacies:

INOVA Alexandria	INOVA Loudoun
INOVA Fair Oaks	INOVA Mount Vernon
INOVA Fairfax	INOVA Springfield HealthPlex *
INOVA ECC Fairfax *	HCA Reston Hospital
INOVA ECC Reston *	Virginia Hospital Center

* Free standing emergency care centers may be unable to supply some medications and should not be used to restock expired drugs or those used on patients not transported.

If units transport to a non-participating facility, the unit shall restock at the closest participating facility before returning to service.

When requesting issue of replacement medications at a hospital emergency room or pharmacy, providers shall present a signed, completed *EMS Medication Issue Sheet* (FRD-211) and their FRD ID, if requested, to the hospital staff. Upon receipt provider shall carefully check for correct drug, concentration, dosage and expiration date.

- Any large issue of medications, such as a new unit or complete drug replacement, shall be authorized by the EMS Division and conducted at the INOVA Fairfax Central Pharmacy.
- The FRD purchases all medications obtained from hospitals. The facilities utilize the FRD-211 for billing.

Cyanokit Issue/Replacement

The cyanokit is carried only on EMS Supervisor vehicles and in MMRS NAAK cache. If a cyanokit is used, the EMS Division coordinates the replacement. To obtain replacement after use, for breakage or expiration the EMS Supervisor shall submit an EMS e-form. Click on "cyanokit" and write a brief narrative including the equipment used and incident number.

Controlled Medications

The FRD utilizes the Northern Virginia Region Controlled Substance Kit (CSK) for issue and storage of DEA Schedule II, III and IV medications. Periodically the region adjusts contents or quantities carried. Providers may only administer medication as authorized by FRD protocols. The current contents are:

- Fentanyl, 100 micrograms/2ml, quantity 4
- Ketamine, 500 milligrams/5ml, quantity 2
- Midazolam, 5 milligrams/5ml, quantity 4
- Midazolam, 10 milligrams/2ml, quantity 2
- Morphine, 10 mg/1ml, quantity 2
- EMS Controlled Substance usage form (not an FRD form, supplied by and only available at hospital pharmacies)

Each ALS-capable unit (transport and non-transport) shall carry one sealed CSK in the designated section of the ALS bag. The CSK shall be checked during the daily medication inventory for:

- Expiration dates
- Intact packaging and container integrity

The number of the CSK bag shall be recorded in the designated space on the *A.L.S. Medication Inventory Sheet* (FRD-212). If the CSK is sealed inside the drug kit (such as rescue squad AFR kits) signing for the sealed kit also accounts for the CSK.

Each time CSKs are replaced or exchanged at the hospital, the numbers of both bags (outgoing and incoming) shall be recorded in the designated space on the medication check sheet belonging to the unit receiving the new CSK.

Example:

- M431's log: 4-16-12 1800 hrs. CSK #83254 exchanged at Mt. Vernon Hospital due to expiration. New CSK #87792 received ***Lt. P Smith/Tech. M Jones***

In the event CSKs are exchanged by a transport unit and a non-transport unit (i.e. a non-transport unit opens and uses its CSK then resupplies a sealed kit from a transport unit), both units shall record the numbers of the bags exchanged in the designated spaces of their respective medication check sheets. The transport unit will then exchange the open/used CSK at the hospital (see procedure above).

Example:

- E431's log: 4-17-12 2300 hrs. CSK #73264 used on Incident #2145 and exchanged with M431. CSK #75342 received from M431 ***Capt. J Parker/Tech C Davis***

- M431's log: 4-17-09 2300 hrs. CSK #75342 given to E431 in exchange for CSK #73264 after use on incident #2145. CSK #73264 exchanged at HCA Reston Hospital for CSK #66521. ***Lt. P Smith/Tech. M Jones***

Any time a CSK medication is administered, the EMS Controlled Substance Usage form shall be completed and signed prior to exchange at the ED or pharmacy.

If a patient is transported to a non-participating facility, obtain the signature of the receiving physician on the EMS Controlled Substance Usage form, recognizing that the unit will have to go to a participating hospital to replace the CSK. In those instances when a signature cannot be obtained, such as a Medevac to the burn center, go a participating hospital to replace the CSK. Explain the situation to the physician on duty in the emergency department and request his/her signature. The physician signature authorizes restock, and is not a treatment order.

Any partially used medication shall be wasted in the ED (not the pharmacy). The disposal shall be witnessed and documented on the usage form by an ALS or BLS FRD provider, or an ED nurse or medical practitioner.

All CSK exchanges after use or prior to expiration shall occur at the ED or at the pharmacy, according to facility policy. Providers shall present FRD ID to the hospital staff upon request and provide:

- Completed EMS Controlled Substance Usage form with MD signature
- Contents of the kit (or remaining contents if kit opened and used)

Provider shall inspect and double-check the new CSK label with hospital personnel prior to accepting the bag.

Controlled Substance Discrepancy

A controlled substance discrepancy exists when an improperly secured, damaged, or non-intact CSK is discovered. Upon discovery:

- The station OIC shall:
  - Immediately notify the EMS Supervisor
  - Complete a *Controlled Medication Discrepancy* (FRD-105) form
  - Forward the FRD-105 to the EMS Supervisor prior to going off duty

- The EMS Supervisor shall:
  - Determine status of unit (in or out of service)
  - Notify DFC-EMS, BC-EMS, and EMS Regulatory Officer via email copying the appropriate BC.
  - Provide direction for appropriate replacement of the CSK
  - Submit EMS *Inquiry Intake Form* (FRD-19)

- The EMS Regulatory Officer shall (when required) complete the State OEMS Drug Diversion reporting form within 15 days of the event.

EMS Equipment Use and Maintenance

All equipment carried on FRD vehicles shall be well maintained and kept in a neat, clean, and operational condition at all times. All permitted vehicles and those carrying AEDs shall document daily check on the *EMS Equipment Daily Check Log* (FRD-205).

No equipment belonging to other agencies or departments shall be carried on FRD vehicles.

Unless otherwise specified by the FRD, care and maintenance shall conform to manufacturer's recommendations.

The equipment carried on each type of unit shall be in accordance with the **EMS Vehicle Standards** policy based on VAOEMS and EMS Division standards.

Cleaning and Disinfection

All equipment shall be cleaned and disinfected in accordance with Chapter 5 of the FRD *Exposure Control Plan.*

The patient care area of each transport unit shall be cleaned and disinfected daily. This shall be documented on the *EMS Equipment Daily Check Log* (FRD-205) in the vehicle equipment log. Guidelines for daily cleaning/disinfecting include:

- Use a general purpose cleaner for visibly dirty areas and equipment.
- After cleaning, disinfect surfaces with an approved solution, such as commercial disinfectant spray or diluted bleach solution.
- Use a dedicated mop to clean the floors of transport vehicles (such mops shall be labeled "for disinfection only").

After each incident, all equipment that came in contact with the patient (splints, BP cuffs, safety belts, ECG cables, etc.) shall be visually inspected, cleaned, and disinfected.

As specified in Chapter 4 of the *Exposure Control Plan*, hospital personnel are only responsible for gross decontamination of equipment left at receiving facilities. FRD personnel are responsible for inspection of equipment to verify cleanliness, and as needed, cleaning minor dirt or contamination prior to placing on the vehicle.

If equipment in a hospital storage area is found to be grossly contaminated, the hospital staff shall be notified of the situation and asked to remedy it. If the situation cannot be remedied, the EMS Supervisor shall be notified. If necessary, the supervisor will elevate the issue to the Safety Officer and/or the Safety and Personnel Services Division for resolution.

Straps and Webbing

Providers shall pay special attention to permeable items such as spider straps after use.

- Dirty or muddy straps (not body fluids) shall be washed at station in a bucket with soapy water and air dried.

- Straps with minor contamination (dried drops of blood) shall be left in FRD hospital "hamper" for weekly collection and laundering by EMS Logistics.
- Grossly contaminated straps (blood saturation) shall be cut in half (destroyed) and placed in hospital red bag for disposal.

Equipment Malfunction

Any medical equipment that fails to operate correctly is to be immediately removed from service.

Any medical device that malfunctions during patient care, regardless of effect on outcome, must be reported.

- The unit OIC, or the provider most directly involved with using the device, shall provide a written report to the EMS Supervisor describing the circumstances of the malfunction and actions taken.
- The EMS Supervisor shall complete an EMS e-form and forward this report (and any other relevant information, such as event history) to EMS Administration via the EMS Regulatory Officer within 48 hours of the event.

If a malfunction is believed to have affected patient outcome, personnel shall also:

- Impound the affected equipment and all associated accessories (cables, batteries, leads, etc.). Any contaminated equipment shall be stored in red biohazard bags as appropriate.
- The impounded equipment shall be secured at the EMS Supervisor's station until an authorized service representative can evaluate the equipment.

The EMS Regulatory Officer will review the report and be responsible for completion of the Federal Food and Drug Administration "Med Watch" report (FDA-3500) if required.

Routine Equipment Repair

Whenever EMS equipment and/or any of its associated parts are in need of repair or replacement, an EMS e-form must be completed. EMS Logistics will respond to the e-form with what action is to be taken (such as send in via service one or remain at the station for on site repair). Monitor/defibrillators and cots are not to be sent in via service one unless directed by EMS Logistics. In some instances a property loss notice (RISK-03) may also be required. The online FRD-84, request for repairs, is not used for EMS equipment.

Equipment sent in for repair shall be in clean condition and, if required, decontaminated in accordance with the *Exposure Control Plan*.

Monitor/defibrillators

FRD units operate two basic levels of monitor/defibrillator:

- Automated External Defibrillators (AEDs) designed for use by BLS or ALS personnel.
- Monitor/defibrillators that combine the AED function with ECG monitoring, cardiac pacing, synchronized cardioversion, and other features. There may be more than one device configuration in service.

A daily check shall be performed on all defibrillators and recorded in the vehicle equipment check sheet. This check shall include:

- General cleanliness and disinfection of the equipment and carrying case.
- Inspect cables and plugs and any accessories.
- Inspect defib pad packages and expiration dates.
- Check supplies, including EMS scissors and safety prep razor.
- Make sure monitor/defibrillator device clock is synchronized with PCR time.
- Check system OK status window.
- Monitor/defibrillator only:
    - Battery level
    - AC Charging status
    - Recording paper supply
    - Q-CPR equipment

A more thorough weekly check shall be performed on monitor/defibrillators on Sundays:

- Attach test load device to therapy cable and perform full operational check per screen prompts. Do not turn off device during test (about two minutes).
- Connect/test all available diagnostic and therapeutic functions
    - Monitoring leads, Pulse oximeter
    - End-Tidal CO2, BP cuff
    - Pacing
    - Cardioversion/Sync capability
    - 12-lead ECG

Monitor/defibrillators Batteries

All units are issued two batteries and will carry one battery in the device and the second as a charged spare. Batteries should be periodically rotated to maintain charge. EMS Supervisors shall have additional batteries including at least one on the unit, and a two-bay charging/calibrating station in their office. Batteries that fail to hold a charge or are otherwise found unserviceable shall be replaced by the EMS Supervisor, who shall return them to Logistics and receive replacements.

Units shall ensure that the power connection to the AC charger is functioning, and immediately report any vehicle power supply malfunction to Apparatus and the EMS Supervisor who may supply spare batteries if needed.

If at any time a monitor/defibrillator indicates a battery requires calibration, the EMS Supervisor shall be contacted for an exchange. Each EMS Battalion office has a charger station that can re-calibrate batteries.

AED batteries are sealed and rated for several years of service life. Each battery is good for numerous discharge/defibrillations. The EMS Supervisor carries a spare AED and shall be contacted for a replacement if the AED status indicator signals a low battery or other malfunction. Although batteries may be changed in the field if available, EMS Supervisors will generally contact EMS Logistics for replacement.

Monitor/defibrillator and AED Repair

Monitor-defibrillators and AEDs requiring repair (or indicating a non-battery problem) shall be removed from service. The EMS Supervisor shall be notified and meet the providers to perform basic troubleshooting (monitoring cables, pulse ox wires, etc.). If unable to resolve the problem by replacing accessories, the supervisor will provide a loaner device and complete the EMS e-form to alert EMS Logistics to contact the appropriate vendor to arrange for repairs.

Immobilization Equipment

Backboards and backboard straps are "pool items" marked "Fairfax County Fire & Rescue" and not assigned to a particular unit. All other items are assigned to a given unit and/or station.

If assigned equipment must be left at a hospital (Reeves, KED, traction splint etc.) personnel are responsible for timely retrieval. Each station has a policy for tracking equipment left at hospitals.

Each receiving facility is expected to have a number of replacement backboards and straps in its equipment room at all times.

- INOVA Fairfax Hospital should have approximately eight boards.
- Other hospitals should have approximately four boards.
- If an inadequate or excessive number of boards/straps are at a hospital, personnel shall notify the appropriate EMS Supervisor, who shall correct the situation if possible or refer it to EMS Logistics.

Head immobilization is accomplished with tightly formed and taped towel rolls.

- Replacement towels for rolls left with patient are obtained from the hospital.
- If providers place towel rolls in hospital hampers for cleaning, all tape shall be removed to prevent damage to laundry equipment.

Every effort shall be made to not leave FRD equipment at remote or out-of-county facilities. However, when equipment is left out-of-county, for example on a Medevac, the unit OIC shall notify the EMS Supervisor with:

- Type of equipment
- Facility
- Date and time
- Unit assigned

The EMS Supervisor shall determine the most appropriate retrieval mechanism or notify EMS Logistics if unable to retrieve the equipment.

Cots and Stair Chairs

The Stryker Rugged® cot (both manual and Power-PRO models) and stair chair are the standard equipment assigned to all EMS transport units.

Cots and stair chairs are assigned to units, and are to be plainly marked with the appropriate unit identifier. If one unit ever exchanges cots with another during a call, the process must be reversed upon completion of the incident.

General Patient Movement Guidelines

- Regardless of device used, moving and carrying an ill or injured person presents a risk to both patient and providers. Personnel must ensure that the correct equipment (stair chair, Reeves stretcher, backboard, etc.) is selected and used properly to avoid injury.
- Patient size and location, obstacles, lighting, weather, or other incident conditions frequently require three or more providers to move a patient safely. Providers must always place patient and provider safety first and not hesitate to request additional units for assistance when necessary.
- When carrying an adult patient (or any patient of similar weight or size) up or down four or more steps, a minimum of three personnel shall be used. At least one person is used as a "spotter" to back up the lower person on the steps.
- All patient movement and lifting operations require personnel to pay full time and attention while using proper lifting techniques. Four basic guidelines:
    - Position hands and lift close to your body
    - Keep your back straight and lift with your legs
    - Coordinate all movements with your partners
    - Avoid twisting motions
- Always communicate with patients and inform them when you are going to load a cot into a vehicle or otherwise lift, adjust, roll, or move them. Stay with the patient and control cot at all times.

Cot and Stair Chair Operation

- Only trained personnel shall operate cots or stair chairs. Do not assume mutual aid crews or students are trained to operate any FRD equipment correctly. These devices shall be operated according to manufacturer guidelines and this policy (FRD policy shall take precedence in the event of conflict).
- Stryker cot and stair chair operation videos are on the FRD intranet and in station training libraries. These materials shall be viewed by all new providers or anyone else unfamiliar with the cot.
- There are slight operational differences between models and personnel must pay attention to the type of equipment they are using. General policies applicable to all cots and stair chairs:
    - Empty cots and stair chairs may be loaded, unloaded and moved by one operator.
    - Any loaded cot or stair chair (one with a patient on it) must have a minimum of two personnel to load, unload, or move it at all.

- When loading or unloading a loaded cot from the unit, a minimum of two personnel must be standing outside at the rear of the vehicle.
    - Operator(s) at feet shall use the lower handle when loading or unloading.
    - Operator(s) at feet must be able to lift/support the weight of the patient, cot and any items on the cot.
    - Any time one operator cannot lift/support the total weight, two operators must be at the feet and additional helpers or units may be required.
- Loading
    - Check area for any obstructions or hazards prior to loading.
    - Confirm that operator(s) are able to lift/support weight of cot.
    - Ensure vehicle has lowered to proper loading height.
    - Raise cot to loading height and align for straight entry into ambulance.
    - Roll guide wheels into back of ambulance ensuring that they enter the approximate center of the back doors.
    - Ensure safety bar has engaged over J-hook and verbalize to partner.
    - Raise wheels and roll cot straight in towards the front "antler" bracket.
    - Ensure rear of cot securely latches to rail clamp mounting bracket.
- Unloading
    - Check area for any obstructions or hazards prior to unloading.
    - Confirm that operator(s) are able to lift/support weight of cot.
    - Ensure vehicle has lowered to proper unloading height.
    - Unlatch cot from the rail clamp mounting bracket, grasp lower handle and ensure crew is aligned to pull cot straight out of the ambulance.
    - Ensure safety bar engages J-hook and verbalize to partner.
    - Lower wheels and confirm they are fully extended and locked.
    - Press the red safety bar release lever forward to disengage the safety bar from the J-hook.
    - Both operators roll cot off ambulance and lower (to operator waist level or below) prior to moving cot.
- All cots are equipped with a complete safety restraint (seat belt) system. Under no circumstances is any portion of the restraint package to be removed.
    - All providers individually and the FRD overall are obligated to provide the highest level of safety to each patient during transport. This includes use of the complete restraint system (leg, waist and chest straps with shoulder harness).
    - Whenever a patient is transported without full safety restraints, there must be a specific, urgent justification for doing so and such justification must be documented in the PCR.

Safety Considerations

- The safety hook (J-hook) installed on the ambulance floor to prevent uncontrolled unloading is required for operation of all Stryker cots. Do not use cot in any transport unit without J-hook properly installed.
- An "in-fastener shut-off" magnetic actuator mounted on the unit's rail clamp handle is required for use of all Power-PRO cots. A Torx wrench is issued to each EMS tool box

for repositioning the shut-off when needed (they are easily dislodged and precise placement is required for proper function).

- Uneven surface considerations
- Loading or unloading cots on uneven surfaces (e.g. curbs or potholes) or when unit is parked on up-grades or down-grades can be challenging. If conditions present any questions regarding the safety of loading or unloading a cot, request additional assistance and/or reposition the vehicle.
- Lower loaded cots to operator waist level or below to improve stability.
- In the case of significant hills or obstacles use three, four, or more personnel to assure safe and stable operation.
- Rolling sideways can lead to tipping. Always roll head or foot end first.
- Moving with the wheel lock/brake applied can lead to tipping. Do not use the wheel lock/brake on loaded equipment.
- Be aware of pinch points when raising, lowering, unfolding, or stowing. Safety decals indicate pinch points.

Maintenance and Repairs

EMS Logistics coordinates a professional annual inspection of all cots and stair chairs as well as any service or repair calls.

Field personnel are to check cots and stair chairs for cleanliness and proper operation as part of daily equipment check. This check is documented on the *EMS Equipment Daily Check Log* (FRD-205).

If a cot or stair chair is found or suspected to be malfunctioning at any time it shall be removed from service.

- Field personnel shall perform no repairs beyond adjustment or replacement of restraints and accessory pouches or adjustment of the in-fastener shut-off switch.
- An EMS e-form shall be submitted for the cot or stair chair requiring service with a detailed description of the issue. The following information shall be included:
    - Name of operators
    - If noted during incident, estimated weight of the patient
    - What were you doing when the malfunction occurred?
    - Where were you, type of surface, terrain?
    - Were there any prior malfunctions with this device?

Each battalion has a loaner cot and stair chair assigned to the Battalion EMS Office. The EMS Supervisor shall be contacted to determine availability

- When a loaner cot or stair chair is used, it shall be logged out in its home station pass-on book and log book.
- If no loaner cots or stair chairs are available, the EMS Supervisor shall coordinate obtaining equipment from a different battalion.
- The broken cot or stair chair shall be left at the EMS Supervisor's station (or where the loaner was obtained) with a printed copy of the submitted EMS e-form. EMS Logistics will notify the service vendor to arrange repairs.

In all other circumstances cots and stair chairs shall remain with the unit they are assigned to.

Power Pro Batteries

The PowerPro cot is operated by a commercial 24 volt battery. Cot batteries have different usage patterns; do not interchange with other tool batteries in the station.

- Do not keep the battery charger on the medic unit (powering off and on with shore line will damage battery and charger).
- A battery can be fully recharged in about one hour.
- The spare battery can be left in the charger until needed or stored on the medic unit after being charged (recommended for busier units).
- To check battery power in cot, depress lightly on the retract/minus switch to activate power indicator:
    - Solid green LED = charged battery
    - Flashing red LED = charging needed – about four lift cycles remaining.

If while away from the station the PowerPro battery becomes totally discharged, the cot can be operated in "manual" mode. Recognize that wheels will raise and lower more slowly and with greater resistance when moved manually.

Bariatric Cots

The FRD has larger cots and specialized lifting and transfer equipment to assist with safe and effective movement of very large patients. See "Bariatric Patients" in the Special Circumstances section of this manual for utilization.

The Stryker MX-PRO Bariatric cot operates in similar fashion as the standard MX-PRO cot. Other features:

- Six inches wider than standard MX-PRO (29 inches versus 23 inches).
- Rated capacity of 1600 pounds in lowest position and 850 pounds raised
- Fits in standard ambulance using standard mounting brackets.
- Has additional lifting and moving handles on front, rear and sides.
- Manual operation only

Patient Movement Mishaps

Any time personnel lose control of or drop a loaded cot, stair chair, or other patient transfer device (backboard, Reeves stretcher, etc.), specific actions must be taken immediately to ensure safety of patient and crew. Whether or not the event appears to have resulted in injury to patient or providers, the following actions shall occur:

Personnel on involved unit

- Notify DPSC of incident, who shall in turn dispatch the EMS Supervisor and Safety Officer.
- Assess patient and/or other providers for any injury sustained and provide treatment if indicated.
- Call for additional resources such as different transport unit or additional personnel if necessary to manage incident and provide uninterrupted patient care.
- Notify receiving facility physician of the event.
- Document the event in the narrative section of the electronic patient care report.
- Do not complete a second PCR for the event.

EMS Supervisor

- Ensure that welfare of patient and FRD personnel is provided for.
- Initiate investigation of the incident and complete an *Inquiry Intake Form* (FRD-19) for tracking purposes.
- If cot or stair chair is involved, ensure that it is removed from service and assist obtaining loaner equipment.
- Ensure EMS e-form is completed for inspection and/or repair of cot or stair chair.

Safety Officer

- Ensure personal injury (career, civilian or volunteer) is investigated according to FRD SOPs.
- Assist EMS Supervisor with initial investigation and/or documentation of circumstances of the patient movement mishap.

EMS Innovation

The EMS Division seeks to foster innovation in order to continuously improve patient care and provider capability. It is understood that since EMS is highly dynamic and technology-driven, personnel may become aware of new and innovative treatments, procedures, and/or equipment and wish to utilize them in our system.

Recommendations for the acquisition of new or non-standard EMS equipment by the department or any volunteer shall be made via submission of a letter of proposal to the EMS Regulatory Officer. The letter shall include:

- A detailed description of the new or innovative equipment, to include correct nomenclature, manufacturer, and vendor, if known.
- The potential benefit to patient care.
- The total cost, to include unit cost, maintenance cost, and any other special needs expenses (training, storage, need for special mounting, etc.).
- Research from independent sources (not simply the manufacturer or vendor) detailing the benefit to patient care of the proposed item.

The EMS Regulatory Officer will log the recommendation and schedule it for presentation at the EMS Division Meeting. The individual making the recommendation will be notified and is encouraged to appear at the meeting to present the recommendation.

EMS Division members regularly present at meetings include the Operational Medical Director, the DC-EMS, the EMS Regulatory Officer, the Quality Manager, and the budget analyst.

Members present will consider proposals and by majority vote authorize procurement of limited sets of nominated equipment for testing. Once procured, a 90-day test period will begin (testing methodology depending on the nature of the innovation) with the new equipment utilized on selected operational field units. Upon completion of testing, the EMS Regulatory officer will coordinate a review the results and make appropriate recommendations to the DC-EMS.

The EMS Regulatory Officer will reply to the provider making the initial proposal in writing within 30 days upon completion of the final recommendation.

EMS Vehicle Standards

All vehicles shall be equipped with an appropriate level of EMS equipment according to FRD and VAOEMS standards. The *Vehicle EMS Equipment Issue* (FRD-209-H) summarizes the equipment standards authorized for each type of FRD vehicle. All State permitted EMS vehicles shall display the EMS permit in the patient care area of transport vehicles or in the EMS compartment of non-transport units.

In accordance with FRD policy prohibiting loose equipment in vehicles and State EMS regulations, all equipment is to be secured when vehicle is in motion. This is accomplished by placing in a closed and latched compartment, securing in a designated bracket or belting in place on cot or ambulance bench.

All medications and drug kits shall be kept in a locked storage compartment inaccessible to the public.

When not inside a secured building, transport unit patient compartments shall be locked to prevent public access.

Current station and vehicle inventory lists, inspection check sheets, and equipment allocation tables are located on the FRD Intranet.

EMS Equipment Loan

The FRD will permit some EMS equipment to be loaned out to providers for off duty use at "standby events," such as charity fundraisers or summer camp events.

Requests for such an equipment loan must be made at least two weeks in advance and directed to the EMS Regulatory Officer. The request must include:

- Nature of the event
- Specific location including what jurisdiction has authority
- What equipment is requested (BLS bag, AED, etc.)
- Who will be responsible for the equipment
- When it is needed and when it will be returned

Note: No ALS equipment can be loaned out for off duty standbys.

The request must be approved by the EMS Division.

When a provider is representing the department, whether on-duty or off-duty, all policies regarding "when a person becomes a patient" apply. If care required goes beyond simple first aid, the EMS system must be activated to provide full assessment, treatment and documentation of care.

QUALITY MANAGEMENT PROGRAM

Quality Management Program

§ 12 VAC 5-31-600. Quality management reporting.
An EMS agency shall have an ongoing Quality Management (QM) Program designed to objectively, systematically and continuously monitor, assess and improve the quality and appropriateness of patient care provided by the agency. The QM Program shall be integrated and include activities related to patient care, communications, and all aspects of transport operations and equipment maintenance pertinent to the agency's mission. The agency shall maintain a QM report that documents quarterly PPCR reviews, supervised by the operational medical director.
http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+12VAC5-31-600

This program will establish mechanisms to help ensure that the highest quality of prehospital care is consistently and compassionately delivered to the residents and visitors of Fairfax County. To be effective, the Quality Management Program must foster a positive working relationship between all stakeholders and components of the emergency medical services system.

Quality management is a system-wide responsibility shared between and among the EMS Division, the Operations Bureau and the Training Division; this joint effort is a collective promise to provide quality emergency medical services to everyone in our care, consistent with best practices and evidence based medicine.

Program Objectives:

The Quality Management Section seeks to improve the quality of care being provided by members of the Fire and Rescue Department by:

- Assessing the quality of patient care and processes related to patient care by monitoring significant trends through analysis of aggregated data gathered by the QI process.
- Identifying opportunities for improvement for individuals or processes that can be improved by training, remediation, and policy and/or procedure reviews/revision.

Quality measures are at the heart of the QM program to monitor individual and system performance. "A quality measure is a mechanism that enables the user to quantify the quality of a selected aspect of care by comparing it to a criterion. A subtype of a quality measure is a clinical performance measure. Specifically, a clinical performance measure is a mechanism for assessing the degree to which a provider competently and safely delivers clinical services that are appropriate for the patient in the optimal time period."
http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx

Performance measures are carefully selected to be relevant, useful, measurable, and consistent with performance improvement and the relevant standards of care. The following chart reflects the current clinical performance measures being evaluated, however, it should be noted that this list is subject to change. Causes for such changes may be due to but not limited to the implementation of new protocols, equipment or as part of short or long term departmental or regional system initiatives.

Current Ongoing/ Continuous Review	
	Quality Indicators
Acute coronary syndrome/STEMI	Onset (duration of symptoms) History of present illness Time to 1st ECG + 12-lead ECG - annotated ST changes Medication: Aspirin, Nitroglycerin, and/or narcotic analgesia Transport to a designated STEMI center 5/5/10/2 compliance STEMI alert vs STEMI notification
Cardiac arrest using Utstein template	Cardiopulmonary arrest cause: Medical? Trauma? Believed to be cardiac event? Witnessed? Bystander CPR? Bystander AED? Initial rhythm? Shockable rhythm? ROSC anytime? ROSC @ ED? Destination Outcome
Procedures: Advanced airway management Vascular access Chest decompression Cricothyrotomy	Provider Frequency intervention is utilized Clinical indications for intervention Primary impression Methodology and/or site (if vascular access) Attempt vs. success Confirmation of success documentation (specific for procedure)
Respiratory distress	Assessment: Lung sounds, hypoxia, hypotension Supplemental oxygen + pulse oximetry Delivery method: cannula, NRB, nebulizer, BVM + inline Neb CPAP ETCO2 monitoring Medication administration
Stroke	Onset (duration of symptoms) Documented use of stroke scale assessment Assessment: Blood glucose, hypoxia, hypotension Transport to a designated Stroke Center
Current Ongoing/ Periodic Review	
Code 1 interfacility transports	Destination Initial transport to sending facility by EMS? *If so, is the MOI or clinical presentation consistent with original destination decision?*
Major Trauma	Anatomic and/or physiologic indicators for trauma center On scene time < 20 minutes unless entrapped Transport to a designated Trauma Center Mode of transport: ground vs. aeromedical
Diabetes/hypoglycemia	Threshold for review: blood glucose < 70 Treatment: oral glucose? 50% dextrose? Glucagon? Repeat glucose? Transport vs. non-transport
Current Ad Hoc Reviews	
Medical incident review (QI inquiries)	Appropriateness of patient care given clinical presentation Professional conduct

Patient Care Report Review Process

The EMS Supervisor shall complete daily patient care report (PCR) reviews to ensure adherence to established FRD protocols and standards of care, as well as to provide feedback to individual providers with suggestions on how to improve clinical decision-making, overall patient management, and documentation.

PCR reviews are completed using the ePCR records management system. EMS Supervisors have system access for report review, and the ePCR system tracks and logs each time a report is accessed. The EMS Division coordinates with the Assistant Chief of Operations to establish and distribute current policies regarding report review.

The on-duty EMS Supervisor, whether the regularly assigned officer, a detail or overtime position, is expected to complete the assigned PCR reviews for the day. The current schedule and specific reports for review issued by the Operations Division shall be posted at each EMS Supervisor office for ready reference.

The Operational Medical Director (OMD) also engages in ongoing case reviews. This includes adhoc reviews, as well as all PCRs for patients requiring any intervention or treatment above oxygenation if the patient is not transported. Examples include "D50 refusals" and resuscitations terminated in the field.

The Quality Management staff shall review all patient care reports for designated clinical presentations and intervention tracking as part of the ongoing evaluation of emergency medical care and service delivery.

Medical Incident Review Process

In order to continually improve the quality of care, the EMS Division established this process to investigate patient care concerns, adverse events, and/or medical practice deviations related to the delivery of emergency medical service.

§ VAC 5-31.600 of the Virginia EMS Regulations mandates the existence of a *Quality Management Program designed to objectively, systematically and continuously monitor, assess and improve the quality and appropriateness of patient care provided by the agency.* Quality improvement investigations are privileged and confidential, protected from disclosure under Virginia Code §8.01-581.17. All records will be retained in accordance with those specifications.

When incidents or issues involve alleged or suspected misconduct or violations of any laws, statutes, ordinances, standard operating procedures, department rules and regulations, or Fairfax County Standards of Conduct by any employee of the Fire and Rescue Department, the investigation will be conducted in accordance with Standard Operating Procedure 01.03.03, Internal Investigations.

Medical incident review serves the dual purpose of assuring individual accountability as well as system improvement through monitoring of trends to identify areas for process improvement. An alternative pathway is being established to deal with specific situations (self-reported medication errors or patient care concerns arising from provider failure to recognize patient acuity) in a timelier manner without a formal investigative process.

It is understood that not all queries require a formal investigative process. The EMS Supervisor should handle requests for routine information or clarification about system function at the battalion level.

All personnel involved shall maintain confidentiality throughout the process.

Definitions
An **adverse event** occurs whenever an untoward or unexpected outcome occurs as a result of a medical intervention.

Examples of an **adverse event** include, but are not limited to:

- Untoward response to medication
- Medical equipment failure
- Unidentified illness or injury, e.g., patient injury that occurs as a result of treatment. Examples include tissue damage due to extravasation of 50% dextrose, or that occurs in our care, such as injury from a cot drop
- Unexpected deterioration or death of a patient
- Potential/actual patient injury in our care, e.g., cot drop, FRD-vehicle motor vehicle collision.

A **medical practice deviation** occurs whenever a member of the department fails to provide emergency medical service in accordance with established medical protocols or standing orders, training principles, authorized physician's orders, established or generally accepted medical practices and/or Fire and Rescue Department policies and procedures concerning citizen interaction.

Examples of **medical practice deviation** include:

- Any action outside of provider's authorized scope of practice
- Misadministration of medication
- Failure to complete a prehospital patient care report
- Report falsification, including reporting incorrect or unattained patient information
- Performing procedures not authorized by the Operational Medical Director
- Incomplete patient assessment or failure to assess patient
- Improper or inappropriate conduct that impacts the provider's ability to provide or transfer care

NOTE: Failure to complete a prehospital patient care report is a medical practice deviation as well as violation of departmental Standard Operating Procedure 01.09.03, *Field Incident Reports and Processing*, and Rule 400.1, *Submitting Reports* and Rule 100.5, *Performance of Duty*, as well as violating §12VAC5-31-1140. Provision of patient care documentation. http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+12VAC5-31-1140. Such instances will be assigned an EMS inquiry number for the purpose of tracking, but will be returned to the operations shift Deputy Chief for disposition.

A **patient care concern** occurs whenever a provider has reason to believe that some component of the care delivered or management of the call did not proceed as it should have and had the potential to adversely impact the patient.

Examples of **patient care concerns** include:

- Selection of the wrong medical treatment protocol
- Delays in patient access, assessment/stabilization or transport
- Disagreement over choice of destination facility

The **medical incident review** process is the official systematic review of an adverse event, medical practice deviation, patient care concern or patient harm coordinated by the Quality Manager through the Battalion Management Team for the purpose of system quality improvement.

Reporting Procedure

Department personnel who witness an adverse event, medical practice deviation, patient care concern or patient harm shall report it to the EMS Supervisor. The EMS Supervisor shall complete the *Inquiry Intake Form* (FRD-019) and forward the completed form to the Quality Manager and copy the field Battalion Chief. If an allegation involves personnel at or above the

rank of Captain II, the incident shall be reported directly to Deputy Chief-EMS (DCEMS) who shall contact the Quality Manager to initiate QI Review.

Persons outside of the Department who call the station to report an adverse event, medical practice deviation, patient care concern or patient harm shall be directed to the shift OIC, unless the EMS Supervisor is present to take the report (see procedure above). The OIC shall obtain and record on the *Inquiry Intake Form* (FRD 019), the complainant's name and contact information and shall advise the complainant that he or she will be contacted. The OIC shall forward the completed FRD-019 to the EMS Supervisor and copy the Quality Manager and the field Battalion Chief.

If the Quality Manager is the point of contact for persons outside the Department, a record of conversation will be created. This record of conversation will include contact information for the complainant and will be included with the inquiry notice. FRD-019 will not be completed by the Quality Manager.

The following are events that require **immediate notification** by the EMS Supervisor to the DC-EMS and the Operational Medical Director (OMD).

- Any action outside of provider's authorized scope of practice
- All medication errors
- All advanced airway errors, such as unrecognized esophageal intubation
- Death/deterioration of any patient who has been physically or chemically restrained
- All unexpected deaths/deterioration during transport
- Any adverse events encountered during Emergency Department diversion or closures
- Any adverse events encountered during an interfacility transport

In addition, the above events shall receive a preliminary investigation within 24 hours by the Battalion Chief –EMS (BC-EMS) or designee. This preliminary investigation shall include:

- The name and contact information for the individual lodging the concern
- A brief summary of the situation
- The personnel and unit involved

Upon receipt of this information regarding a self-reported medication error or patient care concern arising from provider failure to recognize patient acuity, the Quality Manager will facilitate scheduling a hot wash/case review for all involved providers with the OMD and the respective EMS Supervisor at the earliest opportunity, ideally within 10 days of the event. Following the hot wash/case review, the OMD will provide the Quality Manager with a written summary of the hot wash/case review that includes date conducted, participants and key points of discussion. All such incidents will be reviewed by the Quality Improvement Committee and will be tracked by the Quality Manager.

The Department and/or the OMD reserve(s) the right to reduce or remove the ability of any EMS provider to practice in the field during the inquiry process.

Process
On receipt of the completed FRD-019, the Quality Manager, or in the absence of the Quality Manager, the Battalion Chief of EMS will:

- Assign the EMS inquiry # and enter the incident into the quality improvement database, elements to include:
    - Date received and FRD incident number
    - Inquiry number
    - Unit & personnel involved
    - Investigator
    - Investigation elements received
- Sets target completion date, usually two weeks from date received
- Initiate EMS inquiry notification memo to EMS Captain with copies to DC-EMS, OMD, AC-Ops, Shift DC-Ops, and Shift Battalion Chief. When a volunteer provider is involved in the incident, the Department's Volunteer Liaison will also be copied on the inquiry notification for routing to the appropriate volunteer chief.
- Send a letter of acknowledgement to complainant

The EMS Supervisor ensures that the investigation process is completed within two weeks of receipt and submits a written report through the chain of command to the Quality Manager for review by the Quality Improvement (QI) Review Panel. The investigation process shall be consistent with established Department policies and procedures.

Required EMS Inquiry Report Elements

- Summary of investigation findings (citing violations of any County or departmental document), conclusions, and recommendations. This document should also explain any discrepancies between witness statements.
- Written statements from <u>all</u> personnel on scene, including details of the event:
    - Who was present (include <u>all</u> other FRD personnel, including on scene commander, as well as any other County personnel, patient friends or family members, or other bystanders.
    - What occurred during the event
    - When did it occur
    - Why did it occur (if known)
    - How did it occur (if known)
    - What was the thought process for the decisions made (if known), and
    - Any other relevant concerns, facts, et cetera, such as environmental conditions or safety concerns
- Written statement (and/or interview notes for any non-FRD personnel) which identifies details of the event, issues or concerns about quality of care or service delivery
- CAD event history
- Prehospital Patient Care Report and/or treatment tag
- If applicable, also include incident report from FireRMS and/or audio file of prehospital communications

- Reference any documents used to support investigative findings, such as Standard Operating Procedures, Rules and Regulations, Manuals, General Orders, Standing Orders, and/or Personnel Regulations.

QI Review Panel
The QI Review Panel meets on a regular basis to review completed EMS Inquiry Reports. Providers involved in an EMS Inquiry and/or their supervisors may address the QI Review Panel if they wish to convey extenuating circumstances regarding the incident. To exercise this option, the provider's supervisor shall contact the Quality Manager to verify when the incident will be reviewed.

QI Review Panel Membership includes the Operational Medical Director (OMD), Quality Manager, DC-EMS, BC-EMS, EMS Regulatory Officer, and Director of EMS Training or designee. The quorum required to conduct a QI Review Panel includes the Operational Medical Director (OMD), Quality Manager, and at least two (2) uniformed EMS Division staff members, (DC-EMS and/or BC–EMS ± EMS Regulatory Officer). An on-duty EMS Supervisor will be invited to attend each QI Review Panel meeting. Participation will occur on a rotating basis.

The QI Review Panel will review the investigation report as well as any related materials to draw conclusions and complete a root cause analysis to determine contributory causes for the situation. The panel will make recommendations for individual and/or organizational initiatives to prevent recurrence through remediation, system process changes, or other appropriate means to enhance emergency medical services delivery, as well as enhance the personal and professional development of the providers. Decision-making authority lies with the OMD for medical issues and with the DC-EMS for operational issues.

QI Review Panel Conclusions
Conclusion findings may include:
- No variance
- Variance with no effect
- Variance with potential adverse effect
- Variance with adverse effect
- No patient care issue (redirect to Operations)

Contributory causes, identified through root cause analysis may include:
- Patients (external customers)
- Providers (internal customers)
- Provisions (equipment and supplies)
- Places (environment where care is delivered)
- Procedures (protocols, policies and procedures)

Recommended Follow-Up
The specific recommended follow-up action will be determined based on the details of the case and the conclusions of the QI Panel as to contributory causes. Follow-up action shall be consistent with established Department policies and procedures. In addition to the established

policies, the QI Panel may direct one of the following actions; completion of recommended actions shall be reported in writing to the Quality Manager.

Incident Critique: A constructive process to review the events and decision-making strategies relevant to the incident.

Remediation (Coaching/Counseling): Represents a constructive intervention that may be utilized to clarify expectations, rectify minor deficiencies in knowledge or skills, or refine and redirect behavior.

OMD Letter: Represents the next progressive step wherein the OMD meets with the provider, EMS Supervisor or affected Volunteer Fire Chief, if the provider is a volunteer, and DCEMS to clarify performance expectations. Coaching/counseling is tied to defined consequences if the undesirable behavior persists or recurs. The OMD Letter may include a defined period of monitored performance. Consequences may include subsequent progressive steps as described below. OMD letter may be utilized for:

- Minor problems that have been the subject of prior coaching/counseling efforts
- More serious infractions/issues

Work Improvement Plan: Represents a structured constructive educational effort to rectify significant deficiencies in knowledge or skills. Remediation may also be utilized as the next progressive step in the setting of failed counseling/coaching. Remediation will typically be for a defined period, of defined content, and be tied to a defined method or period of re-evaluation to demonstrate effective remediation. All Work Improvement Plans require review by the Human Resources Manager.

Formal Re-Assessment of Clinical Competencies: A formal re-assessment of a provider's competencies may be initiated based on findings of a medical inquiry. This re-assessment must be authorized by the Deputy Chief of EMS and Operational Medical Director. This re-assessment will be coordinated with the Fire and Rescue Academy and closely resemble the intern final credentialing process specified in the EMS Credentialing Manual. If didactic or practical skill deficiencies are detected, an appropriate remediation plan will be developed by the Fire and Rescue Academy for approval by the Deputy Chief of EMS and Operational Medical Director.

Suspension of authorization pending investigation: Represents an interim measure to remove a provider from clinical care when the provider has been charged with a felony or there is reason to believe he or she may pose a danger to patients. The duration of such suspension will be finite, in writing and a final determination shall follow completion of the investigation in a timely manner.

Suspension of authorization pending remediation: Represents the removal of the provider from clinical care during the period of remediation. The employee shall be notified in writing. This intervention may be utilized:

- When the remediation is required to rectify substantial deficits in core knowledge or essential skills that jeopardize the provider's ability to provide quality prehospital care.

- When there is reason to believe that the rigors of continued clinical care may jeopardize the provider's capacity to successfully complete remediation.
- When prior remediation efforts have been unsuccessful and there is reason to believe that continued clinical care responsibilities may jeopardize the provider's capacity for successful remediation.

Revocation of authorization: Represents the final step in progressive efforts in response to refusal or inability to successfully complete remediation, or the requisite intervention for flagrant infractions/issues.

The following represent circumstances that may result in permanent revocation of authorization:

- Actions outside of provider's authorized scope of practice
- Falsification of the medical record
- Intentional harm to a patient
- Refusal to complete remediation
- Failure to complete successful remediation after substantial, good faith efforts
- Conviction of a felony or grievous felony charges

If any of the following occur, the shift Deputy Chief and the Assistant Chief of Operations Bureau shall be notified immediately for staffing purposes and forwarded up the chain to Deputy Chief-Safety and Personnel Services Division, Human Resources Manager, Assistant Chief of Personnel Services Bureau, and the Fire Chief:

- Suspension of authorization pending investigation
- Suspension of authorization pending remediation
- Revocation of authorization

On revocation of authorization, the Quality Manager will notify the Virginia Office of EMS as required by §12 VAC 5-31-1-40 and the Director of EMS Training.

Within two weeks of the QI Review Panel review, the Quality Manager will

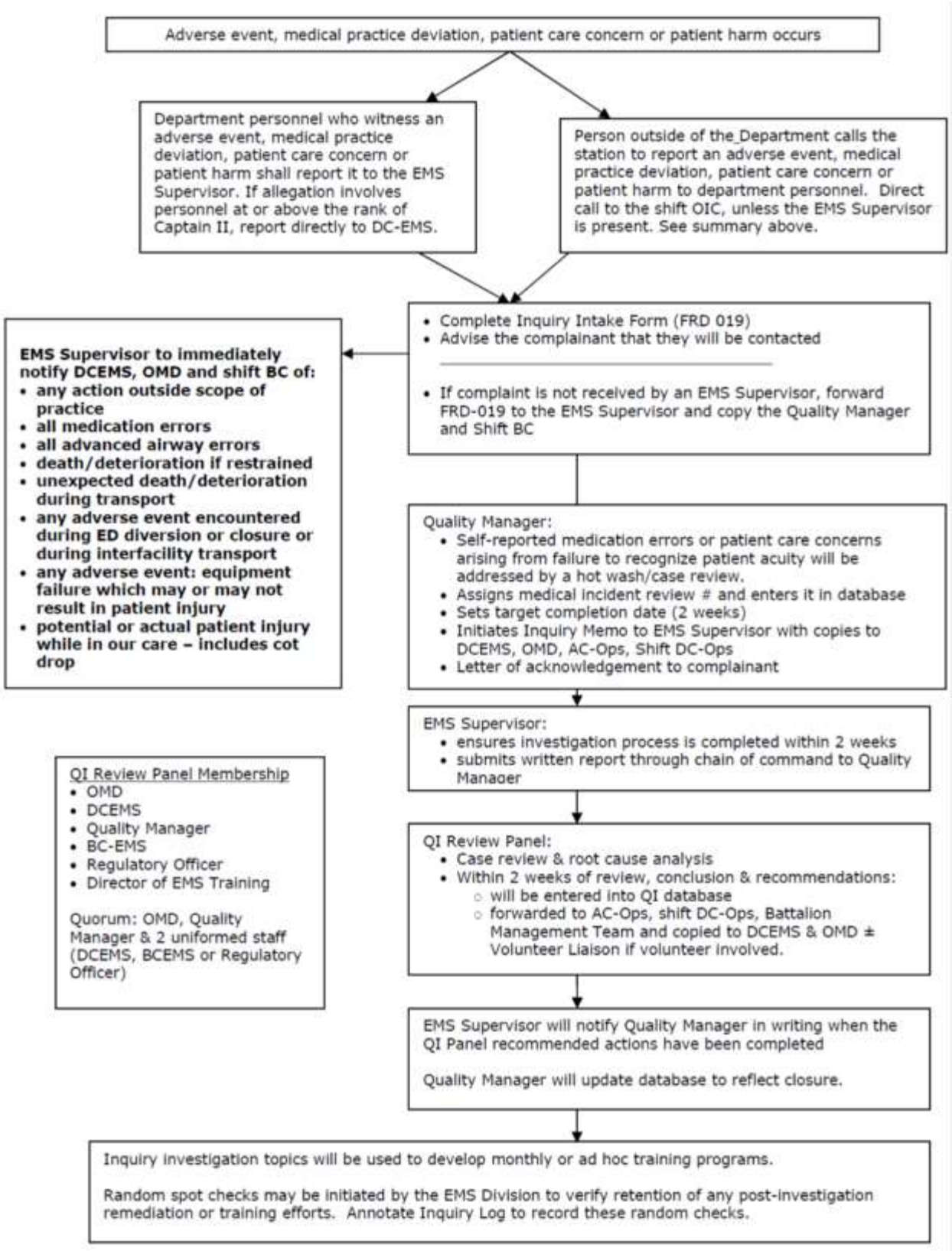
- Enter conclusion and recommendations into the QI database
- Forward memorandum of QI Review Panel conclusions and recommendations to the AC-Ops, shift DC-Ops, shift BC, EMS Supervisor, with copies to DC-EMS and OMD. When a volunteer provider is involved in the incident, the Department's Volunteer Liaison will also be copied on for routing to the appropriate volunteer chief.

The EMS Supervisor will notify the Quality Manager in writing through the chain of command when the QI Panel recommendations are completed; the Quality Manager will update the database to reflect closure. Documentation of completion of recommended actions shall include:

- Reason for coaching/counseling
- Objectives/content
- What occurred during the review and employee's response, if any.
- Signatures of the employee(s) and supervisor

Medical incident review topics will be used to develop training programs, clinical care monitoring strategies and system improvements.

Random spot checks may be initiated by the EMS Division to verify retention of any post-investigation remediation or training efforts and will be noted in the database.


Adverse event, medical practice deviation, patient care concern or patient harm occurs
Department personnel who witness an adverse event, medical practice deviation, patient care concern or patient harm shall report it to the EMS Supervisor. If allegation involves personnel at or above the rank of Captain II, report directly to DC-EMS.
Person outside of the Department calls the station to report an adverse event, medical practice deviation, patient care concern or patient harm to department personnel. Direct call to the shift OIC, unless the EMS Supervisor is present. See summary above.
• Complete Inquiry Intake Form (FRD 019)
• Advise the complainant that they will be contacted
• If complaint is not received by an EMS Supervisor, forward FRD-019 to the EMS Supervisor and copy the Quality Manager and Shift BC
EMS Supervisor to immediately notify DCEMS, OMD and shift BC of:
• any action outside scope of practice
• all medication errors
• all advanced airway errors
• death/deterioration if restrained
• unexpected death/deterioration during transport
• any adverse event encountered during ED diversion or closure or during interfacility transport
• any adverse event: equipment failure which may or may not result in patient injury
• potential or actual patient injury while in our care – includes cot drop
Quality Manager:
• Self-reported medication errors or patient care concerns arising from failure to recognize patient acuity will be addressed by a hot wash/case review.
• Assigns medical incident review # and enters it in database
• Sets target completion date (2 weeks)
• Initiates Inquiry Memo to EMS Supervisor with copies to DCEMS, OMD, AC-Ops, Shift DC-Ops
• Letter of acknowledgement to complainant
EMS Supervisor:
• ensures investigation process is completed within 2 weeks
• submits written report through chain of command to Quality Manager
QI Review Panel Membership
• OMD
• DCEMS
• Quality Manager
• BC-EMS
• Regulatory Officer
• Director of EMS Training
Quorum: OMD, Quality Manager & 2 uniformed staff (DCEMS, BCEMS or Regulatory Officer)
QI Review Panel:
• Case review & root cause analysis
• Within 2 weeks of review, conclusion & recommendations:
○ will be entered into QI database
○ forwarded to AC-Ops, shift DC-Ops, Battalion Management Team and copied to DCEMS & OMD ± Volunteer Liaison if volunteer involved.
EMS Supervisor will notify Quality Manager in writing when the QI Panel recommended actions have been completed
Quality Manager will update database to reflect closure.
Inquiry investigation topics will be used to develop monthly or ad hoc training programs.
Random spot checks may be initiated by the EMS Division to verify retention of any post-investigation remediation or training efforts. Annotate Inquiry Log to record these random checks.

Patient Follow-up/Case Review

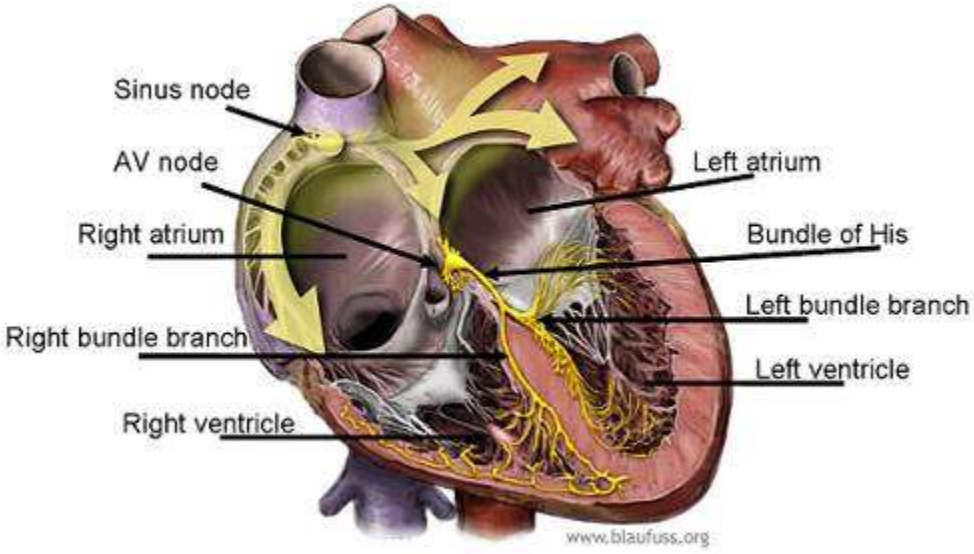
Information from the receiving facility regarding appropriateness of care, accuracy of assessment, effects of treatment or patient outcome is an invaluable resource to the provider and system as a whole in terms of both education and affirmation of clinical judgment.

Providers desiring to follow up on their patients shall submit requests to the Quality Manager. Personnel interested in arranging case reviews shall contact EMS Supervisor who shall coordinate with the OMD, the Quality Manager, and/or the DCEMS if indicated.

APPENDIX

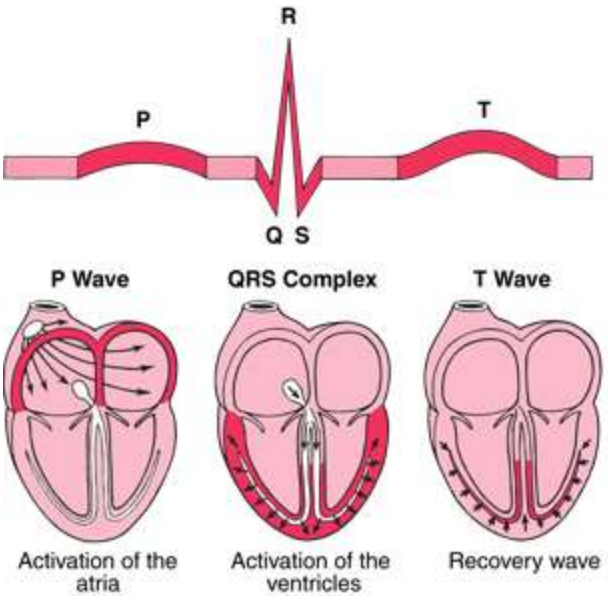
Electrocardiogram (ECG) Review

Electrical Pathway of the Heart



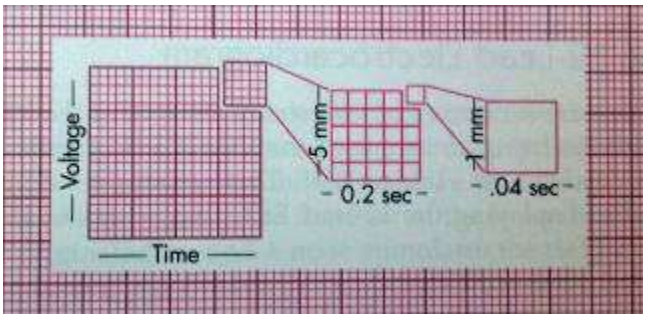
- The Sino-Atrial (SA) Node is the natural pacemaker of the heart and is located in the muscle of the Right Atrium. The SA Node sends an electrical signal via the internodal pathways, innervating the atria causing contractions.
- The signal then slows as it travels through the Atrioventricular Node (AV Node) allowing time for the atria to fully contract and fill the ventricles. The signal then continues on through the Bundle of His prior to branching off down the Right Bundle Branch and the Left Bundle Branch (which further splits off into the Septal Fascicle, Left Anterior Fascicle and the Left Posterior Fascicle).
- The signal culminates at the Purkinje fibers where it innervates the ventricles causing them to contract.

Basics of an ECG Strip



- **P Wave** – Represents the repolarization of the Atria (atria contract)
- **QRS Wave** – Represents depolarization of the ventricles (ventricles contract). The repolarization of the atria occur as the ventricles contract but the wave representing the repolarization process is buried in the QRS complex (it is the lesser of the competing charges occurring at the same time).
- **T Wave** – Represents the repolarization of the ventricles.
- **PR Interval** – The measurement from the beginning of the P wave to the beginning of the QRS wave.
- **ST Segment –** The measurement from the end of the S wave to the beginning of the T wave.

ECG Measurements

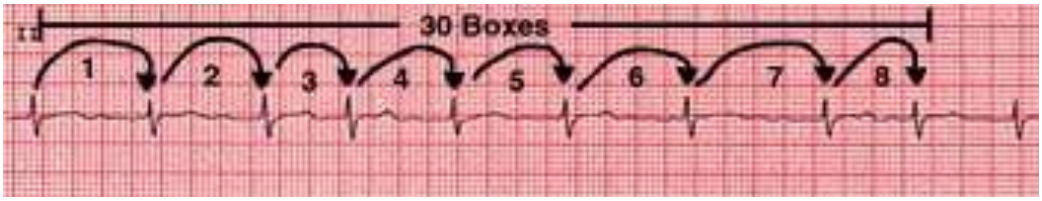


- Each small box is 1mm x 1mm and represents 0.04 seconds
- Each large box is the width of 5 small boxes and equals 0.2 seconds
- 5 Large boxes equals 1 second
- 15 Large Boxes equals 3 seconds (which is the area represented between two hash marks at the top of the ECG graph paper)

ECG Heart Rate Determination

"6 Second Method" of Calculation:

Locate 6 seconds on the ECG Strip (which equates to the space between 3 hash marks at the top of the graph paper or 30 large boxes). Next, count the number of R-R intervals in that segment and multiply by 10. This is the number of beats per minute. This is most useful if you have an irregular rhythm (like atrial fibrillation) when you want to know an average rate.



12-Lead Interpretation

Field providers can localize where ischemia, injury or infarct is occurring in the heart based on the results of a 12-Lead ECG. This information can be sent to pre-alert the receiving facility to reduce the "Door to Balloon" time for rapid interventional catheterization treatment.

- **Ischemia** is a relative lack of blood supply resulting in reduced oxygen availability. Ischemia is represented by **T-wave inversion** (upside down) on the 12-lead.
- **Injury** is acute damage occurring right now. This is represented by **ST Elevation** on the 12-lead. ST Elevation refers to a finding on an ECG wherein the ST Segment is abnormally high above the isoelectric line.
- **Infarct** is an area of dead tissue (irreversible damage). Look for significant "pathologic" **Q waves**. To be significant, a Q wave must be at least one small box wide or one-third the entire QRS height. Remember, to be a Q wave, the initial deflection must be down; even a tiny initial upward deflection makes the apparent Q wave an R wave.

ST Elevation of 1mm or greater in 2 or more contiguous leads is considered significant and should signal a STEMI alert and transport to a PCA capable facility. Reciprocal changes on the 12-lead help in validating other ECG findings, such as ST Elevation, which can help strengthen the diagnosis of an acute myocardial infarction (AMI).

Contiguous Leads
Septal - V1, V2
Anterior - V3, V4
Lateral - V5, V6, I, aVL
Inferior - II, III, aVF

I Lateral	**aVR -------**	**V1 Septal**	**V4 Anterior**
II Inferior	**aVL Lateral**	**V2 Septal**	**V5 Lateral**
III Inferior	**aVF Inferior**	**V3 Anterior**	**V6 Lateral**

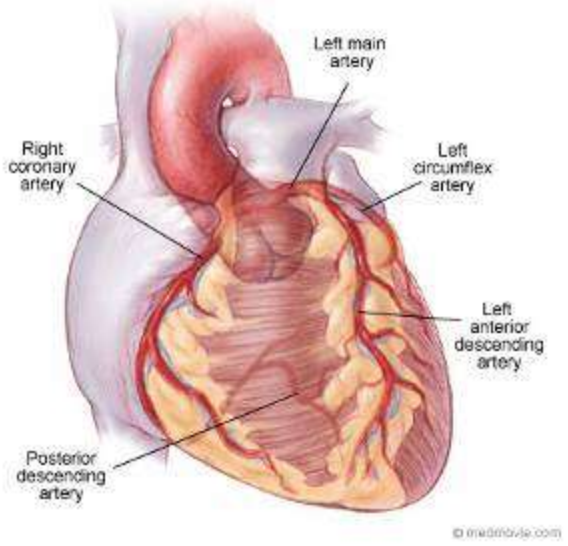
IMPORTANT: Remember some AMI's do not present with ST Elevation so do not rule out the possibility of acute infarction based on the absence of ST Elevation.

Left Bundle Branch Block (LBBB)

A LBBB is the failure of the cardiac impulse to propagate down the left bundle branch from the bundle of His, resulting in early activation of the right ventricle causing a widening of the QRS complex (> 0.12) on the ECG. To determine the presence of a LBBB in a patient that presents with a wide QRS refer to the V1 lead. Starting at the T wave, "walk" along the isoelectric line towards the QRS. If a left turn is made upon reaching the QRS (a downward deflection) the patient has a LBBB. For purposes of the prehospital setting, the presence of a LBBB may obscure the characteristic ECG appearance of an AMI. A LBBB may produce ST segment elevation in the absence of an AMI. The presence of a LBBB is treated as a new acute pathologic finding unless the patient has a known history of the same.

12-Lead Interpretation Reference Chart

Location of Event	Supplying Artery	Elevations	Possible Reciprocal Changes (depressions)
Septal	Posterior Descending Artery (PDA)	V1, V2	
Anterior	Left Anterior Descending Artery (LAD)	V3, V4	II, III, AVF
Lateral	Left Circumflex (LCA)	I, aVL, V5, V6	
Inferior	Right Coronary Artery (RCA)	II, III, aVF	I, aVL, V1, V2, V3
Right	Proximal RCA	V4R	
Posterior	Posterior Descending Artery (PDA)	V7, V8, V9	V1, V2, V3 (ST depression in these leads warrants the conduction of a Posterior 12-Lead ECG)



Common Beta Blockers

Brand	Generic
Sectral	Acebutol
Tenormin	Atenolol
Kerlone	Betaxolol
Ziac	Bisoprolol/Hydrochlorothiazide
Coreg	Carvedilol
Normodyne	Labetolol
Trandate	Labetolol
Lopressor	Metoprolol
Toprol-XL	Metoprolol
Corgard	Nadolol
Levatol	Penbutolol
Inderal	Propanolol
InnoPran XL	Propanolol
Blocadren	Timolol

Common Calcium Channel Blockers

Brand	Generic
Cardizem	Diltiazem
Dilacor XR	Diltiazem
Tiazac	Diltiazem
Norvasc	Amlodipine
Lotrel	Amlodipine/Benazepril
Plendil	Felodipine
Lexxel	Felodipine/Enalapril
DynaCirc	Isradipine
Cardene	Nicardipine
Adalat CC	Nifedipine
Procardia XL	Nifedipine
Sular	Nisoldipine
Calan	Verapamil
Covera-HS	Verapamil
Isoptin SR	Verapamil
Verelan	Verapamil
Tarka	Verapamil/Trandolapril

Common Phenothiazines

Brand	Generic
Thorazine	Chlorpromazine
Chlor-PZ	Chlorpromazine
Klorazine	Chlorpromazine
Promachlor	Chlorpromazine
Sonazine	Chlorpromazine
Promanyl	Chlorpromazine
Duraclon	Fluphenazine
Prolixin	Fluphenazine
Nozinan	Methotrimeprazine
Levoprome	Methotrimeprazine
Serentil	Mesoridazine
Etrafon	Perphenazine
Trilafon	Perphenazine
Phenazine	Perphenazine
Compazine	Prochlorperazine
Anectine	Promazine
Sparine	Promazine
Phenergan	Promethazine
Promethegan	Promethazine
Prothiazine	Promethazine
Romergan	Promethazine
Fargan	Promethazine
Mellaril	Thioridazine
Novoridazine	Thioridazine
Stelazine	Trifluoperazine
Clinazine	Triflupromazine
Pentazine	Triflupromazine
Terfluzine	Triflupromazine
Triflurin	Triflupromazine
Vesprin	Triflupromazine

Common Tricyclic Antidepressants

Brand	Generic
Endep	Amitriptyline
Asendin	Amoxapine
Norpramin	Desipramine
Sinequan	Doxepin
Zonalon	Doxepin
Tofranil	Imipramine
Tofranil-PM	Imipramine
Ludiomil	Maprotiline
Aventyl	Nortriptyline
Pamelor	Nortriptyline
Vivactil	Protriptyline
Surmontil	Trimipramine

Notification Summary

Situation	Who notifies	Who is notified	How	Time frame
Abuse, Neglect, Exploitation	Provider	EMS Supervisor, Attending MD at ED, APS or CPS	Phone/radio, In person Phone	On scene At ED After call
Adverse event, medical practice violation, patient care concern, or patient injury, to include all incidences of dropped cots with patient aboard	All Personnel	EMS Supervisor (DC-EMS if involving ranks above Captain I)	Phone/In person	ASAP after event
Any medication or advanced airway error, death/deterioration of any restrained patient, unexpected death/ deterioration during transport, or adverse event during ED diversion/ closures or interfacility transport	Provider EMS Supervisor	EMS Supervisor OMD & DC-EMS	Phone/radio Phone/In person	ASAP after event On notification
Complex Refusals	Provider	EMS Supervisor	Phone/radio	On scene
Controlled Medication Discrepancy	Provider EMS Supervisor	EMS Supervisor BC-EMS	Phone/radio Phone/In person	On discovery On notification
Cyanokit Administration	Ems Supervisor	OMD & DC-EMS	Email	Within 24hrs
ECO (Medical or Mental)	Provider	EMS Supervisor	Phone/radio	On scene
ED Equipment Room Contamination	Provider	ED Staff EMS Supervisor/SAFO	In person Phone/radio	On discovery If no change after notifying ED
Equipment Leaving County (e.g. to WHC)	Provider EMS Supervisor	EMS Supervisor EMS Regulatory Officer	Phone/radio Phone/In person	After Transfer of Care If unable to retrieve
Extraordinary Care	Provider EMS Supervisor	EMS Supervisor OMD	Phone/radio Phone	On scene After Transfer of Care
Flame impingement	Provider EMS Supervisor	EMS Supervisor FM	In person/phone/radio Phone/radio	ASAP ASAP
Hoarding (EMS-related)	Provider	EMS Supervisor Hoarding Task Force	Phone/radio Phone	On scene After call
Hunting accident	Provider EMS Supervisor	EMS Supervisor State Authority	Phone/radio 804-367-1258/2251	ASAP ASAP
Inability to Follow Orders	Provider	OLMD EMS Supervisor&OMD	Phone/radio In person	On scene Within 24hrs
Investigation	Ems Supervisor	Affected Providers	In person	Timely manner
Monitor/Defib, Cot, Stairchair Problem	Provider	EMS Supervisor	Phone/radio	On discovery
Needle Cricothyrotomy	Provider EMS Supervisor	EMS Supervisor OMD & DC-EMS	Phone/radio Phone/In person	On scene Within 24hrs
Suspected or Witnessed Domestic Violence (PD not on scene)	Provider	PD Attending MD at ED	Radio In person	ASAP At ED
Transportation of Deceased	Provider	EMS Supervisor	Phone/radio	On scene
Workplace fatality/inj.	Provider	VOSH	Phone 703-392-0900	ASAP